ISX12N CM2380 - EMY 2022 SIR A-S

Cummins Inc.
Service Information Document

1 OBD Service Information

1.1 DTC 27.2-SE3633: EGR Valve Position - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	27.2-SE3633
Description	EGR Position Feedback Value In Range High
Monitor Execution	Continuous
Typical Monitoring Duration	Tmax ≤ 5 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
The ECM has detected an electrical issue with the EGR device = FALSE
EGR valve deicing is in progress = FALSE
EGR actuator ≠ PWM-Off state
EGR actuator auto zero is not in progress
(2791.13-SE7321 and 2791.13-SE7322)
Engine = RUNNING
None active: 2791.15-SE4368, 2791.5-SE1825, 168.17-SE4367, 2791.6-SE1826

Malfunction Thresholds (all active):
Average of (measured EGR position - commanded EGR position) is ever > 20 %
Over a period of time = 5 sec
Where:
Diagnostic tolerance = 0 %

1.2 DTC 27.2-SE3635: EGR Valve Position - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	27.2-SE3635
Description	EGR Position Feedback Value In Range Low
Monitor Execution	Continuous
Typical Monitoring Duration	Tmax ≤ 5 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
The ECM has detected an electrical issue with the EGR device = FALSE
EGR valve deicing is in progress = FALSE
EGR actuator ≠ PWM-Off state
EGR actuator auto zero is not in progress
(2791.13-SE7321 and 2791.13-SE7322)
Engine = RUNNING
None active: 2791.15-SE4368, 2791.5-SE1825, 168.17-SE4367, 2791.6-SE1826

Malfunction Thresholds (all active):
Average of (commanded EGR position - measured EGR position) is ever > 20 %
Over a period of time = 5 sec
Where:
Diagnostic tolerance = 0 %

1.3 DTC 27.4-SE1796: EGR Valve Position Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	27.4-SE1796
Description	Position Feedback for EGR Brushless Motor Invalid
Monitor Execution	Continuous
Typical Monitoring Duration	20 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Brushless motor EGR valve has three hall effect sensors which return position feedback information. Each hall effect sensor may have one of two states, "on" or "off," for a combined total of 8 unique combinations, of which six are valid. If all three states are either "on" or "off," the position is considered invalid. Furthermore, the "on" and "off" combinations must proceed from one state to another specific state according to a specific order. If the combined states for the three sensors do not proceed in this order, this also indicates that the position feedback mechanism has failed.

1.4 DTC 51.3-SE1991: Throttle Position 1 Sensor Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	51.3-SE1991
Description	Electronic Throttle Actuator Position 1 Sensor Circuit Voltage High or Shorted High
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Electronic throttle actuator position 1 > 4.8 V (< 0 %)

1.5 DTC 51.4-SE1993: Throttle Position 1 Sensor Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	51.4-SE1993
Description	Electronic Throttle Actuator Position 1 Sensor Circuit Voltage Low or Shorted Low
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Electronic throttle actuator position 1 < 0.2 V (> 100 %)

1.6 DTC 51.7-SE2312: Throttle Plate Leaking - Mechanical System Not Responding or Out of Adjustment

Monitor Summary:	
DTC	51.7-SE2312
Description	Electronic Throttle Actuator Leak
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
(Engine = CRANKING
OR Engine = RUNNING)
Engine speed ≤ 1,000 RPM
None active: 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995, 3464.6-SE2226, 3464.5-SE14289, 3464.4-SE2225, 3464.3-SE13641, 3464.1-SE2046

Malfunction Thresholds (all active):
Electronic throttle actuator position (feedback - commanded) > 25 %

1.7 DTC 84.2-SE130: Wheel-Based Vehicle Speed - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	84.2-SE130
Description	Vehicle Speed Signal Lost
Monitor Execution	Continuous
Typical Monitoring Duration	For signal lost stopped error: 1, for signal lost moving error: 1.04 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Auxiliary device ≠ CONTROL ENGINE
Primary accelerator = ACTIVE
Datalink Sensors:
(Sensor type = Datalink Road Speed
OR Sensor type = Datalink Tailshaft Speed
OR Sensor type = Datalink Tachograph)
Physical Sensors:
(Sensor Type = Pulses Per Mile
OR Sensor Type = Pulses per Km
OR Sensor type = Inductance Vehicle Speed Sensor)

Malfunction Thresholds (all active):
Signal lost stopped error (Check for physical sensors and datalink sensors):
Vehicle speed = 0 mph
Engine speed > 0 RPM
Combustion Control Path Owner ≠ STOP
(
Boost transition counter ≥ 10 counts
When:
Boost pressure > 120 kPa(gauge)
FOR ≥ 5 sec
OR Net brake torque ≥ 1,300 Nm
FOR ≥ 30 sec
)
Idle validation counter ≥ 10 counts
Where:
Idle validation counter = INCREMENTED
When:
Idle transitions = NON-IDLE to IDLE
Signal lost moving error (Additional check for physical sensors):
Engine Speed > 900 RPM
FOR ≥ 300 sec
Net brake torque ≥ 500 Nm
Unfiltered vehicle speed = 0 mph

Malfunction Thresholds (all active):
Filtered vehicle speed > 9.942 mph
Combustion Control Path Owner ≠ STOP

1.8 DTC 84.2-SE4360: Wheel-Based Vehicle Speed - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	84.2-SE4360
Description	Vehicle Speed In Range High
Monitor Execution	Continuous
Typical Monitoring Duration	300 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Net brake torque ≥ 1,200 Nm
Auxiliary device ≠ CONTROL ENGINE
Primary accelerator = ACTIVE

Malfunction Thresholds (all active):
Actual gear ratio < 0.592 (ratio)

1.9 DTC 84.2-SE4361: Wheel-Based Vehicle Speed - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	84.2-SE4361
Description	Vehicle Speed Stuck In Range
Monitor Execution	Continuous
Typical Monitoring Duration	1,500 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Road speed governor ≠ ACTIVE
Cruise control ≠ ACTIVE
Primary accelerator = ACTIVE
Vehicle speed > 0 mph
Accelerator pedal position ≥ 40 %
Auxiliary device ≠ CONTROL ENGINE
Not active: 84.2-SE130

Malfunction Thresholds (all active):
Difference between min and max vehicle speeds attained within a time window < 0.621 mph
Pedal position has changed ≥ 3 %
FOR ≥ 5 counts

1.10 DTC 84.2-SE7458: Wheel-Based Vehicle Speed - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	84.2-SE7458
Description	Vehicle Speed In Range High at Keyswitch Off
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = OFF
Engine speed = 0 RPM

Malfunction Thresholds (all active):
Vehicle speed ≥ 1.864 mph

1.11 DTC 91.2-SE1380: Accelerator Pedal or Lever Position Sensor 1 - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	91.2-SE1380
Description	Dual Pedal Sensor Accelerator Rationality Check
Monitor Execution	Continuous
Typical Monitoring Duration	1.96 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
None active: 2623.3-SE1378, 2623.4-SE1379, 91.3-SE63, 91.4-SE64, 3512.3-SE817, 3512.4-SE815, 3513.3-SE1893, 3513.4-SE1894

Malfunction Thresholds (all active):
(Primary accelerator pedal position > secondary accelerator pedal position + 10 %
OR Primary accelerator pedal position < secondary accelerator pedal position - 10 %)

1.12 DTC 91.2-SE3200: Accelerator Pedal or Lever Position Sensor 1 - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	91.2-SE3200
Description	Multiplexed Accelerator Pedal Position Error
Monitor Execution	Continuous
Typical Monitoring Duration	1.96 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
None active: 639.13-SE748, 91.9-SE712, 639.13-SE750, 558.19-SE5333, 558.9-SE709, 91.19-SE1001

Malfunction Thresholds (all active):
(
(On idle switch = ON IDLE
AND Multiplexed accelerator pedal position > 12 %)
OR (On idle switch = OFF IDLE
AND Multiplexed accelerator pedal position ≤ 3.5 %)
)

1.13 DTC 91.3-SE63: Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	91.3-SE63
Description	Primary Accelerator Pedal Position High
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
None active: 3512.3-SE817, 3512.4-SE815

Malfunction Thresholds (all active):
Primary accelerator pedal position sensor value > 4.467 V (100 %)

1.14 DTC 91.4-SE64: Accelerator Pedal or Lever Position Sensor 1 Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	91.4-SE64
Description	Primary Accelerator Pedal Position Low
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
None active: 3512.3-SE817, 3512.4-SE815

Malfunction Thresholds (all active):
Primary accelerator pedal position sensor value < 0.826 V (0 %)

1.15 DTC 91.8-SE6990: Accelerator Pedal or Lever Position Sensor 1 Circuit Frequency - Abnormal Frequency or Pulse Width or Period

Monitor Summary:	
DTC	91.8-SE6990
Description	Primary PWM Accelerator Pedal Duty Cycle Out of Range
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
None active: 3512.3-SE817, 3512.4-SE815

Malfunction Thresholds (all active):
(PWM primary pedal position < 15 %
OR PWM primary pedal position > 95 %)

1.16 DTC 91.8-SE6991: Accelerator Pedal or Lever Position Sensor 1 Circuit Frequency - Abnormal Frequency or Pulse Width or Period

Monitor Summary:	
DTC	91.8-SE6991
Description	Primary PWM Accelerator Pedal Base Frequency Out of Range
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
None active: 3512.3-SE817, 3512.4-SE815

Malfunction Thresholds (all active):
(Base frequency of primary PWM accelerator pedal < 180 Hz
OR Base frequency of primary PWM accelerator pedal > 220 Hz)

1.17 DTC 91.9-SE712: SAE J1939 Multiplexed Accelerator Pedal or Lever Sensor System - Abnormal Update Rate

Monitor Summary:	
DTC	91.9-SE712
Description	Accelerator Pedal Position Message not Received
Monitor Execution	Continuous
Typical Monitoring Duration	260 msec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Data links related faults are inhibited.

Malfunction Thresholds (all active):
Accelerator pedal position message ≠ RECEIVED

1.18 DTC 91.19-SE1001: SAE J1939 Multiplexed Accelerator Pedal or Lever Sensor System - Received Network Data in Error

Monitor Summary:	
DTC	91.19-SE1001
Description	Accelerator Pedal Position Message Indicates Error
Monitor Execution	Continuous
Typical Monitoring Duration	5 msec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Accelerator pedal position message = J1939 error

1.19 DTC 100.2-SE3574: Engine Oil Rifle Pressure - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	100.2-SE3574
Description	Oil Pressure In Range High
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine = STARTED
FOR ≥ 300 sec
Engine = RUNNING
None active: 723.2-SE415, 723.2-SE45, 612.2-SE460, 190.2-SE417, 190.2-SE54, 723.7-SE389, 100.3-SE67, 100.4-SE72, 100.2-SE4443, 175.3-SE104, 175.4-SE105, 175.2-SE3578, 175.2-SE3579

Malfunction Thresholds (all active):
Oil pressure ≥ oil pressure upper bound is determined by sequentially stepping through the list of tables below. The first table listed below to meet the criteria based on oil temperature is the one selected for oil pressure upper bound determination. The tables may or may not be calibrated the same way depending on application.
Oil temperature ≥ 100 °C
Use = [Table of values] kPa(gauge)
(
Oil temperature ≥ 90 °C
Use = [Table of values] kPa(gauge)
AND Oil temperature < 100 °C
Use = [Table of values] kPa(gauge)
)
(
Oil temperature ≥ 80 °C
Use = [Table of values] kPa(gauge)
AND Oil temperature < 90 °C
Use = [Table of values] kPa(gauge)
)
(
Oil temperature ≥ 70 °C
Use = [Table of values] kPa(gauge)
AND Oil temperature < 80 °C
Use = [Table of values] kPa(gauge)
)
(
Oil temperature ≥ 60 °C
Use = [Table of values] kPa(gauge)
AND Oil temperature < 70 °C
Use = [Table of values] kPa(gauge)
)

Malfunction Thresholds (all active):
(
Oil temperature ≥ 50 ˚C
Use = [Table of values] kPa(gauge)
AND Oil temperature < 60 ˚C
Use = [Table of values] kPa(gauge)
)
(
Oil temperature ≥ 40 ˚C
Use = [Table of values] kPa(gauge)
AND Oil temperature < 50 ˚C
Use = [Table of values] kPa(gauge)
)
(
Oil temperature ≥ 30 ˚C
Use = [Table of values] kPa(gauge)
AND Oil temperature < 40 ˚C
Use = [Table of values] kPa(gauge)
)
(
Oil temperature ≥ 20 ˚C
Use = [Table of values] kPa(gauge)
AND Oil temperature < 30 ˚C
Use = [Table of values] kPa(gauge)
)
Oil temperature < 20 ˚C
Use = [Table of values] kPa(gauge)

1.20 DTC 100.2-SE3576: Engine Oil Rifle Pressure - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	100.2-SE3576
Description	Oil Pressure Stuck In Range
Monitor Execution	Continuous
Typical Monitoring Duration	3 counts
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine = RUNNING
Engine = STARTED
FOR ≥ 300 sec
None active: 723.2-SE415, 723.2-SE45, 612.2-SE460, 190.2-SE417, 190.2-SE54, 723.7-SE389, 100.3-SE67, 100.4-SE72, 100.2-SE4443, 175.3-SE104, 175.4-SE105, 175.2-SE3578, 175.2-SE3579

Malfunction Thresholds (all active):
Maximum oil pressure - minimum oil pressure < 6 kPa(gauge)
Over a time window = 60 sec
Maximum engine speed - minimum engine speed > 800 RPM
Over a time window = 60 sec

1.21 DTC 100.2-SE4443: Engine Oil Rifle Pressure - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	100.2-SE4443
Description	Oil Pressure Sensor Reading Erratic, Intermittent, or Incorrect at Keyswitch Off
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec within a 5 sec window.
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Coolant temperature > 70 °C
Engine = STOPPED
Number of pressure sensors available ≥ 3 sensors
Exhaust pressure sensor tube icing ≠ ACTIVE
Keyswitch = OFF
FOR ≥ 30 sec
None active: 101.2-SE2086, 101.0-SE2020, 100.3-SE67, 100.4-SE72

Malfunction Thresholds (all active):
(
Oil pressure sensor reading < 17 kPa(absolute)
OR Oil pressure sensor reading > 145 kPa(absolute)
OR (
|Oil pressure - pressure with lowest tolerance from remaining sensors| > (29.44 + lowest tolerance of remaining pressure sensors) kPa(absolute)
AND |Oil pressure - pressure with second lowest tolerance from remaining sensors| > (29.44 + second lowest tolerance of remaining pressure sensors) kPa(absolute)
AND |Pressure with lowest tolerance from remaining sensors - pressure with second lowest tolerance from remaining sensors| < (lowest tolerance of remaining pressure sensors + second lowest tolerance of remaining pressure sensors) kPa(absolute)
)
)
Tolerance of remaining pressure sensors are:
Charge pressure sensor tolerance = 12 kPa(absolute)
Compressor inlet pressure sensor tolerance = 5.81 kPa(absolute)
Compressor outlet pressure sensor tolerance = 18.31 kPa(absolute)
EGR orifice pressure sensor tolerance = 28.63 kPa(absolute)
Exhaust pressure sensor tolerance = 28.78 kPa(absolute)

1.22 DTC 100.3-SE67: Engine Oil Rifle Pressure 1 Sensor Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	100.3-SE67
Description	Engine Oil Rifle Pressure Sensor Circuit Continuity High or Shorted to High Source
Monitor Execution	Continuous
Typical Monitoring Duration	8 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Oil pressure sensor value > 4.741 V (774.662 kPa(gauge))

1.23 DTC 100.4-SE72: Engine Oil Rifle Pressure 1 Sensor Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	100.4-SE72
Description	Engine Oil Rifle Pressure Sensor Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	8 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Oil pressure sensor value < 0.259 V (3.382 kPa(gauge))

1.24 DTC 101.2-SE2086: Crankcase Pressure - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	101.2-SE2086
Description	Crankcase Pressure In Range High or In Range Low
Monitor Execution	Continuous
Typical Monitoring Duration	0.02 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine speed ≤ 0 RPM
FOR ≥ 30 sec
(Coolant temperature > 71.109 °C
FOR ≥ 900 sec
AND None active: 110.3-SE75, 110.4-SE76)
Crankcase pressure delta ≤ 0.02 kPa(gauge)
None active: 101.3-SE1422, 101.4-SE1424

Malfunction Thresholds (all active):
(
Crankcase pressure > 0.8 kPa(gauge)
OR Crankcase pressure < -0.8 kPa(gauge)
)

1.25 DTC 101.2-SE3665: Crankcase Pressure - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	101.2-SE3665
Description	Crankcase Pressure Sensor Stuck In Range
Monitor Execution	Continuous
Typical Monitoring Duration	1 counts
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine speed > 0 RPM
(Coolant temperature > 71.109 °C
FOR ≥ 900 sec
AND None active: 110.3-SE75, 110.4-SE76)
None active: 101.2-SE2086, 101.3-SE1422, 101.4-SE1424

Malfunction Thresholds (all active):
Maximum crankcase pressure - minimum crankcase pressure < 0.2 kPa(gauge)
High power condition and low power condition have been met
High Power Condition:
Engine torque ≥ 1,000 Nm
Engine speed ≥ 1,500 RPM
Boost pressure ≥ 140 kPa(gauge)
FOR ≥ 150 sec
Low Power Condition:
Engine torque ≤ 500 Nm
Engine speed ≤ 900 RPM
Boost pressure ≤ 10 kPa(gauge)
FOR ≥ 150 sec

1.26 DTC 101.3-SE1422: Crankcase Pressure Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	101.3-SE1422
Description	Crankcase Pressure Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	8 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Crankcase pressure sensor value > 4.741 V (7.449 kPa(gauge))

1.27 DTC 101.4-SE1424: Crankcase Pressure Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	101.4-SE1424
Description	Crankcase Pressure Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	8 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Crankcase pressure sensor value < 0.254 V (-3.069 kPa(gauge))

1.28 DTC 102.2-SE4439: Intake Manifold 1 Pressure - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	102.2-SE4439
Description	Charge Pressure Sensor Reading Erratic, Intermittent, or Incorrect at Keyswitch Off
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec within a 5 sec window.
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Coolant temperature > 70 °C
Engine = STOPPED
Number of pressure sensors available ≥ 3 sensors
Exhaust pressure sensor tube icing ≠ ACTIVE
Keyswitch = OFF
FOR ≥ 30 sec

Malfunction Thresholds (all active):
(
Charge pressure sensor reading < 17 kPa(absolute)
OR Charge pressure sensor reading > 145 kPa(absolute)
OR (
|Charge pressure - pressure with lowest tolerance from remaining sensors| > (12 + lowest tolerance of remaining pressure sensors) kPa(absolute)
AND |Charge pressure - pressure with second lowest tolerance from remaining sensors| > (12 + second lowest tolerance of remaining pressure sensors) kPa(absolute)
AND |Pressure with lowest tolerance from remaining sensors - pressure with second lowest tolerance from remaining sensors| < (lowest tolerance of remaining pressure sensors + second lowest tolerance of remaining pressure sensors) kPa(absolute)
)
)
Tolerance of remaining pressure sensors are:
Compressor inlet pressure sensor tolerance = 5.81 kPa(absolute)
Compressor outlet pressure sensor tolerance = 18.31 kPa(absolute)
EGR orifice pressure sensor tolerance = 28.63 kPa(absolute)
Exhaust pressure sensor tolerance = 28.78 kPa(absolute)

1.29 DTC 102.2-SE9037: Intake Manifold 1 Pressure - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	102.2-SE9037
Description	Intake Manifold Pressure Sensor Stuck during Engine Crank and Start
Monitor Execution	Continuous
Typical Monitoring Duration	6 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine speed > 0 RPM
None active: 102.2-SE4439, 102.16-SE2323, 102.18-SE2324, 102.3-SE1999, 102.4-SE2000

Malfunction Thresholds (all active):
Change in intake manifold pressure during engine crank and start < 15 kPa(absolute)

1.30 DTC 102.2-SE13766: Intake Manifold 1 Pressure - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	102.2-SE13766
Description	Intake Manifold Pressure Stuck In Range
Monitor Execution	Continuous
Typical Monitoring Duration	Maximum of 15 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine state = RUN
The engine is running out of fuel = FALSE
None active: 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.4-SE14242, 609.2-SE14410, 609.9-SE17604, 609.1-SE17603, 609.1-SE14249, 102.2-SE4439, 612.2-SE460, 102.16-SE2323, 102.18-SE2324, 102.3-SE1999, 102.4-SE2000, 102.2-SE15429, 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995

Malfunction Thresholds (all active):
Change in intake manifold pressure < 5 kPa(absolute)
When:
Engine speed delta = 150 RPM
In Time window = 1.5 sec
FOR ≥ 10 counts

1.31 DTC 102.2-SE15429: Intake Manifold 1 Pressure - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	102.2-SE15429
Description	Intake Manifold Pressure Sensor Keyswitch On Pressure Check Error
Monitor Execution	Continuous
Typical Monitoring Duration	As soon as engine enters CRANK state OR 10 sec at keyswitch on
MIL Activation Criteria	1 trip

Entry Conditions (all active):
None active: 102.2-SE4439, 102.16-SE2323, 102.18-SE2324, 102.3-SE1999, 102.4-SE2000, 102.2-SE13766, 102.2-SE9037

Malfunction Thresholds (all active):
(
(
|Intake manifold pressure - compressor inlet pressure| ≥ 10 kPa(absolute)
AND |Intake manifold pressure - compressor outlet pressure| ≥ 12 kPa(absolute)
)
OR |Intake manifold pressure - compressor inlet pressure| ≥ 10 kPa(absolute)
When:
Compressor outlet pressure = UNAVAILABLE
OR |Intake manifold pressure - compressor outlet pressure| ≥ 12 kPa(absolute)
When:
Compressor inlet pressure = UNAVAILABLE
OR Intake manifold pressure > 150 kPa(absolute)
OR Intake manifold pressure < 45 kPa(absolute)
)

1.32 DTC 102.3-SE1999: Intake Manifold 1 Pressure Sensor Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	102.3-SE1999
Description	Intake Manifold Pressure Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Intake manifold pressure > 4.712 V (421.94 kPa(absolute))

1.33 DTC 102.4-SE2000: Intake Manifold 1 Pressure Sensor Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	102.4-SE2000
Description	Intake Manifold Pressure Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Intake manifold pressure < 0.279 V (0 kPa(absolute))

1.34 DTC 102.16-SE2323: Intake Manifold 1 Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	102.16-SE2323
Description	Intake Manifold Pressure Sensor is Above Estimated Intake Manifold Pressure
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine speed > 300 RPM
Engine state = RUN
Engine is motoring and experiencing fuel cut = FALSE
None active: 102.2-SE4439, 1127.2-SE13700, 1127.20-SE14591, 1127.3-SE1996, 1127.4-SE1998, 1127.2-SE9036, 102.18-SE2324, 102.3-SE1999, 102.4-SE2000, 102.2-SE13766, 102.2-SE9037, 1127.2-SE15430, 102.2-SE15429, 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995, 3464.6-SE2226, 3464.4-SE2225, 3464.3-SE13641, 51.7-SE2312, 3464.0-SE2044, 3464.1-SE2046, 3673.2-SE2047

Malfunction Thresholds (all active):
Intake manifold pressure - estimated intake manifold pressure > 30 kPa(absolute)

1.35 DTC 102.18-SE2324: Intake Manifold 1 Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	102.18-SE2324
Description	Intake Manifold Pressure Sensor is Below Estimated Intake Manifold Pressure
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine speed > 300 RPM
Engine state = RUN
Engine is motoring and experiencing fuel cut = FALSE
None active: 102.2-SE4439, 1127.2-SE13700, 1127.20-SE14591, 1127.3-SE1996, 1127.4-SE1998, 1127.2-SE9036, 102.18-SE2324, 102.3-SE1999, 102.4-SE2000, 102.2-SE13766, 102.2-SE9037, 1127.2-SE15430, 102.2-SE15429, 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995, 3464.6-SE2226, 3464.4-SE2225, 3464.3-SE13641, 51.7-SE2312, 3464.0-SE2044, 3464.1-SE2046, 3673.2-SE2047

Malfunction Thresholds (all active):
Estimated intake manifold pressure - intake manifold pressure > 30 kPa(absolute)

1.36 DTC 105.0-SE649: Intake Manifold 1 Temperature - Data Valid But Above Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	105.0-SE649
Description	Intake Manifold Temperature High
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine speed ≥ 400 RPM
None active: 105.2-SE3793, 105.3-SE487, 105.4-SE488, 105.2-SE8976

Malfunction Thresholds (all active):
Intake manifold temperature ≥ 89 °C

1.37 DTC 105.2-SE3793: Intake Manifold 1 Temperature - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	105.2-SE3793
Description	Charge Temperature Sensor Reading Erratic, Intermittent, or Incorrect
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec within a 3 sec window.
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Temperature drop detected on coolant temperature sensor ≤ 1.2 °C
FOR ≥ 30 sec
After engine = STARTED
Keyswitch = ON
Number of temperature sensors available ≥ 3 sensors
Engine control module off time ≥ 28,800 sec
None active: 105.3-SE487, 105.4-SE488

