



Audi

Audi AG, a member of the Volkswagen Group

Application for Emissions Certification Part 1 2016 Model Year

Durability Group: GVGAGPGENAUF

Evap. Families: GVGAR0140AA1

Test Group: GVGAJ02.0AUF

Certificate Number: GVGAJ02.0AUF-xxx

Durability Group Description: Four Stroke, Otto Cycle, Flex Fuel (Ethanol), Direct Fuel Injection, Catalyst Code: TEX 0442

Test group Description: 2.0 Liter Turbocharged I-4 longitude – LDV
(E85 Flexible-Fuel Vehicle)

Applicable Standards: 50-State: Federal: Tier 2 BIN 5
CA: LEV-II ULEV

Carlines Covered: A4 quattro, allroad quattro, Audi A5 quattro,
A5 Cabriolet quattro, Q5

Vehicles Tested:

VID	Config.	Test Type / #		Test Type / #	
B3UB-Q5A	0	FTP	DADX10021373	HFET /	DADX10021451
B3UB-Q5A	0	US06 /	DADX10021372	SC03 /	DADX10021369
B3UB-Q5A	0	Cold CO /	DADX10021370	50°F FTP /	DADX10021376
B3UB-Q5A	1	FTP /	DADX10022548	HFET /	DADX10022545
B3UB-Q5A	1	50°F FTP/	DADX10022547		
F3UB-Q5A	1	Cold CO /	EADX10025754		
DFUB-BAQ	3	ORVR /	DADX10022280		
DFUB-BAQ	3	2-Day /	DADX10022279		
DFUB-BAQ	3	3-Day /	DADX10022282	Running Loss/	DADX10022281

Issue Date: 05-28-2015

For Questions, Contact:

Michael Giles, (248) 754-4229
William Rodgers, (248) 754-4219
Gregory Allen, (248) 754-4209

Table of Contents – Part 1

Section 01 -	Correspondence and Communications	- see Common Sections
Section 02 -	Durability Group Description	- see Common Sections
Section 03 -	Evaporative/Refueling Family Description	- see Common Sections
Section 04 -	Durability Procedure Description	- see Common Sections
Section 05 -	Test Group Description	
Section 06 -	Test Vehicle Description	
Section 07 -	Test Results	
Section 08 -	Emission Testing Waiver Statements	
Section 09 -	OBD System Description	
Section 10 -	Description of Alternate-fueled Vehicles	- Not Applicable
Section 11 -	AECD Description	
Section 12 -	Description of vehicles covered by certificate and test parameters	
Section 13 -	Projected Sales	
Section 14 -	Request for Certificate	
Section 15 -	Other Information	
Section 16 -	Confidential Information	
Section 17 -	California ARB Information	

Section 5	Pg. 1	Test Group Description	Engine Code	R.CH-No.:	Revision Date
Test Group		GVGAJ02.0AUF	all		

5.1 Test Group Description

Test Group Name	GVGAJ02.0AUF
Certificate Number	GVGAJ02.0AUF-xxx
Engine displacements covered	2.0 liters
Arrangement and number of cylinders	I-4 longitude
Vehicle class(es) covered	LDV – E85 Flexible-Fuel Vehicle
Federal Emissions Standards Class	Tier 2 BIN 5
California Emissions Standards Class	LEV-II ULEV

5.2 Test Group Emission Standards

Please refer to Certification Summary Information Report included in Section 7 for applicable emission standards.

5.3 Test Group Cold NMHC Emission Standards

In accordance with §86.1811-10, all vehicles of this test groups are part of the Cold NMHC phase in and are certified to fulfill the following family emission limits (FEL):
Certification FEL = 0.3 g/mi

Section 6	Pg. 1	Test Vehicle Description	Engine Code	R.CH-No.:	Revision Date
Test Group		GVGAJ02.0AUF	all		

6. Test Vehicle Description

Please refer to included Certification Summary Information Report for the following vehicles:

Certificate Number: GVGAJ02.0AUF-xxx
Test Group: GVGAJ02.0AUF
Evaporative/Refueling Family: GVGAR0140AA1

VID	Config.	Vehicle Type	Tests Performed
DFUB-Q5A	0	Cert. Emission	FTP, HFET, Cold CO, US06, SC03
DFUB-Q5A	0	Cert. Emission	CST, 50°F FTP
DFUB-Q5A	1	Cert. Emission	FTP, HFET, 50°F FTP (E85)
EFUB-Q5A	1	Cert. Emission	Cold CO (E85)
DFUB-BAA	0	Fuel Economy	FTP, HFET, Cold CO, US06, SC03
DFUB-BAA	1	Fuel Economy	FTP, HFET (E85)
DFUB-BAQ	0	Fuel Economy	FTP, HFET, US06, SC03, Cold CO
DFUB-BAQ	1	Fuel Economy	FTP, HFET, US06, SC03, Cold CO
DFUB-BAQ	2	Fuel Economy	FTP, HFET (E85)
DFUB-BAQ	3	Fuel Economy	FTP, HFET (E85)
DFUB-BAQ	4	Cert. Emission	ORVR
DFUB-BAQ	4	Cert. Emission	2-Day, 3-Day, R/L

Section 7	Pg. 1	Test Results	Engine Code	R.CH-No.:	Revision Date
Test Group		GVGAJ02.0AUF	all		

7. Test Results

Please refer to included EPA Certification Summary Information Report.

Certificate Number:	GVGAJ02.0AUF-xxx
Combination of:	
Test Group:	GVGAJ02.0AUF
EVAP/Refueling Family:	GVGAR0140AA1

Certification Summary Information Report

Manufacturer	Volkswagen Group of America, Inc.	Manufacturer Code	VGA
Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1
Certificate Number	N/A	CARB Executive Order #	N/A
Certificate Issue Date	N/A	Certificate Revision Date	N/A
Certificate Effective Date	N/A	Conditional Certificate	--
CSI Revision #	N/A	CSI Submission/Revision Date	05/28/2015
Model Year	2016		

Test Group Information

CSI Type	New	Running Change Reference Number	N/A
GHG Exempt Status	Not Exempt		

Drive Sources and Fuel(s)

Drive Source #1: Combustion Engine

Fuel	Basic Fuel Metering System	Lean Burn Strategy Indicator
Ethanol	Spark Ignition Direct fuel injection	N
Gasoline	Spark Ignition Direct fuel injection	N

Hybrid Indicator	No		
Multiple Fuel Storage	Fuels Stored Together	Rechargeable Energy Storage System Indicator	--
Multiple Fuel Combustion	Fuels Combusted Together	Off-board Charge Capable Indicator	--
Fuel Cell Indicator	--	EPA Vehicle Class	LDVT
Federal Clean Fuel Vehicle	No	Federal Clean Fuel Vehicle Standard	--
Federal Clean Fuel Vehicle ILEV	No	California Partial Zero Emissions Vehicle Indicator	No
Durability Group Name	GVGAGPGENAUF	Durability Group Equivalency Factor	1
Reduced Fee Test Group	No	Certification Region Code(s)	FA, CA
Complies with HD GHG 2b/3 regulations?	No		
Introduction into Commerce Date	--	CAP2000 Conditional Certificate?	N/A
Independent Commercial Importer?	--	Alternative Fuel Converter Certificate?	--
SFTP Federal Composite Compliance Identifier	Tier 2	SFTP Tier 2 Composite CO Option	No
SFTP LEV-III Composite Compliance Indicator	No		
OBD Compliance Type	CARB	OBD Demonstration Vehicle Test Group	FVGAJ02.0AUF
Mfr Test Group Comments	Carry over test group from 2015 model year.		
Mfr Exhaust / Evap Standards Comments	--		

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1				
Evaporative/Refueling Family Information							
Evaporative Summary Information Type	New	Submission/Correction Date	09/05/2014				
Integrated ORVR?	Yes	Fuel(s)	Gasoline,Ethanol				
Multiple Fuel Storage	Fuels Stored Together						
Bladder Fuel Tank?	No						
Fuel Tank Material	Plastic	Fuel Tank Material Description	HDPE+EVOH				
Fill Pipe Seal Type	Liquid seal						
Air Intake System Vapor Storage Device?	No	Air Intake System Vapor Storage Device Description	N/A				
Fuel System Vapor Storage Canister?	Yes	Other Vapor Storage	N/A				
Fuel System Vapor Storage Canister(s) Total Working Capacity (grams)	140	Number of Primary Canisters	1				
Number of Bleed Canisters	0	Bleed Canister Total Working Capacity (grams)	N/A				
Mfr Evaporative/Refueling Family Comments	E85 Flex Fuel Evap family FVGAR0140AA1						
Leak Family Details							
Leak Family Indicator	--						
Canister Bleed Test Indicator	--	Applicability of Evaporative Canister Bleed Test	--				
Evaporative Canister Bleed Test Comments	--						
CARB Fuel Only (Rig) Test Indicator	--	Applicability of CARB Fuel Only (Rig) Test	--				
CARB Fuel Only (Rig) Test Comments	--						
Models Covered by this Certificate							
Carline Manufacturer	Division	Carline	Certification Region Code(s)	Drive System	Trans - Type	- # of Gears	Trans - Lockup
Volkswagen Group of America, Inc.	2 - Audi	26 - allroad quattro	California + CAA Section 177 states	All Wheel Drive	Semi-Automatic	8	Yes
Volkswagen Group of America, Inc.	2 - Audi	53 - A5 Cabriolet quattro	California + CAA Section 177 states	All Wheel Drive	Semi-Automatic	8	Yes
Volkswagen Group of America, Inc.	2 - Audi	330 - Q5	Federal	All Wheel Drive	Semi-Automatic	8	Yes
Volkswagen Group of America, Inc.	2 - Audi	330 - Q5	California + CAA Section 177 states	All Wheel Drive	Semi-Automatic	8	Yes
Volkswagen Group of America, Inc.	2 - Audi	20 - A4 quattro	California + CAA Section 177 states	All Wheel Drive	Semi-Automatic	8	Yes
Volkswagen Group of America, Inc.	2 - Audi	26 - allroad quattro	Federal	All Wheel Drive	Semi-Automatic	8	Yes
Volkswagen Group of America, Inc.	2 - Audi	53 - A5 Cabriolet quattro	Federal	All Wheel Drive	Semi-Automatic	8	Yes
Volkswagen Group of America, Inc.	2 - Audi	20 - A4 quattro	Federal	All Wheel Drive	Semi-Automatic	8	Yes
Volkswagen Group of America, Inc.	2 - Audi	40 - A5 quattro	California + CAA Section 177 states	All Wheel Drive	Semi-Automatic	8	Yes
Volkswagen Group of America, Inc.	2 - Audi	40 - A5 quattro	Federal	All Wheel Drive	Semi-Automatic	8	Yes

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1							
Engine Description										
Hybrid Type	--	Hybrid Description	--							
Engine Type	4-Stroke Spark Ignition	Mfr Engine Description	--							
Engine Block Arrangement	Inline	Mfr Engine Block Arrangement Description	--							
Camless Valvetrain Indicator	No	Oil Viscosity/Classification	5W40 VW 50200							
Number of Cylinders/Rotors	4									
After Treatment Device(s) (ATD)										
ATD Number	ATD Type	ATD Precious Metal	Substrate Material							
1	Three-way catalyst	Paladium + Rhodium	Ceramic							
Substrate Construction										
Monolith										
Mfr After Treatment Device (ATD) Comments										
--										
Direct Ozone Reduction (DOR) Device										
Not Equipped										
Mfr Emission Control Device Comments										
--										
Engine Configuration Number 1										
Engine Displacement (liters)	2.0	Engine Rated Horsepower	220							
Number of Inlet Valves Per Cylinder	2	Number of Exhaust Valves Per Cylinder	2							
Air Aspiration Method	Turbocharged	Number of Air Aspiration Devices	1							
Air Aspiration Device Configuration	Single	Charge Air Cooler Type	Air							
Cylinder Deactivation Description	N/A									
Variable Valve Timing System Description	CONTINUOUS VARIABLE VALVE TIMING FOR INTAKE / EXHAUST	Variable Valve Lift System	AUDI VALVE LIFT SYSTEM FOR EXHAUST							
Number of Knock Sensors	2									
Air/Fuel Sensor # 1 Type	Heated oxygen	Air/Fuel Sensor # 1 Description	N/A							
Air/Fuel Sensor # 2 Type	Heated oxygen	Air/Fuel Sensor # 2 Description	N/A							
Mfr Air/Fuel Sensor Comments	--									
Exhaust Gas Recirculation	Yes	EGR Type	Variable Valve Timing Control							
Cooled Exhaust Gas Recirculation	No									
Closed Loop Air Injection System	No	Air Injection Type	--							
Mfr Engine Configuration Comments	Engine Code: CPMB									
Official Test Numbers										
Test Group	FTP	US06	SC03	Cold CO	Highway	EPA City Litmus Value	EPA City Litmus Threshold	EPA Highway Litmus Value	EPA Highway Litmus Threshold	CREE Weighting Factor
Gasoline	DADX10021373	DADX10021372	DADX10021369	DADX10021370	DADX10021451	19.7	18.9	28.2	26.2	0.5
Ethanol	DADX10022548	--	--	EADX10025754	DADX10022545	N/A	N/A	--	N/A	0.5

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1
-------------------	--------------	-------------------------------------	--------------

Emission Data Vehicle Information

Vehicle ID / Configuration DFUB-BAQ / 3

Vehicle Model

Represented Test Vehicle Make AUDI **Represented Test Vehicle Model** A5

Leak Family Details

Leak Family Identifier -- **Leak Family Name** --

Drive Sources and Fuel System Details

Drive Source and Fuel#	Drive Source	Fuel
1	Combustion Engine	Ethanol, Gasoline

Hybrid Indicator N

Multiple Fuel Storage Fuels Stored Together **Multiple Fuel Combustion** Fuels Combusted Together

Fuel Cell Indicator -- **Rechargeable Energy Storage System Indicator** --

Rechargeable Energy Storage System -- **Rechargeable Energy Storage System, if 'Other'** --

Off-board charge Capable Indicator --

Transmission Type Semi-Automatic **# of Transmission Gears** 8

Engine Code CPMA **Axle Ratio** 2.85

Displacement (liters) 1.984 **Rated Horsepower** 211

Equivalent Test Weight (pounds) 4250 **Air Aspiration Method** Turbocharged

Drive Mode While Testing 2-Wheel Drive, Front **SIL Usage** Not equipped

Aged Emission Components 4,000 (mi)

Dynamometer Coefficients:

Coefficient Category	Target Coefficients			Set Coefficients			EPA Calculated Total Road Load Horse Power for City/Highway/Evap Coefficients
	A (lbf)	B (lbf/mph)	C (lbf/mph**2)	A (lbf)	B (lbf/mph)	C (lbf/mph**2)	
City/Highway/Evap	40.016	0.46662	0.018391	3.417	0.51364	0.016878	14.6
Cold CO	44.018	0.51328	0.02023	3.759	0.565	0.018566	N/A
US06	40.016	0.46662	0.018391	3.417	0.51364	0.016878	N/A

Manufacturer Test Vehicle Comments MY 2013 AUDI A5 tested as A5 Cabrio quattro FFV-E85 with Automatic 8 speed - ETW: 4250

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1											
Test #	DADX10022279	Test Procedure	23 - 2-day evap											
Exhaust Test # for this Evap Test	DADX10022276	Test Fuel Type	37 - E10 (10% Ethanol 90% EPA Unleaded Gasoline)											
Test Date	02/21/2012	Fuel	Ethanol											
Vehicle Class	N/A	DF Type	Mfr. Determined											
Verify Test Lab ID	Audi Ingolstadt													
E10 Evaporative Test Measurement Method	--													
Test Results														
<table border="1"> <tr> <td>Test Result Name</td> <td>Unrounded Test Result</td> <td>Verify Calculated FE MPG Equivalent Value</td> </tr> <tr> <td>Organic material Hydrocarbon Equivalent</td> <td>0.349</td> <td>--</td> </tr> </table>				Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value	Organic material Hydrocarbon Equivalent	0.349	--					
Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value												
Organic material Hydrocarbon Equivalent	0.349	--												
Manufacturer Test Comments														
4k FED. FUEL 2-DAY EVAP TEST - Tested as AUDI A5 Cabrio quattro Convertible 2 dr. FEDV - ETW: 4250														
Certification Region	Useful Life	Standard Level	Emission Name	Rounded Result	Add DF	Certification Level	Standard	Pass/Fail						
Fed	120,000 miles	Federal LEV-II Evap	OMHCE	0.3490	0.041	0.390	0.650	Pass						
CA	150,000 miles	California LEV-II Evap	OMHCE	0.3490	0.041	0.390	0.650	Pass						
Test #														
DADX10022282														
Exhaust Test # for this Evap Test														
DADX10022278														
Test Date														
03/08/2012														
Vehicle Class														
N/A														
Verify Test Lab ID														
Audi Ingolstadt														
E10 Evaporative Test Measurement Method														
--														
Test Results														
<table border="1"> <tr> <td>Test Result Name</td> <td>Unrounded Test Result</td> <td>Verify Calculated FE MPG Equivalent Value</td> </tr> <tr> <td>Organic material Hydrocarbon Equivalent</td> <td>0.287</td> <td>--</td> </tr> </table>									Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value	Organic material Hydrocarbon Equivalent	0.287	--
Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value												
Organic material Hydrocarbon Equivalent	0.287	--												
Manufacturer Test Comments														
4k FED. FUEL 3-Day EVAP TEST - Tested as AUDI A5 Cabrio quattro Convertible 2 dr. FEDV - ETW: 4250														
Certification Region	Useful Life	Standard Level	Emission Name	Rounded Result	Add DF	Certification Level	Standard	Pass/Fail						
Fed	120,000 miles	Federal LEV-II Evap	OMHCE	0.2870	0.041	0.328	0.500	Pass						
CA	150,000 miles	California LEV-II Evap	OMHCE	0.2870	0.041	0.328	0.500	Pass						

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1											
Test #	DADX10022280	Test Procedure	24 - Federal fuel refueling test (ORVR)											
Exhaust Test # for this Evap Test	DADX10022277	Test Fuel Type	37 - E10 (10% Ethanol 90% EPA Unleaded Gasoline)											
Test Date	03/07/2012	Fuel	Ethanol											
Vehicle Class	N/A	DF Type	Mfr. Determined											
Verify Test Lab ID	Audi Ingolstadt													
E10 Evaporative Test Measurement Method	--													
Test Results														
<table border="1"> <tr> <th>Test Result Name</th> <th>Unrounded Test Result</th> <th>Verify Calculated FE MPG Equivalent Value</th> </tr> <tr> <td>Organic material Hydrocarbon Equivalent</td> <td>0.015</td> <td>--</td> </tr> </table>		Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value	Organic material Hydrocarbon Equivalent	0.015	--							
Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value												
Organic material Hydrocarbon Equivalent	0.015	--												
Manufacturer Test Comments														
4k FED. FUEL ORVR TEST - Tested as AUDI A5 Cabrio quattro Convertible 2 dr. FEDV - ETW: 4250														
Certification Region	Useful Life	Standard Level	Emission Name	Rounded Result	Add DF	Certification Level	Standard	Pass/Fail						
Fed	120,000 miles	Federal LEV-II Evap	OMHCE	0.0150	0.001	0.016	0.200	Pass						
CA	150,000 miles	California LEV-II Evap	OMHCE	0.0150	0.001	0.016	0.200	Pass						
Test #														
DADX10022281		Test Procedure		32 - Federal Fuel Running Loss										
Exhaust Test # for this Evap Test		DADX10022278		Test Fuel Type		37 - E10 (10% Ethanol 90% EPA Unleaded Gasoline)								
Test Date		03/08/2012		Fuel		Ethanol								
Vehicle Class		N/A		DF Type		Mfr. Determined								
Verify Test Lab ID		Audi Ingolstadt												
E10 Evaporative Test Measurement Method		--												
Test Results														
<table border="1"> <tr> <th>Test Result Name</th> <th>Unrounded Test Result</th> <th>Verify Calculated FE MPG Equivalent Value</th> </tr> <tr> <td>Organic material Hydrocarbon Equivalent</td> <td>0.009</td> <td>--</td> </tr> </table>		Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value	Organic material Hydrocarbon Equivalent	0.009	--							
Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value												
Organic material Hydrocarbon Equivalent	0.009	--												
Manufacturer Test Comments														
4k FED. FUEL RUNNING LOSS - Tested as AUDI A5 Cabrio quattro Convertible 2 dr. FEDV - ETW: 4250														
Certification Region	Useful Life	Standard Level	Emission Name	Rounded Result	Add DF	Certification Level	Standard	Pass/Fail						
Fed	120,000 miles	Federal LEV-II Evap	OMHCE	0.0090	0.001	0.010	0.050	Pass						
CA	150,000 miles	California LEV-II Evap	OMHCE	0.0090	0.001	0.010	0.050	Pass						

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1																																						
Emission Data Vehicle Information																																									
Vehicle ID / Configuration	DFUB-Q5A / 0																																								
Vehicle Model																																									
Represented Test Vehicle Make	AUDI	Represented Test Vehicle Model	Q5																																						
Leak Family Details																																									
Leak Family Identifier	--	Leak Family Name	--																																						
Drive Sources and Fuel System Details																																									
	<table border="1"> <tr> <th>Drive Source and Fuel#</th> <th>Drive Source</th> <th>Fuel</th> </tr> <tr> <td>1</td> <td>Combustion Engine</td> <td>Gasoline</td> </tr> </table>			Drive Source and Fuel#	Drive Source	Fuel	1	Combustion Engine	Gasoline																																
Drive Source and Fuel#	Drive Source	Fuel																																							
1	Combustion Engine	Gasoline																																							
Hybrid Indicator	N																																								
Multiple Fuel Storage	--	Multiple Fuel Combustion	--																																						
Fuel Cell Indicator	--	Rechargeable Energy Storage System Indicator	--																																						
Rechargeable Energy Storage System	--	Rechargeable Energy Storage System, if 'Other'	--																																						
Off-board charge Capable Indicator	--																																								
Transmission Type	Semi-Automatic	# of Transmission Gears	8																																						
Engine Code	CPMA	Axle Ratio	3.76																																						
Displacement (liters)	1.984	Rated Horsepower	211																																						
Equivalent Test Weight (pounds)	4500	Air Aspiration Method	Turbocharged																																						
Drive Mode While Testing	All Wheel Drive	SIL Usage	Not equipped																																						
Aged Emission Components	4,000 (mi)																																								
Dynamometer Coefficients:																																									
	<table border="1"> <thead> <tr> <th colspan="3">Target Coefficients</th> <th colspan="3">Set Coefficients</th> <th rowspan="2">EPA Calculated Total Road Load Horse Power for City/Highway/Evap Coefficients</th> </tr> <tr> <th>Coefficient Category</th> <th>A (lbf)</th> <th>B (lbf/mph)</th> <th>C (lbf/mph**2)</th> <th>A (lbf)</th> <th>B (lbf/mph)</th> <th>C (lbf/mph**2)</th> </tr> </thead> <tbody> <tr> <td>City/Highway/Evap</td> <td>35.969</td> <td>0.49555</td> <td>0.020079</td> <td>-15.512</td> <td>0.25682</td> <td>0.018624</td> <td>14.8</td> </tr> <tr> <td>Cold CO</td> <td>39.566</td> <td>0.54511</td> <td>0.022087</td> <td>-13.961</td> <td>0.02208</td> <td>0.020487</td> <td>N/A</td> </tr> <tr> <td>US06</td> <td>35.969</td> <td>0.49555</td> <td>0.020079</td> <td>-15.512</td> <td>0.25682</td> <td>0.018624</td> <td>N/A</td> </tr> </tbody> </table>			Target Coefficients			Set Coefficients			EPA Calculated Total Road Load Horse Power for City/Highway/Evap Coefficients	Coefficient Category	A (lbf)	B (lbf/mph)	C (lbf/mph**2)	A (lbf)	B (lbf/mph)	C (lbf/mph**2)	City/Highway/Evap	35.969	0.49555	0.020079	-15.512	0.25682	0.018624	14.8	Cold CO	39.566	0.54511	0.022087	-13.961	0.02208	0.020487	N/A	US06	35.969	0.49555	0.020079	-15.512	0.25682	0.018624	N/A
Target Coefficients			Set Coefficients			EPA Calculated Total Road Load Horse Power for City/Highway/Evap Coefficients																																			
Coefficient Category	A (lbf)	B (lbf/mph)	C (lbf/mph**2)	A (lbf)	B (lbf/mph)		C (lbf/mph**2)																																		
City/Highway/Evap	35.969	0.49555	0.020079	-15.512	0.25682	0.018624	14.8																																		
Cold CO	39.566	0.54511	0.022087	-13.961	0.02208	0.020487	N/A																																		
US06	35.969	0.49555	0.020079	-15.512	0.25682	0.018624	N/A																																		
Manufacturer Test Vehicle Comments	MY 2013 AUDI Q5 tested as Q5 SUV with Automatic 8 speed - ETW: 4500 Q5 tested as a Q5 4 dr. SUV - ETW: 4500																																								

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1
Test #	DADX10021370	Test Procedure	11 - Cold CO
Exhaust Test # for this Evap Test	N/A	Test Fuel Type	27 - Cold CO Premium (Tier 2)
Test Date	05/04/2012	Fuel	Gasoline
Vehicle Class	LDV/Passenger Car	DF Type	Mfr. Determined
Verify Test Lab ID	Audi Ingolstadt		
E10 Evaporative Test Measurement Method	--		

Test Results

Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value
Bag 1 Carbon Dioxide	582.7	--
Bag 1 Fuel Economy	15.2	15.2
Bag 2 Carbon Dioxide	440.3	--
Bag 2 Fuel Economy	20.3	20.3
Bag 3 Carbon Dioxide	375.6	--
Bag 3 Fuel Economy	23.8	23.8
CH4 - Methane	0.0134	--
Carbon Monoxide	0.86	--
Formaldehyde	0.0033	--
Manufacturer Fuel Economy	19.8	19.8
Nitrogen Oxide	0.048	--
Non-methane Hydrocarbon	0.11	--
Non-methane organic gas (California)	0.1144	--
Total Hydrocarbon	0.1263	--

Test Result Name	Unrounded Test Result	Verify Calculated CO2
Carbon dioxide	452	--

Manufacturer Test Comments

4k Cold-CO - Tested as AUDI Q5 SUV 4 dr. EDV - ETW: 4500

Certification Region	Useful Life	Standard Level	Emission Name	Rounded Result	RAF	NMOG/NM HC Ratio	Diesel Adjustment Factor	Add DF	Mult DF	Certification Level	Standard	Pass/Fail
Fed	50,000 miles	Federal Tier 2 Bin 5	CO	0.860	--	--	--	0.015	--	0.88	10.00	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	HC-NM	0.110	--	--	--	0.0141	--	0.12	0.30	Pass
CA	50,000 miles	California LEV-II ULEV	CO	0.860	--	--	--	0.015	--	0.88	10.00	Pass

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1
Test #	DADX10021373	Test Procedure	21 - Federal fuel 2-day exhaust (w/can load)
Exhaust Test # for this Evap Test	N/A	Test Fuel Type	61 - Tier 2 Cert Gasoline
Test Date	05/22/2012	Fuel	Gasoline
Vehicle Class	LDV/Passenger Car	DF Type	Mfr. Determined
Verify Test Lab ID	Audi Ingolstadt		
E10 Evaporative Test Measurement Method	--		

Test Results

Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value
Bag 1 Carbon Dioxide	371.8	--
Bag 1 Fuel Economy	23.8	23.8
Bag 2 Carbon Dioxide	362.6	--
Bag 2 Fuel Economy	24.5	24.5
Bag 3 Carbon Dioxide	337.2	--
Bag 3 Fuel Economy	26.3	26.3
CH4 - Methane	0.0036	--
Carbon Monoxide	0.46	--
Formaldehyde	0.0007	--
Manufacturer Fuel Economy	24.8	24.8
Nitrogen Oxide	0.026	--
Nitrous Oxide	0.01	--
Non-methane Hydrocarbon	0.0223	--
Non-methane organic gas (California)	0.0232	--
Particulate Matter	0.003	--
Total Hydrocarbon	0.0254	--

Test Result Name	Unrounded Test Result	Verify Calculated CREE/OPT-CREE
Carbon-Related Exhaust Emissions	359	359
Optional Carbon-Related Exhaust Emissions	362	362

Test Result Name	Unrounded Test Result	Verify Calculated CO2
Carbon dioxide	358	--

Manufacturer Test Comments

Re-Test FTP 4k FED. FUEL FTP - Tested as AUDI Q5 SUV 4 dr. EDV - ETW: 4500

Certification Summary Information Report

Test Group		GVGAJ02.0AUF			Evaporative/Refueling Family					GVGAR0140AA1		
Certification Region	Useful Life	Standard Level	Emission Name	Rounded Result	RAF	NMOG/NM HC Ratio	Diesel Adjustment Factor	Add DF	Mult DF	Certification Level	Standard	Pass/Fail
Fed	50,000 miles	Federal Tier 2 Bin 5	CO	0.460	--	--	--	0.310	--	0.77	3.40	Pass
Fed	50,000 miles	Federal Tier 2 Bin 5	HCHO	0.00070	--	--	--	0.0002	--	0.0009	0.0150	Pass
Fed	50,000 miles	Federal Tier 2 Bin 5	NMOG	0.02320	1	1.04	--	0.0059	--	0.0291	0.0750	Pass
Fed	50,000 miles	Federal Tier 2 Bin 5	NOX	0.0260	--	--	--	0.0150	--	0.041	0.050	Pass
Fed	50,000 miles	Federal Tier 2 Bin 5	PM	0.0030	--	--	--	0.0010	--	0.004	0.010	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	CO	0.460	--	--	--	0.730	--	1.19	4.20	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	CREE	359	--	--	--	1.2	--	360	--	--
Fed	120,000 miles	Federal Tier 2 Bin 5	HC-NM+NOX-COMP	0.0896	--	--	--	--	--	0.090	0.630	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	HCHO	0.00070	--	--	--	0.0004	--	0.0011	0.0180	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	METHANE	0.00360	--	--	--	0.004	--	0.0076	0.0300	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	N2O	0.0100	--	--	--	0.0	--	0.010	0.010	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	NMOG	0.02320	1	1.04	--	0.0141	--	0.0373	0.0900	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	NOX	0.0260	--	--	--	0.0370	--	0.063	0.070	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	OPT-CREE	362	--	--	--	1.3	--	363	--	--
Fed	120,000 miles	Federal Tier 2 Bin 5	PM	0.0030	--	--	--	0.0010	--	0.004	0.010	Pass
CA	50,000 miles	California LEV-II ULEV	CO	0.460	--	--	--	0.310	--	0.77	1.70	Pass
CA	50,000 miles	California LEV-II ULEV	HCHO	0.00070	--	--	--	0.0002	--	0.0009	0.0080	Pass
CA	50,000 miles	California LEV-II ULEV	NMOG	0.02320	1	1.04	--	0.0059	--	0.0291	0.0400	Pass
CA	50,000 miles	California LEV-II ULEV	NOX	0.0260	--	--	--	0.0150	--	0.041	0.050	Pass
CA	120,000 miles	California LEV-II ULEV	CO	0.460	--	--	--	0.730	--	1.19	2.10	Pass
CA	120,000 miles	California LEV-II ULEV	HCHO	0.00070	--	--	--	0.0004	--	0.0011	0.0110	Pass
CA	120,000 miles	California LEV-II ULEV	NMOG	0.02320	1	1.04	--	0.0141	--	0.0373	0.0550	Pass

Certification Summary Information Report

Test Group		GVGAJ02.0AUF			Evaporative/Refueling Family				GVGAR0140AA1			
Certification Region	Useful Life	Standard Level	Emission Name	Rounded Result	RAF	NMOG/NM HC Ratio	Diesel Adjustment Factor	Add DF	Mult DF	Certification Level	Standard	Pass/Fail
CA	120,000 miles	California LEV-II ULEV	NOX	0.0260	--	--	--	0.0370	--	0.063	0.070	Pass
CA	120,000 miles	California LEV-II ULEV	PM	0.0030	--	--	--	0.0010	--	0.004	0.010	Pass

NOTE: For Non-charge depleting tests, the Rounded Result for CREE/OPT-CREE Emission names are Verify-calculated values.

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1
Test #	DADX10021376	Test Procedure	52 - Fed. fuel 50 F exh.
Exhaust Test # for this Evap Test	N/A	Test Fuel Type	61 - Tier 2 Cert Gasoline
Test Date	05/08/2012	Fuel	Gasoline
Vehicle Class	LDV/Passenger Car	DF Type	Mfr. Determined
Verify Test Lab ID	Audi Ingolstadt		
E10 Evaporative Test Measurement Method	--		

Test Results

Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value
Bag 1 Carbon Dioxide	429.2	--
Bag 1 Fuel Economy	20.6	20.6
Bag 2 Carbon Dioxide	390.593	--
Bag 2 Fuel Economy	22.7	22.7
Bag 3 Carbon Dioxide	344.52	--
Bag 3 Fuel Economy	25.8	25.8
CH4 - Methane	0.0074	--
Carbon Monoxide	0.46	--
Formaldehyde	0.0016	--
Manufacturer Fuel Economy	23	23
Nitrogen Oxide	0.037	--
Non-methane Hydrocarbon	0.0536	--
Non-methane organic gas (California)	0.0557	--
Total Hydrocarbon	0.06	--

Test Result Name	Unrounded Test Result	Verify Calculated CO2
Carbon dioxide	386	--

Manufacturer Test Comments

BAG CO2 values corrected. 4k FED. FUEL 50°F FTP - Tested as AUDI Q5 SUV 4 dr. EDV - ETW: 4500

Certification Region	Useful Life	Standard Level	Emission Name	Rounded Result	RAF	NMOG/NM HC Ratio	Diesel Adjustment Factor	Add DF	Mult DF	Certification Level	Standard	Pass/Fail
CA	4,000 miles	California LEV-II ULEV	CO	0.460	--	--	--	--	--	0.46	1.70	Pass
CA	4,000 miles	California LEV-II ULEV	HCHO	0.00160	--	--	--	--	--	0.0016	0.0160	Pass
CA	4,000 miles	California LEV-II ULEV	NMOG	0.05570	1	1.04	--	--	--	0.0557	0.0800	Pass
CA	4,000 miles	California LEV-II ULEV	NOX	0.0370	--	--	--	--	--	0.037	0.050	Pass

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1																														
Test #	DADX10021451	Test Procedure	3 - HWFE																														
Exhaust Test # for this Evap Test	N/A	Test Fuel Type	61 - Tier 2 Cert Gasoline																														
Test Date	05/28/2012	Fuel	Gasoline																														
Vehicle Class	LDV/Passenger Car	DF Type	Mfr. Determined																														
Verify Test Lab ID	Audi Ingolstadt																																
E10 Evaporative Test Measurement Method	--																																
Test Results																																	
<table border="1"> <thead> <tr> <th>Test Result Name</th> <th>Unrounded Test Result</th> <th>Verify Calculated FE MPG Equivalent Value</th> </tr> </thead> <tbody> <tr> <td>CH4 - Methane</td> <td>0.003</td> <td>--</td> </tr> <tr> <td>Carbon Monoxide</td> <td>0.11</td> <td>--</td> </tr> <tr> <td>Formaldehyde</td> <td>0.0001</td> <td>--</td> </tr> <tr> <td>Manufacturer Fuel Economy</td> <td>38.6</td> <td>38.6</td> </tr> <tr> <td>Nitrogen Oxide</td> <td>0.006</td> <td>--</td> </tr> <tr> <td>Nitrous Oxide</td> <td>0.01</td> <td>--</td> </tr> <tr> <td>Non-methane Hydrocarbon</td> <td>0.0048</td> <td>--</td> </tr> <tr> <td>Non-methane organic gas (California)</td> <td>0.005</td> <td>--</td> </tr> <tr> <td>Total Hydrocarbon</td> <td>0.0073</td> <td>--</td> </tr> </tbody> </table>				Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value	CH4 - Methane	0.003	--	Carbon Monoxide	0.11	--	Formaldehyde	0.0001	--	Manufacturer Fuel Economy	38.6	38.6	Nitrogen Oxide	0.006	--	Nitrous Oxide	0.01	--	Non-methane Hydrocarbon	0.0048	--	Non-methane organic gas (California)	0.005	--	Total Hydrocarbon	0.0073	--
Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value																															
CH4 - Methane	0.003	--																															
Carbon Monoxide	0.11	--																															
Formaldehyde	0.0001	--																															
Manufacturer Fuel Economy	38.6	38.6																															
Nitrogen Oxide	0.006	--																															
Nitrous Oxide	0.01	--																															
Non-methane Hydrocarbon	0.0048	--																															
Non-methane organic gas (California)	0.005	--																															
Total Hydrocarbon	0.0073	--																															
<table border="1"> <thead> <tr> <th>Test Result Name</th> <th>Unrounded Test Result</th> <th>Verify Calculated CREE/OPT-CREE</th> </tr> </thead> <tbody> <tr> <td>Carbon-Related Exhaust Emissions</td> <td>230</td> <td>230</td> </tr> <tr> <td>Optional Carbon-Related Exhaust Emissions</td> <td>233</td> <td>233</td> </tr> </tbody> </table>				Test Result Name	Unrounded Test Result	Verify Calculated CREE/OPT-CREE	Carbon-Related Exhaust Emissions	230	230	Optional Carbon-Related Exhaust Emissions	233	233																					
Test Result Name	Unrounded Test Result	Verify Calculated CREE/OPT-CREE																															
Carbon-Related Exhaust Emissions	230	230																															
Optional Carbon-Related Exhaust Emissions	233	233																															
<table border="1"> <thead> <tr> <th>Test Result Name</th> <th>Unrounded Test Result</th> <th>Verify Calculated CO2</th> </tr> </thead> <tbody> <tr> <td>Carbon dioxide</td> <td>230</td> <td>--</td> </tr> </tbody> </table>				Test Result Name	Unrounded Test Result	Verify Calculated CO2	Carbon dioxide	230	--																								
Test Result Name	Unrounded Test Result	Verify Calculated CO2																															
Carbon dioxide	230	--																															
Manufacturer Test Comments	Re-Test Hwy MFR CONFIRMATORY RETEST - 4k HWFET - Tested as AUDI Q5 SUV 4 dr. EDV - ETW: 4500																																

Certification Summary Information Report

Test Group		GVGAJ02.0AUF			Evaporative/Refueling Family					GVGAR0140AA1		
Certification Region	Useful Life	Standard Level	Emission Name	Rounded Result	RAF	NMOG/NM HC Ratio	Diesel Adjustment Factor	Add DF	Mult DF	Certification Level	Standard	Pass/Fail
Fed	50,000 miles	Federal Tier 2 Bin 5	NOX	0.0060	--	--	--	0.0120	--	0.018	0.070	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	CREE	230	--	--	--	1.2	--	231	--	--
Fed	120,000 miles	Federal Tier 2 Bin 5	NOX	0.0060	--	--	--	0.0280	--	0.034	0.090	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	OPT-CREE	233	--	--	--	1.3	--	234	--	--
CA	50,000 miles	California LEV-II ULEV	NOX	0.0060	--	--	--	0.0120	--	0.018	0.070	Pass
CA	120,000 miles	California LEV-II ULEV	NOX	0.0060	--	--	--	0.0280	--	0.034	0.090	Pass

NOTE: For Non-charge depleting tests, the Rounded Result for CREE/OPT-CREE Emission names are Verify-calculated values.

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1
Test #	DADX10021372	Test Procedure	90 - US06
Exhaust Test # for this Evap Test	N/A	Test Fuel Type	61 - Tier 2 Cert Gasoline
Test Date	05/11/2012	Fuel	Gasoline
Vehicle Class	LDV/Passenger Car	DF Type	Mfr. Determined
Verify Test Lab ID	Audi Ingolstadt		
E10 Evaporative Test Measurement Method	--		

Test Results

Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value
Bag 1 Carbon Dioxide	572.2	--
Bag 1 Fuel Economy	15.4	15.4
Bag 2 Carbon Dioxide	292.9	--
Bag 2 Fuel Economy	30.3	30.3
CH4 - Methane	0.005	--
Carbon Monoxide	0.71	--
Formaldehyde	0.0003	--
Manufacturer Fuel Economy	25	25
Nitrogen Oxide	0.03	--
Non-methane Hydrocarbon	0.0093	--
Non-methane organic gas (California)	0.0097	--
Particulate Matter	0	--
SFTP Non-methane Hydrocarbon + Nitrogen Oxides for US06 or SC03	0.0393	--
Total Hydrocarbon	0.0136	--

Test Result Name	Unrounded Test Result	Verify Calculated CO2
Carbon dioxide	355	--

Manufacturer Test Comments 4k US06 - Tested as AUDI Q5 SUV 4 dr. EDV - ETW: 4500

Certification Region	Useful Life	Standard Level	Emission Name	Rounded Result	RAF	NMOG/NM HC Ratio	Diesel Adjustment Factor	Add DF	Mult DF	Certification Level	Standard	Pass/Fail
Fed	4,000 miles	Federal Tier 2 Bin 5	CO	0.710	--	--	--	--	--	0.71	8.00	Pass
Fed	4,000 miles	Federal Tier 2 Bin 5	HC-NM+NOX	0.0393	--	--	--	--	--	0.039	0.140	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	CO	0.710	--	--	--	0.730	--	1.44	11.10	Pass
CA	4,000 miles	California LEV-II ULEV	CO	0.710	--	--	--	--	--	0.71	8.00	Pass
CA	4,000 miles	California LEV-II ULEV	HC-NM+NOX	0.0393	--	--	--	--	--	0.039	0.140	Pass

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1																														
Test #	DADX10021369	Test Procedure	95 - SC03																														
Exhaust Test # for this Evap Test	N/A	Test Fuel Type	61 - Tier 2 Cert Gasoline																														
Test Date	05/02/2012	Fuel	Gasoline																														
Vehicle Class	LDV/Passenger Car	DF Type	Mfr. Determined																														
Verify Test Lab ID	Audi Ingolstadt																																
E10 Evaporative Test Measurement Method	--																																
Test Results																																	
	<table border="1"> <thead> <tr> <th>Test Result Name</th> <th>Unrounded Test Result</th> <th>Verify Calculated FE MPG Equivalent Value</th> </tr> </thead> <tbody> <tr> <td>CH4 - Methane</td> <td>0.0044</td> <td>--</td> </tr> <tr> <td>Carbon Monoxide</td> <td>0.68</td> <td>--</td> </tr> <tr> <td>Formaldehyde</td> <td>0.0003</td> <td>--</td> </tr> <tr> <td>Manufacturer Fuel Economy</td> <td>23.8</td> <td>23.8</td> </tr> <tr> <td>Nitrogen Oxide</td> <td>0.02</td> <td>--</td> </tr> <tr> <td>Non-methane Hydrocarbon</td> <td>0.0087</td> <td>--</td> </tr> <tr> <td>Non-methane organic gas (California)</td> <td>0.009</td> <td>--</td> </tr> <tr> <td>SFTP Non-methane Hydrocarbon + Nitrogen Oxides for US06 or SC03</td> <td>0.0287</td> <td>--</td> </tr> <tr> <td>Total Hydrocarbon</td> <td>0.0125</td> <td>--</td> </tr> </tbody> </table>	Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value	CH4 - Methane	0.0044	--	Carbon Monoxide	0.68	--	Formaldehyde	0.0003	--	Manufacturer Fuel Economy	23.8	23.8	Nitrogen Oxide	0.02	--	Non-methane Hydrocarbon	0.0087	--	Non-methane organic gas (California)	0.009	--	SFTP Non-methane Hydrocarbon + Nitrogen Oxides for US06 or SC03	0.0287	--	Total Hydrocarbon	0.0125	--		
Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value																															
CH4 - Methane	0.0044	--																															
Carbon Monoxide	0.68	--																															
Formaldehyde	0.0003	--																															
Manufacturer Fuel Economy	23.8	23.8																															
Nitrogen Oxide	0.02	--																															
Non-methane Hydrocarbon	0.0087	--																															
Non-methane organic gas (California)	0.009	--																															
SFTP Non-methane Hydrocarbon + Nitrogen Oxides for US06 or SC03	0.0287	--																															
Total Hydrocarbon	0.0125	--																															
	<table border="1"> <thead> <tr> <th>Test Result Name</th> <th>Unrounded Test Result</th> <th>Verify Calculated CO2</th> </tr> </thead> <tbody> <tr> <td>Carbon dioxide</td> <td>373</td> <td>--</td> </tr> </tbody> </table>	Test Result Name	Unrounded Test Result	Verify Calculated CO2	Carbon dioxide	373	--																										
Test Result Name	Unrounded Test Result	Verify Calculated CO2																															
Carbon dioxide	373	--																															
Manufacturer Test Comments	4k SC03 - Tested as AUDI Q5 SUV 4 dr. EDV - ETW: 4500																																
Certification Region	Useful Life	Standard Level	Emission Name	Rounded Result	RAF	NMOG/NM HC Ratio	Diesel Adjustment Factor	Add DF	Mult DF	Certification Level	Standard	Pass/Fail																					
Fed	4,000 miles	Federal Tier 2 Bin 5	CO	0.680	--	--	--	--	--	0.68	2.70	Pass																					
Fed	4,000 miles	Federal Tier 2 Bin 5	HC-NM+NOX	0.0287	--	--	--	--	--	0.029	0.200	Pass																					
Fed	120,000 miles	Federal Tier 2 Bin 5	CO	0.680	--	--	--	0.730	--	1.41	3.70	Pass																					
CA	4,000 miles	California LEV-II ULEV	CO	0.680	--	--	--	--	--	0.68	2.70	Pass																					
CA	4,000 miles	California LEV-II ULEV	HC-NM+NOX	0.0287	--	--	--	--	--	0.029	0.200	Pass																					

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1
-------------------	--------------	-------------------------------------	--------------

Emission Data Vehicle Information

Vehicle ID / Configuration DFUB-Q5A / 1

Vehicle Model

Represented Test Vehicle Make AUDI **Represented Test Vehicle Model** Q5

Leak Family Details

Leak Family Identifier -- **Leak Family Name** --

Drive Sources and Fuel System Details

Drive Source and Fuel#	Drive Source	Fuel
1	Combustion Engine	Gasoline, Ethanol

Hybrid Indicator N

Multiple Fuel Storage Fuels Stored Together **Multiple Fuel Combustion** Fuels Combusted Together

Fuel Cell Indicator N **Rechargeable Energy Storage System Indicator** --

Rechargeable Energy Storage System -- **Rechargeable Energy Storage System, if 'Other'** --

Off-board charge Capable Indicator --

Transmission Type Semi-Automatic **# of Transmission Gears** 8

Engine Code CPMA **Axle Ratio** 3.76

Displacement (liters) 1.984 **Rated Horsepower** 211

Equivalent Test Weight (pounds) 4500 **Air Aspiration Method** Turbocharged

Drive Mode While Testing All Wheel Drive **SIL Usage** Not equipped

Aged Emission Components 4,000 (mi)

Dynamometer Coefficients:

Coefficient Category	Target Coefficients			Set Coefficients			EPA Calculated Total Road Load Horse Power for City/Highway/Evap Coefficients
	A (lbf)	B (lbf/mph)	C (lbf/mph**2)	A (lbf)	B (lbf/mph)	C (lbf/mph**2)	
City/Highway/Evap	35.969	0.49555	0.020079	-15.512	0.25682	0.018624	14.8
Cold CO	39.566	0.54511	0.022087	-13.961	0.2825	0.020487	N/A
US06	35.969	0.49555	0.020079	-15.512	0.25682	0.018624	N/A

Manufacturer Test Vehicle Comments MY 2013 AUDI Q5 tested as Q5 SUV with Automatic 8 speed - ETW: 4500 E85 Flex Fuel Vehicle

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1
Test #	DADX10022547	Test Procedure	52 - Fed. fuel 50 F exh.
Exhaust Test # for this Evap Test	N/A	Test Fuel Type	38 - E85 (85% Ethanol 15% EPA Unleaded Gasoline)
Test Date	08/23/2012	Fuel	Ethanol
Vehicle Class	LDV/Passenger Car	DF Type	Mfr. Determined
Verify Test Lab ID	Volkswagen AG, Dept EASZ/1		
E10 Evaporative Test Measurement Method	--		

Test Results

Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value
Acetaldehyde	0.0081	--
C2H5OH - Ethanol	0.0418	--
CH3OH - Methanol	0.0049	--
CH4 - Methane	0.0111	--
Carbon Monoxide	0.219	--
Formaldehyde	0.0009	--
Manufacturer Fuel Economy	16	16
Nitrogen Oxide	0.0191	--
Non-methane Hydrocarbon	0.0092	--
Non-methane organic gas (California)	0.0652	--
Total Hydrocarbon	0.0469	--

Test Result Name	Unrounded Test Result	Verify Calculated CO2
Carbon dioxide	388	--

Manufacturer Test Comments

4k FED. FUEL 50'F FTP - Tested as AUDI Q5 SUV 4 dr. EDV - ETW: 4500

Certification Region	Useful Life	Standard Level	Emission Name	Rounded Result	RAF	NMOG/NM HC Ratio	Diesel Adjustment Factor	Add DF	Mult DF	Certification Level	Standard	Pass/Fail
CA	4,000 miles	California LEV-II ULEV	CO	0.219	--	--	--	--	--	0.22	1.70	Pass
CA	4,000 miles	California LEV-II ULEV	HCHO	0.00090	--	--	--	--	--	0.0009	0.0160	Pass
CA	4,000 miles	California LEV-II ULEV	NMOG	0.06520	--	0.94	--	--	--	0.0652	0.0800	Pass
CA	4,000 miles	California LEV-II ULEV	NOX	0.0191	--	--	--	--	--	0.019	0.050	Pass

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1
Test #	DADX10022548	Test Procedure	21 - Federal fuel 2-day exhaust (w/can load)
Exhaust Test # for this Evap Test	N/A	Test Fuel Type	38 - E85 (85% Ethanol 15% EPA Unleaded Gasoline)
Test Date	08/29/2012	Fuel	Ethanol
Vehicle Class	LDV/Passenger Car	DF Type	Mfr. Determined
Verify Test Lab ID	Volkswagen AG, Dept EASZ/1		
E10 Evaporative Test Measurement Method	--		

Test Results

Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value
Acetaldehyde	0.0022	--
Bag 1 Carbon Dioxide	380.9	--
Bag 1 Fuel Economy	16.3	16.3
Bag 2 Carbon Dioxide	369.6	--
Bag 2 Fuel Economy	16.8	16.8
Bag 3 Carbon Dioxide	316	--
Bag 3 Fuel Economy	19.6	19.6
C2H5OH - Ethanol	0.0144	--
CH3OH - Methanol	0.0007	--
CH4 - Methane	0.0061	--
Carbon Monoxide	0.163	--
Formaldehyde	0.0038	--
Manufacturer Fuel Economy	17.4	17.4
Nitrogen Oxide	0.0279	--
Nitrous Oxide	0.01	--
Non-methane Hydrocarbon	0.0019	--
Non-methane organic gas (California)	0.0209	--
Particulate Matter	0	--
Total Hydrocarbon	0.0139	--

Test Result Name	Unrounded Test Result	Verify Calculated CREE/OPT-CREE
Carbon-Related Exhaust Emissions	357	357
Optional Carbon-Related Exhaust Emissions	360	360

Test Result Name	Unrounded Test Result	Verify Calculated CO2
Carbon dioxide	357	--

Manufacturer Test Comments

4k FED. FUEL FTP - Tested as AUDI Q5 SUV 4 dr. EDV - ETW: 4500

Certification Summary Information Report

Test Group		GVGAJ02.0AUF			Evaporative/Refueling Family					GVGAR0140AA1		
Certification Region	Useful Life	Standard Level	Emission Name	Rounded Result	RAF	NMOG/NM HC Ratio	Diesel Adjustment Factor	Add DF	Mult DF	Certification Level	Standard	Pass/Fail
Fed	50,000 miles	Federal Tier 2 Bin 5	CO	0.163	--	--	--	0.11	--	0.27	3.40	Pass
Fed	50,000 miles	Federal Tier 2 Bin 5	HCHO	0.00380	--	--	--	0.0001	--	0.0039	0.0150	Pass
Fed	50,000 miles	Federal Tier 2 Bin 5	NMOG	0.02090	--	0.94	--	0.0102	--	0.0311	0.0750	Pass
Fed	50,000 miles	Federal Tier 2 Bin 5	NOX	0.0279	--	--	--	0.002	--	0.030	0.050	Pass
Fed	50,000 miles	Federal Tier 2 Bin 5	PM	0.0000	--	--	--	0.000	--	0.000	0.010	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	CO	0.163	--	--	--	0.25	--	0.41	4.20	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	CREE	357	--	--	--	0.5	--	358	--	--
Fed	120,000 miles	Federal Tier 2 Bin 5	ETHANOL	0.01440	--	--	--	0.0198	--	0.0342	999.9999	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	H3C2HO	0.00220	--	--	--	0.0015	--	0.0037	999.9999	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	HCHO	0.00380	--	--	--	0.0002	--	0.0040	0.0180	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	METHANE	0.0061	--	--	--	0.0079	--	0.014	0.030	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	METHANOL	0.00070	--	--	--	0.0011	--	0.0018	999.9999	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	N2O	0.0100	--	--	--	0.0	--	0.010	0.010	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	NMOG	0.02090	--	0.94	--	0.0243	--	0.0452	0.0900	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	NOX	0.0279	--	--	--	0.005	--	0.033	0.070	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	OPT-CREE	360	--	--	--	0.6	--	361	--	--
Fed	120,000 miles	Federal Tier 2 Bin 5	PM	0.0000	--	--	--	0.000	--	0.000	0.010	Pass
CA	50,000 miles	California LEV-II ULEV	CO	0.163	--	--	--	0.11	--	0.27	1.70	Pass
CA	50,000 miles	California LEV-II ULEV	HCHO	0.00380	--	--	--	0.0001	--	0.0039	0.0080	Pass
CA	50,000 miles	California LEV-II ULEV	NMOG	0.02090	--	0.94	--	0.0102	--	0.0311	0.0400	Pass
CA	50,000 miles	California LEV-II ULEV	NOX	0.0279	--	--	--	0.002	--	0.030	0.050	Pass
CA	120,000 miles	California LEV-II ULEV	CO	0.163	--	--	--	0.25	--	0.41	2.10	Pass

Certification Summary Information Report

Test Group		GVGAJ02.0AUF			Evaporative/Refueling Family					GVGAR0140AA1		
Certification Region	Useful Life	Standard Level	Emission Name	Rounded Result	RAF	NMOG/NM HC Ratio	Diesel Adjustment Factor	Add DF	Mult DF	Certification Level	Standard	Pass/Fail
CA	120,000 miles	California LEV-II ULEV	HCHO	0.00380	--	--	--	0.0002	--	0.0040	0.0110	Pass
CA	120,000 miles	California LEV-II ULEV	NMOG	0.02090	--	0.94	--	0.0243	--	0.0452	0.0550	Pass
CA	120,000 miles	California LEV-II ULEV	NOX	0.0279	--	--	--	0.005	--	0.033	0.070	Pass
CA	120,000 miles	California LEV-II ULEV	PM	0.0000	--	--	--	0.000	--	0.000	0.010	Pass

NOTE: For Non-charge depleting tests, the Rounded Result for CREE/OPT-CREE Emission names are Verify-calculated values.

