INFORMATION DOCUMENT

of

Diesel On-Board Diagnostic system

Family Name : MMC-EOBD-D21

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3.2.12.2.7.1.	Written description and/or drawing of the MI	: See Part 3
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3.2.12.2.7.4.	Criteria for MI activation (fixed number of driving cycles or statistical method)	: See Parts 3 to 6
3.2.12.2.7.5.	List of all OBD output codes and formats used (with explanation of each)	: See Parts 3 to 6
3.2.12.2.7.6.	Additional information provided by the vehicle manufacturer for the purposes of enabling the manufacturer of OBD-compatible replacement or service parts and diagnostic tools and test equipment	: See Parts 3 to 6
3.2.12.2.7.6.1.	A description of the type and number of the pre-conditioning cycles used for the original type-approval of the vehicle.	: See Part 4
3.2.12.2.7.6.2.	A description of the type of the OBD demonstration cycle used for the original type-approval of the vehicle for the component monitored by the OBD system.	: See Part 4

3.2.12.2.7.6.3.	A comprehensive document describing all sensed components with the strategy for fault detection and MI activation (fixed number of driving cycles or statistical method), including a list of relevant secondary sensed parameters for each component monitored by the OBD system. A list of all OBD output codes and format used (with an explanation of each) associated with individual emission related power-train components and individual non-emission related components, where monitoring of the component is used to determine MI activation. In particular, a comprehensive explanation for the data given in service $05 Test ID $21 to FF and the data given in service $06 shall be provided. In the case of vehicle types that use a communication link in accordance with ISO 15765-4 'Road vehicles diagnostics on controller area network (CAN) - part 4: requirements for emissions-related systems', a comprehensive explanation for the data given in service $06 Test ID $00 to FF, for each OBD monitor ID supported, shall be provided.	: See Parts 4 & 6
3.2.12.2.7.6.4.	The information required by this section may, for example, be defined by completing a table as follows, which shall be attached to this Annex.	: See Part 4

Description of monitoring

1. Monitoring items

Monitoring items are listed in Part 4.

Following components are not monitored since defective components will not result in emissions exceeding the EOBD-limits.

- EGR cooler

When the malfunction condition is detected, the fault code and freeze-frame data will be stored and the MI will be illuminated.

2. Readiness

The readiness can be read-out and reset by means of a general scan-tool via the data link connector in the vehicle.
Battery disconnection does not reset the readiness status.

At the end of the D/C*, the readiness will be attained in case there are no tests that are incomplete (Judgment of malfunction or not is made by the EOBD-system)

* : D/C means the driving cycle of Type I test.

3. Fault code storage

The fault codes can be read-out and reset by means of a general scan-tool via the diagnostic connector in the vehicle.

The fault codes will be erased from the ECU after 40 warm up cycles during which the failure has not been reported anymore.

(Annex XI of UN/ECE Regulation 83, paragraph 3.6.1.)
The distance traveled by the vehicle while MI activated is available.

4. Freeze-frame storage

In the application to the engine(s) covered by this EOBD family, one freeze-frame of data is available. The freeze-frame shows the following data, which will be stored in the ECU at a defect recognition.

- Coolant temperature
- Intake manifold absolute pressure
- Engine RPM
- Vehicle speed
- Intake air temperature
- Air flow rate
- Absolute throttle position
- Time since engine start
- Commanded throttle actuator control
- Fuel rail pressure
- Commanded EGR valve position
- EGR valve position
- Barometric Pressure
- Control module voltage
- Relative throttle position
- Accelerator Pedal position main
- Accelerator Pedal position sub

The freeze-frame data can be read-out and reset by means of a general scan-tool via the data link connector in the vehicle.

The freeze-frame will be erased from the ECU after 40 warm up cycles during which the failure has not been reported anymore.

5. Calibration identification

The software calibration identification number is available through the serial port on the standardized data link connector and is provided in a standardized format in accordance with SAE J1979

The software calibration identification number is alphanumeric designation which has max. 16.places.

6. Data link connector

Data link connector complies with ISO DIS 15031-3.

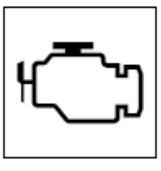
7. Malfunction indicator

Malfunction indicator lamp identified by the following symbol illuminates when the ignition key is turned to “ON” position before engine start to indicate that malfunction indicator lamp is functioning.

Malfunction indicator lamp illuminates when the emission control component is malfunctioning.

Location : Malfunction indicator lamp is located somewhere in the meter cluster depending on vehicle models so that it is readily visible to the driver.

Size : The size of the actual symbol is almost the same as those of other symbols in the meter cluster, such as the brake failure tell-tale or the battery charging condition tell-tale.

Symbol of malfunction indicator lamp  Color : Amber (Tell-tale)

8. Provisions taken to prevent tampering with and modification of the emission control computer

- The emission control computer is integrated in the powertrain control module and non-removable.
- The software is protected against misuse by encoding, checksum detection or encrypted access.
- Switch-off function is not provided to emission control computer.