Malfunction Thresholds (all active):
|Charge temperature sensor - temperature with lowest tolerance from remaining sensors| > (14 + lowest tolerance of remaining temperature sensors) °C
|Charge temperature sensor - temperature with second lowest tolerance from remaining sensors| > (14 + second lowest tolerance of remaining temperature sensors) °C
|Temperature with lowest tolerance from remaining sensors - temperature with second lowest tolerance from remaining sensors| < (lowest tolerance of the remaining temperature sensors + second lowest tolerance of the remaining temperature sensors) °C
Tolerance of remaining temperature sensors are:
Air temperature sensor tolerance = 26 °C
Compressor inlet temperature sensor tolerance = 6 °C
Coolant temperature sensor tolerance = 12 °C
EGR orifice temperature sensor tolerance = 13 °C
Oil temperature sensor tolerance = 20 °C

1.38 DTC 105.2-SE8976: Intake Manifold 1 Temperature - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	105.2-SE8976
Description	Intake Manifold Temperature Stuck In Range
Monitor Execution	Continuous
Typical Monitoring Duration	600 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
Engine state = RUN
Net engine torque < 200 Nm
Net engine torque > 600 Nm
None active: 105.3-SE487, 105.4-SE488

Malfunction Thresholds (all active):
Change in intake manifold temperature < 1.5 ˚C
When:
(Net engine torque > 600 Nm
FOR Cumulative time ≥ 300 sec
AND Net engine torque < 200 Nm
FOR Cumulative time ≥ 300 sec)

1.39 DTC 105.3-SE487: Intake Manifold 1 Temperature Sensor Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	105.3-SE487
Description	Intake Manifold Temperature Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Intake manifold temperature > 4.941 V (< -44.72 °C)

1.40 DTC 105.4-SE488: Intake Manifold 1 Temperature Sensor Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	105.4-SE488
Description	Intake Manifold Temperature Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Intake manifold temperature < 0.059 V (> 145 °C)

1.41 DTC 110.2-SE3668: Engine Coolant Temperature - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	110.2-SE3668
Description	Coolant Temperature In Range Low
Monitor Execution	Continuous
Typical Monitoring Duration	60 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Maximum coolant temperature this trip ≥ 71.109 °C
Engine = RUNNING
(Engine ≠ IDLE
OR Vehicle speed > 0 mph)
Engine speed > 600 RPM
Ambient air temperature ≥ -6.664 °C
None active: 110.3-SE75, 110.4-SE76, 110.2-SE3669, 110.2-SE3805

Malfunction Thresholds (all active):
Coolant temperature < 50 °C

1.42 DTC 110.2-SE3669: Engine Coolant Temperature - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	110.2-SE3669
Description	Coolant Temperature Stuck In Range
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine = RUNNING
None active: 110.3-SE75, 110.4-SE76, 110.2-SE3668, 110.2-SE3805

Malfunction Thresholds (all active):
Maximum coolant temperature - minimum coolant temperature < 0.336 ˚C
FOR ≥ 300 counts
Where:
Samples are taken when either high or low
High:
Net engine torque > 1,000 Nm
Low:
Net engine torque < 150 Nm

1.43 DTC 110.2-SE3805: Engine Coolant Temperature - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	110.2-SE3805
Description	Coolant Temperature Sensor Reading Erratic, Intermittent, or Incorrect
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec within a 3 sec window.
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Temperature drop detected on coolant temperature sensor ≤ 1.2 ˚C
FOR ≥ 30 sec
After engine = STARTED
Keyswitch = ON
Number of temperature sensors available ≥ 3 sensors
Engine control module off time ≥ 28,800 sec
None active: 110.3-SE75, 110.4-SE76

Malfunction Thresholds (all active):
|Coolant temperature sensor - temperature with lowest tolerance from remaining sensors| > (12 + lowest tolerance of remaining temperature sensors) ˚C
|Coolant temperature sensor - temperature with second lowest tolerance from remaining sensors| > (12 + second lowest tolerance of remaining temperature sensors) ˚C
|Temperature with lowest tolerance from remaining sensors - temperature with second lowest tolerance from remaining sensors| < (lowest tolerance of remaining temperature sensors + second lowest tolerance of remaining temperature sensors) ˚C
Tolerance of remaining temperature sensors are:
Air temperature sensor tolerance = 26 ˚C
Charge temperature sensor tolerance = 14 ˚C
Compressor inlet temperature sensor tolerance = 6 ˚C
EGR orifice temperature sensor tolerance = 13 ˚C
Oil temperature sensor tolerance = 20 ˚C

1.44 DTC 110.3-SE75: Engine Coolant Temperature 1 Sensor Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	110.3-SE75
Description	Coolant Temperature Sensor Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Coolant temperature sensor value > 4.956 V (< -40 °C)

1.45 DTC 110.4-SE76: Engine Coolant Temperature 1 Sensor Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	110.4-SE76
Description	Coolant Temperature Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Coolant temperature sensor value < 0.108 V (> 145 ˚C)

1.46 DTC 111.3-SE572: Coolant Level Sensor 1 Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	111.3-SE572
Description	Coolant Level Sensor Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Coolant level sensor value > 4.418 V

1.47 DTC 111.4-SE283: Coolant Level Sensor 1 Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	111.4-SE283
Description	Coolant Level Sensor Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Coolant level sensor value < 0.577 V

1.48 DTC 132.16-SE3094: Engine Intake Air Mass Flow - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	132.16-SE3094
Description	Estimated Mass Air Flow High
Monitor Execution	Continuous
Typical Monitoring Duration	8 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine speed > 400 RPM
FOR ≥ 1 sec
Engine speed ≥ 1,200 RPM
Torque demand ≥ 500 Nm
Engine is motoring and experiencing fuel cut = FALSE
FOR ≥ 1 sec
Electronic throttle actuator throttle command compensation ≤ -27 %
None active: 102.2-SE4439, 102.16-SE2323, 102.18-SE2324, 102.3-SE1999, 102.4-SE2000, 102.2-SE13766, 102.2-SE9037, 102.2-SE15429

Malfunction Thresholds (all active):
Estimated mass air flow - commanded mass air flow ≥ 1 kg/min

1.49 DTC 132.18-SE3098: Engine Intake Air Mass Flow - Data Valid But Below Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	132.18-SE3098
Description	Estimated Mass Air Flow Low
Monitor Execution	Continuous
Typical Monitoring Duration	8 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine speed > 1,400 RPM
Commanded mass air flow ≥ [Table of values] kg/min
Engine is motoring and experiencing fuel cut = FALSE
Engine state = RUN
None active: 102.2-SE4439, 1176.2-SE8802, 1176.18-SE14522, 102.16-SE2323, 102.18-SE2324, 102.3-SE1999, 102.4-SE2000, 102.2-SE13766, 102.2-SE9037, 1176.2-SE15431, 102.2-SE15429, 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995, 3464.6-SE2226, 3464.4-SE2225, 51.7-SE2312, 3464.0-SE2044, 3464.1-SE2046, 3673.2-SE2047, 4490.19-SE6971, 4490.9-SE6970, 1188.4-SE574, 1188.3-SE573

Malfunction Thresholds (all active):
Commanded mass air flow - estimated mass air flow ≥ [Table of values] kg/min

1.50 DTC 159.0-SE2051: Gas Supply Pressure (Regulated) - Data Valid But Above Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	159.0-SE2051
Description	Fuel Inlet Pressure Sensor Above Critical Threshold
Monitor Execution	Continuous
Typical Monitoring Duration	2 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine speed ≥ 100 RPM
None active: 159.21-SE14412, 159.2-SE13721, 159.3-SE1986, 159.4-SE1987

Malfunction Thresholds (all active):
Fuel inlet pressure ≥ 950 kPa(absolute)

1.51 DTC 159.0-SE16640: Gas Supply Pressure (Regulated) - Data Valid But Above Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	159.0-SE16640
Description	Fuel Inlet Pressure Sensor High
Monitor Execution	Continuous
Typical Monitoring Duration	0.04 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine ≠ RUN
None active: 159.21-SE14412, 159.2-SE13721, 159.3-SE1986, 159.4-SE1987

Malfunction Thresholds (all active):
Fuel inlet pressure > 1,379 kPa(absolute)

1.52 DTC 159.2-SE13721: Gas Supply Pressure (Regulated) - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	159.2-SE13721
Description	Fuel Inlet Pressure Sensor Stuck In Range
Monitor Execution	Continuous
Typical Monitoring Duration	0.2 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
Engine speed > 600 RPM
Change in estimated mass air flow ≥ 12 kg/min
Engine is motoring and experiencing fuel cut = FALSE
None active: 159.21-SE14412, 159.3-SE1986, 159.4-SE1987, 159.0-SE2051, 159.16-SE2050

Malfunction Thresholds (all active):
Change in fuel inlet pressure < 5 kPa(absolute)

1.53 DTC 159.3-SE1986: Gas Supply (Regulated) Pressure Sensor Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	159.3-SE1986
Description	Fuel Inlet Pressure Sensor Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	3 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Fuel inlet pressure > 4.691 V (1,969.94 kPa(absolute))

1.54 DTC 159.4-SE1987: Gas Supply (Regulated) Pressure Sensor Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	159.4-SE1987
Description	Fuel Inlet Pressure Sensor Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	3 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Fuel inlet pressure < 0.278 V (44.81 kPa(absolute))

1.55 DTC 159.16-SE2050: Gas Supply Pressure (Regulated) - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	159.16-SE2050
Description	Fuel Inlet Pressure Sensor Above Moderate Threshold
Monitor Execution	Continuous
Typical Monitoring Duration	2 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine speed ≥ 100 RPM
Engine has still not exited fuel cut after a motoring event = FALSE
FOR ≥ 0.02 sec
None active: 159.21-SE14412, 159.2-SE13721, 159.3-SE1986, 159.4-SE1987

Malfunction Thresholds (all active):
Fuel inlet pressure ≥ 824 kPa(absolute)

1.56 DTC 159.21-SE14412: Engine Gaseous Fuel Supply Pressure - Data Not Rational - Drifted Low

Monitor Summary:	
DTC	159.21-SE14412
Description	Fuel Inlet Pressure Sensor Low
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Fuel outlet pressure > [Table of values] kPa(absolute)
Engine has still not exited fuel cut after a motoring event = FALSE
None active: 159.2-SE13721, 159.3-SE1986, 159.4-SE1987, 1390.20-SE13720, 1390.21-SE13718, 632.3-SE2284, 632.4-SE2285

Malfunction Thresholds (all active):
Fuel inlet pressure < [Table of values] kPa(absolute)

1.57 DTC 159.31-SE14391: Engine Gaseous Fuel Supply Pressure - Condition Exists

Monitor Summary:	
DTC	159.31-SE14391
Description	Fuel Inlet Pressure and Fuel Outlet Pressure Sensors Low
Monitor Execution	Continuous
Typical Monitoring Duration	Accumulated Net Work ≥ 247.413 MJ
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine state = RUN
Engine speed > 600 RPM
Engine has still not exited fuel cut after a motoring event = FALSE
None active: 159.21-SE14412, 159.2-SE13721, 159.3-SE1986, 159.4-SE1987

Malfunction Thresholds (all active):
Fuel inlet pressure < [Table of values] kPa(absolute)
Fuel outlet pressure < [Table of values] kPa(absolute)

1.58 DTC 168.1-SE17602: Battery 1 Voltage - Data Valid But Below Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	168.1-SE17602
Description	Ignition Control Module (ICM), TriCAN Smart sensor and Continuous Flow Valve (CFV) Smart Fuel Control Module lost power to microprocessor and unable to communicate
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
(
Ignition Control Module (ICM) message ≠ RECEIVED
AND TriCAN smart sensor message ≠ RECEIVED
AND CFV smart fuel control module message ≠ RECEIVED
FOR ≥ 30 sec
When Keyswitch = ON
FOR ≥ 7.2 sec
WHEN Engine State = CRANK
FOR ≥ 0.6 sec
WHEN Engine State = RUN
)

1.59 DTC 168.17-SE4367: Battery 1 Voltage - Data Valid But Below Normal Operating Range - Least Severe Level

Monitor Summary:	
DTC	168.17-SE4367
Description	Sensed Voltage for EGR Driver Chip Low
Monitor Execution	Continuous
Typical Monitoring Duration	2.2 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Sensed voltage for EGR driver chip < 9 V

1.60 DTC 171.2-SE3871: Ambient Air Temperature - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	171.2-SE3871
Description	Air Temperature Sensor Reading Erratic, Intermittent, or Incorrect
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec within a 3 sec window.
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Temperature drop detected on coolant temperature sensor ≤ 1.2 ˚C
FOR ≥ 30 sec
After engine = STARTED
Keyswitch = ON
Number of temperature sensors available ≥ 3 sensors
Engine control module off time ≥ 28,800 sec
None active: 171.3-SE3802, 171.4-SE3803

Malfunction Thresholds (all active):
|Air temperature sensor - temperature with lowest tolerance from remaining sensors| > (26 + lowest tolerance of the remaining temperature sensors) ˚C
|Air temperature sensor - temperature with second lowest tolerance from remaining sensors| > (26 + second lowest tolerance of remaining temperature sensors) ˚C
|Temperature with lowest tolerance from remaining sensors - temperature with second lowest tolerance from remaining sensors| < (lowest tolerance of the remaining temperature sensors + second lowest tolerance of the remaining temperature sensors) ˚C
Tolerance of remaining temperature sensors are:
Charge temperature sensor tolerance = 14 ˚C
Compressor inlet temperature sensor tolerance = 6 ˚C
Coolant temperature sensor tolerance = 12 ˚C
EGR orifice temperature sensor tolerance = 13 ˚C
Oil temperature sensor tolerance = 20 ˚C

1.61 DTC 171.3-SE3802: Ambient Air Temperature Sensor 1 Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	171.3-SE3802
Description	Ambient Air Temperature Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Ambient air temperature > 4.944 V (< -46.691 °C)

1.62 DTC 171.4-SE3803: Ambient Air Temperature Sensor 1 Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	171.4-SE3803
Description	Ambient Air Temperature Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Ambient air temperature < 0.107 V (> 150 °C)

1.63 DTC 171.16-SE3799: Ambient Air Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	171.16-SE3799
Description	Ambient Air Temperature In Range High
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
None active: 171.2-SE3871, 171.3-SE3802, 171.4-SE3803

Malfunction Thresholds (all active):
Ambient air temperature ≥ 75 ˚C

1.64 DTC 174.2-SE13702: Engine Fuel Temperature - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	174.2-SE13702
Description	Fuel Outlet Temperature Sensor Reading Erratic, Intermittent, or Incorrect
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec within a 3 sec window.
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Temperature drop detected on coolant temperature sensor ≤ 1.2 ˚C
FOR ≥ 30 sec
After engine = STARTED
Keyswitch = ON
Number of temperature sensors available ≥ 3 sensors
Engine control module off time ≥ 28,800 sec

Malfunction Thresholds (all active):
|Fuel outlet temperature - temperature with lowest tolerance from remaining sensors| > (15 + lowest tolerance of remaining temperature sensors) ˚C
|Fuel outlet temperature - temperature with second lowest tolerance from remaining sensors| > (15 + second lowest tolerance of remaining temperature sensors) ˚C
|Temperature with lowest tolerance from remaining sensors - temperature with second lowest tolerance from remaining sensors| < (lowest tolerance of the remaining temperature sensors + second lowest tolerance of the remaining temperature sensors) ˚C
Tolerance of remaining temperature sensors are:
Air temperature sensor tolerance = 26 ˚C
Charge temperature sensor tolerance = 14 ˚C
Compressor inlet temperature sensor tolerance = 6 ˚C
Coolant temperature sensor tolerance = 12 ˚C
EGR orifice temperature sensor tolerance = 13 ˚C
Oil temperature sensor tolerance = 20 ˚C

1.65 DTC 174.3-SE14246: Engine Fuel Temperature Sensor 1 Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	174.3-SE14246
Description	Continuous Flow Valve (CFV) Fuel Outlet Temperature Sensor Shorted High
Monitor Execution	Continuous
Typical Monitoring Duration	X sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON
None active: 168.1-SE17602, 609.9-SE17604, 609.1-SE17603

Malfunction Thresholds (all active):
Fuel outlet temperature sensor element > X V

1.66 DTC 174.4-SE14245: Engine Fuel Temperature Sensor 1 Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	174.4-SE14245
Description	Continuous Flow Valve (CFV) Fuel Outlet Temperature Sensor Shorted Low
Monitor Execution	Continuous
Typical Monitoring Duration	X sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON
None active: 168.1-SE17602, 609.9-SE17604, 609.1-SE17603

Malfunction Thresholds (all active):
Fuel outlet temperature sensor element < X V

1.67 DTC 174.20-SE13722: Engine Fuel Temperature Sensor - Data Not Rational - Drifted High

Monitor Summary:	
DTC	174.20-SE13722
Description	Fuel Outlet Temperature Sensor High
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine speed > 0 RPM
FOR ≥ 0 sec
Engine is motoring and experiencing fuel cut = FALSE

Malfunction Thresholds (all active):
Fuel outlet temperature > 90 °C

1.68 DTC 174.21-SE13723: Engine Fuel Temperature Sensor - Data Not Rational - Drifted Low

Monitor Summary:	
DTC	174.21-SE13723
Description	Fuel Outlet Temperature Sensor Low
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine is motoring and experiencing fuel cut = FALSE
None active: 110.3-SE75, 110.4-SE76, 110.2-SE3668, 110.2-SE3669, 3060.18-SE12227

Malfunction Thresholds (all active):
Fuel outlet temperature < -50 ˚C

1.69 DTC 175.2-SE3578: Engine Oil Temperature - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	175.2-SE3578
Description	Oil Temperature In Range Low
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine = RUNNING
Engine = STARTED
FOR ≥ 30 sec
None active: 110.3-SE75, 110.4-SE76, 110.2-SE3668, 110.2-SE3669, 110.2-SE3805, 175.3-SE104, 175.4-SE105

Malfunction Thresholds (all active):
Oil temperature < [Table of values] °C

1.70 DTC 175.2-SE3579: Engine Oil Temperature - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	175.2-SE3579
Description	Oil Temperature Stuck In Range
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine = RUNNING
Engine = STARTED
FOR ≥ 30 sec
None active: 175.3-SE104, 175.4-SE105, 175.2-SE3578, 175.2-SE3807

Malfunction Thresholds (all active):
Maximum oil temperature - minimum oil temperature < 0.203 °C
FOR ≥ 600 counts
Where:
Counts increment according to high counts and low counts
"High counts" increment when:
(
Net engine torque > 1,000 Nm
OR (Coolant temperature < 71.109 °C
AND Net engine torque > 1,000 Nm)
)
"Low counts" increment when:
(
Net engine torque < 150 Nm
OR (Coolant temperature < 71.109 °C
AND Net engine torque < 150 Nm)
)

1.71 DTC 175.2-SE3807: Engine Oil Temperature - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	175.2-SE3807
Description	Oil Temperature Sensor Reading Erratic, Intermittent, or Incorrect
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec within a 3 sec window.
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Temperature drop detected on coolant temperature sensor ≤ 1.2 ˚C
FOR ≥ 30 sec
After engine = STARTED
Keyswitch = ON
Number of temperature sensors available ≥ 3 sensors
Engine control module off time ≥ 28,800 sec
None active: 175.3-SE104, 175.4-SE105

Malfunction Thresholds (all active):
|Oil temperature - temperature with lowest tolerance from remaining sensors| > (20 + lowest tolerance of remaining temperature sensors) ˚C
|Oil temperature - temperature with second lowest tolerance from remaining sensors| > (20 + second lowest tolerance of remaining temperature sensors) ˚C
|Temperature with lowest tolerance from remaining sensors - temperature with second lowest tolerance from remaining sensors| < (lowest tolerance of the remaining temperature sensors + second lowest tolerance of the remaining temperature sensors) ˚C
Tolerance of remaining temperature sensors are:
Air temperature sensor tolerance = 26 ˚C
Charge temperature sensor tolerance = 14 ˚C
Compressor inlet temperature sensor tolerance = 6 ˚C
Coolant temperature sensor tolerance = 12 ˚C
EGR orifice temperature sensor tolerance = 13 ˚C

1.72 DTC 175.3-SE104: Engine Oil Temperature Sensor 1 Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	175.3-SE104
Description	Engine Oil Temperature Sensor Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Oil temperature sensor value > 4.956 V (< -39.539 °C)

1.73 DTC 175.4-SE105: Engine Oil Temperature Sensor 1 Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	175.4-SE105
Description	Engine Oil Temperature Sensor Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Oil temperature sensor value < 0.108 V (> 150 °C)

1.74 DTC 188.16-SE3775: Engine Speed At Idle - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	188.16-SE3775
Description	Idle Engine Speed High
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
The engine is running out of fuel = FALSE
Transmission ≠ manual
(Datalink selected gear = GOOD
OR Datalink current gear status = GOOD)
Engine = IDLE
Engine running condition
Idle reference speed ≤ 900 RPM
Vehicle speed ≤ 0 mph
Current idle reference speed = previous idle reference speed
Transmission = manual
Clutch switch = ACTIVE
None active: 2623.3-SE1378, 2623.4-SE1379, 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 110.3-SE75, 110.4-SE76, 110.2-SE3668, 110.2-SE3669, 110.2-SE3805, 1323.11-SE12011, 1324.11-SE12012, 1325.11-SE12013, 1326.11-SE12014, 1327.11-SE12015, 1328.11-SE12016, 1323.16-SE12458, 1324.16-SE12459, 1325.16-SE12460, 1326.16-SE12461, 1327.16-SE12462, 1328.16-SE12463, 91.2-SE1380, 723.2-SE422, 723.2-SE415, 723.2-SE45, 612.2-SE460, 190.2-SE419, 190.2-SE417, 190.2-SE54, 723.7-SE389, 159.31-SE14391, 159.21-SE14412, 159.2-SE13721, 159.3-SE1986, 159.4-SE1987, 159.0-SE2051, 159.16-SE2050, 1390.20-SE13720, 1390.21-SE13718, 1322.11-SE12019, 1322.16-SE12464, 91.2-SE3200, 91.3-SE63, 91.4-SE64, 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995, 3464.6-SE2226, 3464.5-SE14289, 3464.4-SE2225, 3464.3-SE13641, 51.7-SE2312, 3464.0-SE2044, 3464.1-SE2046, 3673.2-SE2047, 84.2-SE4360, 84.2-SE4361, 84.2-SE130

Malfunction Thresholds (all active):
(Engine speed - idle reference speed > 100 RPM
FOR ≥ 30 sec
OR 188.16-SE3775 ≠ made a pass or fail decision
FOR ≥ 120 sec)

1.75 DTC 188.18-SE3781: Engine Speed At Idle - Data Valid But Below Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	188.18-SE3781
Description	Idle Engine Speed Low
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
The engine is running out of fuel = FALSE
Transmission ≠ manual
(Datalink selected gear = GOOD
OR Datalink current gear status = GOOD)
Engine = IDLE
Engine running condition
Idle reference speed ≤ 900 RPM
Vehicle speed ≤ 0 mph
Current idle reference speed = previous idle reference speed
Transmission = manual
Clutch switch = ACTIVE
None active: 2623.3-SE1378, 2623.4-SE1379, 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 110.3-SE75, 110.4-SE76, 110.2-SE3668, 110.2-SE3669, 110.2-SE3805, 1323.11-SE12011, 1324.11-SE12012, 1325.11-SE12013, 1326.11-SE12014, 1327.11-SE12015, 1328.11-SE12016, 1323.16-SE12458, 1324.16-SE12459, 1325.16-SE12460, 1326.16-SE12461, 1327.16-SE12462, 1328.16-SE12463, 91.2-SE1380, 723.2-SE422, 723.2-SE415, 723.2-SE45, 612.2-SE460, 190.2-SE419, 190.2-SE417, 190.2-SE54, 723.7-SE389, 159.31-SE14391, 159.21-SE14412, 159.2-SE13721, 159.3-SE1986, 159.4-SE1987, 159.0-SE2051, 159.16-SE2050, 1390.20-SE13720, 1390.21-SE13718, 1322.11-SE12019, 1322.16-SE12464, 91.2-SE3200, 91.3-SE63, 91.4-SE64, 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995, 3464.6-SE2226, 3464.5-SE14289, 3464.4-SE2225, 3464.3-SE13641, 51.7-SE2312, 3464.0-SE2044, 3464.1-SE2046, 3673.2-SE2047, 84.2-SE4360, 84.2-SE4361, 84.2-SE130

Malfunction Thresholds (all active):
(Idle reference speed - engine speed > 100 RPM
FOR ≥ 30 sec
OR 188.18-SE3781 ≠ made a pass or fail decision
FOR ≥ 120 sec)

1.76 DTC 190.2-SE54: Engine Crankshaft Speed/Position - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	190.2-SE54
Description	Crankshaft Sensor Expected Sync Gap Pulse
Monitor Execution	Continuous
Typical Monitoring Duration	6 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine speed > 100 RPM

Malfunction Thresholds (all active):
Absence of an expected synchronization gap in generated pulse signal waveform from crankshaft sensor.