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1
Test #	DADX10022545	Test Procedure	3 - HWFE
Exhaust Test # for this Evap Test	N/A	Test Fuel Type	38 - E85 (85% Ethanol 15% EPA Unleaded Gasoline)
Test Date	07/12/2012	Fuel	Ethanol
Vehicle Class	LDV/Passenger Car	DF Type	Mfr. Determined
Verify Test Lab ID	Volkswagen AG, Dept EASZ/1		
E10 Evaporative Test Measurement Method	--		

Test Results

Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value
Acetaldehyde	0.0001	--
C2H5OH - Ethanol	0.0009	--
CH3OH - Methanol	0	--
CH4 - Methane	0.003	--
Carbon Monoxide	0.13	--
Formaldehyde	0	--
Manufacturer Fuel Economy	27.1	27.1
Nitrogen Oxide	0.0034	--
Nitrous Oxide	0.01	--
Non-methane Hydrocarbon	0	--
Non-methane organic gas (California)	0	--
Total Hydrocarbon	0.0028	--

Test Result Name	Unrounded Test Result	Verify Calculated CREE/OPT-CREE
Carbon-Related Exhaust Emissions	229	229
Optional Carbon-Related Exhaust Emissions	232	232

Test Result Name	Unrounded Test Result	Verify Calculated CO2
Carbon dioxide	229	--

Manufacturer Test Comments

4k HWFET - Tested as AUDI Q5 SUV 4 dr. EDV - ETW: 4500

Certification Summary Information Report

Test Group		GVGAJ02.0AUF			Evaporative/Refueling Family					GVGAR0140AA1		
Certification Region	Useful Life	Standard Level	Emission Name	Rounded Result	RAF	NMOG/NM HC Ratio	Diesel Adjustment Factor	Add DF	Mult DF	Certification Level	Standard	Pass/Fail
Fed	50,000 miles	Federal Tier 2 Bin 5	NOX	0.0034	--	--	--	0.002	--	0.005	0.070	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	CREE	229	--	--	--	0.5	--	230	--	--
Fed	120,000 miles	Federal Tier 2 Bin 5	NOX	0.0034	--	--	--	0.005	--	0.008	0.090	Pass
Fed	120,000 miles	Federal Tier 2 Bin 5	OPT-CREE	232	--	--	--	0.6	--	233	--	--
CA	50,000 miles	California LEV-II ULEV	NOX	0.0034	--	--	--	0.002	--	0.005	0.070	Pass
CA	120,000 miles	California LEV-II ULEV	NOX	0.0034	--	--	--	0.005	--	0.008	0.090	Pass

NOTE: For Non-charge depleting tests, the Rounded Result for CREE/OPT-CREE Emission names are Verify-calculated values.

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1
-------------------	--------------	-------------------------------------	--------------

Emission Data Vehicle Information

Vehicle ID / Configuration EFUB-Q5A / 1

Vehicle Model

Represented Test Vehicle Make AUDI **Represented Test Vehicle Model** Q5

Leak Family Details

Leak Family Identifier -- **Leak Family Name** --

Drive Sources and Fuel System Details

Drive Source and Fuel#	Drive Source	Fuel
1	Combustion Engine	Gasoline, Ethanol

Hybrid Indicator N

Multiple Fuel Storage Fuels Stored Together **Multiple Fuel Combustion** Fuels Combusted Together

Fuel Cell Indicator -- **Rechargeable Energy Storage System Indicator** --

Rechargeable Energy Storage System -- **Rechargeable Energy Storage System, if 'Other'** --

Off-board charge Capable Indicator --

Transmission Type Semi-Automatic **# of Transmission Gears** 8

Engine Code CPMB **Axle Ratio** 3.76

Displacement (liters) 1.984 **Rated Horsepower** 220

Equivalent Test Weight (pounds) 4500 **Air Aspiration Method** Turbocharged

Drive Mode While Testing 2-Wheel Drive, Front **SIL Usage** Not equipped

Aged Emission Components 4,000 (mi)

Dynamometer Coefficients:

Coefficient Category	Target Coefficients			Set Coefficients			EPA Calculated Total Road Load Horse Power for City/Highway/Evap Coefficients
	A (lbf)	B (lbf/mph)	C (lbf/mph**2)	A (lbf)	B (lbf/mph)	C (lbf/mph**2)	
City/Highway/Evap	35.969	0.49555	0.020079	6.182	0.19026	0.020603	14.8
Cold CO	39.566	0.54511	0.022087	6.8	0.20929	0.022663	N/A
US06	35.969	0.49555	0.020079	6.182	0.19026	0.020603	N/A

Manufacturer Test Vehicle Comments E85 Q5 tested as a Q5 4 dr, SUV - ETW: 4500

Certification Summary Information Report

Test Group	GVGAJ02.0AUF	Evaporative/Refueling Family	GVGAR0140AA1
Test #	EADX10025754	Test Procedure	11 - Cold CO
Exhaust Test # for this Evap Test	N/A	Test Fuel Type	38 - E85 (85% Ethanol 15% EPA Unleaded Gasoline)
Test Date	04/03/2013	Fuel	Ethanol
Vehicle Class	LDV/Passenger Car	DF Type	Mfr. Determined
Verify Test Lab ID	Audi Ingolstadt		
E10 Evaporative Test Measurement Method	--		

Test Results

Test Result Name	Unrounded Test Result	Verify Calculated FE MPG Equivalent Value
Acetaldehyde	0.0302	--
Bag 1 Carbon Dioxide	528	--
Bag 1 Fuel Economy	11.4	11.4
Bag 2 Carbon Dioxide	423.3	--
Bag 2 Fuel Economy	14.5	14.5
Bag 3 Carbon Dioxide	352.9	--
Bag 3 Fuel Economy	17.4	17.4
C2H5OH - Ethanol	0.1254	--
CH3OH - Methanol	0	--
CH4 - Methane	0.0584	--
Carbon Monoxide	2.31	--
Formaldehyde	0.0032	--
Manufacturer Fuel Economy	17.2	17.2
Nitrogen Oxide	0.033	--
Non-methane Hydrocarbon	0.2065	--
Non-methane organic gas (California)	0.3653	--
Total Hydrocarbon	0.2779	--

Test Result Name	Unrounded Test Result	Verify Calculated CO2
Carbon dioxide	426	--

Manufacturer Test Comments

E85 4k Cold-CO - Tested as AUDI Q5 SUV 4 dr. EDV - ETW: 4500

Certification Region	Useful Life	Standard Level	Emission Name	Rounded Result	RAF	NMOG/NM HC Ratio	Diesel Adjustment Factor	Add DF	Mult DF	Certification Level	Standard	Pass/Fail
CA	50,000 miles	California LEV-II ULEV	CO	2.310	--	--	--	0.015	--	2.32	10.00	Pass

Certification Summary Information Report

Test Group		GVGAJ02.0AUF			Evaporative/Refueling Family		GVGAR0140AA1		
Consolidated List of Standards									
Exhaust Standards									
Cert Region		Federal			Cert/In-Use Code		Both		
Vehicle Class		LDV/Passenger Car			Standard Level		Federal Tier 2 Bin 5		
Fuel		Ethanol			Test Procedure		Federal fuel 2-day exhaust (w/can load)		
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
50,000 miles	CO	--	--	--	--	--	--	0.11	3.40
50,000 miles	HCHO	--	--	--	--	--	--	0.0001	0.0150
50,000 miles	NMOG	--	--	0.94	--	--	--	0.0102	0.0750
50,000 miles	NOX	--	--	--	--	--	--	0.002	0.050
50,000 miles	PM	--	--	--	--	--	--	0.000	0.010
120,000 miles	CO	--	--	--	--	--	--	0.25	4.20
120,000 miles	CREE	--	--	--	--	--	--	0.5	999.9999
120,000 miles	ETHANOL	--	--	--	--	--	--	0.0198	999.9999
120,000 miles	H3C2HO	--	--	--	--	--	--	0.0015	999.9999
120,000 miles	HC-NM+NOX-COMP	--	--	--	--	--	--	--	0.650
120,000 miles	HCHO	--	--	--	--	--	--	0.0002	0.0180
120,000 miles	METHANE	--	--	--	--	--	--	0.0079	0.030
120,000 miles	METHANOL	--	--	--	--	--	--	0.0011	999.9999
120,000 miles	N2O	--	--	--	--	--	--	0.0	0.010
120,000 miles	NMOG	--	--	0.94	--	--	--	0.0243	0.0900
120,000 miles	NOX	--	--	--	--	--	--	0.005	0.070
120,000 miles	OPT-CREE	--	--	--	--	--	--	0.6	999.9999
120,000 miles	PM	--	--	--	--	--	--	0.000	0.010
Cert Region		Federal			Cert/In-Use Code		Both		
Vehicle Class		LDV/Passenger Car			Standard Level		Federal Tier 2 Bin 5		
Fuel		Ethanol			Test Procedure		SC03		
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
4,000 miles	CO	--	--	--	--	--	--	--	2.70
4,000 miles	HC-NM+NOX	--	--	--	--	--	--	--	0.200
120,000 miles	CO	--	--	--	--	--	--	0.25	3.70

Certification Summary Information Report

Test Group		GVGAJ02.0AUF			Evaporative/Refueling Family			GVGAR0140AA1	
Cert Region		California + CAA Section 177 states			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			California LEV-II ULEV	
Fuel		Gasoline			Test Procedure			Federal fuel 2-day exhaust (w/can load)	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
50,000 miles	CO	--	--	--	--	--	--	0.310	1.70
50,000 miles	HCHO	--	--	--	--	--	--	0.0002	0.0080
50,000 miles	NMOG	--	1	1.04	--	--	--	0.0059	0.0400
50,000 miles	NOX	--	--	--	--	--	--	0.0150	0.050
120,000 miles	CO	--	--	--	--	--	--	0.730	2.10
120,000 miles	HCHO	--	--	--	--	--	--	0.0004	0.0110
120,000 miles	NMOG	--	1	1.04	--	--	--	0.0141	0.0550
120,000 miles	NOX	--	--	--	--	--	--	0.0370	0.070
120,000 miles	PM	--	--	--	--	--	--	0.0010	0.010

Cert Region		Federal			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			Federal Tier 2 Bin 5	
Fuel		Gasoline			Test Procedure			Federal fuel 2-day exhaust (w/can load)	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
50,000 miles	CO	--	--	--	--	--	--	0.310	3.40
50,000 miles	HCHO	--	--	--	--	--	--	0.0002	0.0150
50,000 miles	NMOG	--	1	1.04	--	--	--	0.0059	0.0750
50,000 miles	NOX	--	--	--	--	--	--	0.0150	0.050
50,000 miles	PM	--	--	--	--	--	--	0.0010	0.010
120,000 miles	CO	--	--	--	--	--	--	0.730	4.20
120,000 miles	CREE	--	--	--	--	--	--	1.2	999.9999
120,000 miles	HC-NM+NOX-COMP	--	--	--	--	--	--	--	0.630
120,000 miles	HCHO	--	--	--	--	--	--	0.0004	0.0180
120,000 miles	METHANE	--	--	--	--	--	--	0.004	0.0300
120,000 miles	N2O	--	--	--	--	--	--	0.0	0.010
120,000 miles	NMOG	--	1	1.04	--	--	--	0.0141	0.0900
120,000 miles	NOX	--	--	--	--	--	--	0.0370	0.070
120,000 miles	OPT-CREE	--	--	--	--	--	--	1.3	999.9999
120,000 miles	PM	--	--	--	--	--	--	0.0010	0.010

Certification Summary Information Report

Test Group		GVGAJ02.0AUF			Evaporative/Refueling Family			GVGAR0140AA1	
Cert Region		Federal			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			Federal Tier 2 Bin 5	
Fuel		Gasoline			Test Procedure			SC03	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
4,000 miles	CO	--	--	--	--	--	--	--	2.70
4,000 miles	HC-NM+NOX	--	--	--	--	--	--	--	0.200
120,000 miles	CO	--	--	--	--	--	--	0.730	3.70
Cert Region		Federal			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			Federal Tier 2 Bin 5	
Fuel		Gasoline			Test Procedure			Cold CO	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
50,000 miles	CO	--	--	--	--	--	--	0.015	10.00
120,000 miles	HC-NM	--	--	--	--	--	--	0.0141	0.30
Cert Region		California + CAA Section 177 states			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			California LEV-II ULEV	
Fuel		Gasoline			Test Procedure			SC03	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
4,000 miles	CO	--	--	--	--	--	--	--	2.70
4,000 miles	HC-NM+NOX	--	--	--	--	--	--	--	0.200

Certification Summary Information Report

Test Group		GVGAJ02.0AUF			Evaporative/Refueling Family			GVGAR0140AA1	
Cert Region		California + CAA Section 177 states			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			California LEV-II ULEV	
Fuel		Ethanol			Test Procedure			Federal fuel 2-day exhaust (w/can load)	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
50,000 miles	CO	--	--	--	--	--	--	0.11	1.70
50,000 miles	HCHO	--	--	--	--	--	--	0.0001	0.0080
50,000 miles	NMOG	--	--	0.94	--	--	--	0.0102	0.0400
50,000 miles	NOX	--	--	--	--	--	--	0.002	0.050
120,000 miles	CO	--	--	--	--	--	--	0.25	2.10
120,000 miles	HCHO	--	--	--	--	--	--	0.0002	0.0110
120,000 miles	NMOG	--	--	0.94	--	--	--	0.0243	0.0550
120,000 miles	NOX	--	--	--	--	--	--	0.005	0.070
120,000 miles	PM	--	--	--	--	--	--	0.000	0.010

Cert Region		Federal			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			Federal Tier 2 Bin 5	
Fuel		Ethanol			Test Procedure			HWFE	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
50,000 miles	NOX	--	--	--	--	--	--	0.002	0.070
120,000 miles	CREE	--	--	--	--	--	--	0.5	999.9999
120,000 miles	NOX	--	--	--	--	--	--	0.005	0.090
120,000 miles	OPT-CREE	--	--	--	--	--	--	0.6	999.9999

Cert Region		California + CAA Section 177 states			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			California LEV-II ULEV	
Fuel		Ethanol			Test Procedure			SC03	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
4,000 miles	CO	--	--	--	--	--	--	--	2.70
4,000 miles	HC-NM+NOX	--	--	--	--	--	--	--	0.200

Certification Summary Information Report

Test Group		GVGAJ02.0AUF			Evaporative/Refueling Family			GVGAR0140AA1	
Cert Region		California + CAA Section 177 states			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			California LEV-II ULEV	
Fuel		Gasoline			Test Procedure			Cold CO	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
50,000 miles	CO	--	--	--	--	--	--	0.015	10.00

Cert Region		California + CAA Section 177 states			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			California LEV-II ULEV	
Fuel		Gasoline			Test Procedure			Fed. fuel 50 F exh.	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
4,000 miles	CO	--	--	--	--	--	--	--	1.70
4,000 miles	HCHO	--	--	--	--	--	--	--	0.0160
4,000 miles	NMOG	--	1	1.04	--	--	--	--	0.0800
4,000 miles	NOX	--	--	--	--	--	--	--	0.050

Cert Region		Federal			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			Federal Tier 2 Bin 5	
Fuel		Ethanol			Test Procedure			US06	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
4,000 miles	CO	--	--	--	--	--	--	--	8.00
4,000 miles	HC-NM+NOX	--	--	--	--	--	--	--	0.140
120,000 miles	CO	--	--	--	--	--	--	0.25	11.10

Certification Summary Information Report

Test Group		GVGAJ02.0AUF			Evaporative/Refueling Family			GVGAR0140AA1	
Cert Region		Federal			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			Federal Tier 2 Bin 5	
Fuel		Gasoline			Test Procedure			HWFE	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
50,000 miles	NOX	--	--	--	--	--	--	0.0120	0.070
120,000 miles	CREE	--	--	--	--	--	--	1.2	999.9999
120,000 miles	NOX	--	--	--	--	--	--	0.0280	0.090
120,000 miles	OPT-CREE	--	--	--	--	--	--	1.3	999.9999

Cert Region		California + CAA Section 177 states			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			California LEV-II ULEV	
Fuel		Gasoline			Test Procedure			US06	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
4,000 miles	CO	--	--	--	--	--	--	--	8.00
4,000 miles	HC-NM+NOX	--	--	--	--	--	--	--	0.140

Cert Region		California + CAA Section 177 states			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			California LEV-II ULEV	
Fuel		Ethanol			Test Procedure			Fed. fuel 50 F exh.	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
4,000 miles	CO	--	--	--	--	--	--	--	1.70
4,000 miles	HCHO	--	--	--	--	--	--	--	0.0160
4,000 miles	NMOG	--	--	0.94	--	--	--	--	0.0800
4,000 miles	NOX	--	--	--	--	--	--	--	0.050

Certification Summary Information Report

Test Group		GVGAJ02.0AUF			Evaporative/Refueling Family			GVGAR0140AA1	
Cert Region		California + CAA Section 177 states			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			California LEV-II ULEV	
Fuel		Ethanol			Test Procedure			US06	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
4,000 miles	CO	--	--	--	--	--	--	--	8.00
4,000 miles	HC-NM+NOX	--	--	--	--	--	--	--	0.140

Cert Region		Federal			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			Federal Tier 2 Bin 5	
Fuel		Gasoline			Test Procedure			US06	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
4,000 miles	CO	--	--	--	--	--	--	--	8.00
4,000 miles	HC-NM+NOX	--	--	--	--	--	--	--	0.140
120,000 miles	CO	--	--	--	--	--	--	0.730	11.10

Cert Region		California + CAA Section 177 states			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			California LEV-II ULEV	
Fuel		Ethanol			Test Procedure			HWFE	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
50,000 miles	NOX	--	--	--	--	--	--	0.002	0.070
120,000 miles	NOX	--	--	--	--	--	--	0.005	0.090

Cert Region		California + CAA Section 177 states			Cert/In-Use Code			Both	
Vehicle Class		LDV/Passenger Car			Standard Level			California LEV-II ULEV	
Fuel		Ethanol			Test Procedure			Cold CO	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
50,000 miles	CO	--	--	--	--	--	--	0.015	10.00

Certification Summary Information Report

Test Group	GVGAJ02.0AUF				Evaporative/Refueling Family			GVGAR0140AA1	
Cert Region	California + CAA Section 177 states				Cert/In-Use Code			Both	
Vehicle Class	LDV/Passenger Car				Standard Level			California LEV-II ULEV	
Fuel	Gasoline				Test Procedure			HWFE	
Useful Life	Emission Name	Rounded Result	RAF	NMOG / NMHC	Upward Diesel Adjustment Factor	Downward Diesel Adjustment Factor	Mult DF	Add DF	Std
50,000 miles	NOX	--	--	--	--	--	--	0.0120	0.070
120,000 miles	NOX	--	--	--	--	--	--	0.0280	0.090

Evaporative/Refueling Standards

Evaporative/Refueling Family		GVGAR0140AA1		Cert Region		California + CAA Section 177 states	
Cert/In-Use Code		Both		Standard Level		California LEV-II Evap	
Test Procedure		2-day evap					
Fuel	Useful Life	Emission Name	Rounded Result	Std	Add DF		
Gasoline	150,000 miles	HC-TOTAL	--	0.650	0.041		
Ethanol	150,000 miles	OMHCE	--	0.650	0.041		

Evaporative/Refueling Family		GVGAR0140AA1		Cert Region		Federal	
Cert/In-Use Code		Both		Standard Level		Federal LEV-II Evap	
Test Procedure		2-day evap					
Fuel	Useful Life	Emission Name	Rounded Result	Std	Add DF		
Gasoline	120,000 miles	HC-TOTAL	--	0.650	0.041		
Ethanol	120,000 miles	OMHCE	--	0.650	0.041		

Evaporative/Refueling Family		GVGAR0140AA1		Cert Region		Federal	
Cert/In-Use Code		Both		Standard Level		Federal LEV-II Evap	
Test Procedure		Federal Fuel Running Loss					
Fuel	Useful Life	Emission Name	Rounded Result	Std	Add DF		
Gasoline	120,000 miles	HC	--	0.050	0.001		
Ethanol	120,000 miles	OMHCE	--	0.050	0.001		

Certification Summary Information Report

Test Group		GVGAJ02.0AUF		Evaporative/Refueling Family		GVGAR0140AA1	
Evaporative/Refueling Family		GVGAR0140AA1		Cert Region		Federal	
Cert/In-Use Code		Both		Standard Level		Federal LEV-II Evap	
Test Procedure		Federal fuel 3-day evap					
Fuel	Useful Life	Emission Name	Rounded Result	Std	Add DF		
Gasoline	120,000 miles	HC-TOTAL	--	0.500	0.041		
Ethanol	120,000 miles	OMHCE	--	0.500	0.041		
Evaporative/Refueling Family		GVGAR0140AA1		Cert Region		Federal	
Cert/In-Use Code		Both		Standard Level		Federal LEV-II Evap	
Test Procedure		Federal fuel refueling test (ORVR)					
Fuel	Useful Life	Emission Name	Rounded Result	Std	Add DF		
Gasoline	120,000 miles	HC	--	0.200	0.001		
Ethanol	120,000 miles	OMHCE	--	0.200	0.001		
Evaporative/Refueling Family		GVGAR0140AA1		Cert Region		California + CAA Section 177 states	
Cert/In-Use Code		Both		Standard Level		California LEV-II Evap	
Test Procedure		Federal Fuel Running Loss					
Fuel	Useful Life	Emission Name	Rounded Result	Std	Add DF		
Gasoline	150,000 miles	HC	--	0.050	0.001		
Ethanol	150,000 miles	OMHCE	--	0.050	0.001		
Evaporative/Refueling Family		GVGAR0140AA1		Cert Region		California + CAA Section 177 states	
Cert/In-Use Code		Both		Standard Level		California LEV-II Evap	
Test Procedure		Federal fuel refueling test (ORVR)					
Fuel	Useful Life	Emission Name	Rounded Result	Std	Add DF		
Gasoline	150,000 miles	HC	--	0.200	0.001		
Ethanol	150,000 miles	OMHCE	--	0.200	0.001		
Evaporative/Refueling Family		GVGAR0140AA1		Cert Region		California + CAA Section 177 states	
Cert/In-Use Code		Both		Standard Level		California LEV-II Evap	
Test Procedure		Federal fuel 3-day evap					
Fuel	Useful Life	Emission Name	Rounded Result	Std	Add DF		
Gasoline	150,000 miles	HC-TOTAL	--	0.500	0.041		
Ethanol	150,000 miles	OMHCE	--	0.500	0.041		

Certification Summary Information Report

Test Group		GVGAJ02.0AUF	Evaporative/Refueling Family		GVGAR0140AA1
Glossary					
Useful Life					
4	4,000 miles		120	120,000 miles	
50	50,000 miles		150	150,000 miles	
100	100,000 miles				
Emission Name					
HC-TOTAL	Total Hydrocarbon		METHANOL	CH3OH - Methanol	
CO	Carbon Monoxide		N2O	Nitrous Oxide	
CO2	Carbon dioxide		SPITBACK	Spitback Hydrocarbon in grams	
CREE	Carbon-Related Exhaust Emissions		AMP-HRS	Integrated Amp-hours	
OPT-CREE	Optional Carbon-Related Exhaust Emissions		START-SOC	System Start State of Charge Watt-hours	
NOX	Nitrogen Oxide		END-SOC	System End State of Charge Watt-hours	
PM	Particulate Matter		ACT-DISTANCE	Actual Distance Driven (miles)	
PM-COMP	SFTP Composite Particulate Matter		AS-VOLT	Average System Voltage	
HC-NM	Non-methane Hydrocarbon		CO2 BAG 1	Bag 1 Carbon Dioxide	
OMHCE	Organic material Hydrocarbon Equivalent		CO2 BAG 2	Bag 2 Carbon Dioxide	
OMNMHCE	Organic material non-methane HC equivalent		CO2 BAG 3	Bag 3 Carbon Dioxide	
NMOG	Non-methane organic gas (California)		CO2 BAG 4	Bag 4 Carbon Dioxide	
HCHO	Formaldehyde		NMOG+NOX	Non-methane organic gases plus Nitrogen Oxides	
H3C2HO	Acetaldehyde		NMOG+NOX-COMP	SFTP Composite Non-methane Organic Gases + Nitrogen Oxides	
HC-NM+NOX	SFTP Non-methane Hydrocarbon + Nitrogen Oxides for US06 or SC03		DT-IWRR	Drive Trace Inertia Work Ratio Rating	
HC-NM+NOX-COMP	SFTP Composite Non-methane Hydrocarbon + Nitrogen Oxides		DT-ASCR	Drive Trace Absolute Speed Change Rating	
CO-COMP	SFTP Composite Carbon Monoxide		DT-EER	Drive Trace Energy Economy Rating	
ETHANOL	C2H5OH - Ethanol		COMB-CREE	Combined Carbon-Related Exhaust Emissions	
FE BAG 1	Bag 1 Fuel Economy		COMB-OPT-CREE	Combined Optional Carbon-Related Exhaust Emissions	
FE BAG 2	Bag 2 Fuel Economy		HC-TOTAL-EQUIV	Total Hydrocarbon equivalent - Evap only	
FE BAG 3	Bag 3 Fuel Economy		METHANE-COMB	Combined CH4 for HD 2b/3 vehicles only	
FE BAG 4	Bag 4 Fuel Economy		N2O-COMB	Combined Nitrous Oxide for HD 2b/3 vehicles only	
MFR FE	Manufacturer Fuel Economy		LEAK-DIA	Effective Leak Diameter (inches)	
HC	Hydrocarbon for Running Loss and ORVR		LEAK-GAS CAP	Gas Cap Leakage (cc/min)	
METHANE	CH4 - Methane				
Certification Region					
CA	California + CAA Section 177 states		FA	Federal	
Exhaust Emission Standard Level					
B1	Federal Tier 2 Bin 1		L3ULEV340	California LEV-III ULEV340	
B2	Federal Tier 2 Bin 2		L3ULEV250	California LEV-III ULEV250	
B3	Federal Tier 2 Bin 3		L3ULEV200	California LEV-III ULEV200	
B4	Federal Tier 2 Bin 4		L3SULEV170	California LEV-III SULEV170	
B5	Federal Tier 2 Bin 5		L3SULEV150	California LEV-III SULEV150	

Certification Summary Information Report

Test Group		GVGAJ02.0AUF	Evaporative/Refueling Family		GVGAR0140AA1
B6	Federal Tier 2 Bin 6		L3LEV630	California LEV-III LEV630	
B7	Federal Tier 2 Bin 7		L3ULEV570	California LEV-III ULEV570	
B8	Federal Tier 2 Bin 8		L3ULEV400	California LEV-III ULEV400	
B9	Federal Tier 2 Bin 9		L3ULEV270	California LEV-III ULEV270	
B10	Federal Tier 2 Bin 10		L3SULEV230	California LEV-III SULEV230	
B11	Federal Tier 2 Bin 11		L3SULEV200	California LEV-III SULEV200	
HDV1	HDV1 (Federal HD chassis Class 2b GVW 8501-10000)		T3B160	Federal Tier 3 Bin 160	
HDV2	HDV2 (Federal HD chassis Class 3 GVW 10001-14000)		T3B125	Federal Tier 3 Bin 125	
L2	California LEV-II LEV		T3B110	Federal Tier 3 Transitional Bin 110	
L2OP	California LEV-II LEV Optional		T3B85	Federal Tier 3 Transitional Bin 85	
U2	California LEV-II ULEV		T3SULEV30	Federal Tier 3 Transitional LEV-II SULEV30 Carryover	
S2	California LEV-II SULEV		T3B70	Federal Tier 3 Bin 70	
ZEV	California ZEV		T3B50	Federal Tier 3 Bin 50	
OT	Other		T3B30	Federal Tier 3 Bin 30	
T1	Federal Tier 1		T3B20	Federal Tier 3 Bin 20	
PZEV	California PZEV		T3B0	Federal Tier 3 Bin 0	
L2LEV160	California LEV-II LEV160		HDV2B395	Federal Tier 3 HD Class 2b Transitional Bin 395	
L2ULEV125	California LEV-II ULEV125		HDV2B340	Federal Tier 3 HD Class 2b Transitional Bin 340	
L2SULEV30	California LEV-II SULEV30		HDV2B250	Federal Tier 3 HD Class 2b Bin 250	
L2LEV395	California LEV-II LEV395		HDV2B200	Federal Tier 3 HD Class 2b Bin 200	
L2ULEV340	California LEV-II ULEV340		HDV2B170	Federal Tier 3 HD Class 2b Bin 170	
L2LEV630	California LEV-II LEV630		HDV2B150	Federal Tier 3 HD Class 2b Bin 150	
L2ULEV570	California LEV-II ULEV570		HDV2B0	Federal Tier 3 HD Class 2b Bin 0	
L3LEV160	California LEV-III LEV160		HDV3B630	Federal Tier 3 HD Class 3 Transitional Bin 630	
L3ULEV125	California LEV-III ULEV125		HDV3B570	Federal Tier 3 HD Class 3 Transitional Bin 570	
L3ULEV70	California LEV-III ULEV70		HDV3B400	Federal Tier 3 HD Class 3 Bin 400	
L3ULEV50	California LEV-III ULEV50		HDV3B270	Federal Tier 3 HD Class 3 Bin 270	
L3SULEV30	California LEV-III SULEV30		HDV3B230	Federal Tier 3 HD Class 3 Bin 230	
L3SULEV20	California LEV-III SULEV20		HDV3B200	Federal Tier 3 HD Class 3 Bin 200	
L3LEV395	California LEV-III LEV395		HDV3B0	Federal Tier 3 HD Class 3 Bin 0	
Transmission Type Code					
AMS	Automated Manual- Selectable (e.g. Automated Manual with paddles)	M	Manual		
A	Automatic	OT	Other		
AM	Automated Manual	SA	Semi-Automatic		
CVT	Continuously Variable	SCV	Selectable Continuously Variable (e.g. CVT with paddles)		
Drive System Code					
4	4-Wheel Drive	P	Part-time 4-Wheel Drive		
F	2-Wheel Drive, Front	A	All Wheel Drive		
R	2-Wheel Drive, Rear				

Certification Summary Information Report

Test Group		GVGAJ02.0AUF	Evaporative/Refueling Family		GVGAR0140AA1
Additional Terms and Acronyms					
AFC	Alternative Fuel Converter		ICI	Independent Commercial Importer	
CSI	Certificate Summary Information		ORVR	Onboard Refueling Vapor Recovery	
DF	Deterioration Factor		SIL	Shift Indicator Light	
Evap	Evaporation, Evaporative		Trans	Transmission	

Section 8	Pg. 1	Emission Testing Waiver	Engine Code	R.CH-No.:	Revision Date
Test Group		GVGAJ02.0AUF	all		

8. Emission Testing Waiver Statements

Please refer to Section 8 of the Common Sections Binder for the complete text of the following statements.

High Altitude Exhaust Emissions
 High Altitude EVAP/Refueling Emissions
 Spit back
 Particulate Matter
 Certification Short Test
 HCHO Compliance
 OBD Compliance
 Leak Free Exhaust System
 Formaldehyde Emissions Compliance
 N2O Compliance

Section 9	Pg. 1	OBD System Description	Engine Code	R.CH-No.:	Revision Date
Test Group		GVGAJ02.0AUF	all		

9.0 OBD System Description

9.1 General Description

Please refer to Common Section

9.2 Summary Table

Please refer to Confidential Section

9.3 California Air Resources Board OBD System Approval Letter.

Please refer to Confidential Section

Section 11	Pg. 1	AECD Description	Engine Code	R.CH-No.:	Revision Date
Test Group		GVGAJ02.0AUF	all		

11. Auxiliary Emission Control Devices (AECD) Descriptions

Control device Configuration	parameters sensed	parameters controlled	justification
Cooling fan switch	coolant temperature	coolant temperature	A
Cooling water Thermostat	coolant temperature	coolant temperature	A
Temperature Sensor	coolant temperature	Actuation of enrichment characteristic	A
Pressure Regulator	primary fuel pressure	primary fuel pressure	A
Idle switch	movement of first stage throttle plate	actuation of idle speed and coasting fuel shut off	A
knock sensor	engine knocking	ignition timing	A
Turbo Charger	charge pressure	charge pressure	A

Justification:

A: under all normal driving condition

B:

C:

Section 12 Pg. 1	Vehicles Covered by Certificate	Engine Code	R.CH-No.:	Revision Date
Test Group	GVGAJ02.0AUF	all		

List of Certified Vehicles

Dur. Group: GVGAGPGENAUF
Test Group: GVGAJ02.0AUF
Emission Control Sys.: DFI/TC/CAC/TWC/WR-HO2S/HO2S/FFS

Engine Displacement: 2.0 liters
Valves / Cylinder: 4
Sales Area: 50 States + Canada
MMS¹: Bosch

Evap Family: FVGAR0140AA1

Model	Carline	Engine Code	Transmission Code	SIL	ETW (lbs)	Curb Weight (lbs)	Tank Capacity [l]	Canister working capacity [g]	Tire size
A4 quattro	A4 quattro	CPMB	AL551-8Q	n.a.	4000	3715	64	140	225/50 R17
A5 quattro	A5 quattro	CPMB	AL551-8Q	n.a.	4000	3726	64		245/45 R17
A5 Cabriolet quattro	A5 Cabriolet quattro	CPMB	AL551-8Q	n.a.	4250	4075	64		245/40 R18 255/35 R19
Allroad quattro	allroad quattro	CPMB	AL551-8Q/1	n.a.	4250	3947	64	140	225/55 R17 245/45 R18 245/40 R19
Q5	Q5	CPMB	AL551-8Q/2	n.a.	4500	4190	75	140	235/60 R18 235/55 R19

* Use J1930 Abbreviations 1) Motor management system

Section 12 Pg. 2	Vehicles Covered by Certificate	Engine Code	R.CH-No.:	Revision Date
Test Group	GVGAJ02.0AUF	all		

Engine Code	Engine Code Characteristic				
	Cat Code	Compression ratio	Idle [rpm]	HP @ RPM	Torque [Nm] @ RPM
CPMB	TEX 0442	9.6 : 1	700 ± 100	220 @ 4450-6000	350 @ 1500 - 4200

Transmission Code	Transmission Code Characteristic											
	Basic drivetrain layout	Trans./ OD²⁾										
			Axle	Gear 1	Gear 2	Gear 3	Gear 4	Gear 5	Gear 6	Gear 7	Gear 8	N/V Ratio
AL551-8Q	4WD	L8/2	2.848	4.714	3.143	2.106	1.667	1.285	1.000	0.839	0.667	26.0
AL551-8Q/1	4WD	L8/2	3.076	4.714	3.143	2.106	1.667	1.285	1.000	0.839	0.667	26.9
AL551-8Q/2	4WD	L8/2	3.760	4.714	3.143	2.106	1.667	1.285	1.000	0.839	0.667	30.3

1) Code number that describes if the ratio of the top gear of the transmission is less than 1. The value is 2 when this is true.

Section 13	Pg. 1	Test Group Projected Sales	Engine Code	R.CH-No.:	Revision Date
Test Group		GVGAJ02.0AUF	all		

13.01 Test Group Projected Sales

Please Refer to Section 16 Confidential Information, of this test group

13.02 Compliance Plans

Refer to Section 16 Confidential Information, of the Common Sections Binder

Section 14 Pg. 1	Request for Certificate	Engine Code	R.CH-No.:	Revision Date
Test Group	GVGAJ02.0AUF	all		

14. Request for Certificate

14.01 Statement of Compliance

The Volkswagen Group states that any element of design, system, or emission control device installed on or incorporated in the Volkswagen Group's new motor vehicles or new motor vehicle engines for the purpose of complying with standards prescribed under section 202 of the Clean Air Act, will not, to the best of the Volkswagen Group's information and belief, cause the emission into the ambient air of pollutants in the operation of its motor vehicles or motor vehicle engines which cause or contribute to an unreasonable risk to public health or welfare except as specifically permitted by the standards prescribed under section 202 of the Clean Air Act. The Volkswagen Group further states that any element of design, system, or emission control device installed or incorporated in the Volkswagen Group's new motor vehicles or new motor vehicle engines, for the purpose of complying with standards prescribed under section 202 of the Clean Air Act, will not, to the best of the Volkswagen Group's information and belief, cause or contribute to an unreasonable risk to public safety.

The term pollutant means:

- a. Diesel particulates
- b. Nickel
- c. MMT combustion products
- d. Ammonia
- e. Sulfates
- f. Hydrogen sulfide
- g. Hydrogen cyanide
- h. Ruthenium combustion products
- i. Nitrosamines

or any other pollutant which VW/AUDI has identified which can reasonably be expected to be emitted from these vehicles.

All vehicles have been tested in accordance with good engineering practice to ascertain that such test vehicles meet the requirement of this section for the useful life of the vehicle.

Section 14	Pg. 2	Request for Certificate	Engine Code	R.CH-No.:	Revision Date
Test Group		GVGAJ02.0AUF	all		

The test vehicles with respect to which data are submitted are in all material respects as described in the application for certification, have been tested in accordance with the applicable test procedures utilizing the fuels and equipment described in the application for certification, they meet the requirement of such tests, and on the basis of such tests, they conform to the requirements of the regulations in 40 CFR, Part 86, Subpart S.

The vehicles for which certification is requested conform to the requirements in 86.1810-01 (a) and the description of tests performed to ascertain compliance with the general standards in 86.1810-01 (a) and the data derived from such tests are available.

The testing described under 86.1824-01 has been designed and conducted in accordance with good engineering practice to assure that the vehicles covered by a certificate issued under 86.1848-01 will meet the evaporative emission standards in 86.1811-01 for the useful life of the vehicle.

14.02 Durability Statement

Based on the Volkswagen Group's good engineering judgment, all the vehicles described in this Application for Certification comply with all applicable intermediate and full useful life standards.

Section 15 Pg. 1	Other Information	Engine Code	R.CH-No.:	Revision Date
Test Group	GVGAJ02.0AUF	all		

15. Other Information

Revision Index for Test Group Only

Part 1

Sec.	Page	Date:	Comment:	R/C No.
				-

Part 2

Section 15	Pg. 2	Other Information	Engine Code	R.CH-No.:	Revision Date
Test Group		GVGAJ02.0AUF	all		

Running Change / Field Fix Log

Model Year: 2016
 Test Group: GVGAJ02.0AUF
 Models: Audi A4/A5 quattro, A5 Cabriolet Quattro, Q5
 Evaporative Families: GVGAR0140AA1

RC / FF Number	Description of Change / Reason	Date

Prefix:
 RC = Running Change
 RF = Running Change / Field Fix
 FF = Field Fix

VOLKSWAGEN

GROUP OF AMERICA

Mr. Jim Snyder
Compliance and Innovative Strategies Division
Office of Mobile Sources
U. S. Environmental Protection Agency
2000 Traverwood Drive
Ann Arbor, MI 48105

Leonard W. Kata Name
Manager Title
EEO Department
248-754-4204 Phone
248-754-4207 Fax
leonard.kata@vw.com E-Mail

May 28, 2015 Date

Subject: MY 2016 Audi Light Duty Vehicle Initial Application for Emissions
Certification for Test Group GVGAJ02.0AUF with Evaporative Families:
GVGAR0140AA1.

VOLKSWAGEN GROUP OF AMERICA, INC.
3800 HAMLIN ROAD
AUBURN HILLS, MI 48326
PHONE +1 248 754 5000

Dear Mr. Snyder,

We submit, with this letter, the model year 2016 Part 1 Application for Emissions
Certification for the following Test Group:

<u>Test Group</u>	<u>Standards</u>	<u>Sales Area</u>
GVGAJ02.0AUF	Tier 2 BIN 5 LEV-II ULEV	Federal California

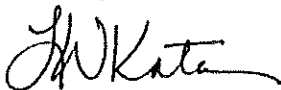
Copies of the Certification Fee filing form and OBD approval letter are contained in
sections 15 and 16 of the included electronic application.

All vehicles within this test group comply with all applicable regulations contained in
40 CFR Part 86 and the compliance statements contained in sections 8 and 14.

This submission constitutes our final application and the request for issuance of a
Certificate of Conformity.

If you have any questions with regard to this information please contact our office in
Auburn Hills at (248) 754-4224 or (248) 754-4219.

Sincerely,



Leonard W. Kata
Volkswagen Group of America, Inc.

Engineering and Environmental Office

Enclosure(s)

Section 15 Pg. 3	Other Information	Engine Code	R.CH-No.:	Revision Date
Test Group	GVGAJ02.0AUF	all		

ORVR Safety Application for Carry-over ORVR Systems

The information provided below is in accordance with EPA Dear Manufacturer Letter CCD-05-03 - Attachment A.

Name of current ORVR/Evaporative Family: GVGAR0140AA1

- 1.) Name of most recent previously certified ORVR/Evaporative Family from which the current family is being carried over:

FVGAR0140AA1

- 2.) Statement of No Substantial Changes:

There have been no substantial changes made from the previously certified ORVR system.

- 3.) List of changes that have been implemented:

a) none

- 4.) Statement of No In-Use Problems:

Audi has issued no defect reports, service notifications, emissions or safety recalls, campaigns, instructions or bulletins to dealers or field personnel and there are no changes in production procedure or components related to the ORVR system except as listed below.

a) none



U.S. Environmental Protection Agency
Motor Vehicle and Engine Compliance Program
On-Highway Fee Filing Form
For Certification Applications Received In Calendar Year 2015

Manufacturer Name Volkswagen Group of America, Inc.

Address 3800 Hamlin Road

City/State/Zip Code/Country Auburn Hills, Michigan 48326

On-Highway Certification Request Type (check one)

- ☒ LDV/LDT/MDPV/HDV (Chassis cert) FEDERAL (\$26,741) ☐ HDV EVAP-ONLY (\$563)
☐ LDV/LDT/MDPV/HDV (Chassis cert) CAL-ONLY (\$14,193) ☐ HDE CALIF-ONLY (\$563)
☐ HDE (Engine Dyno cert) FEDERAL (\$47,664) ☐ MOTORCYCLE (\$1,852)
☐ LD/MDPV/HDV ICI (\$76,399)

EPA standard family or test group:

G V G A J 0 2 . 0 A U F

Amount paid (U.S. Funds Only):

\$ 26,741.00

Enter the check number, or the statement "WIRE" or "ACH":

ACH

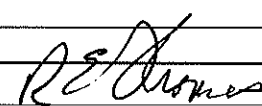
Reduced Fee Section (40 CFR §1027.120)

Reduced fee calculation (minimum initial payment \$750): Total number of vehicles/units covered: _____

Aggregate retail sales price of the vehicles/units: \$ _____ x 1% = \$ _____

Check box if an Independent Commercial Importer: ☐ List the VIN of imported vehicles/engines below:

Company Representative: Richard E Thomas

Signature: 

Title: Emission Cert Strategist

Phone/Fax: 248 754 4213

/ 248 754 4207

Date: 05/14/2015

E-mail Address: Richard.Thomas@VW.com

Submission of payments and forms:

- (1) Online: Forms may be found and submitted with or without payments online at www.Pay.gov.
(2) By mail: For check payments only, send checks and this form to:

Environmental Protection Agency
Motor Vehicle and Engine Compliance Program
P.O. Box 979032
St. Louis, MO 63197-9000

- (3) Transmit offline Wire payments to the New York Federal Reserve Bank. (See Instructions, p.2)
(4) Transmit offline ACH payments to the Federal Reserve Bank of Cleveland. (Instructions, p.2)
(5) Forms not submitted under (1) and (2) above can be sent as email attachments to Fees@epa.gov.
Forms and payments sent in ways other than the above may be delayed or ineffective. See the Instructions for sending checks and forms by private mail service (e.g., Federal Express).

The public reporting and recordkeeping burden for this collection of information is estimated to average 18 minutes per response. Send comments on EPA's need for this information, the accuracy of the provided burden estimate, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques, to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., N.W., Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed Form 3520-29 to this address.



Matthew Rodriguez
Secretary for
Environmental Protection

Air Resources Board

Mary D. Nichols, Chairman
9480 Telstar Avenue, Suite 4
El Monte, California 91731 www.arb.ca.gov



Edmund G. Brown Jr.
Governor

March 13, 2015

Reference No. E-15-053

Dr. Oliver Schmidt
General Manager
Engineering and Environmental Office
Volkswagen Group of America, Incorporated
3800 Hamlin Road
Auburn Hills, Michigan 48326

SUBJECT: Approval of Volkswagen's (VW) On-Board Diagnostics II (OBD II) System
for 2016 Model Year Test Groups GVGAV02.0AUB and GVGAJ02.0AUF.

Dear Dr. Schmidt:

The Air Resources Board's (ARB) On-Board Diagnostics Branch has received the OBD II system description submitted by VW for the 2016 model year test groups listed above. Representations made in the application indicate that the system is compliant with the OBD II regulation. Therefore, ARB approves the 2016 model year system design with no deficiencies.

Should you have questions or comments regarding this letter, please have your staff contact Peter Ho, Air Resources Engineer, at (626) 459-4392.

Sincerely,

For Michael Regenfuss, Chief
On-Board Diagnostics Branch
Emissions Compliance, Automotive Regulations and Science Division

cc: Peter Ho
Air Resources Engineer
Emissions Compliance, Automotive Regulations and Science Division

*The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption.
For a list of simple ways you can reduce demand and cut your energy costs, see our website: <http://www.arb.ca.gov>.*

California Environmental Protection Agency

VOLKSWAGEN

GROUP OF AMERICA

Mr. Mike Regenfuss, OBD Branch Chief
California Air Resources Board
Emissions Compliance, Automotive Regulations
And Science Division (ECAR)
9480 Telstar Avenue
El Monte, CA 91731

Attn: Engineering Studies Branch

Leonard W. Kata Name
Manager – Emis. Cert. Title
EEO Department
248-754-4204 Phone
248-754-4207 Fax
leonard.kata@vw.com E-Mail

January 20, 2015 Date

Subject: MY 2016 Volkswagen Group Approval Request for OBD Group GVGAAUB and
Test Groups GVGAV02.0AUB, GVGAJ02.0AUF.

Dear Mr. Regenfuss,

Volkswagen herewith requests approval for the following model year 2016 **OBD Group**:

VOLKSWAGEN GROUP OF AMERICA, INC.
3800 HAMLIN ROAD
AUBURN HILLS, MI 48326
PHONE 41 248 754 5000

Related OBD Groups: GVGAAUB

Related Test Groups: GVGAV02.0AUB, GVGAJ02.0AUF

The following pages provide a detailed description for the above listed OBD and test groups.

If you have any questions with regard to this information please contact our office in Auburn Hills at (248) 754-4206 or (248) 754-4209.

