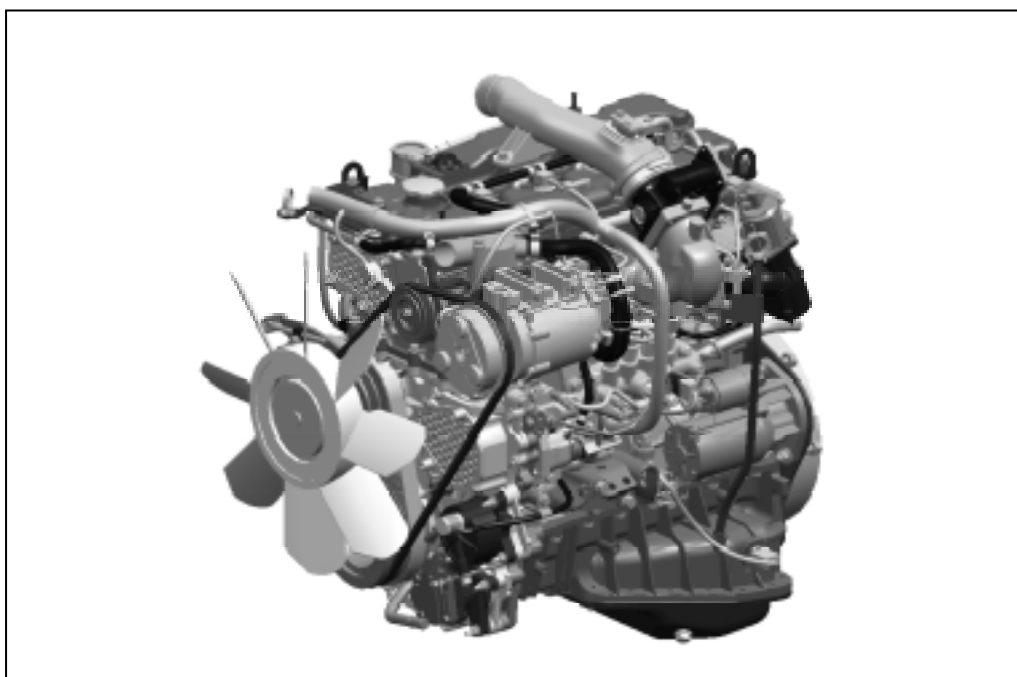


FOR SERVICE TRAINING

4JJ1-TC ENGINE

*-Engine Mechanical Features-
-Engine Control System & Diagnosis-*



Applicable Model

<i>Model Year</i>	<i>Vehicle Model</i>	<i>Main Market</i>
2005	TFR/TFS	Thailand
2005	UCR/UCS	Thailand & Philippine