1.77 DTC 190.2-SE417: Engine Crankshaft Speed/Position - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	190.2-SE417
Description	Crankshaft Sensor Loss of Pulses
Monitor Execution	Continuous
Typical Monitoring Duration	6 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine speed > 100 RPM
Camshaft tooth edge = DETECTED
None active: 3511.3-SE814, 3511.4-SE816

Malfunction Thresholds (all active):
(
(Engine speed ≥ 100 RPM
AND Engine speed < 200 RPM
AND Time since a pulse was seen on crankshaft sensor > 0.5 sec)
OR (Engine speed ≥ 200 RPM
AND Engine speed < 400 RPM
AND Time since a pulse was seen on crankshaft sensor > 0.25 sec)
OR (Engine speed ≥ 400 RPM
AND Time since a pulse was seen on crankshaft sensor > 0.125 sec)
)

1.78 DTC 190.2-SE419: Engine Crankshaft Speed/Position - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	190.2-SE419
Description	Crankshaft Intermittent Unexpected Sync Gap
Monitor Execution	Continuous
Typical Monitoring Duration	10 rev
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Crankshaft tooth edge = DETECTED
Engine speed > 1,200 RPM
None active: 190.2-SE417, 190.2-SE54

Malfunction Thresholds (all active):
Crankshaft tooth gap, as detected by crankshaft sensor, doesn't match expected sync gap location at most once every 2 crankshaft revolutions.

1.79 DTC 191.9-SE5110: Transmission Output Shaft Speed - Abnormal Update Rate

Monitor Summary:	
DTC	191.9-SE5110
Description	Transmission Output Shaft Speed Message not Received
Monitor Execution	Continuous
Typical Monitoring Duration	210 msec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Data links related faults are inhibited.

Malfunction Thresholds (all active):
Transmission output shaft speed message ≠ RECEIVED

1.80 DTC 191.19-SE5109: Transmission Output Shaft Speed - Received Network Data in Error

Monitor Summary:	
DTC	191.19-SE5109
Description	Transmission Output Shaft Speed Message "Not Available" or "Reserved" and no Alternative "Valid Signal" Available
Monitor Execution	Continuous
Typical Monitoring Duration	40 msec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Data links related faults are inhibited.

Malfunction Thresholds (all active):
Output shaft speed message = received as "Not Available" or "Reserved"
Alternative sources ≠ "valid signal"

1.81 DTC 237.13-SE7946: Vehicle Identification Number - Out of Calibration

Monitor Summary:	
DTC	237.13-SE7946
Description	VIN Unprogrammed
Monitor Execution	Continuous
Typical Monitoring Duration	0.02 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Time elapsed after power up ≥ 60 sec

Malfunction Thresholds (all active):
All values in VIN = ASCII 0 (HEX 30)

1.82 DTC 411.2-SE1911: Exhaust Gas Recirculation Differential Pressure - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	411.2-SE1911
Description	EGR Delta Pressure Sensor Erratic
Monitor Execution	Continuous
Typical Monitoring Duration	1 consecutive keyswitch off events
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine speed = 0 RPM
Keyswitch = OFF
Coolant temperature ≥ 67.781 °C
Intake manifold temperature ≥ 15.563 °C
EGR position ≤ 2 %
None active: 105.2-SE3793, 105.3-SE487, 105.4-SE488, 110.3-SE75, 110.4-SE76, 110.2-SE3668, 110.2-SE3669, 110.2-SE3805, 2791.15-SE4368, 2791.5-SE1825, 168.17-SE4367, 2791.6-SE1826, 2791.13-SE7321, 2791.13-SE7322, 27.4-SE1796, 27.2-SE3633, 27.2-SE3635, 411.3-SE485, 411.4-SE483, 105.2-SE8976

Malfunction Thresholds (all active):
|EGR delta pressure sensor| ≥ 1.5 kPa(absolute)

1.83 DTC 411.3-SE485: Exhaust Gas Recirculation Differential Pressure Sensor Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	411.3-SE485
Description	EGR Delta Pressure Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	8 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
EGR delta pressure > 4.716 V (36.271 kPa(absolute))

1.84 DTC 411.4-SE483: Exhaust Gas Recirculation Differential Pressure Sensor Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	411.4-SE483
Description	EGR Delta Pressure Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	8 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
EGR delta pressure < 0.279 V (-7.178 kPa(absolute))

1.85 DTC 411.16-SE13879: Exhaust Gas Recirculation Differential Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	411.16-SE13879
Description	EGR Delta Pressure High
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine has still not exited fuel cut after a motoring event = FALSE
Engine state = RUN
EGR position < 4 %
None active: 102.2-SE4439, 2791.15-SE4368, 2791.5-SE1825, 168.17-SE4367, 2791.6-SE1826, 2791.13-SE7321, 2791.13-SE7322, 27.4-SE1796, 27.2-SE3633, 27.2-SE3635, 411.3-SE485, 411.4-SE483, 411.2-SE1911, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 102.16-SE2323, 102.18-SE2324, 102.3-SE1999, 102.4-SE2000, 102.2-SE13766, 102.2-SE9037, 102.2-SE15429

Malfunction Thresholds (all active):
EGR delta pressure > 25 kPa(absolute)

1.86 DTC 411.18-SE13880: Exhaust Gas Recirculation Differential Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	411.18-SE13880
Description	EGR Delta Pressure Low
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine has still not exited fuel cut after a motoring event = FALSE
Engine state = RUN
None active: 102.2-SE4439, 2791.15-SE4368, 2791.5-SE1825, 168.17-SE4367, 2791.6-SE1826, 2791.13-SE7321, 2791.13-SE7322, 27.4-SE1796, 27.2-SE3633, 27.2-SE3635, 411.3-SE485, 411.4-SE483, 411.2-SE1911, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 102.16-SE2323, 102.18-SE2324, 102.3-SE1999, 102.4-SE2000, 102.2-SE13766, 102.2-SE9037, 102.2-SE15429

Malfunction Thresholds (all active):
EGR delta pressure < [Table of values] kPa(absolute)

1.87 DTC 412.2-SE3872: Exhaust Gas Recirculation Temperature - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	412.2-SE3872
Description	EGR Orifice Temperature Sensor Reading Erratic, Intermittent, or Incorrect
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec within a 3 sec window.
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Temperature drop detected on coolant temperature sensor ≤ 1.2 ˚C
FOR ≥ 30 sec
After engine = STARTED
Keyswitch = ON
Number of temperature sensors available ≥ 3 sensors
Engine control module off time ≥ 28,800 sec

Malfunction Thresholds (all active):
|EGR orifice temperature - temperature with lowest tolerance from remaining sensors| > (13 + lowest tolerance of remaining temperature sensors) ˚C
|EGR orifice temperature - temperature with second lowest tolerance from remaining sensors| > (13 + second lowest tolerance of remaining temperature sensors) ˚C
|Temperature with lowest tolerance from remaining sensors - temperature with second lowest tolerance from remaining sensors| < (lowest tolerance of the remaining temperature sensors + second lowest tolerance of the remaining temperature sensors) ˚C
Tolerance of remaining temperature sensors are:
Air temperature sensor tolerance = 26 ˚C
Charge temperature sensor tolerance = 14 ˚C
Compressor inlet temperature sensor tolerance = 6 ˚C
Coolant temperature sensor tolerance = 12 ˚C
Oil temperature sensor tolerance = 20 ˚C

1.88 DTC 412.2-SE8978: Exhaust Gas Recirculation Temperature - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	412.2-SE8978
Description	EGR Outlet Temperature Stuck In Range
Monitor Execution	Continuous
Typical Monitoring Duration	200 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
Engine state = RUN
Net engine torque < 400 Nm
Net engine torque > 600 Nm
None active: 412.2-SE9362, 412.3-SE1964, 412.4-SE1965, 412.2-SE3872

Malfunction Thresholds (all active):
Change in EGR outlet temperature < 1.5 °C
When:
(Net engine torque > 600 Nm
FOR Cumulative time ≥ 100 sec
AND Net engine torque < 400 Nm
FOR Cumulative time ≥ 100 sec)

1.89 DTC 412.2-SE9362: Exhaust Gas Recirculation Temperature - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	412.2-SE9362
Description	EGR Outlet Temperature Low
Monitor Execution	Continuous
Typical Monitoring Duration	0.02 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
Keyswitch = OFF
(EGR outlet temperature ≥ -40 ˚C
AND Net engine torque ≥ 600 Nm
FOR ≥ 100 sec)
None active: 110.3-SE75, 110.4-SE76, 110.2-SE3668, 110.2-SE3669, 412.3-SE1964, 412.4-SE1965, 412.2-SE8978, 412.2-SE3872

Malfunction Thresholds (all active):
Maximum value of EGR outlet temperature < -20 ˚C

1.90 DTC 412.3-SE1964: Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	412.3-SE1964
Description	EGR Outlet Temperature Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
EGR outlet temperature > 4.756 V (< 38.821 °C)

1.91 DTC 412.4-SE1965: Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	412.4-SE1965
Description	EGR Outlet Temperature Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
EGR outlet temperature < 0.097 V (> 255 °C)

1.92 DTC 412.16-SE2055: Exhaust Gas Recirculation Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	412.16-SE2055
Description	EGR Outlet Temperature High
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine speed ≥ 400 RPM
None active: 412.2-SE9362, 412.3-SE1964, 412.4-SE1965, 412.2-SE8978, 412.2-SE3872

Malfunction Thresholds (all active):
EGR outlet temperature ≥ 160 ˚C

1.93 DTC 558.9-SE709: Accelerator Pedal or Lever Idle Validation Switch - Abnormal Update Rate

Monitor Summary:	
DTC	558.9-SE709
Description	Accelerator Pedal 1 Low Idle Switch Message not Received
Monitor Execution	Continuous
Typical Monitoring Duration	260 msec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Data links related faults are inhibited.

Malfunction Thresholds (all active):
Accelerator pedal 1 low idle switch message ≠ RECEIVED

1.94 DTC 558.19-SE5333: Accelerator Pedal or Lever Idle Validation Switch - Received Network Data in Error

Monitor Summary:	
DTC	558.19-SE5333
Description	Accelerator Pedal 1 Low Idle Switch Message Indicates Error
Monitor Execution	Continuous
Typical Monitoring Duration	5 msec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Accelerator pedal 1 low idle switch message = J1939 error

1.95 DTC 609.1-SE14249: Fuel Control Module Circuit Voltage - Data Valid But Below Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	609.1-SE14249
Description	Continuous Flow Valve (CFV) Smart Fuel Control Module Supply Voltage Low
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec for first decision after keyswitch on and 0.5 sec subsequently
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON
None active: 168.1-SE17602, 609.9-SE17604, 609.1-SE17603

Malfunction Thresholds (all active):
CFV actuator supply voltage < 6 V

1.96 DTC 609.1-SE17603: Fuel Control Module Circuit Voltage - Data Valid But Below Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	609.1-SE17603
Description	TriCAN Smart sensor and Continuous Flow Valve (CFV) Smart Fuel Control Module lost power to microprocessor and unable to communicate
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Not active: 168.1-SE17602

Malfunction Thresholds (all active):
(TriCAN smart sensor message ≠ RECEIVED
AND CFV smart fuel control module message ≠ RECEIVED
FOR ≥ 30 sec
When Keyswitch = ON
FOR ≥ 7.2 sec
WHEN Engine State = CRANK
FOR ≥ 0.6 sec
WHEN Engine State = RUN)

1.97 DTC 609.1-SE17606: Fuel Control Module Circuit Voltage - Data Valid But Below Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	609.1-SE17606
Description	Continuous Flow Valve (CFV) Smart Fuel Control Module actuator power interrupt
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
CFV actuator supply voltage = INTERRUPTED

1.98 DTC 609.2-SE14238: Fuel Control Module - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	609.2-SE14238
Description	Continuous Flow Valve (CFV) Internal Microcontroller Failure
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON
None active: 168.1-SE17602, 609.9-SE17604, 609.1-SE17603

Malfunction Thresholds (all active):
(CFV Execution loop = FAILURE
OR CFV A2D converter = FAILURE
OR CFV Micro-controller interrupt = FAILURE
OR CFV microprocessor computational operation process = TIMEOUT
OR CFV EEPROM = FAILURE)

1.99 DTC 609.2-SE14410: Fuel Control Module - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	609.2-SE14410
Description	Continuous Flow Valve (CFV) Smart Fuel Control Module Actuating Low
Monitor Execution	Continuous
Typical Monitoring Duration	CUSUM malfunction criteria needs to stay true for ≥ 0.02 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
The engine is running out of fuel = FALSE
Engine has still not exited fuel cut after a motoring event = FALSE
FOR ≥ 0.02 sec
(Engine = RUN
FOR ≥ 0.02 sec
OR Engine = BRAKE
FOR ≥ 0.02 sec)
Commanded fuel system gas mass flow > 0.1 kg/min
Filtered commanded fuel system gas mass flow ≤ [Table of values] (unitless)
None active: 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 1390.3-SE14241, 1390.4-SE14242, 174.3-SE14246, 174.4-SE14245, 609.2-SE14238, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 159.31-SE14391, 159.0-SE2051, 159.16-SE2050, 1390.20-SE13720, 1390.18-SE2041, 1390.21-SE13718, 1390.1-SE2640, 632.11-SE14825, 632.14-SE17550

Malfunction Thresholds (all active):
Ratio of ((commanded - estimated)/commanded) CFV fuel system gas mass flow is ever ≥ (25 - diagnostic tolerance) (unitless)
Where:
Diagnostic tolerance = [Table of values] (unitless)

1.100 DTC 609.9-SE17604: Fuel Control Module - Abnormal Update Rate

Monitor Summary:	
DTC	609.9-SE17604
Description	Continuous Flow Valve (CFV) Smart Fuel Control Module Message not Received
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
None active: 168.1-SE17602, 4490.9-SE6970

Malfunction Thresholds (all active):
CFV smart fuel control module message ≠ RECEIVED
FOR ≥ 30 sec
When Keyswitch = ON
FOR ≥ 7.2 sec
WHEN Engine State = CRANK
FOR ≥ 0.6 sec
WHEN Engine State = RUN

1.101 DTC 609.9-SE17605: Fuel Control Module - Abnormal Update Rate

Monitor Summary:	
DTC	609.9-SE17605
Description	Continuous Flow Valve (CFV) Smart Fuel Control Module actuator timeout
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
CFV experienced Timeout

1.102 DTC 609.12-SE14239: Fuel Control Module - Bad Intelligent Device or Component

Monitor Summary:	
DTC	609.12-SE14239
Description	Continuous Flow Valve (CFV) First Stage Actuator Shorted High
Monitor Execution	Continuous
Typical Monitoring Duration	X sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON
None active: 168.1-SE17602, 609.9-SE17604, 609.1-SE17603

Malfunction Thresholds (all active):
(Low side current in CFV first stage actuator > X A
OR High side current in CFV first stage actuator > X A)

1.103 DTC 609.12-SE14240: Fuel Control Module - Bad Intelligent Device or Component

Monitor Summary:	
DTC	609.12-SE14240
Description	Continuous Flow Valve (CFV) First Stage Actuator Shorted Low
Monitor Execution	Continuous
Typical Monitoring Duration	X sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON
Commanded fuel system gas mass flow ≥ 0.1 kg/min
None active: 168.1-SE17602, 609.9-SE17604, 609.1-SE17603

Malfunction Thresholds (all active):
|CFV first stage actuator current| < X A

1.104 DTC 609.12-SE14243: Fuel Control Module - Bad Intelligent Device or Component

Monitor Summary:	
DTC	609.12-SE14243
Description	Continuous Flow Valve (CFV) Second Stage Actuator Shorted High
Monitor Execution	Continuous
Typical Monitoring Duration	X sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON
None active: 168.1-SE17602, 609.9-SE17604, 609.1-SE17603

Malfunction Thresholds (all active):
(Low side current in CFV second stage actuator > X A
OR High side current in CFV second stage actuator > X A)

1.105 DTC 609.12-SE14244: Fuel Control Module - Bad Intelligent Device or Component

Monitor Summary:	
DTC	609.12-SE14244
Description	Continuous Flow Valve (CFV) Second Stage Actuator Shorted Low
Monitor Execution	Continuous
Typical Monitoring Duration	X sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON
Commanded fuel system gas mass flow ≥ 0.1 kg/min
None active: 168.1-SE17602, 609.9-SE17604, 609.1-SE17603

Malfunction Thresholds (all active):
|CFV second stage actuator current| < X A

1.106 DTC 609.12-SE14247: Fuel Control Module - Bad Intelligent Device or Component

Monitor Summary:	
DTC	609.12-SE14247
Description	Continuous Flow Valve (CFV) Smart Fuel Control Module Second Stage Actuator Position Sensor System Failure
Monitor Execution	Continuous
Typical Monitoring Duration	X sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON
None active: 168.1-SE17602, 609.9-SE17604, 609.1-SE17603

Malfunction Thresholds (all active):
(
Any of the six position sensor element > X V
OR Any of the six position sensor element < X V
OR Differential voltage of any given pair of six position sensors > X V
OR Differential voltage of any given pair of six position sensors < X V
OR Linear Least Squares (LLS) of any of the six position sensor voltage residual > X (unitless)
OR Normalized magnet strength of any of the six position sensor > X %
OR Normalized magnet strength of any of the six position sensor < X %
)

1.107 DTC 609.12-SE14411: Fuel Control Module - Bad Intelligent Device or Component

Monitor Summary:	
DTC	609.12-SE14411
Description	Continuous Flow Valve (CFV) Smart Fuel Control Module Actuating High
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
The engine is running out of fuel = FALSE
Engine has still not exited fuel cut after a motoring event = FALSE
FOR ≥ 0.02 sec
(Engine = RUN
FOR ≥ 0.02 sec
OR Engine = BRAKE
FOR ≥ 0.02 sec)
Commanded fuel system gas mass flow > 0.1 kg/min
Filtered commanded fuel system gas mass flow ≤ [Table of values] (unitless)
None active: 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 1390.3-SE14241, 1390.4-SE14242, 174.3-SE14246, 174.4-SE14245, 609.2-SE14238, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 159.31-SE14391, 159.0-SE2051, 159.16-SE2050, 1390.20-SE13720, 1390.18-SE2041, 1390.21-SE13718, 1390.1-SE2640, 632.11-SE14825, 632.14-SE17550

Malfunction Thresholds (all active):
Ratio of ((estimated - commanded)/estimated) CFV fuel system gas mass flow is ever ≥ (25 - diagnostic tolerance) (unitless)
Where:
Diagnostic tolerance = [Table of values] (unitless)

1.108 DTC 612.2-SE460: Engine Magnetic Speed/Position Lost Both of Two Signals - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	612.2-SE460
Description	Crankshaft Sensor and Camshaft Sensor Complete Loss of Pulses
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Battery voltage ≥ 10.5 V

Malfunction Thresholds (all active):
(Crankshaft pulse signals ≠ DETECTED
OR Crankshaft sync signal ≠ DETECTED
OR Camshaft half cycle = UNKNOWN)
(Camshaft pulse signals ≠ DETECTED
OR Camshaft sync signal ≠ DETECTED
OR Engine is turning in reverse direction)
At least one of two sensors (crankshaft sensor and camshaft sensor) has pulse signal

1.109 DTC 629.12-SE33: Engine Control Module Critical Internal Failure - Bad Intelligent Device or Component

Monitor Summary:	
DTC	629.12-SE33
Description	ECM RAM Image Error
Monitor Execution	Continuous
Typical Monitoring Duration	0.04 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Checksum of the flash data block ≠ checksum of its RAM imaged data block on a separate occurrences

1.110 DTC 629.12-SE216: Engine Control Module Critical Internal Failure - Bad Intelligent Device or Component

Monitor Summary:	
DTC	629.12-SE216
Description	Non Volatile Memory Error
Monitor Execution	Continuous
Typical Monitoring Duration	0.04 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Data written to non volatile memory ≠ SAVED

1.111 DTC 629.12-SE217: Engine Control Module Warning Internal Hardware Failure - Bad Intelligent Device or Component

Monitor Summary:	
DTC	629.12-SE217
Description	Power Off Error
Monitor Execution	Continuous
Typical Monitoring Duration	0.04 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
ECM stays powered on after the ignition = OFF

1.112 DTC 629.12-SE5344: Engine Control Module Critical Internal Failure - Bad Intelligent Device or Component

Monitor Summary:	
DTC	629.12-SE5344
Description	Fuel System ASIC Clock Frequency Error
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Internal oscillator, used as ECM fuel system ASIC clock, is oscillating at a frequency < 7,812.5 Hz

1.113 DTC 630.12-SE5340: Engine Control Module Calibration Memory - Bad Intelligent Device or Component

Monitor Summary:	
DTC	630.12-SE5340
Description	Mismatched Data between Non Volatile Memory and RAM Image
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Data in flash memory ≠ image in RAM
FOR = 125 counts

1.114 DTC 632.3-SE2284: Engine Fuel Shutoff Valve Driver Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	632.3-SE2284
Description	Fuel Shutoff Valve Driver Shorted High
Monitor Execution	Continuous
Typical Monitoring Duration	0.08 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Fuel shutoff valve commanded = OFF

Malfunction Thresholds (all active):
Fuel shutoff valve driver ≥ 12 V

1.115 DTC 632.4-SE2285: Engine Fuel Shutoff Valve Driver Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	632.4-SE2285
Description	Fuel Shutoff Valve Driver Shorted Low
Monitor Execution	Continuous
Typical Monitoring Duration	0.08 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Fuel shutoff valve commanded = ON

Malfunction Thresholds (all active):
Fuel shutoff valve driver = 0 V

1.116 DTC 632.11-SE14825: Engine Fuel Shutoff Valve Feedback Position Does Not Match Desired - Root Cause Not Known

Monitor Summary:	
DTC	632.11-SE14825
Description	Fuel Shutoff Valve Stuck Closed
Monitor Execution	Continuous
Typical Monitoring Duration	0.8 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine state = CRANK
Engine state = CRANK
FOR ≥ 1.4 sec
Fuel inlet pressure ≥ 480 kPa(absolute)
FOR ≥ 1.4 sec
None active: 168.1-SE17602, 609.9-SE17604, 609.1-SE17603, 102.2-SE4439, 159.31-SE14391, 159.21-SE14412, 159.2-SE13721, 159.3-SE1986, 159.4-SE1987, 1390.20-SE13720, 1390.21-SE13718, 632.3-SE2284, 632.4-SE2285, 102.16-SE2323, 102.18-SE2324, 102.3-SE1999, 102.4-SE2000, 102.2-SE13766, 102.2-SE9037, 102.2-SE15429

Malfunction Thresholds (all active):
Fuel outlet pressure - intake manifold pressure < 20 kPa(absolute)

1.117 DTC 632.14-SE17550: Engine Fuel Shutoff 1 Control - Special Instructions

Monitor Summary:	
DTC	632.14-SE17550
Description	Fuel Shutoff Valve Stuck Closed
Monitor Execution	Continuous
Typical Monitoring Duration	2 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Commanded mass gas flow > 0 kg/min
Engine has still not exited fuel cut after a motoring event = FALSE
FOR ≥ 0.06 sec
The engine is running out of fuel = FALSE
None active: 168.1-SE17602, 609.9-SE17604, 609.1-SE17603, 102.2-SE4439, 159.31-SE14391, 159.21-SE14412, 159.2-SE13721, 159.3-SE1986, 159.4-SE1987, 159.0-SE2051, 159.16-SE2050, 1390.20-SE13720, 1390.18-SE2041, 1390.21-SE13718, 1390.1-SE2640, 632.3-SE2284, 632.4-SE2285, 632.11-SE14825, 102.16-SE2323, 102.18-SE2324, 102.3-SE1999, 102.4-SE2000, 102.2-SE13766, 102.2-SE9037, 102.2-SE15429

Malfunction Thresholds (all active):
Intake Manifold Pressure/Fuel Outlet Pressure > 0.85 (ratio)

1.118 DTC 723.2-SE45: Engine Camshaft Speed/Position Sensor - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	723.2-SE45
Description	Camshaft Sensor Expected Missing Sync Tooth
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine speed > 100 RPM

Malfunction Thresholds (all active):
Absence of sync tooth pulse in generated pulse signal waveform from camshaft sensor

1.119 DTC 723.2-SE415: Engine Camshaft Speed/Position Sensor - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	723.2-SE415
Description	Camshaft Sensor Loss of Pulses
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine speed > 100 RPM
Crankshaft tooth edge = DETECTED
None active: 3510.3-SE119, 3510.4-SE101

Malfunction Thresholds (all active):
(
(Engine speed ≥ 100 RPM
AND Engine speed < 200 RPM
AND Time since a pulse was seen on camshaft sensor > 0.4 sec)
OR (Engine speed ≥ 200 RPM
AND Engine speed < 400 RPM
AND Time since a pulse was seen on camshaft sensor > 0.2 sec)
OR (Engine speed ≥ 400 RPM
AND Time since a pulse was seen on camshaft sensor > 0.1 sec)
)

1.120 DTC 723.2-SE422: Engine Camshaft Speed/Position Sensor - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	723.2-SE422
Description	Camshaft Pulse Signal for Intermittent Unexpected Sync Tooth
Monitor Execution	Continuous
Typical Monitoring Duration	20 rev
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Camshaft tooth edge = DETECTED
Engine speed > 1,200 RPM
None active: 723.2-SE415, 723.2-SE45

Malfunction Thresholds (all active):
Camshaft sync tooth, as detected by camshaft sensor, doesn't match expected sync tooth location at most once every 2 camshaft revolutions.