Sincerely,



Leonard W. Kata

Volkswagen Group of America, Inc.
Engineering and Environmental Office

COVER LETTER for OBD submission and request for MY2016 approval

OBD Group	GVGA-AUB
Test group(s)	GVGAV02.0AUB, GVGAJ02.0AUF
Representative Test group	GVGAV02.0AUB
MY / SOP	MY 2016 / SOP: CW 22/2015
Vehicles	Audi A4, A5, Q5
Emission Control System	DFI / TC / CAC / TWC / WR-HO2S / HO2S DFI / TC / CAC / TWC / WR-HO2S / HO2S / FFS (FFV)
Standard	LEVII ULEV; Tier 2 Bin 5
Transmission Group	GVGA-CVTN (c/o) (submitted with this application Section C4) GVGA-ZF8 (c/o) (submitted with GVGA-NUA)
OBD Demonstration	was performed for MY 2008
PVE Testing	j(1)and j(3) selected for MY 2016 PVE (j)(2) test
Technical OBD Description	Attached with this submission
Application submission	Carry over from FVGA-AUB
IUMPR	Evap system 0.02inch leak: min ratio = 0,52 Catalyst, O2, RO2 Sensor, VVT, CCP: min ratio = 0,336
OBD Phase-In: Enhanced CSER RO2S transient time check FO2S Symmetric Asymmetric Cylinder imbalance monitor	supported (e)(11.2.2) supported response & transition time, (e)(7.2.2)(C) supported (e)(7.2.1)(A) supported (new for MY 2016) supported close the gap step 3
MY14 OBD approval	Reference No. E-13-086;
Deficiency MY15	Idle speed monitor (removed MY 2015) Fuel pump monitor (removed MY 2015)
Concern MY15	none
Approval request for	CW12 / 2015

ECM

Changes in OBD monitors MY2014 → MY2015	Yellow marked application data are changed
Idle speed monitor	In order to remove the deficiency the torque stability criteria are not active for the idle speed monitor.
Catalyst and RO2S monitor P0420, P013E, P013F	Enable criteria are optimized. (integrated exhaust mass flow instead of only time after engine start

ECM

Changes in OBD monitors MY2015 → MY2016	Yellow marked application data are changed
Cylinder imbalance monitor	Supported for MY 2016
Fuel level monitor	Updated threshold for gradient check

ECM

Changes in OBD monitors MY2016 → MY2017	none
Remark	MY 2017: Audi will introducing the Audi A4 successor Limousine. Only the Audi Cabriolet, Coupe will be built with this engines. Also The Audi Q5 will be produced until CW 17/2016. There will be no OBD changes from MY 2016 to MY 2017 and VW is will ask for MY 2017 OBD approval with the same application.
MJ 2017 Test Groups	HVGAV02.0AUB, HVGAJ02.0AUF

Gasoline		List DTC of monitor that detects the following failure malfunction:									
Component/System		MONITORING REQUIREMENTS									
Catalyst	(e)(1.2.2) Conversion Efficiency										
	P0420										
Heated Catalyst	(e)(2.2) Heating Performance										
	n.a.										
Misfire	(e)(3.2.1) Catalyst Damage Misfire	(e)(3.2.2) FTP Level Misfire: First 1000-revs	(e)(3.2.2) FTP Level Misfire: 4 x 1000-revs								
	P0300, P0301, P0303, P0304, P0302	P0300, P0301, P0303, P0304, P0302	P0300, P0301, P0303, P0304, P0302								
Evaporative System	(e)(4.2.2)(A) Purge Flow	(e)(4.2.2)(B) 0.040" Leak Check	(e)(4.2.2)(C) 0.020" Leak Check	(e)(4.2.5) 0.090" Leak Check in Lieu of 0.040"							
	P0441	n.a.	P0456	n.a.							
Secondary Air	(e)(5.2.3) Insufficient Flow Emission Threshold	(e)(5.2.4) Functional Monitor In Lieu of Emission Threshold									
	n.a.	n.a.									
Fuel System	(e)(6.2.1)(A) Emission Threshold	(e)(6.2.1)(B) Secondary Fuel Trim Emission Threshold	(e)(6.2.1)(C) Air-fuel ratio cylinder imbalance	(e)(6.2.2) Adaptive Limits Reached	(e)(6.2.3) Secondary Fuel Trim Adaptive Limits Reached	(e)(6.2.4) Fails to Enter Closed Loop					
	P0171, P0172	n.a.	P219C, P219E, P219F, P219D	P2187, P2188, P2177, P2178	P2096, P2097	n.a.					
Upstream O2/Exhaust Gas Sensor	(e)(7.2.1)(A) Emission Threshold	(e)(7.2.1)(B) Open Circuit	(e)(7.2.1)(B) Out-of-Range High	(e)(7.2.1)(B) Out-of-Range Low	(e)(7.2.1)(C) Feedback: Slow/fails to Enter, Default OL	(e)(7.2.1)(D) Sufficient for Other Diagnostics	(e)(7.2.3)(A) Heater Performance	(e)(7.2.3)(B) Heater Circuit Continuity			
	P0133	P2251, P2243, P2626, P2237	P0132	P0131	P2414, P0130, P2195, P2196	n.a.	P0135	P0031, P0030, P0032			
Downstream O2/Exhaust Gas Sensor	(e)(7.2.2)(A) Emission Threshold	(e)(7.2.2)(B) Open Circuit	(e)(7.2.2)(D) Out-of-Range High	(e)(7.2.2)(D) Out-of-Range Low	(d)(2.2.3) & (e)(6.2.4) Feedback: Slow/fails to Enter, Default OL	(e)(7.2.2)(C) Sufficient for Other Diagnostics	(e)(7.2.3)(A) Heater Performance	(e)(7.2.3)(B) Heater Circuit Continuity			
	P013A, P2271, P013F, P013E, P013B, P2270	P0140	P0138	P0137	n.a.	n.a.	P0141	P0037, P0036, P0038			
EGR	(e)(8.2.1) Low Flow Emission Threshold	(e)(8.2.1) High Flow Emission Threshold	(e)(8.2.2) Functional Monitor in Lieu of Emission Threshold								
	n.a.	n.a.	n.a.								
Crankcase Ventilation	(e)(9.2.2) Disconnection										
	P2279										
Engine Cooling System	(e)(10.2.1) Time to Reach Threshold Temp	(e)(10.2.2)(A) ECT Open Circuit	(e)(10.2.2)(A) ECT Out-of-Range High	(e)(10.2.2)(A) ECT Out-of-Range Low	(e)(10.2.2)(B) Time to Reach Closed Loop	(e)(10.2.2)(C) ECT Stuck Below Highest Minimum Enable Temp	(e)(10.2.2)(D) ECT Stuck Above Lowest Maximum Enable Temp				
	P2181	P0118	P0117	P0118	n.a.	P3081	P0116				
Cold Start Strategy	(e)(11.2.1)(A) Emission Threshold	(e)(11.2.1)(B) Functional Monitor in Lieu of Emission Threshold	(e)(11.2.2)(A) Phase-in Single Element Functional Monitor	(e)(11.2.2)(B) Phase-in Emission Threshold							
	n.a.	P053F, P052A	P13EA, P050B, P053F	n.a.							
VVT System	(e)(13.2.1) Target Error Emission Threshold	(e)(13.2.3) Target Error Functional Monitor in Lieu of Emission Threshold	(e)(13.2.2) Slow Response Emission Threshold	(e)(13.2.3) Slow Response Functional Monitor in Lieu of Emission Threshold							
	P0011	n.a.	P000A	n.a.							
Direct Ozone Reduction (DOR) System	(e)(14.2.1) Functional Monitor for <50% Std Credit	(e)(14.2.2) Emission Threshold Monitor for >50% Std Credit									
	n.a.	n.a.									
		List DTC of monitor used that detects the following failure mode:									
Monitor/System		Input Out-of-Range High	Input Out-of-Range Low	Input Open Circuit	Input Rationality Low	Input Rationality High	Input Other Rationality	Output Functional	Output Shorted High	Output Shorted Low	Output Open Circuit
Evaporative Emission (EVAP) Canister Purge Valve									P0459	P0458	P0444

Gasoline	List DTC of monitor that detects the following failure malfunction:									
Natural Vacuum Leak Detection (NVLD) Switch	P0453	P0452	P0450							
Natural Vacuum Leak Detection (NVLD) Switch						P0451				
Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor	P2025	P2025				P2025				
Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor						P2025				
Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor						P2025				
Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor						P2025				
Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor	P2027	P2026	P2024							
Fuel System						P230A, P230C, P230D, P230B				
Fuel Pump Control (FPC)							P0634			
Fuel Pump Control (FPC)								P025D	P025C	P025A
Fuel Injection Valves							P0201, P0203, P0204, P0202	P0262, P0268, P0271, P0265, P2146, P2149	P0261, P0267, P0270, P0264, P2146, P2149	P0201, P0203, P0204, P0202, P2146, P2149
Fuel Rail Pressure (FRP)	P0191									
Fuel Volume Regulator Control							P0087			
Fuel Volume Regulator Control								P2296	P2295	P2294
Fuel Volume Regulator Control							P12A4			
Fuel Rail Pressure (FRP) Sensor	P0190	P0192								
Fuel Rail Pressure (FRP) Sensor					P12A2					
Fuel Rail Pressure (FRP) Sensor				P12A1						
Fuel Volume Regulator HP Control							P2293			
Fuel Level Sensor						P0461				
Engine Coolant Temperature (ECT) Sensor						P0116				
Phase Sensor 1				P0342	P0343	P0341				
Variable Valve Timing (VVT) Intake Actuator								P2089	P2088	P0010
Camshaft Position (CMP) Intake Sensor				P0016	P0016					
Crankshaft Position (CKP) Sensor						P0321, P0322				
Barometric Pressure (BARO) Sensor						P0606				
Barometric Pressure (BARO) Sensor	P0606	P0606	P0606							
Barometric Pressure (BARO) Sensor	P0606	P0606								
Ambient Air Temperature (AAT) Sensor						P0071				
Mass Air Flow (MAF) Sensor	P0103	P0102	P0100							
Mass Air Flow (MAF) Sensor				P0101	P0101	P0101				
Turbocharger (TC) Boost Pressure Sensor	P0238	P0237	P0238							
Turbocharger (TC) Boost Pressure Sensor						P0236				
Turbocharger (TC) Bypass Actuator								P0246	P0245	P0243
Turbocharger (TC) Boost Pressure Control							P0234, P0299			
Throttle Position Sensor (TPS)	P0123	P0122				P0121				
Throttle Position Sensor (TPS) 2		P0222			P0223	P0221				
Throttle Actuator							P2106, P2101	P2106	P2106	P2106
Throttle Actuator							P0638			
Throttle Actuator							P0638			
Accelerator Pedal Position (APP) Sensor 1	P2123	P2122								
Accelerator Pedal Position (APP) Sensor 1 and 2						P2138				
Accelerator Pedal Position (APP) Sensor 2	P2128	P2127								
Idle Speed Control (ISC)							P050A			
Idle Speed Control (ISC)							P050A			
Idle Speed Control (ISC)							P0506, P0507			
Idle Speed Control (ISC)							P0506			
Engine Components Supply Voltage Relay								P0659	P0658	P0657
Intake Air (IA) System							P0068			
Intake Air Temperature (IAT) Sensor						P0111				
Intake Air Temperature (IAT) Sensor @ Manifold	P0113	P0112	P0113							
Intake Manifold Runner Control (IMRC) Position Sensor	P2014	P2016								

Gasoline	List DTC of monitor that detects the following failure malfunction:									
Intake Manifold Runner Control (IMRC) Actuator							P2015			
Intake Manifold Runner Control (IMRC) Actuator								P2010	P2009	P2008
Vehicle Speed Sensor (VSS)				P0501						
Vehicle Speed Sensor (VSS)					U0415					
Knock Control							P0324			
Knock Sensor (KS)				P0327	P0328					
Knock Sensor (KS)				P0327	P0328					
Ignition Control (IC)							P0606			
Ignition Coil								P2301, P2307, P2310, P2304	P2300, P2306, P2309, P2303	P0351, P0353, P0354, P0352
Engine Off Time				P150A	P150A					
Engine Control Module (ECM): 5V Supply Voltage							P0606			
Engine Control Module (ECM): Analog / Digital Converter							P0606			
Engine Control Module (ECM): EEPROM							P0606			
Engine Control Module (ECM): Electronic Throttle Control Module							P0606			
Engine Control Module (ECM): Electronic Throttle Control Module							P0606			
Engine Control Module (ECM): Electronic Throttle Control Module							P0606			
Engine Control Module (ECM): Electronic Throttle Control Module							P0606			
Engine Control Module (ECM): Electronic Throttle Control Module							P060C			
Engine Control Module (ECM): Electronic Throttle Control Module							P060C			
Engine Control Module (ECM): Electronic Throttle Control Module							P0606			
Engine Control Module (ECM): Electronic Throttle Control Module							P060C			
Engine Control Module (ECM): Electronic Throttle Control Module							P060C			
Engine Control Module (ECM): Electronic Throttle Control Module							P0169			
Engine Control Module (ECM): Electronic Throttle Control Module							P0169			
Engine Control Module (ECM): Electronic Throttle Control Module							P0169			
Engine Control Module (ECM): Electronic Throttle Control Module							P0606			
Engine Control Module (ECM): Electronic Throttle Control Module							P0169			
Engine Control Module (ECM): Electronic Throttle Control Module							P0606			
Engine Control Module (ECM): Electronic Throttle Control Module							P060C			
Engine Control Module (ECM): Electronic Throttle Control Module							P060C			
Engine Control Module (ECM): Fuel Injection Valves							P062B			
Engine Control Module (ECM): Production Mode							U1103			
Engine Control Module (ECM): Sensor Integrated Circuit							P0606			
Engine Control Module (ECM): Sensor Reference Circuit A							P0641			
Engine Control Module (ECM): Sensor Reference Circuit B							P0651			
Engine Control Module (ECM): Transport Mode							P169A			
Engine Control Module (ECM): Sensor Reference Circuit C							P0697			
Engine Control Module (ECM): WDA							P0606			
Engine Control Module (ECM): WDA							P0606			

Gasoline		List DTC of monitor that detects the following failure malfunction:								
Engine Control Module (ECM): RAM							P0606			
COM: Ambient Air Temperature (AAT) Sensor						U0422, U0323				
COM: Ambient Air Temperature (AAT) Sensor	P0070	P0072	P0070							
COM: Body Control Module (BCM)						U0140				
COM: Brake System Control Module (BSCM)						U0415				
COM: Brake System Control Module (BSCM)						U0121				
COM: Fuel Level (FL) Sensor 1	P0463	P0462	P0463			P0462				
COM: Fuel Level (FL) Sensor 2	P2068	P2067	P2068			P2067				
COM: Gateway						U0146				
COM: Gateway						U0447				
COM: Instrument Panel Cluster (IPC)						U0423				
COM: Instrument Panel Cluster (IPC)						U0155				
CAN: Powertrain							U0002			
COM: Transmission Control Module (TCM)						U0302				
COM: Transmission Control Module (TCM)						U0402				
COM: Transmission Control Module (TCM)						U0101				
COM: Vehicle Speed Sensor (VSS)						U0415				
CAN: Powertrain							U0001			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value		Secondary Parameters	Enable Condition		Monitoring Time Length	MIL Illum.
Catalyst System	P0420	measure of OSC compared to OSC of borderline catalyst	<u>measured OSC / OSC of borderline catalyst</u> measured OSC EWMA filter value for catalyst	< 1.00	[-]	<u>general:</u> delta exhaust gas mass flow relative delta exhaust gas mass flow exhaust gas mass flow, lower range exhaust gas mass flow, upper range modeled exhaust gas temp. dynamic time delay modeled exhaust gas temp. in catalyst system, lower range modeled exhaust gas temp. in catalyst system, upper range minimum modeled exhaust gas temp. in catalyst system for time filtered minimum modeled exhaust gas temp. in catalyst system for time engine load evap purge loading engine speed deviation between lambda setpoint and actual lambda value lambda control lambda control AAT number of checks, no step change suspicion number of checks, step change suspicion O2S front O2S rear AIR no misfire O2S front plausibility check in current driving cycle O2S front response monitoring in current driving cycle <u>Case 1:</u> time after engine start or time after dew point and	< 45.00 [kg/h] n.a. [-] 15.00...125.00 [kg/h] 60.00...155.00 [kg/h] < 35.0 [K] > 10.0 [s] 520...710 [°C] 680...845 [°C] > 400 [°C] > 60.0 [s] > 0 [°C] >= 0.2 [s] 15.00...125.30 [%] not high 1120...3600 [rpm] < 3.00 [%] closed loop not at min or max limit > -11 [°C] 1 [-] 6 [-] ready ready not active ready ready n.a. n.a.	66.0 [s] once / DCY	1 DCY	

						integrated exhaust gas mass Case 2: time after engine start or time after dew point or integrated exhaust gas mass	n.a. > 340 [s] n.a. >= 5.0 [kg]			
Misfire	P0300	crankshaft speed fluctuation (single or multiple)	emission threshold misfire rate (MR)	> 1.50	[%]	case 1:			1000 [rev] continuous	2 DCY
	P0301		catalyst damage misfire rate (MR)	> 5.00...20.00	[%]	ECT@cylinder block @ start	>= -11	[°C]	200 [rev] continuous	immediately
	P0303				case 2:					
	P0304				ECT@cylinder block @ start then activation if ECT@cylinder block	< -11 > 20	[°C] [°C]			
	P0302				general: active after engine start time after engine start engine torque fuel cut off rough road	idle - 150 [rpm] + 1 camshaft [rev] > 0.0 >= 0 not active not detected	[s] [Nm]			
Evaporative Emission (EVAP) System	P0441	function check	deviation lambda control	< 7.00	[%]	Choice of:			18.2 [s] once / DCY	2 DCY
			and deviation idle control	< 30.00	[%]	integrated EVAP purge mass or integrated air mass and Choise of: ECT @ cylinder block or substitute ECT and general: engine speed engine speed engine speed deviation engine load deviation engine load AAT barometric pressure lambda control	> 150.0...170.0 > 3.20...8.00 > 44 > 80 idle < n.a < 200 0.00...50.02 =< 3.00 > 4 > 72.00 closed loop	[g] [kg] [°C] [°C] [rpm] [rpm] [rpm] [%] [%] [°C] [kPa]		
Evaporative Emission (EVAP) Canister Purge Valve	P0458	short to ground	signal voltage	< 2.74...3.26	[V]	evap purge valve	commanded off		0.5 [s] continuous	2 DCY
	P0444	open circuit	signal voltage	4.70...5.40	[V]	evap purge valve	commanded off		0.5 [s] continuous	2 DCY
	P0459	short to battery plus	signal current	driver stage internal value		evap purge valve engine speed	commanded on >= 0	 [rpm]	0.5 [s] continuous	2 DCY
Evaporative Emission (EVAP)	P0456	functional check	natural vacuum leak detection	open		ignition	off		once / DCY	2 DCY

System Very Small Leak			(NVLD) switch position			fuel level fuel temperature drop for time AAT barometric pressure difference between barometric pressure @ stop and barometric pressure @ start time since ignition off	< 85.10 [%] >= 6 [K] >= 1.0 [h] >= 4 [°C] > 73.00 [kPa] < 0.65 [kPa] > 1.5; < 10 [h]		
Natural Vacuum Leak Detection (NVLD) Switch	P0452	short to ground	signal voltage	< 0.24 [V]	case 1: ignition engine running case 2: ignition NVLD (EVAP-System) diagnostic mode	on running off active		0.5 [s] continuous	2 DCY
	P0450	open circuit	signal voltage	0.39...0.55 [V]	case 1: ignition engine case 2: ignition NVLD (EVAP-System) diagnostic mode	on running off active		0.5 [s] continuous	2 DCY
	P0453	short to battery plus	signal voltage	> 3.0 [V]	case 1: ignition engine case 2: ignition NVLD (EVAP-System) diagnostic mode	on running off active		0.5 [s] continuous	2 DCY
Natural Vacuum Leak Detection (NVLD) Switch	P0451	functional check: stuck close	natural vacuum leak detection (NVLD) switch position	closed	ignition fuel level fuel temperature increase for time AAT barometric pressure time since ignition off time since ignition off	off < 85.10 [%] >= 5 [K] >= 1.0 [h] >= 4 [°C] > 73.00 [kPa] > 1200 [s] < 24 [h]		once / DCY	2 DCY
Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor	P2025	out of range high	case 1: smart module temperature	> 119 [°C]	case 1: ignition	off		300 [s] continuous	2 DCY
			case 2: smart module temperature	> 119 [°C]	NVLD (EVAP-System) diagnostic mode case 2: ignition engine	active on running		30 [s] continuous	2 DCY

	P2025	out of range low	smart module temperature	< -39 [°C]	engine off time ECT @ cylinder block IAT @ manifold IAT cross check ECT cross check	> 28800.0 [s] > -14 [°C] > -14 [°C] finished finished	1 [s] once / DCY	2 DCY
	P2025	cross check	diff. between smart temperature and ECT@cylinder block and diff. between smart temperature and IAT@manifold	>= 25.5 [K] >= 25.5 [K]	engine off time IAT cross check ECT cross check	> 28800.0 [s] finished finished	1 [s] once / DCY	2 DCY
Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor	P2025	signal dynamic check	gradient smart temperature	> 20 [K/10min]	ignition fuel level NVLD (EVAP-System) diagnostic mode	off < 85.10 [%] active	300 [s] once / DCY	2 DCY
Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor	P2025	communication with Smart Temperature Sensor	response time and number of checks or security bit and number of checks	> 1000 [ms] > 3.00 [-] incorrect > 3.00 [-]	<u>case 1:</u> ignition engine <u>case 2:</u> ignition (during ECM keep alive-time)	 on running off	5.0 [s] continuous	2 DCY
Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor	P2025	functional check	resetcounter	> 3.00 [-]	ignition fuel level engine last ECM keep alive mode	on < 85.10 [%] running finished	once / DCY	3 DCY
	P2025	functional check	time difference between ECM and smart module	> 3.0 [s]	ignition	off	3.0 [s] once / DCY	2 DCY
Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor	P2026	short to ground	signal voltage	< 2.74...3.26 [V]	<u>case 1:</u> ignition <u>case 2:</u> ignition (during ECM keep alive-time)	on off	0.5 [s] continuous	2 DCY
	P2024	open circuit	signal voltage	4.70...5.40 [V]	<u>case 1:</u> ignition <u>case 2:</u> ignition (during ECM keep alive-time)	on off	0.5 [s] continuous	2 DCY
	P2027	short to battery plus	signal current	driver stage internal value	<u>case 1:</u> ignition <u>case 2:</u> ignition (during ECM keep alive-time)	on off	0.5 [s] continuous	2 DCY

Fuel System	P219C P219E P219F P219D	A/F cylinder imbalance: out of range high	individual cylinder fuel correction based on measured enleanment for dedicated engine roughness increase	> 1.12 [-]	<u>general:</u> camshaft adjustment crankshaft adaptation rough road engine roughness signal engine speed engine load selected gear barometric pressure AAT ECT @ cylinder block modeled catalyst temperature electrical check of O2S front electrical check of O2S rear lambda control lambda set value catalyst heating ratio fuel mass from evap purge system to fuel mass through injectors integrated air mass misfire on currently lean shifted cylinder	not calibrated not calibrated not detected valid 1240...2240 [rpm] 30.80...87.80 [%] >= 7.00 [-] > 0.00 [kPa] > -48 [°C] 60...143 [°C] 350...880 [°C] completed completed closed loop 1 [-] not active < 0.30 [-] >= 3.00...16.50 [kg] not detected		20 (does not run in FTP) [s] once / DCY	2 DCY
Fuel System	P219C P219E P219F P219D	A/F cylinder imbalance: out of range low	individual cylinder fuel correction based on measured enleanment for dedicated engine roughness increase	< 0.89 [-]	<u>general:</u> camshaft adjustment crankshaft adaptation rough road engine roughness signal engine speed engine load selected gear barometric pressure AAT ECT @ cylinder block modeled catalyst temperature electrical check of O2S front electrical check of O2S rear lambda control lambda set value catalyst heating ratio fuel mass from evap purge system to fuel mass through injectors integrated air mass misfire on currently lean shifted cylinder	not calibrated not calibrated not detected valid 1240...2240 [rpm] 30.80...87.80 [%] >= 7.00 [-] > 0.00 [kPa] > -48 [°C] 60...143 [°C] 350...880 [°C] completed completed closed loop 1 [-] not active < 0.30 [-] >= 3.00...16.50 [kg] not detected		20 (does not run in FTP) [s] once / DCY	2 DCY

Fuel System	P230A P230C P230D P230B	A/F cylinder imbalance: back-stop monitor	cylinder misfire counter	> 15.00 [-]	general: camshaft adjustment crankshaft adaptation rough road engine roughness signal engine speed engine load selected gear barometric pressure AAT ECT @ cylinder block modeled catalyst temperature electrical check of O2S front electrical check of O2S rear lambda control lambda set value catalyst heating ratio fuel mass from evap purge system to fuel mass through injectors integrated air mass additional conditions: A/F cylinder imbalance monitor	not calibrated not calibrated not detected valid 1240...2240 [rpm] 30.80...87.80 [%] ≥ 7.00 [-] > 0.00 [kPa] > -48 [°C] 60...143 [°C] 350...880 [°C] completed completed closed loop 1 [-] not active < 0.30 [-] ≥ 3.00...16.50 [kg] active	20 (does not run in FTP) [s] once / DCY	2 DCY
Fuel System	P0171	system too lean	low pass filtered lambda controller output for time	> 23.00 [%] > 25.0 [s]	general: number of injections after engine start ECT @ cylinder block lambda control ethanol value and case 1: evap purge case 2: integrated EVAP purge mass case 3: evap purge controller limitation evap purge flow	≥ 200.00 [-] ≥ 55 [°C] closed loop n.a. [-] not active ≥ 0.0 [g] ≥ 15.94 [-] ≤ 0.00 [kg/h]	35.0 [s] continuous	2 DCY
	P0172	system too rich	low pass filtered lambda controller output for time	< -23.00 [%] > 25.0 [s]	general: number of injections after engine start ECT @ cylinder block lambda control high PCV purge load due to oil dilution ethanol value and case 1:	≥ 200.00 [-] ≥ 55 [°C] closed loop n.a. n.a. [-]	35.0 [s] continuous	2 DCY

						evap purge case 2: integrated EVAP purge mass case 3: evap purge controller limitation evap purge flow	not active >= 0.0 [g] >= 15.94 [-] <= 0.00 [kg/h]			
Fuel System	P2096	out of range low	I-part of 2nd lambda control loop	< -0.045 [-]		general: modeled exhaust gas temp. for time lambda control lambda control 2nd lambda control O2S front O2S rear O2S heater front O2S heater rear and integrated exhaust gas mass after the following mixture disturbances: time fuel cut off deviation engine load ECT @ cylinder block catalyst heating AIR lambda setpoint catalyst purge engine speed for time Disabling the offset adaptation after repeated transients within a short time: acceleration enrichment or deceleration enleanment then LSU offset adaptation stops if event counter and exhaust gas mass flow or exhaust gas mass flow within time	450...900 [°C] > 0.0 [s] closed loop not at min or max limit closed loop ready ready active active > 160.0 [g] > 0.5 [s] > 20.0 [%/rev] < 44 [°C] active active < 1; > 1 [-] active < 920 [rpm] > 15.0 [s] active active n/a [-] 25.00...250.00 [kg/h] 16.00...25.00 [kg/h] 15.0 [s]	152.6 [s] continuous	2 DCY	
	P2097	out of range high	I-part of 2nd lambda control loop	> 0.045 [-]		general: modeled exhaust gas temp. for time lambda control	450...900 [°C] > 0.0 [s] closed loop	152.6 [s] continuous	2 DCY	

						lambda control 2nd lambda control O2S front O2S rear O2S heater front O2S heater rear and integrated exhaust gas mass <u>after the following mixture disturbances:</u> time fuel cut off deviation engine load ECT @ cylinder block catalyst heating AIR lambda setpoint catalyst purge engine speed for time <u>Disabling the offset adaptation after repeated transients within a short time:</u> acceleration enrichment or deceleration enleanment <u>then</u> LSU offset adaptation stops if event counter and exhaust gas mass flow or exhaust gas mass flow within time	not at min or max limit closed loop ready ready active active > 160.0 [g] > 0.5 [s] > 20.0 [%/rev] < 44 [°C] active active < 1; > 1 [-] active < 920 [rpm] > 15.0 [s] active active n/a [-] 25.00...250.00 [kg/h] or 16.00...25.00 [kg/h] 15.0 [s]			
Fuel System	P2187	system too lean @ idle	adaptive value	> 5.02 [%]		case 1: integrated air mass ECT @ cylinder block case 2: integrated air mass minimum of: ECT @ cylinder block or ECT @ cylinder block general: number of injections after engine start engine speed engine load IAT @ manifold delta part load adaptation	<= 3.00 [kg] > 50 [°C] > 3.00 [kg] > 50 [°C] > 43...55 [°C] > 250 [-] 560...960 [rpm] 0...36 [%] < 90 [°C] completed	10.0 [s] continuous	2 DCY	

						lambda control evap purge valve high PCV purge load due to oil dilution	closed loop closed not detected			
P2188	system too rich @ idle	adaptive value	< -6.00	[%]	case 1: integrated air mass ECT @ cylinder block case 2: integrated air mass minimum of: ECT @ cylinder block or ECT @ cylinder block general: number of injections after engine start engine speed engine load IAT @ manifold delta part load adaptation lambda control evap purge valve high PCV purge load due to oil dilution	<= 3.00 [kg] > 50 [°C] > 3.00 [kg] > 50 [°C] > 43...55 [°C] > 250 [-] 560...960 [rpm] 0...36 [%] < 90 [°C] completed closed loop closed not detected	10.0 [s] continuous	2 DCY		
P2177	system too lean @ part load	adaptive value	> 26.00	[%]	case 1: integrated air mass ECT @ cylinder block case 2: integrated air mass minimum of: ECT @ cylinder block or ECT @ cylinder block general: number of injections after engine start engine speed engine load IAT @ manifold lambda control evap purge valve high PCV purge load due to oil dilution	<= 3.00 [kg] > 50 [°C] > 3.00 [kg] > 50 [°C] > 43...55 [°C] > 250 [-] 920...5000 [rpm] 23...244 [%] < 90 [°C] closed loop closed not detected	10.0 [s] continuous	2 DCY		
P2178	system too rich @ part load	adaptive value	< -26.00	[%]	case 1: integrated air mass ECT @ cylinder block case 2: integrated air mass minimum of: ECT @ cylinder block or	<= 3.00 [kg] > 50 [°C] > 3.00 [kg] > 50 [°C]	10.0 [s] continuous	2 DCY		

						ECT @ cylinder block general: number of injections after engine start engine speed engine load IAT @ manifold lambda control evap purge valve high PCV purge load due to oil dilution	> 43...55 [°C] > 250 [-] 920...5000 [rpm] 23...244 [%] < 90 [°C] closed loop closed not detected			
Fuel Pump Control (FPC)	P0634	over-temperature power stage	power stage temperature	> 150	[°C]	engine speed	> 80	[rpm]	0.5 [s] continuous	2 DCY
Fuel Pump Control (FPC)	P025C	short to ground	signal voltage	< 2.74...3.26	[V]				3.5 [s] continuous	2 DCY
	P025A	open circuit	signal voltage	4.70...5.40	[V]				0.5 [s] continuous	2 DCY
	P025D	short to battery plus	signal current	driver stage internal value					0.5 [s] continuous	2 DCY
Fuel Injection Valves	P0261	short to ground (low side)	signal current	driver stage internal value		engine speed	> 80	[rpm]	0.5 [s] continuous	2 DCY
	P0267 P0270 P0264									
	P2146	short to ground (high side)	signal current	driver stage internal value		engine speed	> 80	[rpm]	0.5 [s] continuous	2 DCY
	P2149									
	P0201	open circuit	signal current	driver stage internal value					0.5 [s] continuous	2 DCY
	P0203 P0204 P0202									
	P0262	short to battery plus (low side)	signal current	driver stage internal value		engine speed	> 80	[rpm]	0.5 [s] continuous	2 DCY
	P0268 P0271 P0265									
	P2146	short to battery plus (high side)	signal current	driver stage internal value		engine speed	> 80	[rpm]	0.5 [s] continuous	2 DCY
	P2149									
	P2146	coil winding (high side - low side)	signal current	driver stage internal value		engine speed	> 80	[rpm]	0.5 [s] continuous	2 DCY
	P2149									
	P0201	monitoring booster-time	internal logic	failure		engine speed	> 80	[rpm]	0.5 [s] continuous	2 DCY
P0203 P0204 P0202										
Fuel Rail Pressure (FRP)	P0191	out of range high	actual pressure	> 21.30	[MPa]	engine speed	1000...7000	[rpm]	3.0 [s] continuous	2 DCY

Fuel Volume Regulator Control	P0087	functional check: stuck open	pressure control activity and fuel trim activity and difference between target pressure vs. actual pressure	> 5.00 [MPa] 0.90...1.20 [-] > -16.38 [MPa]	engine speed engine load evap purge adaptation ECT @ cylinder block IAT @ manifold fuel cut off lambda control	1600...4000 [rpm] not calibrated [%] < 22.00 [-] >= 55 [°C] < 90 [°C] not active closed loop		5.0 [s] multiple	2 DCY	
Fuel Volume Regulator Control	P2295	short to ground	signal voltage	< 1.40 [V]	fuel control valve engine speed	commanded off >= 80 [rpm]		0.5 [s] continuous	2 DCY	
	P2294	open circuit	signal voltage	1.40...3.20 [V]	fuel control valve fuel pump	commanded off commanded on		0.5 [s] continuous	2 DCY	
	P2296	short to battery plus	signal voltage	> 3.20 [V]	fuel control valve engine speed	commanded on >= 80 [rpm]		0.5 [s] continuous	2 DCY	
Fuel Volume Regulator Control	P12A4	functional check: stuck close	pressure control activity and fuel trim activity and difference between target pressure vs. actual pressure	< -6.00 [MPa] 0.85...1.15 [-] < 16.38 [MPa]	engine speed engine load evap purge adaptation ECT @ cylinder block IAT @ manifold lambda control fuel cut off	600...900 [rpm] not calibrated [%] < 22.00 [-] >= 55 [°C] < 90 [°C] closed loop not active		5.0 [s] multiple	2 DCY	
Fuel Rail Pressure (FRP) Sensor	P0190	signal range check	signal voltage	> 4.90 [V]				0.5 [s] continuous	2 DCY	
	P0192	signal range check	signal voltage	< 0.20 [V]				0.5 [s] continuous	2 DCY	
Fuel Rail Pressure (FRP) Sensor	P12A2	rationality check inappropriately high	pressure control activity	< -0.07 [MPa]	engine speed	600...900 [rpm]		5.0 [s] multiple	2 DCY	
			and fuel trim activity and difference between target pressure vs. actual pressure	> 1.64 [-] -16.38...16.38 [MPa]	engine load evap purge adaptation ECT @ cylinder block IAT @ manifold lambda control fuel cut off target pressure	not calibrated [%] < 22.00 [-] >= 55 [°C] < 90 [°C] closed loop not active not calibrated [MPa]				
Fuel Rail Pressure (FRP) Sensor	P12A1	rationality check inappropriately low	pressure control activity and fuel trim activity and difference between target pressure vs. actual pressure	> 0.25 [MPa] < 0.85 [-] -16.38...16.38 [MPa]	engine speed engine load evap purge adaptation ECT @ cylinder block IAT @ manifold lambda control fuel cut off target pressure	1600...4000 [rpm] not calibrated [%] < 22.00 [-] >= 55 [°C] < 90 [°C] closed loop not active not calibrated [MPa]		5.0 [s] multiple	2 DCY	

Fuel Volume Regulator HP Control	P2293	functional check	difference between target pressure vs. actual pressure	< -1.50	[MPa]	time after engine start	> 13.0	[s]	3.5 [s] multiple	2 DCY
	P2293	functional check	difference between target pressure vs. actual pressure	> 1.50	[MPa]	time after fuel cut off fuel cut off catalyst heating fuel volume regulator control relative fuel mass	> 6.0 not active not active active 5.02...240.00	[s] [s] [s] [s] [%]	3.5 [s] multiple	2 DCY
Cold Start Monitoring Fuel Volume Regulator HP Control	P053F	functional check	difference between target pressure vs. actual pressure	< -1.50	[MPa]	time after engine start	> 13.0	[s]	3.5 [s] multiple	2 DCY
	P053F	functional check	difference between target pressure vs. actual pressure	> 1.50	[MPa]	fuel cut off time after fuel cut off catalyst heating fuel volume regulator control relative fuel mass	not active > 5.0 active active 5.02...240.00	[s] [s] [s] [s] [%]	3.5 [s] multiple	2 DCY
Fuel Level Sensor	P0461	plausibility check	difference between fuel consumption and fuel level changes	< -70.00; > 12.00	[l]	vehicle speed	not calibrated	[mph]	1.0 [s] multiple	2 DCY
						for time case 1: for tank full fuel level fuel consumption since last refueling or last plausibility check case 2: for tank not full fuel level fuel consumption since last refueling or last plausibility check	not calibrated > 96.00 >= 44.00 ≤ 96.00 ≥ 15.00	[s] [%] [l] [%] [l]		
Oxygen Sensors (O2S) front	P2414	signal range check (check for sensor at ambient air)	threshold 1: signal voltage	3.10...4.81	[V]	lambda set value O2S ceramic temp.	< 1.6 > 715	[-] [°C]	20.0 [s] multiple	2 DCY
			threshold 2: signal voltage Depending on gain factor, that actual is used for sensor characteristic, the threshold is	2.50...3.10	[V]	fuel cut off heater control if low fuel signal then wait only AIR system AIR	not active closed loop > 120.0 not active	[s] [s]		

page 19 of 236

	P2196	out of range low	delta lambda of 2nd lambda control loop	< -0.070	[-]	general: modeled exhaust gas temp. for time lambda control 2nd lambda control O2S front O2S rear O2S heater front O2S heater rear and integrated exhaust gas mass after the following mixture disturbances: time fuel cut off deviation engine load ECT @ cylinder block catalyst heating AIR lambda setpoint catalyst purge engine speed for time Disabling the offset adaptation after repeated transients within a short time: acceleration enrichment or deceleration enleanment and then LSU offset adaptation stops if event counter and exhaust gas mass flow or exhaust gas mass flow within time and case 1: 1st lambda control loop 2nd lambda control loop or case 2: 1st lambda control loop O2S front O2S rear voltage or case 3: 1st lambda control loop O2S front	450...900 [°C] > 0.0 [s] closed loop closed loop ready ready ready ready > 160.0 [g] > 0.5 [s] > 20.0 [%/rev] < 44 [°C] active active < 1; > 1 [-] active < 920 [rpm] > 15.0 [s] active active n.a. [-] 25.00...250.00 [kg/h] 16.00...25.00 [kg/h] 15.0 [s] not at min or max limit active at min limit < 1.0 [-] < 0.4 [V] at max limit > 1.0 [-]	152.6 [s] multiple	2 DCY
--	-------	------------------	---	----------	-----	---	---	-----------------------	-------

						O2S rear voltage	> 0.6 [V]			
Oxygen Sensors (O2S) front	P0133	response rate monitoring, area ratio and gradient ratio	<u>SYMMETRIC FAULT:</u>			O2S front - min. operation temperatur is reached	> 715 [°C]		53.0 [s] once / DCY	2 DCY
			difference of R2L area ratio vs. L2R area ratio	-0.40...0.40 [-]		O2S front - time since operation readiness	> 10.0 [s]			
			max value of both counters for area ratio R2L and L2R	>= 4 times		engine speed	920...4000 [rpm]			
			<u>Delay Time:</u>			engine load	15.00...100.01 [%]			
			gradient ratio	>= 0.00 [-]		gradient of engine load	<= 14.02 [%]			
			lower value of both area ratios R2L and L2R	< 0.30 [-]		exhaust system lag time calculation	0.1...0.3 [s]			
			<u>Transient Time:</u>			gradient of exhaust system lag time calculation	<= 0.08 [s]			
			gradient ratio	>= 0.00 [-]		heat supply	n.a.			
			gradient ratio	<= 0.45 [-]		ECT @ cylinder block	>= 30.0 [°C]			
			lower value of both area ratios R2L and L2R	< 0.30 [-]		catalyst temperature	>= 400 [°C]			
			or			A/F-Ratio stoichiometric	<= 0.40 [-]			
			lower value of both gradient ratios R2L and L2R	< 0.00 [-]		relative fuel amount from wall-applied compensation and evap purge				
			<u>ASYMMETRIC FAULT:</u>			time since last measurement	> 3.0 [s]			
			difference of R2L area ratio vs. L2R area ratio	< -0.40; > 0.40 [-]		gear shifting	n.a.			
			values of both counters for area ratio R2L and L2R	>= 4 times		evap purge	not active			
			<u>Delay Time:</u>			or				
gradient ratio	>= 0.00 [-]		evap purge	> 6.5 [g]						
lower value of both area ratios R2L and L2R	< 0.30 [-]		1st lambda control loop	active						
<u>Transient Time:</u>			for time	> 2.0 [s]						
gradient ratio	>= 0.00 [-]		2nd lambda control loop	not active						
gradient ratio	<= 0.45 [-]		forced lambda oscillation	not active						
lower value of both area ratios R2L and L2R	< 0.30 [-]		AIR	not active						
or			tank leakage detection	not active						
lower value of both gradient ratios R2L and L2R	< 0.00 [-]		diagnosis evap purge system	not active						
			fuel cut off for any cylinders	not active						
			open circuit pump current (IP)	ready						
			exhaust gas mass after end of scavenging	n.a. [g]						
			<u>only Flex fuel systems without ethanol sensor:</u>							
			ethanol concentration adaptation	not active						
Oxygen Sensors (O2S) front	P0130	out of range	O2S ceramic temp.	< 640 [°C]	modeled exhaust gas temp.	> 300 [°C]	12.0 [s] multiple	2 DCY		
					fuel cut off	not active				
Oxygen Sensors (O2S) front	P2251	open circuit virtual mass (VM)	O2S voltage signal front	1.45...1.53 [V]	modeled exhaust gas temp.	< 750 [°C]	25.0 [s] continuous	2 DCY		

			and internal resistance	> 1000.00	[Ohm]	no fuel cut off heater control	> 2.0 [s] active			
	P2243	open circuit nernst voltage (UN)	O2S voltage signal front and internal resistance	< 0.30; > 3.25	[V]	heater control	active		20.0 [s] continuous	2 DCY
	P2626	open circuit adjustment voltage (IA)	O2S voltage signal front	> 4.81	[V]	modeled exhaust gas temp. O2S ceramic temp. fuel cut off heater control if low fuel signal then wait	< 750 [°C] > 715 [°C] active closed loop > 120.0 [s]	2.0 [s] continuous	2 DCY	
	P2237	open circuit pump current (IP)	O2S voltage signal front and difference between maximum and minimum value of O2S voltage signal front and delta lambda controller or lambda control at min or max limit	1.49...1.51 < 32.00 > 0.10	[V] [V] [-]	O2S ceramic temp. lambda modulation lambda control heater control <u>if stepwise change lambda- setpoint</u> commanded delta lambda step	> 715 [°C] > 0.01 [-] closed loop closed loop 0.10 [-]	5.0 [s] continuous	2 DCY	
			O2S voltage signal front and difference between maximum and minimum value of O2S voltage signal front and no reaction on commanded stepwise change of lambda- setpoint <> 1	1.49...1.51 < 32.00	[V] [V]			3.0 [s] continuous	2 DCY	
	P0132	signal range check	<u>short to battery</u> virtual mass (VM) or nernst voltage (UN) or adjustment voltage (IA) or adjustment voltage (IP)	> 3.25 > 4.40 > 7.00 > 7.00	[V] [V] [V] [V]			10.0 [s] continuous	2 DCY	
	P0131	signal range check	<u>short to ground</u> virtual mass (VM) or nernst voltage (UN) or adjustment voltage (IA) or adjustment voltage (IP)	< 1.75 < 1.50 < 0.30 < 0.30	[V] [V] [V] [V]			10.0 [s] continuous	2 DCY	

Oxygen Sensors (O2S) Heater front	P0031	short to ground	signal voltage	0.0...3.26 [V]	time after engine start	> 5 [s]	0.5 [s] continuous	2 DCY
	P0030	open circuit	signal voltage	4.70...5.40 [V]	O2S heater front time after engine start	commanded off > 5 [s]	0.5 [s] continuous	2 DCY
	P0032	short to battery plus	signal current	driver stage internal value	O2S heater front time after engine start	commanded off > 5 [s]	0.5 [s] continuous	2 DCY
Oxygen Sensors (O2S) Heater front	P0135	out of range high	O2S ceramic temp.	< 715 [°C]	modeled exhaust gas temp.	> 300 [°C]	55.0 [s] multiple	2 DCY
			and heater duty cycle	> 90.00 [%]	heater control	active		
	P0135	rationality check (sensor heating up)	O2S ceramic temp.	< 715 [°C]	ECT@cylinder block @ start	> -11 [°C]	40.0 [s] once / DCY	2 DCY
Oxygen Sensors (O2S) rear	P013F	check of differential delay time at lean to rich transition	arithmetic filtered max differential delay time at lean to rich transition	n.a. [s]	O2S front out of range	ready, no fault	40.0 [s] once / DCY	1 DCY
			EWMA filtered max differential delay time at lean to rich transition	> 1.5 [s]	general:			
			and number of checks	>= 3.00 [-]	heat supply integrated exhaust gas mass after O2S rear ready integrated exhaust gas mass during catalyst temperature exhaust gas mass flow change of exhaust gas mass flow engine speed O2S rear stuck lean / stuck rich vehicle speed and time after engine start or exhaust gas mass scavenging: scavenging-rate integrated air mass lambda control lambda set value for time binary sensor front fitted O2S front voltage linear sensor front fitted	n.a. [kJ] > 0.50 [kg] > 0.20 [kg] 500...830 [°C] 40.00...140.00 [kg/h] -65.00...65.00 [kg/h] 800...5000 [rpm] ready, no fault >= 0 [mph] >= 234.0 [s] >= 3.25 [kg] n.a. [-] > n.a. [kg/h] n.a. >= n.a. [-] n.a. [s] n.a. [V]		

						diff. between lambda setpoint value (combustion chamber) vs. expected lambda (front sensor fitting) diff. between lambda set value and actual lambda value CASE 1: (Diagnosis in Catalyst State full) time after engine start - threshold 1 O2S rear voltage gradient O2S rear voltage integrated O2 mass or - threshold 2 O2S rear voltage CASE 2: (Diagnosis at Fuel Feed Restart) integrated exhaust gas mass integrated exhaust gas mass exhaust gas mass during catalyst temperature exhaust gas mass flow gradient of exhaust gas mass flow engine speed O2S rear voltage after fuel cut off for time and O2 mass	<= 0.01 [-] <= 0.04 [-] n.a. n.a. n.a. n.a. n.a. > 0.50 [kg] > 0.50 [kg] > 0.20 [kg] 500...830 [°C] 6.00...140.00 [kg/h] -3276.80...3276.70 [kg/h] 520...4000 [rpm] < 0.15 [V] >= 2.0 [s] > 1000 [mg]		
P013E	check of differential delay time at rich to lean transition	arithmetic filtered max differential delay time at rich to lean transition or EWMA filtered max differential delay time at rich to lean transition and number of checks	n.a. [s] > 1.0 [s] >= 3.00 [-]	O2S front out of range heat supply integrated exhaust gas mass after O2S rear ready integrated exhaust gas mass during catalyst temperature exhaust gas mass flow change of exhaust gas mass flow engine speed O2S rear stuck lean / stuck rich vehicle speed and time after engine start or exhaust gas mass	ready, no fault n.a. [kJ] > 0.50 [kg] > 0.20 [kg] 500...830 [°C] 40.00...140.00 [kg/h] -65.00...65.00 [kg/h] 800...5000 [rpm] ready, no fault >= 0 [mph] >= 234.0 [s] >= 3.25 [kg]	40.0 [s] once / DCY	1 DCY		

						scavenging: scavenging-rate integrated air mass lambda control lambda set value before for integrated exhaust gas mass lambda set value for time binary sensor front fitted O2S front voltage linear sensor front fitted diff. between lambda setpoint value (combustion chamber) vs. expected lambda (front sensor fitting) diff. between lambda set value and actual lambda value - threshold 1 O2S rear voltage gradient O2S rear voltage integrated negative O2 mass or - threshold 2 O2S rear voltage	n.a. [-] > n.a [kg/h] n.a n.a [-] >= n.a [kg] < n.a [-] >= n.a [s] n.a. [V] <= 0.01 [-] <= 0.04 [-] >= 0.75 [V] -0.01...0.02 [V/s] >= 450 [mg] > 1.25 [V]			
Oxygen Sensors (O2S) rear	P013A	check of differential transient time at fuel cut off	arithmetic filtered max differential transient time at fuel cut off or EWMA filtered max differential transient time at fuel cut off and number of checks	not calibrated [s] >= 0.7 [s] >= 3.00 [-]	[s] [s] [-]	O2S front out of range O2S rear fuel cut off engine speed integrated exhaust gas mass since O2S rear ready exhaust gas mass flow modeled exhaust gas temperature fitted position O2S rear change of exhaust gas mass flow time fuel cut off if time fuel cut off then disabling till next fuel cut off binary sensor front fitted O2S front voltage linear sensor front fitted deviation between expected and measured lambda value or lambda value	ready, no fault ready active 560...6000 [rpm] > 0.04 [kg] > 6.00 [kg/h] >= 450 [°C] -250.00...150.00 [kg/h] < 90.0 [s] > 90.0 [s] 20.0 [s] not equipped [V] < 6.00 [-] > 0.00 [-]	10 [s] once / DCY	1 DCY	

						additional conditions: time after fuel cut off at first cylinder O2S rear voltage before start of measurement O2S rear target voltage end of measurement or integrated O2 mass during fuel cut off time delay case 1: (with scavenging) if scavenging-rate then disabling until scavenging-rate and integrated air mass case 2: (without scavenging) integrated air mass engine	 >= 1.5 [s] > 0.52 [V] <= 0.18 [V] >= 2800 [mg] 1.0 [s] not calibrated [-] not calibrated [-] not calibrated [kg] > 0.00 [kg] running		
	P013B	check of differential transient time at fuel feed restart	arithmetic filtered max differential transient time at fuel feed restart or EWMA filtered max differential transient time at fuel feed restart and number of checks	not calibrated [s] >= 0.7 [s] >= 3.00 [-]		O2S front out of range O2S rear fuel feed restart engine speed integrated exhaust gas mass since O2S rear ready exhaust gas mass flow modeled exhaust gas temperature fitted position O2S rear change of exhaust gas mass flow if time fuel cut off then disabling till next fuel feed restart additional conditions: O2S rear voltage before start of measurement O2S rear target voltage end of measurement or integrated negative O2 mass during catalyst purge time delay	ready, no fault ready active 560...6000 [rpm] > 0.04 [kg] > 20.00 [kg/h] >= 580 [°C] -20.00...50.00 [kg/h] > 90.0 [s] 20.0 [s] < 0.15 [V] >= 0.65 [V] >= 2800 [mg] 2.0 [s]	10 [s] once / DCY	1 DCY

page 27 of 236

						(during fuel cut off) modeled exhaust gas temperature fitted position O2S rear O2S front lambda value (for wide range sensor) O2S front voltage (for binary sensor) fuel cut off integrated O2 mass during fuel cut off time delay	340...840 [°C] n.a. [s]		
	P2270	stuck lean	sensor voltage	< 0.76 [V]	O2S rear integrated exhaust gas mass after O2S rear ready injection valve engine <u>if</u> integrated exhaust gas mass <u>or</u> error suspicion <u>then</u> enabling lambda ramp slope of the lambda ramp target lambda of the lambda ramp exhaust gas mass during target lambda reached <u>if</u> time fuel cut off <u>then disabling for</u> time delay after fuel cut off <u>additional conditions</u> scavenging-rate integrated exhaust gas mass split factor DFI/MFI modeled exhaust gas temperature fitted position O2S rear engine speed vehicle speed lambda controller output within time lambda controller adaptation mass air flow within time	ready >= 0.20 [kg] commanded on running >= 5.00 [kg] set 0.10 [1/s] 0.72 [-] >= 0.18 [kg] <= 0.72 [-] > 2.0 [s] 2.0 [s] n.a. n.a. n.a. [-] 340...840 [°C] 800...7000 [rpm] >= 0 [mph] n.a. [-] n.a. [s] n.a. 20.00...200.00 [kg/h] 0.0 [s]	30.0 [s] once / DCY	2 DCY	
Oxygen Sensors (O2S) rear	P0137	O2S signal check - circuit continuity (short to ground, core connection signal wires)	signal voltage for time and difference of sensor voltage with	< 0.06 [V] > 3.0 [s] < 0.01 [V]	<u>case 1: sensor ready for operation</u> sensor voltage or sensor voltage	 ≤ 0.40 [V] 0.50...1.26 [V]		3.0 [s] multiple	2 DCY

			load pulse and voltage without load pulse (mean value of 3 measurements)			<u>case 2: sensor theoretical ready for operation</u> for time sensor sufficient heated up if exhaust temperature for time or heater power for time <u>general:</u> engine running dew point exceeded fuel cut off catalyst purge	> 12.0 [s] >= 700 [°C] > 18.0 [s] >= 50.00 [%] > 18.0 [s] not active not active			
P0138	O2S signal check - out of range high (short to battery plus)	signal voltage for time	> 1.26 [V] > 5.0 [s]		<u>case 1: sensor ready for operation</u> sensor voltage or sensor voltage <u>case 2: sensor theoretical ready for operation</u> for time sensor sufficient heated up if exhaust temperature for time or heater power for time <u>general:</u> engine running dew point exceeded lambda set value	<= 0.40 [V] 0.50...1.26 [V] > 12.0 [s] >= 700 [°C] > 18.0 [s] >= 50.00 [%] > 18.0 [s] > 0.995 [-]	5.0 [s] multiple		2 DCY	
P0140	O2S signal check - circuit continuity (sensor signal line open circuit)	signal voltage for time and difference of sensor voltage with load pulse and voltage without load pulse (mean value of 3 measurements)	0.40...0.60 [V] > 3.0 [s] >= 2.80 [V]		<u>case 1: sensor ready for operation</u> sensor voltage or sensor voltage <u>case 2: sensor theoretical ready for operation</u> for time sensor sufficient heated up if exhaust temperature for time or heater power for time <u>general:</u> engine running dew point exceeded	<= 0.40 [V] 0.50...1.26 [V] > 12.0 [s] >= 700 [°C] > 18.0 [s] >= 50.00 [%] > 18.0 [s]	30.0 [s] multiple		2 DCY	
P0140	O2S signal check - circuit continuity (sensor ground line open circuit)	internal resistance and exhaust temperature	> 40000.00 [Ohm] > 600 [°C]		<u>case 1: sensor ready for operation</u> sensor voltage or	<= 0.40 [V]	30.0 [s] multiple		2 DCY	

						sensor voltage <u>case 2: sensor theoretical ready for operation</u> for time sensor sufficient heated up if exhaust temperature for time or heater power for time <u>general:</u> engine running dew point exceeded valid Ri-measurements	0.50...1.26 [V] > 12.0 [s] >= 700 [°C] > 18.0 [s] >= 50.00 [%] > 18.0 [s] > 10 times		
Oxygen Sensors (O2S) Heater rear	P0037	short to ground	signal voltage	< 2.74...3.26 [V]	engine speed	= 0 [rpm]	0.5 [s] continuous	2 DCY	
	P0036	open circuit	signal voltage	4.70...5.40 [V]	O2S heater rear	commanded off			
					engine speed	> 0 [rpm]	0.5 [s] continuous	2 DCY	
					O2S heater rear	commanded off			
P0038	short to battery plus	signal current	driver stage internal value	engine speed	= 0 [rpm]	0.5 [s] continuous	2 DCY		
				O2S heater rear	commanded on				
Oxygen Sensors (O2S) Heater rear	P0141	out of range	internal resistance	> 810.00...4560.00 [Ohm]	modeled exhaust gas temp.	250...700 [°C]	15.0 [s] multiple	2 DCY	
					engine shut-off-time (during ECM keep alive-time after ignition off)	> 60.0 [s] < 300.0 [s]			
					number of checks	10.00 [-]			
					fuel cut off heater	not active commanded on			
Positive Crankcase Ventilation (PCV)	P2279	<u>rationality</u> survey of the lambda controller in a defined measurement window	threshold to detect a defective system and ratio of the time "System defective" during the measurem. window to the whole duration of the measurem. window	> 1.45 [-] > 0.60 [-]	time after engine start	> 60.0 [s]	16.0 [s] multiple	2 DCY	
					engine load	< 40.01 [%]			
					mass air flow	< 6553.50 [kg/h]			
					ECT @ cylinder block	> 50 [°C]			
					IAT @ manifold	< 100 [°C]			
					lambda control value	> -5.00 [%]			
					lambda set value	0.95...1.05 [-]			
					vehicle speed	< 6 [mph]			
					lambda control	active			
					engine speed	idle			
barometric pressure	> 72.80 [kPa]								
purge valve	closed								
Engine Cooling System	P2181	cooling system performance not in the expected range	cooling system temperature too low after a sufficient mass air flow integral	< 55...80 [°C]	<u>monitor entry conditions:</u>		0 (Unified 1000.0) [s] once / DCY	2 DCY	
					ECT@cylinder block @ start and AAT	-7...60 [°C] -7...3004 [°C]			

						or IAT @ manifold <u>begin of air mass integration:</u> ECT @ cylinder block <u>conditions for diagnosis:</u> mass air flow delta barometric pressure delta AAT and accum. time required or accum. integrated air mass <u>accumulation enable if</u> fuel cut off or engine load or engine load <u>start of fault decision:</u> integrated air mass <u>conditions at fault decision:</u> (average values since start) mass air flow (lower threshold) mass air flow (upper threshold) vehicle speed (lower threshold) vehicle speed (upper threshold)	n.a. [°C] > 30 [°C] < 3276.70 [kg/h] < 1.70 [kPa] < 3003.6 [K] < 40.0...250.0 [s] n.a. [kg] active > 399.99 [%] < -399.99 [%] > 4.50...15.00 [kg] >= 23.00...80.00 [kg/h] ≤ 50.00...180.00 [kg/h] >= 21...23 [mph] ≤ 75 [mph]		
Engine Coolant Temperature (ECT) Sensor	P0116	cross check	diff. between ECT@cylinder block and IAT@manifold @ start (depending on engine off time) and diff. between IAT@manifold and AAT @ start (depending on engine off time) and diff. between AAT and ECT@cylinder block @ start (depending on engine off time)	> 24.8 [K] < 24.8 [K] > 24.8 [K]	engine off time <u>Blockheater</u> ECT@cylinder block @ start minus ECT @ condition: time after engine start <u>solar radiation case 1:</u> AAT @ start minus AAT @ condition: vehicle speed for time <u>solar radiation case 2:</u> IAT @ manifold @ start minus IAT @ condition: vehicle speed for time	> 8.00 [h] < 1.5 [K] 60.0 [s] ≤ 5.3 [K] > 25 [mph] > 30.0 [s] ≤ 5.3 [K] > 25 [mph] > 30.0 [s]	0 [s] once / DCY	2 DCY	

