15 OBDG04 TCM Summary Tables (Initial DTCs)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
Solenoid S1	P0973	Circuit continuity check	Short-cut ground Detect signal of the S1 monitor	"OFF"	DS Active V[1] Time after solenoid output changed S1 driver outputs signal	TRUE >10 msec "ON"	500 msec Continuous	2nd
	P0974		Not connected or short-cut Ubatt Detect signal of the S1 monitor	"ON"	DS Active V[1] Time after solenoid output changed S1 driver outputs signal	TRUE >10 msec "OFF"		
Timing solenoid SLC1	P0966	Circuit continuity check	Short-cut ground or open Feedback current	< 20 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P0967 for 1 sec and over	500 msec Continuous	2nd
	P0967		Short-cut Ubatt (B+) Feedback current	>= 1358 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P0966 for 1 sec and over	500 msec Continuous	2nd
	P0778		Feed Back Current Stuck(Electrical) **Criteria1:** | ie |	> 50 mA	Battery voltage Feedback current Emergency mode DS Active V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P0966 P0967 P0657	2000 msec Continuous	2nd
			Criteria2: sum_ie "ie" is added to "sum_ie" every 10 msec. "ie" : Difference of "ir" and "ifb". "ir" : Target current "ifb": Feedback current "sum_ie" is cleared as follows: (1) or (2) or (3) (1): Detection window = FALSE (2): -50 mA <= ie <= 50 mA (3): ie value cahnges from "ie < 0mA" ("ie >0mA") to "ie >0mA" ("ie < 0mA").	>20000 mA	Battery voltage Feedback current Emergency mode DS Active V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P0966 P0967 P0657	sum_ie > 60000mA	
Timing solenoid SLC2	P0970	Circuit continuity check	Short-cut ground or open Feedback current	< 20 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P0971 for 1 sec and over	500 msec Continuous	2nd
	P0971		Short-cut Ubatt (B+) Feedback current	>= 1358 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P0970 for 1 sec and over	500 msec Continuous	2nd

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
	P0798		Feed Back Current Stuck(Electrical) **Criteria1:** | ie |	 > 50 mA	Battery voltage Feedback current Emergency mode DS_Active_V1 No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P0970 P0971 P0657	2000 msec Continuous	2nd
			Criteria2: sum_ie "ie" is added to "sum_ie" every 10 msec. "ie" : Difference of "ir" and "ifb". "ir" : Target current "ifb": Feedback current "sum_ie" is cleared as follows: (1) or (2) or (3) (1): Detection window = FALSE (2): -50 mA <= ie <= 50 mA (3): ie value cahnges from "ie < 0mA" ("ie >0mA") to "ie >0mA" ("ie < 0mA").	 >20000 mA	Battery voltage Feedback current Emergency mode DS_Active_V1 No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P0970 P0971 P0657	sum_ie > 60000mA	
Timing solenoid SLC3	P2720	Circuit continuity check	Short-cut ground or open Feedback current	< 20 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P2721 for 1 sec and over	500 msec Continuous	2nd
	P2721		Short-cut Ubatt (B+) Feedback current	>= 1358 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P2720 for 1 sec and over	500 msec Continuous	2nd
	P2716		Feed Back Current Stuck(Electrical) **Criteria1:** | ie |	 > 50 mA	Battery voltage Feedback current Emergency mode DS Active V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P2720 P2721 P0657	2000 msec Continuous	2nd
			Criteria2: sum_ie "ie" is added to "sum_ie" every 10 msec. "ie" : Difference of "ir" and "ifb". "ir" : Target current "ifb": Feedback current "sum_ie" is cleared as follows: (1) or (2) or (3) (1): Detection window = FALSE (2): -50 mA <= ie <= 50 mA	 >20000 mA	Battery voltage Feedback current Emergency mode DS Active V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P2720 P2721 P0657	sum_ie > 60000mA	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
			(3): ie value cahnges from “ie < 0mA“ (“ie >0mA“) to “ie >0mA“ (“ie < 0mA“).					
Timing solenoid SLB1	P2729	Circuit continuity check	Short-cut ground or open Feedback current	< 20 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P2730 for 1 sec and over	500 msec Continuous	2nd
	P2730		Short-cut Ubatt (B+) Feedback current	>= 1358 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P2729 for 1 sec and over	500 msec Continuous	2nd
	P2727		Feed Back Current Stuck(Electrical) **Criteria1:** | ie |	> 50 mA	Battery voltage Feedback current Emergency mode DS Active V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P2729 P2730 P0657	2000 msec Continuous	2nd
			Criteria2: sum_ie "ie" is added to “sum_ie” every 10 msec. “ie” : Difference of “ir” and “ifb”. “ir” : Target current “ifb”: Feedback current “sum_ie” is cleared as follows: (1) or (2) or (3) (1): Detection window = FALSE (2): -50 mA <= ie <= 50 mA (3): ie value cahnges from “ie < 0mA“ (“ie >0mA“) to “ie >0mA“ (“ie < 0mA“).	>20000 mA	Battery voltage Feedback current Emergency mode DS Active V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P2729 P2730 P0657	sum_ie > 60000mA	
Pressure solenoid SLT	P0962	Circuit continuity check	Short-cut ground or open Feedback current	< 20 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P0963 for 1 sec and over	500 msec Continuous	2nd
	P0963		Short-cut Ubatt (B+) Feedback current	>= 1358 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P0962 for 1 sec and over	500 msec Continuous	2nd
	P0748		Feed Back Current Stuck(Electrical) **Criteria1:** | ie |	> 50 mA	Battery voltage Feedback current Emergency mode DS Active V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P0962 P0963	2000 msec Continuous	2nd