1.121 DTC 723.7-SE389: Engine Speed/Position Camshaft and Crankshaft Misalignment - Mechanical System Not Responding or Out of Adjustment

Monitor Summary:	
DTC	723.7-SE389
Description	Phase Misalignment Between Engine Crankshaft and Camshaft Targets
Monitor Execution	Continuous
Typical Monitoring Duration	60 rev
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine speed > 100 RPM
Engine speed ≤ 1,200 RPM

Malfunction Thresholds (all active):
(Difference between detected and expected backup sync tooth location < -2 counts
OR Difference between detected and expected backup sync tooth location > 2 counts)

1.122 DTC 725.3-SE2264: Ignition Control Signal Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	725.3-SE2264
Description	Spark Reference Control Line Shorted High
Monitor Execution	Continuous
Typical Monitoring Duration	309 msec WHERE engine speed = 0 RPM OR 3 cam revs WHERE engine = RUNNING.
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON
FOR ≥ 3,200 msec

Malfunction Thresholds (all active):
Spark reference line > X V

1.123 DTC 725.4-SE2265: Ignition Control Signal Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	725.4-SE2265
Description	Spark Reference Control Line Shorted Low
Monitor Execution	Continuous
Typical Monitoring Duration	309 msec WHERE engine speed = 0 RPM OR 3 cam revs WHERE engine = RUNNING.
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON
FOR ≥ 3,200 msec

Malfunction Thresholds (all active):
Spark reference line < X V

1.124 DTC 726.3-SE2262: Ignition Timing Signal Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	726.3-SE2262
Description	Spark Timing Control Line Shorted High
Monitor Execution	Continuous
Typical Monitoring Duration	1,236 msec WHERE engine speed = 0 RPM OR 12 cam revs WHERE engine = RUNNING.
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON
FOR ≥ 3,200 msec

Malfunction Thresholds (all active):
Spark timing line > X V

1.125 DTC 726.4-SE2263: Ignition Timing Signal Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	726.4-SE2263
Description	Spark Timing Control Line Shorted Low
Monitor Execution	Continuous
Typical Monitoring Duration	1,236 msec WHERE engine speed = 0 RPM OR 12 cam revs WHERE engine = RUNNING
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON
FOR ≥ 3,200 msec

Malfunction Thresholds (all active):
Spark timing line < X V

1.126 DTC 1127.2-SE9036: Engine Turbocharger 1 Boost Pressure - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	1127.2-SE9036
Description	Compressor Outlet Pressure Stuck In Range
Monitor Execution	Continuous
Typical Monitoring Duration	600 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine state = RUN
Net engine torque > 400 Nm
Net engine torque < 200 Nm
None active: 1127.2-SE13700, 1127.3-SE1996, 1127.4-SE1998, 1127.2-SE15430

Malfunction Thresholds (all active):
Change in compressor outlet pressure < 6.5 kPa(absolute)
When:
(Net engine torque > 400 Nm
FOR Cumulative time ≥ 300 sec
AND Net engine torque < 200 Nm
FOR Cumulative time ≥ 300 sec)

1.127 DTC 1127.2-SE13700: Engine Turbocharger 1 Boost Pressure - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	1127.2-SE13700
Description	Compressor Outlet Pressure Sensor Reading Erratic, Intermittent, or Incorrect at Keyswitch Off
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec within a 5 sec window.
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Coolant temperature > 70 °C
Engine = STOPPED
Number of pressure sensors available ≥ 3 sensors
Exhaust pressure sensor tube icing ≠ ACTIVE
Keyswitch = OFF
FOR ≥ 30 sec
None active: 1127.3-SE1996, 1127.4-SE1998

Malfunction Thresholds (all active):
(
Compressor outlet pressure sensor reading < 17 kPa(absolute)
OR Compressor outlet pressure sensor reading > 145 kPa(absolute)
OR (
|Compressor outlet pressure - pressure with lowest tolerance from remaining sensors| > (18.31 + lowest tolerance of remaining pressure sensors) kPa(absolute)
AND |Compressor outlet pressure - pressure with second lowest tolerance from remaining sensors| > (18.31 + second lowest tolerance of remaining pressure sensors) kPa(absolute)
AND |Pressure with lowest tolerance from remaining sensors - pressure with second lowest tolerance from remaining sensors| < (lowest tolerance of remaining pressure sensors + second lowest tolerance of remaining pressure sensors) kPa(absolute)
)
)
Tolerance of remaining pressure sensors are:
Charge pressure sensor tolerance = 12 kPa(absolute)
Compressor inlet pressure sensor tolerance = 5.81 kPa(absolute)
EGR orifice pressure sensor tolerance = 28.63 kPa(absolute)
Exhaust pressure sensor tolerance = 28.78 kPa(absolute)
Oil pressure sensor tolerance = 29.44 kPa(absolute)

1.128 DTC 1127.2-SE15430: Engine Turbocharger 1 Boost Pressure - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	1127.2-SE15430
Description	Compressor Outlet Pressure Sensor Keyswitch On Pressure Check Error
Monitor Execution	Continuous
Typical Monitoring Duration	As soon as engine enters CRANK state OR 10 sec at keyswitch on
MIL Activation Criteria	2 trips

Entry Conditions (all active):
None active: 1127.2-SE13700, 1127.20-SE14591, 1127.3-SE1996, 1127.4-SE1998, 1127.2-SE9036

Malfunction Thresholds (all active):
(
(
|Compressor outlet pressure - compressor inlet pressure| ≥ 10 kPa(absolute)
AND |Compressor outlet pressure - intake manifold pressure| ≥ 12 kPa(absolute)
)
OR |Compressor outlet pressure - compressor inlet pressure| ≥ 10 kPa(absolute)
When:
Intake manifold pressure = UNAVAILABLE
OR |Compressor outlet pressure - intake manifold pressure| ≥ 12 kPa(absolute)
When:
Compressor inlet pressure = UNAVAILABLE
OR Compressor outlet pressure > 150 kPa(absolute)
OR Compressor outlet pressure < 45 kPa(absolute)
)

1.129 DTC 1127.3-SE1996: Engine Turbocharger 1 Boost Pressure Sensor - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	1127.3-SE1996
Description	Compressor Outlet Pressure Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Compressor outlet pressure > 4.7 V (526.56 kPa(absolute))

1.130 DTC 1127.4-SE1998: Engine Turbocharger 1 Boost Pressure Sensor - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	1127.4-SE1998
Description	Compressor Outlet Pressure Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Compressor outlet pressure < 0.25 V (35.38 kPa(absolute))

1.131 DTC 1127.20-SE14591: Engine Turbocharger 1 Boost Pressure - Data Not Rational - Drifted High

Monitor Summary:	
DTC	1127.20-SE14591
Description	Compressor Outlet Pressure High
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
(Engine state = RUN
OR Engine state = BRAKE)
None active: 1127.3-SE1996, 1127.4-SE1998

Malfunction Thresholds (all active):
Compressor outlet pressure > 450 kPa(absolute)

1.132 DTC 1172.2-SE4746: Turbocharger 1 Compressor Intake Temperature - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	1172.2-SE4746
Description	Compressor Inlet Temperature Sensor Reading Erratic, Intermittent, or Incorrect
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec within a 3 sec window.
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Temperature drop detected on coolant temperature sensor ≤ 1.2 °C
FOR ≥ 30 sec
After engine = STARTED
Keyswitch = ON
Number of temperature sensors available ≥ 3 sensors
Engine control module off time ≥ 28,800 sec

Malfunction Thresholds (all active):
|Compressor inlet temperature sensor - temperature with lowest tolerance from remaining sensors| > (6 + lowest tolerance of remaining temperature sensors) °C
|Compressor inlet temperature sensor - temperature with second lowest tolerance from remaining sensors| > (6 + second lowest tolerance of remaining temperature sensors) °C
|Temperature with lowest tolerance from remaining sensors - temperature with second lowest tolerance from remaining sensors| < (lowest tolerance of remaining temperature sensors + second lowest tolerance of remaining temperature sensors) °C
Tolerance of remaining temperature sensors are:
Air temperature sensor tolerance = 26 °C
Charge temperature sensor tolerance = 14 °C
Coolant temperature sensor tolerance = 12 °C
EGR orifice temperature sensor tolerance = 13 °C
Oil temperature sensor tolerance = 20 °C

1.133 DTC 1172.16-SE13693: Turbocharger 1 Compressor Intake Temperature - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	1172.16-SE13693
Description	Compressor Inlet Temperature TriCAN sensor In Range High
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine speed > 600 RPM
FOR ≥ 30 sec
Engine is motoring and experiencing fuel cut = FALSE
None active: 1172.2-SE4746, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
Compressor inlet temperature > 80 °C

1.134 DTC 1172.18-SE13694: Turbocharger 1 Compressor Intake Temperature - Data Valid But Below Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	1172.18-SE13694
Description	Compressor Inlet Temperature TriCAN sensor In Range Low
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Coolant temperature ≥ 70 ˚C
FOR ≥ 300 sec
Engine speed > 600 RPM
FOR ≥ 30 sec
Engine is motoring and experiencing fuel cut = FALSE
None active: 1172.2-SE4746, 110.3-SE75, 110.4-SE76, 110.2-SE3668, 110.2-SE3669, 3060.18-SE12227, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
Compressor inlet temperature < -25 ˚C

1.135 DTC 1176.2-SE8802: Turbocharger 1 Compressor Intake Pressure - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	1176.2-SE8802
Description	Compressor Inlet Pressure Sensor Reading Erratic, Intermittent, or Incorrect at Keyswitch Off
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec within a 5 sec window.
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Coolant temperature > 70 °C
Engine = STOPPED
Number of pressure sensors available ≥ 3 sensors
Exhaust pressure sensor tube icing ≠ ACTIVE
Keyswitch = OFF
FOR ≥ 30 sec
Not active: 4490.9-SE6970

Malfunction Thresholds (all active):
(
Compressor inlet pressure sensor reading < 17 kPa(absolute)
OR Compressor inlet pressure sensor reading > 145 kPa(absolute)
OR (
|Compressor inlet pressure - pressure with lowest tolerance from remaining sensors| > (5.81 + lowest tolerance of remaining pressure sensors) kPa(absolute)
AND |Compressor inlet pressure - pressure with second lowest tolerance from remaining sensors| > (5.81 + second lowest tolerance of remaining pressure sensors) kPa(absolute)
AND |Pressure with lowest tolerance from remaining sensors - pressure with second lowest tolerance from remaining sensors| < (lowest tolerance of remaining pressure sensors + second lowest tolerance of remaining pressure sensors) kPa(absolute)
)
)
Tolerance of remaining pressure sensors are:
Charge pressure sensor tolerance = 12 kPa(absolute)
Compressor outlet pressure sensor tolerance = 18.31 kPa(absolute)
EGR orifice pressure sensor tolerance = 28.63 kPa(absolute)
Exhaust pressure sensor tolerance = 28.78 kPa(absolute)
Oil pressure sensor tolerance = 29.44 kPa(absolute)

1.136 DTC 1176.2-SE15431: Turbocharger 1 Compressor Intake Pressure - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	1176.2-SE15431
Description	Compressor Inlet Pressure Sensor Keyswitch On Pressure Check Error
Monitor Execution	Continuous
Typical Monitoring Duration	As soon as engine enters CRANK state OR 10 sec at keyswitch on
MIL Activation Criteria	2 trips

Entry Conditions (all active):
None active: 1176.2-SE8802, 1176.18-SE14522, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
(
(
|Compressor inlet pressure - compressor outlet pressure| ≥ 10 kPa(absolute)
AND |Compressor inlet pressure - intake manifold pressure| ≥ 10 kPa(absolute)
)
OR |Compressor inlet pressure - compressor outlet pressure| ≥ 10 kPa(absolute)
When:
Intake manifold pressure = UNAVAILABLE
OR |Compressor inlet pressure - intake manifold pressure| ≥ 10 kPa(absolute)
When:
Compressor outlet pressure = UNAVAILABLE
OR Compressor inlet pressure > 150 kPa(absolute)
OR Compressor inlet pressure < 45 kPa(absolute)
)

1.137 DTC 1176.18-SE14522: Turbocharger 1 Compressor Intake Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	1176.18-SE14522
Description	Compressor Inlet Pressure TriCAN sensor Low
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
None active: 1176.2-SE8802, 1176.2-SE15431, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
Compressor inlet pressure < 47.5 kPa(absolute)

1.138 DTC 1180.3-SE2026: Turbocharger 1 Turbine Intake Temperature - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	1180.3-SE2026
Description	Turbine Inlet Temperature Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine state = RUN
Time since engine start ≥ 1 sec
Engine is motoring and experiencing fuel cut = FALSE
FOR ≥ 2 sec

Malfunction Thresholds (all active):
Turbine inlet temperature > 4.941 V (< 151.744 ˚C)

1.139 DTC 1180.4-SE2027: Turbocharger 1 Turbine Intake Temperature - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	1180.4-SE2027
Description	Turbine Inlet Temperature Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Turbine inlet temperature < 0.059 (> 1,000 °C)

1.140 DTC 1180.15-SE13882: Turbocharger 1 Turbine Intake Temperature - Data Valid But Above Normal Operating Range - Least Severe Level

Monitor Summary:	
DTC	1180.15-SE13882
Description	Turbine Inlet Temperature High
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine off time ≥ 28,800 sec
None active: 1180.3-SE2026, 1180.4-SE2027

Malfunction Thresholds (all active):
Average of turbine inlet temperature ≥ 100 °C
At keyswitch = ON
Over Samples = 50

1.141 DTC 1180.18-SE13881: Engine Turbocharger 1 Turbine Intake Temperature - Data Valid But Below Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	1180.18-SE13881
Description	Turbine Inlet Temperature Low
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine off time ≥ 28,800 sec
Engine state = RUN
FOR ≥ 15 sec
Engine has still not exited fuel cut after a motoring event = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
The engine is running out of fuel = FALSE
None active: 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 609.12-SE14411, 609.2-SE14410, 609.9-SE17604, 609.1-SE17603, 609.1-SE14249, 1390.20-SE13720, 1390.18-SE2041, 1390.1-SE2640, 1180.3-SE2026, 1180.4-SE2027

Malfunction Thresholds (all active):
Average of turbine inlet temperature < 125 °C
Over Samples = 250

1.142 DTC 1188.3-SE573: Turbocharger 1 Wastegate Control Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	1188.3-SE573
Description	Wastegate Control Valve Actuator Driver Voltage Shorted High
Monitor Execution	Continuous
Typical Monitoring Duration	2 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Wastegate control valve actuator control output line voltage ≥ 12 V
When:
PWM waveform = OFF

1.143 DTC 1188.4-SE574: Engine Turbocharger Wastegate Actuator 1 Position Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	1188.4-SE574
Description	Wastegate Control Valve Actuator Driver Voltage Shorted Low
Monitor Execution	Continuous
Typical Monitoring Duration	2 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Wastegate control valve actuator control output line voltage ≤ 0 V
When:
PWM waveform = ON

1.144 DTC 1209.2-SE4442: Exhaust Gas Pressure 1 - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	1209.2-SE4442
Description	Exhaust Pressure Sensor Reading Erratic, Intermittent, or Incorrect at Keyswitch Off
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec within a 5 sec window.
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Coolant temperature > 70 °C
Engine = STOPPED
Number of pressure sensors available ≥ 3 sensors
Exhaust pressure sensor tube icing ≠ ACTIVE
Keyswitch = OFF
FOR ≥ 30 sec
None active: 1209.3-SE493, 1209.4-SE494

Malfunction Thresholds (all active):
(
Exhaust pressure sensor reading < 17 kPa(absolute)
OR Exhaust pressure sensor reading > 145 kPa(absolute)
OR (
|Exhaust pressure - pressure with lowest tolerance from remaining sensors| > (28.78 + lowest tolerance of remaining pressure sensors) kPa(absolute)
AND |Exhaust pressure - pressure with second lowest tolerance from remaining sensors| > (28.78 + second lowest tolerance of remaining pressure sensors) kPa(absolute)
AND |Pressure with lowest tolerance from remaining sensors - pressure with second lowest tolerance from remaining sensors| < (lowest tolerance of remaining pressure sensors + second lowest tolerance of remaining pressure sensors) kPa(absolute)
)
)
Tolerance of remaining pressure sensors are:
Charge pressure sensor tolerance = 12 kPa(absolute)
Compressor inlet pressure sensor tolerance = 5.81 kPa(absolute)
Compressor outlet pressure sensor tolerance = 18.31 kPa(absolute)
EGR orifice pressure sensor tolerance = 28.63 kPa(absolute)
Oil pressure sensor tolerance = 29.44 kPa(absolute)

1.145 DTC 1209.3-SE493: Exhaust Gas Pressure Sensor 1 Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	1209.3-SE493
Description	Exhaust Manifold Pressure Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	8 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Exhaust manifold pressure > 4.774 V (642.1 kPa(absolute))

1.146 DTC 1209.4-SE494: Exhaust Gas Pressure Sensor 1 Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	1209.4-SE494
Description	Exhaust Manifold Pressure Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	8 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Exhaust manifold pressure < 0.115 V (7.612 kPa(absolute))

1.147 DTC 1209.16-SE13860: Exhaust Gas Pressure 1 - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	1209.16-SE13860
Description	Exhaust Manifold Pressure Sensor is Above Estimated Exhaust Manifold Pressure
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine speed ≥ 600 RPM
Engine speed ≤ 2,100 RPM
Rate of change of estimated engine torque < 15 Nm
FOR ≥ 100 msec
Engine is motoring and experiencing fuel cut = FALSE
FOR ≥ 2 sec
Ice formation is suspected on Exhaust Manifold Pressure = FALSE
None active: 1127.2-SE13700, 1127.20-SE14591, 1127.3-SE1996, 1127.4-SE1998, 1127.2-SE9036, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 1127.2-SE15430

Malfunction Thresholds (all active):
Exhaust manifold pressure > (estimated exhaust manifold pressure + (estimated exhaust manifold pressure * [Table of values])) kPa

1.148 DTC 1209.18-SE13861: Exhaust Gas Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	1209.18-SE13861
Description	Exhaust Manifold Pressure is Below Estimated Exhaust Manifold Pressure
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine speed ≥ 600 RPM
Engine speed ≤ 2,100 RPM
Rate of change of estimated engine torque < 15 Nm
FOR ≥ 100 msec
Engine is motoring and experiencing fuel cut = FALSE
FOR ≥ 2 sec
Ice formation is suspected on Exhaust Manifold Pressure = FALSE
None active: 1127.2-SE13700, 1127.20-SE14591, 1127.3-SE1996, 1127.4-SE1998, 1127.2-SE9036, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 1127.2-SE15430

Malfunction Thresholds (all active):
Exhaust manifold pressure < (estimated exhaust manifold pressure - (estimated exhaust manifold pressure * [Table of values])) kPa

1.149 DTC 1268.5-SE13919: Engine Ignition Coil #1 - Current Below Normal or Open Circuit

Monitor Summary:	
DTC	1268.5-SE13919
Description	Open Circuit Between Cylinder 1 Ignition Coil Primary Side and Ignition Control Module (ICM)
Monitor Execution	Continuous
Typical Monitoring Duration	3 cam revs
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine = CRANK or RUN
ECM = receive datalink communication from ICM
Engine is motoring and experiencing fuel cut = FALSE
FOR ≥ 2 cam revs

Malfunction Thresholds (all active):
Ratio of charge capacitor end voltage to charge capacitor start voltage during spark release sequence > X (ratio)

1.150 DTC 1269.5-SE13920: Engine Ignition Coil #2 - Current Below Normal or Open Circuit

Monitor Summary:	
DTC	1269.5-SE13920
Description	Open Circuit Between Cylinder 2 Ignition Coil Primary Side and Ignition Control Module (ICM)
Monitor Execution	Continuous
Typical Monitoring Duration	3 cam revs
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine = CRANK or RUN
ECM = receive datalink communication from ICM
Engine is motoring and experiencing fuel cut = FALSE
FOR ≥ 2 cam revs

Malfunction Thresholds (all active):
Ratio of charge capacitor end voltage to charge capacitor start voltage during spark release sequence > X (ratio)

1.151 DTC 1270.5-SE13921: Engine Ignition Coil #3 - Current Below Normal or Open Circuit

Monitor Summary:	
DTC	1270.5-SE13921
Description	Open Circuit Between Cylinder 3 Ignition Coil Primary Side and Ignition Control Module (ICM)
Monitor Execution	Continuous
Typical Monitoring Duration	3 cam revs
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine = CRANK or RUN
ECM = receive datalink communication from ICM
Engine is motoring and experiencing fuel cut = FALSE
FOR ≥ 2 cam revs

Malfunction Thresholds (all active):
Ratio of charge capacitor end voltage to charge capacitor start voltage during spark release sequence > X (ratio)

1.152 DTC 1271.5-SE13922: Engine Ignition Coil #4 - Current Below Normal or Open Circuit

Monitor Summary:	
DTC	1271.5-SE13922
Description	Open Circuit Between Cylinder 4 Ignition Coil Primary Side and Ignition Control Module (ICM)
Monitor Execution	Continuous
Typical Monitoring Duration	3 cam revs
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine = CRANK or RUN
ECM = receive datalink communication from ICM
Engine is motoring and experiencing fuel cut = FALSE
FOR ≥ 2 cam revs

Malfunction Thresholds (all active):
Ratio of charge capacitor end voltage to charge capacitor start voltage during spark release sequence > X (ratio)

1.153 DTC 1272.5-SE13923: Engine Ignition Coil #5 - Current Below Normal or Open Circuit

Monitor Summary:	
DTC	1272.5-SE13923
Description	Open Circuit Between Cylinder 5 Ignition Coil Primary Side and Ignition Control Module (ICM)
Monitor Execution	Continuous
Typical Monitoring Duration	3 cam revs
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine = CRANK or RUN
ECM = receive datalink communication from ICM
Engine is motoring and experiencing fuel cut = FALSE
FOR ≥ 2 cam revs

Malfunction Thresholds (all active):
Ratio of charge capacitor end voltage to charge capacitor start voltage during spark release sequence > X (ratio)

1.154 DTC 1273.5-SE13924: Engine Ignition Coil #6 - Current Below Normal or Open Circuit

Monitor Summary:	
DTC	1273.5-SE13924
Description	Open Circuit Between Cylinder 6 Ignition Coil Primary Side and Ignition Control Module (ICM)
Monitor Execution	Continuous
Typical Monitoring Duration	3 cam revs
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine = CRANK or RUN
ECM = receive datalink communication from ICM
Engine is motoring and experiencing fuel cut = FALSE
FOR ≥ 2 cam revs

Malfunction Thresholds (all active):
Ratio of charge capacitor end voltage to charge capacitor start voltage during spark release sequence > X (ratio)

1.155 DTC 1292.2-SE13725: Engine Ignition Control Module #1 - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	1292.2-SE13725
Description	Ignition Control Module (ICM) Momentary Power Interruption
Monitor Execution	Continuous
Typical Monitoring Duration	4 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
After keyswitch = ON
Engine = RUNNING
FOR ≥ 1 counts
ECM = receive datalink communication from ICM

Malfunction Thresholds (all active):
Due to power interruption, Ignition Control Module (ICM) = RESET

1.156 DTC 1292.4-SE13709: Engine Ignition Control Module #1 - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	1292.4-SE13709
Description	Low Short Circuit Between All Cylinders Ignition Coil Primary Side and Ignition Control Module (ICM)
Monitor Execution	Continuous
Typical Monitoring Duration	3 cam revs
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine = CRANK or RUN
ECM = receive datalink communication from ICM
Engine is motoring and experiencing fuel cut = FALSE
FOR ≥ 2 cam revs
None active: 1268.5-SE13919, 1269.5-SE13920, 1270.5-SE13921, 1271.5-SE13922, 1272.5-SE13923, 1273.5-SE13924

Malfunction Thresholds (all active):
(
Average measured voltage at charge capacitor inside the ICM during engine run < 315 V
OR Average measured voltage at charge capacitor inside the ICM during engine crank < minimum of (battery voltage, 315) V
)