List of monitoring Items for Engine

Component	Fault code	Monitoring Strategy	Fault detection Criteria	MI activation criteria	Secondary Parameters	Precondition	Demo. test
Supply pump Suction control Valve	P0003	Circuit continuity: Shorted-low	Voltage	1st cycle	Battery voltage Engine running	-	Type1
	P0004	Circuit continuity: Open/Shorted-low	Voltage	1st cycle	Battery voltage Engine running	-	Type1
	P0089	Plausibility of Fuel pressure	Fuel pressure	1st cycle	Battery voltage Ignition on Pump initial learning Fuel pressure pump status Injection amount	-	Type1
Crankshaft position sensor and Camshaft position sensor	P0016	Position sensor Phase problem	Angle difference	1st cycle	Time after Ignition on Battery voltage Camshaft sensor status Crankshaft sensor status Engine speed	-	Type1
Turbocharger control solenoid	P0047	Circuit continuity: Shorted-low	Voltage	1st cycle	Battery voltage Engine running	-	Type1
	P0048	Circuit continuity: Shorted-high	Voltage	1st cycle	Battery voltage Engine running	-	Type1
Air temperature Sensor (integrated Mass air flow sensor)	P0072	Circuit continuity: Shorted-low	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1
	P0073	Circuit continuity: Shorted-high	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1
Common Rail	P0088	Plausibility (high pressure)	Fuel pressure	1st cycle	Battery voltage	-	Type1
Mass Air Flow Sensor	P0101	Range/ Performance	Voltage	1st cycle	Engine speed Injection amount EGR valve duty EGR valve Lift position Target EGR valve Lift position Intake air temperature Accel-pedal position Throttle duty Ignition on	-	Type1
	P0102	Circuit continuity: Shorted-low	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1
	P0103	Circuit continuity: Shorted-high	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1
Manifold absolute Pressure sensor	P0106	Plausibility	Signal dependency on engine condition	1st cycle	Battery voltage Time after engine start-up Injection amount Engine speed	-	Type1
	P0107	Range check-min	Pressure	1st cycle	Battery voltage Engine running	-	Type1
	P0108	Range check-max	Pressure	1st cycle	Battery voltage Engine running	-	Type1
Intake air Temperature Sensor	P0112	Range check-min	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1
	P0113	Range check-max	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1
Fuel Leak Problem	P0093	Fuel pressure	Fuel pressure	1st cycle	Battery voltage Engine running Fuel pressure sensor status	-	Type1
Power Steering Switch	P0551	Plausibility	Voltage	2nd cycle	Ignition off	One Type1 Cycle	Type1
Swirl Control Valve Solenoid Circuit	P2009	Circuit continuity: Shorted-low	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1
	P2010	Circuit continuity: Shorted-high	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1
Temperature Sensor (For DPF Diff Press Snsr)	P1474	Circuit continuity: Shorted-low	Voltage	1st cycle	Battery voltage Engine running	-	Type1
	P1475	Circuit continuity: Shorted-high	Voltage	1st cycle	Battery voltage Engine running	-	Type1

Component	Fault code	Monitoring Strategy	Fault detection Criteria	MI activation criteria	Secondary Parameters	Precondition	Demo. test
Engine coolant Temperature Sensor	P0117	Range check-min	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1
	P0118	Range check-max	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1
Throttle Position Sensor	P0122	Range check-min	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1
	P0123	Range check-max	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1
Fuel Temperature Sensor	P0182	Range check-min	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1
	P0183	Range check-max	Voltage	2nd cycle	Battery voltage Engine running	One Type1 *Cycle*	Type1
Fuel pressure Sensor	P0191	Plausibility	Deviation of actual and target pressure Voltage	1st cycle	Ignition on Target fuel pressure Injection amount Fuel temp Pump initial learning	-	Type1
	P0192	Range check-min	Voltage	1st cycle	Battery voltage Engine running	-	Type1
	P0193	Range check-max	Voltage	1st cycle	Battery voltage Engine running	-	Type1
Turbocharger	P0299	Absolute boost pressure monitor	Intake air pressure	1st cycle	Engine running Accel-pedal	-	Type1
	P1298	Positive deviation	Intake air pressure	1st cycle	Engine running Injection amount Engine speed Gear position Vehicle speed Intake air temperature Atmosphere pressure Turbocharger control status EGR valve position	-	Type1
	P1299	negative deviation	Intake air pressure	1st cycle	Engine running Injection amount Engine speed Gear position Vehicle speed Intake air temperature Atmosphere pressure Turbocharger control status EGR valve position	-	Type1

Component	Fault code	Monitoring Strategy	Fault detection Criteria	MI activation criteria	Secondary Parameters	Precondition	Demo. test
Injector	P0201	Circuit continuity (Cylinder #1)	Voltage	1st cycle	Ignition on Battery voltage Injector activation	-	Type1
	P0202	Circuit continuity (Cylinder #2)	Voltage	1st cycle	Ignition on Battery voltage Injector activation	-	Type1
	P0203	Circuit continuity (Cylinder #3)	Voltage	1st cycle	Ignition on Battery voltage Injector activation	-	Type1
	P0204	Circuit continuity (Cylinder #4)	Voltage	1st cycle	Ignition on Battery voltage Injector activation	-	Type1
	P0301	Engine speed monitor	Engine speed	1st cycle	Battery voltage Time after engine start-up Fuel balancing Engine coolant temp.	-	Type1
	P0302	Engine speed monitor	Engine speed	1st cycle	Battery voltage Time after engine start-up Fuel balancing Engine coolant temp.	-	Type1
	P0303	Engine speed monitor	Engine speed	1st cycle	Battery voltage Time after engine start-up Fuel balancing Engine coolant temp.	-	Type1
	P0304	Engine speed monitor	Engine speed	1st cycle	Battery voltage Time after engine start-up Fuel balancing Engine coolant temp.	-	Type1
Crankshaft Position Sensor	P0335	No pulse	Alignment to camshaft	1st cycle	Battery voltage Engine running	-	Type1
	P0336	Plausibility	Alignment to camshaft	1st cycle	Engine speed Battery voltage	-	Type1
Camshaft Position Sensor	P0340	No pulse	Alignment to crankshaft	1st cycle	Battery voltage Engine running	-	Type1
	P0341	Plausibility	Alignment to crankshaft	1st cycle	Engine speed Battery voltage	-	Type1
Glow plug Control module	P0381	Glow plug open or short	Glow module status signal	2nd cycle	Engine running Glow duty	One Type1 Cycle	Type1
	P064C	Self check of Glow plug module	Glow module status signal	2nd cycle	Engine running Glow duty	One Type1 Cycle	Type1
	P0683	No signal of Glow plug module	Glow module status signal	2nd cycle	Engine running Glow duty	One Type1 Cycle	Type1
EGR system	P0401	Plausibility	Intake air pressure	2nd cycle	Engine speed Atmosphere pressure Injection amount Gear position Vehicle speed intake temp target air-fuel ratio DPF regeneration status	One Type1 Cycle	Type1