ISUZU

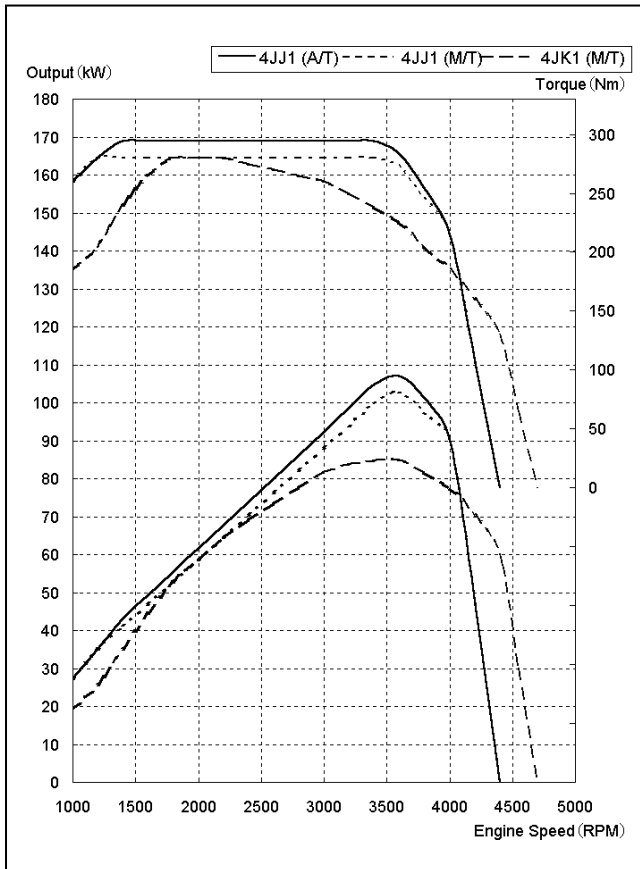
ISUZU MOTORS LIMITED

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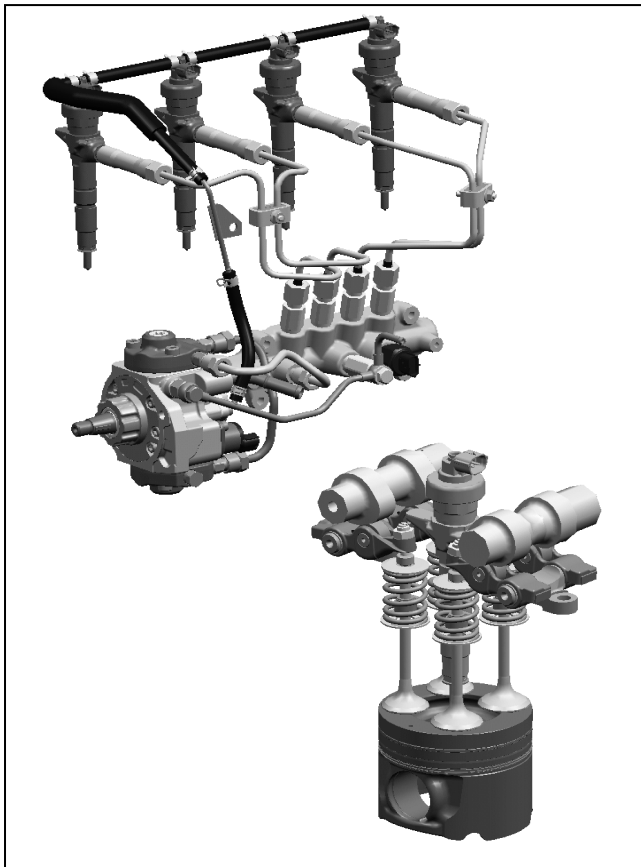
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INTRODUCTION & ENGINE MECHANICAL FEATURES



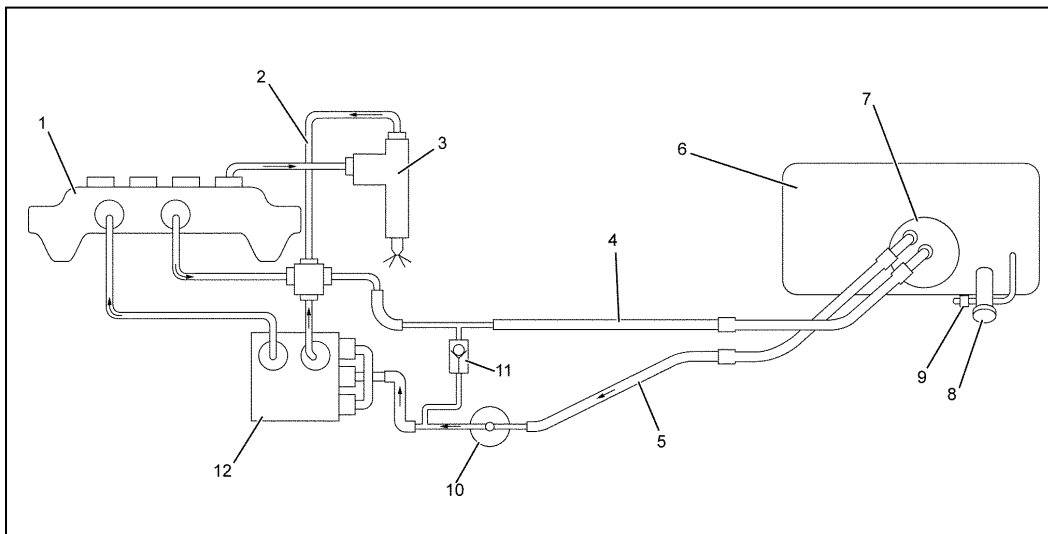
The 2005 model year TFR/TFS pick-up truck and UCR/UCS model, the 4JK1-TC engine replaces the 4JA1-T engine and 4JJ1-TC engine replaces the 4JH1-T engine. The both engines has been newly developed with additional features mainly employment of common rail fuel injection system which has resulted in an increase both in maximum output and torque, and met Euro 3 emission regulation standard. Most conspicuous items are listed below.