1.157 DTC 1292.9-SE12892: Engine Ignition Control Module #1 - Abnormal Update Rate

Monitor Summary:	
DTC	1292.9-SE12892
Description	Ignition Control Module (ICM) Message not Received
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
(Engine state = CRANK
OR Engine state = RUN)

Malfunction Thresholds (all active):
ICM message ≠ RECEIVED
FOR ≥ 3 rev
WHEN
(Engine state = CRANK
OR Engine state = RUN)

1.158 DTC 1322.11-SE12019: Engine Misfire for Multiple Cylinders - Root Cause Not Known

Monitor Summary:	
DTC	1322.11-SE12019
Description	Multiple Cylinders Significant Misfire
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	1 trip

Entry Conditions (all active):
1390.18-SE2041 = INACTIVE
FOR ≥ 0.02 sec
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
FOR ≥ 0.02 sec
Engine speed ≥ 600 RPM
Engine speed ≤ 2,300 RPM
(
Primary (crankshaft) engine position sensor = DATA VALID
AND Pulse = detected on the primary engine position sensor
)
Engine is motoring and experiencing fuel cut = FALSE
(Gear shift not detected on manual transmission
AND Gear shift not detected on automated manual transmission)
None active: 1176.2-SE8802, 1176.18-SE14522, 190.2-SE419, 190.2-SE417, 190.2-SE54, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
(Sum of weighted misfire events for all cylinders ≥ 10,000 counts
Within first 1,000 crankshaft revolutions after engine start.
OR Sum of weighted misfire events for all cylinders ≥ 10,000 counts
During any subsequent windows = 1,000 crankshaft revolutions
OR FOR ≥ 4 counts)
Where:
Pulses from the exhaust manifold pressure sensor determine if a misfire event = OCCURRED
Each misfire is assigned a weight as a function of engine speed and net engine torque = [Table of values] (unitless)

1.159 DTC 1322.16-SE12464: Engine Misfire for Multiple Cylinders - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	1322.16-SE12464
Description	Multiple Cylinders Misfire
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	MIL Flashes with Catalyst damage level of Misfire

Entry Conditions (all active):
1390.18-SE2041 = INACTIVE
FOR ≥ 0.02 sec
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
FOR ≥ 0.02 sec
Engine speed ≥ 600 RPM
Engine speed ≤ 2,300 RPM
(
Primary (crankshaft) engine position sensor = DATA VALID
AND Pulse = detected on the primary engine position sensor
)
Engine is motoring and experiencing fuel cut = FALSE
(Gear shift not detected on manual transmission
AND Gear shift not detected on automated manual transmission)
None active: 1176.2-SE8802, 1176.18-SE14522, 190.2-SE419, 190.2-SE417, 190.2-SE54, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
(
(Sum of weighted misfire events for all cylinders ≥ 10,000 counts
During any windows = 200 crankshaft revolutions
AND FOR ≥ 3 counts
When operating in positive torque region encountered in a FTP cycle)
OR (Sum of weighted misfire events for all cylinders ≥ 10,000 counts
During any windows = 200 crankshaft revolutions
AND FOR = 1 counts
When operating in positive torque region not encountered in a FTP cycle)
)
Where:
Pulses from exhaust manifold pressure sensor determine if a misfire event = OCCURRED
Each misfire is assigned a weight as a function of engine speed and net engine torque = [Table of values] (unitless)

1.160 DTC 1323.11-SE12011: Engine Misfire Cylinder #1 - Root Cause Not Known

Monitor Summary:	
DTC	1323.11-SE12011
Description	Cylinder 1 Significant Misfire
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	1 trip

Entry Conditions (all active):
1390.18-SE2041 = INACTIVE
FOR ≥ 0.02 sec
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
FOR ≥ 0.02 sec
Engine speed ≥ 600 RPM
Engine speed ≤ 2,300 RPM
(
Primary (crankshaft) engine position sensor = DATA VALID
AND Pulse = detected on the primary engine position sensor
)
Engine is motoring and experiencing fuel cut = FALSE
(Gear shift not detected on manual transmission
AND Gear shift not detected on automated manual transmission)
None active: 1176.2-SE8802, 1176.18-SE14522, 190.2-SE419, 190.2-SE417, 190.2-SE54, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
(
(Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 1 ≥ 2,500 counts
Within the first 1,000 crankshaft revolutions after engine start)
OR (Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 1 ≥ 2,500 counts
During any subsequent windows of 1,000 crankshaft revolutions
AND FOR ≥ 4 counts)
)
Where:
Pulses from exhaust manifold pressure sensor determine if a misfire event = OCCURRED
Each misfire is assigned a weight as a function of engine speed and net engine torque = [Table of values] (unitless)

1.161 DTC 1323.16-SE12458: Engine Misfire Cylinder 1 - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	1323.16-SE12458
Description	Cylinder 1 Misfire
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	MIL Flashes with Catalyst damage level of Misfire

Entry Conditions (all active):
1390.18-SE2041 = INACTIVE
FOR ≥ 0.02 sec
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
FOR ≥ 0.02 sec
Engine speed ≥ 600 RPM
Engine speed ≤ 2,300 RPM
(
Primary (crankshaft) engine position sensor = DATA VALID
AND Pulse = detected on the primary engine position sensor
)
Engine is motoring and experiencing fuel cut = FALSE
(Gear shift not detected on manual transmission
AND Gear shift not detected on automated manual transmission)
None active: 1176.2-SE8802, 1176.18-SE14522, 190.2-SE419, 190.2-SE417, 190.2-SE54, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
(
(Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 1 ≥ 2,500 counts
During any windows = 200 crankshaft revolutions
AND FOR ≥ 3 counts
When operating in positive torque region encountered in a FTP cycle)
OR (Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 1 ≥ 2,500 counts
During any windows = 200 crankshaft revolutions
AND FOR = 1 count
When operating in positive torque region not encountered in a FTP cycle)
)
Where:
Pulses from the exhaust manifold pressure sensor determine if a misfire event = OCCURRED
Each misfire is assigned a weight as a function of engine speed and net engine torque = [Table of values] (unitless)

1.162 DTC 1324.11-SE12012: Engine Misfire Cylinder #2 - Root Cause Not Known

Monitor Summary:	
DTC	1324.11-SE12012
Description	Cylinder 2 Significant Misfire
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	1 trip

Entry Conditions (all active):
1390.18-SE2041 = INACTIVE
FOR ≥ 0.02 sec
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
FOR ≥ 0.02 sec
Engine speed ≥ 600 RPM
Engine speed ≤ 2,300 RPM
(
Primary (crankshaft) engine position sensor = DATA VALID
AND Pulse = detected on the primary engine position sensor
)
Engine is motoring and experiencing fuel cut = FALSE
(Gear shift not detected on manual transmission
AND Gear shift not detected on automated manual transmission)
None active: 1176.2-SE8802, 1176.18-SE14522, 190.2-SE419, 190.2-SE417, 190.2-SE54, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
(
(Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 2 ≥ 2,500 counts
Within the first 1,000 crankshaft revolutions after engine start)
OR (Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 2 ≥ 2,500 counts
During any subsequent windows of 1,000 crankshaft revolutions
AND FOR ≥ 4 counts)
)
Where:
Pulses from exhaust manifold pressure sensor determine if a misfire event = OCCURRED
Each misfire is assigned a weight as a function of engine speed and net engine torque = [Table of values] (unitless)

1.163 DTC 1324.16-SE12459: Engine Misfire Cylinder 2 - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	1324.16-SE12459
Description	Cylinder 2 Misfire
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	MIL Flashes with Catalyst damage level of Misfire

Entry Conditions (all active):
1390.18-SE2041 = INACTIVE
FOR ≥ 0.02 sec
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
FOR ≥ 0.02 sec
Engine speed ≥ 600 RPM
Engine speed ≤ 2,300 RPM
(
Primary (crankshaft) engine position sensor = DATA VALID
AND Pulse = detected on the primary engine position sensor
)
Engine is motoring and experiencing fuel cut = FALSE
(Gear shift not detected on manual transmission
AND Gear shift not detected on automated manual transmission)
None active: 1176.2-SE8802, 1176.18-SE14522, 190.2-SE419, 190.2-SE417, 190.2-SE54, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
(
(Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 2 ≥ 2,500 counts
During any windows = 200 crankshaft revolutions
AND FOR ≥ 3 counts
When operating in positive torque region encountered in a FTP cycle)
OR (Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 2 ≥ 2,500 counts
During any windows = 200 crankshaft revolutions
AND FOR = 1 count
When operating in positive torque region not encountered in a FTP cycle)
)
Where:
Pulses from the exhaust manifold pressure sensor determine if a misfire event = OCCURRED
Each misfire is assigned a weight as a function of engine speed and net engine torque = [Table of values] (unitless)

1.164 DTC 1325.11-SE12013: Engine Misfire Cylinder #3 - Root Cause Not Known

Monitor Summary:	
DTC	1325.11-SE12013
Description	Cylinder 3 Significant Misfire
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	1 trip

Entry Conditions (all active):
1390.18-SE2041 = INACTIVE
FOR ≥ 0.02 sec
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
FOR ≥ 0.02 sec
Engine speed ≥ 600 RPM
Engine speed ≤ 2,300 RPM
(
Primary (crankshaft) engine position sensor = DATA VALID
AND Pulse = detected on the primary engine position sensor
)
Engine is motoring and experiencing fuel cut = FALSE
(Gear shift not detected on manual transmission
AND Gear shift not detected on automated manual transmission)
None active: 1176.2-SE8802, 1176.18-SE14522, 190.2-SE419, 190.2-SE417, 190.2-SE54, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
(
(Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 3 ≥ 2,500 counts
Within the first 1,000 crankshaft revolutions after engine start)
OR (Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 3 ≥ 2,500 counts
During any subsequent windows of 1,000 crankshaft revolutions
AND FOR ≥ 4 counts)
)
Where:
Pulses from exhaust manifold pressure sensor determine if a misfire event = OCCURRED
Each misfire is assigned a weight as a function of engine speed and net engine torque = [Table of values] (unitless)

1.165 DTC 1325.16-SE12460: Engine Misfire Cylinder 3 - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	1325.16-SE12460
Description	Cylinder 3 Misfire
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	MIL Flashes with Catalyst damage level of Misfire

Entry Conditions (all active):
1390.18-SE2041 = INACTIVE
FOR ≥ 0.02 sec
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
FOR ≥ 0.02 sec
Engine speed ≥ 600 RPM
Engine speed ≤ 2,300 RPM
(
Primary (crankshaft) engine position sensor = DATA VALID
AND Pulse = detected on the primary engine position sensor
)
Engine is motoring and experiencing fuel cut = FALSE
(Gear shift not detected on manual transmission
AND Gear shift not detected on automated manual transmission)
None active: 1176.2-SE8802, 1176.18-SE14522, 190.2-SE419, 190.2-SE417, 190.2-SE54, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
(
(Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 3 ≥ 2,500 counts
During any windows = 200 crankshaft revolutions
AND FOR ≥ 3 counts
When operating in positive torque region encountered in a FTP cycle)
OR (Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 3 ≥ 2,500 counts
During any windows = 200 crankshaft revolutions
AND FOR = 1 count
When operating in positive torque region not encountered in a FTP cycle)
)
Where:
Pulses from the exhaust manifold pressure sensor determine if a misfire event = OCCURRED
Each misfire is assigned a weight as a function of engine speed and net engine torque = [Table of values] (unitless)

1.166 DTC 1326.11-SE12014: Engine Misfire Cylinder #4 - Root Cause Not Known

Monitor Summary:	
DTC	1326.11-SE12014
Description	Cylinder 4 Significant Misfire
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	1 trip

Entry Conditions (all active):
1390.18-SE2041 = INACTIVE
FOR ≥ 0.02 sec
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
FOR ≥ 0.02 sec
Engine speed ≥ 600 RPM
Engine speed ≤ 2,300 RPM
(
Primary (crankshaft) engine position sensor = DATA VALID
AND Pulse = detected on the primary engine position sensor
)
Engine is motoring and experiencing fuel cut = FALSE
(Gear shift not detected on manual transmission
AND Gear shift not detected on automated manual transmission)
None active: 1176.2-SE8802, 1176.18-SE14522, 190.2-SE419, 190.2-SE417, 190.2-SE54, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
(
(Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 4 ≥ 2,500 counts
Within the first 1,000 crankshaft revolutions after engine start)
OR (Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 4 ≥ 2,500 counts
During any subsequent windows of 1,000 crankshaft revolutions
AND FOR ≥ 4 counts)
)
Where:
Pulses from exhaust manifold pressure sensor determine if a misfire event = OCCURRED
Each misfire is assigned a weight as a function of engine speed and net engine torque = [Table of values] (unitless)

1.167 DTC 1326.16-SE12461: Engine Misfire Cylinder 4 - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	1326.16-SE12461
Description	Cylinder 4 Misfire
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	MIL Flashes with Catalyst damage level of Misfire

Entry Conditions (all active):
1390.18-SE2041 = INACTIVE
FOR ≥ 0.02 sec
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
FOR ≥ 0.02 sec
Engine speed ≥ 600 RPM
Engine speed ≤ 2,300 RPM
(
Primary (crankshaft) engine position sensor = DATA VALID
AND Pulse = detected on the primary engine position sensor
)
Engine is motoring and experiencing fuel cut = FALSE
(Gear shift not detected on manual transmission
AND Gear shift not detected on automated manual transmission)
None active: 1176.2-SE8802, 1176.18-SE14522, 190.2-SE419, 190.2-SE417, 190.2-SE54, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
(
(Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 4 ≥ 2,500 counts
During any windows = 200 crankshaft revolutions
AND FOR ≥ 3 counts
When operating in positive torque region encountered in a FTP cycle)
OR (Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 4 ≥ 2,500 counts
During any windows = 200 crankshaft revolutions
AND FOR = 1 count
When operating in positive torque region not encountered in a FTP cycle)
)
Where:
Pulses from the exhaust manifold pressure sensor determine if a misfire event = OCCURRED
Each misfire is assigned a weight as a function of engine speed and net engine torque = [Table of values] (unitless)

1.168 DTC 1327.11-SE12015: Engine Misfire Cylinder #5 - Root Cause Not Known

Monitor Summary:	
DTC	1327.11-SE12015
Description	Cylinder 5 Significant Misfire
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	1 trip

Entry Conditions (all active):
1390.18-SE2041 = INACTIVE
FOR ≥ 0.02 sec
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
FOR ≥ 0.02 sec
Engine speed ≥ 600 RPM
Engine speed ≤ 2,300 RPM
(
Primary (crankshaft) engine position sensor = DATA VALID
AND Pulse = detected on the primary engine position sensor
)
Engine is motoring and experiencing fuel cut = FALSE
(Gear shift not detected on manual transmission
AND Gear shift not detected on automated manual transmission)
None active: 1176.2-SE8802, 1176.18-SE14522, 190.2-SE419, 190.2-SE417, 190.2-SE54, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
(
(Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 5 ≥ 2,500 counts
Within the first 1,000 crankshaft revolutions after engine start)
OR (Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 5 ≥ 2,500 counts
During any subsequent windows of 1,000 crankshaft revolutions
AND FOR ≥ 4 counts)
)
Where:
Pulses from exhaust manifold pressure sensor determine if a misfire event = OCCURRED
Each misfire is assigned a weight as a function of engine speed and net engine torque = [Table of values] (unitless)

1.169 DTC 1327.16-SE12462: Engine Misfire Cylinder 5 - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	1327.16-SE12462
Description	Cylinder 5 Misfire
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	MIL Flashes with Catalyst damage level of Misfire

Entry Conditions (all active):
1390.18-SE2041 = INACTIVE
FOR ≥ 0.02 sec
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
FOR ≥ 0.02 sec
Engine speed ≥ 600 RPM
Engine speed ≤ 2,300 RPM
(
Primary (crankshaft) engine position sensor = DATA VALID
AND Pulse = detected on the primary engine position sensor
)
Engine is motoring and experiencing fuel cut = FALSE
(Gear shift not detected on manual transmission
AND Gear shift not detected on automated manual transmission)
None active: 1176.2-SE8802, 1176.18-SE14522, 190.2-SE419, 190.2-SE417, 190.2-SE54, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
(
(Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 5 ≥ 2,500 counts
During any windows = 200 crankshaft revolutions
AND FOR ≥ 3 counts
When operating in positive torque region encountered in a FTP cycle)
OR (Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 5 ≥ 2,500 counts
During any windows = 200 crankshaft revolutions
AND FOR = 1 count
When operating in positive torque region not encountered in a FTP cycle)
)
Where:
Pulses from the exhaust manifold pressure sensor determine if a misfire event = OCCURRED
Each misfire is assigned a weight as a function of engine speed and net engine torque = [Table of values] (unitless)

1.170 DTC 1328.11-SE12016: Engine Misfire Cylinder #6 - Root Cause Not Known

Monitor Summary:	
DTC	1328.11-SE12016
Description	Cylinder 6 Significant Misfire
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	1 trip

Entry Conditions (all active):
1390.18-SE2041 = INACTIVE
FOR ≥ 0.02 sec
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
FOR ≥ 0.02 sec
Engine speed ≥ 600 RPM
Engine speed ≤ 2,300 RPM
(
Primary (crankshaft) engine position sensor = DATA VALID
AND Pulse = detected on the primary engine position sensor
)
Engine is motoring and experiencing fuel cut = FALSE
(Gear shift not detected on manual transmission
AND Gear shift not detected on automated manual transmission)
None active: 1176.2-SE8802, 1176.18-SE14522, 190.2-SE419, 190.2-SE417, 190.2-SE54, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
(
(Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 6 ≥ 2,500 counts
Within the first 1,000 crankshaft revolutions after engine start)
OR (Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 6 ≥ 2,500 counts
During any subsequent windows of 1,000 crankshaft revolutions
AND FOR ≥ 4 counts)
)
Where:
Pulses from exhaust manifold pressure sensor determine if a misfire event = OCCURRED
Each misfire is assigned a weight as a function of engine speed and net engine torque = [Table of values] (unitless)

1.171 DTC 1328.16-SE12463: Engine Misfire Cylinder 6 - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	1328.16-SE12463
Description	Cylinder 6 Misfire
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	MIL Flashes with Catalyst damage level of Misfire

Entry Conditions (all active):
1390.18-SE2041 = INACTIVE
FOR ≥ 0.02 sec
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
FOR ≥ 0.02 sec
Engine speed ≥ 600 RPM
Engine speed ≤ 2,300 RPM
(
Primary (crankshaft) engine position sensor = DATA VALID
AND Pulse = detected on the primary engine position sensor
)
Engine is motoring and experiencing fuel cut = FALSE
(Gear shift not detected on manual transmission
AND Gear shift not detected on automated manual transmission)
None active: 1176.2-SE8802, 1176.18-SE14522, 190.2-SE419, 190.2-SE417, 190.2-SE54, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
(
(Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 6 ≥ 2,500 counts
During any windows = 200 crankshaft revolutions
AND FOR ≥ 3 counts
When operating in positive torque region encountered in a FTP cycle)
OR (Sum of weighted misfire events for all cylinders ≥ 10,000 counts
AND Sum of weighted misfire events for cylinder 6 ≥ 2,500 counts
During any windows = 200 crankshaft revolutions
AND FOR = 1 count
When operating in positive torque region not encountered in a FTP cycle)
)
Where:
Pulses from the exhaust manifold pressure sensor determine if a misfire event = OCCURRED
Each misfire is assigned a weight as a function of engine speed and net engine torque = [Table of values] (unitless)

1.172 DTC 1352.0-SE818: Engine Cylinder 1 (A1) Knock - Data Valid But Above Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	1352.0-SE818
Description	Cylinder 1 Engine Knock Intensity High
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Knock Detection is enabled.
None active: 190.2-SE419, 190.2-SE417, 190.2-SE54

Malfunction Thresholds (all active):
Cylinder 1 engine knock intensity ≥ [Table of values] (unitless)

1.173 DTC 1352.15-SE838: Engine Cylinder 1 (A1) Knock - Data Valid But Above Normal Operating Range - Least Severe Level

Monitor Summary:	
DTC	1352.15-SE838
Description	Knock Sensor 1 Detects Cylinder 1 Derate Action
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Knock Detection is enabled.
Engine speed < 2,100 RPM
Engine speed > 900 RPM
None active: 190.2-SE419, 190.2-SE417, 190.2-SE54

Malfunction Thresholds (all active):
Fraction of significant derate time due to cylinder 1 knock action ≥ 0.5 (unitless)
Within a time window = 60 sec
Where:
Significant derate occurs when (driver demand torque - derate torque) ≥ 20.3 %

1.174 DTC 1353.0-SE819: Engine Cylinder 2 (B1) Knock - Data Valid But Above Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	1353.0-SE819
Description	Cylinder 2 Engine Knock Intensity High
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Knock Detection is enabled.
None active: 190.2-SE419, 190.2-SE417, 190.2-SE54

Malfunction Thresholds (all active):
Cylinder 2 engine knock intensity ≥ [Table of values] (unitless)

1.175 DTC 1353.4-SE2683: Engine Cylinder 2 (B1) Knock - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	1353.4-SE2683
Description	Knock Sensor 1 Circuit Continuity failure
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine speed > 1,700 RPM
None active: 190.2-SE419, 190.2-SE417, 190.2-SE54

Malfunction Thresholds (all active):
Knock sensor 1 intensity < 6 (unitless)

1.176 DTC 1353.15-SE839: Engine Cylinder 2 (B1) Knock - Data Valid But Above Normal Operating Range - Least Severe Level

Monitor Summary:	
DTC	1353.15-SE839
Description	Knock Sensor 1 Detects Cylinder 2 Derate Action
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Knock Detection is enabled.
Engine speed < 2,100 RPM
Engine speed > 900 RPM
None active: 190.2-SE419, 190.2-SE417, 190.2-SE54

Malfunction Thresholds (all active):
Fraction of significant derate time due to cylinder 2 knock action ≥ 0.5 (unitless)
Within a time window = 60 sec
Where:
Significant derate occurs when (driver demand torque - derate torque) ≥ 20.3 %

1.177 DTC 1354.0-SE822: Engine Cylinder 3 (A2) Knock - Data Valid But Above Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	1354.0-SE822
Description	Cylinder 3 Engine Knock Intensity High
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Knock Detection is enabled.
None active: 190.2-SE419, 190.2-SE417, 190.2-SE54

Malfunction Thresholds (all active):
Cylinder 3 engine knock intensity ≥ [Table of values] (unitless)

1.178 DTC 1354.15-SE840: Engine Cylinder 3 (A2) Knock - Data Valid But Above Normal Operating Range - Least Severe Level

Monitor Summary:	
DTC	1354.15-SE840
Description	Knock Sensor 1 Detects Cylinder 3 Derate Action
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Knock Detection is enabled.
Engine speed < 2,100 RPM
Engine speed > 900 RPM
None active: 190.2-SE419, 190.2-SE417, 190.2-SE54

Malfunction Thresholds (all active):
Fraction of significant derate time due to cylinder 3 knock action ≥ 0.5 (unitless)
Within a time window = 60 sec
Where:
Significant derate occurs when (driver demand torque - derate torque) ≥ 20.3 %

1.179 DTC 1355.0-SE823: Engine Cylinder 4 (B2) Knock - Data Valid But Above Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	1355.0-SE823
Description	Cylinder 4 Engine Knock Intensity High
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Knock Detection is enabled.
None active: 190.2-SE419, 190.2-SE417, 190.2-SE54

Malfunction Thresholds (all active):
Cylinder 4 engine knock intensity ≥ [Table of values] (unitless)

1.180 DTC 1355.15-SE841: Engine Cylinder 4 (B2) Knock - Data Valid But Above Normal Operating Range - Least Severe Level

Monitor Summary:	
DTC	1355.15-SE841
Description	Knock Sensor 2 Detects Cylinder 4 Derate Action
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Knock Detection is enabled.
Engine speed < 2,100 RPM
Engine speed > 900 RPM
None active: 190.2-SE419, 190.2-SE417, 190.2-SE54

Malfunction Thresholds (all active):
Fraction of significant derate time due to cylinder 4 knock action ≥ 0.5 (unitless)
Within a time window = 60 sec
Where:
Significant derate occurs when (driver demand torque - derate torque) ≥ 20.3 %

1.181 DTC 1356.0-SE824: Engine Cylinder 5 (A3) Knock - Data Valid But Above Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	1356.0-SE824
Description	Cylinder 5 Engine Knock Intensity High
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Knock Detection is enabled.
None active: 190.2-SE419, 190.2-SE417, 190.2-SE54

Malfunction Thresholds (all active):
Cylinder 5 engine knock intensity ≥ [Table of values] (unitless)

1.182 DTC 1356.4-SE2684: Engine Cylinder 5 (A3) Knock - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	1356.4-SE2684
Description	Knock Sensor 2 Circuit Continuity failure
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine speed > 1,700 RPM
None active: 190.2-SE419, 190.2-SE417, 190.2-SE54