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
						P0657		
			Criteria2: sum_ie "ie" is added to "sum_ie" every 10 msec. "ie" : Difference of "ir" and "ifb". "ir" : Target current "ifb": Feedback current "sum_ie" is cleared as follows: (1) or (2) or (3) (1): Detection window = FALSE (2): -50 mA <= ie <= 50 mA (3): ie value cahnges from "ie < 0mA" ("ie >0mA") to "ie >0mA" ("ie < 0mA").	 >20000 mA	Battery voltage Feedback current Emergency mode DS Active V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P0962 P0963 P0657	sum_ie > 60000mA	
Pressure solenoid SLU	P2764	Circuit continuity check	Short-cut ground or open Feedback current	< 20 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P2763 for 1 sec and over	500 msec Continuous	2nd
	P2763		Short-cut Ubatt (B+) Feedback current	>= 1358 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P2764 for 1 sec and over	500 msec Continuous	2nd
	P2761		Feed Back Current Stuck(Electrical) **Criteria1:** | ie |	 > 50 mA	Battery voltage Feedback current Emergency mode DS Active V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P2764 P2763 P0657	2000 msec Continuous	2nd
			Criteria2: sum_ie "ie" is added to "sum_ie" every 10 msec. "ie" : Difference of "ir" and "ifb". "ir" : Target current "ifb": Feedback current "sum_ie" is cleared as follows: (1) or (2) or (3) (1): Detection window = FALSE (2): -50 mA <= ie <= 50 mA (3): ie value cahnges from "ie < 0mA" ("ie >0mA") to "ie >0mA" ("ie < 0mA").	 >20000 mA	Battery voltage Feedback current Emergency mode DS Active V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P2764 P2763 P0657	sum_ie > 60000mA	
Linear solenoid driver	P0657		Malfunction Linear solenoid driver status	= abnormal	DS_Active_V[1]	TRUE	400 msec Cntinuous	2nd
Transmission Output speed sensor	P0722		No pulse		DS Active EG V[16] Emergency mode	TRUE FALSE	Dependent of Speed	2nd

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
			Number of pulses from Transmission Output Speed Sensor Number of pulses from Transmission Input Speed Sensor	0 16	Shift position Not during Neutral control T_NConFin[14] msec after Neutral control Not during shifting T_ShiftFin[14] msec after shifting Not during garage control T_GarageFin[14] msec after garage control Not during C1 OFF control T_C1ctrlFin[15] msec after C1 OFF control Not during C2 OFF control T_C3ctrlFin[15] msec after C2 OFF control Not in Engine stall avoidance control outRpmNC No DTC set	RANGE_D(defined) >= 300 rpm P0705 P0707 P0708 P0717 P0715 P0748 P0778 P0798 P0962 P0963 P0966 P0967 P0970 P0971 P0973 P0974 P2716 P2720 P2721 P2727 P0657 P0720 P2729 P2730		
	P0720	Circuit continuity check	Electrical Failure (B+ short / GND short / Open) NINM-voltage (AD value)	< 0.206V or > 2.727V (< 45 or > 545)	DS_Active_V[1]	TRUE	1000 msec Consecutive	2nd
Transmission input speed sensor	P0717		No pulse No of pulses from Transmission Input Speed Sensor No of pulses from Transmission Output Speed Sensor	0 24	DS_Active_EG_V[16] Emergency mode Shift position CurrentGear Not during Neutral control	TRUE FALSE RANGE_D(defined) >= 2nd gear	Dependent of Speed	2nd

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
					T_NConFin[14] msec after Neutral control Not during shifting T_ShiftFin[14] msec after shifting Not during garage control T_GarageFin[14] msec after garage control Not during C1 OFF control T_C1ctrlFin[15] msec after C1 OFF control T_C3ctrlFin[15] msec after C2 OFF control Not in Engine stall avoidance control Transmission Output Speed No DTC set	 >= 300 rpm P0705 P0707 P0708 P0722 P0720 P0748 P0778 P0798 P0962 P0963 P0966 P0967 P0970 P0971 P0973 P0974 P2716 P2720 P2721 P2727 P0657 P0715 P2729 P2730		
	P0715	Circuit continuity check	Electrical Failure (B+ short / GND short / Open) NOUTM-voltage (AD value)	 < 0.206V or > 2.727V (< 45 or > 545)	DS Active V[1]	TRUE	1000 msec Consecutive	2nd
Transmission Range Sensor Circuit	P0707	Voltage low	Input POS1 Voltage or Input POS2 Voltage	< 0.127V	Diagnosis Service mode Battery voltage	FALSE 9V < Battery Voltage <= 32 V	200msec Continuous	2nd
	P0708	Voltage high	Input POS1 Voltage or Input POS2 Voltage	> 4.84V	Diagnosis Service mode Battery voltage	FALSE 9V < Battery Voltage <= 32 V	200 msec Continuous	2nd
	P0705	Signal out of range	Input POS1 Voltage + Input POS2 Voltage	< 5V -0.29V or > 5V +0.29V	Diagnosis Service mode Battery voltage No DTC set	FALSE 9 V <= Battery Voltage < 32 V P0707 P0708	200 msec Continuous	2nd