Engine Coolant Temperature Sensor @ Cylinder Block	P3081	rationality check	diff. between reference model temperature and measured ECT@cylinder block	> 9.8	[K]				4.0 [s] continuous	2 DCY
Engine Coolant Temperature Sensor @ Cylinder Block	P0117	short to ground	ECT @ cylinder block	> 140	[°C]				2.0 [s] continuous	2 DCY
	P0118	short to battery / open circuit	ECT @ cylinder block	< -40	[°C]				2.0 [s] continuous	2 DCY
	P0116	stuck high / low - no change on signal	diff. between max. ECT@cylinder block and min. ECT@cylinder block	< 1.5	[K]	ECT@cylinder block @ start	50...140	[°C]	117.0 [s] once / DCY	2 DCY
						without substitute ECT driving condition H: vehicle speed mass air flow (lower threshold) mass air flow (upper threshold) or fuel cut off for time required frequency driving condition L: vehicle speed mass air flow (lower threshold) mass air flow (upper threshold) for time required frequency	n.a. > -48 25...75 4.00 36.00...152.00 active > 40.0 1 times 0...6 4.00 4.00...180.00 > 25.0 3 times	[°C] [°C] [mph] [kg/h] [kg/h] [s] times		
P0116	stuck in range	no change on signal and signal in range (lower threshold) signal in range (upper threshold)	< 1.5 > 89 < 110	[K] [°C] [°C]	engine off time ECT@cylinder block @ start substitute ECT driving condition H: vehicle speed mass air flow (lower threshold) mass air flow (upper threshold) for time required frequency driving condition L: vehicle speed mass air flow (lower threshold) mass air flow (upper threshold) for time required frequency	> 9900.0...15600.0 < 89; > 110 > -48 25...75 4.00 36.00...152.00 > 40.0 once 0...6 4.00 4.00...180.00 > 25.0 3 times	[s] [°C] [°C] [mph] [kg/h] [kg/h] [s] [mph] [kg/h] [kg/h] [s] times	117.0 [s] once / DCY	2 DCY	

Phase Sensor 1	P0343	rationality check	signal voltage and crankshaft signals	permanently high 8 [-]					0.5 [s] continuous	2 DCY
	P0342	rationality check	signal voltage and crankshaft signals	permanently low 8.00 [-]					0.5 [s] continuous	2 DCY
	P0341	rationality check	signal pattern defect counter	incorrect 12.00 [-]					0.5 [s] continuous	2 DCY
Variable Valve Timing (VVT) Intake Actuator	P000A	slow response	difference between target position vs. actual position for time and adjustment angle	> 8.00 [°CRK] > 1.3...2.9 [s] >= 2.50 [°CRK]	time after engine start engine speed modeled oil temperature frequency (normal operation)	> 3.0...10.0 [s] 920...6000 [rpm] -48...143 [°C] 4 times			14.0 [s] multiple	2 DCY
	P0011	target error	difference between target position vs. actual position for time and adjustment angle	> 8.00 [°CRK] > 1.3...2.9 [s] < 2.50 [°CRK]	time after engine start engine speed modeled oil temperature frequency (normal operation)	> 3.0...10.0 [s] 920...6000 [rpm] -48...143 [°C] 4 times			14.0 [s] multiple	2 DCY
Variable Valve Timing (VVT) Intake Actuator	P2088	short to ground	signal voltage	< 2.74...3.26 [V]	camshaft actuator solenoid valve	commanded off			0.5 [s] continuous	2 DCY
	P0010	open circuit	signal voltage	4.70...5.40 [V]	camshaft actuator solenoid valve	commanded off			0.5 [s] continuous	2 DCY
	P2089	short to battery plus	signal current	driver stage internal value	camshaft actuator solenoid valve engine speed	commanded on >= 0 [rpm]			0.5 [s] continuous	2 DCY
Cold Start Monitoring	P052A	target error	difference between target position vs. actual position	> 12.00 [°CRK]	time after engine start engine speed modeled oil temperature commanded camshaft timing correction for catalyst heating	>= 15.0 [s] >= 0 [rpm] >= -13 [°C] active			3.5 [s] once / DCY	2 DCY
Camshaft Position (CMP) Intake Sensor	P0016	angular offset check	permissible deviation or permissible deviation	< -11.01 [°CRK] > 11.01 [°CRK]					20 [rev] multiple	2 DCY
Crankshaft Position (CKP) Sensor	P0321	rationality check	counted teeth vs. reference or monitoring reference gap	incorrect failure					1.5 [s] multiple	2 DCY
	P0322	signal activity check	camshaft signals and engine speed	> 3.00 [-] no signal					2.5 [s] multiple	2 DCY
Barometric Pressure (BARO) Sensor	P0606	plausibility check	signal gradient	> 7.50 [kPa/s]					3.0 [s] continuous	2 DCY

	P0606	plausibility check	signal gradient	< -7.50	[kPa/s]				3.0 [s] continuous	2 DCY
	P0606	plausibility check	diff. barometric sensor vs. last driving cycle and diff. barometric pressure vs. upper threshold model	> 15.00	[kPa]	time after engine start	< 5.0	[s]	3.0 [s] once / DCY	2 DCY
	P0606	plausibility check	diff. barometric sensor vs. last driving cycle and diff. barometric pressure vs. lower threshold model	> 15.00	[kPa]	time after engine start	< 5.0	[s]	3.0 [s] once / DCY	2 DCY
	P0606	plausibility check	diff. barometric sensor vs. last driving cycle and diff. barometric pressure vs. lower threshold model	< 2.00	[kPa]					
Barometric Pressure (BARO) Sensor	P0606	short to ground	signal voltage	< 0.20	[V]				3.0 [s] multiple	2 DCY
	P0606	short to battery / open circuit	signal voltage	> 4.80	[V]				3.0 [s] multiple	2 DCY
Barometric Pressure (BARO) Sensor	P0606	out of range high	measured barometric pressure	> 115.00	[kPa]				3.0 [s] continuous	2 DCY
	P0606	out of range low	measured barometric pressure	< 45.00	[kPa]				3.0 [s] continuous	2 DCY
Ambient Air Temperature (AAT) Sensor	P0071	cross check	diff. between ECT@cylinder block and IAT@manifold @ start (depending on engine off time) and diff. between IAT@manifold and AAT @ start (depending on engine off time) and diff. between AAT and ECT@cylinder block @ start (depending on engine off time)	< 24.8	[K]	engine off time	> 8.00	[h]	0 [s] once / DCY	2 DCY
				> 24.8	[K]	Blockheater ECT@cylinder block @ start minus	< 1.5	[K]		
				> 24.8	[K]	ECT @ condition: time after engine start solar radiation case 1:	60.0	[s]		
						AAT @ start minus AAT @ condition: vehicle speed for time solar radiation case 2: IAT @ manifold @ start minus IAT @ condition: vehicle speed for time	<= 5.3	[K]		
							> 25	[mph]		
							> 30.0	[s]		
Mass Air Flow (MAF) Sensor	P0102	out of range low	MAF sensor signal	< 66	[μs]	engine speed	> 20	[rpm]	0.2 [s] continuous	2 DCY
	P0103	out of range high	MAF sensor signal	> 4500	[μs]	engine speed	> 20	[rpm]	0.2 [s] continuous	2 DCY
	P0100	internal check	MAF sensor signal	0	[μs]	engine speed	> 20	[rpm]	0.2 [s] continuous	2 DCY

Mass Air Flow (MAF) Sensor	P0101	rationality check mass air flow	mass air flow vs. lower threshold model	< 0...417	[kg/h]	camshaft revolutions	> 150.00	[-]	2.0 [s] continuous	2 DCY
						time after engine start	> 0.5	[s]		
	P0101	rationality check mass air flow	mass air flow vs. upper threshold model	> 39...873	[kg/h]	camshaft revolutions	> 150.00	[-]	2.0 [s] continuous	2 DCY
						time after engine start	> 0.5	[s]		
	P0101	rationality check load survey	load calculation	> 23.00	[%]	engine speed	920...5000	[rpm]	2.0 [s] continuous	2 DCY
			and fuel system (mult.)	< -23.00	[%]	ECT @ cylinder block	> 55	[°C]		
						IAT @ manifold	< 90	[°C]		
						mass air flow	0...450	[kg/h]		
	P0101	rationality check load survey	load calculation	< -23.00	[%]	engine speed	920...5000	[rpm]	2.0 [s] continuous	2 DCY
			and fuel system (mult.)	> 23.00	[%]	ECT @ cylinder block	> 55	[°C]		
						IAT @ manifold	< 90	[°C]		
						mass air flow	0...450	[kg/h]		
Turbocharger (TC) Boost Pressure Sensor	P0237	short to ground	signal voltage	< 0.20	[V]	engine speed	> 80	[rpm]	0.2 [s] continuous	2 DCY
	P0238	short to battery / open circuit	signal voltage	> 4.88	[V]	engine speed	> 80	[rpm]	0.2 [s] continuous	2 DCY
						throttle position	< 11.50	[%]		
Turbocharger (TC) Boost Pressure Sensor	P0236	plausibility check	diff. boost pressure signal vs. barometric sensor signal	> 24.20	[kPa]	engine speed	< 1000	[rpm]	2.0 [s] multiple	2 DCY
						throttle position	< 11.50	[%]		
	P0236	plausibility check	diff. boost pressure signal vs. barometric sensor signal	< --5.80	[kPa]	engine speed	< 1000	[rpm]	2.0 [s] multiple	2 DCY
						throttle position	< 11.50	[%]		
Turbocharger (TC) Bypass Actuator	P0245	short to ground	signal voltage	< 2.74...3.26	[V]	boost pressure control valve	commanded off		0.5 [s] continuous	2 DCY
						engine speed	>= 0	[rpm]		
	P0243	open circuit	signal voltage	> 4.70...5.40	[V]	boost pressure control valve	commanded off		0.5 [s] continuous	2 DCY
						engine speed	>= 0	[rpm]		
	P0246	short to battery plus	signal current	driver stage internal value		boost pressure control valve	commanded on		0.5 [s] continuous	2 DCY
						engine speed	>= 0	[rpm]		
Turbocharger (TC) Boost Pressure Control	P0234	rationality check high	diff. set value boost pressure vs. actual boost pressure value	> 20.00...128.00	[kPa]	barometric pressure	> 73.00	[kPa]	1.5 [s] multiple	2 DCY

	P0299	rationality check low	diff. set value boost pressure vs. actual boost pressure value (filtered)	> 15.00	[kPa]	engine speed	> 2200...2800	[rpm]	6.0 [s] multiple	2 DCY
						barometric pressure	> 73.00	[kPa]		
						diff. set value boost pressure vs. basic boost pressure value	> 20.00	[kPa]		
						boost pressure control	active			
						turbo charger bypass valve	closed			
Throttle Position Sensor (TPS)	P0122	out of range low	signal voltage	< 0.20	[V]				0.1 [s] multiple	2 DCY
	P0123	out of range high	signal voltage	> 4.81	[V]				0.1 [s] multiple	2 DCY
	P0121	rationality check	TPS1-TPS2 and actual TPS1-calc.value or TPS1 - calc.value	> 5.10...6.30 > actual TPS2-calc.value > 9.00	[%] [%]	engine speed	> 480	[rpm]	0.3 [s] multiple	2 DCY
Throttle Position Sensor (TPS) 2	P0222	out of range low	signal voltage	< 0.20	[V]				0.1 [s] multiple	2 DCY
	P0223	out of range high	signal voltage	> 4.81	[V]				0.1 [s] multiple	2 DCY
	P0221	rationality check	TPS1-TPS2 and actual TPS2-calc.value or TPS2 - calc.value	> 5.10...6.30 > actual TPS1-calc.value > 9.00	[%] [%]	engine speed	> 480	[rpm]	0.3 [s] multiple	2 DCY
Throttle Actuator	P2106	short to battery plus/ short to ground	internal check	failed					0.5 [s] continuous	2 DCY
	P2106	open circuit	internal check	failed		duty cycle	> 80	[%]	0.5 [s] continuous	2 DCY
						or deviation throttle value angles vs. throttle value setpoint	> 4.00...50.00	[%]		
	P2106	temperatur / current monitoring	internal check	failed					0.5 [s] continuous	2 DCY
	P2106	functional check	internal check	failed					0.5 [s] continuous	2 DCY
	P2101	signal range check	duty cycle and ECM power stage	> 80 no failure	[%] [%]				5.0 [s] continuous	2 DCY
	P2101	rationality check	deviation throttle value angles vs. throttle value setpoint	> 4.00...50.00	[%]				0.5 [s] continuous	2 DCY
Throttle Actuator	P0638	rationality check open movement	time to open over reference point	> 0.6	[s]	ignition	on		0 [s] multiple	2 DCY
			and deviation to reference point	< -1.5	[%]	engine speed vehicle speed	<= 300 <= 0	[rpm] [mph]		

						ECT @ cylinder block IAT @ manifold	>= 5 [°C] >= 5 [°C]		
	P0638	rationality check open movement	time to close below reference point and deviation to reference point	> 0.3 [s] > 1.0 [%]		ignition engine speed vehicle speed ECT @ cylinder block IAT @ manifold	on <= 300 [rpm] <= 0 [mph] >= 5 [°C] >= 5 [°C]	0 [s] multiple	2 DCY
Throttle Actuator	P0638	rationality check close movement	time to close to reference point and deviation to reference point	> 0.6 [s] > 2.88 [%]		engine speed vehicle speed ECT @ cylinder block IAT @ manifold Case 1: ignition Case 2: engine shut-off-time number of checks	0 [rpm] 0 [mph] > -20 [°C] > -20 [°C] on > 0.5 [s] 3.00 [-]	5.0 [s] multiple	2 DCY
	P0638	signal range check @ mechanical stop low	TPS 1 signal voltage or TPS 2 signal voltage	< 0.40; > 0.80 [V] < 4.20; > 4.60 [V]		engine speed vehicle speed Case 1: ignition ECT @ cylinder block IAT @ manifold Case 2: engine shut-off-time ECT @ cylinder block IAT @ manifold	0 [rpm] 0 [mph] on -20...115 [°C] -20...143 [°C] > 0.5 [s] 5...115 [°C] 5...143 [°C]	0.3 [s] multiple	2 DCY
Accelerator Pedal Position (APP) Sensor 1	P2122	out of range low	signal voltage	< 0.65 [V]				0.50 [s] continuous	2 DCY
	P2123	out of range high	signal voltage	> 4.79 [V]				0.50 [s] continuous	2 DCY
Accelerator Pedal Position (APP) Sensor 1 and 2	P2138	rationality check	signal voltage sensor 1 vs. 2	> 0.14...0.70 [V]		signal voltage sensor 1 signal voltage sensor 2	> 445 [mV] > 445 [mV]	0.24 [s] continuous	2 DCY
Accelerator Pedal Position (APP) Sensor 2	P2127	out of range low	signal voltage	< 0.28 [V]				0.5 [s] continuous	2 DCY
	P2128	out of range high	signal voltage	> 2.43 [V]				0.5 [s] continuous	2 DCY
Cold Start Monitoring Idle Speed Control (ISC)	P050A	out of range low	engine speed deviation and RPM controller torque value	> 100 [rpm] n.a. [Nm]		catalyst heating vehicle speed barometric pressure torque safety limitation accelerator pedal for manual transmission: engine load	active 0 [mph] > 71.90 [kPa] not active released by driver n.a. [%]	9.0 [s] multiple	2 DCY

	P050A	out of range high	engine speed deviation and RPM controller torque value or integrated number of fuel cut off transitions	< -200 [rpm] n.a. [Nm] n.a. [-]	catalyst heating vehicle speed barometric pressure torque safety limitation accelerator pedal	active 0 [mph] > 71.90 [kPa] not active released by driver		9.0 [s] multiple	2 DCY
Cold Start Monitoring	P050A	plausibility check	integrated deviation of engine speed low and integrated deviation of engine speed high	> 2000 [rpm]	catalyst heating vehicle speed barometric pressure torque safety limitation accelerator pedal	active 0 [mph] > 71.90 [kPa] not active released by driver		3.0 [s] multiple	2 DCY
Idle Speed Control (ISC)									
Idle Speed Control (ISC)	P0506	out of range low	engine speed deviation and RPM controller torque value	> 80 [rpm] n.a. [Nm]	time after engine start vehicle speed barometric pressure ECT @ cylinder block IAT @ manifold torque safety limitation accelerator pedal for time for manual transmission: engine load	>= 0.0 [s] 0 [mph] > 71.90 [kPa] > -11 [°C] > -48 [°C] not active released by driver > 0.0 [s] < 19.99...63.00 [%]		9.0 [s] multiple	2 DCY
	P0507	out of range high	engine speed deviation and RPM controller torque value or integrated number of fuel cut off transitions	< -80 [rpm] n.a. [Nm] >= 4.00 [-]	time after engine start vehicle speed barometric pressure ECT @ cylinder block IAT @ manifold torque safety limitation accelerator pedal for time	>= 0.0 [s] 0 [mph] > 71.90 [kPa] > -11 [°C] > -48 [°C] not active released by driver > 0.0 [s]		9.0 [s] multiple	2 DCY
Idle Speed Control (ISC)	P0506	plausibility check	integrated deviation of engine speed low and integrated deviation of engine speed high	> 2000 [rpm]	time after engine start vehicle speed barometric pressure ECT @ cylinder block IAT @ manifold torque safety limitation accelerator pedal for time	>= 0.0 [s] 0 [mph] > 71.90 [kPa] > -11 [°C] > -48 [°C] not active released by driver > 0.0 [s]		3.0 [s] multiple	2 DCY
Engine Components Supply Voltage Relay	P0658	short to ground	signal voltage	< 2.74...3.26 [V]	supply voltage relay	commanded off		0.50 [s] continuous	2 DCY
	P0657	open circuit	signal voltage	4.70...5.40 [V]	supply voltage relay	commanded off		0.50 [s] continuous	2 DCY
	P0659	short to battery plus	signal current	driver stage internal value	supply voltage relay	commanded on		0.50 [s] continuous	2 DCY
Intake Air (IA) System	P0068	load survey below threshold	plausibility with fuel system		engine speed	920...5000 [rpm]			

			load calculation	< -50.00 [%]	ECT @ cylinder block	> 55 [°C]	29.8 [s] multiple	2 DCY
	P0068	load survey above threshold	<u>plausibility with fuel system</u> load calculation	> 50.00 [%]	IAT @ manifold mass air flow ratio manifold pressure to barometric pressure evap purge valve lambda control	< 90 [°C] 0.00...3000.00 [kg/h] < 0.90 [-] closed closed loop		
					engine speed ECT @ cylinder block	920...5000 [rpm] > 55 [°C]	29.8 [s] multiple	2 DCY
					IAT @ manifold mass air flow ratio manifold pressure to barometric pressure evap purge valve lambda control	< 90 [°C] 0.00...3000.00 [kg/h] < 0.90 [-] closed closed loop		
Intake Air Temperature (IAT) Sensor	P0111	cross check	diff. between ECT@cylinder block and IAT@manifold @ start	> 24.8 [K]	engine off time	> 8.00 [h]	0 [s] once / DCY	2 DCY
			(depending on engine off time) and		<u>Blockheater</u>			
			diff. between IAT@manifold and AAT @ start	> 24.8 [K]	ECT@cylinder block @ start minus	< 1.5 [K]		
			(depending on engine off time) and		ECT @ condition: time after engine start	60.0 [s]		
			diff. between AAT and ECT@cylinder block @ start (depending on engine off time)	< 24.8 [K]	<u>solar radiation case 1:</u> AAT @ start minus AAT @ condition: vehicle speed for time	<= 5.3 [K] > 25 [mph] > 30.0 [s]		
					<u>solar radiation case 2:</u> IAT @ manifold @ start minus IAT @ condition: vehicle speed for time	<= 5.3 [K] > 25 [mph] > 30.0 [s]		
Intake Air Temperature (IAT) Sensor @ Manifold	P0112	short to ground	signal voltage	< 0.16 [V]			2.0 [s] continuous	2 DCY
	P0113	short to battery / open circuit	signal voltage	> 4.48 [V]	ECT@cylinder block @ start or time after engine start ECT @ cylinder block vehicle speed mass air flow	n.a. > 20.0 [s] >= 60 [°C] <= 6 [mph] <= 24.00 [kg/h]	2.0 [s] continuous	2 DCY
Intake Manifold Runner Control (IMRC) Position	P2016	out of range low	signal voltage	< 0.25 [V]			0.3 [s] continuous	2 DCY

Sensor	P2014	out of range high	signal voltage	> 4.75	[V]				0.3 [s] continuous	2 DCY
Intake Manifold Runner Control (IMRC) Actuator	P2015	rationality check	difference between target position vs. actual position and actual position	> 25.00	[%]				1.5 [s] multiple	2 DCY
	P2015	rationality check high	difference between target position vs. actual position and actual position	< 0; > 100	[%]	flap	commanded on		1.5 [s] multiple	2 DCY
	P2015	rationality check low	difference between target position vs. actual position and actual position	> 25.00	[%]	flap	commanded off		1.5 [s] multiple	2 DCY
Intake Manifold Runner Control (IMRC) Actuator	P2009	short to ground	signal voltage	< 2.74...3.26	[V]	tumble flap	commanded off		0.5 [s] continuous	2 DCY
	P2008	open circuit	signal voltage	4.70...5.40	[V]	engine speed tumble flap	>= 0 [rpm] commanded off		0.5 [s] continuous	2 DCY
	P2010	short to battery plus	signal current	driver stage internal value		engine speed tumble flap	>= 0 [rpm] commanded on		0.5 [s] continuous	2 DCY
Vehicle Speed Sensor (VSS)	P0501	plausibility check	vehicle speed	< 2	[mph]	fuel cut off	active		2.0 [s] multiple	2 DCY
						engine speed ECT @ cylinder block	1520...4520 [rpm] > 40 [°C]			
Vehicle Speed Sensor (VSS)	U0415	out of range high	vehicle speed	> 202	[mph]				2.0 [s] continuous	2 DCY
Knock Control	P0324	internal hardware check	signal fault counter (combustion)	> 24.00	[-]	engine speed	> 2500	[rpm]	0.5 [s] multiple	2 DCY
			or signal fault counter (measuring window)	> 2.00	[-]					
Knock Sensor (KS)	P0327	short to ground Port B	signal voltage	< -0.70	[V]	engine speed	> 1000	[rpm]	0.5 [s] continuous	2 DCY
	P0327	short to ground Port A	signal voltage	< -0.70	[V]	engine speed	> 1000	[rpm]	0.5 [s] continuous	2 DCY
	P0328	short to battery plus Port B	signal voltage	> 1.00	[V]	engine speed	> 1000	[rpm]	0.5 [s] continuous	2 DCY
	P0328	short to battery plus Port A	signal voltage	> 1.00	[V]	engine speed	> 1000	[rpm]	0.5 [s] continuous	2 DCY
Knock Sensor (KS)	P0327	signal range check	lower threshold	< 0.58...1.60	[V]	engine speed	> 2000	[rpm]	3.0 [s] multiple	2 DCY
						ECT @ cylinder block engine load	> 56 [°C] > 42.80...60.00 [%]			

	P0328	signal range check	upper threshold	> 18.00...150.00 [V]	engine speed	> 2000 [rpm]	3.0 [s] multiple	2 DCY
					ECT @ cylinder block engine load	> 56 [°C] > 42.80...60.00 [%]		
Cold Start Monitoring Ignition Control (IC)	P13EA	<u>part load</u> ignition timing monitor	difference between commanded spark timing vs. actual value	> 20.00...45.00 [%]	general: commanded spark retard during catalyst heating catalyst heating for time fuel cut off barometric pressure idle condition vehicle speed diff. relative engine load vs. filtered relative engine load (for relative engine load dynamic detection) diff. engine speed vs. filtered engine speed (for engine speed dynamic detection) additional (only for hybrid): engine running and decoupled from powertrain	< 90.0 [%] active > 3.0 [s] not active > 72.00 [kPa] not active >= 3 [mph] ≤ 49.99 [%] ≤ 1000 [rpm] not equipped	10.0 [s] once / DCY	2 DCY
	P050B	<u>idle</u> ignition timing monitor	difference between commanded spark timing vs. actual value	> 20.00...35.00 [%]	general: commanded spark retard during catalyst heating catalyst heating for time fuel cut off barometric pressure idle condition diff. relative engine load vs. filtered relative engine load (for relative engine load dynamic detection) diff. engine speed vs. filtered engine speed (for engine speed dynamic detection) relative engine load conditions vehicle speed: vehicle speed or engine running and decoupled from powertrain (for hybrid)	< 80.0 [%] active > 3.0 [s] not active > 72.00 [kPa] active ≤ 49.99 [%] ≤ 1000 [rpm] ≤ 75.00...100.01 [%] = 0.0 [mph] not equipped	10.0 [s] once / DCY	2 DCY
Ignition Control (IC)	P0606	communication check	internal check	failure	engine speed	n.a. [rpm]	0.5 [s] continuous	2 DCY
	P0606	communication check	SPI communications check Identifier	failure	engine speed	n.a. [rpm]	0.5 [s] continuous	2 DCY

Ignition Coil	P2300	short to ground	signal current	driver stage internal value		engine speed	> 680	[rpm]	2.0 [s] continuous	2 DCY
	P2306 P2309 P2303									
	P0351	open circuit	signal current	driver stage internal value		engine speed	> 680	[rpm]	2.0 [s] continuous	2 DCY
	P0353 P0354 P0352		or internal check	failed						
	P2301	short to battery plus	signal voltage	> 5.10...7.10	[V]	engine speed	> 680	[rpm]	2.0 [s] continuous	2 DCY
	P2307 P2310 P2304									
Engine Off Time	P150A	comparison of engine off time from instrument cluster control unit with engine after run time	difference between engine-off-time and ECM after-run time	< -(12.0)	[s]	ignition	on		2 [s] once / DCY	2 DCY
						CAN	active			
	P150A	comparison of engine off time from instrument cluster control unit with engine after run time	difference between engine-off-time and ECM after-run time	> 12.0	[s]	ignition	on		2 [s] once / DCY	2 DCY
						(during ECM keep alive-time) CAN	active			
Engine Control Module (ECM): 5V Supply Voltage	P0606	internal hardware check	under-/ overvoltage detection						2.0 [s] continuous	2 DCY
Engine Control Module (ECM): Analog / Digital Converter	P0606	power-up calibration	check	failed		initialization phase	active		0.5 [s] continuous	2 DCY
	P0606	adc-cannel conversion	check	failed		initialization phase power-up calibration	active executed		0.5 [s] continuous	2 DCY
Engine Control Module (ECM): EEPROM	P0606	functional check	internal checksum	failed		ignition	on		0.5 [s] continuous	2 DCY
Engine Control Module (ECM): Electronic Throttle Control Module	P0606	function monitoring: A/D converter	comparison refence voltage with sensor voltage	incorrect					0.5 [s] continuous	2 DCY
Engine Control Module (ECM): Electronic Throttle Control Module	P0606	function monitoring: A/D converter	internal check	failed					0.5 [s] continuous	2 DCY
Engine Control Module (ECM): Electronic Throttle Control Module	P0606	function monitoring: A/D converter	test voltage / test pulse check	failed					0.5 [s] continuous	2 DCY
Engine Control Module (ECM): Electronic Throttle Control Module	P0606	function monitoring: torque	comparison with allowed engine torque	incorrect		internal engine speed	> 1240	[rpm]	0.5 [s] continuous	2 DCY

Engine Control Module (ECM): Electronic Throttle Control Module	P060C	function monitoring: StartStop	engine restart	failed					0.5 [s] continuous	2 DCY
Engine Control Module (ECM): Electronic Throttle Control Module	P060C	function monitoring: engine speed deviation	difference between calculated and internal engine speed	> 320	[rpm]	internal engine speed	> 520	[rpm]	0.5 [s] continuous	2 DCY
Engine Control Module (ECM): Electronic Throttle Control Module	P0606	function monitoring: coding	internal check	failed					0.5 [s] continuous	2 DCY
Engine Control Module (ECM): Electronic Throttle Control Module	P060C	function monitoring: ignition timing	internal check	failed					0.5 [s] continuous	2 DCY
Engine Control Module (ECM): Electronic Throttle Control Module	P060C	function monitoring: intern	system reaction	incorrect					0.5 [s] continuous	2 DCY
	P060C	function monitoring: injection rate limitation	system reaction	incorrect					0.5 [s] continuous	2 DCY
Engine Control Module (ECM): Electronic Throttle Control Module	P0169	function monitoring: injection	corrections of fuel mass on single cylinders	incorrect					2.0 [s] continuous	2 DCY
Engine Control Module (ECM): Electronic Throttle Control Module	P0169	function monitoring: injection	injection cut off	incorrect					2.0 [s] continuous	2 DCY
Engine Control Module (ECM): Electronic Throttle Control Module	P0169	function monitoring: lambda mode	internal check	failed		internal engine speed	> 1200	[rpm]	0.5 [s] continuous	2 DCY
Engine Control Module (ECM): Electronic Throttle Control Module	P0606	function monitoring: accelerator position	comparison voltage sensor1 with sensor2	implausible					0.5 [s] continuous	2 DCY
Engine Control Module (ECM): Electronic Throttle Control Module	P0169	function monitoring: mixture control	correction factor	incorrect		internal engine speed	> 1200	[rpm]	0.5 [s] continuous	2 DCY
	P0169	function monitoring: mixture control	fuel quantity	incorrect		internal engine speed	> 1200	[rpm]	0.5 [s] continuous	2 DCY
Engine Control Module (ECM): Electronic Throttle Control Module	P0606	monitoring module	function controller check	failed		SPI-interface	no failure		0.5 [s] continuous	2 DCY
			and monitoring module check	no failure						
Engine Control Module (ECM): Electronic Throttle Control Module	P0169	function monitoring: load plausibility	abs. difference between predicted and real air mass	> 11.30	[%]	engine speed	>= 1200	[rpm]	0.5 [s] continuous	2 DCY

Engine Control Module (ECM): Electronic Throttle Control Module	P060C	function monitoring: mixture control	measured FlexFuel-value	< 0.98; > 1.02	[%]	engine speed	>= 1200	[rpm]	0.5 [s] continuous	2 DCY
Engine Control Module (ECM): Electronic Throttle Control Module	P060C	function monitoring: mixture control	activation of additional injection valve for cold start after start or activation of additional injection valve for cold start while engine is running	> 15.2	[s]	engine speed	>= 1200	[rpm]	0.5 [s] continuous	2 DCY
Engine Control Module (ECM): Fuel Injection Valves	P062B	communication check	SPI communications check Identifier	failure		engine speed	> 80	[rpm]	2.2 [s] continuous	2 DCY
Engine Control Module (ECM): Production Mode	U1103	vehicle in production mode	production mode	active		for activation: during ECM keep alive-time after ignition off vehicle speed engine speed max trip mileage since initial vehicle start-up for hybrid: drive motor	< 3 [mph] 0 [rpm] < 62.15 [miles] off		0 [s]	1 DCY
Engine Control Module (ECM): Sensor Integrated Circuit	P0606	internal hardware check (electrical adjustment communication, voltage supply)	check	failed					0.50 [s] continuous	2 DCY
Engine Control Module (ECM): Sensor Reference Circuit A	P0641	short circuit	signal voltage	< 4.8; > 5.2	[V]				0.5 [s] continuous	2 DCY
Engine Control Module (ECM): Sensor Reference Circuit B	P0651	short circuit	signal voltage	< 4.8; > 5.2	[V]				0.5 [s] continuous	2 DCY
Engine Control Module (ECM): Transport Mode	P169A	vehicle in transport mode	transport mode	active		for activation: during ECM keep alive-time after ignition off vehicle speed engine speed max trip mileage since initial vehicle start-up production mode for hybrid: drive motor	< 3 [mph] 0 [rpm] < 62.15 [miles] not active off		0 [s]	1 DCY
Engine Control Module (ECM): Sensor Reference Circuit C	P0697	short circuit	signal voltage	< 4.8; > 5.2	[V]				0.5 [s] continuous	2 DCY

Engine Control Module (ECM): WDA	P0606	function monitoring: WDA	overvoltage detection	failure					0.5 [s] continuous	2 DCY
Engine Control Module (ECM): WDA	P0606	function monitoring: WDA	general cause	failure					0.5 [s] continuous	2 DCY
	P0606	function monitoring: WDA	internal check	failure					0.5 [s] continuous	2 DCY
Engine Control Module (ECM): RAM	P0606	controller RAM check	memory checksum error	detected		ECM initialization phase	active		none [-] once / DCY	2 DCY
COM: Ambient Air Temperature (AAT) Sensor	U0422	communication with BCM	AAT value (initialization)	FEh [-]		ignition	on		3.0 [s] continuous	2 DCY
						COM: BCM (Body Control Module)	no time out			
	U0323	communication with BCM	AAT value (module not encoded for AAT sensor)	FDh [-]		ignition	on		2.0 [s] continuous	2 DCY
COM: Ambient Air Temperature (AAT) Sensor	P0072	communication with AAT Sensor	AAT signal: short to ground	failure		time after ignition on	> 2.0 [s]		1.0 [s] continuous	2 DCY
	P0070	communication with AAT Sensor	AAT signal: short to battery / open circuit	failure		time after ignition on	> 2.0 [s]		1.0 [s] continuous	2 DCY
COM: Body Control Module (BCM)	U0140	communication with BCM	time out	no message		time after ignition on	> 500 [ms]		2.0 [s] continuous	2 DCY
COM: Brake System Control Module (BSCM)	U0415	communication with BSCM	received data	implausible message		time after ignition on	> 500 [ms]		0.4 [s] continuous	2 DCY
COM: Brake System Control Module (BSCM)	U0121	communication with BSCM	received message	no message		time after ignition on	> 500 [ms]		0.5 [s] continuous	2 DCY
COM: Fuel Level (FL) Sensor 1	P0462	communication with IPC	IPC module signal: short to ground	failure		ignition	on		0.5 [s] continuous	2 DCY
	P0463	communication with IPC	IPC module signal: short to battery / open circuit	failure		ignition	on		0.5 [s] continuous	2 DCY
	P0462	communication with IPC	IPC module signal: signal range check	failure		ignition	on		0.5 [s] continuous	2 DCY
COM: Fuel Level (FL) Sensor 2	P2067	communication with IPC	IPC module signal: short to ground	failure		ignition	on		0.5 [s] continuous	2 DCY
	P2068	communication with IPC	IPC module signal: short to battery / open circuit	failure		ignition	on		0.5 [s] continuous	2 DCY
	P2067	communication with IPC	IPC module signal: signal range check	failure		ignition	on		0.5 [s] continuous	2 DCY
COM: Gateway	U0146	communication with Gateway	received message	no message		time after ignition on	> 500 [ms]		0.5 [s] continuous	2 DCY
COM: Gateway	U0447	communication with Gateway	received data	implausible message		time after ignition on	> 500 [ms]		0.3 [s] continuous	2 DCY
COM: Instrument Panel Cluster (IPC)	U0423	communication with IPC	received data	implausible message		time after ignition on	> 500 [ms]		3.0 [s] continuous	2 DCY

COM: Instrument Panel Cluster (IPC)	U0155	communication with IPC	received message	no message		time after ignition on	> 500	[ms]	2.0 [s] continuous	2 DCY
CAN: Powertrain	U0002	communication check	global time out	receiving no message		time after ignition on	> 500	[ms]	0.45 [s] continuous	2 DCY
COM: Transmission Control Module (TCM)	U0302	communication with TCM	received AT vehicle data	TCM signal		time after ignition on	> 500	[ms]	5.0 [s] continuous	2 DCY
COM: Transmission Control Module (TCM)	U0402	communication with TCM	received data	implausible message		time after ignition on	> 500	[ms]	0.3 [s] continuous	2 DCY
COM: Transmission Control Module (TCM)	U0101	communication with TCM	received message	no message		time after ignition on	> 500	[ms]	0.5 [s] continuous	2 DCY
COM: Vehicle Speed Sensor (VSS)	U0415	communication with VSS	speed sensor signal: initialisation error	407.296	[mph]	time after ignition on	> 500	[ms]	1.98 [s] continuous	2 DCY
	U0415	communication with VSS	speed sensor signal: low voltage error	407.290	[mph]	time after ignition on	> 500	[ms]	1.98 [s] continuous	2 DCY
	U0415	communication with VSS	speed sensor signal: sensor error	407.303	[mph]	time after ignition on	> 500	[ms]	0.48 [s] continuous	2 DCY
CAN: Powertrain	U0001	reading back sent message	message	no feedback		time after ignition on	> 500	[ms]	0.25 [s] continuous	2 DCY

only FFV Test Group: GVGAJ02.0AUF

Ethanol Sensor	P0179	short to battery / open circuit	signal voltage	> 2.2	[V]	engine	on		5.0 [s] continuous	2 DCY
	P0178	short to ground	signal voltage	< 1.0	[V]	engine	on		5.0 [s] continuous	2 DCY
Ethanol Sensor	P0177	gradient check	delta ethanol sensor signal within time and fuel system fault detected	> 5.95	200 [%Eth] [ms]	ignition	on		0.2 [s] continuous	2 DCY
	P0177	stuck check	delta quotient fuel system adaptation @ part load in possible fuel change window after possible refueling event with change in fuel trim activity and fuel system fault detected	> 0.08	[-]	<u>general:</u> change in ethanol sensor signal <u>possible refueling event 1:</u> engine speed (once in current driving cycle) vehicle speed (once in current driving cycle) vehicle speed for time or <u>possible refueling event 2:</u>	<= 4.25 >= 20 > 0 0 > 150.0	[%Eth] [rpm] [mph] [mph] [s]	0 (FTP75: 800.0) [s] multiple	2 DCY

						vehicle speed (once in current driving cycle) vehicle speed for time (time in idle speed in last driving cycle + engine off time + time in idle speed in current driving cycle) <u>fuel change window after detecting possible refueling event:</u> fuel consumption fuel consumption <u>change in fuel trim activity</u> fault suspicion lambda controller or quotient of fuel trim activity mean value before possible fuel change window to in possible fuel change window or delta fuel trim activity bandwidth (max to min) in possible fuel change window to before possible fuel change window	0 [mph] 0 [mph] > 90.0 [s] <u>fuel change window begin</u> <u>fuel change window end</u> 1.00...2.50 [l] detected > 1.04 [-] > 0.05 [-]		
Ethanol Sensor	P0177	signal range check	signal frequency	> 155.00 [Hz]	engine	on		5.0 [s] continuous	2 DCY
	P0177	signal range check	signal frequency	< 45.00 [Hz]	engine	on		5.0 [s] continuous	2 DCY
	P0177	error oscillation check	number of toggle error events	> 2.00 [-]	engine	on		5.0 [s] continuous	2 DCY
	P0177	sensor internal fault	signal frequency	165.00...195.00 [Hz]	time between toggle events engine	< 5.0 [s] on		5.0 [s] continuous	2 DCY
Ethanol Sensor (Temperature)	P0177	sensor internal fault	signal negativ pulse length	0...1 [ms]	engine	on		5.0 [s] continuous	2 DCY
Ethanol Sensor (Temperature)	P0177	signal range check	signal negativ pulse length	> 4 [ms]	engine	on		5.0 [s] continuous	2 DCY
	P0177	signal range check	signal negativ pulse length	< 1 [ms]	engine	on		5.0 [s] continuous	2 DCY
Ethanol Sensor (Temperature)	P0177	rationality check	diff. between ethanol temperature and ECT@cylinder block	> 30...45 [°C]	cold start ECT @ cylinder block	detected > -40 [°C]		60.0 [s] once / DCY	2 DCY

--

GVGA-CVTN
Summary Table

Component / System	Fault Code	Monitor Strategy	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Monitor Time Length	Frequency of Checks	MIL Illum.
Position Switch	P0706	rationality check	illegal 4-bit position code				1[s]	continuous	2 DCY
Transmission Output Speed Sensor	P0722	signal range check	output speed	<= 50[rpm]	CAN based output speed	> 150 [rpm]	1[s]	continuous	2 DCY
Transmission Output Speed Sensor	P0721	signal range check	output speed	>= 12000[rpm]			1[s]	continuous	2 DCY
Transmission Input Speed Sensor 1	P0717	signal range check	input speed sensor 1	<= 50[rpm]	output speed and CAN engine speed	>150[rpm] >100[rpm]	1[s]	continuous	2 DCY
Transmission Input Speed Sensor 1	P0716	signal range check	input speed sensor 1	>= 7850[rpm]			1[s]	continuous	2 DCY
Transmission Input Speed Sensor 2	P0717	signal range check	input speed sensor 2	<= 50[rpm]	output speed and CAN engine speed	>150[rpm] >100[rpm]	1[s]	continuous	2 DCY
Transmission Input Speed Sensor 2	P0716	signal range check	input speed sensor 2	>= 7850[rpm]			1[s]	continuous	2 DCY
AD-converter	P0606	internal IC-check	Internal IC-check				0.02[s]	continuous	1 DCY
Clutch Valve Pressure Control	P0841	rationality check	Safety Valve debounce counter and difference between measured pressure and expected pressure(calculated by current)	>= 70 > 0.06[bar/s]	output speed and accelerator angle and gear position and CAN accelerator message	<= 150[rpm] <= 5 ° R or D or S no failure	0.04[s]	continuous	2 DCY
Controller Safety Monitor	P0606	functional check	check	failed			0.02[s]	continuous	1 DCY
Clutch Pressure Adaption	P2789	signal range check	adapted current @ clutch pressure 0 Bar or adapted current @ clutch pressure 10 Bar	> 250[ma] > 800[ma]			0[s]	continuous	2 DCY
Valve Power Supply	P0562	signal range check	voltage too low and valve control current deviation	< 9[V] > 100[ma]	Highside and Ignition and Enginestart	on on not aktive	1[s]	continuous	2 DCY
Gear Ratio Control	P0730	rationality check	output speed and difference of input speed gradient to desired input speed gradient	> 350[rpm] > 20000[rpm/s]	input speed	1000[rpm] ... 5750[rpm]	0.1[s]	continuous	2 DCY
FLASH	P0603	checksum check	double bit error(check sum error)				0.02[s]	continuous	1 DCY
RAM	P0604	RAM-check	write/read check				0.02[s]	continuous	1 DCY
ITM	P2755	circuit continuity check	short to battery		power supply voltage range and cooling valve(CAN-information)	6[V]-16[V] and installed	1[s]	continuous	2 DCY
ITM	P2753	circuit continuity check	short to ground		power supply voltage range and cooling valve(CAN-information)	6[V]-16[V] and installed	1[s]	continuous	2 DCY
CAN Signal from ECM	U0100	communication check	no messages received from engine control module		Can-Bus internal diagnostics	active	0.5[s]	continuous	2 DCY
CAN Signal from ABS	U0121	communication check	no messages received from Anti-Lock Brake System		Can-Bus internal diagnostics	active	0.5[s]	continuous	2 DCY
CAN Bus Off	U0001	communication check	detects CAN BUS off		Can-Bus internal diagnostics	active	0.5[s]	continuous	2 DCY
CAN Signal from other Control Units	U0002	communication check	no messages received from other control units		Can-Bus internal diagnostics	active	0.5[s]	continuous	2 DCY
CAN Signal from ECM	P0614	rationality check	ECM sent incorrect TCM-variant		Can-Bus internal diagnostics	active	0.5[s]	continuous	2 DCY
Clutch Slip Control	P0811	rationality check	difference between engine soeed and input speed	> 30rpm	clutch solenoid valve and vehicle speed	maximum current > 0mph	5[s]	continuous	2 DCY
CAN Signal from ECM	P0614	rationality check	ECM sent incorrect engine code or TCM coding incorrect		Can-Bus internal diagnostics	active	0.5[s]	continuous	2 DCY
FLASH	P0601	checksum check	check sum error				0.02[s]	continuous	1 DCY
EEPROM	P0601	EEPROM-check	comparison of stored value		check during initialization		0.02[s]	continuous	1 DCY
EEPROM	P0603	EEPROM-check	write ability check		check during initialization		0.02[s]	continuous	1 DCY
Watchdog	P0606	functional check	watchdog check failed				0.02[s]	continuous	1 DCY
Clutch Pressure Sensor	P0701	signal range check	AD-Converter signal value or AD-Converter signal value	> 1003 < 20			1[s]	continuous	2 DCY
Transmission Input Speed Sensor 1	P0716	rationality check	incorrect signals from sensing wheel to input sensor 1	> 30	ESP control and input speed range	not active for 1 s 1000[rpm]...5750[rpm]	0.02[s]	continuous	2 DCY