Malfunction Thresholds (all active):
Knock sensor 2 intensity < 6 (unitless)

1.183 DTC 1356.15-SE842: Engine Cylinder 5 (A3) Knock - Data Valid But Above Normal Operating Range - Least Severe Level

Monitor Summary:	
DTC	1356.15-SE842
Description	Knock Sensor 2 Detects Cylinder 5 Derate Action
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Knock Detection is enabled.
Engine speed < 2,100 RPM
Engine speed > 900 RPM
None active: 190.2-SE419, 190.2-SE417, 190.2-SE54

Malfunction Thresholds (all active):
Fraction of significant derate time due to cylinder 5 knock action ≥ 0.5 (unitless)
Within a time window = 60 sec
Where:
Significant derate occurs when (driver demand torque - derate torque) ≥ 20.3 %

1.184 DTC 1357.0-SE825: Engine Cylinder 6 (B3) Knock - Data Valid But Above Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	1357.0-SE825
Description	Cylinder 6 Engine Knock Intensity High
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Knock Detection is enabled.
None active: 190.2-SE419, 190.2-SE417, 190.2-SE54

Malfunction Thresholds (all active):
Cylinder 6 engine knock intensity ≥ [Table of values] (unitless)

1.185 DTC 1357.15-SE843: Engine Cylinder 6 (B3) Knock - Data Valid But Above Normal Operating Range - Least Severe Level

Monitor Summary:	
DTC	1357.15-SE843
Description	Knock Sensor 2 Detects Cylinder 6 Derate Action
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Knock Detection is enabled.
Engine speed < 2,100 RPM
Engine speed > 900 RPM
None active: 190.2-SE419, 190.2-SE417, 190.2-SE54

Malfunction Thresholds (all active):
Fraction of significant derate time due to cylinder 6 knock action ≥ 0.5 (unitless)
Within a time window = 60 sec
Where:
Significant derate occurs when (driver demand torque - derate torque) ≥ 20.3 %

1.186 DTC 1390.1-SE2640: Engine Fuel Valve 1 Intake Pressure - Data Valid But Below Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	1390.1-SE2640
Description	Fuel Outlet Pressure Sensor Above Critical Threshold
Monitor Execution	Continuous
Typical Monitoring Duration	3 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
The engine is running out of fuel = FALSE
(Engine = RUN
FOR ≥ 5 sec
OR Engine = CRANK
FOR ≥ 5 sec
OR Engine = BRAKE
FOR ≥ 5 sec)
Engine speed ≥ 300 RPM
Commanded fuel system gas mass flow ≥ 0.02 kg/min
Engine has still not exited fuel cut after a motoring event = FALSE
FOR ≥ 0.5 sec
None active: 1390.20-SE13720, 1390.21-SE13718

Malfunction Thresholds (all active):
Fuel outlet pressure ≤ [Table of values] kPa(absolute)

1.187 DTC 1390.3-SE14241: Engine Fuel Valve 1 Intake Pressure Sensor Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	1390.3-SE14241
Description	Continuous Flow Valve (CFV) Fuel Outlet Pressure Sensor Shorted High
Monitor Execution	Continuous
Typical Monitoring Duration	X sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
(Engine state = RUN
FOR ≥ 5 sec
OR Engine state = CRANK)
Engine has still not exited fuel cut after a motoring event = FALSE
FOR ≥ 5 sec
None active: 168.1-SE17602, 609.9-SE17604, 609.1-SE17603

Malfunction Thresholds (all active):
Fuel outlet pressure sensor element > X V

1.188 DTC 1390.4-SE14242: Engine Fuel Valve 1 Intake Pressure Sensor Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	1390.4-SE14242
Description	Continuous Flow Valve (CFV) Fuel Outlet Pressure Sensor Shorted Low
Monitor Execution	Continuous
Typical Monitoring Duration	X sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON
None active: 168.1-SE17602, 609.9-SE17604, 609.1-SE17603

Malfunction Thresholds (all active):
Fuel outlet pressure sensor element < X V

1.189 DTC 1390.18-SE2041: Engine Fuel Valve 1 Intake Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	1390.18-SE2041
Description	Fuel Outlet Pressure Sensor Low
Monitor Execution	Continuous
Typical Monitoring Duration	7 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
(Engine state = RUN
FOR ≥ 5 sec
OR Engine state = CRANK
FOR ≥ 5 sec
OR Engine state = BRAKE
FOR ≥ 5 sec)
Commanded fuel system gas mass flow ≥ 0.02 kg/min
The engine is running out of fuel = FALSE
Engine has still not exited fuel cut after a motoring event = FALSE
FOR ≥ 0.5 sec
None active: 190.0-SE124, 1390.20-SE13720, 1390.21-SE13718

Malfunction Thresholds (all active):
Fuel outlet pressure < [Table of values] kPa(absolute)

1.190 DTC 1390.20-SE13720: Engine Fuel Intake Pressure Sensor - Data Not Rational - Drifted High

Monitor Summary:	
DTC	1390.20-SE13720
Description	Fuel Outlet Pressure Sensor High
Monitor Execution	Continuous
Typical Monitoring Duration	7 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Fuel inlet pressure < 824 kPa(absolute)
Engine state ≠ STOP
Engine has still not exited fuel cut after a motoring event = FALSE
Engine speed > 600 RPM
None active: 168.1-SE17602, 609.9-SE17604, 609.1-SE17603, 159.2-SE13721, 159.3-SE1986, 159.4-SE1987

Malfunction Thresholds (all active):
Fuel outlet pressure > 650 kPa(absolute)

1.191 DTC 1390.21-SE13718: Engine Fuel Intake Pressure Sensor - Data Not Rational - Drifted Low

Monitor Summary:	
DTC	1390.21-SE13718
Description	Fuel Outlet Pressure Sensor Low at Keyswitch Off
Monitor Execution	Continuous
Typical Monitoring Duration	0.2 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = OFF
FOR ≥ 20 sec
Engine state = SHUTDOWN
102.2-SE4439 has made a decision
None active: 102.2-SE4439, 159.31-SE14391, 1390.20-SE13720, 1390.18-SE2041, 1390.1-SE2640, 102.16-SE2323, 102.18-SE2324, 102.3-SE1999, 102.4-SE2000, 102.2-SE13766, 102.2-SE9037, 102.2-SE15429

Malfunction Thresholds (all active):
Fuel outlet pressure - intake manifold pressure < -35 kPa(absolute)

1.192 DTC 1696.31-SE13742: Engine Exhaust O2 Sensor Closed Loop Operation - Condition Exists

Monitor Summary:	
DTC	1696.31-SE13742
Description	Fuel Control System Failed to Enter Closed Loop
Monitor Execution	Continuous
Typical Monitoring Duration	[Table of values] + 5 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
Engine has still not exited fuel cut after a motoring event = FALSE
Battery voltage ≥ 8 V
FOR ≥ 3 sec

Malfunction Thresholds (all active):
Fuel System Closed Loop Entry in Expected Time = FAILURE

1.193 DTC 2623.3-SE1378: Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	2623.3-SE1378
Description	Secondary Accelerator Pedal Position High
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
None active: 3513.3-SE1893, 3513.4-SE1894

Malfunction Thresholds (all active):
Secondary accelerator pedal position sensor value > 2.419 V (100 %)

1.194 DTC 2623.4-SE1379: Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	2623.4-SE1379
Description	Secondary Accelerator Pedal Position Low
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
None active: 3513.3-SE1893, 3513.4-SE1894

Malfunction Thresholds (all active):
Secondary accelerator pedal position sensor value < 0.323 V (0 %)

1.195 DTC 2623.8-SE6992: Accelerator Pedal or Lever Position Sensor 2 Circuit Frequency - Abnormal Frequency or Pulse Width or Period

Monitor Summary:	
DTC	2623.8-SE6992
Description	Secondary PWM Accelerator Pedal Duty Cycle Out of Range
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
None active: 3513.3-SE1893, 3513.4-SE1894

Malfunction Thresholds (all active):
(Dual PWM secondary pedal position < 5 %
OR Dual PWM secondary pedal position > 50 %)

1.196 DTC 2623.8-SE6993: Accelerator Pedal or Lever Position Sensor 2 Circuit Frequency - Abnormal Frequency or Pulse Width or Period

Monitor Summary:	
DTC	2623.8-SE6993
Description	Secondary PWM Accelerator Pedal Base Frequency Out of Range
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
None active: 3513.3-SE1893, 3513.4-SE1894

Malfunction Thresholds (all active):
(Base frequency of secondary PWM accelerator pedal < 180 Hz
OR Base frequency of secondary PWM accelerator pedal > 220 Hz)

1.197 DTC 2659.16-SE2028: EGR Mass Flow - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	2659.16-SE2028
Description	Estimated EGR Flow High when EGR Valve is Commanded Closed
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
EGR position command ≤ 0.004 %
EGR position ≤ 0.008 %
EGR delta pressure auto zero completed in previous key cycle
Engine at Idle
None active: 102.2-SE4439, 2791.15-SE4368, 2791.5-SE1825, 168.17-SE4367, 2791.6-SE1826, 2791.13-SE7321, 2791.13-SE7322, 27.4-SE1796, 27.2-SE3633, 27.2-SE3635, 412.2-SE9362, 412.3-SE1964, 412.4-SE1965, 412.2-SE8978, 411.3-SE485, 411.4-SE483, 411.2-SE1911, 411.16-SE13879, 411.18-SE13880, 412.2-SE3872, 102.16-SE2323, 102.18-SE2324, 102.3-SE1999, 102.4-SE2000, 102.2-SE13766, 102.2-SE9037, 102.2-SE15429

Malfunction Thresholds (all active):
Estimated EGR flow > 0.5 kg/min

1.198 DTC 2659.18-SE2029: EGR Mass Flow - Data Valid But Below Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	2659.18-SE2029
Description	Estimated EGR Flow Low
Monitor Execution	Continuous
Typical Monitoring Duration	Tmax ≤ 10 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Commanded mass air flow > [Table of values] kg/min
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
Engine has still not exited fuel cut after a motoring event = FALSE
EGR delta pressure ≥ -1.89 kPa(absolute)
None active: 102.2-SE4439, 2791.15-SE4368, 2791.5-SE1825, 168.17-SE4367, 2791.6-SE1826, 2791.13-SE7321, 2791.13-SE7322, 27.4-SE1796, 27.2-SE3633, 27.2-SE3635, 412.2-SE9362, 412.3-SE1964, 412.4-SE1965, 412.2-SE8978, 411.3-SE485, 411.4-SE483, 411.2-SE1911, 411.16-SE13879, 411.18-SE13880, 5019.16-SE14539, 5019.18-SE14540, 5019.2-SE4441, 5019.20-SE14506, 5019.3-SE3003, 5019.4-SE3004, 412.2-SE3872, 102.16-SE2323, 102.18-SE2324, 102.3-SE1999, 102.4-SE2000, 102.2-SE13766, 102.2-SE9037, 102.2-SE15429

Malfunction Thresholds (all active):
Average of (estimated EGR flow - commanded EGR flow) is ever ≥ 0.6 kg/min
Over a period of time = 10 sec
Where:
Diagnostic tolerance = 0.2 kg/min

1.199 DTC 2791.5-SE1825: EGR Valve Control Circuit - Current Below Normal or Open Circuit

Monitor Summary:	
DTC	2791.5-SE1825
Description	ECM Detects Open Circuit
Monitor Execution	Continuous
Typical Monitoring Duration	2.8 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
ECM has detected the current through the EGR device driver circuitry < 1.2 A
While:
Commanded duty cycle > 30 %

1.200 DTC 2791.6-SE1826: EGR Valve Control Circuit - Current Above Normal or Grounded Circuit

Monitor Summary:	
DTC	2791.6-SE1826
Description	ECM Driver Chip Detects Short Circuit
Monitor Execution	Continuous
Typical Monitoring Duration	2.8 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Sensed current for EGR driver chip > 12 A

1.201 DTC 2791.13-SE7321: EGR Valve Controller - Out of Calibration

Monitor Summary:	
DTC	2791.13-SE7321
Description	Zero Position of EGR Actuator or Span of EGR Valve Mechanical Stops are High
Monitor Execution	Continuous
Typical Monitoring Duration	3.38 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
The ECM has not detected an electrical issue with the EGR device.
(Engine = RUNNING
OR Engine = STOP)
Battery voltage > 8 V
(EGR orifice temperature > 0.02 °C
OR EGR position command > 0 %
OR 27.4-SE1796 recovers from failure
OR EGA valve is commanded = 0
FOR ≥ 0.5 sec
EGA position feedback deviates from zero by > 1 counts
FOR ≥ 0.5 sec)
Monitor only runs once at keyswitch on
Not active: 27.4-SE1796

Malfunction Thresholds (all active):
Zero position of EGR actuator > 4.992 mm

1.202 DTC 2791.13-SE7322: EGR Valve Controller - Out of Calibration

Monitor Summary:	
DTC	2791.13-SE7322
Description	Zero Position of EGR Actuator OR Span of EGR Valve Mechanical Stops are Low
Monitor Execution	Continuous
Typical Monitoring Duration	3.38 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
The ECM has not detected an electrical issue with the EGR device.
(Engine = RUNNING
OR Engine = STOP)
Battery voltage > 8 V
(EGR orifice temperature > 0.02 °C
OR EGR position command > 0 %
OR 27.4-SE1796 recovers from failure
OR EGA valve is commanded = 0
FOR ≥ 0.5 sec
EGA position feedback deviates from zero by > 1 counts
FOR ≥ 0.5 sec)
Monitor only runs once at keyswitch on
Not active: 27.4-SE1796

Malfunction Thresholds (all active):
Zero position of EGR actuator < 1.997 mm

1.203 DTC 2791.15-SE4368: EGR Valve Control Circuit Over Temperature - Data Valid But Above Normal Operating Range - Least Severe Level

Monitor Summary:	
DTC	2791.15-SE4368
Description	Sensed Temperature for EGR Driver Chip High
Monitor Execution	Continuous
Typical Monitoring Duration	4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Sensed temperature for EGR driver chip > 150 °C

1.204 DTC 3060.18-SE12227: Engine Cooling System Monitor - Data Valid But Below Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	3060.18-SE12227
Description	Coolant Temperature Lower than Predicted
Monitor Execution	Continuous
Typical Monitoring Duration	450 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine speed > 300 RPM
At engine = STARTED
Coolant temperature < 51.594 °C
(
Engine = STARTED
FOR ≥ 90 sec
When:
Block heater is detected
OR Engine = STARTED
FOR ≥ 30 sec
)
Ambient air temperature ≥ -6.664 °C
Engine speed ≥ 950 RPM
Torque fuel ≤ 400 mg/stroke
Coolant temperature < 71.109 °C
None active: 171.16-SE3799, 171.3-SE3802, 171.4-SE3803, 105.3-SE487, 105.4-SE488, 110.3-SE75, 110.4-SE76

Malfunction Thresholds (all active):
Predicted coolant temperature > coolant temperature

1.205 DTC 3061.14-SE13878: Engine Cold Start Emission Reduction Strategy System Monitor - Special Instructions

Monitor Summary:	
DTC	3061.14-SE13878
Description	Catalyst Warmup Based Fuel System Closed Loop Commands Malfunction
Monitor Execution	Continuous
Typical Monitoring Duration	0.02 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Catalyst warmup fuel system closed loop command = ACTIVE
None active: 3241.15-SE13792, 3241.2-SE9367, 3241.2-SE9008, 3249.15-SE13793, 3249.17-SE9366, 3249.3-SE8805, 3249.4-SE8806, 3249.2-SE9009, 3241.3-SE2669, 3241.4-SE2670

Malfunction Thresholds (all active):
Final fuel system closed loop command ≠ catalyst warmup fuel system closed loop command

1.206 DTC 3061.31-SE13877: Engine Cold Start Emission Reduction Strategy System Monitor - Condition Exists

Monitor Summary:	
DTC	3061.31-SE13877
Description	Catalyst Warmup Based Spark Timing Retardation Commands not Functioning
Monitor Execution	Continuous
Typical Monitoring Duration	0.02 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
Catalyst warmup spark timing retardation = ACTIVE
None active: 3241.15-SE13792, 3241.2-SE9367, 3241.2-SE9008, 3249.15-SE13793, 3249.17-SE9366, 3249.3-SE8805, 3249.4-SE8806, 3249.2-SE9009, 3241.3-SE2669, 3241.4-SE2670, 110.3-SE75, 110.4-SE76, 110.2-SE3668, 110.2-SE3669, 110.2-SE3805, 411.3-SE485, 411.4-SE483, 411.2-SE1911, 411.16-SE13879, 411.18-SE13880, 1180.3-SE2026, 1180.4-SE2027, 1180.15-SE13882, 1180.18-SE13881

Malfunction Thresholds (all active):
Commanded final spark timing retardation ≠ catalyst warmup spark timing retardation deg

1.207 DTC 3217.2-SE13883: Aftertreatment Intake Oxygen Sensor - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	3217.2-SE13883
Description	Primary O2 Sensor Rich to Lean Switch Time High
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
The engine is running out of fuel = FALSE
Lambda control mode 2 = ACTIVE
3217.3-SE1978 has made a pass decision
3217.4-SE5223 has made a pass decision
3217.21-SE14551 has made a pass decision
3217.20-SE14552 has made a pass decision
3217.18-SE13884 has made a pass decision
3217.16-SE13885 has made a pass decision
None active: 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 105.2-SE3793, 105.3-SE487, 105.4-SE488, 1696.31-SE13742, 3217.16-SE13885, 3217.2-SE13886, 3217.18-SE13884, 412.2-SE9362, 412.3-SE1964, 412.4-SE1965, 412.16-SE2055, 412.2-SE8978, 411.3-SE485, 411.4-SE483, 411.2-SE1911, 411.16-SE13879, 411.18-SE13880, 5019.16-SE14539, 5019.18-SE14540, 5019.2-SE4441, 5019.20-SE14506, 5019.3-SE3003, 5019.4-SE3004, 412.2-SE3872, 159.0-SE2051, 159.16-SE2050, 1390.18-SE2041, 1390.1-SE2640, 4237.0-SE13858, 4237.1-SE13859, 105.0-SE649, 105.2-SE8976, 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995, 3464.6-SE2226, 3464.5-SE14289, 3464.4-SE2225, 3464.3-SE13641, 51.7-SE2312, 3464.0-SE2044, 3464.1-SE2046, 3673.2-SE2047

Malfunction Thresholds (all active):
Primary O2 sensor rich to lean switch time ≥ 0.2 sec
Number of slow switches in 30 samples ≥ 25
Rich to lean switch time is discounted from the monitor if the primary O2 sensor voltage does not monotonically decrease from 0.551 V to 0.199 V during the switch

1.208 DTC 3217.2-SE13886: Aftertreatment Intake Oxygen Sensor - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	3217.2-SE13886
Description	Primary O2 Sensor Lean to Rich Switch Time High
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
The engine is running out of fuel = FALSE
Lambda control mode 2 = ACTIVE
3217.3-SE1978 has made a pass decision
3217.4-SE5223 has made a pass decision
3217.21-SE14551 has made a pass decision
3217.20-SE14552 has made a pass decision
3217.18-SE13884 has made a pass decision
3217.16-SE13885 has made a pass decision
None active: 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 105.2-SE3793, 105.3-SE487, 105.4-SE488, 1696.31-SE13742, 3217.16-SE13885, 3217.18-SE13884, 3217.2-SE13883, 412.2-SE9362, 412.3-SE1964, 412.4-SE1965, 412.16-SE2055, 412.2-SE8978, 411.3-SE485, 411.4-SE483, 411.2-SE1911, 411.16-SE13879, 411.18-SE13880, 5019.16-SE14539, 5019.18-SE14540, 5019.2-SE4441, 5019.20-SE14506, 5019.3-SE3003, 5019.4-SE3004, 412.2-SE3872, 159.0-SE2051, 159.16-SE2050, 1390.18-SE2041, 1390.1-SE2640, 4237.0-SE13858, 4237.1-SE13859, 105.0-SE649, 105.2-SE8976, 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995, 3464.6-SE2226, 3464.5-SE14289, 3464.4-SE2225, 3464.3-SE13641, 51.7-SE2312, 3464.0-SE2044, 3464.1-SE2046, 3673.2-SE2047

Malfunction Thresholds (all active):
Primary O2 sensor lean to rich switch time ≥ 0.27 sec
Number of slow switches in 15 samples ≥ 14
Lean to rich switch time is discounted from the monitor if the primary O2 sensor voltage does not monotonically increase from 0.199 V to 0.602 V during the switch

1.209 DTC 3217.3-SE1978: Aftertreatment Intake Oxygen Sensor Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	3217.3-SE1978
Description	Primary O2 Sensor Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Primary O2 sensor > 1.2 V

1.210 DTC 3217.4-SE5223: Aftertreatment Intake Oxygen Sensor Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	3217.4-SE5223
Description	Primary O2 Sensor Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Fuel System Closed Loop is active.
The engine is running out of fuel = FALSE
None active: 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 174.3-SE14246, 174.4-SE14245, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 159.0-SE2051, 159.16-SE2050, 1390.18-SE2041, 1390.1-SE2640

Malfunction Thresholds (all active):
Primary O2 sensor < 0.023 V

1.211 DTC 3217.16-SE13885: Aftertreatment Intake Oxygen Sensor - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	3217.16-SE13885
Description	Primary O2 Sensor Switch Point Voltage Shifted Lean
Monitor Execution	Continuous
Typical Monitoring Duration	200 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Ambient air temperature ≥ -6.703 ˚C
Fuel consumed in current operation cycle ≥ 0.1 kg
The engine is running out of fuel = FALSE
Engine speed ≥ 900 RPM
Fuel system gas mass flow ≥ 0.3 kg/min
Fuel System Closed Loop is active.
3217.3-SE1978 has made a pass decision
3217.4-SE5223 has made a pass decision
3217.21-SE14551 has made a pass decision
3217.20-SE14552 has made a pass decision
None active: 3222.3-SE4029, 3222.4-SE4030, 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 105.2-SE3793, 105.3-SE487, 105.4-SE488, 1696.31-SE13742, 3222.2-SE13870, 3217.3-SE1978, 3217.4-SE5223, 3217.20-SE14552, 3217.21-SE14551, 412.2-SE9362, 412.3-SE1964, 412.4-SE1965, 412.16-SE2055, 412.2-SE8978, 411.3-SE485, 411.4-SE483, 411.2-SE1911, 411.16-SE13879, 411.18-SE13880, 5019.16-SE14539, 5019.18-SE14540, 5019.2-SE4441, 5019.20-SE14506, 5019.3-SE3003, 5019.4-SE3004, 412.2-SE3872, 159.0-SE2051, 159.16-SE2050, 1390.18-SE2041, 1390.1-SE2640, 4237.0-SE13858, 4237.1-SE13859, 105.0-SE649, 105.2-SE8976, 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995, 3464.6-SE2226, 3464.5-SE14289, 3464.4-SE2225, 3464.3-SE13641, 51.7-SE2312, 3464.0-SE2044, 3464.1-SE2046, 3673.2-SE2047

Malfunction Thresholds (all active):
Average of rich primary O2 sensor values < [Table of values] V
Where:
Primary O2 sensor considered lean if value < 0.449 V
Primary O2 sensor considered rich if value ≥ 0.449 V

1.212 DTC 3217.18-SE13884: Aftertreatment Intake Oxygen Sensor - Data Valid But Below Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	3217.18-SE13884
Description	Primary O2 Sensor Switch Point Voltage Shifted Rich
Monitor Execution	Continuous
Typical Monitoring Duration	200 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Ambient air temperature ≥ -6.703 ˚C
Fuel consumed in current operation cycle ≥ 0.1 kg
The engine is running out of fuel = FALSE
Engine Speed ≥ 900 RPM
Fuel system gas mass flow ≥ 0.3 kg/min
Fuel System Closed Loop is active.
3217.3-SE1978 has made a pass decision
3217.4-SE5223 has made a pass decision
3217.21-SE14551 has made a pass decision
3217.20-SE14552 has made a pass decision
None active: 3222.3-SE4029, 3222.4-SE4030, 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 105.2-SE3793, 105.3-SE487, 105.4-SE488, 1696.31-SE13742, 3222.2-SE13870, 3217.3-SE1978, 3217.4-SE5223, 3217.20-SE14552, 3217.21-SE14551, 412.2-SE9362, 412.3-SE1964, 412.4-SE1965, 412.16-SE2055, 412.2-SE8978, 411.3-SE485, 411.4-SE483, 411.2-SE1911, 411.16-SE13879, 411.18-SE13880, 5019.16-SE14539, 5019.18-SE14540, 5019.2-SE4441, 5019.20-SE14506, 5019.3-SE3003, 5019.4-SE3004, 412.2-SE3872, 159.0-SE2051, 159.16-SE2050, 1390.18-SE2041, 1390.1-SE2640, 4237.0-SE13858, 4237.1-SE13859, 105.0-SE649, 105.2-SE8976, 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995, 3464.6-SE2226, 3464.5-SE14289, 3464.4-SE2225, 3464.3-SE13641, 51.7-SE2312, 3464.0-SE2044, 3464.1-SE2046, 3673.2-SE2047