Component	Fault code	Monitoring Strategy	Fault detection Criteria	MI activation criteria	Secondary Parameters	Precondition	Demo. test
EGR valve	P0403	Self check of Driver IC	Motor current	2nd cycle	Ignition on	One Type1 Cycle	Type1
	P2413	EGR position Comparison to Target value	EGR position	2nd cycle	Ignition on	One Type1 Cycle	Type1
Exhaust gas temperature sensor (Aft.DOC)	P0427	Range check-min	Voltage	1st cycle	Battery voltage Engine running	-	Type1
	P0428	Range check-max	Voltage	1st cycle	Battery voltage Engine running Engine coolant temp. Vehicle speed Injection amount Intake temp Engine speed	-	Type1
EGR valve Lift sensor	P0489	Range check-min	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1
	P0490	Range check-max	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1
vehicle speed sensor	P0500	Plausibility	vehicle speed	2nd cycle	CAN network status Engine running Engine coolant temp Battery voltage Engine speed Injection amount Clutch SW status	One Type1 Cycle	Type1
Exhaust gas temperature sensor (Bef.DOC)	P0545	Range check-min	Voltage	1st cycle	Battery voltage Engine running	-	Type1
	P0546	Range check-max	Voltage	1st cycle	Battery voltage Engine running Engine coolant temp. Vehicle speed Injection amount Intake temp Engine speed	-	Type1
EEPROM	P0602	self check of coded (Variant code not done / EOL not programmed)	coded counter	1st cycle	Ignition on	-	Type1
	P062F	Read/write to EEPROM	EEPROM data	2nd cycle	Ignition on	One Type1 Cycle	Type1
	P0630	self check (VIN not programmed)	VIN data	1st cycle	Ignition on	-	Type1
	P1625	self check of injection quantity compensation value	Stored data	1st cycle	Ignition on	-	Type1
	P1626	self check of injection quantity compensation value is coded	Stored data	1st cycle	Ignition on	-	Type1
RAM	P0604	self check	Internal check	2nd cycle	Ignition on	One Type1 Cycle	Type1
ROM	P0605	Calculate check sum and compare with stored value	Check sum	1st cycle	Ignition on	-	Type1

Component	Fault code	Monitoring Strategy	Fault detection Criteria	MI activation criteria	Secondary Parameters	Precondition	Demo. test
CPU (MAIN)	P0606	Check with SUB-CPU run pulse	Run pulse signal change	1st cycle	Ignition on	-	Type1
CPU (SUB)	P0607	Check with CPU run pulse	Run pulse signal change	1st cycle	Battery voltage Engine running	-	Type1
Throttle actuator Control	P0638	Throttle valve position comparison To target value	Throttle valve position	2nd cycle	Ignition on Battery voltage Injection amount Engine speed target intake-valve position	One Type1 Cycle	Type1
	P2118	Self check of driver IC	Motor current	2nd cycle	Ignition on	One Type1 Cycle	Type1
Analog sensor Reference voltage #1	P0642	Range check-min	Voltage	1st cycle	Battery voltage Engine running	-	Type1
	P0643	Range check-max	Voltage	1st cycle	Battery voltage Engine running	-	Type1
Analog sensor Reference voltage #2	P0652	Range check-min	Voltage	1st cycle	Battery voltage Engine running	-	Type1
	P0653	Range check-max	Voltage	1st cycle	Battery voltage Engine running	-	Type1
Injector driver #1 and #2	P1203	Range check-min	Voltage	1st cycle	Battery voltage Time after engine start-up Injector activation	-	Type1
	P1204	Range check-max	Voltage	1st cycle	Battery voltage Time after engine start-up Injector activation	-	Type1
	P2146	Circuit continuity: Open (driver1)	Voltage	1st cycle	starter off Ignition on Battery voltage Injector activation	-	Type1
	P2147	Circuit continuity: Open/Shorted-low (driver1)	Voltage	1st cycle	starter off Ignition on Battery voltage Injector activation	-	Type1
	P2148	Circuit continuity: Shorted-high (driver1)	Voltage	1st cycle	starter off Ignition on Battery voltage Injector activation	-	Type1
	P2149	Circuit continuity: Open(driver2)	Voltage	1st cycle	starter off Ignition on Battery voltage Injector activation	-	Type1
	P2150	Circuit continuity: Open/Shorted-low (driver2)	Voltage	1st cycle	starter off Ignition on Battery voltage Injector activation	-	Type1
	P2151	Circuit continuity: Shorted-high (driver2)	Voltage	1st cycle	Starter off Ignition on Battery voltage Injector activation	-	Type1