15 OBDG04 TCM Summary Tables (Initial DTCs)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
Transmission oil temperature sensor	P0711	Rationality	**Criteria1:** Oil temperature change less than	10 (AD value)	Oil temperature DS Active EG V[16] AD value of oil temperature AD value of oil temperature Emergency mode Shift position Vehicle Speed No DTC set	<= 20deg.C TRUE >= 10 <= 1010 FALSE ≠ (P, R or N) >= 40km/h once P0705 P0707 P0708 P0711 P0712 P0713	10 min	2nd
			Criteria2: Oil temperature	< 20deg.C	DS Active EG V[16] AD value of oil temperature AD value of oil temperature Emergency mode Estimated heating value Engine speed No DTC set	TRUE >= 10 <= 1010 FALSE >= MAP Q NORMAL[16] P0717 P0715 P0711 P0712 P0713	1 time	
	P0712	Circuit continuity check	Short-cut ground AD value of Oil temperature	< 10 (More than 200deg.C).	DS Active V[1]	TRUE	60 sec	2nd
	P0713	Circuit continuity check	Short-cut Ubat or open circuit AD value of Oil temperature	> 1010 (less than -55deg.C)	DS Active EG V[16] DriveTime	TRUE > 1 min	12 sec	2nd
Ignition Switch Run/Start Position	P2534	Circuit Low	Ignition voltage	< 9V	DS Active ACC[4] Emergency mode Engine speed No DTC set	TRUE FALSE > 400rpm U0001 U0100	20 sec	2nd
Internal Control Module Memory	P0601	Check Sum Error	Detectin of differences between the result of the checksum calculation executed after IG ON and the correct checksum. If there are differences from the correct checksum value stored in the FLASH ROM, a second calculation is made.		Ignition	OFF->ON	1 time	2nd
Control Module Programming	P0602	Control Module Programming	Calibration data is not downlord properly.		None		1 time	1st
Non volatile memory	P0603	Read / Write error	To detect calculated checksum in RAM is different from checksum value in EEPROM. TCM has two areas (main and sub) for EEPROM. This failure is detected when both areas are wrong.		Ignition	OFF->ON (only at T/M computer initialization function)	1 time	1st
Random access memory	P0604	Read / Write error	To detect different value between write and read (Step1 and Step2, Step3 and Step4) while TCM checks all RAM from step 1 to step 4 in initialize routine.		Ignition	OFF->ON (only at T/M computer initialization function)	1 time	1st

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
			Step 1. TCU writes 55(hex) data in the ram. Step 2. TCU reads 55(hex) data in the ram. Step 3. TCU writes AA(hex) data in the ram. Step 4. TCU reads AA(hex) data in the ram.					
CAN Bus Off Counter Overrun	U0001	CAN controller continuity check	Receiving “BUS OFF” state from CAN controller		DS Active ACC[4]	TRUE	8 times	2nd
Lost communication with ECM (Engine)	U0100	Frame missing from ECM	No CAN status frame from ECM detected		Diagnostic Service "Disable Normal Communication" not detected Ignition DS Active CAN[2] No DTC set	 ON >5 sec TRUE U0001	4 sec Continuous	2nd
Gear error, hydraulic fault	P0731	Rationality	Calculation of actual gear ratio for 1st gear is not correct. abs(1 - GRCurrent/ 2nd GearRatio) **or** abs(1 - GRCurrent/ 3rd GearRatio) **or** abs(1 - GRCurrent/ 4th GearRatio)	 < 4% < 4% < 4%	Current Gear Transmission Output Speed EngineTorque_noACC Transmission Input Speed Transmission Input Speed ConditionA[13]	1st > 60rpm >= 60Nm (GEAR_1ST) <=6000rpm (gasoline engine) <=4000rpm (diesel engine) TRUE	2.5sec Continuous	2nd
	P0732	Rationality	Calculation of actual gear ratio for 2nd gear is not correct. (Criteria1 or Criteria2)				12 sec Continuous	2nd
			Criteria1: abs(1-GRCurrent/GRExpected)	>20%	Current gear Transmission Output Speed ConditionA[13] No DTC set	2nd >= 60rpm TRUE P0732 (Criteria2)		
			Criteria2: abs(1-Gear Ratio Current/ 3rd Gear Ratio) **or** abs(1-Gear Ratio Current/ 4th Gear Ratio) **or** abs(1-Gear Ratio Current/ 6th Gear Ratio)	 <4% <4% <4%	Current gear Transmission Output Speed ConditionA[13] InTorque	2nd >= 60rpm TRUE >=30Nm or <=-20Nm	2.5 sec Accumulate	
	P0733	Rationality	Calculation of actual gear ratio for 3rd gear is not correct. (Criteria1 or Criteria2)				12 sec Continuous	2nd
			Criteria1: abs(1-GRCurrent/GRExpected)	>20%	Current gear Transmission Output Speed ConditionA[13] No DTC set	3rd >= 60rpm TRUE P0733 (Criteria2)		
			Criteria2: abs(1-Gear Ratio Current/ 2nd Gear Ratio) **or** abs(1-Gear Ratio Current/ 4th Gear Ratio) **or** abs(1-Gear Ratio Current/ 5th Gear Ratio)	 <4% <4% <4%	Current gear Transmission Output Speed ConditionA[13] InTorque	3rd >= 60rpm TRUE >=30Nm or <=-20Nm	2.5 sec Accumulate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
	P0734	Rationality	Calculation of actual gear ratio for 4th gear is not correct. (Criteria1 or Criteria2)				12 sec Continuous	2nd
			Criteria1: abs(1-GRCurrent/GRExpected)	>20%	Current gear Transmission Output Speed ConditionA[13] No DTC set	4th >= 60rpm TRUE P0734 (Criteria2)		
			Criteria2: abs(1-Gear Ratio Current/ 2nd Gear Ratio) **or** abs(1-Gear Ratio Current/ 3rd Gear Ratio) **or** abs(1-Gear Ratio Current/ 5th Gear Ratio) **or** abs(1-Gear Ratio Current/ 6th Gear Ratio)	<4% <4% <4% <4%	Current gear Transmission Output Speed ConditionA[13] InTorque	4th >= 60rpm TRUE >=30Nm or <=-20Nm	2.5 sec Accumulate	
	P0735	Rationality	Calculation of actual gear ratio for 5th gear is not correct. (Criteria1 or Criteria2)				12 sec Continuous	2nd
			Criteria1: abs(1-GRCurrent/GRExpected)	>20%	Current gear Transmission Output Speed ConditionA[13] No DTC set	5th >= 60rpm TRUE P0735 (Criteria2)		
			Criteria2: abs(1-Gear Ratio Current/ 3rd Gear Ratio) **or** abs(1-Gear Ratio Current/ 4th Gear Ratio) **or** abs(1-Gear Ratio Current/ 6th Gear Ratio)	<4% <4% <4%	Current gear Transmission Output Speed ConditionA[13] InTorque	5th >= 60rpm TRUE >=30Nm or <=-20Nm	2.5 sec Accumulate	
	P0729	Rationality	Calculation of actual gear ratio for 6th gear is not correct. (Criteria1 or Criteria2)				12 sec Continuous	2nd
			Criteria1: abs(1-GRCurrent/GRExpected)	> 20%	Current gear Transmission Output Speed ConditionA[13] No DTC set	6th >= 60rpm TRUE P0729 (Criteria2)		
			Criteria2: abs(1-Gear Ratio Current/ 2nd Gear Ratio) **or** abs(1-Gear Ratio Current/ 4th Gear Ratio) **or** abs(1-Gear Ratio Current/ 5th Gear Ratio)	<4% <4% <4%	Current gear Transmission Output Speed ConditionA[13] InTorque	6th >= 60rpm TRUE >=30Nm or <=-20Nm	2.5 sec Accumulate	
Torque Converter Clutch	P0741	Comparison of engine speed and transmission input speed	Converter is slipping with active lock-up on. (Engine Speed - Transmission Input Speed)	> 300rpm	DS Active EG V[16] Fdetect inh[5] Shift position Time after N-D shifting control[10] ends Engine Torque Engine Speed	TRUE FALSE RANGE_D(defined) 8 sec >= 0 Nm < 4000 rpm	12 sec Continuous	2nd