- Multi fuel injection type high-pressure common rail system and is made with Denso.
- Double overhead camshaft (DOHC) with 4 valves per a cylinder operated by roller rocker arm.
- Chain driven intake and exhaust camshaft.
- Electrical control EGR valve, water-cooled EGR cooler.
- Electrical control intake throttle.
- Variable swirl control system.
- Turbocharger with intercooler.
- Aluminum cylinder head.
- Induction hardening cylinder liner.
- Cylinder block built in oil cooler.
- Gear driven vacuum pump, power steering oil pump and engine oil pump.



Engine Type	Maximum Output	Maximum Toruque
4JK1-TC	85kw/ 3600RPM	280Nm/ 1800 - 2200RPM
4JJ1-TC (A/T)	107kw/ 3600RPM	294Nm/ 1400 - 3400RPM
4JJ1-TC (M/T)	103kw/ 3600RPM	280Nm/ 1200 - 3400RPM

The base transmission is the Isuzu MUA5H manual for 4JK1-TC, MUA5G manual for 4JJ1-TC. JATCO JR405E automatic transmission for 4JJ1-TC as an option.



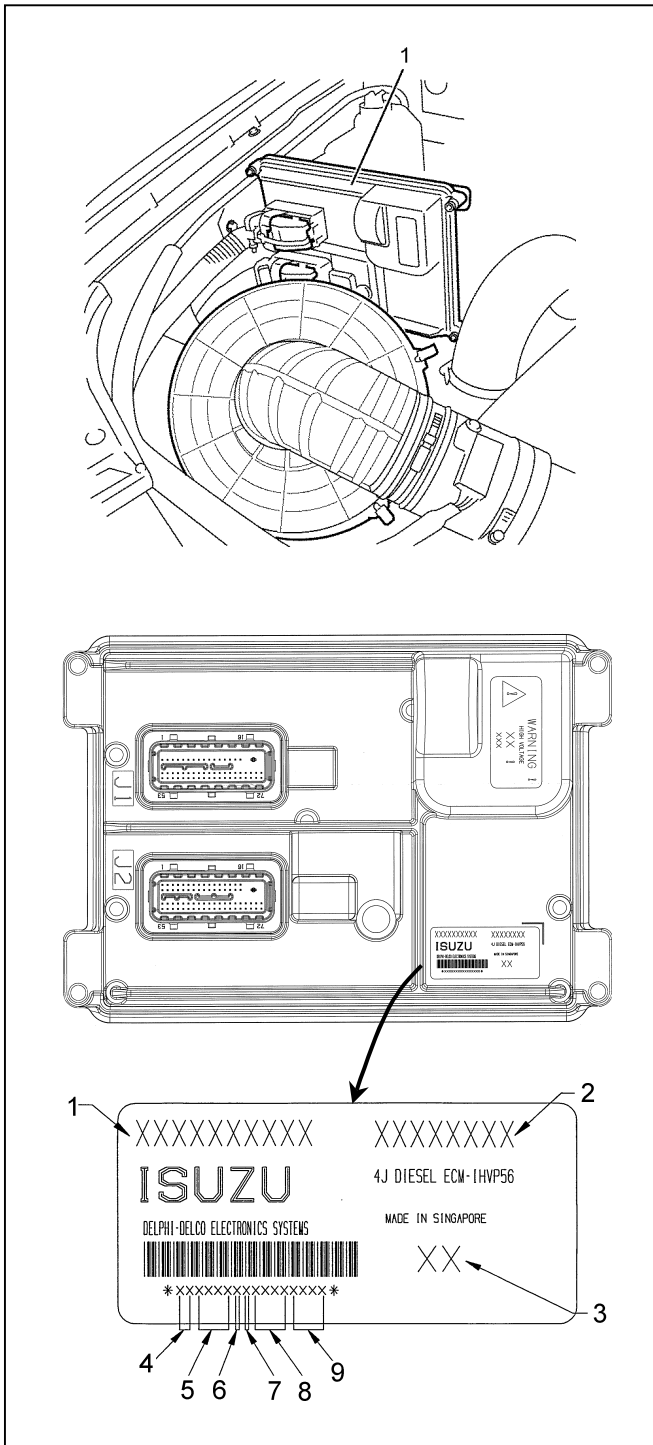
1. Fuel Rail
2. Leak Off Pipe
3. Fuel Injector
4. Return Pipe
5. Fuel Feed Pipe
6. Fuel Tank
7. Fuel Pump & Sender Assembly
8. Fuel Filler Cap
9. Check Valve
10. Fuel Filter with Water Separator
11. Bypass One-way Valve
12. Fuel Supply Pump