Component	Fault code	Monitoring Strategy	Fault detection Criteria	MI activation criteria	Secondary Parameters	Precondition	Demo. test
Pressure limiter	P1272	Fuel pressure	Fuel pressure	2nd cycle	Battery voltage Ignition on Engine speed Fuel pressure sensor status	One Type1 Cycle	Type1
Supply pump	P1273	Injection amount monitor	Injection amount	1st cycle	Fuel pressure pump status Fuel pressure Injection amount	-	Type1
	P1274	High pressure Occurrence for protection	Counter of High pressure Occurrence	1st cycle	Engine running	-	Type1
	P1275	Fuel pressure	Pressure	1st cycle	Fuel pressure sensor status Ignition on	-	Type1
Exhaust gas temperature sensor (Aft.DPF)	P1427	Range check-min	Voltage	1st cycle	Battery voltage Engine running	-	Type1
	P1428	Range check-max	Voltage	1st cycle	Battery voltage Ignition on Engine running Engine coolant temp. Vehicle speed Injection amount intake temp Engine speed	-	Type1
Accelerator Position Sensor (APS)	P2122	Range check-min	APS(main) voltage	1st cycle	Ignition on APS(sub) status	-	Type1
	P2123	Range check-max	APS(main) voltage	1st cycle	Ignition on APS(sub) status	-	Type1
	P2127	Range check-min	APS(sub) voltage	1st cycle	Ignition on APS(main) status	-	Type1
	P2128	Range check-max	APS(sub) voltage	1st cycle	Ignition on APS(main) status	-	Type1
	P2138	Rationality	Relation between main and sub	1st cycle	Ignition on Battery voltage starter off Engine speed	-	Type1
Barometric Pressure Sensor	P2228	Range check-min	Pressure	2nd cycle	Ignition on Battery voltage	One Type1 Cycle	Type1
	P2229	Range check-max	Pressure	2nd cycle	Ignition on Battery voltage	One Type1 Cycle	Type1
EGR cooler bypass valve	P2426	Range check-min	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1
	P2427	Range check-max	Voltage	2nd cycle	Battery voltage Engine running	One Type1 Cycle	Type1

Component	Fault code	Monitoring Strategy	Fault detection Criteria	MI activation criteria	Secondary Parameters	Precondition	Demo. test
DPF Differential Pressure Sensor	P2453	Range/ Performance	Differential Pressure	1st cycle	Battery voltage	-	Type1
	P2454	Range check-min	Voltage	1st cycle	Battery voltage Engine running	-	Type1
	P2455	Range check-max	Voltage	1st cycle	Battery voltage Engine running	-	Type1
DPF	P1497	Regeneration occurrence	Regeneration counter	1st cycle	Regeneration mode	-	Type1
	P1498	Time of regeneration exceeded limit	Regeneration timer	1st cycle	Ignition on	-	Type1
	P1499	Temperature check	Temperature	1st cycle	Battery voltage Engine running Regeneration mode	-	Type1
	P244A	DPF Differential Pressure Too Low	Differential pressure	2nd cycle	Battery voltage Engine running Engine speed Injection amount Intake air mass Exhaust gas temperature	One Type1 Cycle	Type1
	P2463	Time of regeneration exceeded limit	Regeneration timer	1st cycle	Ignition on	-	Type1
Catalytic converter	P0420	Catalytic Converter Malfunction (HC Conversion Efficiency)	Catalyst temperature	2nd cycle	Regeneration mode	One Type1 Cycle	Type1
NOx aftertreatment system	P2000	NOx Adsorber Efficiency Below Threshold	<GA0, GF0> Exhaust gas Temperature <V88, V98> Differential pressure	2nd cycle	<GA0, GF0> Engine running Exhaust gas temperature <V88, V98> Engine speed Injection amount Intake air mass Exhaust gas temperature	One Type1 Cycle	Type1

Component	Fault code	Monitoring Strategy	Fault detection Criteria	MI activation criteria	Secondary Parameters	Precondition	Demo. test
NTC Differential Pressure Sensor	P1480	Range/ Performance	Differential Pressure	1st cycle	Battery voltage	-	Type1
	P1481	Range check-min	Voltage	1st cycle	Battery voltage Engine running	-	Type1
	P1482	Range check-max	Voltage	1st cycle	Battery voltage Engine running	-	Type1
O2 Sensor	P0130	Circuit	Voltage	1st cycle	Battery voltage	-	Type1
	P0134	Circuit (No Activity Detected)	Impedance	1st cycle	Battery voltage O2 sensor status	-	Type1
	P0135	Heater Circuit	Voltage	1st cycle	Battery voltage O2 sensor heater duty	-	Type1
	P2297	Out of Range During Deceleration	Current	1st cycle	Atmospheric oxygen learning state	-	Type1
	P2238	Pumping Current Circuit Low	Voltage	1st cycle	Ignition on Battery voltage	-	Type1
	P2239	Pumping Current Circuit High	Voltage	1st cycle	Ignition on Battery voltage	-	Type1
	P2252	Offset Circuit Low	Voltage	1st cycle	Ignition on Battery voltage	-	Type1
	P2253	Offset Circuit High	Voltage	1st cycle	Ignition on Battery voltage	-	Type1
Exhaust Fuel Injector	P20CD	Control Circuit Low	Monitor port signal	1st cycle	Exhaust fuel injector duty Battery voltage Engine running	-	Type1
	P20CE	Control Circuit High	Monitor port signal	1st cycle	Exhaust fuel injector duty Battery voltage Engine running	-	Type1
	P20CF	Stuck Open	air-fuel ratio	1st cycle	Engine speed Injection amount Intake air mass O2 sensor status Exhaust gas temperature	-	Type1
	P20D0	Stuck Closed	air-fuel ratio	1st cycle	NTC status Exhaust gas mass Exhaust gas temperature air-fuel ratio(In Cylinder)	-	Type1