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
					Time after SLU target current (_ir) >= 1000 mA	Time_SLU_Full[18] sec		
					Oil temperature	>= -7deg.C		
					Lock-up	FALSE		
					Not during garage control			
					T_GarageFin[14] msec after garage control			
					Not during shifting			
					T_ShiftFin[14] msec after shifting			
					No DTC set	P2763 P2764 P2761 P0715 P0717 P0720 P0722		
Un-usual shifting	P0869	SLC1 MAX	count fail SLC1MAX usft [17]	>= 5times	DS_Active_EG_V16	TRUE	1 time	2nd
					Fdetect inh[5]	FALSE		
					Time after N-D Shifting Control[10] ends	This timer is based on oil temperature.		
					Not during garage control			
		SLC2 MAX	count_fail_SLC2MAX_usft [17]	>= 5times	T_GarageFin[14] msec after garage control			
					Shift position	RANGE_D(defined)		
					Not during Neutral control			
		SLC3 MAX	count_fail_SLC3MAX_usft [17]	>= 5times	T_NConFin[14] msec after Neutral control			
					Time after neutral control ends	This timer is based on oil temperature.		
					wheel spin condition	FALSE		
		SLB1 MAX	count fail SLB1MAX usft [17]	>= 5times	Transmission Output Speed	>300rpm		
					Oil temperature	>= -20 °C		
					Tmr_inh_GE[14] sec after shift to safe gear			
					No DTC set	P0715 P0717 P0720 P0722		
Neutral condition	P0965		**Step 1:** abs(Engine Speed - Transmission Input Speed) Transmission Input Speed (at D range)	<300rpm > Transmission Output Speed x (1st gear ratio at RANGE_D) + revNfaildet[19] rpm	DS Active EG V[16] Fdetect_Inh[5]	TRUE FALSE	**Step 1:** at D range:	2nd
					Oil temperature	>= -7deg.C	3.3 sec if (0 <= X <= 1500)	
					Shift position	RANGE_D(defined)		
					Not during shifting		1.3 sec if (1501 <= X <= 3000)	
					T ShiftFin[14] msec after shifting			
					Not during garage control(N-D)			
					T_GarageFin[14] msec after garage control			
			Step 2: Transmission Input Speed	<200rpm	Not during Neutral control T_NConFin[14] msec after Neutral control			
			Engine Speed	>600rpm	Transmission Output Speed	<=500rpm	0.8 sec if (3001 <= X)	
			Shift position	RANGE_D(defined)	Lockup	FALSE		
					Current gear	1 or 2 or 3 or 4		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
					QS AirSuction[6] Prohibit Neutral Judgment flag No DTC set	FALSE FALSE P0717 P0722 P0715 P0720	**Step 2:** 0.3sec	

[1)]DS_Active_V

DS_Active_V = TRUE when start condition for failure detection is fulfilled for 2.0 sec continuously.
DS_Active_V = FALSE when permission condition for failure detection is not fulfilled.