Malfunction Thresholds (all active):
Average of rich primary O2 sensor values > [Table of values] V
Where:
Primary O2 sensor considered lean if value < 0.449 V
Primary O2 sensor considered rich if value ≥ 0.449 V

1.213 DTC 3217.20-SE14552: Aftertreatment Intake Oxygen Sensor - Data Not Rational - Drifted High

Monitor Summary:	
DTC	3217.20-SE14552
Description	Primary O2 Sensor Stuck Lean Below a Voltage
Monitor Execution	Continuous
Typical Monitoring Duration	20.941 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Intake manifold pressure ≥ 22.5 kPa(absolute)
FOR ≥ 2 sec
Fuel System Closed Loop is active.
Since First entry ≥ 25 sec
Since Re-entry ≥ 2 sec
The engine is running out of fuel = FALSE
3217.3-SE1978 has made a pass decision
3217.4-SE5223 has made a pass decision
None active: 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 174.3-SE14246, 174.4-SE14245, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 159.0-SE2051, 159.16-SE2050, 1390.18-SE2041, 1390.1-SE2640

Malfunction Thresholds (all active):
Primary O2 sensor < 0.45 V

1.214 DTC 3217.21-SE14551: Aftertreatment Intake Oxygen Sensor - Data Not Rational - Drifted Low

Monitor Summary:	
DTC	3217.21-SE14551
Description	Primary O2 Sensor Stuck Rich Above a Voltage
Monitor Execution	Continuous
Typical Monitoring Duration	39.969 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Intake manifold pressure ≥ 22.5 kPa(absolute)
FOR ≥ 2 sec
Fuel System Closed Loop is active.
Since First entry ≥ 25 sec
Since Re-entry ≥ 2 sec
The engine is running out of fuel = FALSE
3217.3-SE1978 has made a pass decision
3217.4-SE5223 has made a pass decision
None active: 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 174.3-SE14246, 174.4-SE14245, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 159.0-SE2051, 159.16-SE2050, 1390.18-SE2041, 1390.1-SE2640

Malfunction Thresholds (all active):
Primary O2 sensor > 0.45 V

1.215 DTC 3222.2-SE13870: Aftertreatment 1 Intake Gas Sensor Heater - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	3222.2-SE13870
Description	Primary O2 Sensor Heater Performance Error
Monitor Execution	Continuous
Typical Monitoring Duration	20 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine is motoring and experiencing fuel cut = FALSE
FOR ≥ 15 sec
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
Primary O2 sensor heater duty cycle > 4 %
FOR ≥ 12 sec

Malfunction Thresholds (all active):
(Primary O2 sensor heater resistance > 50 Ω
OR Primary O2 sensor heater resistance < 7 Ω)

1.216 DTC 3222.3-SE4029: Aftertreatment Intake Gas Sensor Heater - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	3222.3-SE4029
Description	Primary O2 Sensor Heater Shorted High
Monitor Execution	Continuous
Typical Monitoring Duration	50 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine ≠ RUNNING
Primary O2 sensor heater commanded = OFF

Malfunction Thresholds (all active):
Primary O2 sensor heater element ≥ 3.25 V

1.217 DTC 3222.4-SE4030: Aftertreatment Intake Gas Sensor Heater - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	3222.4-SE4030
Description	Primary O2 Sensor Heater Shorted Low
Monitor Execution	Continuous
Typical Monitoring Duration	50 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine = RUNNING
Primary O2 sensor heater commanded = ON

Malfunction Thresholds (all active):
Primary O2 sensor heater element ≥ 5 A

1.218 DTC 3227.2-SE14189: Aftertreatment Outlet Oxygen Sensor - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	3227.2-SE14189
Description	Secondary O2 Sensor Rich to Lean Switch Time High
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
The engine is running out of fuel = FALSE
Lambda control mode 2 = ACTIVE
3217.3-SE1978 has made a pass decision
3217.4-SE5223 has made a pass decision
3217.20-SE14552 has made a pass decision
3217.21-SE14551 has made a pass decision
3217.2-SE13886 has made a pass decision
3217.2-SE13883 has made a pass decision
3217.18-SE13884 has made a pass decision
3217.16-SE13885 has made a pass decision
3227.3-SE1977 has made a pass decision
3227.4-SE11555 has made a pass decision
3227.21-SE14615 has made a pass decision
3227.20-SE14613 has made a pass decision
3227.18-SE14704 has made a pass decision
None active: 3232.3-SE4040, 3232.4-SE4041, 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 105.2-SE3793, 105.3-SE487, 105.4-SE488, 1696.31-SE13742, 3217.16-SE13885, 3217.18-SE13884, 3217.2-SE13883, 3227.20-SE14613, 3227.21-SE14615, 3232.2-SE13871, 3227.10-SE14550, 3227.3-SE1977, 3227.4-SE11555, 3227.18-SE14704, 412.2-SE9362, 412.3-SE1964, 412.4-SE1965, 412.16-SE2055, 412.2-SE8978, 411.3-SE485, 411.4-SE483, 411.2-SE1911, 411.16-SE13879, 411.18-SE13880, 5019.16-SE14539, 5019.18-SE14540, 5019.2-SE4441, 5019.20-SE14506, 5019.3-SE3003, 5019.4-SE3004, 412.2-SE3872, 159.0-SE2051, 159.16-SE2050, 1390.18-SE2041, 1390.1-SE2640, 4237.0-SE13858, 4237.1-SE13859, 105.0-SE649, 105.2-SE8976, 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995, 3464.6-SE2226, 3464.5-SE14289, 3464.4-SE2225, 3464.3-SE13641, 51.7-SE2312, 3464.0-SE2044, 3464.1-SE2046, 3673.2-SE2047

Malfunction Thresholds (all active):
Secondary O2 sensor rich to lean switch time ≥ 0.35 sec
Number of slow switches in 25 samples ≥ 23
Rich to lean switch time is discounted from the monitor if the secondary O2 sensor voltage does not monotonically decrease from 0.469 V to 0.199 V during the switch

1.219 DTC 3227.3-SE1977: Aftertreatment Outlet Oxygen Sensor Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	3227.3-SE1977
Description	Secondary O2 Sensor Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Secondary O2 sensor > 1.2 V

1.220 DTC 3227.4-SE11555: Aftertreatment Outlet Oxygen Sensor Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	3227.4-SE11555
Description	Secondary O2 Sensor Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	30 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Fuel System Closed Loop is active = FALSE
FOR ≥ 5 sec
(Aftertreatment catalyst temperature 1 ≥ 250 °C
IF:
Coolant temperature at engine start ≥ 71.109 °C
OR Aftertreatment catalyst temperature 1 ≥ 200 °C
IF:
Coolant temperature at engine start < 71.109 °C)
The engine is running out of fuel = FALSE
None active: 3232.3-SE4040, 3232.4-SE4041, 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 174.3-SE14246, 174.4-SE14245, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 3217.16-SE13885, 3217.2-SE13886, 3217.18-SE13884, 3217.2-SE13883, 159.0-SE2051, 159.16-SE2050, 1390.18-SE2041, 1390.1-SE2640

Malfunction Thresholds (all active):
Secondary O2 sensor < 0.023 V

1.221 DTC 3227.10-SE14550: Aftertreatment Outlet Oxygen - Abnormal Rate of Change

Monitor Summary:	
DTC	3227.10-SE14550
Description	Secondary O2 Sensor Lean to Rich Switch Time High
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
The engine is running out of fuel = FALSE
Lambda control mode 2 = ACTIVE
3217.3-SE1978 has made a pass decision
3217.4-SE5223 has made a pass decision
3217.20-SE14552 has made a pass decision
3217.21-SE14551 has made a pass decision
3217.2-SE13886 has made a pass decision
3217.2-SE13883 has made a pass decision
3217.18-SE13884 has made a pass decision
3217.16-SE13885 has made a pass decision
3227.3-SE1977 has made a pass decision
3227.4-SE11555 has made a pass decision
3227.21-SE14615 has made a pass decision
3227.20-SE14613 has made a pass decision
3227.18-SE14704 has made a pass decision
None active: 3232.3-SE4040, 3232.4-SE4041, 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 105.2-SE3793, 105.3-SE487, 105.4-SE488, 1696.31-SE13742, 3217.16-SE13885, 3217.18-SE13884, 3217.2-SE13883, 3227.20-SE14613, 3227.21-SE14615, 3232.2-SE13871, 3227.3-SE1977, 3227.4-SE11555, 3227.18-SE14704, 3227.2-SE14189, 412.2-SE9362, 412.3-SE1964, 412.4-SE1965, 412.16-SE2055, 412.2-SE8978, 411.3-SE485, 411.4-SE483, 411.2-SE1911, 411.16-SE13879, 411.18-SE13880, 5019.16-SE14539, 5019.18-SE14540, 5019.2-SE4441, 5019.20-SE14506, 5019.3-SE3003, 5019.4-SE3004, 412.2-SE3872, 159.0-SE2051, 159.16-SE2050, 1390.18-SE2041, 1390.1-SE2640, 4237.0-SE13858, 4237.1-SE13859, 105.0-SE649, 105.2-SE8976, 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995, 3464.6-SE2226, 3464.5-SE14289, 3464.4-SE2225, 3464.3-SE13641, 51.7-SE2312, 3464.0-SE2044, 3464.1-SE2046, 3673.2-SE2047

Malfunction Thresholds (all active):
Secondary O2 sensor lean to rich switch time ≥ 0.8 sec
Number of slow switches in 20 samples ≥ 19
Lean to rich switch is discounted if:
(Secondary O2 sensor voltage does not monotonically increase from 0.199 V to 0.52 V during the switch
OR Average measured fuel system gas mass flow during the switch < 0.35 kg/min
OR Secondary O2 sensor voltage before the start of switch < 0.199 V
FOR ≥ 0.6 sec)

1.222 DTC 3227.18-SE14704: Aftertreatment Outlet Oxygen Sensor - Data Valid But Below Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	3227.18-SE14704
Description	Secondary O2 Sensor Switch Point Voltage Shifted Rich
Monitor Execution	Continuous
Typical Monitoring Duration	200 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Ambient air temperature ≥ -6.703 ˚C
Fuel consumed in current operation cycle ≥ 0.1 kg
The engine is running out of fuel = FALSE
Lambda control mode 2 = ACTIVE
Engine speed ≥ 900 RPM
Fuel system gas mass flow ≥ 0.3 kg/min
After-treatment catalyst temperature 1 ≥ 400 ˚C
Fuel System Closed Loop is active.
3217.3-SE1978 has made a pass decision
3217.4-SE5223 has made a pass decision
3217.20-SE14552 has made a pass decision
3217.21-SE14551 has made a pass decision
3217.2-SE13886 has made a pass decision
3217.2-SE13883 has made a pass decision
3217.18-SE13884 has made a pass decision
3217.16-SE13885 has made a pass decision
3227.3-SE1977 has made a pass decision
3227.4-SE11555 has made a pass decision
3227.21-SE14615 has made a pass decision
3227.20-SE14613 has made a pass decision
None active: 3222.3-SE4029, 3222.4-SE4030, 3232.3-SE4040, 3232.4-SE4041, 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 105.2-SE3793, 105.3-SE487, 105.4-SE488, 1696.31-SE13742, 3222.2-SE13870, 3217.16-SE13885, 3217.2-SE13886, 3217.3-SE1978, 3217.4-SE5223, 3217.18-SE13884, 3217.2-SE13883, 3217.20-SE14552, 3217.21-SE14551, 3227.20-SE14613, 3227.21-SE14615, 3232.2-SE13871, 3227.3-SE1977, 3227.4-SE11555, 412.2-SE9362, 412.3-SE1964, 412.4-SE1965, 412.16-SE2055, 412.2-SE8978, 411.3-SE485, 411.4-SE483, 411.2-SE1911, 411.16-SE13879, 411.18-SE13880, 5019.16-SE14539, 5019.18-SE14540, 5019.2-SE4441, 5019.20-SE14506, 5019.3-SE3003, 5019.4-SE3004, 412.2-SE3872, 159.0-SE2051, 159.16-SE2050, 1390.18-SE2041, 1390.1-SE2640, 4237.0-SE13858, 4237.1-SE13859, 105.0-SE649, 105.2-SE8976, 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995, 3464.6-SE2226, 3464.5-SE14289, 3464.4-SE2225, 3464.3-SE13641, 51.7-SE2312, 3464.0-SE2044, 3464.1-SE2046, 3673.2-SE2047

Malfunction Thresholds (all active):
Average of rich secondary O2 sensor values > [Table of values] V
Where:
Secondary O2 sensor considered lean if value < 0.449 V
Secondary O2 sensor considered rich if value ≥ 0.449 V

1.223 DTC 3227.20-SE14613: Aftertreatment Outlet Oxygen - Data Not Rational - Drifted High

Monitor Summary:	
DTC	3227.20-SE14613
Description	Secondary O2 Sensor Stuck Lean Below a Voltage
Monitor Execution	Continuous
Typical Monitoring Duration	20 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Intake Manifold Pressure ≥ 22.5 kPa(absolute)
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
Lambda control mode 2 = ACTIVE
3217.3-SE1978 has made a pass decision
3217.4-SE5223 has made a pass decision
3217.20-SE14552 has made a pass decision
3217.21-SE14551 has made a pass decision
3217.2-SE13886 has made a pass decision
3217.2-SE13883 has made a pass decision
3217.18-SE13884 has made a pass decision
3217.16-SE13885 has made a pass decision
3227.3-SE1977 has made a pass decision
3227.4-SE11555 has made a pass decision
None active: 3232.3-SE4040, 3232.4-SE4041, 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 174.3-SE14246, 174.4-SE14245, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 3217.16-SE13885, 3217.2-SE13886, 3217.18-SE13884, 3217.2-SE13883, 3232.2-SE13871, 3227.3-SE1977, 3227.4-SE11555, 1390.18-SE2041, 1390.1-SE2640, 4237.0-SE13858, 4237.1-SE13859

Malfunction Thresholds (all active):
Secondary O2 sensor < 0.449 V

1.224 DTC 3227.21-SE14615: Aftertreatment Outlet Oxygen - Data Not Rational - Drifted Low

Monitor Summary:	
DTC	3227.21-SE14615
Description	Secondary O2 Sensor Stuck Rich Above a Voltage
Monitor Execution	Continuous
Typical Monitoring Duration	100 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Intake Manifold Pressure ≥ 22.5 kPa(absolute)
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
Lambda control mode 2 = ACTIVE
3217.3-SE1978 has made a pass decision
3217.4-SE5223 has made a pass decision
3217.20-SE14552 has made a pass decision
3217.21-SE14551 has made a pass decision
3217.2-SE13886 has made a pass decision
3217.2-SE13883 has made a pass decision
3217.18-SE13884 has made a pass decision
3217.16-SE13885 has made a pass decision
3227.3-SE1977 has made a pass decision
3227.4-SE11555 has made a pass decision
None active: 3232.3-SE4040, 3232.4-SE4041, 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 174.3-SE14246, 174.4-SE14245, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 3217.16-SE13885, 3217.2-SE13886, 3217.18-SE13884, 3217.2-SE13883, 3232.2-SE13871, 3227.3-SE1977, 3227.4-SE11555, 1390.18-SE2041, 1390.1-SE2640, 4237.0-SE13858, 4237.1-SE13859

Malfunction Thresholds (all active):
Secondary O2 sensor > 0.449 V

1.225 DTC 3232.2-SE13871: Aftertreatment 1 Outlet Gas Sensor Heater - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	3232.2-SE13871
Description	Secondary O2 Sensor Heater Performance Error
Monitor Execution	Continuous
Typical Monitoring Duration	20 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine is motoring and experiencing fuel cut = FALSE
FOR ≥ 15 sec
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
Secondary O2 sensor heater duty cycle > 4 %
FOR ≥ 12 sec

Malfunction Thresholds (all active):
(Secondary O2 sensor heater resistance > 50 Ω
OR Secondary O2 sensor heater resistance < 7 Ω)

1.226 DTC 3232.3-SE4040: Aftertreatment Outlet Oxygen Sensor Heater - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	3232.3-SE4040
Description	Secondary O2 Sensor Heater Shorted High
Monitor Execution	Continuous
Typical Monitoring Duration	50 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine ≠ RUNNING
Secondary O2 sensor heater commanded = OFF

Malfunction Thresholds (all active):
Secondary O2 sensor heater element ≥ 3.25 V

1.227 DTC 3232.4-SE4041: Aftertreatment Outlet Oxygen Sensor Heater - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	3232.4-SE4041
Description	Secondary O2 Sensor Heater Shorted Low
Monitor Execution	Continuous
Typical Monitoring Duration	50 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine = RUNNING
Secondary O2 sensor heater commanded = ON

Malfunction Thresholds (all active):
Secondary O2 sensor heater element ≥ 5 A

1.228 DTC 3241.0-SE2674: Aftertreatment Exhaust Gas Temperature 1 - Data Valid But Above Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	3241.0-SE2674
Description	Aftertreatment Catalyst Temperature 1 Sensor Above Critical Threshold
Monitor Execution	Continuous
Typical Monitoring Duration	2 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine speed ≥ 400 RPM
None active: 3241.15-SE13792, 3241.2-SE9367, 3241.2-SE9008, 3241.3-SE2669, 3241.4-SE2670

Malfunction Thresholds (all active):
Brick temperature based on aftertreatment catalyst temperature 1 sensor [Table of values] ≥ 1,000 °C

1.229 DTC 3241.2-SE9008: Aftertreatment Exhaust Gas Temperature 1 - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	3241.2-SE9008
Description	Aftertreatment Catalyst Temperature 1 Sensor Stuck
Monitor Execution	Continuous
Typical Monitoring Duration	600 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine state = RUN
Net engine torque > 450 Nm
Net engine torque < 300 Nm
None active: 3241.15-SE13792, 3241.2-SE9367, 3241.3-SE2669, 3241.4-SE2670

Malfunction Thresholds (all active):
Change in aftertreatment catalyst temperature 1 < 10 °C
When:
(Net engine torque > 450 Nm
FOR Cumulative Time ≥ 300 sec
AND Net engine torque < 300 Nm
FOR Cumulative Time ≥ 300 sec)

1.230 DTC 3241.2-SE9367: Aftertreatment Exhaust Gas Temperature 1 - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	3241.2-SE9367
Description	Aftertreatment Catalyst Temperature 1 Sensor Low
Monitor Execution	Continuous
Typical Monitoring Duration	0.02 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = OFF
Coolant temperature > 70 °C
FOR ≥ 5 sec
(Aftertreatment catalyst temperature 1 ≥ 0 °C
AND Net engine torque ≥ 450 Nm
FOR ≥ 300 sec)
None active: 3241.15-SE13792, 3241.2-SE9008, 3241.3-SE2669, 3241.4-SE2670, 110.3-SE75, 110.4-SE76, 110.2-SE3668, 110.2-SE3669

Malfunction Thresholds (all active):
Highest aftertreatment catalyst temperature 1 < 200 °C

1.231 DTC 3241.3-SE2669: Aftertreatment Exhaust Gas Temperature 1 Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	3241.3-SE2669
Description	Aftertreatment Catalyst Temperature 1 Sensor Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine state = RUN
Engine state = RUN
FOR ≥ 90 sec
Engine is motoring and experiencing fuel cut = FALSE

Malfunction Thresholds (all active):
Aftertreatment catalyst temperature 1 > 4.917 V (< 68.565 ˚C)

1.232 DTC 3241.4-SE2670: Aftertreatment Exhaust Gas Temperature 1 Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	3241.4-SE2670
Description	Aftertreatment Catalyst Temperature 1 Sensor Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Aftertreatment catalyst temperature 1 < 0.13 V (> 1,000 °C)

1.233 DTC 3241.15-SE13792: Aftertreatment Exhaust Gas Temperature 1 - Data Valid But Above Normal Operating Range - Least Severe Level

Monitor Summary:	
DTC	3241.15-SE13792
Description	Aftertreatment Catalyst Temperature 1 Sensor High
Monitor Execution	Continuous
Typical Monitoring Duration	2 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine off time ≥ 28,800 sec
None active: 3241.2-SE9367, 3241.2-SE9008, 3241.3-SE2669, 3241.4-SE2670

Malfunction Thresholds (all active):
Average of aftertreatment catalyst temperature ≥ 200 °C
Samples = 100
At keyswitch = ON

1.234 DTC 3241.16-SE2672: Aftertreatment Exhaust Gas Temperature 1 - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	3241.16-SE2672
Description	Aftertreatment Catalyst Temperature 1 Sensor Above Moderate Threshold
Monitor Execution	Continuous
Typical Monitoring Duration	2 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine speed ≥ 400 RPM
None active: 3241.15-SE13792, 3241.2-SE9367, 3241.2-SE9008, 3241.3-SE2669, 3241.4-SE2670

Malfunction Thresholds (all active):
Brick temperature based on aftertreatment catalyst temperature 1 sensor [Table of values] ≥ 950 °C

1.235 DTC 3249.0-SE9078: Aftertreatment Exhaust Gas Temperature 2 - Data Valid But Above Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	3249.0-SE9078
Description	Aftertreatment Catalyst Temperature 2 Sensor Above Critical Threshold
Monitor Execution	Continuous
Typical Monitoring Duration	2 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine speed ≥ 400 RPM
None active: 3249.15-SE13793, 3249.17-SE9366, 3249.3-SE8805, 3249.4-SE8806, 3249.2-SE9009

Malfunction Thresholds (all active):
Brick temperature based on aftertreatment catalyst temperature 2 sensor [Table of values] ≥ 1,000 °C

1.236 DTC 3249.2-SE9009: Aftertreatment Exhaust Gas Temperature 2 - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	3249.2-SE9009
Description	Aftertreatment Catalyst Temperature 2 Sensor Stuck
Monitor Execution	Continuous
Typical Monitoring Duration	600 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine state = RUN
Net engine torque > 450 Nm
Net engine torque < 300 Nm
None active: 3249.15-SE13793, 3249.17-SE9366, 3249.3-SE8805, 3249.4-SE8806

Malfunction Thresholds (all active):
Change in aftertreatment catalyst temperature 2 < 10 °C
When:
(Net engine torque > 450 Nm
FOR Cumulative time ≥ 300 sec
AND Net engine torque < 300 Nm
FOR Cumulative time ≥ 300 sec)

1.237 DTC 3249.3-SE8805: Aftertreatment Exhaust Gas Temperature 2 Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	3249.3-SE8805
Description	Aftertreatment Catalyst Temperature 2 Sensor Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine state = RUN
Engine state = RUN
FOR ≥ 90 sec
Engine is motoring and experiencing fuel cut = FALSE

Malfunction Thresholds (all active):
Aftertreatment catalyst temperature 2 > 4.917 V (< 68.565 ˚C)

1.238 DTC 3249.4-SE8806: Aftertreatment Exhaust Gas Temperature 2 Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	3249.4-SE8806
Description	Aftertreatment Catalyst Temperature 2 Sensor Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	5 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Aftertreatment catalyst temperature 2 < 0.13 V (> 1,000 °C)

1.239 DTC 3249.15-SE13793: Aftertreatment Exhaust Gas Temperature 2 - Data Valid But Above Normal Operating Range - Least Severe Level

Monitor Summary:	
DTC	3249.15-SE13793
Description	Aftertreatment Catalyst Temperature 2 Sensor High
Monitor Execution	Continuous
Typical Monitoring Duration	2 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine off time ≥ 28,800 sec
None active: 3249.17-SE9366, 3249.3-SE8805, 3249.4-SE8806, 3249.2-SE9009

Malfunction Thresholds (all active):
Average of aftertreatment catalyst temperature 2 ≥ 200 °C
Samples = 100
At keyswitch = ON

1.240 DTC 3249.16-SE9077: Aftertreatment Exhaust Gas Temperature 2 - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	3249.16-SE9077
Description	Aftertreatment Catalyst Temperature 2 Sensor Above Moderate Threshold
Monitor Execution	Continuous
Typical Monitoring Duration	2 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine speed ≥ 400 RPM
None active: 3249.15-SE13793, 3249.17-SE9366, 3249.3-SE8805, 3249.4-SE8806, 3249.2-SE9009

Malfunction Thresholds (all active):
Brick temperature based on aftertreatment catalyst temperature 2 sensor [Table of values] ≥ 950 °C

1.241 DTC 3249.17-SE9366: Aftertreatment Exhaust Gas Temperature 2 - Data Valid But Below Normal Operating Range - Least Severe Level

Monitor Summary:	
DTC	3249.17-SE9366
Description	Aftertreatment Catalyst Temperature 2 Sensor Low
Monitor Execution	Continuous
Typical Monitoring Duration	0.02 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = OFF
Coolant temperature > 70 °C
FOR ≥ 5 sec
(Aftertreatment catalyst temperature 2 ≥ 0 °C
AND Net engine torque ≥ 450 Nm
FOR ≥ 300 sec)
None active: 3249.15-SE13793, 3249.3-SE8805, 3249.4-SE8806, 3249.2-SE9009, 110.3-SE75, 110.4-SE76, 110.2-SE3668, 110.2-SE3669