List of monitoring Items for T/M

<5AT> for V88 & V98

Component	Fault code	Monitoring Strategy	Fault detection Criteria	MI activation criteria	Secondary Parameters	Precondition	Demo. test
A/T Range Switch	P0707	Circuit continuity	T/M range switch input	2nd cycle	Battery voltage Engine speed	One Type1 cycle	Type1
	P0708	Circuit continuity	T/M range switch input	2nd cycle	Battery voltage Engine speed	One Type1 cycle	Type1
A/T Oil Temp Sensor1	P0711	Rationality (Stuck)	Fluid temperature	2nd cycle	Battery voltage Engine speed Time after T/M range switch "D"	One Type1 cycle	Type1
	P0712	Circuit continuity	Fluid temperature	1st cycle	Battery voltage Engine speed	-	Type1
	P0713	Circuit continuity	Fluid temperature	1st cycle	Battery voltage Engine speed Time after IG-ON T/M range switch not "P" or not "N" Output shaft speed	-	Type1
A/T Oil Temp Sensor2	P2742	Circuit continuity	Fluid temperature	2nd cycle	Battery voltage Engine speed	One Type1 cycle	Type1
	P2743	Circuit continuity	Fluid temperature	2nd cycle	Battery voltage Engine speed Time after IG-ON T/M range switch not "P" or not "N" Output shaft speed	One Type1 cycle	Type1
A/T Input Speed Sensor	P0715	Circuit continuity	Input shaft speed	1st cycle	Battery voltage Engine speed Output shaft speed Time after T/M range switch "D"	-	Type1
A/T Output Speed Sensor	P0720	Circuit continuity	Output shaft speed	1st cycle	Battery voltage Engine speed Input shaft speed Time after T/M range switch "D"	-	Type1
Shift Solenoid A	P0751	Rationality (Stuck-Off)	Gear ratio Input shaft speed Output shaft speed	2nd cycle	Battery voltage Engine speed AT fluid temperature T/M range switch "D" Time after T/M range switch "D" Engine water temperature Accelerator position Engine torque Transfer high/low gear signal Time after shift gear Sports mode and Gear ratio	One Type1 cycle	Type1

List of monitoring Items for T/M

<5AT> for V88 & V98

Component	Fault code	Monitoring Strategy	Fault detection Criteria	MI activation criteria	Secondary Parameters	Precondition	Demo. test
Shift Solenoid A	P0752	Rationality (Stuck-On)	Gear ratio Input shaft speed Output shaft speed	2nd cycle	Battery voltage Engine speed AT fluid temperature T/M range switch "D" Time after T/M range switch "D" Engine water temperature Accelerator position Engine torque Transfer high/low gear signal Time after shift gear Sports mode and Gear ratio	One Type1 cycle	Type1
	P0973	Circuit continuity	Solenoid actual current	1st cycle	Battery voltage	-	Type1
	P0974	Circuit continuity	Solenoid actual current	1st cycle	Battery voltage	-	Type1
Shift Solenoid B	P0756	Rationality (Stuck-Off)	Gear ratio Input shaft speed Output shaft speed	2nd cycle	Battery voltage Engine speed AT fluid temperature T/M range switch "D" Time after T/M range switch "D" Engine water temperature Accelerator position Engine torque Transfer high/low gear signal Time after shift gear Sports mode and Gear ratio	One Type1 cycle	Type1
	P0757	Rationality (Stuck-On)	Gear ratio Input shaft speed Output shaft speed	2nd cycle	Battery voltage Engine speed AT fluid temperature T/M range switch "D" Time after T/M range switch "D" Engine water temperature Accelerator position Engine torque Transfer high/low gear signal Time after shift gear Sports mode and Gear ratio	One Type1 cycle	Type1
	P0976	Circuit continuity	Solenoid actual current	1st cycle	Battery voltage	-	Type1
	P0977	Circuit continuity	Solenoid actual current	1st cycle	Battery voltage	-	Type1

List of monitoring Items for T/M

<5AT> for V88 & V98

Component	Fault code	Monitoring Strategy	Fault detection Criteria	MI activation criteria	Secondary Parameters	Precondition	Demo. test
Shift Solenoid E	P0771	Rationality (Stuck-Off)	Gear ratio Input shaft speed Output shaft speed	2nd cycle	Battery voltage Engine speed AT fluid temperature T/M range switch "D" Time after T/M range switch "D" Engine water temperature Accelerator position Engine torque Transfer high/low gear signal Time after shift gear Sports mode and Gear ratio	One Type1 cycle	Type1
	P0772	Rationality (Stuck-On)	Gear ratio Input shaft speed Output shaft speed	2nd cycle	Battery voltage Engine speed AT fluid temperature T/M range switch "D" Time after T/M range switch "D" Engine water temperature Accelerator position Engine torque Transfer high/low gear signal Sports mode and Gear ratio	One Type1 cycle	Type1
	P0985	Circuit continuity	Solenoid actual current	1st cycle	Battery voltage	-	Type1
	P0986	Circuit continuity	Solenoid actual current	1st cycle	Battery voltage	-	Type1
Pressure Control Solenoid A	P0961	Rationality (Stuck)	Solenoid actual current	1st cycle	Battery voltage Solenoid actual current Solenoid actual voltage	-	Type1
	P0962	Circuit continuity	Solenoid actual current Solenoid actual voltage	1st cycle	Battery voltage	-	Type1
	P0963	Circuit continuity	Solenoid actual current Solenoid actual voltage	1st cycle	Battery voltage	-	Type1
Pressure Control Solenoid B	P0771	Rationality (Stuck-Off)	Gear ratio Input shaft speed Output shaft speed	2nd cycle	Battery voltage Engine speed AT fluid temperature T/M range switch "D" Time after T/M range switch "D" Engine water temperature Accelerator position Engine torque Transfer high/low gear signal Time after shift gear Sports mode and Gear ratio	One Type1 cycle	Type1