Start Condition for failure detection:

Ignition ON and
10.2V < Battery Voltage <= 32V and
Not in service mode and
Reading EEPROM finish

Permission condition for failure detection:

Ignition ON and
9.0V < Battery Voltage <= 32V and
Not in service mode

[2)] DS_Active_CAN

DS_Active_CAN = TRUE when the start condition for CAN failure detection is fulfilled for 5.0 sec continously.
DS_Active_CAN = FALSE when the permission condition for CAN failure detection is not fulfilled.

Start Condition for failure detection:

Ignition ON and
10.2V < Battery Voltage <= 32V and
Not in service mode and
Reading EEPROM finish

Permission condition for failure detection:

Ignition ON and
9.0V < Battery Voltage <= 32V and
Not in service mode

[3)]DS_Active_EG_V

DS_Active_EG_V = TRUE when start condition for failure detection is fulfilled for 2.0 sec continuously.
DS_Active_EG_V = FALSE when permission condition for failure detection is not fulfilled.

Start Condition for failure detection:

Ignition ON and
10.2V < Battery Voltage <= 32V and
Not in service mode and
Reading EEPROM finish and
Egrpm > 400rpm and Egrpm = Q_NORMAL[16]
Bus off, ECU no communication = Q_NORMAL[16]

Permission condition for failure detection:

Ignition ON and
9.0V < Battery Voltage <= 32V and
Not in service mode and
Egrpm > 400rpm and Egrpm = Q_NORMAL[16]
Bus off, ECU no communication = Q_NORMAL[16]

[4)] DS_Active_ACC

DS_Active_ACC = TRUE when the start condition for failure detection is fulfilled for 2.0 sec continously.
DS_Active_ACC = FALSE when the permission condition for failure detection is not fulfilled.

Start Condition for failure detection:

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.

Accessory ON **or** Ignition ON and
10.2V < Battery Voltage <= 32V and
Not in service mode and
Reading EEPROM finish

Permission condition for failure detection:
Accessory ON **or** Ignition ON and
9.0V < Battery Voltage <= 32V and
Not in service mode

[5] Fdetech_Inh = TRUE if:
In Emergency mode **or**
Spinning[7] = TRUE **or**
within 10.0 sec after spinning[7] detection end **or**
DTC set: P0973, P0974, P0966, P0967, P0970, P0971, P2720, P2721, P2729, P2730, P0962, P0963, P2763, P0717, P0722, P0705, P0707, P0708, U0001, U0100, P0601, P0711, P0712, P0713, P2534, P0604, P0778, P0798, P2716, P0748, P2761, P2727, P0657, P0720, P0715,

Not in Neutral avoidance control
Not in Engine stall avoidance control
Egrpm = Q NORMAL[16]
Egtrq = Q NORMAL[16]
Accel = Q NORMAL[16]

[6] QS_AirSuction : Quick stop detection flag for the prevention of failure misdetection for Air suction, is set if the vehicle brakes hard.

[7] Spinning : If “LateralACC > 7.00m/s^2”, Spinning is TRUE.
LateralACC[m/s^2] = (WheelDiff[m/s] * WheelSpeedABS[m/s]) / WheelWidth[m])
WheelDiff ... “WheelSpeed RR” - “WheelSpeed RL”
WheelWidth... The width of the Wheel.

[8] Wheel spin condition
(1) 300 rpm < outRpm < 3000rpm
(2) Egtorque_noACC > -500Nm
(3) ABS (vehicle front wheels average speed - vehicle rear wheels average speed) > 5.0 km/h
(4) Throttle > 70 %
(5) outRpmSpeed < -50rpm/sec
{(1)and(2)and(3)}or{ (1)and(4)and(5)}continuously detected for 300 msec
After that, Wheel spin condition = TRUE continuously 10000 msec

[9] EngineTorque_noACC
Engine output torque, acceleration inertia torque not included.

[10] Shifting Control
"Shifting Control” is activated when the transmission is in between two gears (undefined gear ratio), until applied pressure has reached to full

[11] "Neutral Control"
Neutral Control is activated if the vehicle is at stand still and in range D with the brake pressed for 2 seconds until the brake is released.

[12] "Garage Shifting"
"Garage Shifting Control” is activated when the range selector changes from N to D or R until appropriate Gear Ratio is detected.

[13] ConditionA = TRUE if:
DS Active EG V[3] = TRUE **and**
Fdetect_Inh[5] = FALSE **and**
Garage shifting control[12](N-D or N-R) = FALSE **and**
T_GarageFin sec [14] after garage shift control[12] end **and**

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.

Neutral control[11] = FALSE **and**
T_NConFin[14] after neutral control[11] end **and**
Shifting control[10] = FALSE **and**
T_ShiftFin[14] after shifting control[10] end **and**
RANGE_D (defined signal) **and**
Oil temperature >= -20 deg.C **and**
QS_AirSuction[6] = FALSE **and**
No DTC set: P0717, P0715, P0722, P0720

14)

Const Data	< -20 deg.C	>= -20 deg.C< -10 deg.C	>= -10 deg.C< 20 deg.C	>= 20 deg.C
T_GarageFin [msec]	50000	8000	2000	1000
T_NConFin [msec]	50000	8000	2000	1000
T_ShiftFin [msec]	50000	2000	1000	500
Tmr_inh_GE [msec]	50000	2000	1000	500

15)

Const Data / oiltemp	< GE_OT1	>= GE_OT1 < GE_OT2	>= GE_OT2
T_C1ctrlFin [msec]	50000	20000	8000
T_C3ctrlFin [msec]	50000	20000	8000

16) Q_NORMAL
Q_NORMAL menas that no failure is detected

17) count_fail_SLC1MAX_usft, count_fail_SLC2MAX_usft,count_fail_SLC3MAX_usft, count_fail_SLB1MAX_usft
When the following shift conditions are satisfied, increments the counter of count_fail_SLXXMAX_usft.