Component / System	Fault Code	Monitor Strategy	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Monitor Time Length	Frequency of Checks	MIL Illum.
Transmission Input Speed Sensor 2	P0716	rationality check	incorrect signals from sensing wheel to input sensor 2	> 30	ESP control and input speed range	not active for 1 s 1000[rpm]...5750[rpm]	0.02[s]	continuous	2 DCY
Transmission Output Speed Sensor	P0721	rationality check	incorrect signals from sensing wheel to output speed sensor	> 30	ESP control and output speed range	not active for 1 s 1000[rpm]...5750[rpm]	0.02[s]	continuous	2 DCY
ATF Temperature Sensor	P0711	rationality check	temperatur difference between actual temperatur and filtered temperatur	> 8[°C]			0.5[s]	continuous	2 DCY
ATF Temperature Sensor	P0711	rationality check	temperatur difference between transmission oil temperature indicator and chip temperature indicator	> 26[°C]			0.5[s]	continuous	2 DCY
CAN Signal from ECM	U0401	rationality check	invalid data		Can-Bus internal diagnostics	active	0.5[s]	continuous	2 DCY
CAN Signal from ABS	U0415	rationality check	invalid data		Can-Bus internal diagnostics	active	0.5[s]	continuous	2 DCY
Gear Ratio Valve Voltage Check	P0778	signal range check	short cut plus terminal to ground				0.02[s]	continuous	2 DCY
Gear Ratio Valve Voltage Check	P0778	rationality check	target current and difference between actual current and target current	> 120[mA] > 100[mA]	Highside	on	0.24[s]	continuous	2 DCY
Gear Ratio Valve Voltage Check	P0778	signal range check	short cut plus terminal to minus terminal		Highside	on	0.1[s]	continuous	2 DCY
Gear Ratio Valve Voltage Check	P0778	signal range check	Open line		Highside	on	0.1[s]	continuous	2 DCY
Safety Valve Voltage Check	P0753	signal range check	short cut plus terminal to ground				0.02[s]	continuous	2 DCY
Safety Valve Voltage Check	P0753	rationality check	target current and difference between actual current and target current	> 120[mA] > 100[mA]	Highside	on	0.24[s]	continuous	2 DCY
Safety Valve Voltage Check	P0753	signal range check	short cut plus terminal to minus terminal		Highside	on	0.1[s]	continuous	2 DCY
Safety Valve Voltage Check	P0753	signal range check	Open line		Highside	on	0.1[s]	continuous	2 DCY
ATF Temperature Sensor	P0710	functional check	self check	failed	Ignition	on	1[s]	continuous	2 DCY
ATF Temperature Sensor	P0710	rationality check	actual ATF temperature and actual chip temperature or actual chip temperature	= -0.03125[°C] < -20[°C] > 20[°C]	Ignition	on	1[s]	continuous	2 DCY
CAN Controller	P0606	CAN RAM-check	write ability check		TCM initialization	active	0.02[s]	continuous	2 DCY
Clutch Valve Pressure Control	P0841	rationality check	Safety Valve activation time and difference between measured pressure and expected pressure(calculated by current)	>=2500[ms]	output speed and accelerator angle and gear position and CAN accelerator message	<= 150[rpm] <= 5 ° R or D or S no failure	0.04[s]	continuous	2 DCY

Component/System	Malfunction Criteria	Secondary Parameter	Values	Name of Map/Curve	
Catalyst System		time delay	> 10.0	TVKTDTKB	
		engine load	15.00...125.30	RLKTD MN	RLKTD MX
		deviation between lambda setpoint and actual lambda value	< 3.00	KLTVKTD LAM	
Misfire	catalyst damage misfire rate (MR)		> 5.00...20.00	AHEKSA	KFKSWF
		time after engine start	> 0.0	KLTALUST	
Evaporative Emission (EVAP) System	deviation lambda control		< 7.00	KLDTEAG	
		integrated EVAP purge mass	> 150.0...170.0	KLDTET MST	
Fuel System		engine load	30.80...87.80	CILCN_rOpRngLoLoAt_CUR	CILCN_rOpRngLoHiAt_CUR
		integrated air mass	>= 3.00...16.50	CILCN_rAirMThd_CUR	
Fuel System		engine load	30.80...87.80	CILCN_rOpRngLoLoAt_CUR	CILCN_rOpRngLoHiAt_CUR
		integrated air mass	>= 3.00...16.50	CILCN_rAirMThd_CUR	
Fuel System		engine load	30.80...87.80	CILCN_rOpRngLoLoAt_CUR	CILCN_rOpRngLoHiAt_CUR
		integrated air mass	>= 3.00...16.50	CILCN_rAirMThd_CUR	
Fuel System		evap purge flow	<= 0.00	KLMSTEVMSTOML	
		evap purge flow	<= 0.00	KLMSTEVMSTOML	
Fuel System		~~ Signal (tmot)	> 43...55	KLTURAA	
		~~ Signal (tmot)	> 43...55	KLTURAA	
		~~ Signal (tmot)	> 43...55	KLTURAA	
		~~ Signal (tmot)	> 43...55	KLTURAA	
Fuel Rail Pressure (FRP)	actual pressure		> 21.30	KLPRMXPRC	
		engine speed	1000...7000	KLPRMXPRC	
Fuel Volume Regulator HP Control		relative fuel mass	5.02...240.00	KLRKMXHDP	
		relative fuel mass	5.02...240.00	KLRKMXHDP	
Fuel Volume Regulator HP Control		relative fuel mass	5.02...240.00	KLRKMXHDP	
		relative fuel mass	5.02...240.00	KLRKMXHDP	
Oxygen Sensors (O2S) Heater front		(during ECM keep alive-time after ignition off)	< 300.0	TNLSGM	
Oxygen Sensors (O2S) rear		integrated O2 mass during fuel cut off	>= 2800	KLMSTRRLS2	
		exhaust gas mass flow	> 20.00	KLMSTRLRMNHK	
		integrated negative O2 mass during catalyst purge	>= 2800	KLMSTRLRS2	
Oxygen Sensors (O2S) rear		for time	> 12.0	SBBH.KLT TBMH	
		for time	> 12.0	SBBH.KLT TBMH	
		for time	> 12.0	SBBH.KLT TBMH	
		for time	> 12.0	SBBH.KLT TBMH	
Oxygen Sensors (O2S) Heater rear	internal resistance		> 810.00...4560.00	DHLSH.KFRIN	
		(during ECM keep alive-time after ignition off)	< 300.0	TNLSGM	
Positive Crankcase Ventilation (PCV)	threshold to detect a defective system		> 1.45	KLFRMULTOE	
Engine Cooling System		accum. time required	< 40.0...250.0	CtT_tiMaxOut_CUR	
		engine load	< -399.99	CtT_rAirFillThdMn_MAP	
		vehicle speed (lower threshold)	>= 33...37	CtT_vThresEnbLo_CUR	
		vehicle speed (upper threshold)	<= 120	CtT_vThresEnbHi_CUR	
Engine Coolant Temperature (ECT) Sensor	~~ diff. between Signal (tmot) and Signal (tans) @ start		> 24.8	KLDCTMATAB	
	~~ diff. between Signal (tans) and AAT @ start		< 24.8	KLDCTUMTAB	
	~~ diff. between AAT and Signal (tmot) @ start		> 24.8	KLDCTAUTAB	
Engine Coolant Temperature Sensor @ Cylinder Block	~~ diff. between max. Signal (tmot) and min. Signal (tmot)		< 1.5	KLDTMFXTM	
		mass air flow (upper threshold)	36.00...152.00	MLOBKLHV	
		mass air flow (lower threshold)	4.00	MLUBKLN V	
		mass air flow (upper threshold)	4.00...180.00	MLOBKLN V	
	no change on signal		< 1.5	KLDTMFXTM	
	signal in range (lower threshold)		> 89	KLTMDMNKS	
		engine off time	> 9900.0...15600.0	KL TABTUM	
		mass air flow (upper threshold)	36.00...152.00	MLOBKLHV	
		mass air flow (lower threshold)	4.00	MLUBKLN V	
		mass air flow (upper threshold)	4.00...180.00	MLOBKLN V	
Variable Valve Timing (VVT) Intake Actuator	difference between target position vs. actual position		> 8.00	KFDWNWDMXE	
	for time		> 1.3...2.9	KFTDDNWNPE	
		time after engine start	> 3.0...10.0	KLTN WEDSTE	
		engine speed	920...6000	KLNDN WEMN	
	difference between target position vs. actual position		> 8.00	KFDWNWDMXE	
	for time		> 1.3...2.9	KFTDDNWNPE	
		time after engine start	> 3.0...10.0	KLTN WEDSTE	
		engine speed	920...6000	KLNDN WEMN	
Variable Valve Timing (VVT) Intake Actuator	difference between target position vs. actual position		> 12.00	KFDWNWCSE	
		time after engine start	>= 15.0	TVNWSTTME	TVNWSTNTME

		engine speed	>= 0	NNWTMNE	
Ambient Air Temperature (AAT) Sensor	~~ diff. between Signal (tmot) and Signal (tans) @ start		< 24.8	KLDCTMATAB	
	~~ diff. between Signal (tans) and AAT @ start		> 24.8	KLDCTUMTAB	
	~~ diff. between AAT and Signal (tmot) @ start		> 24.8	KLDCTAUTAB	
Turbocharger (TC) Boost Pressure Control	diff. set value boost pressure vs. actual boost pressure value		> 20.00...128.00	KLDLUL	
		engine speed	> 2200...2800	NDLDRAPU	
Throttle Position Sensor (TPS)	TPS1-TPS2		> 5.10...6.30	KLDWDK12O	
Throttle Position Sensor (TPS) 2	TPS1-TPS2		> 5.10...6.30	KLDWDK12O	
Throttle Actuator		deviation throttle value angles vs. throttle value setpoint	> 4.00...50.00	DWDKSBAMX	
		deviation throttle value angles vs. throttle value setpoint	> 4.00...50.00	DWDKSBAMX	
Accelerator Pedal Position (APP) Sensor 1 and 2	signal voltage sensor 1 vs. 2		> 0.14...0.70	APP_uSync_CUR	
Idle Speed Control (ISC)		engine load	< 19.99...63.00	LIGov_rChrgCylLos_CUR	
Intake Air Temperature (IAT) Sensor	~~ diff. between Signal (tmot) and Signal (tans) @ start		> 24.8	KLDCTMATAB	
	~~ diff. between Signal (tans) and AAT @ start		> 24.8	KLDCTUMTAB	
	~~ diff. between AAT and Signal (tmot) @ start		< 24.8	KLDCTAUTAB	
Knock Sensor (KS)	lower threshold		< 0.58...1.60	UDKSV6UN	
		engine load	> 42.80...60.00	LKRN	
	upper threshold		> 18.00...150.00	UDKSV6ON	
		engine load	> 42.80...60.00	LKRN	
Ignition Control (IC)	difference between commanded spark timing vs. actual value		> 20.00...45.00	KLMXETKHTL	
	difference between commanded spark timing vs. actual value		> 20.00...35.00	KLMXETKHLL	
		relative engine load	<= 75.00...100.01	KLRLMDVERL	

Component/System
 Fault Code

Catalyst System
 P0420

Text im ST
 Name of Map/Curve

time delay
 TVKTDTKB
 x-axis: Nicht angegeben [K]
 value: [s]

x	0.000	30.000	45.000	60.000
v	0.00	5.00	8.00	10.00

Text im ST
 Name of Map/Curve

engine load
 RLKTDMN
 x-axis: engine speed [1/min]
 value: [%]

x	920	1680	2440	3160	3600
v	15.8	15.0	15.0	15.0	15.0

Name of Map/Curve

RLKTDMX
 x-axis: engine speed [1/min]
 value: [%]

x	920	1680	2440	3160	3600
v	125.3	122.3	87.8	68.3	60.0

Text im ST
 Name of Map/Curve

deviation between lambda setpoint and actual lambda value
 KLTVKTDLAM
 x-axis: deviation lambda control [-]
 value: [1/s]

x	0.03003	0.04492	0.05005
v	0.00000	1.00021	2.50015

Component/System
 Fault Code

Misfire
 P0300, P0301, P0303, P0304, P0302

Text im ST
 Name of Map/Curve

catalyst damage misfire rate (MR)
 AHEKSA
 value: [-]

v	1600.00

Name of Map/Curve

KFKSWF
 x-axis: engine speed [1/min]
 y-axis: calc. load value [%]
 value: [-]

y/x	2000	3000	3520	4000	5000	6000
19.92	20.0	24.0	32.0	40.0	44.0	68.0
30.08	24.0	40.0	52.0	60.0	80.0	80.0
37.11	28.0	40.0	56.0	80.0	80.0	64.0
44.92	40.0	52.0	80.0	80.0	80.0	64.0
51.95	60.0	72.0	80.0	80.0	76.0	64.0
62.11	68.0	60.0	52.0	44.0	36.0	48.0

Text im ST
 Name of Map/Curve

time after engine start
 KLTALUST
 x-axis: engine start temperature [Grad C]
 value: [s]

x	-39.8	-10.5	30.0	80.3
v	0.000	0.000	0.000	0.000

Component/System
 Fault Code

Evaporative Emission (EVAP) System
 P0441

Text im ST
 Name of Map/Curve

deviation lambda control
 KLDTEAG
 x-axis: deviation lambda control [-]
 value: [-]

x	0.100006	0.300018
v	0.070007	0.070007

Text im ST
 Name of Map/Curve

integrated EVAP purge mass
 KLDTETMST
 x-axis: engine start temperature [Grad C]
 value: [g]

x	0.0	15.0	30.0	90.0
v	170.009	160.000	155.004	150.009

Component/System
 Fault Code

Fuel System
 P219C, P219E, P219F, P219D

Text im ST

engine load

Name of Map/Curve

CILCN_rOpRngLoLoAt_CUR						
x-axis: engine speed [1/min]						
value: [%]						
x	1280	1400	1720	2000	2240	2520
v	30.8	30.8	31.5	35.3	35.3	40.5

Name of Map/Curve

CILCN_rOpRngLoHiAt_CUR						
x-axis: engine speed [1/min]						
value: [%]						
x	1280	1400	1720	2000	2240	2520
v	75.0	80.3	80.3	87.8	87.8	87.8

Text im ST

Name of Map/Curve

integrated air mass						
CILCN_rAirMThd_CUR						
x-axis: ambient air temperature [Grad C]						
value: [kg]						
x	-40.5	-10.5	10.5	27.8	28.5	40.5
v	16.5013	12.0000	5.4009	5.4009	3.0009	3.0009

Component/System

Fault Code

Fuel System
P219C, P219E, P219F, P219D

Text im ST

Name of Map/Curve

engine load						
CILCN_rOpRngLoLoAt_CUR						
x-axis: engine speed [1/min]						
value: [%]						
x	1280	1400	1720	2000	2240	2520
v	30.8	30.8	31.5	35.3	35.3	40.5

Name of Map/Curve

CILCN_rOpRngLoHiAt_CUR						
x-axis: engine speed [1/min]						
value: [%]						
x	1280	1400	1720	2000	2240	2520
v	75.0	80.3	80.3	87.8	87.8	87.8

Text im ST

Name of Map/Curve

integrated air mass						
CILCN_rAirMThd_CUR						
x-axis: ambient air temperature [Grad C]						
value: [kg]						
x	-40.5	-10.5	10.5	27.8	28.5	40.5
v	16.5013	12.0000	5.4009	5.4009	3.0009	3.0009

Component/System

Fault Code

Fuel System
P230A, P230C, P230D, P230B

Text im ST

Name of Map/Curve

engine load						
CILCN_rOpRngLoLoAt_CUR						
x-axis: engine speed [1/min]						
value: [%]						
x	1280	1400	1720	2000	2240	2520
v	30.8	30.8	31.5	35.3	35.3	40.5

Name of Map/Curve

CILCN_rOpRngLoHiAt_CUR						
x-axis: engine speed [1/min]						
value: [%]						
x	1280	1400	1720	2000	2240	2520
v	75.0	80.3	80.3	87.8	87.8	87.8

Text im ST

Name of Map/Curve

integrated air mass						
CILCN_rAirMThd_CUR						
x-axis: ambient air temperature [Grad C]						
value: [kg]						
x	-40.5	-10.5	10.5	27.8	28.5	40.5
v	16.5013	12.0000	5.4009	5.4009	3.0009	3.0009

Component/System

Fault Code

Fuel System
P0171, P0172

Text im ST

Name of Map/Curve

evap purge flow				
KLMSTEMSTOML				
x-axis: ratio EVAP flow to MAF [-]				
value: [kg/h]				
x	0.000000	0.500000	1.000000	1.500000
v	0.00000	0.00000	0.00000	0.00000

Text im ST

Name of Map/Curve

evap purge flow				
KLMSTEMSTOML				
x-axis: ratio EVAP flow to MAF [-]				
value: [kg/h]				

x	0.000000	0.500000	1.000000	1.500000
v	0.00000	0.00000	0.00000	0.00000

Component/System
Fault Code

Fuel System
P2187, P2188, P2177, P2178

Text im ST
Name of Map/Curve

~~ Signal (tmot)
KLTURAA
x-axis: ambient air temperature [Grad C]
value: [Grad C]

x	-8.3	-6.8	0.0	6.0
v	54.8	42.8	50.3	54.8

Text im ST
Name of Map/Curve

~~ Signal (tmot)
KLTURAA
x-axis: ambient air temperature [Grad C]
value: [Grad C]

x	-8.3	-6.8	0.0	6.0
v	54.8	42.8	50.3	54.8

Text im ST
Name of Map/Curve

~~ Signal (tmot)
KLTURAA
x-axis: ambient air temperature [Grad C]
value: [Grad C]

x	-8.3	-6.8	0.0	6.0
v	54.8	42.8	50.3	54.8

Text im ST
Name of Map/Curve

~~ Signal (tmot)
KLTURAA
x-axis: ambient air temperature [Grad C]
value: [Grad C]

x	-8.3	-6.8	0.0	6.0
v	54.8	42.8	50.3	54.8

Component/System
Fault Code

Fuel Rail Pressure (FRP)
P0191

Text im ST
Name of Map/Curve

actual pressure
KLPRMXPRC
x-axis: engine speed [1/min]
value: [MPa]

x	1000	3000	5000	7000
v	21.30000	21.30000	21.30000	21.30000

Text im ST
Name of Map/Curve

engine speed
KLPRMXPRC
x-axis: engine speed [1/min]
value: [MPa]

x	1000	3000	5000	7000
v	21.30000	21.30000	21.30000	21.30000

Component/System
Fault Code

Fuel Volume Regulator HP Control
P2293

Text im ST
Name of Map/Curve

relative fuel mass
KLRKMXHDP
x-axis: engine speed [1/min]
value: [%]

x	600.00	1500.00	3000.00	6000.00
v	240.000	240.000	240.000	240.000

Text im ST
Name of Map/Curve

relative fuel mass
KLRKMXHDP
x-axis: engine speed [1/min]
value: [%]

x	600.00	1500.00	3000.00	6000.00
v	240.000	240.000	240.000	240.000

Component/System
Fault Code

Fuel Volume Regulator HP Control
P053F

Text im ST
Name of Map/Curve

relative fuel mass
KLRKMXHDP
x-axis: engine speed [1/min]
value: [%]

x	600.00	1500.00	3000.00	6000.00
v	240.000	240.000	240.000	240.000

Text im ST
 Name of Map/Curve

relative fuel mass					
KLRKMXHDP					
x-axis: engine speed [1/min]					
value: [%]					
x	600.00	1500.00	3000.00	6000.00	
v	240.000	240.000	240.000	240.000	

Component/System
 Fault Code

Oxygen Sensors (O2S) Heater front
 P0135

Text im ST
 Name of Map/Curve

(during ECM keep alive-time after ignition off)						
TNLSGM						
x-axis: engine shut-off temperature [Grad C]						
value: [s]						
x	0.0	20.3	39.8	60.0	75.0	90.0
v	300.00	300.00	300.00	170.00	60.00	60.00

Component/System
 Fault Code

Oxygen Sensors (O2S) rear
 P013A, P013B

Text im ST
 Name of Map/Curve

integrated O2 mass during fuel cut off				
KLMSTRRLS2				
x-axis: exhaust mass flow [kg/h]				
value: [mg]				
x	0.000	1200.000	2500.000	3276.000
v	2800.00	2800.00	2800.00	2800.00

Text im ST
 Name of Map/Curve

exhaust gas mass flow				
KLMSTRLRMNHK				
x-axis: OSC catalyst correction [-]				
value: [kg/h]				
x	0.000000	0.500000	1.000000	1.992188
v	20.000	20.000	20.000	20.000

Text im ST
 Name of Map/Curve

integrated negative O2 mass during catalyst purge				
KLMSTRLRS2				
x-axis: exhaust mass flow [kg/h]				
value: [mg]				
x	0.000	50.000	100.000	200.000
v	2800.00	2800.00	2800.00	2800.00

Component/System
 Fault Code

Oxygen Sensors (O2S) rear
 P0137, P0138, P0140

Text im ST
 Name of Map/Curve

for time				
SBBH.KLTTBMH				
x-axis: wall temperature O2-sensor [Grad C]				
value: [s]				
x	0.014	400.022	500.006	600.014
v	12.000	12.000	12.000	12.000

Text im ST
 Name of Map/Curve

for time				
SBBH.KLTTBMH				
x-axis: wall temperature O2-sensor [Grad C]				
value: [s]				
x	0.014	400.022	500.006	600.014
v	12.000	12.000	12.000	12.000

Text im ST
 Name of Map/Curve

for time				
SBBH.KLTTBMH				
x-axis: wall temperature O2-sensor [Grad C]				
value: [s]				
x	0.014	400.022	500.006	600.014
v	12.000	12.000	12.000	12.000

Text im ST
 Name of Map/Curve

for time				
SBBH.KLTTBMH				
x-axis: wall temperature O2-sensor [Grad C]				
value: [s]				
x	0.014	400.022	500.006	600.014
v	12.000	12.000	12.000	12.000

Component/System
 Fault Code

Oxygen Sensors (O2S) Heater rear
 P0141

Text im ST
 Name of Map/Curve

internal resistance				
DHLSH.KFRIN				
x-axis: model exhaust gas temperature at sensor [Grad C]				
y-axis: filtered normalized O2-sensor heater power [-]				

Text im ST
Name of Map/Curve

value: [Ohm]

y/x	249.998	350.006	449.991	549.998	650.006
0.600000	4560.0	4350.0	3864.0	2208.0	1278.0
0.700000	3930.0	3676.0	3220.0	2064.0	1090.0
0.800000	3300.0	3000.0	2576.0	1920.0	900.0
0.900000	2926.0	2670.0	2268.0	1524.0	856.0
1.000000	2550.0	2340.0	1960.0	1128.0	810.0

(during ECM keep alive-time after ignition off)
TNLSGM
x-axis: engine shut-off temperature [Grad C]
value: [s]

x	0.0	20.3	39.8	60.0	75.0	90.0
v	300.00	300.00	300.00	170.00	60.00	60.00

Component/System
Fault Code

Positive Crankcase Ventilation (PCV)
P2279

Text im ST
Name of Map/Curve

threshold to detect a defective system
KLFRMULTOE
x-axis: correction factor air mass compensation [-]
value: [-]

x	0.700012	0.829956	0.840027	1.299988
v	1.44995	1.44995	1.44995	1.44995

Component/System
Fault Code

Engine Cooling System
P2181

Text im ST
Name of Map/Curve

accum. time required
CtT_tiMaxOut_CUR
x-axis: integrated MAF [Kg]
value: [s]

x	4.0000	7.0000	10.0000	13.0000	16.0000	19.0000	22.0000	25.0000
v	40.00	70.00	100.00	130.00	160.00	190.00	220.00	250.00

Text im ST
Name of Map/Curve

engine load
CtT_rAirFillThdMn_MAP
x-axis: AAT [deg C]
y-axis: vehicle speed [rpm]
value: [%]

y/x	-30.040	-15.040	-0.040	14.960	29.960
600.00	-399.9878	-399.9878	-399.9878	-399.9878	-399.9878
1000.00	-399.9878	-399.9878	-399.9878	-399.9878	-399.9878
1200.00	-399.9878	-399.9878	-399.9878	-399.9878	-399.9878
1400.00	-399.9878	-399.9878	-399.9878	-399.9878	-399.9878
1600.00	-399.9878	-399.9878	-399.9878	-399.9878	-399.9878

Text im ST
Name of Map/Curve

vehicle speed (lower threshold)
CtT_vThresEnblLo_CUR
x-axis: ECT @ 1st start of dcy [deg C]
value: [km/h]

x	-9.840	9.760	29.960	39.760	50.260
v	36.9000	33.4000	33.4000	35.2000	36.9000

Text im ST
Name of Map/Curve

vehicle speed (upper threshold)
CtT_vThresEnblHi_CUR
x-axis: ECT @ 1st start of dcy [deg C]
value: [km/h]

x	-9.840	9.760	29.960	39.760	50.260
v	120.0000	120.0000	120.0000	120.0000	120.0000

Component/System
Fault Code

Engine Coolant Temperature (ECT) Sensor
P0116

Text im ST
Name of Map/Curve

~~ diff. between Signal (tmot) and Signal (tans) @ start
KLDCTMATAB
x-axis: engine off time [s]
value: [Grad C]

x	28800.0	28804.0	28812.0	28816.0	28820.0
v	24.75	24.75	24.75	24.75	24.75

Text im ST
Name of Map/Curve

~~ diff. between Signal (tans) and AAT @ start
KLDCTUMTAB
x-axis: engine off time [s]
value: [Grad C]

x	28800.0	28804.0	28812.0	28816.0	28820.0
v	24.75	24.75	24.75	24.75	24.75

Text im ST
Name of Map/Curve

~~ diff. between AAT and Signal (tmot) @ start
KLDCTAUTAB

x-axis: engine off time [s]
 value: [Grad C]

x	28800.0	28804.0	28812.0	28816.0	28820.0
v	24.75	24.75	24.75	24.75	24.75

Component/System
 Fault Code

Engine Coolant Temperature Sensor @ Cylinder Block
 P0117, P0118, P0116

Text im ST
 Name of Map/Curve

~~ diff. between max. Signal (tmot) and min. Signal (tmot)
 KLDTMFXTM
 x-axis: engine temperature [Grad C]
 value: [Grad C]

x	49.5	51.8	53.3	87.8	88.5	110.3	111.0	140.3
v	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5

Text im ST
 Name of Map/Curve

mass air flow (upper threshold)
 MLOBKLHV
 x-axis: vehicle speed [km/h]
 value: [kg/h]

x	40.0	60.0	80.0	100.0	120.0
v	36	52	80	112	152

Text im ST
 Name of Map/Curve

mass air flow (lower threshold)
 MLUBKLVN
 x-axis: vehicle speed [km/h]
 value: [kg/h]

x	0.0	3.8	8.8	10.0	30.0
v	4	4	4	4	4

Text im ST
 Name of Map/Curve

mass air flow (upper threshold)
 MLOBKLVN
 x-axis: vehicle speed [km/h]
 value: [kg/h]

x	0.0	3.8	8.8	10.0	30.0
v	180	180	180	4	4

Text im ST
 Name of Map/Curve

no change on signal
 KLDTMFXTM
 x-axis: engine temperature [Grad C]
 value: [Grad C]

x	49.5	51.8	53.3	87.8	88.5	110.3	111.0	140.3
v	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5

Text im ST
 Name of Map/Curve

signal in range (lower threshold)
 KLTMDMNKS
 x-axis: ambient air temperature [Grad C]
 value: [Grad C]

x	0.0	5.3	9.8	30.0	60.0	90.0	95.3	99.8
v	88.5	88.5	88.5	88.5	88.5	88.5	88.5	88.5

Text im ST
 Name of Map/Curve

engine off time
 KLTABTUM
 x-axis: ambient air temperature [Grad C]
 value: [s]

x	-20.3	0.0	9.8	20.3	30.0	45.0
v	9900.0	10800.0	11400.0	12300.0	13200.0	15600.0

Text im ST
 Name of Map/Curve

mass air flow (upper threshold)
 MLOBKLHV
 x-axis: vehicle speed [km/h]
 value: [kg/h]

x	40.0	60.0	80.0	100.0	120.0
v	36	52	80	112	152

Text im ST
 Name of Map/Curve

mass air flow (lower threshold)
 MLUBKLVN
 x-axis: vehicle speed [km/h]
 value: [kg/h]

x	0.0	3.8	8.8	10.0	30.0
v	4	4	4	4	4

Text im ST
 Name of Map/Curve

mass air flow (upper threshold)
 MLOBKLVN
 x-axis: vehicle speed [km/h]
 value: [kg/h]

x	0.0	3.8	8.8	10.0	30.0
v	180	180	180	4	4

Component/System

Variable Valve Timing (VVT) Intake Actuator

Fault CodeP000A, P0011

Text im ST
Name of Map/Curve

difference between target position vs. actual position						
KFDWNWDMXE						
x-axis: engine speed [1/min]						
y-axis: modeled cylinder head oil temperature [Grad C]						
value: [Grad KW]						
y/x	800	1600	2520	3520	4520	6000
-20.3	8.00	8.00	8.00	8.00	8.00	8.00
0.0	8.00	8.00	8.00	8.00	8.00	8.00
110.3	8.00	8.00	8.00	8.00	8.00	8.00
114.8	8.00	8.00	8.00	8.00	8.00	8.00
120.0	8.00	8.00	8.00	8.00	8.00	8.00

Text im ST
Name of Map/Curve

for time				
KFTDDNWNPE				
x-axis: engine speed [1/min]				
y-axis: modeled cylinder head oil temperature [Grad C]				
value: [s]				
y/x	800	2000	4000	6000
-20.3	2.40	2.40	2.40	2.40
0.0	1.30	1.30	1.30	1.30
110.3	1.30	1.30	1.30	1.30
114.8	1.70	1.70	1.70	1.70
120.0	2.90	2.90	2.90	2.90

Text im ST
Name of Map/Curve

time after engine start						
KLTNWEDSTE						
x-axis: engine start temperature [Grad C]						
value: [s]						
x	-9.8	20.3	40.5	50.3	105.0	110.3
v	10.0000	10.0000	10.0000	3.0000	3.0000	10.0000

Text im ST
Name of Map/Curve

engine speed						
KLNDNWEMN						
x-axis: modeled cylinder head oil temperature [Grad C]						
value: [1/min]						
x	3.741	5.241	44.991	95.991	110.241	119.991
v	1000	920	920	920	920	1000

Text im ST
Name of Map/Curve

difference between target position vs. actual position						
KFDWNWDMXE						
x-axis: engine speed [1/min]						
y-axis: modeled cylinder head oil temperature [Grad C]						
value: [Grad KW]						
y/x	800	1600	2520	3520	4520	6000
-20.3	8.00	8.00	8.00	8.00	8.00	8.00
0.0	8.00	8.00	8.00	8.00	8.00	8.00
110.3	8.00	8.00	8.00	8.00	8.00	8.00
114.8	8.00	8.00	8.00	8.00	8.00	8.00
120.0	8.00	8.00	8.00	8.00	8.00	8.00

Text im ST
Name of Map/Curve

for time				
KFTDDNWNPE				
x-axis: engine speed [1/min]				
y-axis: modeled cylinder head oil temperature [Grad C]				
value: [s]				
y/x	800	2000	4000	6000
-20.3	2.40	2.40	2.40	2.40
0.0	1.30	1.30	1.30	1.30
110.3	1.30	1.30	1.30	1.30
114.8	1.70	1.70	1.70	1.70
120.0	2.90	2.90	2.90	2.90

Text im ST
Name of Map/Curve

time after engine start						
KLTNWEDSTE						
x-axis: engine start temperature [Grad C]						
value: [s]						
x	-9.8	20.3	40.5	50.3	105.0	110.3
v	10.0000	10.0000	10.0000	3.0000	3.0000	10.0000

Text im ST
Name of Map/Curve

engine speed						
KLNDNWEMN						
x-axis: modeled cylinder head oil temperature [Grad C]						
value: [1/min]						
x	3.741	5.241	44.991	95.991	110.241	119.991
v	1000	920	920	920	920	1000

Component/SystemVariable Valve Timing (VVT) Intake Actuator
Fault CodeP052A

Text im ST
Name of Map/Curve

difference between target position vs. actual position						
KFDWNWCSE						
x-axis: engine speed [1/min]						

y-axis: modeled cylinder head oil temperature [Grad C]
value: [Grad KW]

y/x	800	1600	2520	3520
-30.0	12.00	12.00	12.00	12.00
20.3	12.00	12.00	12.00	12.00
95.3	12.00	12.00	12.00	12.00
110.3	12.00	12.00	12.00	12.00

Text im ST
Name of Map/Curve

time after engine start
TVNWSTRTME
x-axis: engine temperature [Grad C]
value: [s]

x	-20.3	-12.8	39.8	90.0
v	15.0000	5.0000	3.0000	1.0000

Name of Map/Curve

TVNWSTRNTME
x-axis: engine temperature [Grad C]
value: [s]

x	-20.3	-12.8	39.8	90.0
v	15.000	5.000	3.000	1.000

Text im ST
Name of Map/Curve

engine speed
NNWWTMNE
x-axis: cylinder head oil temperature [Grad C]
value: [1/min]

x	-20.259	-0.009	119.991	140.241
v	0	0	0	0

Component/System
Fault Code

Ambient Air Temperature (AAT) Sensor
P0071

~~ diff. between Signal (tmot) and Signal (tans) @ start
KLDCTMATAB
x-axis: engine off time [s]
value: [Grad C]

x	28800.0	28804.0	28812.0	28816.0	28820.0
v	24.75	24.75	24.75	24.75	24.75

Text im ST
Name of Map/Curve

~~ diff. between Signal (tans) and AAT @ start
KLDCTUMTAB
x-axis: engine off time [s]
value: [Grad C]

x	28800.0	28804.0	28812.0	28816.0	28820.0
v	24.75	24.75	24.75	24.75	24.75

Text im ST
Name of Map/Curve

~~ diff. between AAT and Signal (tmot) @ start
KLDCTAUTAB
x-axis: engine off time [s]
value: [Grad C]

x	28800.0	28804.0	28812.0	28816.0	28820.0
v	24.75	24.75	24.75	24.75	24.75

Component/System
Fault Code

Turbocharger (TC) Boost Pressure Control
P0234, P0299

diff. set value boost pressure vs. actual boost pressure value
KLDLUL
x-axis: boost pressure [hPa]
value: [hPa]

x	-500.000	-250.000	0.000	250.000	500.000	750.000	1000.000	1270.000
v	1279.961	1279.961	700.000	450.000	350.000	350.000	225.000	200.000

Text im ST
Name of Map/Curve

engine speed
NDLDRAPU
x-axis: barometric pressure [hPa]
value: [1/min]

x	700	1000
v	2800	2200

Component/System
Fault Code

Throttle Position Sensor (TPS)
P0122, P0123, P0121

Text im ST
Name of Map/Curve

[TPS1-TPS2]
KLDWDK12O
x-axis: throttle position [%DK]
value: [%DK]

x	0.0	5.1	10.2	14.9	100.0
v	5.1	5.1	6.3	6.3	6.3

Component/System
Fault Code

Throttle Position Sensor (TPS) 2
P0222, P0223, P0221

Text im ST
Name of Map/Curve

[TPS1-TPS2]					
KLDWWDK12O					
x-axis: throttle position [%DK]					
value: [%DK]					
x	0.0	5.1	10.2	14.9	100.0
v	5.1	5.1	6.3	6.3	6.3

Component/System
Fault Code

Throttle Actuator
P2106, P2101

Text im ST
Name of Map/Curve

deviation throttle value angles vs. throttle value setpoint					
DWDKSBAMX					
x-axis: throttle set position change [%DK]					
value: [%DK]					
x	0.00000	0.30060	0.99945	5.00031	14.99939
v	4.0009	6.0014	11.0002	20.0000	50.0008

Text im ST
Name of Map/Curve

deviation throttle value angles vs. throttle value setpoint					
DWDKSBAMX					
x-axis: throttle set position change [%DK]					
value: [%DK]					
x	0.00000	0.30060	0.99945	5.00031	14.99939
v	4.0009	6.0014	11.0002	20.0000	50.0008

Component/System
Fault Code

Accelerator Pedal Position (APP) Sensor 1 and 2
P2138

Text im ST
Name of Map/Curve

signal voltage sensor 1 vs. 2			
APP_uSync_CUR			
x-axis: minimum of signal 1 and signal 2 in range of signal 2 [mV]			
value: [mV]			
x	445.000	842.000	1914.000
v	143.000	260.000	703.000

Component/System
Fault Code

Idle Speed Control (ISC)
P0506, P0507

Text im ST
Name of Map/Curve

engine load			
LIGov_rChrgCylLos_CUR			
x-axis: torque loss [Nm]			
value: [%]			
x	20.000	35.000	80.000
v	19.9922	39.0000	63.0000

Component/System
Fault Code

Intake Air Temperature (IAT) Sensor
P0111

Text im ST
Name of Map/Curve

~~ diff. between Signal (tmot) and Signal (tans) @ start					
KLDCTMATAB					
x-axis: engine off time [s]					
value: [Grad C]					
x	28800.0	28804.0	28812.0	28816.0	28820.0
v	24.75	24.75	24.75	24.75	24.75

Text im ST
Name of Map/Curve

~~ diff. between Signal (tans) and AAT @ start					
KLDCTUMTAB					
x-axis: engine off time [s]					
value: [Grad C]					
x	28800.0	28804.0	28812.0	28816.0	28820.0
v	24.75	24.75	24.75	24.75	24.75

Text im ST
Name of Map/Curve

~~ diff. between AAT and Signal (tmot) @ start					
KLDCTAUTAB					
x-axis: engine off time [s]					
value: [Grad C]					
x	28800.0	28804.0	28812.0	28816.0	28820.0
v	24.75	24.75	24.75	24.75	24.75

Component/System
Fault Code

Knock Sensor (KS)
P0327, P0328

Text im ST
Name of Map/Curve

lower threshold	
UDKSV6UN	
x-axis: engine speed [1/min]	

value: [V]

x	1000	1520	2000	2520	3000	3520	4000	4520
v	0.5762	0.5811	0.6006	0.6299	0.6543	0.7031	0.7520	1.0010

x	5000	5400	5720	6000	6520
v	1.1035	1.3330	1.4014	1.5039	1.6016

Text im ST
Name of Map/Curve

engine load
LKRN
x-axis: engine speed [1/min]
value: [%]

x	1000	1520	2000	2520	3000	3520	4000	4520
v	42.8	42.8	45.0	48.0	50.3	55.5	60.0	60.0

x	5000	5400	5720	6000	6520
v	60.0	60.0	60.0	60.0	60.0

Text im ST
Name of Map/Curve

upper threshold
UDKSV6ON
x-axis: engine speed [1/min]
value: [V]

x	1000	1520	2000	2520	3000	3520	4000	4520
v	18.0029	20.0000	32.0020	46.0010	63.4668	95.0000	106.6016	114.9023

x	5000	5400	5720	6000	6520
v	122.4023	129.1016	135.4980	141.6016	150.0000

Text im ST
Name of Map/Curve

engine load
LKRN
x-axis: engine speed [1/min]
value: [%]

x	1000	1520	2000	2520	3000	3520	4000	4520
v	42.8	42.8	45.0	48.0	50.3	55.5	60.0	60.0

x	5000	5400	5720	6000	6520
v	60.0	60.0	60.0	60.0	60.0

Component/System
Fault Code

Ignition Control (IC)
P13EA, P050B

Text im ST
Name of Map/Curve

difference between commanded spark timing vs. actual value
KLMXETKHTL
x-axis: engine start temperature [Grad C]
value: [-]

x	-9.8	-6.8	0.0	9.8	15.0	24.8	39.0	39.8
v	0.200012	0.200012	0.200012	0.299988	0.399994	0.450012	0.450012	0.450012

Text im ST
Name of Map/Curve

difference between commanded spark timing vs. actual value
KLMXETKHLL
x-axis: ECT @ start [Grad C]
value: [-]

x	-9.8	-6.8	0.0	9.8	15.0	24.8	39.0	39.8
v	0.200012	0.200012	0.200012	0.250000	0.299988	0.350006	0.350006	0.350006

Text im ST
Name of Map/Curve

relative engine load
KLRLMDVERL
x-axis: engine torqueloss [%]
value: [%]

x	19.99969	30.00031	39.99939	50.00000	60.00061	69.99969
v	75.000	79.992	85.008	90.000	94.992	100.008

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
Variable Valve Timing (VVT) Intake Actuator	slow response	P000A	P0010	Variable Valve Timing (VVT) Intake Actuator
			P0016	Camshaft Position (CMP) Intake Sensor
			P0321	Crankshaft Position (CKP) Sensor
			P0322	Crankshaft Position (CKP) Sensor
			P0341	Phase Sensor 1
			P0342	Phase Sensor 1
			P0343	Phase Sensor 1
				Engine Control Module (ECM): Sensor Reference Circuit A
			P0641	Engine Control Module (ECM): Sensor Reference Circuit A
			P0651	Engine Control Module (ECM): Sensor Reference Circuit B
			P2088	Variable Valve Timing (VVT) Intake Actuator
P2089	Variable Valve Timing (VVT) Intake Actuator			
Variable Valve Timing (VVT) Intake Actuator	open circuit	P0010		
Variable Valve Timing (VVT) Intake Actuator	target error	P0011	P0010	Variable Valve Timing (VVT) Intake Actuator
			P0016	Camshaft Position (CMP) Intake Sensor
			P0321	Crankshaft Position (CKP) Sensor
			P0322	Crankshaft Position (CKP) Sensor
			P0341	Phase Sensor 1
			P0342	Phase Sensor 1
			P0343	Phase Sensor 1
				Engine Control Module (ECM): Sensor Reference Circuit A
			P0641	Engine Control Module (ECM): Sensor Reference Circuit A
			P0651	Engine Control Module (ECM): Sensor Reference Circuit B
			P2088	Variable Valve Timing (VVT) Intake Actuator
P2089	Variable Valve Timing (VVT) Intake Actuator			
Camshaft Position (CMP) Intake Sensor	angular offset check	P0016	P0321	Crankshaft Position (CKP) Sensor
			P0322	Crankshaft Position (CKP) Sensor
			P0341	Phase Sensor 1
			P0342	Phase Sensor 1
			P0343	Phase Sensor 1
Oxygen Sensors (O2S) Heater front	open circuit	P0030		
Oxygen Sensors (O2S) Heater front	short to ground	P0031		
Oxygen Sensors (O2S) Heater front	short to battery plus	P0032		
Oxygen Sensors (O2S) Heater rear	open circuit	P0036		
Oxygen Sensors (O2S) Heater rear	short to ground	P0037		
Oxygen Sensors (O2S) Heater rear	short to battery plus	P0038		
Intake Air (IA) System	load survey above threshold	P0068	P0100	Mass Air Flow (MAF) Sensor
			P0101	Mass Air Flow (MAF) Sensor
			P0102	Mass Air Flow (MAF) Sensor
			P0103	Mass Air Flow (MAF) Sensor
			P0236	Turbocharger (TC) Boost Pressure Sensor
			P0237	Turbocharger (TC) Boost Pressure Sensor
			P0238	Turbocharger (TC) Boost Pressure Sensor
			P0606	Barometric Pressure (BARO) Sensor
			P0638	Throttle Actuator
			P0641	Engine Control Module (ECM): Sensor Reference Circuit A
Intake Air (IA) System	load survey below threshold	P0068	P0100	Mass Air Flow (MAF) Sensor
			P0101	Mass Air Flow (MAF) Sensor
			P0102	Mass Air Flow (MAF) Sensor
			P0103	Mass Air Flow (MAF) Sensor
			P0236	Turbocharger (TC) Boost Pressure Sensor
			P0237	Turbocharger (TC) Boost Pressure Sensor
			P0238	Turbocharger (TC) Boost Pressure Sensor
			P0606	Barometric Pressure (BARO) Sensor
			P0638	Throttle Actuator
			P0641	Engine Control Module (ECM): Sensor Reference Circuit A
COM: Ambient Air Temperature (AAT) Sensor	communication with AAT Sensor	P0070		
Ambient Air Temperature (AAT) Sensor	cross check	P0071	P0070	COM: Ambient Air Temperature (AAT) Sensor
			P0072	COM: Ambient Air Temperature (AAT) Sensor
			P0112	Intake Air Temperature (IAT) Sensor @ Manifold
			P0113	Intake Air Temperature (IAT) Sensor @ Manifold

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System				
			P0116	Engine Coolant Temperature Sensor @ Cylinder Block			
			P0117	Engine Coolant Temperature Sensor @ Cylinder Block			
			P0118	Engine Coolant Temperature Sensor @ Cylinder Block			
			P0501	Vehicle Speed Sensor (VSS)			
			P0606	Engine Control Module (ECM): RAM			
			P150A	Engine Off Time			
			P3081	Engine Coolant Temperature Sensor @ Cylinder Block			
			U0001	CAN: Powertrain			
			U0002	CAN: Powertrain			
			U0146	COM: Gateway			
			U0155	COM: Instrument Panel Cluster (IPC)			
			U0323	COM: Ambient Air Temperature (AAT) Sensor			
			U0415	COM: Vehicle Speed Sensor (VSS)			
			U0415	Vehicle Speed Sensor (VSS)			
			U0422	COM: Ambient Air Temperature (AAT) Sensor			
			U0423	COM: Instrument Panel Cluster (IPC)			
			U0447	COM: Gateway			
COM: Ambient Air Temperature (AAT) Sensor	communication with AAT Sensor	P0072					
Fuel Volume Regulator Control	functional check: stuck open	P0087	P0030	Oxygen Sensors (O2S) Heater front			
			P0031	Oxygen Sensors (O2S) Heater front			
			P0032	Oxygen Sensors (O2S) Heater front			
			P0131	Oxygen Sensors (O2S) front			
			P0132	Oxygen Sensors (O2S) front			
			P0133	Oxygen Sensors (O2S) front			
			P0135	Oxygen Sensors (O2S) Heater front			
			P0137	Oxygen Sensors (O2S) rear			
			P0138	Oxygen Sensors (O2S) rear			
			P0140	Oxygen Sensors (O2S) rear			
			P0190	Fuel Rail Pressure (FRP) Sensor			
			P0191	Fuel Rail Pressure (FRP)			
			P0192	Fuel Rail Pressure (FRP) Sensor			
			P025A	Fuel Pump Control (FPC)			
			P025C	Fuel Pump Control (FPC)			
			P025D	Fuel Pump Control (FPC)			
			P0441	Evaporative Emission (EVAP) System			
			P0444	Evaporative Emission (EVAP) Canister Purge Valve			
			P0458	Evaporative Emission (EVAP) Canister Purge Valve			
			P0459	Evaporative Emission (EVAP) Canister Purge Valve			
			P0657	Engine Components Supply Voltage Relay			
			P0658	Engine Components Supply Voltage Relay			
			P0659	Engine Components Supply Voltage Relay			
			P2195	Oxygen Sensors (O2S) front			
			P2196	Oxygen Sensors (O2S) front			
			P2237	Oxygen Sensors (O2S) front			
			P2243	Oxygen Sensors (O2S) front			
			P2251	Oxygen Sensors (O2S) front			
			P2270	Oxygen Sensors (O2S) rear			
			P2271	Oxygen Sensors (O2S) rear			
			P2294	Fuel Volume Regulator Control			
			P2295	Fuel Volume Regulator Control			
			P2296	Fuel Volume Regulator Control			
			P2626	Oxygen Sensors (O2S) front			
			Mass Air Flow (MAF) Sensor	internal check	P0100		
Mass Air Flow (MAF) Sensor	rationality check load survey rationality check mass air flow	P0101	P000A	Variable Valve Timing (VVT) Intake Actuator			
			P0010	Variable Valve Timing (VVT) Intake Actuator			
			P0011	Variable Valve Timing (VVT) Intake Actuator			
			P0016	Camshaft Position (CMP) Intake Sensor			
			P0030	Oxygen Sensors (O2S) Heater front			
			P0031	Oxygen Sensors (O2S) Heater front			
			P0032	Oxygen Sensors (O2S) Heater front			
			P0100	Mass Air Flow (MAF) Sensor			
			P0102	Mass Air Flow (MAF) Sensor			
			P0103	Mass Air Flow (MAF) Sensor			
			P0112	Intake Air Temperature (IAT) Sensor @ Manifold			
			P0113	Intake Air Temperature (IAT) Sensor @ Manifold			
			P0130	Oxygen Sensors (O2S) front			
			P0131	Oxygen Sensors (O2S) front			
			P0132	Oxygen Sensors (O2S) front			
			P0133	Oxygen Sensors (O2S) front			

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System				
			P0135	Oxygen Sensors (O2S) Heater front			
			P0190	Fuel Rail Pressure (FRP) Sensor			
			P0192	Fuel Rail Pressure (FRP) Sensor			
			P0236	Turbocharger (TC) Boost Pressure Sensor			
			P0237	Turbocharger (TC) Boost Pressure Sensor			
			P0238	Turbocharger (TC) Boost Pressure Sensor			
			P0300	Misfire			
			P0321	Crankshaft Position (CKP) Sensor			
			P0322	Crankshaft Position (CKP) Sensor			
			P0444	Evaporative Emission (EVAP) Canister Purge Valve			
			P0458	Evaporative Emission (EVAP) Canister Purge Valve			
			P0459	Evaporative Emission (EVAP) Canister Purge Valve			
			P0606	Barometric Pressure (BARO) Sensor			
			P0606	Engine Control Module (ECM): Sensor Integrated Circuit			
			P0638	Throttle Actuator			
			P2088	Variable Valve Timing (VVT) Intake Actuator			
			P2089	Variable Valve Timing (VVT) Intake Actuator			
			P2096	Fuel System			
			P2097	Fuel System			
			P2195	Oxygen Sensors (O2S) front			
			P2196	Oxygen Sensors (O2S) front			
			P2237	Oxygen Sensors (O2S) front			
			P2243	Oxygen Sensors (O2S) front			
			P2251	Oxygen Sensors (O2S) front			
			P2414	Oxygen Sensors (O2S) front			
			P2626	Oxygen Sensors (O2S) front			
Mass Air Flow (MAF) Sensor	out of range low	P0102					
Mass Air Flow (MAF) Sensor	out of range high	P0103					
Intake Air Temperature (IAT) Sensor	cross check	P0111	P0070	COM: Ambient Air Temperature (AAT) Sensor			
			P0072	COM: Ambient Air Temperature (AAT) Sensor			
			P0112	Intake Air Temperature (IAT) Sensor @ Manifold			
			P0113	Intake Air Temperature (IAT) Sensor @ Manifold			
			P0116	Engine Coolant Temperature Sensor @ Cylinder Block			
			P0117	Engine Coolant Temperature Sensor @ Cylinder Block			
			P0118	Engine Coolant Temperature Sensor @ Cylinder Block			
			P0501	Vehicle Speed Sensor (VSS)			
			P0606	Engine Control Module (ECM): RAM			
			P150A	Engine Off Time			
			P3081	Engine Coolant Temperature Sensor @ Cylinder Block			
			U0001	CAN: Powertrain			
			U0002	CAN: Powertrain			
			U0146	COM: Gateway			
			U0155	COM: Instrument Panel Cluster (IPC)			
			U0323	COM: Ambient Air Temperature (AAT) Sensor			
			U0415	COM: Vehicle Speed Sensor (VSS)			
			U0415	Vehicle Speed Sensor (VSS)			
			U0422	COM: Ambient Air Temperature (AAT) Sensor			
			U0423	COM: Instrument Panel Cluster (IPC)			
			U0447	COM: Gateway			
			Intake Air Temperature (IAT) Sensor @ Manifold	short to ground	P0112		
			Intake Air Temperature (IAT) Sensor @ Manifold	short to battery / open circuit	P0113		
Engine Coolant Temperature (ECT) Sensor	cross check	P0116	P0070	COM: Ambient Air Temperature (AAT) Sensor			
			P0072	COM: Ambient Air Temperature (AAT) Sensor			
			P0112	Intake Air Temperature (IAT) Sensor @ Manifold			
			P0113	Intake Air Temperature (IAT) Sensor @ Manifold			
			P0116	Engine Coolant Temperature Sensor @ Cylinder Block			
			P0117	Engine Coolant Temperature Sensor @ Cylinder Block			
			P0118	Engine Coolant Temperature Sensor @ Cylinder Block			
			P0501	Vehicle Speed Sensor (VSS)			
			P0606	Engine Control Module (ECM): RAM			
			P150A	Engine Off Time			
			P3081	Engine Coolant Temperature Sensor @ Cylinder Block			
			U0001	CAN: Powertrain			
			U0002	CAN: Powertrain			
			U0146	COM: Gateway			
			U0155	COM: Instrument Panel Cluster (IPC)			