ENGINE MAIN DATA & SPECIFICATIONS

Engine Model	4JK1-TC	4JJ1-TC
Engine Type	Diesel, Four Cycle	
Cylinder Layout - Number of Cylinders	Inline-Four Cylinders	
Fuel Injection Order	1-3-4-2	
Bore x Stroke (mm)	95.4 x 87.4	95.4 x 104.9
Total Displacement (cc)	2499	2999
Compression Ratio	17.5	18.3
Compression Pressure at Cranking	More than 3Mpa	
Combustion Camber Type	Direct Injection	
Cylinder Liner	Liner Less	
Engine Idle Speed (RPM)	700 ±25	
Fast Engine Idle Speed (RPM)	750 ±25	
No Load Maximum Engine Speed (RPM)	4700 ±50	4400 ±50
Fuel System	Common Rail System	
Injection Pump Type	DENSO (HP3) Supply Pump	
Injection Nozzle Type	Electrical Controlled Injector	
Number of Injection Hole	6	
Diameter of Injection Hole (mm)	0.13	0.14
Injection Nozzle Operating Pressure (MPa)	Electrically Controlled	
Fuel Filter Type	Cartridge Paper Element & Water Separator	

Valve System	
Valve Layout	Double Overhead Camshaft
Drive Type	Gear & Chain Drive
Intake Valve Open At BTDC (°CA)	13.0
Intake Valve Close At ABDC (°CA)	41.0
Exhaust Valve Open At BBDC (°CA)	52.0
Exhaust Valve Close At ATDC (°CA)	6.0
Intake Valve Clearance At Cold (mm)	0.15 (Between roller and camshaft)
Exhaust Valve Clearance At Cold (mm)	0.15 (Between roller and camshaft)
Cooling System	
Cooling Method	Water Cooled
Water Capacity (litter/gal)	14
Water Pump Type	Centrifugal Impeller Type
Thermostat Type	Wax Pellet
Thermostat Opening Temperature (°C / °F)	85 /185
Lubricating System	
Lubricating Method	Full Flow Pressure Circulation
Oil Pump Type	Gear
Oil Capacity (litter)	8
Oil Filter Type	Cartridge Paper Element
Air Cleaner Type	Dry Paper Element
EGR System	W/Cooler & Electrical Control EGR Valve
PCV System	Closed Type
Preheating System	Glow Plug
Starting System	
Starter Motor Output (V-kW)	12 – 2.3
Charge System	
Alternator Output (V-A)	12 – 90
Regulator Type	IC
Battery Size	65D31L

ENGINE CONTROL MODULE (ECM)



The engine control module (ECM) is located inside of engine compartment via mounting bracket and is behind air cleaner case. The ECM has 32 bits performance and is made with Delphi. The ECM mainly controls the following.

- Fuel injection control
- Fuel timing control
- Exhaust gas recirculation (EGR) system control
- Preheating system control
- A/C compressor control
- Fuel pump control
- Immobilizer control (If so equipped)
- On-board diagnostics for engine control

The ECM constantly observes the information from various sensors. The ECM controls the systems that affect vehicle performance. The ECM performs the diagnostic function of the system. The ECM can recognize operational problems, alert the driver through the malfunction indicator lamp (MIL), and store diagnostic trouble code (DTCs). DTC identify the system faults to aid the technician in making repair.

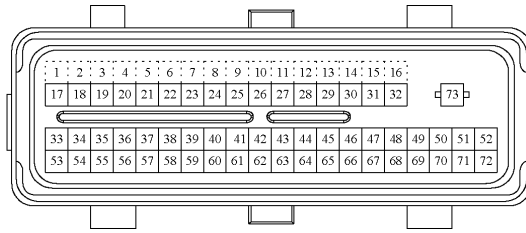
1. Isuzu Parts Number
2. Delphi Parts Number
3. Transmission Type
4. 1st & last digit of Isuzu Parts Number
5. Broadcast Code
6. Assembled Factory Code
7. Engineering Revision Level
8. Product Date
9. Product Sequential Number

Notice! If the ECM is to be replaced the following programmed contents MUST be programmed into the new ECM.

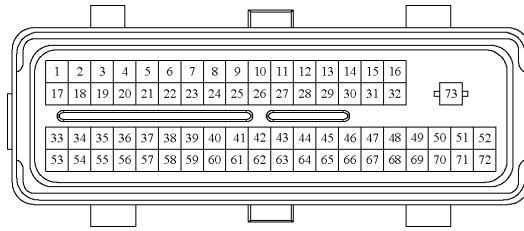
- Fuel Injector ID Code Data (24, 0-9 or A-F characters for each fuel injector)
- Immobilizer (if so equipped)

This diagnostic applies to internal microprocessor integrity conditions within the ECM. The electronically erasable programmable read only memory (EEPROM) memorize learning data, VIN data, immobilizer data and injector ID code data for engine control and communication with other control module.