Condition / count	A-1*	A-2*	B-1*	B-2*	D*	E*
SLC1MAX_usft	4-5, 4-6, 2-6, 3-5	-	-	-	6-2, 5-3	5-6, 6-5, 6-4, 5-4
SLC2MAX_usft	-	4-3, 4-2, 5-3, 6-2	-	-	2-6, 3-5, 2-1, 1-1EB	1-2, 1-3, 2-3, 2-4, 3-4, 3-2, 3-1, 2-1
SLC3MAX_usft	3-4, 5-6	5-4, 3-2	-	-	2-6, 4-5, 4-6, 4-2 4-3, 6-2	1-2, 1-3, 2-3, 2-4, 4-3, 4-2, 2-1, 2-1EB, 1EB-1, 1-1EB, 4-5, 4-6, 6-5, 6-4
SLB1MAX_usft	2-3, 2-4	6-5, 6-4, 2-1EB	3-4	4-3	3-5, 4-5, 4-6, 5-6, 3-1, 3-2, 4-2, 5-3, 5-4	1-2, 1-3, 3-4, 3-2, 3-1, 1EB-1,1-1EB, 4-5, 4-6, 5-6, 5-4, 4-2

*Refer to Un-usual shifting Condition for the detail of "A-1, A-2, B-1, B-2, D, E"

18)

	OT < 20 deg.C	OT >= 20 deg.C
OilTemp [deg.C]		
Time_SLU_Full [msec]	3000	3000

19)

OilTemp [deg.C]		OT < 0 deg.C	OT >= 0 deg.C
revNfaildet [rpm]	R range	1200	1000

15 OBDG04 TCM Summary Tables (Unusual Shifting)

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
Solenoid S1	P0973	Circuit continuity check	Short-cut ground Detect signal of the S1 monitor	 "OFF"	DS_Active_V[1] Time after solenoid output changed S1 driver outputs signal	TRUE >10 msec "ON"	500 msec Continuous	2nd
	P0974		Not connected or short-cut Ubatt Detect signal of the S1 monitor	 "ON"	DS_Active_V[1] Time after solenoid output changed S1 driver outputs signal	TRUE >10 msec "OFF"		
Timing solenoid SLC1	P0966	Circuit continuity check	Short-cut ground or open Feedback current	< 20 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P0967 for 1 sec and over	500 msec Continuous	2nd
	P0967		Short-cut Ubatt (B+) Feedback current	>= 1358 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P0966 for 1 sec and over	500 msec Continuous	2nd
	P0778		Feed Back Current Stuck(Electrical) **Criteria1:** | ie |	 > 50 mA	Battery voltage Feedback current Emergency mode DS_Active_V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P0966 P0967 P0657	2000 msec Continuous	2nd

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
			Criteria2: sum_ie "ie" is added to “sum_ie” every 10 msec. “ie” : Difference of “ir” and “ifb”. “ir” : Target current “ifb”: Feedback current “sum_ie” is cleared as follows: (1) or (2) or (3) (1): Detection window = FALSE (2): -50 mA <= ie <= 50 mA (3): ie value cahnges from “ie < 0mA“ (“ie >0mA“) to “ie >0mA“ (“ie < 0mA“).	 >20000 mA	Battery voltage Feedback current Emergency mode DS_Active_V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P0966 P0967 P0657	sum_ie > 60000mA	
Timing solenoid SLC2	P0970	Circuit continuity check	Short-cut ground or open Feedback current	< 20 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P0971 for 1 sec and over	500 msec Continuous	2nd

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
	P0971		Short-cut Ubatt (B+) Feedback current	 >= 1358 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P0970 for 1 sec and over	500 msec Continuous	2nd
	P0798		Feed Back Current Stuck(Electrical) **Criteria1:** | ie |	 > 50 mA	Battery voltage Feedback current Emergency mode DS_Active_V1 No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P0970 P0971 P0657	2000 msec Continuous	2nd
			Criteria2: sum_ie "ie" is added to "sum_ie" every 10 msec. "ie" : Difference of "ir" and "ifb". "ir" : Target current "ifb": Feedback current "sum_ie" is cleared as follows: (1) or (2) or (3) (1): Detection window = FALSE	 >20000 mA	Battery voltage Feedback current Emergency mode DS_Active_V1 No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P0970 P0971 P0657	sum_ie > 60000mA	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
			(2): -50 mA <= ie <= 50 mA (3): ie value cahnges from “ie < 0mA“ (“ie >0mA“) to “ie >0mA“ (“ie < 0mA“).					
Timing solenoid SLC3	P2720	Circuit continuity check	Short-cut ground or open Feedback current	< 20 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P2721 for 1 sec and over	500 msec Continuous	2nd
	P2721		Short-cut Ubatt (B+) Feedback current	>= 1358 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P2720 for 1 sec and over	500 msec Continuous	2nd
	P2716		Feed Back Current Stuck(Electrical) **Criteria1:** | ie |	> 50 mA	Battery voltage Feedback current Emergency mode DS_Active_V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P2720 P2721 P0657	2000 msec Continuous	2nd
			Criteria2: sum_ie "ie" is added to “sum_ie” every 10 msec.	>20000 mA	Battery voltage Feedback current Emergency mode	> 10.5 V for 500 msec continuously < 1358 mA FALSE	sum_ie > 60000mA	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
			"ie" : Difference of "ir" and "ifb". "ir" : Target current "ifb": Feedback current "sum_ie" is cleared as follows: (1) or (2) or (3) (1): Detection window = FALSE (2): -50 mA <= ie <= 50 mA (3): ie value cahnges from "ie < 0mA" ("ie >0mA") to "ie >0mA" ("ie < 0mA").		DS_Active_V[1] No DTC set	TRUE P2720 P2721 P0657		
Timing solenoid SLB1	P2729	Circuit continuity check	Short-cut ground or open Feedback current	< 20 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P2730 for 1 sec and over	500 msec Continuous	2nd
	P2730		Short-cut Ubatt (B+) Feedback current	>= 1358 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P2729 for 1 sec and over	500 msec Continuous	2nd
	P2727		Feed Back Current Stuck(Electrical) **Criteria1:**		Battery voltage Feedback current	> 10.5 V for 500 msec continuously < 1358 mA	2000 msec Continuous	2nd