List of monitoring Items for T/M

<5AT> for V88 & V98

Component	Fault code	Monitoring Strategy	Fault detection Criteria	MI activation criteria	Secondary Parameters	Precondition	Demo. test
Pressure Control Solenoid B	P0965	Rationality (Stuck)	Solenoid actual current	1st cycle	Battery voltage Solenoid actual current Solenoid actual voltage	-	Type1
	P0966	Circuit continuity	Solenoid actual current Solenoid actual voltage	1st cycle	Battery voltage	-	Type1
	P0967	Circuit continuity	Solenoid actual current Solenoid actual voltage	1st cycle	Battery voltage	-	Type1
Pressure Control Solenoid C	P0797	Rationality (Stuck-On)	Gear ratio Input shaft speed Output shaft speed	2nd cycle	Battery voltage Engine speed AT fluid temperature T/M range switch "D" Time after T/M range switch "D" Engine water temperature Accelerator position Engine torque Transfer high/low gear signal Time after shift gear Sports mode and Gear ratio	One Type1 cycle	Type1
	P0969	Rationality (Stuck)	Solenoid actual current	1st cycle	Battery voltage Solenoid actual current Solenoid actual voltage	-	Type1
	P0970	Circuit continuity	Solenoid actual current Solenoid actual voltage	1st cycle	Battery voltage	-	Type1
	P0971	Circuit continuity	Solenoid actual current Solenoid actual voltage	1st cycle	Battery voltage	-	Type1
Torque Converter Clutch Solenoid	P2757	Rationality (Stuck-Off)	Engine speed Input shaft speed	2nd cycle	Battery voltage Engine speed T/M range switch "D" Time after T/M range switch "D" Engine water temperature Transfer high/low gear signal	One Type1 cycle	Type1
	P2758	Rationality (Stuck-On)	Engine speed Input shaft speed	2nd cycle	Battery voltage Engine speed T/M range switch "D" Time after T/M range switch "D" Engine water temperature Transfer high/low gear signal	One Type1 cycle	Type1
	P2762	Rationality (Stuck)	Solenoid actual current	1st cycle	Battery voltage Solenoid actual current Solenoid actual voltage	-	Type1
	P2763	Circuit continuity	Solenoid actual current Solenoid actual voltage	1st cycle	Battery voltage	-	Type1
	P2764	Circuit continuity	Solenoid actual current Solenoid actual voltage	1st cycle	Battery voltage	-	Type1

List of monitoring Items for T/M

<5AT> for V88 & V98

Component	Fault code	Monitoring Strategy	Fault detection Criteria	MI activation criteria	Secondary Parameters	Precondition	Demo. test
1-2shift valve	P0781	Functional	Input shaft speed Output shaft speed	2nd cycle	Battery voltage Engine speed AT fluid temperature T/M range switch "D" Time after T/M range switch "D" Water temperature Accelerator position Engine torque Transfer high/low gear signal Time after shift gear Sports mode and Gear ratio	One Type1 cycle	Type1
Power Input Signal	P0882	Circuit continuity	Battery voltage	1st cycle	Input shaft speed Engine speed IG-ON signal	-	Type1
EEPROM	P0603	Rationality	Checksum	1st cycle	IG-ON signal	-	Type1
RAM	P0604	Rationality	Access error	1st cycle	IG-ON signal	-	Type1
ROM	P0605	Rationality	Checksum	1st cycle	IG-ON signal Requested diag clear	-	Type1
Controller area network	U1073	Malfunction CAN status (BUS OFF)	CAN signal	1st cycle	Battery voltage	-	Type1
	U1100	Communication status (ENG-ECU)	CAN signal from ENG-ECU	1st cycle	Battery voltage	-	Type1

List of monitoring Items for T/M

<6AT> for GF0, GA0

Component	Fault code	Monitoring Strategy	Fault detection Criteria	MI activation criteria	Secondary Parameters	Precondition	Demo. test
A/T Range Switch	P0705	Rationality Circuit continuity	T/M range switch input	2nd cycle	Battery voltage	One Type1 cycle	Type1
A/T Oil Temp Sensor	P0712	Range check Min	Fluid temperature	1st cycle	T/M Range Switch "D" Accelerator position Vehicle speed Engine speed	-	Type1
	P0713	Range check Max	Fluid temperature	1st cycle	Vehicle speed		
A/T Input Speed Sensor	P0715	Circuit continuity	Input shaft speed	1st cycle	Idle Status Vehicle speed Engine speed	-	Type1
A/T Output Speed Sensor	P0720	Circuit continuity	Output shaft speed	1st cycle	Vehicle speed	-	Type1
1st Gear Ratio	P0731	Rationality	Input shaft speed Output shaft speed	1st cycle	Gear Position	-	Type1
2nd Gear Ratio	P0732	Rationality	Input shaft speed Output shaft speed	1st cycle	Gear Position	-	Type1
3rd Gear Ratio	P0733	Rationality	Input shaft speed Output shaft speed	1st cycle	Gear Position	-	Type1
4th Gear Ratio	P0734	Rationality	Input shaft speed Output shaft speed	1st cycle	Gear Position	-	Type1
5th Gear Ratio	P0735	Rationality	Input shaft speed Output shaft speed	1st cycle	Gear Position	-	Type1
6th Gear Ratio	P0729	Rationality	Input shaft speed Output shaft speed	1st cycle	Gear Position	-	Type1
Reverse Gear Ratio	P0736	Rationality	Input shaft speed Output shaft speed	1st cycle	Gear Position	-	Type1
Torque Converter Clutch	P0741	Rationality	Engine Speed Input shaft speed	2nd cycle	TCC target status T/M Range Switch "D"	One Type1 cycle	Type1
	P0742	Rationality (Stuck ON)	Engine Speed Input shaft speed		TCC target status T/M Range Switch "D" Output shaft speed		
Torque Converter Clutch Solenoid	P0743	Circuit continuity	Solenoid actual current	1st cycle	Gear Position TCC status Solenoid target current	-	Type1