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
			U0323	COM: Ambient Air Temperature (AAT) Sensor
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
			U0422	COM: Ambient Air Temperature (AAT) Sensor
			U0423	COM: Instrument Panel Cluster (IPC)
			U0447	COM: Gateway
Engine Coolant Temperature Sensor @ Cylinder Block	stuck high / low - no change on signal	P0116	P0100	Mass Air Flow (MAF) Sensor
			P0101	Mass Air Flow (MAF) Sensor
	stuck in range		P0102	Mass Air Flow (MAF) Sensor
			P0103	Mass Air Flow (MAF) Sensor
			P0117	Engine Coolant Temperature Sensor @ Cylinder Block
			P0118	Engine Coolant Temperature Sensor @ Cylinder Block
			P0501	Vehicle Speed Sensor (VSS)
			P0606	Engine Control Module (ECM): RAM
			P150A	Engine Off Time
			P2181	Engine Cooling System
			P3081	Engine Coolant Temperature Sensor @ Cylinder Block
			U0001	CAN: Powertrain
			U0002	CAN: Powertrain
			U0155	COM: Instrument Panel Cluster (IPC)
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
			U0423	COM: Instrument Panel Cluster (IPC)
Engine Coolant Temperature Sensor @ Cylinder Block	short to ground	P0117	P0100	Mass Air Flow (MAF) Sensor
			P0101	Mass Air Flow (MAF) Sensor
			P0102	Mass Air Flow (MAF) Sensor
			P0103	Mass Air Flow (MAF) Sensor
			P0118	Engine Coolant Temperature Sensor @ Cylinder Block
			P0501	Vehicle Speed Sensor (VSS)
			P0606	Engine Control Module (ECM): RAM
			P150A	Engine Off Time
			P2181	Engine Cooling System
			P3081	Engine Coolant Temperature Sensor @ Cylinder Block
			U0001	CAN: Powertrain
			U0002	CAN: Powertrain
			U0155	COM: Instrument Panel Cluster (IPC)
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
			U0423	COM: Instrument Panel Cluster (IPC)
Engine Coolant Temperature Sensor @ Cylinder Block	short to battery / open circuit	P0118	P0100	Mass Air Flow (MAF) Sensor
			P0101	Mass Air Flow (MAF) Sensor
			P0102	Mass Air Flow (MAF) Sensor
			P0103	Mass Air Flow (MAF) Sensor
			P0117	Engine Coolant Temperature Sensor @ Cylinder Block
			P0501	Vehicle Speed Sensor (VSS)
			P0606	Engine Control Module (ECM): RAM
			P150A	Engine Off Time

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
			P2181	Engine Cooling System
			P3081	Engine Coolant Temperature Sensor @ Cylinder Block
			U0001	CAN: Powertrain
			U0002	CAN: Powertrain
			U0155	COM: Instrument Panel Cluster (IPC)
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
			U0423	COM: Instrument Panel Cluster (IPC)
Throttle Position Sensor (TPS)	rationality check	P0121	P0641	Engine Control Module (ECM): Sensor Reference Circuit A
Throttle Position Sensor (TPS)	out of range low	P0122	P0641	Engine Control Module (ECM): Sensor Reference Circuit A
Throttle Position Sensor (TPS)	out of range high	P0123	P0641	Engine Control Module (ECM): Sensor Reference Circuit A
Oxygen Sensors (O2S) front	out of range	P0130	P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0135	Oxygen Sensors (O2S) Heater front
			P0606	Engine Control Module (ECM): Sensor Integrated Circuit
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
Oxygen Sensors (O2S) front	signal range check	P0131		
Oxygen Sensors (O2S) front	signal range check	P0132		
Oxygen Sensors (O2S) front	response rate monitoring, area ratio and gradient ratio	P0133	P000A	Variable Valve Timing (VVT) Intake Actuator
			P0010	Variable Valve Timing (VVT) Intake Actuator
			P0011	Variable Valve Timing (VVT) Intake Actuator
			P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
			P0130	Oxygen Sensors (O2S) front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0135	Oxygen Sensors (O2S) Heater front
			P0300	Misfire
			P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			P0606	Engine Control Module (ECM): Sensor Integrated Circuit
			P2088	Variable Valve Timing (VVT) Intake Actuator
			P2089	Variable Valve Timing (VVT) Intake Actuator
			P2195	Oxygen Sensors (O2S) front
			P2196	Oxygen Sensors (O2S) front
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P2414	Oxygen Sensors (O2S) front
			P2626	Oxygen Sensors (O2S) front
Oxygen Sensors (O2S) Heater front	out of range high	P0135	P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0300	Misfire
			P0606	Engine Control Module (ECM): Sensor Integrated Circuit
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
			P2626	Oxygen Sensors (O2S) front
Oxygen Sensors (O2S) Heater front	rationality check (sensor heating up)	P0135	P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0300	Misfire
			P0606	Engine Control Module (ECM): Sensor Integrated Circuit
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P2626	Oxygen Sensors (O2S) front
Oxygen Sensors (O2S) rear	O2S signal check - circuit continuity (short to ground, core connection signal wires)	P0137		
Oxygen Sensors (O2S) rear	O2S signal check - out of range high (short to battery plus)	P0138	P0036	Oxygen Sensors (O2S) Heater rear
			P0037	Oxygen Sensors (O2S) Heater rear
			P0038	Oxygen Sensors (O2S) Heater rear
Oxygen Sensors (O2S) rear	check of differential transient time at fuel cut off	P013A	P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
			P0036	Oxygen Sensors (O2S) Heater rear
			P0037	Oxygen Sensors (O2S) Heater rear
			P0038	Oxygen Sensors (O2S) Heater rear
			P0130	Oxygen Sensors (O2S) front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0133	Oxygen Sensors (O2S) front
			P0135	Oxygen Sensors (O2S) Heater front
			P0141	Oxygen Sensors (O2S) Heater rear
			P0441	Evaporative Emission (EVAP) System
			P0606	Engine Control Module (ECM): Sensor Integrated Circuit
			P2096	Fuel System
			P2097	Fuel System
			P2195	Oxygen Sensors (O2S) front
			P2196	Oxygen Sensors (O2S) front
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P2270	Oxygen Sensors (O2S) rear
			P2271	Oxygen Sensors (O2S) rear
			P2414	Oxygen Sensors (O2S) front
			P2626	Oxygen Sensors (O2S) front
Oxygen Sensors (O2S) rear	check of differential transient time at fuel feed restart	P013B	P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
			P0036	Oxygen Sensors (O2S) Heater rear
			P0037	Oxygen Sensors (O2S) Heater rear
			P0038	Oxygen Sensors (O2S) Heater rear
			P0130	Oxygen Sensors (O2S) front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0133	Oxygen Sensors (O2S) front
			P0135	Oxygen Sensors (O2S) Heater front
			P0141	Oxygen Sensors (O2S) Heater rear
			P0441	Evaporative Emission (EVAP) System
			P0606	Engine Control Module (ECM): Sensor Integrated Circuit
			P2096	Fuel System
			P2097	Fuel System
			P2195	Oxygen Sensors (O2S) front
			P2196	Oxygen Sensors (O2S) front
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
			P2270	Oxygen Sensors (O2S) rear
			P2271	Oxygen Sensors (O2S) rear
			P2414	Oxygen Sensors (O2S) front
			P2626	Oxygen Sensors (O2S) front
Oxygen Sensors (O2S) rear	check of differential delay time at rich to lean transition	P013E	P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
			P0036	Oxygen Sensors (O2S) Heater rear
			P0037	Oxygen Sensors (O2S) Heater rear
			P0038	Oxygen Sensors (O2S) Heater rear
			P0130	Oxygen Sensors (O2S) front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0133	Oxygen Sensors (O2S) front
			P0135	Oxygen Sensors (O2S) Heater front
			P013A	Oxygen Sensors (O2S) rear
			P013B	Oxygen Sensors (O2S) rear
			P0141	Oxygen Sensors (O2S) Heater rear
			P0441	Evaporative Emission (EVAP) System
				Engine Control Module (ECM): Sensor Integrated Circuit
			P0606	
			P2096	Fuel System
			P2097	Fuel System
			P2195	Oxygen Sensors (O2S) front
			P2196	Oxygen Sensors (O2S) front
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P2270	Oxygen Sensors (O2S) rear
			P2271	Oxygen Sensors (O2S) rear
			P2414	Oxygen Sensors (O2S) front
			P2626	Oxygen Sensors (O2S) front
Oxygen Sensors (O2S) rear	check of differential delay time at lean to rich transition	P013F	P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
			P0036	Oxygen Sensors (O2S) Heater rear
			P0037	Oxygen Sensors (O2S) Heater rear
			P0038	Oxygen Sensors (O2S) Heater rear
			P0130	Oxygen Sensors (O2S) front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0133	Oxygen Sensors (O2S) front
			P0135	Oxygen Sensors (O2S) Heater front
			P013A	Oxygen Sensors (O2S) rear
			P013B	Oxygen Sensors (O2S) rear
			P0141	Oxygen Sensors (O2S) Heater rear
			P0441	Evaporative Emission (EVAP) System
				Engine Control Module (ECM): Sensor Integrated Circuit
			P0606	
			P2096	Fuel System
			P2097	Fuel System
			P2195	Oxygen Sensors (O2S) front
			P2196	Oxygen Sensors (O2S) front
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P2270	Oxygen Sensors (O2S) rear
			P2271	Oxygen Sensors (O2S) rear
			P2414	Oxygen Sensors (O2S) front
			P2626	Oxygen Sensors (O2S) front
Oxygen Sensors (O2S) rear	O2S signal check - circuit continuity (sensor ground line open circuit)	P0140	P0036	Oxygen Sensors (O2S) Heater rear
	O2S signal check - circuit continuity (sensor signal line open circuit)		P0037	Oxygen Sensors (O2S) Heater rear
			P0038	Oxygen Sensors (O2S) Heater rear
Oxygen Sensors (O2S) Heater rear	out of range	P0141	P0036	Oxygen Sensors (O2S) Heater rear
			P0037	Oxygen Sensors (O2S) Heater rear
			P0038	Oxygen Sensors (O2S) Heater rear

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
Engine Control Module (ECM): Electronic Throttle Control Module	function monitoring: injection	P0169		
Engine Control Module (ECM): Electronic Throttle Control Module	function monitoring: lambda mode	P0169		
Engine Control Module (ECM): Electronic Throttle Control Module	function monitoring: load plausibility	P0169		
Engine Control Module (ECM): Electronic Throttle Control Module	function monitoring: mixture control	P0169		
Fuel System	system too lean	P0171		
Fuel System	system too rich	P0172		
Fuel Rail Pressure (FRP) Sensor	signal range check	P0190	P0651	Engine Control Module (ECM): Sensor Reference Circuit B
Fuel Rail Pressure (FRP)	out of range high	P0191	P0190 P0192	Fuel Rail Pressure (FRP) Sensor Fuel Rail Pressure (FRP) Sensor
Fuel Rail Pressure (FRP) Sensor	signal range check	P0192	P0651	Engine Control Module (ECM): Sensor Reference Circuit B
Fuel Injection Valves	monitoring booster-time	P0201		
Fuel Injection Valves	open circuit	P0201		
Fuel Injection Valves	monitoring booster-time	P0202		
Fuel Injection Valves	open circuit	P0202		
Fuel Injection Valves	monitoring booster-time	P0203		
Fuel Injection Valves	open circuit	P0203		
Fuel Injection Valves	monitoring booster-time	P0204		
Fuel Injection Valves	open circuit	P0204		
Throttle Position Sensor (TPS) 2	rationality check	P0221	P0641	Engine Control Module (ECM): Sensor Reference Circuit A
Throttle Position Sensor (TPS) 2	out of range low	P0222	P0641	Engine Control Module (ECM): Sensor Reference Circuit A
Throttle Position Sensor (TPS) 2	out of range high	P0223	P0641	Engine Control Module (ECM): Sensor Reference Circuit A
Turbocharger (TC) Boost Pressure Control	rationality check high	P0234	P0236 P0237 P0238 P0243 P0245 P0246 P0606 P0638 P0641 P2279	Turbocharger (TC) Boost Pressure Sensor Turbocharger (TC) Boost Pressure Sensor Turbocharger (TC) Boost Pressure Sensor Turbocharger (TC) Bypass Actuator Turbocharger (TC) Bypass Actuator Turbocharger (TC) Bypass Actuator Barometric Pressure (BARO) Sensor Throttle Actuator Engine Control Module (ECM): Sensor Reference Circuit A Positive Crankcase Ventilation (PCV)
Turbocharger (TC) Boost Pressure Sensor	plausibility check	P0236	P0237 P0238 P0606 P0638	Turbocharger (TC) Boost Pressure Sensor Turbocharger (TC) Boost Pressure Sensor Barometric Pressure (BARO) Sensor Throttle Actuator
Turbocharger (TC) Boost Pressure Sensor	short to ground	P0237	P0641	Engine Control Module (ECM): Sensor Reference Circuit A
Turbocharger (TC) Boost Pressure Sensor	short to battery / open circuit	P0238	P0641	Engine Control Module (ECM): Sensor Reference Circuit A
Turbocharger (TC) Bypass Actuator	open circuit	P0243		
Turbocharger (TC) Bypass Actuator	short to ground	P0245		

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
Turbocharger (TC) Bypass Actuator	short to battery plus	P0246		
Fuel Pump Control (FPC)	open circuit	P025A		
Fuel Pump Control (FPC)	short to ground	P025C		
Fuel Pump Control (FPC)	short to battery plus	P025D		
Fuel Injection Valves	short to ground (low side)	P0261		
Fuel Injection Valves	short to battery plus (low side)	P0262		
Fuel Injection Valves	short to ground (low side)	P0264		
Fuel Injection Valves	short to battery plus (low side)	P0265		
Fuel Injection Valves	short to ground (low side)	P0267		
Fuel Injection Valves	short to battery plus (low side)	P0268		
Fuel Injection Valves	short to ground (low side)	P0270		
Fuel Injection Valves	short to battery plus (low side)	P0271		
Turbocharger (TC) Boost Pressure Control	rationality check low	P0299	P0236 P0237 P0238 P0243 P0245 P0246 P0606 P0638 P0641 P2279	Turbocharger (TC) Boost Pressure Sensor Turbocharger (TC) Boost Pressure Sensor Turbocharger (TC) Boost Pressure Sensor Turbocharger (TC) Bypass Actuator Turbocharger (TC) Bypass Actuator Turbocharger (TC) Bypass Actuator Barometric Pressure (BARO) Sensor Throttle Actuator Engine Control Module (ECM): Sensor Reference Circuit A Positive Crankcase Ventilation (PCV)
Misfire	crankshaft speed fluctuation (single or multiple)	P0300	P0201 P0202 P0203 P0204 P0261 P0262 P0264 P0265 P0267 P0268 P0270 P0271 P0321 P0322 P2146 P2149	Fuel Injection Valves Fuel Injection Valves Fuel Injection Valves Fuel Injection Valves Fuel Injection Valves Fuel Injection Valves Fuel Injection Valves Fuel Injection Valves Fuel Injection Valves Fuel Injection Valves Fuel Injection Valves Fuel Injection Valves Crankshaft Position (CKP) Sensor Crankshaft Position (CKP) Sensor Fuel Injection Valves Fuel Injection Valves
Misfire	crankshaft speed fluctuation (single or multiple)	P0301	P0321 P0322 P0351 P2300 P2301	Crankshaft Position (CKP) Sensor Crankshaft Position (CKP) Sensor Ignition Coil Ignition Coil Ignition Coil
Misfire	crankshaft speed fluctuation (single or multiple)	P0302	P0321 P0322 P0352 P2303 P2304	Crankshaft Position (CKP) Sensor Crankshaft Position (CKP) Sensor Ignition Coil Ignition Coil Ignition Coil
Misfire	crankshaft speed fluctuation (single or multiple)	P0303	P0321 P0322	Crankshaft Position (CKP) Sensor Crankshaft Position (CKP) Sensor

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
			P0353	Ignition Coil
			P2306	Ignition Coil
			P2307	Ignition Coil
Misfire	crankshaft speed fluctuation (single or multiple)	P0304	P0321	Crankshaft Position (CKP) Sensor
			P0322	Crankshaft Position (CKP) Sensor
			P0354	Ignition Coil
			P2309	Ignition Coil
			P2310	Ignition Coil
Crankshaft Position (CKP) Sensor	rationality check	P0321	P0641	Engine Control Module (ECM): Sensor Reference Circuit A
Crankshaft Position (CKP) Sensor	signal activity check	P0322	P0641	Engine Control Module (ECM): Sensor Reference Circuit A
Knock Control	internal hardware check	P0324		
Knock Sensor (KS)	short to ground Port A	P0327		
Knock Sensor (KS)	short to ground Port B	P0327		
Knock Sensor (KS)	signal range check	P0327		
Knock Sensor (KS)	short to battery plus Port A	P0328		
Knock Sensor (KS)	short to battery plus Port B	P0328		
Knock Sensor (KS)	signal range check	P0328		
Phase Sensor 1	rationality check	P0341		
Phase Sensor 1	rationality check	P0342		
Phase Sensor 1	rationality check	P0343		
Ignition Coil	open circuit	P0351		
Ignition Coil	open circuit	P0352		
Ignition Coil	open circuit	P0353		
Ignition Coil	open circuit	P0354		
Catalyst System	measure of OSC compared to OSC of borderline catalyst	P0420	P000A	Variable Valve Timing (VVT) Intake Actuator
			P0010	Variable Valve Timing (VVT) Intake Actuator
			P0011	Variable Valve Timing (VVT) Intake Actuator
			P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
			P0036	Oxygen Sensors (O2S) Heater rear
			P0037	Oxygen Sensors (O2S) Heater rear
			P0038	Oxygen Sensors (O2S) Heater rear
			P0100	Mass Air Flow (MAF) Sensor
			P0101	Mass Air Flow (MAF) Sensor
			P0102	Mass Air Flow (MAF) Sensor
			P0103	Mass Air Flow (MAF) Sensor
			P0116	Engine Coolant Temperature (ECT) Sensor
			P0116	Engine Coolant Temperature Sensor @ Cylinder Block
			P0117	Engine Coolant Temperature Sensor @ Cylinder Block
			P0118	Engine Coolant Temperature Sensor @ Cylinder Block
			P0130	Oxygen Sensors (O2S) front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0133	Oxygen Sensors (O2S) front
			P0135	Oxygen Sensors (O2S) Heater front
			P0137	Oxygen Sensors (O2S) rear
			P0138	Oxygen Sensors (O2S) rear
			P013A	Oxygen Sensors (O2S) rear
			P013B	Oxygen Sensors (O2S) rear
			P013E	Oxygen Sensors (O2S) rear

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System				
			P013F	Oxygen Sensors (O2S) rear			
			P0140	Oxygen Sensors (O2S) rear			
			P0141	Oxygen Sensors (O2S) Heater rear			
			P0300	Misfire			
			P0441	Evaporative Emission (EVAP) System			
			P0444	Evaporative Emission (EVAP) Canister Purge Valve			
			P0458	Evaporative Emission (EVAP) Canister Purge Valve			
			P0459	Evaporative Emission (EVAP) Canister Purge Valve			
			P0501	Vehicle Speed Sensor (VSS)			
			P0606	Engine Control Module (ECM): Sensor Integrated Circuit			
			P2088	Variable Valve Timing (VVT) Intake Actuator			
			P2089	Variable Valve Timing (VVT) Intake Actuator			
			P2096	Fuel System			
			P2097	Fuel System			
			P2177	Fuel System			
			P2178	Fuel System			
			P2181	Engine Cooling System			
			P2187	Fuel System			
			P2188	Fuel System			
			P2195	Oxygen Sensors (O2S) front			
			P2196	Oxygen Sensors (O2S) front			
			P2237	Oxygen Sensors (O2S) front			
			P2243	Oxygen Sensors (O2S) front			
			P2251	Oxygen Sensors (O2S) front			
			P2270	Oxygen Sensors (O2S) rear			
			P2271	Oxygen Sensors (O2S) rear			
			P2414	Oxygen Sensors (O2S) front			
			P2626	Oxygen Sensors (O2S) front			
			P3081	Engine Coolant Temperature Sensor @ Cylinder Block			
			U0415	COM: Vehicle Speed Sensor (VSS)			
			U0415	Vehicle Speed Sensor (VSS)			
			Evaporative Emission (EVAP) System	function check	P0441	P000A	Variable Valve Timing (VVT) Intake Actuator
						P0010	Variable Valve Timing (VVT) Intake Actuator
						P0011	Variable Valve Timing (VVT) Intake Actuator
						P0030	Oxygen Sensors (O2S) Heater front
P0031	Oxygen Sensors (O2S) Heater front						
P0032	Oxygen Sensors (O2S) Heater front						
P0100	Mass Air Flow (MAF) Sensor						
P0101	Mass Air Flow (MAF) Sensor						
P0102	Mass Air Flow (MAF) Sensor						
P0103	Mass Air Flow (MAF) Sensor						
P0116	Engine Coolant Temperature (ECT) Sensor						
P0116	Engine Coolant Temperature Sensor @ Cylinder Block						
P0117	Engine Coolant Temperature Sensor @ Cylinder Block						
P0118	Engine Coolant Temperature Sensor @ Cylinder Block						
P0130	Oxygen Sensors (O2S) front						
P0131	Oxygen Sensors (O2S) front						
P0132	Oxygen Sensors (O2S) front						
P0133	Oxygen Sensors (O2S) front						
P0135	Oxygen Sensors (O2S) Heater front						
P0300	Misfire						
P0322	Crankshaft Position (CKP) Sensor						
P0444	Evaporative Emission (EVAP) Canister Purge Valve						
P0458	Evaporative Emission (EVAP) Canister Purge Valve						
P0459	Evaporative Emission (EVAP) Canister Purge Valve						
P0501	Vehicle Speed Sensor (VSS)						
P0606	Engine Control Module (ECM): Sensor Integrated Circuit						
P0638	Throttle Actuator						
P2088	Variable Valve Timing (VVT) Intake Actuator						
P2089	Variable Valve Timing (VVT) Intake Actuator						
P2096	Fuel System						
P2097	Fuel System						
P2181	Engine Cooling System						
P2195	Oxygen Sensors (O2S) front						
P2196	Oxygen Sensors (O2S) front						
P2237	Oxygen Sensors (O2S) front						
P2243	Oxygen Sensors (O2S) front						
P2251	Oxygen Sensors (O2S) front						
P2414	Oxygen Sensors (O2S) front						
P2626	Oxygen Sensors (O2S) front						
P3081	Engine Coolant Temperature Sensor @ Cylinder Block						

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
Evaporative Emission (EVAP) Canister Purge Valve	open circuit	P0444		
Natural Vacuum Leak Detection (NVLD) Switch	open circuit	P0450	P0116	Engine Coolant Temperature (ECT) Sensor
			P0116	Engine Coolant Temperature Sensor @ Cylinder Block
			P0117	Engine Coolant Temperature Sensor @ Cylinder Block
			P0118	Engine Coolant Temperature Sensor @ Cylinder Block
			P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			P2024	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2025	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2026	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2027	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2181	Engine Cooling System
			P3081	Engine Coolant Temperature Sensor @ Cylinder Block
Natural Vacuum Leak Detection (NVLD) Switch	functional check: stuck close	P0451	P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0450	Natural Vacuum Leak Detection (NVLD) Switch
			P0452	Natural Vacuum Leak Detection (NVLD) Switch
			P0453	Natural Vacuum Leak Detection (NVLD) Switch
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			P2024	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2025	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2026	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2027	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
Natural Vacuum Leak Detection (NVLD) Switch	short to ground	P0452	P0116	Engine Coolant Temperature (ECT) Sensor
			P0116	Engine Coolant Temperature Sensor @ Cylinder Block
			P0117	Engine Coolant Temperature Sensor @ Cylinder Block
			P0118	Engine Coolant Temperature Sensor @ Cylinder Block
			P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			P2024	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2025	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2026	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2027	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2181	Engine Cooling System
			P3081	Engine Coolant Temperature Sensor @ Cylinder Block
Natural Vacuum Leak Detection (NVLD) Switch	short to battery plus	P0453	P0116	Engine Coolant Temperature (ECT) Sensor
			P0116	Engine Coolant Temperature Sensor @ Cylinder Block
			P0117	Engine Coolant Temperature Sensor @ Cylinder Block
			P0118	Engine Coolant Temperature Sensor @ Cylinder Block
			P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			P2024	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2025	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2026	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2027	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2181	Engine Cooling System
			P3081	Engine Coolant Temperature Sensor @ Cylinder Block
Evaporative Emission (EVAP) System Very Small Leak	functional check	P0456	P0070	COM: Ambient Air Temperature (AAT) Sensor
			P0071	Ambient Air Temperature (AAT) Sensor
			P0072	COM: Ambient Air Temperature (AAT) Sensor
			P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0450	Natural Vacuum Leak Detection (NVLD) Switch
			P0451	Natural Vacuum Leak Detection (NVLD) Switch
			P0452	Natural Vacuum Leak Detection (NVLD) Switch
			P0453	Natural Vacuum Leak Detection (NVLD) Switch
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			P0606	Barometric Pressure (BARO) Sensor
			P2024	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2025	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2026	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2027	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			U0323	COM: Ambient Air Temperature (AAT) Sensor
			U0422	COM: Ambient Air Temperature (AAT) Sensor
Evaporative Emission (EVAP) Canister Purge Valve	short to ground	P0458		
Evaporative Emission (EVAP) Canister Purge Valve	short to battery plus	P0459		
Fuel Level Sensor	plausibility check	P0461	P0462	COM: Fuel Level (FL) Sensor 1
			P0463	COM: Fuel Level (FL) Sensor 1
			P0501	Vehicle Speed Sensor (VSS)
			P2067	COM: Fuel Level (FL) Sensor 2
			P2068	COM: Fuel Level (FL) Sensor 2
			U0415	Vehicle Speed Sensor (VSS)
COM: Fuel Level (FL) Sensor 1	communication with IPC	P0462		
COM: Fuel Level (FL) Sensor 1	communication with IPC	P0463		
Vehicle Speed Sensor (VSS)	plausibility check	P0501	P0116	Engine Coolant Temperature Sensor @ Cylinder Block
			P0117	Engine Coolant Temperature Sensor @ Cylinder Block
			P0118	Engine Coolant Temperature Sensor @ Cylinder Block
			P0321	Crankshaft Position (CKP) Sensor
			P0322	Crankshaft Position (CKP) Sensor
			P0606	Engine Control Module (ECM): RAM
			P3081	Engine Coolant Temperature Sensor @ Cylinder Block
			U0001	CAN: Powertrain
			U0002	CAN: Powertrain
			U0415	COM: Brake System Control Module (BSCM)
			U0415	COM: Vehicle Speed Sensor (VSS)
Idle Speed Control (ISC)	out of range low	P0506	P0501	Vehicle Speed Sensor (VSS)
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
Idle Speed Control (ISC)	plausibility check	P0506	P0501	Vehicle Speed Sensor (VSS)
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
Idle Speed Control (ISC)	out of range high	P0507	P0501	Vehicle Speed Sensor (VSS)
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
Idle Speed Control (ISC) - Cold Start Monitoring	out of range high	P050A	P0501	Vehicle Speed Sensor (VSS)
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
Idle Speed Control (ISC) - Cold Start Monitoring	out of range low	P050A	P0501	Vehicle Speed Sensor (VSS)
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
Idle Speed Control (ISC) - Cold Start Monitoring	plausibility check	P050A	P0501	Vehicle Speed Sensor (VSS)
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
Ignition Control (IC) - Cold Start Monitoring	<u>part load</u> Ignition Control (IC)	P050B	P0501	Vehicle Speed Sensor (VSS)
			P0606	Barometric Pressure (BARO) Sensor
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
Variable Valve Timing (VVT) Intake Actuator - Cold Start Monitoring	target error	P052A	P0010	Variable Valve Timing (VVT) Intake Actuator
			P0016	Camshaft Position (CMP) Intake Sensor
			P0321	Crankshaft Position (CKP) Sensor
			P0322	Crankshaft Position (CKP) Sensor
			P0341	Phase Sensor 1
			P0342	Phase Sensor 1
			P0343	Phase Sensor 1
			P0641	Engine Control Module (ECM): Sensor Reference Circuit A
			P0651	Engine Control Module (ECM): Sensor Reference Circuit B
			P2088	Variable Valve Timing (VVT) Intake Actuator
P2089	Variable Valve Timing (VVT) Intake Actuator			
Fuel Volume Regulator HP Control - Cold Start Monitoring	functional check	P053F	P0190	Fuel Rail Pressure (FRP) Sensor
			P0191	Fuel Rail Pressure (FRP)
			P0192	Fuel Rail Pressure (FRP) Sensor
			P025A	Fuel Pump Control (FPC)
			P025C	Fuel Pump Control (FPC)
			P025D	Fuel Pump Control (FPC)
			P0657	Engine Components Supply Voltage Relay
			P0658	Engine Components Supply Voltage Relay
			P0659	Engine Components Supply Voltage Relay
			P2294	Fuel Volume Regulator Control
			P2295	Fuel Volume Regulator Control
			P2296	Fuel Volume Regulator Control
Barometric Pressure (BARO) Sensor	out of range high	P0606	P0236	Turbocharger (TC) Boost Pressure Sensor
			P0237	Turbocharger (TC) Boost Pressure Sensor
			P0238	Turbocharger (TC) Boost Pressure Sensor
			P0638	Throttle Actuator
			Engine Control Module (ECM): Sensor Reference Circuit A	
			P0641	
Barometric Pressure (BARO) Sensor	out of range low	P0606	P0236	Turbocharger (TC) Boost Pressure Sensor
			P0237	Turbocharger (TC) Boost Pressure Sensor
			P0238	Turbocharger (TC) Boost Pressure Sensor
			P0638	Throttle Actuator
			Engine Control Module (ECM): Sensor Reference Circuit A	
			P0641	

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
Barometric Pressure (BARO) Sensor	plausibility check	P0606	P0236	Turbocharger (TC) Boost Pressure Sensor
			P0237	Turbocharger (TC) Boost Pressure Sensor
			P0238	Turbocharger (TC) Boost Pressure Sensor
			P0638	Throttle Actuator
			P0641	Engine Control Module (ECM): Sensor Reference Circuit A
Engine Control Module (ECM): 5V Supply Voltage	internal hardware check	P0606		
Engine Control Module (ECM): Analog / Digital Converter	adc-cannel conversion	P0606		
Engine Control Module (ECM): Analog / Digital Converter	power-up calibration	P0606		
Engine Control Module (ECM): EEPROM	functional check	P0606		
Engine Control Module (ECM): Electronic Throttle Control Module	function monitoring: A/D converter	P0606		
Engine Control Module (ECM): Electronic Throttle Control Module	function monitoring: accelerator position	P0606		
Engine Control Module (ECM): Electronic Throttle Control Module	function monitoring: coding	P0606		
Engine Control Module (ECM): Electronic Throttle Control Module	function monitoring: torque	P0606		
Engine Control Module (ECM): Electronic Throttle Control Module	monitoring module	P0606		
Engine Control Module (ECM): RAM	controller RAM check	P0606		
Engine Control Module (ECM): Sensor Integrated Circuit	internal hardware check (electrical adjustment communication, voltage supply)	P0606	P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P2237	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P2626	Oxygen Sensors (O2S) front
Engine Control Module (ECM): WDA	function monitoring: WDA	P0606		
Ignition Control (IC)	communication check	P0606		
Engine Control Module (ECM): Electronic Throttle Control Module	function monitoring: StartStop	P060C		
Engine Control Module (ECM): Electronic Throttle Control Module	function monitoring: engine speed deviation	P060C		
Engine Control Module (ECM): Electronic Throttle Control Module	function monitoring: ignition timing	P060C		
Engine Control Module (ECM): Electronic Throttle Control Module	function monitoring: injection rate limitation	P060C		
Engine Control Module (ECM): Electronic Throttle Control Module	function monitoring: intern	P060C		
Engine Control Module (ECM): Electronic Throttle Control Module	function monitoring: mixture control	P060C		
Engine Control Module (ECM): Fuel Injection Valves	communication check	P062B		
Fuel Pump Control (FPC)	over-temperature power stage	P0634		

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
Throttle Actuator	rationality check close movement	P0638		
Throttle Actuator	rationality check open movement	P0638		
Throttle Actuator	signal range check @ mechanical stop low	P0638		
Engine Control Module (ECM): Sensor Reference Circuit A	short circuit	P0641		
Engine Control Module (ECM): Sensor Reference Circuit B	short circuit	P0651		
Engine Components Supply Voltage Relay	open circuit	P0657		
Engine Components Supply Voltage Relay	short to ground	P0658		
Engine Components Supply Voltage Relay	short to battery plus	P0659		
Engine Control Module (ECM): Sensor Reference Circuit C	short circuit	P0697		
Fuel Rail Pressure (FRP) Sensor	rationality check inappropriately low	P12A1	P0030 P0031 P0032 P0131 P0132 P0133 P0135 P0137 P0138 P0140 P0190 P0191 P0192 P025A P025C P025D P0441 P0444 P0458 P0459 P0657 P0658 P0659 P2195 P2196 P2237 P2243 P2251 P2270 P2271 P2294 P2295 P2296 P2626	Oxygen Sensors (O2S) Heater front Oxygen Sensors (O2S) Heater front Oxygen Sensors (O2S) Heater front Oxygen Sensors (O2S) front Oxygen Sensors (O2S) front Oxygen Sensors (O2S) front Oxygen Sensors (O2S) Heater front Oxygen Sensors (O2S) rear Oxygen Sensors (O2S) rear Oxygen Sensors (O2S) rear Fuel Rail Pressure (FRP) Sensor Fuel Rail Pressure (FRP) Fuel Rail Pressure (FRP) Sensor Fuel Pump Control (FPC) Fuel Pump Control (FPC) Fuel Pump Control (FPC) Evaporative Emission (EVAP) System Evaporative Emission (EVAP) Canister Purge Valve Evaporative Emission (EVAP) Canister Purge Valve Evaporative Emission (EVAP) Canister Purge Valve Engine Components Supply Voltage Relay Engine Components Supply Voltage Relay Engine Components Supply Voltage Relay Oxygen Sensors (O2S) front Oxygen Sensors (O2S) front Oxygen Sensors (O2S) front Oxygen Sensors (O2S) front Oxygen Sensors (O2S) front Oxygen Sensors (O2S) rear Oxygen Sensors (O2S) rear Oxygen Sensors (O2S) rear Fuel Volume Regulator Control Fuel Volume Regulator Control Fuel Volume Regulator Control Oxygen Sensors (O2S) front
Fuel Rail Pressure (FRP) Sensor	rationality check inappropriately high	P12A2	P0030 P0031 P0032 P0131 P0132 P0133 P0135 P0137 P0138 P0140 P0190 P0191 P0192 P025A P025C P025D	Oxygen Sensors (O2S) Heater front Oxygen Sensors (O2S) Heater front Oxygen Sensors (O2S) Heater front Oxygen Sensors (O2S) front Oxygen Sensors (O2S) front Oxygen Sensors (O2S) front Oxygen Sensors (O2S) Heater front Oxygen Sensors (O2S) rear Oxygen Sensors (O2S) rear Oxygen Sensors (O2S) rear Fuel Rail Pressure (FRP) Sensor Fuel Rail Pressure (FRP) Fuel Rail Pressure (FRP) Sensor Fuel Pump Control (FPC) Fuel Pump Control (FPC) Fuel Pump Control (FPC)

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
			P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			P0657	Engine Components Supply Voltage Relay
			P0658	Engine Components Supply Voltage Relay
			P0659	Engine Components Supply Voltage Relay
			P2195	Oxygen Sensors (O2S) front
			P2196	Oxygen Sensors (O2S) front
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P2270	Oxygen Sensors (O2S) rear
			P2271	Oxygen Sensors (O2S) rear
			P2294	Fuel Volume Regulator Control
			P2295	Fuel Volume Regulator Control
			P2296	Fuel Volume Regulator Control
			P2626	Oxygen Sensors (O2S) front
Fuel Volume Regulator Control	functional check: stuck close	P12A4	P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0133	Oxygen Sensors (O2S) front
			P0135	Oxygen Sensors (O2S) Heater front
			P0137	Oxygen Sensors (O2S) rear
			P0138	Oxygen Sensors (O2S) rear
			P0140	Oxygen Sensors (O2S) rear
			P0190	Fuel Rail Pressure (FRP) Sensor
			P0191	Fuel Rail Pressure (FRP)
			P0192	Fuel Rail Pressure (FRP) Sensor
			P025A	Fuel Pump Control (FPC)
			P025C	Fuel Pump Control (FPC)
			P025D	Fuel Pump Control (FPC)
			P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			P0657	Engine Components Supply Voltage Relay
			P0658	Engine Components Supply Voltage Relay
			P0659	Engine Components Supply Voltage Relay
			P2195	Oxygen Sensors (O2S) front
			P2196	Oxygen Sensors (O2S) front
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P2270	Oxygen Sensors (O2S) rear
			P2271	Oxygen Sensors (O2S) rear
			P2294	Fuel Volume Regulator Control
			P2295	Fuel Volume Regulator Control
			P2296	Fuel Volume Regulator Control
			P2626	Oxygen Sensors (O2S) front
Ignition Control (IC) - Cold Start Monitoring	<u>part load</u> Ignition Control (IC)	P13EA	P0501	Vehicle Speed Sensor (VSS)
			P0606	Barometric Pressure (BARO) Sensor
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
Engine Off Time	comparison of engine off time from instrument cluster control unit with engine after run time	P150A		
Engine Control Module (ECM): Transport Mode	vehicle in transport mode	P169A	P0321	Crankshaft Position (CKP) Sensor
			P0322	Crankshaft Position (CKP) Sensor
			P0606	Engine Control Module (ECM): RAM
			U0001	CAN: Powertrain
			U0002	CAN: Powertrain
Intake Manifold Runner Control (IMRC) Actuator	open circuit	P2008	P2009	Intake Manifold Runner Control (IMRC) Actuator
			P2010	Intake Manifold Runner Control (IMRC) Actuator
Intake Manifold Runner Control (IMRC) Actuator	short to ground	P2009	P2008	Intake Manifold Runner Control (IMRC) Actuator

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
			P2010	Intake Manifold Runner Control (IMRC) Actuator
Intake Manifold Runner Control (IMRC) Actuator	short to battery plus	P2010	P2008	Intake Manifold Runner Control (IMRC) Actuator
			P2009	Intake Manifold Runner Control (IMRC) Actuator
Intake Manifold Runner Control (IMRC) Position Sensor	out of range high	P2014	P0641	Engine Control Module (ECM): Sensor Reference Circuit A
Intake Manifold Runner Control (IMRC) Actuator	rationality check high	P2015	P2008	Intake Manifold Runner Control (IMRC) Actuator
			P2009	Intake Manifold Runner Control (IMRC) Actuator
			P2010	Intake Manifold Runner Control (IMRC) Actuator
			P2014	Intake Manifold Runner Control (IMRC) Position Sensor
			P2016	Intake Manifold Runner Control (IMRC) Position Sensor
Intake Manifold Runner Control (IMRC) Actuator	rationality check low	P2015	P2008	Intake Manifold Runner Control (IMRC) Actuator
			P2009	Intake Manifold Runner Control (IMRC) Actuator
			P2010	Intake Manifold Runner Control (IMRC) Actuator
			P2014	Intake Manifold Runner Control (IMRC) Position Sensor
			P2016	Intake Manifold Runner Control (IMRC) Position Sensor
Intake Manifold Runner Control (IMRC) Actuator	rationality check	P2015	P2008	Intake Manifold Runner Control (IMRC) Actuator
			P2009	Intake Manifold Runner Control (IMRC) Actuator
			P2010	Intake Manifold Runner Control (IMRC) Actuator
			P2014	Intake Manifold Runner Control (IMRC) Position Sensor
			P2016	Intake Manifold Runner Control (IMRC) Position Sensor
Intake Manifold Runner Control (IMRC) Position Sensor	out of range low	P2016	P0641	Engine Control Module (ECM): Sensor Reference Circuit A
Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor	open circuit	P2024		
Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor	cross check	P2025	P0112	Intake Air Temperature (IAT) Sensor @ Manifold
			P0113	Intake Air Temperature (IAT) Sensor @ Manifold
			P0116	Engine Coolant Temperature (ECT) Sensor
			P0116	Engine Coolant Temperature Sensor @ Cylinder Block
			P0117	Engine Coolant Temperature Sensor @ Cylinder Block
			P0118	Engine Coolant Temperature Sensor @ Cylinder Block
			P2024	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2026	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2027	Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor
			P2181	Engine Cooling System
			P3081	Engine Coolant Temperature Sensor @ Cylinder Block
Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor	short to ground	P2026		
Evaporative Emission (EVAP) Fuel Vapor Temperature Sensor	short to battery plus	P2027		
COM: Fuel Level (FL) Sensor 2	communication with IPC	P2067		
COM: Fuel Level (FL) Sensor 2	communication with IPC	P2068		
Variable Valve Timing (VVT) Intake Actuator	short to ground	P2088		
Variable Valve Timing (VVT) Intake Actuator	short to battery plus	P2089		
Fuel System	out of range low	P2096	P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
			P0100	Mass Air Flow (MAF) Sensor
			P0101	Mass Air Flow (MAF) Sensor
			P0102	Mass Air Flow (MAF) Sensor
			P0103	Mass Air Flow (MAF) Sensor

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
			P0130	Oxygen Sensors (O2S) front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0133	Oxygen Sensors (O2S) front
			P0135	Oxygen Sensors (O2S) Heater front
			P0137	Oxygen Sensors (O2S) rear
			P0138	Oxygen Sensors (O2S) rear
			P0140	Oxygen Sensors (O2S) rear
			P0141	Oxygen Sensors (O2S) Heater rear
			P0300	Misfire
			P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
				Engine Control Module (ECM): Sensor Integrated Circuit
			P0606	
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P2270	Oxygen Sensors (O2S) rear
			P2271	Oxygen Sensors (O2S) rear
			P2414	Oxygen Sensors (O2S) front
			P2626	Oxygen Sensors (O2S) front
Fuel System	out of range high	P2097	P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
			P0100	Mass Air Flow (MAF) Sensor
			P0101	Mass Air Flow (MAF) Sensor
			P0102	Mass Air Flow (MAF) Sensor
			P0103	Mass Air Flow (MAF) Sensor
			P0130	Oxygen Sensors (O2S) front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0133	Oxygen Sensors (O2S) front
			P0135	Oxygen Sensors (O2S) Heater front
			P0137	Oxygen Sensors (O2S) rear
			P0138	Oxygen Sensors (O2S) rear
			P0140	Oxygen Sensors (O2S) rear
			P0141	Oxygen Sensors (O2S) Heater rear
			P0300	Misfire
			P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
				Engine Control Module (ECM): Sensor Integrated Circuit
			P0606	
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P2270	Oxygen Sensors (O2S) rear
			P2271	Oxygen Sensors (O2S) rear
			P2414	Oxygen Sensors (O2S) front
			P2626	Oxygen Sensors (O2S) front
Throttle Actuator	rationality check	P2101		
Throttle Actuator	signal range check	P2101		
Throttle Actuator	functional check	P2106		
Throttle Actuator	open circuit	P2106		
Throttle Actuator	short to battery plus/ short to ground	P2106		
Throttle Actuator	temperatur / current monitoring	P2106		
Accelerator Pedal Position (APP) Sensor 1	out of range low	P2122	P0641	Engine Control Module (ECM): Sensor Reference Circuit A
Accelerator Pedal Position (APP) Sensor 1	out of range high	P2123	P0641	Engine Control Module (ECM): Sensor Reference Circuit A
Accelerator Pedal Position (APP) Sensor 2	out of range low	P2127	P0651	Engine Control Module (ECM): Sensor Reference Circuit B

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
Accelerator Pedal Position (APP) Sensor 2	out of range high	P2128	P0651	Engine Control Module (ECM): Sensor Reference Circuit B
Accelerator Pedal Position (APP) Sensor 1 and 2	rationality check	P2138		
Fuel Injection Valves	coil winding (high side - low side)	P2146		
Fuel Injection Valves	short to battery plus (high side)	P2146		
Fuel Injection Valves	short to ground (high side)	P2146		
Fuel Injection Valves	coil winding (high side - low side)	P2149		
Fuel Injection Valves	short to battery plus (high side)	P2149		
Fuel Injection Valves	short to ground (high side)	P2149		
Fuel System	system too lean @ part load	P2177	P000A	Variable Valve Timing (VVT) Intake Actuator
			P0010	Variable Valve Timing (VVT) Intake Actuator
			P0011	Variable Valve Timing (VVT) Intake Actuator
			P0016	Camshaft Position (CMP) Intake Sensor
			P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
			P0112	Intake Air Temperature (IAT) Sensor @ Manifold
			P0113	Intake Air Temperature (IAT) Sensor @ Manifold
			P0116	Engine Coolant Temperature (ECT) Sensor
			P0116	Engine Coolant Temperature Sensor @ Cylinder Block
			P0117	Engine Coolant Temperature Sensor @ Cylinder Block
			P0118	Engine Coolant Temperature Sensor @ Cylinder Block
			P0130	Oxygen Sensors (O2S) front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0133	Oxygen Sensors (O2S) front
			P0135	Oxygen Sensors (O2S) Heater front
			P0300	Misfire
			P0321	Crankshaft Position (CKP) Sensor
			P0322	Crankshaft Position (CKP) Sensor
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			P052A	Variable Valve Timing (VVT) Intake Actuator - Cold Start Monitoring
			P0606	Engine Control Module (ECM): Sensor Integrated Circuit
			P0638	Throttle Actuator
			P2088	Variable Valve Timing (VVT) Intake Actuator
			P2089	Variable Valve Timing (VVT) Intake Actuator
			P2096	Fuel System
			P2097	Fuel System
			P2181	Engine Cooling System
			P2195	Oxygen Sensors (O2S) front
			P2196	Oxygen Sensors (O2S) front
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P2414	Oxygen Sensors (O2S) front
			P2626	Oxygen Sensors (O2S) front
			P3081	Engine Coolant Temperature Sensor @ Cylinder Block
Fuel System	system too rich @ part load	P2178	P000A	Variable Valve Timing (VVT) Intake Actuator
			P0010	Variable Valve Timing (VVT) Intake Actuator
			P0011	Variable Valve Timing (VVT) Intake Actuator
			P0016	Camshaft Position (CMP) Intake Sensor
			P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
			P0112	Intake Air Temperature (IAT) Sensor @ Manifold
			P0113	Intake Air Temperature (IAT) Sensor @ Manifold
			P0116	Engine Coolant Temperature (ECT) Sensor

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System				
			P0116	Engine Coolant Temperature Sensor @ Cylinder Block			
			P0117	Engine Coolant Temperature Sensor @ Cylinder Block			
			P0118	Engine Coolant Temperature Sensor @ Cylinder Block			
			P0130	Oxygen Sensors (O2S) front			
			P0131	Oxygen Sensors (O2S) front			
			P0132	Oxygen Sensors (O2S) front			
			P0133	Oxygen Sensors (O2S) front			
			P0135	Oxygen Sensors (O2S) Heater front			
			P0300	Misfire			
			P0321	Crankshaft Position (CKP) Sensor			
			P0322	Crankshaft Position (CKP) Sensor			
			P0444	Evaporative Emission (EVAP) Canister Purge Valve			
			P0458	Evaporative Emission (EVAP) Canister Purge Valve			
			P0459	Evaporative Emission (EVAP) Canister Purge Valve			
			P052A	Variable Valve Timing (VVT) Intake Actuator - Cold Start Monitoring			
			P0606	Engine Control Module (ECM): Sensor Integrated Circuit			
			P0638	Throttle Actuator			
			P2088	Variable Valve Timing (VVT) Intake Actuator			
			P2089	Variable Valve Timing (VVT) Intake Actuator			
			P2096	Fuel System			
			P2097	Fuel System			
			P2181	Engine Cooling System			
			P2195	Oxygen Sensors (O2S) front			
			P2196	Oxygen Sensors (O2S) front			
			P2237	Oxygen Sensors (O2S) front			
			P2243	Oxygen Sensors (O2S) front			
			P2251	Oxygen Sensors (O2S) front			
			P2414	Oxygen Sensors (O2S) front			
			P2626	Oxygen Sensors (O2S) front			
			P3081	Engine Coolant Temperature Sensor @ Cylinder Block			
			Engine Cooling System	cooling system performance not in the expected range	P2181	P0070	COM: Ambient Air Temperature (AAT) Sensor
P0071	Ambient Air Temperature (AAT) Sensor						
P0072	COM: Ambient Air Temperature (AAT) Sensor						
P0100	Mass Air Flow (MAF) Sensor						
P0101	Mass Air Flow (MAF) Sensor						
P0102	Mass Air Flow (MAF) Sensor						
P0103	Mass Air Flow (MAF) Sensor						
P0116	Engine Coolant Temperature (ECT) Sensor						
P0116	Engine Coolant Temperature Sensor @ Cylinder Block						
P0117	Engine Coolant Temperature Sensor @ Cylinder Block						
P0118	Engine Coolant Temperature Sensor @ Cylinder Block						
P0606	Barometric Pressure (BARO) Sensor						
P0606	Engine Control Module (ECM): RAM						
P3081	Engine Coolant Temperature Sensor @ Cylinder Block						
U0001	CAN: Powertrain						
U0002	CAN: Powertrain						
U0146	COM: Gateway						
U0323	COM: Ambient Air Temperature (AAT) Sensor						
U0422	COM: Ambient Air Temperature (AAT) Sensor						
U0447	COM: Gateway						
Fuel System	system too lean @ idle	P2187	P000A	Variable Valve Timing (VVT) Intake Actuator			
			P0010	Variable Valve Timing (VVT) Intake Actuator			
			P0011	Variable Valve Timing (VVT) Intake Actuator			
			P0016	Camshaft Position (CMP) Intake Sensor			
			P0030	Oxygen Sensors (O2S) Heater front			
			P0031	Oxygen Sensors (O2S) Heater front			
			P0032	Oxygen Sensors (O2S) Heater front			
			P0112	Intake Air Temperature (IAT) Sensor @ Manifold			
			P0113	Intake Air Temperature (IAT) Sensor @ Manifold			
			P0116	Engine Coolant Temperature (ECT) Sensor			
			P0116	Engine Coolant Temperature Sensor @ Cylinder Block			
			P0117	Engine Coolant Temperature Sensor @ Cylinder Block			
			P0118	Engine Coolant Temperature Sensor @ Cylinder Block			
			P0130	Oxygen Sensors (O2S) front			