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
			| ie |	> 50 mA	Emergency mode DS_Active_V[1] No DTC set	FALSE TRUE P2729 P2730 P0657		
			Criteria2: sum_ie "ie" is added to "sum_ie" every 10 msec. "ie" : Difference of "ir" and "ifb". "ir" : Target current "ifb": Feedback current "sum_ie" is cleared as follows: (1) or (2) or (3) (1): Detection window = FALSE (2): -50 mA <= ie <= 50 mA (3): ie value cahnges from "ie < 0mA" ("ie >0mA") to "ie >0mA" ("ie < 0mA").	>20000 mA	Battery voltage Feedback current Emergency mode DS_Active_V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P2729 P2730 P0657	sum_ie > 60000mA	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
Pressure solenoid SLT	P0962	Circuit continuity check	Short-cut ground or open Feedback current	< 20 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P0963 for 1 sec and over	500 msec Continuous	2nd
	P0963		Short-cut Ubatt (B+) Feedback current	>= 1358 mA	DS Active V[1] Emergency mode No DTC set	TRUE FALSE P0657 P0962 for 1 sec and over	500 msec Continuous	2nd
	P0748		Feed Back Current Stuck(Electrical) **Criteria1:** | ie |	> 50 mA	Battery voltage Feedback current Emergency mode DS_Active_V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P0962 P0963 P0657	2000 msec Continuous	2nd
			Criteria2: sum_ie "ie" is added to “sum_ie” every 10 msec. “ie” : Difference of “ir” and “ifb”. “ir” : Target current “ifb”: Feedback current	>20000 mA	Battery voltage Feedback current Emergency mode DS_Active_V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P0962 P0963	sum_ie > 60000mA	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
			"sum_ie" is cleared as follows: (1) or (2) or (3) (1): Detection window = FALSE (2): -50 mA <= ie <= 50 mA (3): ie value cahnges from "ie < 0mA" ("ie >0mA") to "ie >0mA" ("ie < 0mA").			P0657		
Pressure solenoid SLU	P2764	Circuit continuity check	Short-cut ground or open Feedback current	< 20 mA	DS Active V^1 Emergency mode No DTC set	TRUE FALSE P0657 P2763 for 1 sec and over	500 msec Continuous	2nd
	P2763		Short-cut Ubatt (B+) Feedback current	>= 1358 mA	DS Active V^1 Emergency mode No DTC set	TRUE FALSE P0657 P2764 for 1 sec and over	500 msec Continuous	2nd
	P2761		Feed Back Current Stuck(Electrical) **Criteria1:** | ie |	> 50 mA	Battery voltage Feedback current Emergency mode DS_Active_V^1 No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P2764 P2763 P0657	2000 msec Continuous	2nd

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
			Criteria2: sum_ie "ie" is added to “sum_ie” every 10 msec. “ie” : Difference of “ir” and “ifb”. “ir” : Target current “ifb”: Feedback current “sum_ie” is cleared as follows: (1) or (2) or (3) (1): Detection window = FALSE (2): -50 mA <= ie <= 50 mA (3): ie value cahnges from “ie < 0mA“ (“ie >0mA“) to “ie >0mA“ (“ie < 0mA“).	 >20000 mA	Battery voltage Feedback current Emergency mode DS_Active_V[1] No DTC set	> 10.5 V for 500 msec continuously < 1358 mA FALSE TRUE P2764 P2763 P0657	sum_ie > 60000mA	
Linear solenoid driver	P0657		Malfunction Linear solenoid driver status	= abnormal	DS_Active_V[1]	TRUE	400 msec Cntinuous	2nd
Transmission Output speed	P0722		No pulse		DS Active EG V[16]	TRUE	Dependent	2nd

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
sensor							of Speed	
					Emergency mode	FALSE		
					Shift position	RANGE_D(defined)		
			Number of pulses from Transmission Output Speed Sensor	0				
			Number of pulses from Transmission Input Speed Sensor	16	Not during Neutral control			
					T_NConFin[14] msec after Neutral control			
					Not during shifting			
					T_ShiftFin[14] msec after shifting			
					Not during garage control			
					T_GarageFin[14] msec after garage control			
					Not during C1 OFF control			
					T_C1ctrlFin[15] msec after C1 OFF control			
					Not during C2 OFF control			
					T_C3ctrlFin[15] msec after C2 OFF control			
					Not in Engine stall avoidance control			
					outRpmNC	>= 300 rpm		
					No DTC set	P0705		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
						P0707 P0708 P0717 P0715 P0748 P0778 P0798 P0962 P0963 P0966 P0967 P0970 P0971 P0973 P0974 P2716 P2720 P2721 P2727 P0657 P0720 P2729 P2730		
	P0720	Circuit continuity check	Electrical Failure (B+ short / GND short / Open) NINM-voltage (AD value)	 < 0.206V or > 2.727V (< 45 or > 545)	DS Active V[1]	TRUE	1000 msec Consecutive	2nd
Transmission input speed sensor	P0717		No pulse No of pulses from Transmission Input Speed Sensor No of pulses from Transmission Output Speed Sensor	 0 24	DS_Active_EG_V[16] Emergency mode Shift position CurrentGear Not during Neutral control T_NConFin[14] msec after Neutral control	TRUE FALSE RANGE_D(defined) >= 2nd gear	Dependent of Speed	2nd