ECM Connector Pin Assignment



Pin No.	Pin Function	Pin No.	Pin Function	Pin No.	Pin Function
J1-1	Blank	J1-26	Engine Coolant Temperature (ECT) Sensor Low Reference	J1-51	No. 3 Cylinder Fuel Injector Power Supply
J1-2	Blank	J1-27	Engine Coolant Temperature (ECT) Sensor Signal	J1-52	No. 1 Cylinder Fuel Injector Power Supply
J1-3	Blank	J1-28	Fuel Temperature (FT) Sensor Low Reference	J1-53	No. 4 Cylinder Fuel Injector Solenoid Control
J1-4	Blank	J1-29	Fuel Temperature (FT) Sensor Signal	J1-54	Suction Control Valve (SCV) High Control
J1-5	Blank	J1-30	EGR Valve Position Sensor Low Reference	J1-55	Intake Throttle Valve Motor 12 Volts Supply
J1-6	Blank	J1-31	EGR Valve Position Sensor 5 Volts Reference	J1-56	Intake Throttle Valve Motor Duty Signal Control
J1-7	Blank	J1-32	EGR Valve Position Sensor Signal	J1-57	Intake Throttle Valve Position Sensor Signal
J1-8	Blank	J1-33	No. 1 Cylinder Fuel Injector Solenoid Control	J1-58	Crankshaft Position (CKP) Sensor Signal
J1-9	Blank	J1-34	Suction Control Valve (SCV) High Control	J1-59	Not Used
J1-10	Blank	J1-35	Intake Throttle Valve Position Sensor Low Reference	J1-60	ECM Ground (Immobilizer Only)
J1-11	Blank	J1-36	Intake Throttle Valve Position Sensor 5 Volts Reference	J1-61	Intake Air Temperature (IAT) Sensor Low Reference
J1-12	Blank	J1-37	Crankshaft Position (CKP) Sensor 5 Volts Reference	J1-62	EGR Valve Motor 12 Volts Supply
J1-13	Blank	J1-38	Crankshaft Position (CKP) Sensor Shield Ground	J1-63	EGR Valve Motor Duty Signal Control
J1-14	Blank	J1-39	Crankshaft Position (CKP) Sensor Low Reference	J1-64	Camshaft Position (CMP) Sensor Shield Ground
J1-15	Blank	J1-40	Mass Air Flow (MAF) Sensor Signal	J1-65	Not Used
J1-16	Blank	J1-41	Intake Air Temperature (IAT) Sensor Signal	J1-66	Fuel Pump Relay Control
J1-17	Barometric Pressure (BARO) Sensor Low Reference	J1-42	Mass Air Flow (MAF) Sensor Shield Ground	J1-67	Swirl Control Solenoid Valve Control
J1-18	Barometric Pressure (BARO) Sensor Signal	J1-43	Mass Air Flow (MAF) Sensor Low Reference	J1-68	Fuel Rail Pressure (FRP) Sensor Signal
J1-19	Barometric Pressure (BARO) Sensor 5 Volts Reference	J1-44	Camshaft Position (CMP) Sensor Low Reference	J1-69	Fuel Rail Pressure (FRP) Sensor Low Reference
J1-20	Not Used	J1-45	Camshaft Position (CMP) Sensor Signal	J1-70	Suction Control Valve (SCV) Low Control
J1-21	Not Used	J1-46	Camshaft Position (CMP) Sensor 5 Volts Reference	J1-71	No. 2 Cylinder Fuel Injector Power Supply
J1-22	Not Used	J1-47	Fuel Rail Pressure (FRP) Sensor 5 Volts Reference	J1-72	No. 4 Cylinder Fuel Injector Power Supply
J1-23	Not Used	J1-48	Fuel Rail Pressure (FRP) Sensor Signal	J1-73	ECM Ground
J1-24	No. 2 Cylinder Fuel Injector Solenoid Control	J1-49	Fuel Rail Pressure (FRP) Sensor Shield Ground		
J1-25	No. 3 Cylinder Fuel Injector Solenoid Control	J1-50	Suction Control Valve (SCV) Low Control		