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System				
			P0131	Oxygen Sensors (O2S) front			
			P0132	Oxygen Sensors (O2S) front			
			P0133	Oxygen Sensors (O2S) front			
			P0135	Oxygen Sensors (O2S) Heater front			
			P0300	Misfire			
			P0321	Crankshaft Position (CKP) Sensor			
			P0322	Crankshaft Position (CKP) Sensor			
			P0444	Evaporative Emission (EVAP) Canister Purge Valve			
			P0458	Evaporative Emission (EVAP) Canister Purge Valve			
			P0459	Evaporative Emission (EVAP) Canister Purge Valve			
			Variable Valve Timing (VVT) Intake Actuator - Cold Start Monitoring				
			P052A	Engine Control Module (ECM): Sensor Integrated Circuit			
			P0606	Circuit			
			P0638	Throttle Actuator			
			P2088	Variable Valve Timing (VVT) Intake Actuator			
			P2089	Variable Valve Timing (VVT) Intake Actuator			
			P2096	Fuel System			
			P2097	Fuel System			
			P2181	Engine Cooling System			
			P2195	Oxygen Sensors (O2S) front			
			P2196	Oxygen Sensors (O2S) front			
			P2237	Oxygen Sensors (O2S) front			
			P2243	Oxygen Sensors (O2S) front			
			P2251	Oxygen Sensors (O2S) front			
			P2414	Oxygen Sensors (O2S) front			
			P2626	Oxygen Sensors (O2S) front			
			Engine Coolant Temperature Sensor @ Cylinder Block				
			P3081				
			Fuel System	system too rich @ idle	P2188	P000A	Variable Valve Timing (VVT) Intake Actuator
						P0010	Variable Valve Timing (VVT) Intake Actuator
						P0011	Variable Valve Timing (VVT) Intake Actuator
P0016	Camshaft Position (CMP) Intake Sensor						
P0030	Oxygen Sensors (O2S) Heater front						
P0031	Oxygen Sensors (O2S) Heater front						
P0032	Oxygen Sensors (O2S) Heater front						
P0112	Intake Air Temperature (IAT) Sensor @ Manifold						
P0113	Intake Air Temperature (IAT) Sensor @ Manifold						
P0116	Engine Coolant Temperature (ECT) Sensor						
Engine Coolant Temperature Sensor @ Cylinder Block							
P0116	Engine Coolant Temperature Sensor @ Cylinder Block						
P0117	Engine Coolant Temperature Sensor @ Cylinder Block						
P0118	Engine Coolant Temperature Sensor @ Cylinder Block						
P0130	Oxygen Sensors (O2S) front						
P0131	Oxygen Sensors (O2S) front						
P0132	Oxygen Sensors (O2S) front						
P0133	Oxygen Sensors (O2S) front						
P0135	Oxygen Sensors (O2S) Heater front						
P0300	Misfire						
P0321	Crankshaft Position (CKP) Sensor						
P0322	Crankshaft Position (CKP) Sensor						
P0444	Evaporative Emission (EVAP) Canister Purge Valve						
P0458	Evaporative Emission (EVAP) Canister Purge Valve						
P0459	Evaporative Emission (EVAP) Canister Purge Valve						
Variable Valve Timing (VVT) Intake Actuator - Cold Start Monitoring							
P052A	Engine Control Module (ECM): Sensor Integrated Circuit						
P0606	Circuit						
P0638	Throttle Actuator						
P2088	Variable Valve Timing (VVT) Intake Actuator						
P2089	Variable Valve Timing (VVT) Intake Actuator						
P2096	Fuel System						
P2097	Fuel System						
P2181	Engine Cooling System						
P2195	Oxygen Sensors (O2S) front						
P2196	Oxygen Sensors (O2S) front						
P2237	Oxygen Sensors (O2S) front						
P2243	Oxygen Sensors (O2S) front						
P2251	Oxygen Sensors (O2S) front						
P2414	Oxygen Sensors (O2S) front						
P2626	Oxygen Sensors (O2S) front						
Engine Coolant Temperature Sensor @ Cylinder Block							
P3081							
Oxygen Sensors (O2S) front	out of range high	P2195	P0030	Oxygen Sensors (O2S) Heater front			
			P0031	Oxygen Sensors (O2S) Heater front			

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
			P0032	Oxygen Sensors (O2S) Heater front
			P0100	Mass Air Flow (MAF) Sensor
			P0101	Mass Air Flow (MAF) Sensor
			P0102	Mass Air Flow (MAF) Sensor
			P0103	Mass Air Flow (MAF) Sensor
			P0130	Oxygen Sensors (O2S) front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0133	Oxygen Sensors (O2S) front
			P0135	Oxygen Sensors (O2S) Heater front
			P0137	Oxygen Sensors (O2S) rear
			P0138	Oxygen Sensors (O2S) rear
			P0140	Oxygen Sensors (O2S) rear
			P0141	Oxygen Sensors (O2S) Heater rear
			P0300	Misfire
			P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			Engine Control Module (ECM): Sensor Integrated Circuit	
			P0606	
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P2270	Oxygen Sensors (O2S) rear
			P2271	Oxygen Sensors (O2S) rear
			P2414	Oxygen Sensors (O2S) front
P2626	Oxygen Sensors (O2S) front			
Oxygen Sensors (O2S) front	out of range low	P2196	P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
			P0100	Mass Air Flow (MAF) Sensor
			P0101	Mass Air Flow (MAF) Sensor
			P0102	Mass Air Flow (MAF) Sensor
			P0103	Mass Air Flow (MAF) Sensor
			P0130	Oxygen Sensors (O2S) front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0133	Oxygen Sensors (O2S) front
			P0135	Oxygen Sensors (O2S) Heater front
			P0137	Oxygen Sensors (O2S) rear
			P0138	Oxygen Sensors (O2S) rear
			P0140	Oxygen Sensors (O2S) rear
			P0141	Oxygen Sensors (O2S) Heater rear
			P0300	Misfire
			P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			Engine Control Module (ECM): Sensor Integrated Circuit	
			P0606	
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P2270	Oxygen Sensors (O2S) rear
			P2271	Oxygen Sensors (O2S) rear
P2414	Oxygen Sensors (O2S) front			
P2626	Oxygen Sensors (O2S) front			
Fuel System	A/F cylinder imbalance: out of range high	P219C	P000A	Variable Valve Timing (VVT) Intake Actuator
			P0010	Variable Valve Timing (VVT) Intake Actuator
			P0011	Variable Valve Timing (VVT) Intake Actuator
			P0100	Mass Air Flow (MAF) Sensor
			P0101	Mass Air Flow (MAF) Sensor
			P0102	Mass Air Flow (MAF) Sensor
			P0103	Mass Air Flow (MAF) Sensor
			P0130	Oxygen Sensors (O2S) front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0133	Oxygen Sensors (O2S) front
			P0300	Misfire
			P0321	Crankshaft Position (CKP) Sensor
			P0322	Crankshaft Position (CKP) Sensor
			P0441	Evaporative Emission (EVAP) System

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			P0501	Vehicle Speed Sensor (VSS)
			P0606	Engine Control Module (ECM): Sensor Integrated Circuit
			P2088	Variable Valve Timing (VVT) Intake Actuator
			P2089	Variable Valve Timing (VVT) Intake Actuator
			P2096	Fuel System
			P2097	Fuel System
			P2177	Fuel System
			P2178	Fuel System
			P2187	Fuel System
			P2188	Fuel System
			P2195	Oxygen Sensors (O2S) front
			P2196	Oxygen Sensors (O2S) front
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P230A	Fuel System
			P230B	Fuel System
			P230C	Fuel System
			P230D	Fuel System
			P2414	Oxygen Sensors (O2S) front
			P2626	Oxygen Sensors (O2S) front
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
Fuel System	A/F cylinder imbalance: out of range low	P219C	P000A	Variable Valve Timing (VVT) Intake Actuator
			P0010	Variable Valve Timing (VVT) Intake Actuator
			P0011	Variable Valve Timing (VVT) Intake Actuator
			P0100	Mass Air Flow (MAF) Sensor
			P0101	Mass Air Flow (MAF) Sensor
			P0102	Mass Air Flow (MAF) Sensor
			P0103	Mass Air Flow (MAF) Sensor
			P0130	Oxygen Sensors (O2S) front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0133	Oxygen Sensors (O2S) front
			P0300	Misfire
			P0321	Crankshaft Position (CKP) Sensor
			P0322	Crankshaft Position (CKP) Sensor
			P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			P0501	Vehicle Speed Sensor (VSS)
				Engine Control Module (ECM): Sensor Integrated Circuit
			P0606	
			P2088	Variable Valve Timing (VVT) Intake Actuator
			P2089	Variable Valve Timing (VVT) Intake Actuator
			P2096	Fuel System
			P2097	Fuel System
			P2177	Fuel System
			P2178	Fuel System
			P2187	Fuel System
			P2188	Fuel System
			P2195	Oxygen Sensors (O2S) front
			P2196	Oxygen Sensors (O2S) front
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P230A	Fuel System
			P230B	Fuel System
			P230C	Fuel System
			P230D	Fuel System
			P2414	Oxygen Sensors (O2S) front
			P2626	Oxygen Sensors (O2S) front
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
Fuel System	A/F cylinder imbalance: out of range high	P219D	P000A	Variable Valve Timing (VVT) Intake Actuator
			P0010	Variable Valve Timing (VVT) Intake Actuator
			P0011	Variable Valve Timing (VVT) Intake Actuator

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System				
			P0100	Mass Air Flow (MAF) Sensor			
			P0101	Mass Air Flow (MAF) Sensor			
			P0102	Mass Air Flow (MAF) Sensor			
			P0103	Mass Air Flow (MAF) Sensor			
			P0130	Oxygen Sensors (O2S) front			
			P0131	Oxygen Sensors (O2S) front			
			P0132	Oxygen Sensors (O2S) front			
			P0133	Oxygen Sensors (O2S) front			
			P0300	Misfire			
			P0321	Crankshaft Position (CKP) Sensor			
			P0322	Crankshaft Position (CKP) Sensor			
			P0441	Evaporative Emission (EVAP) System			
			P0444	Evaporative Emission (EVAP) Canister Purge Valve			
			P0458	Evaporative Emission (EVAP) Canister Purge Valve			
			P0459	Evaporative Emission (EVAP) Canister Purge Valve			
			P0501	Vehicle Speed Sensor (VSS)			
			P0606	Engine Control Module (ECM): Sensor Integrated Circuit			
			P2088	Variable Valve Timing (VVT) Intake Actuator			
			P2089	Variable Valve Timing (VVT) Intake Actuator			
			P2096	Fuel System			
			P2097	Fuel System			
			P2177	Fuel System			
			P2178	Fuel System			
			P2187	Fuel System			
			P2188	Fuel System			
			P2195	Oxygen Sensors (O2S) front			
			P2196	Oxygen Sensors (O2S) front			
			P2237	Oxygen Sensors (O2S) front			
			P2243	Oxygen Sensors (O2S) front			
			P2251	Oxygen Sensors (O2S) front			
			P230A	Fuel System			
			P230B	Fuel System			
			P230C	Fuel System			
			P230D	Fuel System			
			P2414	Oxygen Sensors (O2S) front			
			P2626	Oxygen Sensors (O2S) front			
			U0415	COM: Vehicle Speed Sensor (VSS)			
			U0415	Vehicle Speed Sensor (VSS)			
			Fuel System	A/F cylinder imbalance: out of range low	P219D	P000A	Variable Valve Timing (VVT) Intake Actuator
			P0010	Variable Valve Timing (VVT) Intake Actuator			
			P0011	Variable Valve Timing (VVT) Intake Actuator			
			P0100	Mass Air Flow (MAF) Sensor			
			P0101	Mass Air Flow (MAF) Sensor			
			P0102	Mass Air Flow (MAF) Sensor			
			P0103	Mass Air Flow (MAF) Sensor			
			P0130	Oxygen Sensors (O2S) front			
			P0131	Oxygen Sensors (O2S) front			
			P0132	Oxygen Sensors (O2S) front			
			P0133	Oxygen Sensors (O2S) front			
			P0300	Misfire			
			P0321	Crankshaft Position (CKP) Sensor			
			P0322	Crankshaft Position (CKP) Sensor			
			P0441	Evaporative Emission (EVAP) System			
			P0444	Evaporative Emission (EVAP) Canister Purge Valve			
			P0458	Evaporative Emission (EVAP) Canister Purge Valve			
			P0459	Evaporative Emission (EVAP) Canister Purge Valve			
			P0501	Vehicle Speed Sensor (VSS)			
			P0606	Engine Control Module (ECM): Sensor Integrated Circuit			
			P2088	Variable Valve Timing (VVT) Intake Actuator			
			P2089	Variable Valve Timing (VVT) Intake Actuator			
			P2096	Fuel System			
			P2097	Fuel System			
			P2177	Fuel System			
			P2178	Fuel System			
			P2187	Fuel System			
			P2188	Fuel System			
			P2195	Oxygen Sensors (O2S) front			
			P2196	Oxygen Sensors (O2S) front			
			P2237	Oxygen Sensors (O2S) front			
			P2243	Oxygen Sensors (O2S) front			
			P2251	Oxygen Sensors (O2S) front			
			P230A	Fuel System			
			P230B	Fuel System			

Green Areas = no influence from other monitors

Component / System			Monitor Strategy	Fault Code	Fault Code and Component / System	
					P230C	Fuel System
					P230D	Fuel System
					P2414	Oxygen Sensors (O2S) front
					P2626	Oxygen Sensors (O2S) front
					U0415	COM: Vehicle Speed Sensor (VSS)
					U0415	Vehicle Speed Sensor (VSS)
Fuel System	A/F cylinder imbalance: out of range high	P219E				

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
			P2097	Fuel System
			P2177	Fuel System
			P2178	Fuel System
			P2187	Fuel System
			P2188	Fuel System
			P2195	Oxygen Sensors (O2S) front
			P2196	Oxygen Sensors (O2S) front
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P230A	Fuel System
			P230B	Fuel System
			P230C	Fuel System
			P230D	Fuel System
			P2414	Oxygen Sensors (O2S) front
			P2626	Oxygen Sensors (O2S) front
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
Fuel System	A/F cylinder imbalance: out of range high	P219F	P000A	Variable Valve Timing (VVT) Intake Actuator
			P0010	Variable Valve Timing (VVT) Intake Actuator
			P0011	Variable Valve Timing (VVT) Intake Actuator
			P0100	Mass Air Flow (MAF) Sensor
			P0101	Mass Air Flow (MAF) Sensor
			P0102	Mass Air Flow (MAF) Sensor
			P0103	Mass Air Flow (MAF) Sensor
			P0130	Oxygen Sensors (O2S) front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0133	Oxygen Sensors (O2S) front
			P0300	Misfire
			P0321	Crankshaft Position (CKP) Sensor
			P0322	Crankshaft Position (CKP) Sensor
			P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			P0501	Vehicle Speed Sensor (VSS)
				Engine Control Module (ECM): Sensor Integrated Circuit
			P0606	
			P2088	Variable Valve Timing (VVT) Intake Actuator
			P2089	Variable Valve Timing (VVT) Intake Actuator
			P2096	Fuel System
			P2097	Fuel System
			P2177	Fuel System
			P2178	Fuel System
			P2187	Fuel System
			P2188	Fuel System
			P2195	Oxygen Sensors (O2S) front
			P2196	Oxygen Sensors (O2S) front
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P230A	Fuel System
			P230B	Fuel System
			P230C	Fuel System
			P230D	Fuel System
			P2414	Oxygen Sensors (O2S) front
			P2626	Oxygen Sensors (O2S) front
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
Fuel System	A/F cylinder imbalance: out of range low	P219F	P000A	Variable Valve Timing (VVT) Intake Actuator
			P0010	Variable Valve Timing (VVT) Intake Actuator
			P0011	Variable Valve Timing (VVT) Intake Actuator
			P0100	Mass Air Flow (MAF) Sensor
			P0101	Mass Air Flow (MAF) Sensor
			P0102	Mass Air Flow (MAF) Sensor
			P0103	Mass Air Flow (MAF) Sensor
			P0130	Oxygen Sensors (O2S) front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0133	Oxygen Sensors (O2S) front
			P0300	Misfire
			P0321	Crankshaft Position (CKP) Sensor
			P0322	Crankshaft Position (CKP) Sensor
			P0441	Evaporative Emission (EVAP) System

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			P0501	Vehicle Speed Sensor (VSS)
			P0606	Engine Control Module (ECM): Sensor Integrated Circuit
			P2088	Variable Valve Timing (VVT) Intake Actuator
			P2089	Variable Valve Timing (VVT) Intake Actuator
			P2096	Fuel System
			P2097	Fuel System
			P2177	Fuel System
			P2178	Fuel System
			P2187	Fuel System
			P2188	Fuel System
			P2195	Oxygen Sensors (O2S) front
			P2196	Oxygen Sensors (O2S) front
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P230A	Fuel System
			P230B	Fuel System
			P230C	Fuel System
			P230D	Fuel System
			P2414	Oxygen Sensors (O2S) front
			P2626	Oxygen Sensors (O2S) front
			U0415	COM: Vehicle Speed Sensor (VSS)
			U0415	Vehicle Speed Sensor (VSS)
Oxygen Sensors (O2S) front	open circuit pump current (IP)	P2237	P0133	Oxygen Sensors (O2S) front
			P0135	Oxygen Sensors (O2S) Heater front
			P0441	Evaporative Emission (EVAP) System
Oxygen Sensors (O2S) front	open circuit nernst voltage (UN)	P2243	P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
Oxygen Sensors (O2S) front	open circuit virtual mass (VM)	P2251	P0030	Oxygen Sensors (O2S) Heater front
			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
Oxygen Sensors (O2S) rear	stuck lean	P2270	P0036	Oxygen Sensors (O2S) Heater rear
			P0037	Oxygen Sensors (O2S) Heater rear
			P0038	Oxygen Sensors (O2S) Heater rear
			P0137	Oxygen Sensors (O2S) rear
			P0138	Oxygen Sensors (O2S) rear
			P0140	Oxygen Sensors (O2S) rear
			P0300	Misfire
			P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			P2177	Fuel System
			P2178	Fuel System
			P2187	Fuel System
			P2188	Fuel System
Oxygen Sensors (O2S) rear	stuck rich	P2271	P0036	Oxygen Sensors (O2S) Heater rear
			P0037	Oxygen Sensors (O2S) Heater rear
			P0038	Oxygen Sensors (O2S) Heater rear
			P0137	Oxygen Sensors (O2S) rear
			P0138	Oxygen Sensors (O2S) rear
			P0140	Oxygen Sensors (O2S) rear
			P0300	Misfire
			P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			P2177	Fuel System
			P2178	Fuel System
			P2187	Fuel System
			P2188	Fuel System
Positive Crankcase Ventilation (PCV)	rationality	P2279	P0030	Oxygen Sensors (O2S) Heater front

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
Positive Crankcase Ventilation (PCV)			P0031	Oxygen Sensors (O2S) Heater front
			P0032	Oxygen Sensors (O2S) Heater front
			P0036	Oxygen Sensors (O2S) Heater rear
			P0037	Oxygen Sensors (O2S) Heater rear
			P0038	Oxygen Sensors (O2S) Heater rear
			P0100	Mass Air Flow (MAF) Sensor
			P0101	Mass Air Flow (MAF) Sensor
			P0102	Mass Air Flow (MAF) Sensor
			P0103	Mass Air Flow (MAF) Sensor
			P0121	Throttle Position Sensor (TPS)
			P0122	Throttle Position Sensor (TPS)
			P0123	Throttle Position Sensor (TPS)
			P0130	Oxygen Sensors (O2S) front
			P0131	Oxygen Sensors (O2S) front
			P0132	Oxygen Sensors (O2S) front
			P0133	Oxygen Sensors (O2S) front
			P0135	Oxygen Sensors (O2S) Heater front
			P0137	Oxygen Sensors (O2S) rear
			P0138	Oxygen Sensors (O2S) rear
			P0140	Oxygen Sensors (O2S) rear
			P0141	Oxygen Sensors (O2S) Heater rear
			P0221	Throttle Position Sensor (TPS) 2
			P0222	Throttle Position Sensor (TPS) 2
			P0223	Throttle Position Sensor (TPS) 2
			P0441	Evaporative Emission (EVAP) System
			P0444	Evaporative Emission (EVAP) Canister Purge Valve
			P0458	Evaporative Emission (EVAP) Canister Purge Valve
			P0459	Evaporative Emission (EVAP) Canister Purge Valve
			Engine Control Module (ECM): Sensor Integrated Circuit	
			P0606	
			P2096	Fuel System
			P2097	Fuel System
			P2195	Oxygen Sensors (O2S) front
			P2196	Oxygen Sensors (O2S) front
			P2237	Oxygen Sensors (O2S) front
			P2243	Oxygen Sensors (O2S) front
			P2251	Oxygen Sensors (O2S) front
			P2270	Oxygen Sensors (O2S) rear
			P2271	Oxygen Sensors (O2S) rear
			P2414	Oxygen Sensors (O2S) front
			P2626	Oxygen Sensors (O2S) front
Fuel Volume Regulator HP Control	functional check	P2293	P0190	Fuel Rail Pressure (FRP) Sensor
			P0191	Fuel Rail Pressure (FRP)
			P0192	Fuel Rail Pressure (FRP) Sensor
			P025A	Fuel Pump Control (FPC)
			P025C	Fuel Pump Control (FPC)
			P025D	Fuel Pump Control (FPC)
			P0657	Engine Components Supply Voltage Relay
			P0658	Engine Components Supply Voltage Relay
			P0659	Engine Components Supply Voltage Relay
			P2294	Fuel Volume Regulator Control
			P2295	Fuel Volume Regulator Control
			P2296	Fuel Volume Regulator Control
Fuel Volume Regulator Control	open circuit	P2294	P0657	Engine Components Supply Voltage Relay
			P0658	Engine Components Supply Voltage Relay
			P0659	Engine Components Supply Voltage Relay
Fuel Volume Regulator Control	short to ground	P2295	P0657	Engine Components Supply Voltage Relay
			P0658	Engine Components Supply Voltage Relay
			P0659	Engine Components Supply Voltage Relay
Fuel Volume Regulator Control	short to battery plus	P2296	P0657	Engine Components Supply Voltage Relay
			P0658	Engine Components Supply Voltage Relay
			P0659	Engine Components Supply Voltage Relay
Ignition Coil	short to ground	P2300		
Ignition Coil	short to battery plus	P2301		
Ignition Coil	short to ground	P2303		
Ignition Coil	short to battery plus	P2304		
Ignition Coil	short to ground	P2306		

Green Areas = no influence from other monitors

Component / System			Monitor Strategy		Fault Code	Fault Code and Component / System	
Ignition Coil			short to battery plus		P2307		
Ignition Coil			short to ground		P2309		
Fuel System			A/F cylinder imbalance: back-stop monitor		P230A		
Fuel System			A/F cylinder imbalance: back-stop monitor		P230B		
Fuel System			A/F cylinder imbalance: back-stop monitor		P230C		
Fuel System			A/F cylinder imbalance: back-stop monitor		P230D		
Ignition Coil			short to battery plus		P2310		
Oxygen Sensors (O2S) front			signal range check (check for sensor at ambient air)		P2414	P0030 Oxygen Sensors (O2S) Heater front P0031 Oxygen Sensors (O2S) Heater front P0032 Oxygen Sensors (O2S) Heater front P0131 Oxygen Sensors (O2S) front P0132 Oxygen Sensors (O2S) front P0135 Oxygen Sensors (O2S) Heater front Engine Control Module (ECM): Sensor Integrated Circuit P0606 P2237 Oxygen Sensors (O2S) front P2243 Oxygen Sensors (O2S) front P2251 Oxygen Sensors (O2S) front P2626 Oxygen Sensors (O2S) front	
Oxygen Sensors (O2S) front			open circuit adjustment voltage (IA)		P2626		
Engine Coolant Temperature Sensor @ Cylinder Block			rationality check		P3081	P0100 Mass Air Flow (MAF) Sensor P0101 Mass Air Flow (MAF) Sensor P0102 Mass Air Flow (MAF) Sensor P0103 Mass Air Flow (MAF) Sensor P0117 Engine Coolant Temperature Sensor @ Cylinder Block P0118 Engine Coolant Temperature Sensor @ Cylinder Block P0501 Vehicle Speed Sensor (VSS) P0606 Engine Control Module (ECM): RAM P150A Engine Off Time P2181 Engine Cooling System U0001 CAN: Powertrain U0002 CAN: Powertrain U0155 COM: Instrument Panel Cluster (IPC) U0415 COM: Vehicle Speed Sensor (VSS) U0415 Vehicle Speed Sensor (VSS) U0423 COM: Instrument Panel Cluster (IPC)	
CAN: Powertrain			reading back sent message		U0001		
CAN: Powertrain			communication check		U0002	P0606 Engine Control Module (ECM): RAM U0001 CAN: Powertrain	
COM: Transmission Control Module (TCM)			communication with TCM		U0101		
COM: Brake System Control Module (BSCM)			communication with BSCM		U0121		

Green Areas = no influence from other monitors

Component / System	Monitor Strategy	Fault Code	Fault Code and Component / System	
COM: Body Control Module (BCM)	communication with BCM	U0140		
COM: Gateway	communication with Gateway	U0146		
COM: Instrument Panel Cluster (IPC)	communication with IPC	U0155		
COM: Transmission Control Module (TCM)	communication with TCM	U0302		
COM: Ambient Air Temperature (AAT) Sensor	communication with BCM	U0323		
COM: Transmission Control Module (TCM)	communication with TCM	U0402		
COM: Brake System Control Module (BSCM)	communication with BSCM	U0415		
COM: Vehicle Speed Sensor (VSS)	communication with VSS	U0415	P0606 U0001 U0002 U0415	Engine Control Module (ECM): RAM CAN: Powertrain CAN: Powertrain COM: Brake System Control Module (BSCM)
Vehicle Speed Sensor (VSS)	out of range high	U0415		
COM: Ambient Air Temperature (AAT) Sensor	communication with BCM	U0422		
COM: Instrument Panel Cluster (IPC)	communication with IPC	U0423		
COM: Gateway	communication with Gateway	U0447		
Engine Control Module (ECM): Production Mode	vehicle in production mode	U1103	P0321 P0322	Crankshaft Position (CKP) Sensor Crankshaft Position (CKP) Sensor

Additional information for all ETC (electronic throttle control) safety concept related malfunctions:
The ETC safety concept consists of several ECM internal checks which lead to a P0606 fault code and several failures of the ETC safety concept torque calculation which lead to a P0169 fault code. All ETC safety concept related malfunctions (P0606 or P0169 codes) lead to an immediate irreversible limp home (within a given drive cycle) mode with limited engine speed (e.g. max. 1500 rpm) and disabled throttle control. The limp home mode furthermore leads to a software-coded inhibition of all other ETC safety concept related fault paths which would lead as well to a P0169 or P0606 fault code. During the limp home mode several other monitors might as well be inhibited because their required enablement conditions can no longer be achieved due the engine speed limitation and throttle control disablement.

Section D:

OBD Demonstration Test

The date were performed for MY 2008.

1 TOLERATED PERCENTAGE OF MISFIRE WITHOUT CATALYST DAMAGING

The misfire percentage to reach the catalyst damage temperature, which is determined as 950 °C for this test group, is listed in the summary table for the misfire monitor, depending on each engine speed and load condition.

The temperature is established in compliance with CCR 1968.2 section (e)(3.2.1)(D).

Load / rpm	2000 and less	3000	3520	4000	5000	6000
19,92 and less	20	20	20	16,6	14,2	12,5
30,08	20	16,6	14,2	11,11	10	10
37,11	14,2	14,2	10	7,14	8,33	12,5
44,92	12,5	9	6,66	5,55	6,66	9
51,95	9	9	6,67	5,8	9	8,33
62,11	8,33	8,33	6,67	5,55	5,55	7,14

1 PROBABILITY OF DETECTION OF MISFIRE EVENTS

cylinder misfire 1.7% (emission threshold) random cylinders													
X: N [U/min] Y: Load [%]	Idle	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500
100			100	100	100	100	100	100	100	100	100	100	100
80			100	100	100	100	100	100	100	100	100	100	100
65			100	100	100	100	100	100	100	100	100	100	100
50			100	100	100	100	100	100	100	100	100	100	100
30			100	100	100	100	100	100	100	100	100	100	100
15			100	100	100	100	100	100	100	100	100	100	100
0	100	100	100	100	100	100							
any one cylinder out													
X: N [U/min] Y: Load [%]	Idle	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500
100			100	100	100	100	100	100	100	100	100	100	100
80			100	100	100	100	100	100	100	100	100	100	100
65			100	100	100	100	100	100	100	100	100	100	100
50			100	100	100	100	100	100	100	100	100	100	100
30			100	100	100	100	100	100	100	100	100	100	100
15			100	100	100	100	100	100	100	100	100	100	100
0	100	100	100	100	100	100							

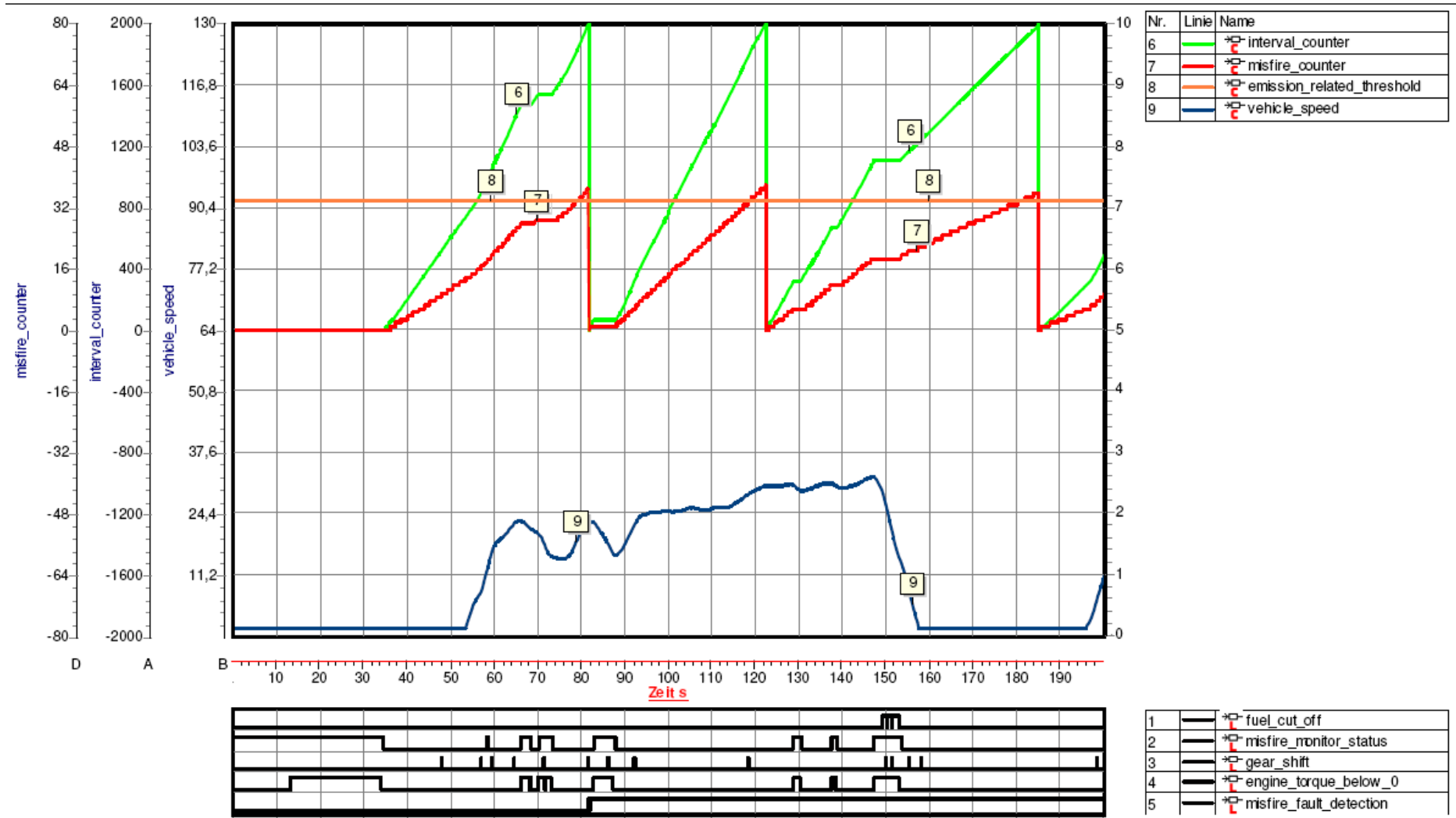
Daueraussetzer über alle Zylinder

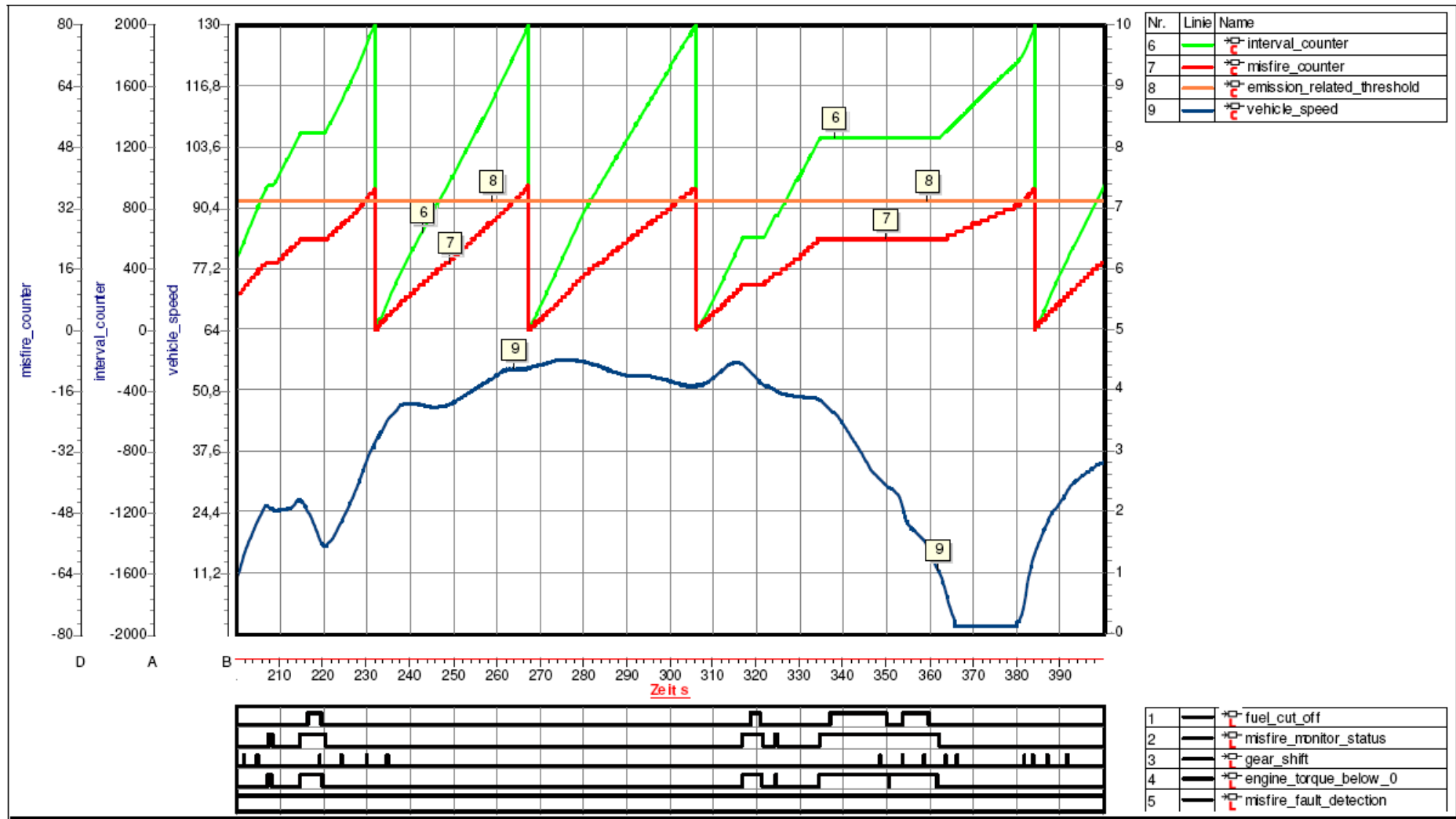
X: N [U/min] Y: Load [%]	Idle	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500
100			100	100	100	100	100	100	100	100	100	100	100
80			100	100	100	100	100	100	100	100	100	100	100
65			100	100	100	100	100	100	100	100	100	100	100
50			100	100	100	100	100	100	100	100	100	100	100
30			100	100	100	100	100	100	100	100	100	100	100
15			100	100	100	100	100	100	100	100	100	100	100
0	100	100	100	100	100	100							
Z: Erkennungsqualität [%]													

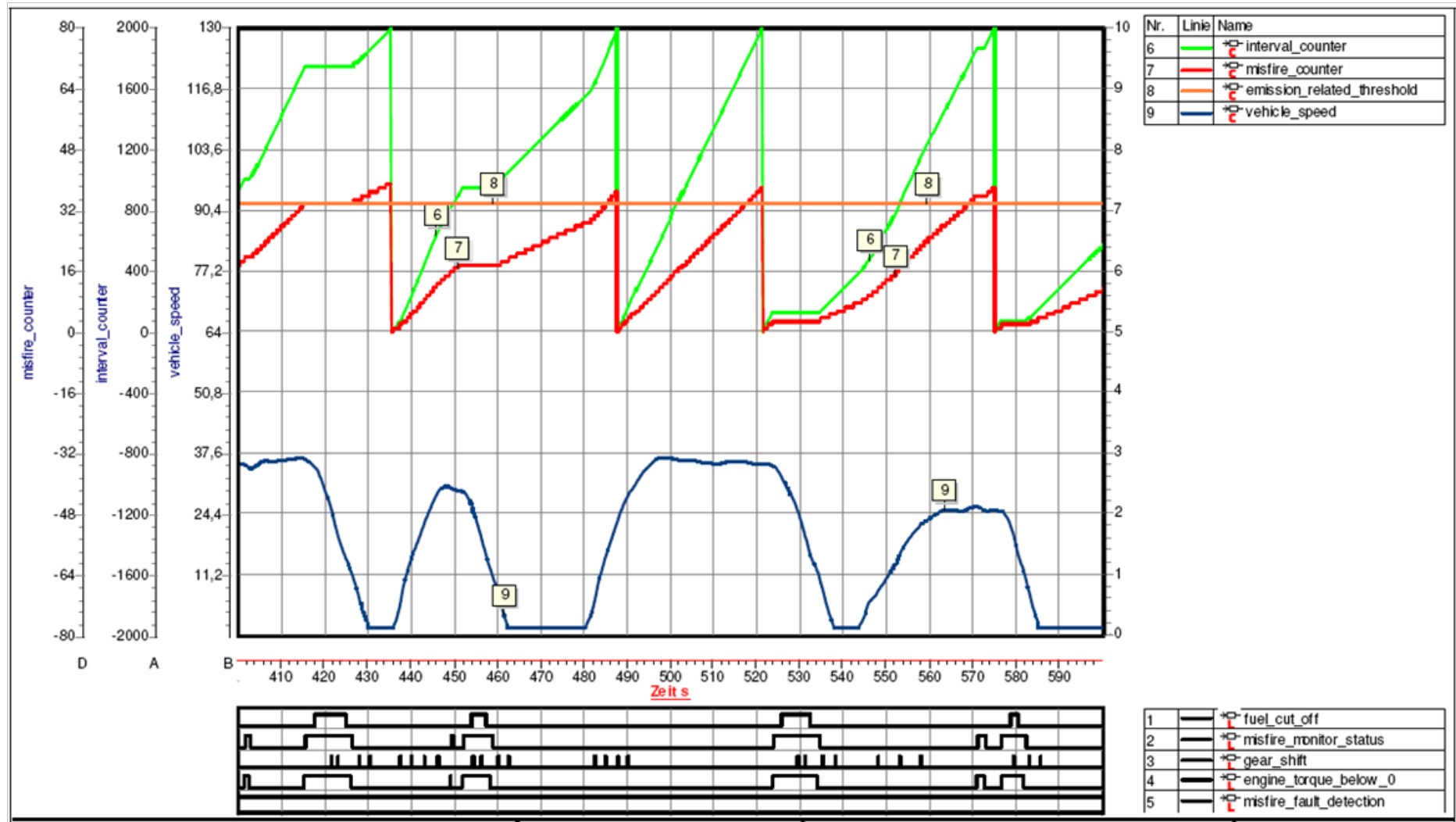
consecutive cylinder out

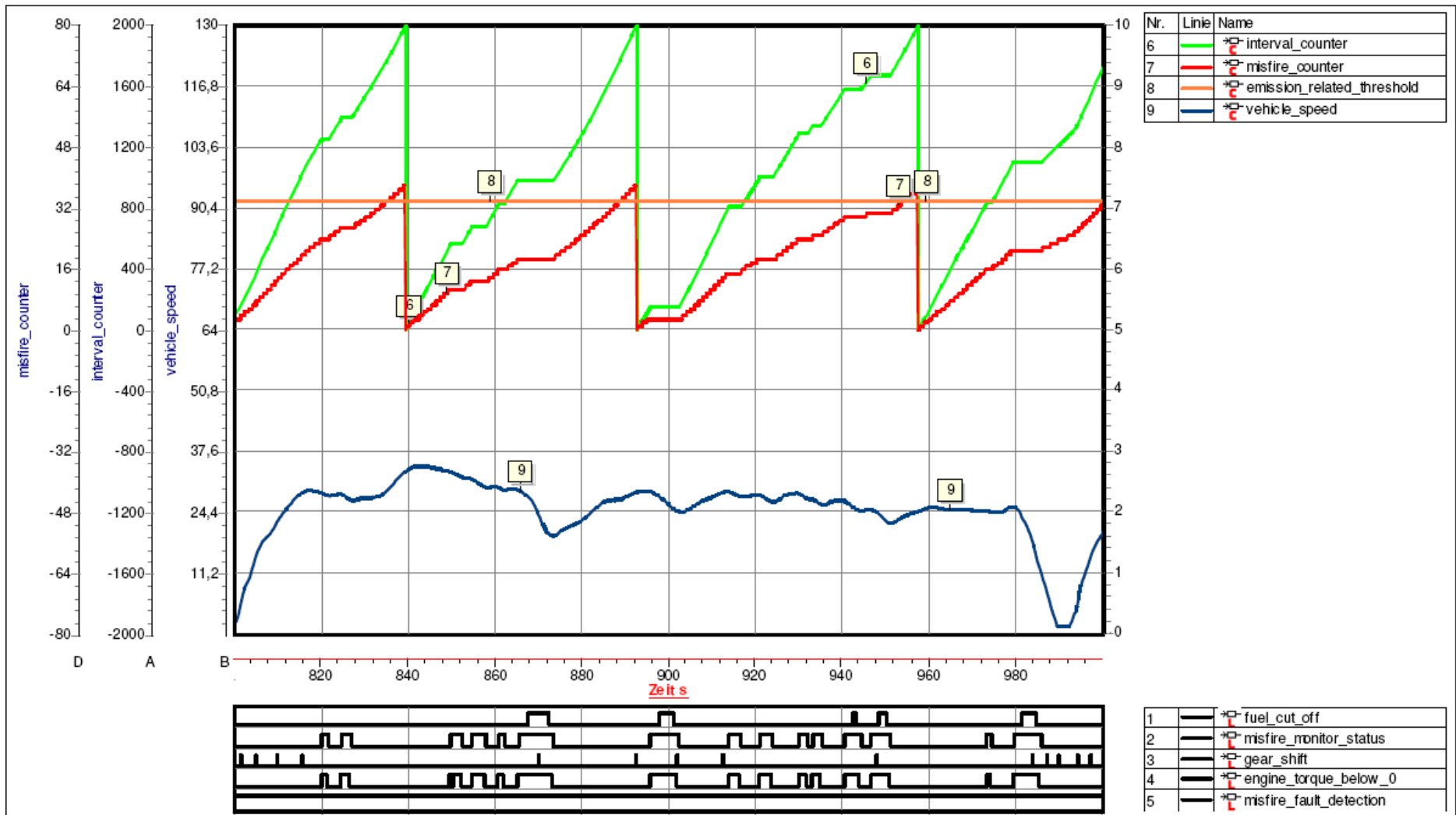
X: N [U/min] Y: Load [%]	Idle	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500
100			100	100	100	100	100	100	100	100	100	100	100
80			100	100	100	100	100	100	100	100	100	100	100
65			100	100	100	100	100	100	100	100	100	100	100
50			100	100	100	100	100	100	100	100	100	100	100
30			100	100	100	100	100	100	100	100	100	100	100
15			100	100	100	100	100	100	100	100	100	100	100
0	100	100	100	100	100	100							

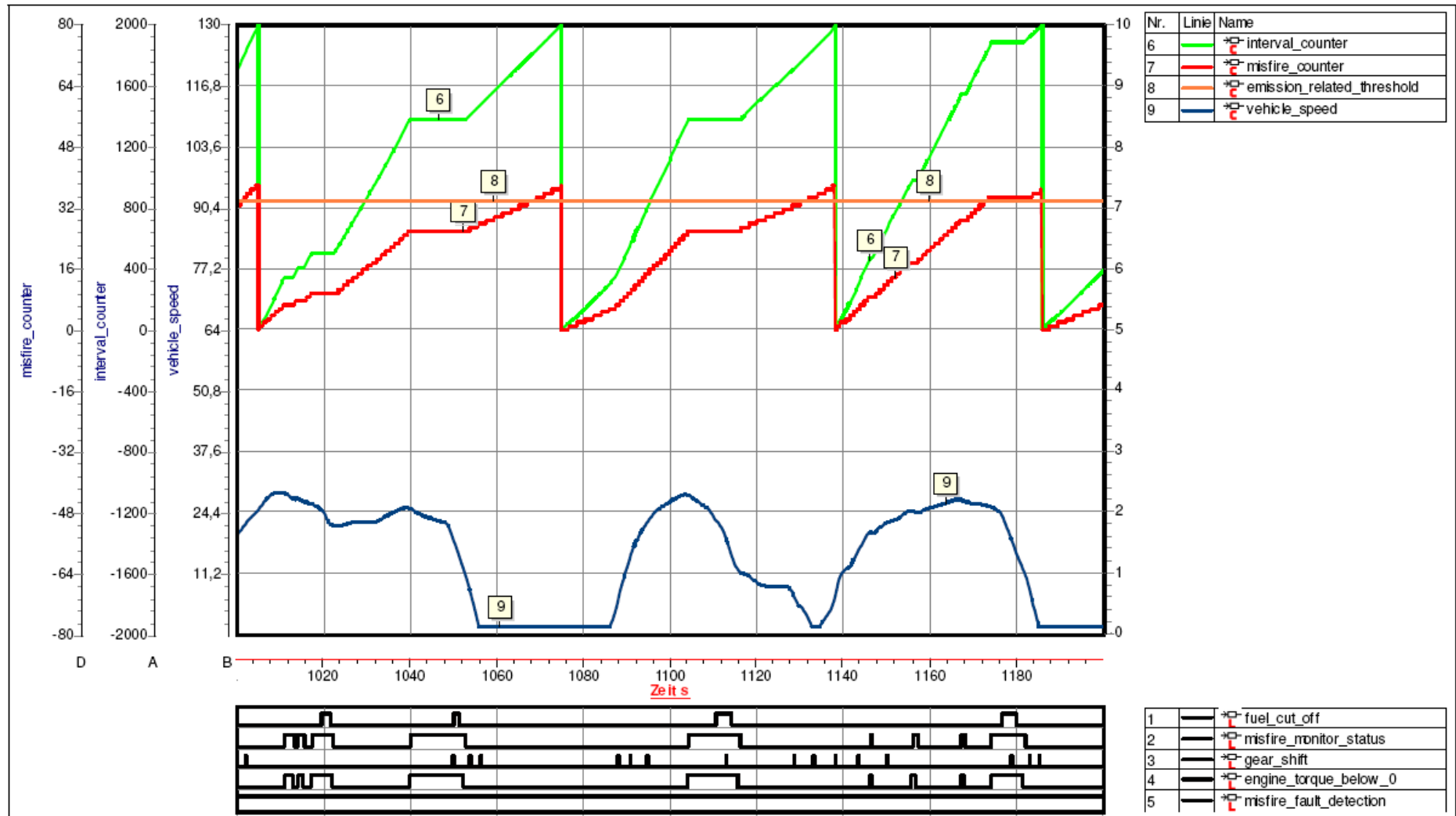
1 Disabling of misfire monitoring during FTP