List of monitoring Items for T/M

<6AT> for GF0, GA0

Component	Fault code	Monitoring Strategy	Fault detection Criteria	MI activation criteria	Secondary Parameters	Precondition	Demo. test
Pressure Control Solenoid	P0748	Circuit continuity	Solenoid actual current	2nd cycle	T/M relay voltage Solenoid target current	One Type1 cycle	Type1
Shift Solenoid A	P0753	Circuit continuity	Solenoid actual current	1st cycle	Gear Position Solenoid target current	-	Type1
Shift Solenoid B	P0758	Circuit continuity	Solenoid actual current	1st cycle	Gear Position Solenoid target current	-	Type1
Shift Solenoid C	P0763	Circuit continuity	Solenoid actual current	1st cycle	Gear Position Solenoid target current	-	Type1
Shift Solenoid D	P0768	Circuit continuity	Solenoid actual current	1st cycle	Gear Position Solenoid target current	-	Type1
A/T Oil Press Switch B	P0846	Rationality (Stuck)	Pressure switch status	2nd cycle	T/M Range Switch "D"or"R" Gear Position	One Type1 cycle	Type1
A/T Oil Press Switch D	P0876	Rationality (Stuck)	Pressure switch status	2nd cycle	T/M Range Switch "D" Solenoid target current	One Type1 cycle	Type1
A/T Oil Press Switch E	P0988	Rationality (Stuck)	Pressure switch status	2nd cycle	T/M Range Switch "D"or"R" Gear Position	One Type1 cycle	Type1
Shift Solenoid F	P1753	Circuit continuity	Solenoid actual current	1st cycle	Gear Position TCC status Solenoid target current	-	Type1
Shift Solenoid G	P1758	Circuit continuity	Solenoid actual current	1st cycle	T/M relay voltage Solenoid target current	-	Type1
Interlock Detection	P0893	Rationality	Deceleration	1st cycle	A/T Oil press switch combination Brake switch signal	-	Type1
Throttle position signal	P1705	Throttle position sensor malfunction	CAN signal from ENG	1st cycle	Time after TCM start Vehicle speed	-	Type1
Accelerator position signal	P1706	Accelerator position sensor malfunction	CAN signal from ENG	1st cycle	Time after TCM start	-	Type1
ABS status	P1773	ABS malfunction	CAN signal from ABS/ASC	2nd cycle	Time after TCM start	One Type1 cycle	Type1
~~Ds position Switch~~	~~P071B~~	~~Circuit continuity~~	~~Ds position Switch input~~	~~2nd cycle~~	~~Battery voltage T/M Range Switch "P"or"R"or"N"~~	~~One Type1 cycle~~	~~Type1~~
Controller Area Network	U0001	malfunction CAN Line	CAN communication	1st cycle	Time after TCM start T/M relay voltage	-	Type1
	U0100	CAN communication status (ENG-ECU)	CAN signal from ENG	1st cycle	Time after TCM start	-	Type1

SERVICE $06 DATA / Engine

※1 The OBDMIDs definition is based on SAE J1979 (May 2007).