Pin No.	Pin Function	Pin No.	Pin Function	Pin No.	Pin Function
J2-1	Not Used	J2-26	Accelerator Pedal Position (APP) Sensor 2 Shield Ground	J2-51	Not Used
J2-2	Diagnostic Request Switch to Data Link Connector (DLC) No. 6	J2-27	Accelerator Pedal Position (APP) Sensor 1 Low Reference	J2-52	Battery Voltage Feed (Backup)
J2-3	Neutral Switch Input	J2-28	Accelerator Pedal Position (APP) Sensor 1 Shield Ground	J2-53	Not Used
J2-4	Thermo Replay Signal Input	J2-29	Not Used	J2-54	Not Used
J2-5	Not Used	J2-30	Not Used	J2-55	A/C Compressor Relay Control
J2-6	Not Used	J2-31	Not Used	J2-56	Accelerator Position Output Duty Signal
J2-7	Accelerator Pedal Position (APP) Sensor 3 5 Volts Reference	J2-32	Not Used	J2-57	Malfunction Indicator Lamp (MIL) Control
J2-8	Accelerator Pedal Position (APP) Sensor 3 Signal	J2-33	Engine Speed Signal Output	J2-58	Not Used
J2-9	Accelerator Pedal Position (APP) Sensor 2 5 Volts Reference	J2-34	Not Used	J2-59	Not Used
J2-10	Accelerator Pedal Position (APP) Sensor 2 Signal	J2-35	Not Used	J2-60	Not Used
J2-11	Accelerator Pedal Position (APP) Sensor 1 5 Volts Reference	J2-36	Not Used	J2-61	Not Used
J2-12	Accelerator Pedal Position (APP) Sensor 1 Signal	J2-37	Glow Relay Control	J2-62	Vehicle Speed Sensor Signal Input
J2-13	Not Used	J2-38	Not Used	J2-63	ECM Main Relay 12 Volts Supply
J2-14	Not Used	J2-39	Not Used	J2-64	Not Used
J2-15	Not Used	J2-40	Not Used	J2-65	Not Used
J2-16	Not Used	J2-41	Not Used	J2-66	Not Used
J2-17	Not Used	J2-42	Not Used	J2-67	Not Used
J2-18	Not Used	J2-43	ECM Main Relay 12 Volts Supply	J2-68	Keyword 2000 to Data Link Connector (DLC) No. 7
J2-19	Not Used	J2-44	Starter Signal Input	J2-69	Not Used
J2-20	Not Used	J2-45	Not Used	J2-70	Not Used
J2-21	Not Used	J2-46	Not Used	J2-71	Not Used
J2-22	Not Used	J2-47	Not Used	J2-72	Ignition Switch Voltage Input
J2-23	Accelerator Pedal Position (APP) Sensor 3 Low Reference	J2-48	Not Used	J2-73	ECM Main Relay Voltage Input
J2-24	Accelerator Pedal Position (APP) Sensor 3 Shield Ground	J2-49	Not Used		
J2-25	Accelerator Pedal Position (APP) Sensor 2 Low Reference	J2-50	Not Used		



Related DTC

DTC (Symptom Code)	DTC Name On Scan Tool	Condition for Running the DTC	Condition for Setting the DTC	Fail-Safe (Back Up)				Suspected Cause
				Fuel Injection Quantity Limitation	Sub System Status		Other Control Status	
					EGR Control	Intake Throttle Control		
P0601 (1)	ECM Program Code Checksum	-	Total sum of ROM data is not equal to registered value.	-	-	-	-	<ul style="list-style-type: none"> ■ Faulty ECM. ■ ECM ground high resistance or poor tightening.
P0601 (2)	ECM Calibration Checksum	-	Total sum of ROM data is not equal to registered calibration value.	-	-	-	-	<ul style="list-style-type: none"> ■ Faulty ECM. ■ ECM ground high resistance or poor tightening.
P0601 (3)	ECM Memory Failure	-	Faulty learning data in the EEPROM.	-	-	-	-	<ul style="list-style-type: none"> ■ Faulty ECM. ■ ECM ground high resistance or poor tightening.
P0601 (4)	ECM Memory Failure	-	Faulty VIN data or faulty immobilizer data in the EEPROM.	-	-	-	-	<ul style="list-style-type: none"> ■ Faulty ECM. ■ ECM ground high resistance or poor tightening.
P0601 (5)	ECM Memory Failure	-	Faulty injector ID code data in the EEROM.	-	-	-	-	<ul style="list-style-type: none"> ■ Faulty ECM. ■ ECM ground high resistance or poor tightening.