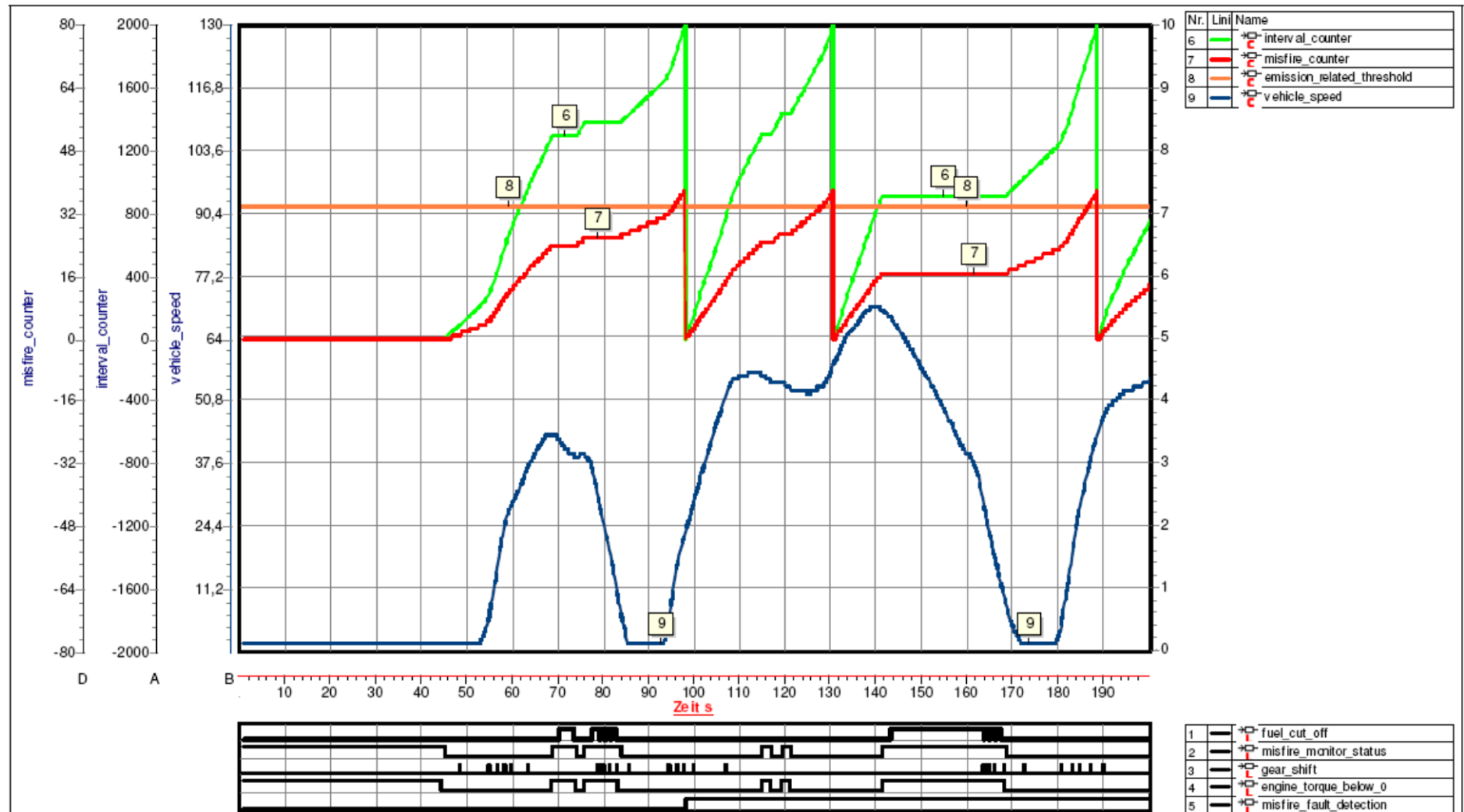


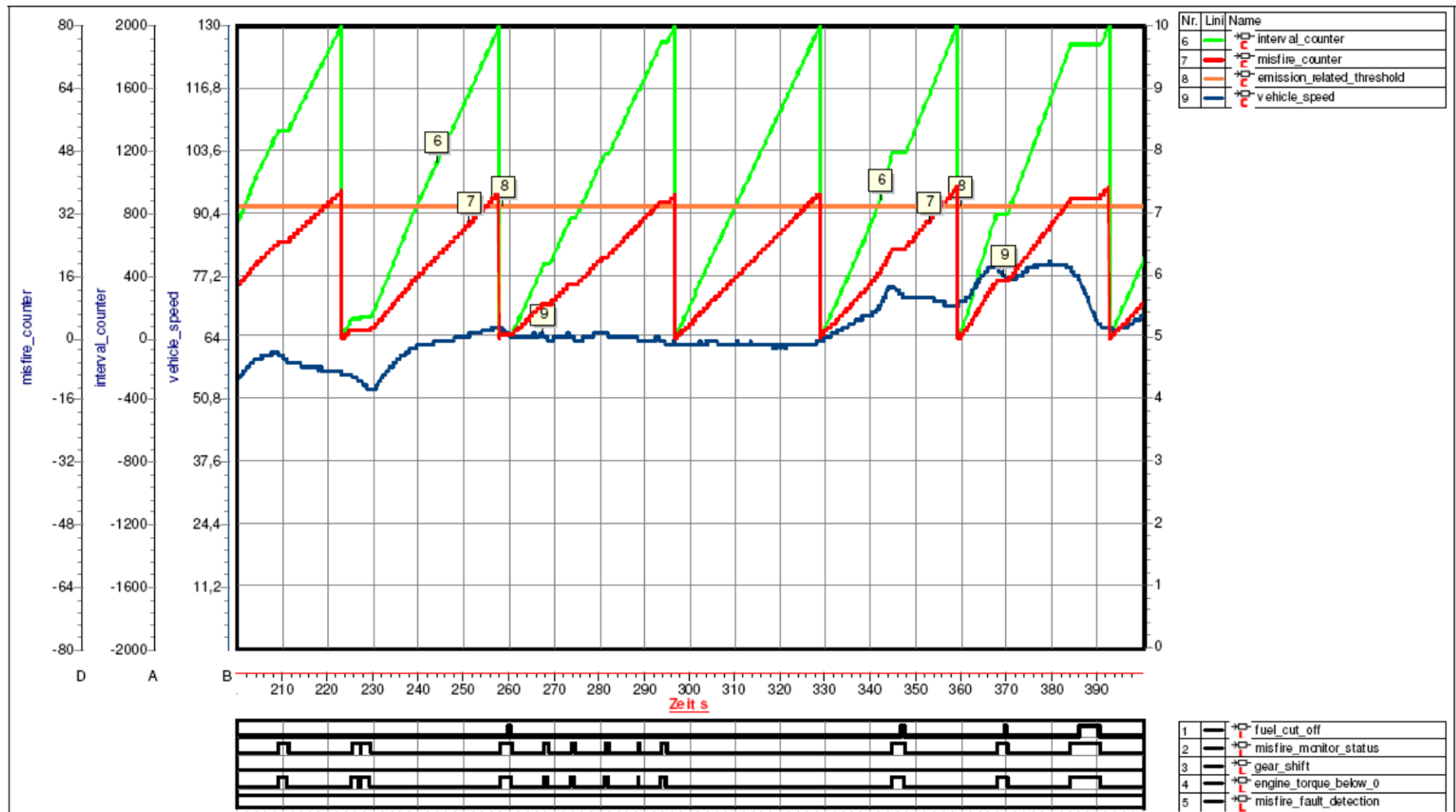


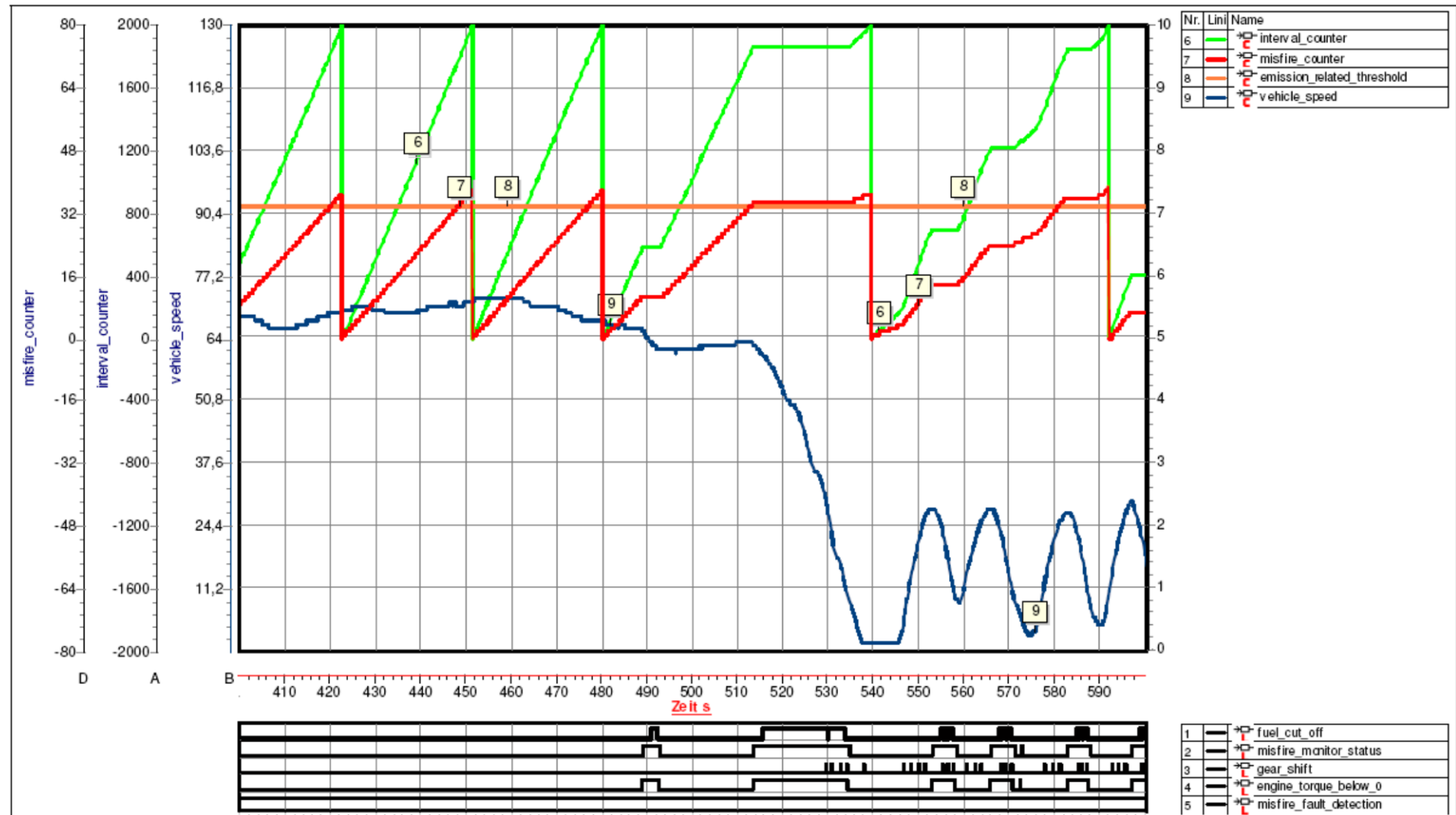


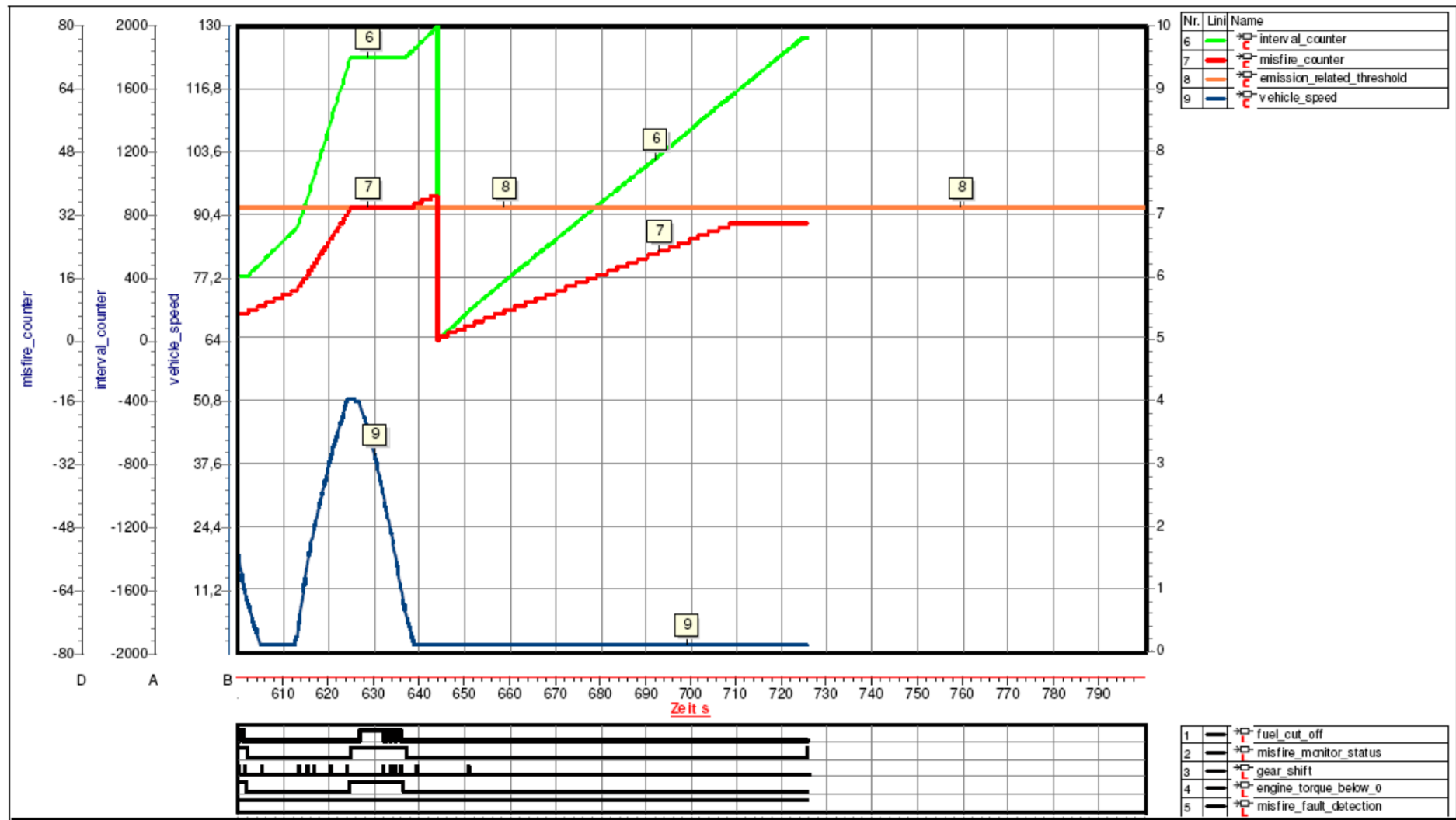


1 DISABLEMENT OF MISFIRE MONITORING DURING US06









Applicable Test Cycle for OBD Demonstration

This overview is valid for the following test groups:

GVGAV02.0AUB / AUF	
EA888 2.0l TFSI	

Monitor	fault simulated on		Emissions measured		prep. cycle	emission cycle	prep. cycle after erasing fault code
	Bank 1	Bank 2	one bank	one bank x 2	(fault induced)	(fault induced)	(o.K-.system, if neccessary)
Misfire	x	-	x	-	1x FTP 72	FTP 75	1 x FTP72
Secondary Air	x	-	x	-	1x FTP 72	FTP 75	1 x FTP72
Fuel System							
a) rich	x	-	x	-	1 x FTP 72	FTP 75	1 X FTP 72
b) lean	x	-	x	-	1 x FTP 72	FTP 75	1 X FTP 72
VVT slow response	x	-	x	-	1 x FTP 72	FTP 75	1 X FTP 72
VVT target error	x	-	x	-	1 x FTP 72	FTP 75	1 X FTP 72
O2 sensor front							
a) dynamic check	x	-	x	-	1 x FTP 72	FTP 75	1 X FTP 72
b) delay	x	-	x	-	1 x FTP 72	FTP 75	1 X FTP 72
O2 sensor rear							
c) dynamic (symmetric slow sensor)	x	-	x	-	1 x UDC	FTP 75	1 X FTP 72
d) rich (shift on front sensor)	x	-	x	-	1 x FTP 72	FTP 75	1 X FTP 72
e) lean (shift on front sensor)	x	-	x	-	1 x FTP 72	FTP 75	1 X FTP 72
Catalyst	x	-	x	-	1 x FTP 72	FTP 75	1 X FTP 72

All other monitors are running in FTP / UDC with the following exemptions:

Monitor	P-Code	Enabling condition for monitor	Description
Thermostat	P2181	Monitor is enabled during UDC test cycle and malfunction will be detected. Cold start needed.	Cooling system temperature to low is detected after a sufficient air mass flow integral and a sufficient average vehicle speed.
Fuel System	P2187 P2177 P2178	continiously enabled	Lean error may case engine to stall, the error should be introduced stepwise after the lambda control is active
EVAP System (NVL D)	P0456	The monitor is running after ignition off. Cold start is needed in the following driving cycle.	It is not possible to find a very small leak in the FTP/UDC emission test. In an ignition off time should be a fuel temperature drop of 8K.

1 ECM INPUT OUTPUT LIST

PIN	Sensor / Actuator / Signal	Signal Type	PIN	Sensor / Actuator / Signal	Signal Type	PIN	Sensor / Actuator / Signal	Signal Type	PIN	Sensor / Actuator / Signal	Signal Type
A1	Throttle Valve Actuator (minus)	Output	A41	Throttle Valve Actuator	Input	B21	Not Used	Not Used	B61	Poti Accerlerator Position P2	Input
A2	AVS actuator exhaust cylinder 1 (high lift)	Output	A42	Temperature Sensor	Input	B22	Not Used	Not Used	B62	Oxygen Sensor (LSF1,2)	Input
A3	AVS actuator inlet cylinder 3 (high lift)	Output	A43	IM runner flap sensor	Input	B23	Mass Air Flow Sensor	Input	B63	Not Used	Not Used
A4	AVS actuator inlet cylinder 4 (high lift)	Output	A44	Throttle Valve Actuator	Ground	B24	Brake Switch	Input	B64	Not Used	Not Used
A5	AVS actuator inlet cylinder 2 (high lift)	Output	A45	Oil Pump	Ground	B25	Not Used	Not Used	B65	Mass Air Flow Sensor	Ground
A6	Ignition Cylinder 4	Output	A46	Injection Valve 3 High Side	Output	B26	Not Used	Not Used	B66	Not Used	Not Used
A7	Ignition Cylinder 1	Output	A47	Injection Valve 4 High Side	Output	B27	Water Pump	Ground	B67	CAN Bus Low	Signal
A8	MA1	Ground	A48	Injection Valve 3 Low Side	Output	B28	IM runner flap actuator	Ground	B68	CAN Bus High	Signal
A9	Not Used	Not Used	A49	Injection Valve 4 Low Side	Output	B29	Oxygen Sensor Heater (LSF1,2)	Output	B69	Main Relay	Output
A10	Knock Sensor	Input	A50	Turbo Charger Bypass Valve	Output	B30	Not Used	Not Used	B70	Not Used	Not Used
A11	Not Used	Not Used	A51	Boost Pressure Control Valve	Output	B31	starter control relais 2	Ground	B71	Not Used	Not Used
A12	Throttle Valve Actuator (plus)	Voltage	A52	Crankshaft Speed Sensor	Ground	B32	Not Used	Not Used	B72	Not Used	Not Used
A13	MA3	Ground	A53	not used	Not Used	B33	Not Used	Not Used	B73	Oxygen Sensor Heater (LSU1)	Output
A14	Temperature Sensor (Engine)	Ground	A54	Camshaft Phase Sensor	Input	B34	Oxygen Sensor (LSF1,2)	Ground	B74	feedback KL.50	Input
A15	Fuel High Presure Pump	Output	A55	Not Used	Not Used	B35	GND Accelerator Position P1	Ground	B75	Not Used	Not Used
A16	Throttle Valve Actuator (plus)	Output	A56	Not Used	Not Used	B36	Not Used	Not Used	B76	Fuel Pump	Output
A17	AVS actuator exhaust cylinder 1 (low lift)	Output	A57	Temperature Sensor (Engine)	Input	B37	Not Used	Not Used	B77	Not Used	Not Used
A18	AVS actuator exhaust cylinder 3 (low lift)	Output	A58	not used	Not Used	B38	Not Used	Not Used	B78	Oxygen Sensor (LSU1)	Input
A19	AVS actuator inlet cylinder 4 (low lift)	Output	A59	MA5	Ground	B39	Not Used	Not Used	B79	Oxygen Sensor (LSU1)	Ground
A20	AVS actuator exhaust cylinder 2 (low lift)	Output	A60	Camshaft Phaser	Output	B40	Oil-Pressure Switch 1	Input	B80	Not Used	Not Used
A21	Ignition Cylinder 2	Output	B1	Line 31	Ground	B41	Not Used	Not Used	B81	5V Accelerator Position P2	Voltage
A22	Ignition Cylinder 3	Output	B2	Line 31	Ground	B42	KL.50 (starter control)	Input	B82	5V Accelerator Position P1	Voltage
A23	Boost Pressure Sensing Device	Input	B3	Line 87	Voltage	B43	Cruise Control Switch	Input	B83	Poti Accerlerator Position P1	Input
A24	Throttle Valve Actuator	Input	B4	Line 31	Ground	B44	Not Used	Not Used	B84	Not Used	Not Used
A25	Knock Sensor	Input	B5	Line 87	Voltage	B45	Cruise Control	Input	B85	Not Used	Not Used
A26	Ethanol Sensor	Not Used	B6	Line 87	Voltage	B46	Generator	Input	B86	neutral gear switch	Output
A27	5V G1	Voltage	B7	Evap purge valve	Ground	B47	Not Used	Not Used	B87	Line 15	Input
A28	Not Used	Not Used	B8	enginge speed	Output	B48	gear position sensor	Input	B88	Not Used	Not Used
A29	5V G2	Voltage	B9	starter control relais 1	Ground	B49	engine bracket 1	Ground	B89	Not Used	Not Used
A30	Not Used	Not Used	B10	Not Used	Not Used	B50	Engine Fan Level 1	Output	B90	Not Used	Not Used
A31	Injection Valve 1 High Side	Output	B11	GND Accelerator Position P2	Ground	B51	Not Used	Not Used	B91	Not Used	Not Used
A32	Injection Valve 2 High Side	Output	B12	Not Used	Not Used	B52	MA7	Ground	B92	Line 30	Voltage
A33	Injection Valve 1 Low Side	Output	B13	pressure brake servo unit	Input	B53	not used	Not Used	B93	Engine Relay	Output
A34	Injection Valve 2 Low Side	Output	B14	MA6	Ground	B54	tank leakage detection NVLDII	Ground	B94	engine bracket 2	Ground
A35	transmission-oil heating valve	Ground	B15	Not Used	Not Used	B55	Not Used	Not Used	B95	Not Used	Not Used
A36	optional additional air flap	Output	B16	Not Used	Not Used	B56	Oxygen Sensor (LSU1)	Input	B96	Not Used	Not Used
A37	Engine Speed Sensor	Input	B17	Not Used	Not Used	B57	Oxygen Sensor (LSU1)	Input			
A38	oil sensor (PULS)	Input	B18	Oil-Pressure Switch 2	Input	B58	Not Used	Not Used			
A39	Not Used	Not Used	B19	Brake Switch	Input	B59	5V G3	Voltage			
A40	Rail Pressure Sensor	Input	B20	clutch switch	Input	B60	Not Used	Not Used			

Items on **bold letters** are monitored by OBD II

List off all TCM Input/Output signals

[illegible]

Items on **bold letters** are monitored by OBD II

[illegible][illegible]

Section H. Closed Loop description

Please refer to the general Bosch ME(D)17 description file at chapter 19-21.

I: DLC Location

Audi B-Class: Audi A4

Located to the right of release lever of engine hood (without cover):



Audi Q5-Class: Audi Q5

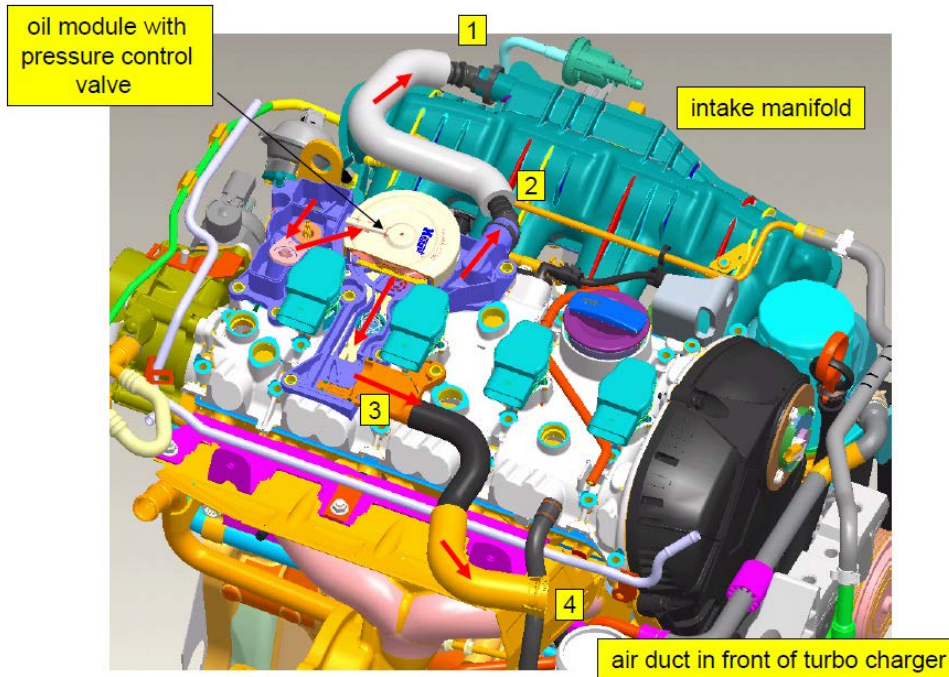
Located to the right of release lever of engine hood (without cover):



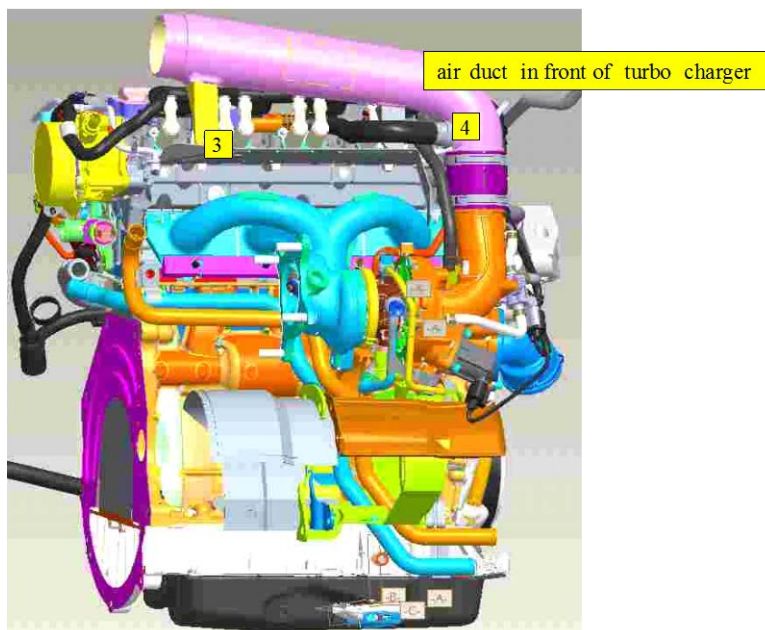
PCV Monitoring for 2.0l I4 engine

General Description

These overviews are showing the 4Cyl Turbo engines cylinder head and engine configuration from the turbo charger side with the 4 connection points for the crankcase ventilation system.



Cylinder head 2.0L TFSI PCV system



Air intake and Turbo 2.0L TFSI PCV system

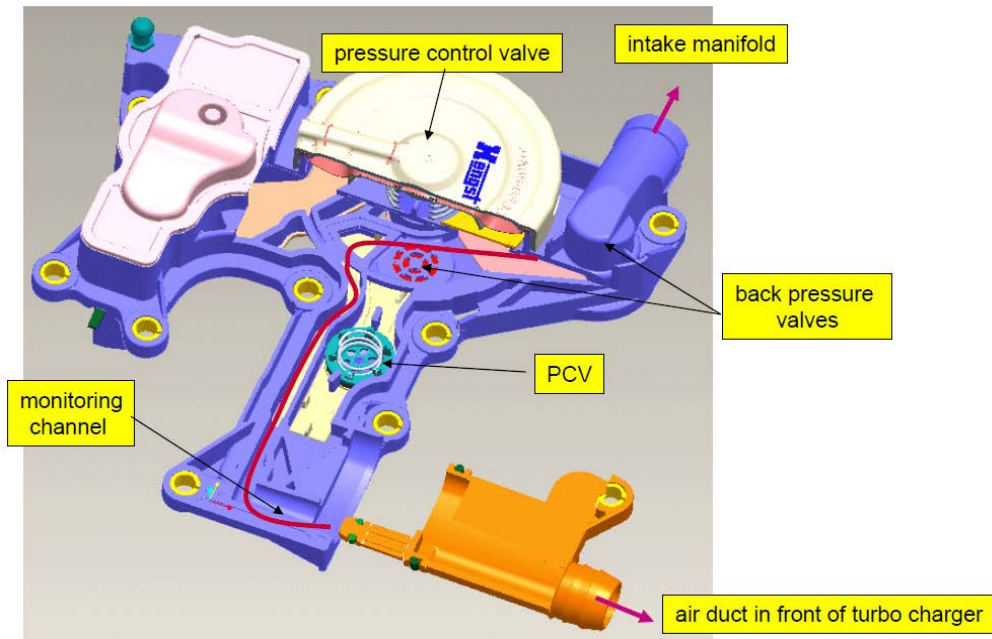
PCV Monitoring Description

A disconnection between oil module and intake manifold causes a very rough idle and will be detected by misfire monitor or fuel system monitor (point 1).

The oil module is situated on top of the cylinder head between connection 2 and 3. Open connection 2 leads to leakage in the air induct system and will be detected by air/fuel mixture failure.

To detect open connection 3 there is an OBD channel implemented in the module which leads vacuum from the intake manifold to the open point in that manner, that a DTC will be detected. The system reaction is the same as open connection 2. In case of proper connection this channel is sealed with a plug.

The connection between air duct in front of turbo charger (point 4) is designed as not to open for repair.



Oil module 2.0L TFSI PCV system

System reaction (DTC):

Overview possible fault modes of the current system with MAF Sensor:

- | | |
|---|-----------------|
| 1: open connection at intake manifold: | DTC A/F failure |
| 2: open connection at oil module to intake manifold : | DTC A/F failure |
| 3: open connection at oil module to turbo charger: | DTC A/F failure |
| 4: open connection at air induct to turbo charger: | DTC MAF failure |

This system design was presented and approved at VW/ARB meeting Aug. 30, 2006.

Section K: AECD; EIACD Description

n.a.

Section L: MIL Location

Audi B-Class: Audi A4



Audi Q5-Class: Audi Q5





Matthew Rodriguez
Secretary for
Environmental Protection

Air Resources Board

Mary D. Nichols, Chairman
9480 Telstar Avenue, Suite 4
El Monte, California 91731 www.arb.ca.gov



Edmund G. Brown Jr.
Governor

April 10, 2014

Reference No. E-14-076

Dr. Oliver Schmidt
General Manager
Engineering and Environmental Office
Volkswagen Group of America, Incorporated
3800 Hamlin Road
Auburn Hills, Michigan 48326

SUBJECT: Approval of Volkswagen's (VW) On-Board Diagnostics II (OBD II) System
for 2015 Model Year Test Groups FVGAV02.0AUB and FVGAJ02.0AUF.

Dear Dr. Schmidt:

The Air Resources Board's (ARB) On-Board Diagnostics Branch has received the OBD II system descriptions submitted by VW for the 2015 model year test groups listed above. Representations made in the applications indicate that the systems are compliant with the OBD II regulation. Therefore, ARB approves the 2015 model year system designs with no deficiencies. While not considered deficient for the 2015 model year, staff has concerns regarding temperature sensor rationality monitoring. Details of the concern have been provided in a previous approval letter (Reference No. E-13-097).

Should you have questions or comments regarding this letter, please have your staff contact Peter Ho, Air Resources Engineer, at (626) 459-4392.

Sincerely,

Michael Regenfuss, Chief
On-Board Diagnostics Branch
Emissions Compliance, Automotive Regulations and Science Division

cc: Peter Ho
Air Resources Engineer
Emissions Compliance, Automotive Regulations and Science Division

*The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption.
For a list of simple ways you can reduce demand and cut your energy costs, see our website: <http://www.arb.ca.gov>.*

California Environmental Protection Agency

Section 16.13	Confidential Information	Engine Code	R.CH.-No.:	Revision Date
Test Group	GVGAJ02.0AUF	all		

	Audi Q5	Audi A4 quattro	Audi A4 Allroad quattro	Audi A5 quattro	Audi A5 Cabrio quattro
Job 1 Date	May-15	May-15	May-15	May-15	May-15
Introduction Date	Jun-15	Jun-15	Jun-15	Jun-15	Jun-15

2016 MY

Projected Sales by Carline, Test Weight and Transmission Configuration

Transmission Configuration		Test Weight (lbs.)	CA Sales Area	Federal Sales Area	Sect. 177 States	Total U.S. Sales
L8q	A4 quattro	4000	2194	4681	3621	10497
L8q	Allroad quattro	4250	871	1406	1493	3769
L8q	A5	4000	868	1894	1276	4038
L8q	A5 Cabriolet	4250	386	1355	1205	2946
L8q	Q5	4500	5301	16165	11257	32723
		Totals	9620	25502	18852	53973

VOLKSWAGEN

GROUP OF AMERICA

Ms. Annette Hebert, Division Chief
Emissions Compliance, Automotive Regulations and
Science Division (ECAR)
State of California
Air Resources Board Laboratory
9528 Telstar Avenue
El Monte, CA 91731

Leonard W. Kata Name
Manager – Emis. Cert. Title
EEO Department
248-754-4204 Phone
248-754-4207 Fax
leonard.kata@vw.com E-Mail

May 28, 2015 Date

Subject: MY 2016 Audi Light Duty Vehicle Initial Application for Emissions
Certification for Test Group GVGAJ02.0AUF with Evaporative Families:
GVGAR0140AA1.

VOLKSWAGEN GROUP OF AMERICA, INC.
3800 HAMLIN ROAD
AUBURN HILLS, MI 48326
PHONE +1 248 754 5000

Dear Ms. Hebert,

We submit, with this letter, the model year 2016 Part 1 Application for Emissions
Certification for the following Test Group:

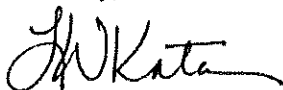
<u>Test Group</u>	<u>Standards</u>	<u>Sales Area</u>
GVGAJ02.0AUF	Tier 2 BIN 5 LEV-II ULEV	Federal California

The EPA Certificate of Conformity for the test group was uploaded to the Document
Management System with the application.

This submission constitutes our final application and the request for issuance of the
Executive Order.

If you have any questions with regard to this information please contact our office in
Auburn Hills at (248) 754-4224 or (248) 754-4219.

Sincerely,



Leonard W. Kata
Volkswagen Group of America, Inc.

Engineering and Environmental Office

Enclosure(s)

Section 17	Pg. 1	California ARB Information	Engine Code	R.CH-No.:	Revision Date
Test Group		GVGAJ02.0AUF	all		

17.01 California ARB Information

Please refer to the Common Section for the following information

Production Vehicle same as Test Vehicle Statement

Labeling Durability Statement

Drivability Statement

ASM Compliance Statement

17.02 Fill Pipe Specifications

Please refer to common section.

17.03 Evaporative Emission Deterioration Program

Please refer to common section.

17.04 I/M Test Data

17.05 Assembly line NMOG / NMHC Factor

F_{NMOG}: **1.04** gasoline (no RAF applied)

F_{NMOG}: **0.94** ethanol (no RAF applied)

According to ARB regulations

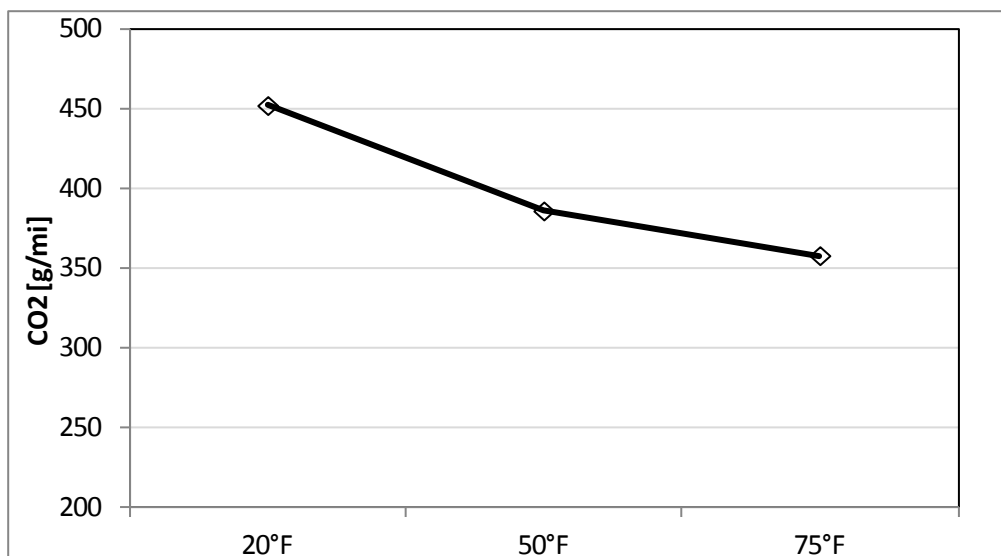
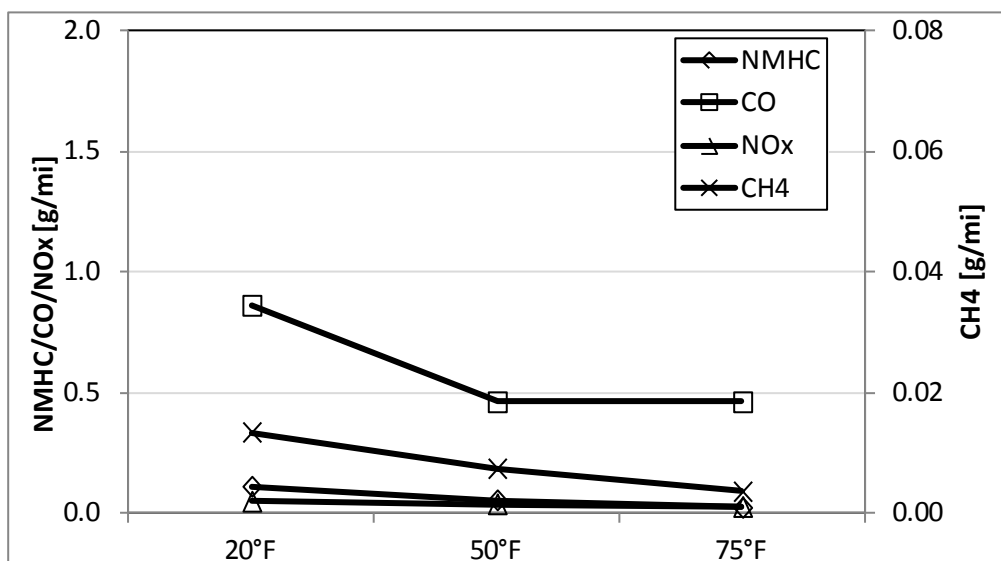
F_{HCHO} (Indolene): **0.03**

F_{HCHO} (Phasell): **0.06**

Compliance covered by statement according to regulations

Section 17	Pg. 2	California ARB Information	Engine Code	R.CH-No.:	Revision Date
Test Group		GVGAJ02.0AUF	all		

17.06 Continuity of Emissions



Section 17	Pg. 3	California ARB Information	Engine Code:	R.CH-No.:	Revision Date:
Part 1	Test Group: GVGAJ02.0AUF		all		

E.O.# A-413-0025

2016 AIR RESOURCES BOARD SUPPLEMENTAL CERTIFICATION SUMMARY SHEET Page 1 of 3
PASSENGER CARS, LIGHT-DUTY TRUCKS AND MEDUM-DUTY VEHICLES

Manufacturer: AUDI AG Durability Group: GVGAGPGENAUF Test Group: GVGAJ02.0AUF
 Evap Fam: 1) GVGAR0140AA1 2) / 3)
 Evaporative Emission T.P.: CA X Fed. R/L Test Proc: SHED Pt Source X
 Zero-Evap NMOG Credit: Yes No X
 Exh Std: CA Tier-1 TLEV LEVII ULEVII X SULEV ; US EPA: Tier 2 BIN 5
 DDV Basis: 100K 120K X 150K SFTP: Yes X No
 Veh Type: LEV1: PC LDT1 LDT2 MDV1 MDV2 MDV3 MDV4
 LEV2: PC/LDT X MDV GVWR <= 10K MDV GVWR > 10K
 Fuel Type(s): Dedicated Flex-Fuel X Dual-Fuel Bi-Fuel Gasoline X Diesel
 CNG LNG LPG M85 Other (specify)
 Exh Emiss Test Fuel(s): Indo X CBG CNG LPG M85 E85 X Other (specify)
 Diesel: 13 CCR 2282 40 CFR 86.113-90 40 CFR 86.113-94
 Durability Service Accum: Whole Veh Full Mi Whole Veh Accel Mi X Bench Other
 EDV Std Compliance: DF X Aged Parts Other
 Exh ECS (use abbreviations per SAE J1930): ECS 1) DFI/TC/CAC/TWC/WR-HO2S/HO2S/FFS
 ECS 2)
 ECS 3)
 EGR Type: n.a. AIR Type: n.a.
 Displ. (L): 2.0 Engine Config. I4 Valves per Cylinder: 4
 Rated HP: 1) 220 hp @ 4450-6000 RPM
 Engine: Front X Mid. Rear Drive: FWD RWD 4WD-FT X 4WD-PT
 All Eng Codes in Test Group: **CA** **49S** **50S** X
 NMOG Test Procedure: Std X Equiv RAF: NMOG n.a. CH4 n.a.
 Mfr's NMOG Fleet Avg (g/mi): Ratio(NMOG w/o RAF): NMOG/NMHC 1.04 HCHO/NMHC 0.03
 OBD2 Compliance: Full X Partial Partial w/o fines
 Test Veh.:

DDV		EDV		EDV		EDV		EDV		
MY	ID	MY	ID	MY	ID	MY	ID	MY	ID	
2013	DFUB-BDQ	2013	DFUB-Q5A	2013	DFUB-BAQ	2013	DFUB-BAA	2014	EFUB-Q5A	

Evap Fam #)	ECS #)	Displ. (Liters)	Engine Code (also list CA/49ST/50ST	Vehicle Make / Models	Trans. (M5, A4, etc.)
1	1	2.0	CPMB / 50 ST	Audi / Q5, A4 quattro, Allroad quattro, A5 quattro, A5 Cabriolet quattro	SA8

Date Issued: 05-13-2015
 Revisions:

Section 17	Pg. 4	California ARB Information	Engine Code:	R.CH-No.:	Revision Date:
Part 1	Test Group:	GVGAJ02.0AUF	all		12-18-2014

2016 MODEL-YEAR CERTIFICATION REVIEW SHEET
EXHAUST/EVAPORATIVE SYSTEM & CALIFORNIA REQUIREMENTS
PASSENGER CARS, LIGHT-DUTY TRUCKS AND MEDIUM-DUTY VEHICLES

E.O.# A-413-0025
Page 2 of 3

Manufacturer: AUDI AG Test Group: GVGAJ02.0AUF Evaporative Family: GVGAR0140AA1

PROJECTED EMISSIONS (Gasoline)

(g/mi, except g/test for evap., g/gal Refuel.) (1), (2)

Data Vehicle ID Test version	Engine Code (Displ)	Test Loc.	Trans	(Check One)		MPG City/Hwy	(Check One)		NOx	HCHO	EVAPORATIVE							
				TW/ X ETW	DPA/ X RLHP		NMHC X NMOG	CO			20°F CO	PM	Hwy NOx	City CO2	3-day D+HS	R/L	2-day D+HS	ORVR
DFUB-Q5A 0	CPMA	Mfr.	L8Q	4500	*	24.8/ 38.6 @ 120K	0.0291 0.0373	0.77 1.19	0.041 0.063	** **	0.88	--	0.018 0.034	358	--	--	--	--
DFUB-BAQ 3	CPMA	Mfr.	L8Q	4250	*	-- / -- @ 150K	-- --	-- --	-- --	-- --	--	--	--	--	0.328	0.010	0.390	0.016

- (1) The EDV (s) above comply with standards of (@ 50K): 0.0400 1.70 0.050 0.0080 10.00 n.a. 0.070 n.a. n.a. n.a. n.a. n.a.
(@ 120K for PC,LDT, MDV): 0.0550 2.10 0.070 0.0110 n.a. n.a. 0.090 n.a. 0.500 0.050 0.650 0.200
The NMOG values include Reactivity Adjustment Factor(s) (RAF) of: Not Applicable X NMOG ____ Methane (CNG or LNG only) ____
Emission values include deterioration factors (DF's)
with RAF deterioration, (if applicable) of (50K): 0.0059 0.31 0.015 ** 0.015 n.a. 0.012 n.a. n.a. n.a. n.a. n.a.
(Full Useful Life Standards for PC,LDT and MDV): 0.0141 0.73 0.037 ** n.a. n.a. 0.028 n.a. 0.041 0.001 0.041 0.001
LEV/ULEV/SULEV 50°F emissions (without RAF and DFs): 0.0557 0.46 0.037 ** Exempted ____
LEV/ULEV/SULEV 50°F standards: 0.0800 1.70 0.050 ** Exempted ____
- (2) Evaporative DF is the average of: **3-day D+HS:** Vehicle DF --- and **3-day D+HS** Bench DF 0.041 **R/L** Vehicle DF --- and **R/L** Bench DF 0.001
2-day D+HS: Vehicle DF --- and **2-day D+HS** Bench DF 0.041 **ORVR** Bench DF 0.001
- (3) List configuration with highest projected sales first

Remarks : * Vehicles tested using Electric Dyno Procedures, See Common Section 12 for Coefficients

** For certification a factor of 1.04 is used to calculate NMOG from NMHC values and a statement of compliance is used for HCHO. For In-Use testing the same factor of 1.04 is used for NMOG. Fuel dependent factors are used to calculate HCHO from NMHC values: Indolene = 0.03; Phase 2 RFG = 0.06. HCHO Compliance by statement.

US06/SC03 testing with indolene fuel, Results: US06: NMHC+NOx = 0.039 , CO = 0.71; SC03: NMHC+NOx = 0.029, CO = 0.68

US06 standards: NMHC+NOx = 0.140, CO = 8.0; SC03 standards: NMHC+NOx = 0.200, CO = 2.70

CO2 values : HFET - 05-28-2012 - 230 g/mi // US06 - 05-11-2012 - 355 g/mi // SC03 - 05-02-2012- 373 g/mi

Application

Processed by: _____ Date: _____ Reviewed by: _____ Date: _____

Date Issued: 05-13-2015

Revised:

Section 17	Pg. 5	California ARB Information	Engine Code:	R.CH-No.:	Revision Date:
Part 1	Test Group:	GVGAJ02.0AUF	all		

2016 MODEL-YEAR CERTIFICATION REVIEW SHEET
EXHAUST/EVAPORATIVE SYSTEM & CALIFORNIA REQUIREMENTS
PASSENGER CARS, LIGHT-DUTY TRUCKS AND MEDIUM-DUTY VEHICLES

E.O.# A-413-0025
Page 3 of 3

Manufacturer: AUDI AG Test Group: GVGAJ02.0AUF Evaporative Family: GVGAR0140AA1

PROJECTED EMISSIONS (E85)

(g/mi, except g/test for evap., g/gal Refuel.) (1), (2)

Data Vehicle ID Test version	Engine Code (Displ)	Test Loc.	Trans	(Check One)		MPG City/Hwy	(Check One)		CO	NOx	HCHO	(gmi), except g/gal for Evap and HCHO.7 (L/E)							
				TW/ X ETW	DPA/ X RLHP		NMHC X NMOG	CO				NOx	HCHO	20°F CO	PM	Hwy NOx	City CO2	EVAPORATIVE	
DFUB-Q5A 1	CPMA	Mfr.	L8Q	4500	*	17.4/ 27.1 @ 120K	0.0311 0.0452	0.27 0.41	0.030 0.033	0.0039 0.0040	--	--	0.005 0.008	357	--	--	--	--	
EFUB-Q5A 1	CPMA	Mfr.	L8Q	4500	*	-- / --	--	--	--	--	2.32	--	--	--	--	--	--	--	
DFUB-BAQ 3	CPMA	Mfr.	L8Q	4250	*	-- / -- @ 150K	--	--	--	--	--	--	--	--	--	--	--	--	
															0.328	0.010	0.390	0.016	

(1) The EDV (s) above comply with standards of (@ 50K): 0.0400 1.70 0.050 0.0080 10.00 n.a. 0.070 n.a. n.a. n.a. n.a. n.a.
(@ 120K for PC,LDT, MDV): 0.0550 2.10 0.070 0.0110 n.a. n.a. 0.090 n.a. 0.500 0.050 0.650 0.200
The NMOG values include Reactivity Adjustment Factor(s) (RAF) of: Not Applicable X NMOG --- Methane (CNG or LNG only) ---

Emission values include deterioration factors (DF's)
with RAF deterioration, (if applicable) of (50K): 0.0102 0.11 0.002 0.0001 0.015 n.a. 0.002 n.a. n.a. n.a. n.a. n.a.
(Full Useful Life Standards for PC,LDT and MDV): 0.0243 0.25 0.005 0.0002 n.a. n.a. 0.005 n.a. 0.041 0.001 0.041 0.001

LEV/ULEV/SULEV 50°F emissions (without RAF and DFs): 0.0652 0.22 0.019 0.0009 Exempted ---
LEV/ULEV/SULEV 50°F standards: 0.0800 1.70 0.050 0.0160 Exempted ---

(2) Evaporative DF is the average of: **3-day D+HS:** Vehicle DF --- and **3-day D+HS** Bench DF 0.041 **R/L** Vehicle DF --- and **R/L** Bench DF 0.001
2-day D+HS: Vehicle DF --- and **2-day D+HS** Bench DF 0.041 **ORVR** Bench DF 0.001

(3) List configuration with highest projected sales first

Remarks : * Vehicles tested using Electric Dyno Procedures, See Common Section 12 for Coefficients

** For certification a factor of 0.94 is used to calculate NMOG from NMHC values and a statement of compliance is used for HCHO. For In-Use testing the same factor of 0.94 is used for NMOG. Fuel dependent factors are used to calculate HCHO from NMHC values: Indolene = 0.03; Phase 2 RFG = 0.06. HCHO Compliance by statement.

CO2 values : HFET - 07-12-2012 - 229 g/mi

Application

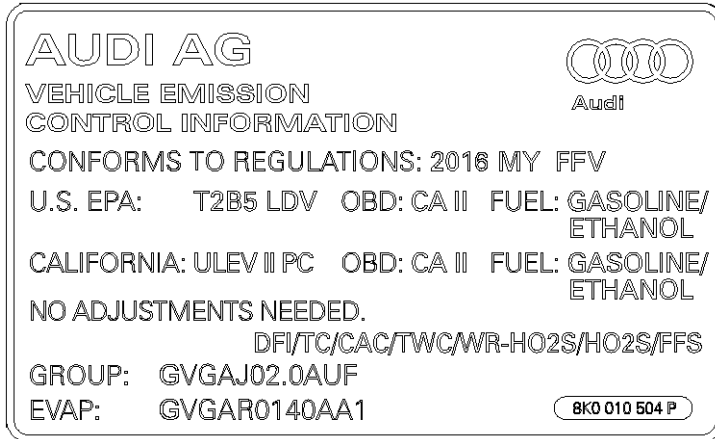
Processed by: _____ Date: _____ Reviewed by: _____ Date: _____

Date Issued: 05-13-2015

Revised:

Section 21	Pg. 1	Other Information	Engine Code	R.CH-No.:	Revision Date
Test Group		GVGAJ02.0AUF	all		

Vehicle Emission Control Information Label



VEC Bar Code Label Information: not applicable

I/M exemption label