OBDMID※1	Test ID	Unit and Scaling ID
OBDMID $00 OBD Monitor Ids supported($01-$20)		
OBDMID $01 Exhaust Gas Sensor Monitor Bank1-Sensor1		
OBDMID $02 Exhaust Gas Sensor Monitor Bank1-Sensor2		
OBDMID $03 Exhaust Gas Sensor Monitor Bank1-Sensor3		
OBDMID $04 Exhaust Gas Sensor Monitor Bank1-Sensor4		
OBDMID $05 Exhaust Gas Sensor Monitor Bank2-Sensor1		
OBDMID $06 Exhaust Gas Sensor Monitor Bank2-Sensor2		
OBDMID $07 Exhaust Gas Sensor Monitor Bank2-Sensor3		
OBDMID $08 Exhaust Gas Sensor Monitor Bank2-Sensor4		
OBDMID $09 Exhaust Gas Sensor Monitor Bank3-Sensor1		
OBDMID $0A Exhaust Gas Sensor Monitor Bank3-Sensor2		
OBDMID $0B Exhaust Gas Sensor Monitor Bank3-Sensor3		
OBDMID $0C Exhaust Gas Sensor Monitor Bank3-Sensor4		
OBDMID $0D Exhaust Gas Sensor Monitor Bank4-Sensor1		
OBDMID $0E Exhaust Gas Sensor Monitor Bank4-Sensor2		
OBDMID $0F Exhaust Gas Sensor Monitor Bank4-Sensor3		
OBDMID $10 Exhaust Gas Sensor Monitor Bank4-Sensor4		
OBDMID $11-$1F ISO/SAE reserved		
OBDMID $20 OBD Monitor Id supported($21-$40)		
OBDMID $21 Catalyst Monitor Bank1		
OBDMID $22 Catalyst Monitor Bank2		
OBDMID $23 Catalyst Monitor Bank3		
OBDMID $24 Catalyst Monitor Bank4		
OBDMID $25-$30 ISO/SAE reserved		
OBDMID $31 EGR Monitor Bank1	S/MD TID $81 EGR Pressure (MMC)	$2D mg/stroke per bit
OBDMID $32 EGR Monitor Bank2		
OBDMID $33 EGR Monitor Bank3		
OBDMID $34 EGR Monitor Bank4		
OBDMID $35 VVT Monitor Bank1		
OBDMID $36 VVT Monitor Bank2		
OBDMID $37 VVT Monitor Bank3		
OBDMID $38 VVT Monitor Bank4		
OBDMID $39 EVAP Monitor(Cap Off / 0.150")		
OBDMID $3A EVAP Monitor(0.09")		
OBDMID $3B EVAP Monitor(0.04")		
OBDMID $3C EVAP Monitor(0.02")		
OBDMID $3D Purge Flow Monitor		
OBDMID $3E-$3F ISO/SAE reserved		
OBDMID $40 OBD Monitor Ids supported($41-$60)		
OBDMID $41 Exhaust Gas Sensor Heater Monitor Bank1-Sensor1		
OBDMID $42 Exhaust Gas Sensor Heater Monitor Bank1-Sensor2		
OBDMID $43 Exhaust Gas Sensor Heater Monitor Bank1-Sensor3		
OBDMID $44 Exhaust Gas Sensor Heater Monitor Bank1-Sensor4		
OBDMID $45 Exhaust Gas Sensor Heater Monitor Bank2-Sensor1		
OBDMID $46 Exhaust Gas Sensor Heater Monitor Bank2-Sensor2		
OBDMID $47 Exhaust Gas Sensor Heater Monitor Bank2-Sensor3		
OBDMID $48 Exhaust Gas Sensor Heater Monitor Bank2-Sensor4		
OBDMID $49 Exhaust Gas Sensor Heater Monitor Bank3-Sensor1		
OBDMID $4A Exhaust Gas Sensor Heater Monitor Bank3-Sensor2		
OBDMID $4B Exhaust Gas Sensor Heater Monitor Bank3-Sensor3		
OBDMID $4C Exhaust Gas Sensor Heater Monitor Bank3-Sensor4		
OBDMID $4D Exhaust Gas Sensor Heater Monitor Bank4-Sensor1		
OBDMID $4E Exhaust Gas Sensor Heater Monitor Bank4-Sensor2		
OBDMID $4F Exhaust Gas Sensor Heater Monitor Bank4-Sensor3		

OBDMID※1	Test ID	Unit and Scaling ID
OBDMID $50 Exhaust Gas Sensor Heater Monitor Bank4-Sensor4		
OBDMID $51-$5F ISO/SAE reserved		
OBDMID $60 OBD Monitor Ids supported($61-$80)		
OBDMID $61 Heated Catalyst Monitor Bank1		
OBDMID $62 Heated Catalyst Monitor Bank2		
OBDMID $63 Heated Catalyst Monitor Bank3		
OBDMID $64 Heated Catalyst Monitor Bank4		
OBDMID $65-$70 ISO/SAE reserved		
OBDMID $71 Secondary Air Monitor 1		
OBDMID $72 Secondary Air Monitor 2		
OBDMID $73 Secondary Air Monitor 3		
OBDMID $74 Secondary Air Monitor 4		
OBDMID $75-$7F ISO/SAE reserved		
OBDMID $80 OBD Monitor Ids supported($81-$A0)		
OBDMID $81 Fuel System Monitor Bank1		
OBDMID $82 Fuel System Monitor Bank2		
OBDMID $83 Fuel System Monitor Bank3		
OBDMID $84 Fuel System Monitor Bank4		
OBDMID $85 Boost Pressure Control Monitor Bank1		
OBDMID $86 Boost Pressure Control Monitor Bank2		
OBDMID $87-$8F ISO/SAE reserved		
OBDMID $90 NOx Adsorber Monitor Bank1		
OBDMID $91 NOx Adsorber Monitor Bank2		
OBDMID $92-$97 ISO/SAE reserved		
OBDMID $98 NOx Catalyst Monitor Bank1		
OBDMID $99 NOx Catalyst Monitor Bank2		
OBDMID $9A-$9F ISO/SAE reserved		
OBDMID $A0 OBD Monitor Ids supported($A1-$C0)		
OBDMID $A1 Misfire General Data		
OBDMID $A2 Misfire Cylinder1 Data		
OBDMID $A3 Misfire Cylinder2 Data		
OBDMID $A4 Misfire Cylinder3 Data		
OBDMID $A5 Misfire Cylinder4 Data		
OBDMID $A6 Misfire Cylinder5 Data		
OBDMID $A7 Misfire Cylinder6 Data		
OBDMID $A8 Misfire Cylinder7 Data		
OBDMID $A9 Misfire Cylinder8 Data		
OBDMID $AA Misfire Cylinder9 Data		
OBDMID $AB Misfire Cylinder10 Data		
OBDMID $AC Misfire Cylinder11 Data		
OBDMID $AD Misfire Cylinder12 Data		
OBDMID $AE Misfire Cylinder13 Data		
OBDMID $AF Misfire Cylinder14 Data		
OBDMID $B0 Misfire Cylinder15 Data		
OBDMID $B1 Misfire Cylinder16 Data		
OBDMID $B2 PM Filter Monitor Bank1		
OBDMID $B3 PM Filter Monitor Bank2		
OBDMID $B4-$BF ISO/SAE reserved		
OBDMID $C0 OBD Monitor Ids supported($C1-$E0)		
OBDMID $C1-$DF ISO/SAE reserved		
OBDMID $C0 OBD Monitor Ids supported($E1-$FF)		
OBDMID $E1-$FFVehicle manufacturer defined OBDMIDs		