Malfunction Thresholds (all active):
Highest aftertreatment catalyst temperature 2 < 200 °C

1.242 DTC 3464.0-SE2044: Electronic Throttle Control Actuator - Data Valid But Above Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	3464.0-SE2044
Description	Electronic Throttle Actuator Open when not Commanded
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Engine speed > 1,000 RPM
None active: 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995, 3464.6-SE2226, 3464.5-SE14289, 3464.4-SE2225, 3464.3-SE13641, 3464.1-SE2046

Malfunction Thresholds (all active):
Electronic throttle actuator position (feedback - commanded) > 25 %

1.243 DTC 3464.1-SE2046: Electronic Throttle Control Actuator - Data Valid But Below Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	3464.1-SE2046
Description	Electronic Throttle Actuator Proper Response not Received
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
(Engine = CRANKING
OR Engine = RUNNING)
None active: 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995, 3464.6-SE2226, 3464.5-SE14289, 3464.4-SE2225, 3464.3-SE13641

Malfunction Thresholds (all active):
Electronic throttle actuator position (commanded - feedback) > 25 %

1.244 DTC 3464.3-SE13641: Electronic Throttle Control Actuator Driver Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	3464.3-SE13641
Description	Electronic Throttle Actuator Driver Shorted High
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Battery voltage > 6 V

Malfunction Thresholds (all active):
Voltage across low side switches of the H-bridge driver circuit > 0.5 V

1.245 DTC 3464.4-SE2225: Electronic Throttle Control Actuator Driver Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	3464.4-SE2225
Description	Electronic Throttle Actuator Driver Circuit Shorted Low
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Battery voltage > 6 V

Malfunction Thresholds (all active):
Voltage across high side switches of the H-bridge driver circuit < battery voltage - 0.5 V

1.246 DTC 3464.5-SE14289: Engine Throttle Control Actuator - Current Below Normal or Open Circuit

Monitor Summary:	
DTC	3464.5-SE14289
Description	Electronic Throttle Actuator Driver Circuit Detects Open Circuit
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Battery voltage > 6 V

Malfunction Thresholds (all active):
Electronic throttle actuator H-bridge driver circuit resistance ≥ 50 kΩ

1.247 DTC 3464.6-SE2226: Engine Throttle Control Actuator - Current Above Normal or Grounded Circuit

Monitor Summary:	
DTC	3464.6-SE2226
Description	Electronic Throttle Actuator Driver Circuit has Excessive Current
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Battery voltage > 6 V

Malfunction Thresholds (all active):
Electronic throttle actuator current feedback > 16.5 A

1.248 DTC 3509.3-SE243: Sensor Supply 1 Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	3509.3-SE243
Description	Sensor Supply 1 Out of Range High
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Sensor supply 1 voltage > 5.356 V

1.249 DTC 3509.4-SE225: Sensor Supply 1 Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	3509.4-SE225
Description	Sensor Supply 1 Out of Range Low
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Sensor supply 1 voltage < 4.644 V

1.250 DTC 3510.3-SE119: Sensor Supply 2 Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	3510.3-SE119
Description	Sensor Supply 2 Out of Range High
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Sensor supply 2 voltage > 5.356 V

1.251 DTC 3510.4-SE101: Sensor Supply 2 Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	3510.4-SE101
Description	Sensor Supply 2 Out of Range Low
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Sensor supply 2 voltage < 4.644 V

1.252 DTC 3511.3-SE814: Sensor Supply 3 Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	3511.3-SE814
Description	Sensor Supply 3 Out of Range High
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Sensor supply 3 voltage > 5.356 V

1.253 DTC 3511.4-SE816: Sensor Supply 3 Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	3511.4-SE816
Description	Sensor Supply 3 Out of Range Low
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Sensor supply 3 voltage < 4.644 V

1.254 DTC 3512.3-SE817: Sensor Supply 4 Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	3512.3-SE817
Description	Sensor Supply 4 Out of Range High
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Sensor supply 4 voltage > 5.356 V

1.255 DTC 3512.4-SE815: Sensor Supply 4 Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	3512.4-SE815
Description	Sensor Supply 4 Out of Range Low
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Sensor supply 4 voltage < 4.644 V

1.256 DTC 3513.3-SE1893: Sensor Supply 5 Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	3513.3-SE1893
Description	Sensor Supply 5 Out of Range High
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Sensor supply 5 voltage > 5.356 V

1.257 DTC 3513.4-SE1894: Sensor Supply 5 Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	3513.4-SE1894
Description	Sensor Supply 5 Out of Range Low
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Sensor supply 5 voltage < 4.644 V

1.258 DTC 3514.3-SE2030: Sensor Supply 6 Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	3514.3-SE2030
Description	Sensor Supply 6 Out of Range High
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Sensor supply 6 voltage > 5.356 V

1.259 DTC 3514.4-SE2031: Sensor Supply 6 Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	3514.4-SE2031
Description	Sensor Supply 6 Out of Range Low
Monitor Execution	Continuous
Typical Monitoring Duration	0.4 sec
MIL Activation Criteria	1 trip

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Sensor supply 6 voltage < 4.644 V

1.260 DTC 3673.2-SE2047: Throttle Plate Position Sensor 1 and 2 - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	3673.2-SE2047
Description	Electronic Throttle Actuator Position 1 and 2 Difference
Monitor Execution	Continuous
Typical Monitoring Duration	0.5 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
None active: 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995

Malfunction Thresholds (all active):
|Electronic throttle actuator (position 1 - position 2)| > 20 %

1.261 DTC 3673.3-SE1994: Throttle Position 2 Sensor Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	3673.3-SE1994
Description	Electronic Throttle Actuator Position 2 Sensor Circuit Voltage High or Shorted High
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Electronic throttle actuator position 2 > 4.8 V (100 %)

1.262 DTC 3673.4-SE1995: Throttle Position 2 Sensor Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	3673.4-SE1995
Description	Electronic Throttle Actuator Position 2 Sensor Circuit Voltage Low or Shorted Low
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
Electronic throttle actuator position 2 < 0.2 V (0 %)

1.263 DTC 4237.0-SE13858: Long-term Fuel Trim - Bank 1 - Data Valid But Above Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	4237.0-SE13858
Description	Fuel System Primary O2 Sensor Adaptive Feedback Control Used up All Allowed Lean Adjustment
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
Fuel System Closed Loop is active.
Commanded fuel system gas mass flow ≥ 0.681 kg/min
Commanded fuel system gas mass flow ≤ 1.129 kg/min
Time spent by engine at the speed-load (given by commanded fuel system gas mass flow) point where decision expected ≥ 80 sec
Coolant temperature ≥ 71.109 °C
FOR ≥ 120 sec
None active: 6575.2-SE14417, 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 174.3-SE14246, 174.4-SE14245, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 105.2-SE3793, 105.3-SE487, 105.4-SE488, 3217.16-SE13885, 3217.2-SE13886, 3217.18-SE13884, 3217.2-SE13883, 412.2-SE9362, 412.3-SE1964, 412.4-SE1965, 412.16-SE2055, 412.2-SE8978, 411.3-SE485, 411.4-SE483, 411.2-SE1911, 411.16-SE13879, 411.18-SE13880, 2659.16-SE2028, 5019.16-SE14539, 5019.18-SE14540, 5019.2-SE4441, 5019.20-SE14506, 5019.3-SE3003, 5019.4-SE3004, 412.2-SE3872, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 159.31-SE14391, 159.21-SE14412, 159.2-SE13721, 159.3-SE1986, 159.4-SE1987, 159.0-SE2051, 159.16-SE2050, 1390.20-SE13720, 1390.18-SE2041, 1390.21-SE13718, 1390.1-SE2640, 174.20-SE13722, 174.21-SE13723, 105.0-SE649, 105.2-SE8976

Malfunction Thresholds (all active):
Normalized primary O2 sensor fuel system adaptive feedback control offset ≥ [Table of values] (unitless)
FOR ≥ 24 sec
Out of = 60 sec

1.264 DTC 4237.1-SE13859: Long-term Fuel Trim - Bank 1 - Data Valid But Below Normal Operating Range - Most Severe Level

Monitor Summary:	
DTC	4237.1-SE13859
Description	Fuel System Primary O2 Sensor Adaptive Feedback Control Used up All Allowed Rich Adjustment
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
Fuel System Closed Loop is active.
Commanded fuel system gas mass flow ≥ 0.681 kg/min
Commanded fuel system gas mass flow ≤ 1.129 kg/min
Time spent by engine at the speed-load (given by commanded fuel system gas mass flow) point where decision expected ≥ 80 sec
Coolant temperature ≥ 71.109 °C
FOR ≥ 120 sec
None active: 6575.2-SE14417, 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 174.3-SE14246, 174.4-SE14245, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 105.2-SE3793, 105.3-SE487, 105.4-SE488, 3217.16-SE13885, 3217.2-SE13886, 3217.18-SE13884, 3217.2-SE13883, 412.2-SE9362, 412.3-SE1964, 412.4-SE1965, 412.16-SE2055, 412.2-SE8978, 411.3-SE485, 411.4-SE483, 411.2-SE1911, 411.16-SE13879, 411.18-SE13880, 2659.16-SE2028, 5019.16-SE14539, 5019.18-SE14540, 5019.2-SE4441, 5019.20-SE14506, 5019.3-SE3003, 5019.4-SE3004, 412.2-SE3872, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494, 159.31-SE14391, 159.21-SE14412, 159.2-SE13721, 159.3-SE1986, 159.4-SE1987, 159.0-SE2051, 159.16-SE2050, 1390.20-SE13720, 1390.18-SE2041, 1390.21-SE13718, 1390.1-SE2640, 174.20-SE13722, 174.21-SE13723, 105.0-SE649, 105.2-SE8976

Malfunction Thresholds (all active):
Normalized primary O2 sensor fuel system adaptive feedback control offset ≤ [Table of values] (unitless)
FOR ≥ 24 sec
Out of = 40 sec

1.265 DTC 4490.2-SE16552: Specific Humidity Sensor - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	4490.2-SE16552
Description	Relative Humidity Sensor Reading Noisy or Erratic
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec (100 samples at 100 msec sample rate)
MIL Activation Criteria	2 trips

Entry Conditions (all active):
None active: 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
Sum of differences between consecutive relative humidity samples ≥ 300 %

1.266 DTC 4490.2-SE17124: Specific Humidity Sensor - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	4490.2-SE17124
Description	Relative Humidity Sensor Stuck In Range
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Compressor inlet temperature = CHANGING
Compressor inlet pressure = STABLE
None active: 4490.19-SE6971, 4490.9-SE6970

Malfunction Thresholds (all active):
Sum of 100 consecutive differences of relative humidity < 1 %
When:
(Sum of 100 consecutive differences of compressor inlet temperature > 10 °C
AND Sum of 100 consecutive differences of compressor inlet pressure < 15 kPa)
FOR ≥ 3 sec
FOR ≥ 3 counts
Where:
Sampling rate = 100 msec

1.267 DTC 4490.9-SE6970: Specific Humidity Sensor - Abnormal Update Rate

Monitor Summary:	
DTC	4490.9-SE6970
Description	TriCAN Smart Sensor Message not Received
Monitor Execution	Continuous
Typical Monitoring Duration	4 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
(Keyswitch = ON
FOR ≥ 30 sec
OR Engine ≠ CRANKING
FOR ≥ 30 sec)

Malfunction Thresholds (all active):
TriCAN smart sensor message ≠ RECEIVED

1.268 DTC 4490.19-SE6971: Specific Humidity Sensor - Received Network Data in Error

Monitor Summary:	
DTC	4490.19-SE6971
Description	TriCAN Smart Sensor Reports Error
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
(TriCAN smart sensor pressure element ≥ X V
FOR ≥ X sec
OR TriCAN smart sensor pressure element < X V
FOR ≥ X sec
OR TriCAN smart sensor temperature element ≥ X V
FOR ≥ X sec
OR TriCAN smart sensor temperature element < X V
FOR ≥ X sec
OR TriCAN smart sensor relative humidity element ≥ X V
FOR ≥ X sec
OR TriCAN smart sensor relative humidity element < X V
FOR ≥ X sec
OR TriCAN smart sensor internal temperature ≥ X °C
OR TriCAN smart sensor specific humidity ≤ X g/kg
FOR ≥ X sec
OR TriCAN smart sensor specific humidity > X g/kg
FOR ≥ X sec
OR TriCAN smart sensor dew point ≤ X °C
FOR ≥ X sec
OR TriCAN smart sensor dew point > X °C
FOR ≥ X sec
OR TriCAN smart sensor software validation key ≠ calibrated validation key
FOR ≥ 35 sec)

1.269 DTC 5019.2-SE4441: Engine Exhaust Gas Recirculation Outlet Pressure - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	5019.2-SE4441
Description	EGR Orifice Pressure Sensor Reading Erratic, Intermittent, or Incorrect at Keyswitch Off
Monitor Execution	Continuous
Typical Monitoring Duration	1 sec within a 5 sec window.
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Coolant temperature > 70 °C
Engine = STOPPED
Number of pressure sensors available ≥ 3 sensors
Exhaust pressure sensor tube icing ≠ ACTIVE
Keyswitch = OFF
FOR ≥ 30 sec
None active: 5019.3-SE3003, 5019.4-SE3004

Malfunction Thresholds (all active):
(
EGR orifice pressure sensor reading < 17 kPa(absolute)
OR EGR orifice pressure sensor reading > 145 kPa(absolute)
OR (
|EGR orifice pressure - pressure with lowest tolerance from remaining sensors| > (28.63 + lowest tolerance of remaining pressure sensors) kPa(absolute)
AND |EGR orifice pressure - pressure with second lowest tolerance from remaining sensors| > (28.63 + second lowest tolerance of remaining pressure sensors) kPa(absolute)
AND |Pressure with lowest tolerance from remaining sensors - pressure with second lowest tolerance from remaining sensors| < (lowest tolerance of remaining pressure sensors + second lowest tolerance of remaining pressure sensors) kPa(absolute)
)
)
Tolerance of remaining pressure sensors are:
Charge pressure sensor tolerance = 12 kPa(absolute)
Compressor inlet pressure sensor tolerance = 5.81 kPa(absolute)
Compressor outlet pressure sensor tolerance = 18.31 kPa(absolute)
Exhaust pressure sensor tolerance = 28.78 kPa(absolute)
Oil pressure sensor tolerance = 29.44 kPa(absolute)

1.270 DTC 5019.3-SE3003: Engine Exhaust Gas Recirculation Outlet Pressure Sensor Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	5019.3-SE3003
Description	EGR Orifice Pressure Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	8 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
EGR orifice pressure > 4.774 V (632.06 kPa(absolute))

1.271 DTC 5019.4-SE3004: Engine Exhaust Gas Recirculation Outlet Pressure Sensor Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	5019.4-SE3004
Description	EGR Orifice Pressure Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	8 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
EGR orifice pressure < 0.115 V (7.612 kPa(absolute))

1.272 DTC 5019.16-SE14539: Engine Exhaust Gas Recirculation Outlet Pressure - Data Valid But Above Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	5019.16-SE14539
Description	EGR Orifice Pressure High
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine state = RUN
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
Engine has still not exited fuel cut after a motoring event = FALSE
Ice formation is suspected on Exhaust Manifold Pressure = FALSE
None active: 5019.2-SE4441, 5019.20-SE14506, 5019.3-SE3003, 5019.4-SE3004, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494

Malfunction Thresholds (all active):
Ratio of filtered EGR orifice pressure to filtered exhaust manifold pressure ≥ [Table of values] (unitless)

1.273 DTC 5019.18-SE14540: Engine Exhaust Gas Recirculation Outlet Pressure - Data Valid But Below Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	5019.18-SE14540
Description	EGR Orifice Pressure Low
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
Engine has still not exited fuel cut after a motoring event = FALSE
Ice formation is suspected on Exhaust Manifold Pressure = FALSE
Engine state = RUN
None active: 5019.2-SE4441, 5019.20-SE14506, 5019.3-SE3003, 5019.4-SE3004, 1209.16-SE13860, 1209.18-SE13861, 1209.2-SE4442, 1209.3-SE493, 1209.4-SE494

Malfunction Thresholds (all active):
Ratio of filtered EGR orifice pressure to filtered exhaust manifold pressure ≤ [Table of values] (unitless)

1.274 DTC 5019.20-SE14506: Engine Exhaust Gas Recirculation Outlet Pressure - Data Not Rational - Drifted High

Monitor Summary:	
DTC	5019.20-SE14506
Description	EGR Orifice Pressure Sensor High
Monitor Execution	Continuous
Typical Monitoring Duration	10 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
None active: 5019.3-SE3003, 5019.4-SE3004

Malfunction Thresholds (all active):
EGR orifice pressure ≥ 550 kPa(absolute)

1.275 DTC 5396.31-SE3524: Engine Crankcase Ventilation Hose Disconnected - Condition Exists

Monitor Summary:	
DTC	5396.31-SE3524
Description	Closed Crankcase Ventilation (CCV) Hose Disconnected
Monitor Execution	Continuous
Typical Monitoring Duration	1,310.7 sec for the lower boost bucket OR 600 sec for the higher boost bucket
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine speed > 600 RPM
Boost pressure ≥ 125 kPa(gauge)
Boost pressure ≤ 350 kPa(gauge)
Coolant temperature ≥ 71.109 °C
FOR ≥ 900 sec
None active: 6302.3-SE7377, 6302.4-SE7378

Malfunction Thresholds (all active):
(
In lower boost bucket, average CCV pressure > 5 kPa(gauge)
Where the lower boost bucket:
Engine boost pressure ≥ -100 kPa(gauge)
Engine boost pressure ≤ -100 kPa(gauge)
OR In the higher boost bucket, average CCV pressure > -0.2 kPa(gauge)
Where the higher boost bucket:
Engine boost pressure ≥ 125 kPa(gauge)
Engine boost pressure ≤ 350 kPa(gauge)
)

1.276 DTC 6302.2-SE7379: Crankcase Pressure 2 - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	6302.2-SE7379
Description	Closed Crankcase Ventilation (CCV) Pressure In Range High or In Range Low
Monitor Execution	Continuous
Typical Monitoring Duration	0.02 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Engine speed ≤ 0 RPM
FOR ≥ 30 sec
(Coolant temperature > 71.109 ˚C
FOR ≥ 900 sec
AND None active: 110.3-SE75, 110.4-SE76)
CCV pressure delta ≤ 0.02 kPa(gauge)
None active: 6302.3-SE7377, 6302.4-SE7378

Malfunction Thresholds (all active):
(
CCV pressure > 0.8 kPa(gauge)
OR CCV pressure < -0.8 kPa(gauge)
)

1.277 DTC 6302.3-SE7377: Crankcase Pressure 2 Sensor Circuit - Voltage Above Normal or Shorted to High Source

Monitor Summary:	
DTC	6302.3-SE7377
Description	Closed Crankcase Ventilation (CCV) Pressure Circuit Continuity High
Monitor Execution	Continuous
Typical Monitoring Duration	8 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
CCV pressure sensor value > 4.751 V (7.472 kPa(gauge))

1.278 DTC 6302.4-SE7378: Crankcase Pressure 2 Sensor Circuit - Voltage Below Normal or Shorted to Low Source

Monitor Summary:	
DTC	6302.4-SE7378
Description	Closed Crankcase Ventilation (CCV) Pressure Circuit Continuity Low
Monitor Execution	Continuous
Typical Monitoring Duration	8 sec
MIL Activation Criteria	2 trips

Entry Conditions (all active):
Keyswitch = ON

Malfunction Thresholds (all active):
CCV pressure sensor value < 0.254 V (-3.069 kPa(gauge))

1.279 DTC 6575.2-SE14417: Engine Main Chamber Air Fuel Ratio - Data Erratic, Intermittent, or Incorrect

Monitor Summary:	
DTC	6575.2-SE14417
Description	Air Fuel Ratio Imbalance Detected
Monitor Execution	Continuous
Typical Monitoring Duration	325 cam revs
MIL Activation Criteria	2 trips

Entry Conditions (all active):
All Enable Conditions
FOR ≥ 1 sec
Fuel System Closed Loop is active.
Intake manifold pressure ≤ 55 kPa(absolute)
Engine speed ≤ reference idle speed + 100 RPM
Engine speed ≥ reference idle speed + -100 RPM
Net engine torque ≤ 90 Nm
None active: 102.2-SE4439, 3217.16-SE13885, 3217.2-SE13886, 3217.18-SE13884, 3217.2-SE13883, 102.16-SE2323, 102.18-SE2324, 102.3-SE1999, 102.4-SE2000, 102.2-SE13766, 102.2-SE9037, 102.2-SE15429

Malfunction Thresholds (all active):
Maximum value of filtered primary O2 sensor voltage > 3 (unitless)

1.280 DTC 6652.18-SE14237: Aftertreatment 1 Three Way Catalyst Conversion Efficiency - Data Valid But Below Normal Operating Range - Moderately Severe Level

Monitor Summary:	
DTC	6652.18-SE14237
Description	Three Way Catalyst (TWC) Missing or Efficiency Low
Monitor Execution	Continuous
Typical Monitoring Duration	Immediate
MIL Activation Criteria	2 trips

Entry Conditions (all active):
The engine is running out of fuel = FALSE
Lean Burn Engine Protection Mode is active due to failure in a critical air, fuel, or EGR component = FALSE
Ambient air temperature > -6.703 °C
Lambda control mode 2 = ACTIVE
Filtered Absolute Change in estimated mass air flow (over 0.02 sec) ≤ [Table of values] kg/min
FOR ≥ 6 sec
3217.3-SE1978 has made a pass decision
3217.4-SE5223 has made a pass decision
3217.20-SE14552 has made a pass decision
3217.21-SE14551 has made a pass decision
3217.2-SE13886 has made a pass decision
3217.2-SE13883 has made a pass decision
3217.18-SE13884 has made a pass decision
3217.16-SE13885 has made a pass decision
3227.3-SE1977 has made a pass decision
3227.4-SE11555 has made a pass decision
3227.18-SE14704 has made a pass decision
3227.2-SE14189 has made a pass decision
3227.20-SE14613 has made a pass decision
3227.21-SE14615 has made a pass decision
None active: 3241.15-SE13792, 3241.2-SE9367, 3241.2-SE9008, 3249.15-SE13793, 3249.17-SE9366, 3249.3-SE8805, 3249.2-SE9009, 3241.3-SE2669, 3241.4-SE2670, 3232.3-SE4040, 3232.4-SE4041, 609.12-SE14239, 609.12-SE14240, 609.12-SE14243, 609.12-SE14244, 168.1-SE17602, 609.1-SE17606, 609.9-SE17605, 1390.3-SE14241, 1390.4-SE14242, 609.12-SE14411, 609.2-SE14238, 609.2-SE14410, 609.9-SE17604, 609.12-SE14247, 609.1-SE17603, 609.1-SE14249, 105.2-SE3793, 105.3-SE487, 105.4-SE488, 1696.31-SE13742, 3217.16-SE13885, 3217.2-SE13886, 3217.18-SE13884, 3217.2-SE13883, 3227.20-SE14613, 3227.21-SE14615, 3232.2-SE13871, 3227.10-SE14550, 3227.3-SE1977, 3227.4-SE11555, 3227.18-SE14704, 3227.2-SE14189, 1323.11-SE12011, 1324.11-SE12012, 1325.11-SE12013, 1326.11-SE12014, 1327.11-SE12015, 1328.11-SE12016, 1323.16-SE12458, 1324.16-SE12459, 1325.16-SE12460, 1326.16-SE12461, 1327.16-SE12462, 1328.16-SE12463, 412.2-SE9362, 412.3-SE1964, 412.4-SE1965, 412.16-SE2055, 412.2-SE8978, 411.3-SE485, 411.4-SE483, 411.2-SE1911, 411.16-SE13879, 411.18-SE13880, 5019.16-SE14539, 5019.18-SE14540, 5019.2-SE4441, 5019.20-SE14506, 5019.3-SE3003, 5019.4-SE3004, 412.2-SE3872, 4237.0-SE13858, 4237.1-SE13859, 105.0-SE649, 105.2-SE8976, 1322.11-SE12019, 1322.16-SE12464, 1180.3-SE2026, 1180.4-SE2027, 51.3-SE1991, 51.4-SE1993, 3673.3-SE1994, 3673.4-SE1995, 3464.6-SE2226, 3464.5-SE14289, 3464.4-SE2225, 3464.3-SE13641, 51.7-SE2312, 3464.0-SE2044, 3464.1-SE2046, 3673.2-SE2047, 1180.15-SE13882, 1180.18-SE13881

Malfunction Thresholds (all active):
Standard deviation of primary O2 sensor lean air-fuel ratio commanded time periods < [Table of values] sec
In secondary O2 lean switch events = 30 counts