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
					Not during shifting			
					T_ShiftFin[14] msec after shifting			
					Not during garage control			
					T_GarageFin[14] msec after garage control			
					Not during C1 OFF control			
					T_C1ctrlFin[15] msec after C1 OFF control			
					T_C3ctrlFin[15] msec after C2 OFF control			
					Not in Engine stall avoidance control			
					Transmission Output Speed	>= 300 rpm		
					No DTC set	P0705 P0707 P0708 P0722 P0720 P0748 P0778 P0798 P0962 P0963 P0966 P0967 P0970 P0971 P0973 P0974 P2716 P2720		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
						P2721 P2727 P0657 P0715 P2729 P2730		
	P0715	Circuit continuity check	Electrical Failure (B+ short / GND short / Open) NOUTM-voltage (AD value)	< 0.206V or > 2.727V (< 45 or > 545)	DS Active V[1]	TRUE	1000 msec Consecutive	2nd
Transmission Range Sensor Circuit	P0707	Voltage low	Input POS1 Voltage or Input POS2 Voltage	< 0.127V	Diagnosis Service mode Battery voltage	FALSE 9V < Battery Voltage <= 32 V	200msec Continuous	2nd
	P0708	Voltage high	Input POS1 Voltage or Input POS2 Voltage	> 4.84V	Diagnosis Service mode Battery voltage	FALSE 9V < Battery Voltage <= 32 V	200 msec Continuous	2nd
	P0705	Signal out of range	Input POS1 Voltage + Input POS2 Voltage	< 5V -0.29V or > 5V +0.29V	Diagnosis Service mode Battery voltage No DTC set	FALSE 9 V <= Battery Voltage < 32 V P0707 P0708	200 msec Continuous	2nd
Transmission oil temperature sensor	P0711	Rationality	**Criteria1:** Oil temperature change less than	10 (AD value)	Oil temperature DS_Active_EG_V[16] AD value of oil temperature AD value of oil temperature Emergency mode Shift position	<= 20deg.C TRUE >= 10 <= 1010 FALSE ≠ (P, R or N)	10 min	2nd

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
					Vehicle Speed No DTC set	>= 40km/h once P0705 P0707 P0708 P0711 P0712 P0713		
			Criteria2: Oil temperature	< 20deg.C	DS_Active_EG_V[16] AD value of oil temperature AD value of oil temperature Emergency mode Estimated heating value Engine speed No DTC set	TRUE >= 10 <= 1010 FALSE >= MAP Q_NORMAL[16] P0717 P0715 P0711 P0712 P0713	1 time	
	P0712	Circuit continuity check	Short-cut ground AD value of Oil temperature	< 10 (More than 200deg.C).	DS Active V[1]	TRUE	60 sec	2nd
	P0713	Circuit continuity check	Short-cut Ubat or open circuit AD value of Oil temperature	> 1010 (less than -55deg.C)	DS Active EG V[16] DriveTime	TRUE > 1 min	12 sec	2nd
Ignition Switch Run/Start Position	P2534	Circuit Low	Ignition voltage	< 9V	DS Active ACC[4] Emergency mode Engine speed No DTC set	TRUE FALSE > 400rpm U0001 U0100	20 sec	2nd

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
Internal Control Module Memory	P0601	Check Sum Error	Detectin of differences between the result of the checksum calculation executed after IG ON and the correct checksum. If there are differences from the correct checksum value stored in the FLASH ROM, a second calculation is made.		Ignition	OFF->ON	1 time	2nd
Control Module Programming	P0602	Control Module Programming	Calibration data is not downlord properly.		None		1 time	1st
Non volatile memory	P0603	Read / Write error	To detect calculated checksum in RAM is different from checksum value in EEPROM. TCM has two areas (main and sub) for EEPROM. This failure is detected when both areas are wrong.		Ignition	OFF->ON (only at T/M computer initialization function)	1 time	1st
Random access memory	P0604	Read / Write error	To detect different value between write and read (Step1 and Step2, Step3 and Step4) while TCM checks all RAM from step 1 to step 4 in initialize routine. Step 1. TCU writes 55(hex) data in the ram. Step 2. TCU reads 55(hex) data in the ram. Step 3. TCU writes AA(hex) data in the ram. Step 4. TCU reads AA(hex) data in the ram.		Ignition	OFF->ON (only at T/M computer initialization function)	1 time	1st
CAN Bus Off Counter Overrun	U0001	CAN controller continuity check	Receiving “BUS OFF” state from CAN controller		DS Active ACC[4]	TRUE	8 times	2nd
Lost communication with ECM (Engine)	U0100	Frame missing from ECM	No CAN status frame from ECM detected		Diagnostic Service "Disable Normal Communication" not detected Ignition DS_Active_CAN[2] No DTC set	 ON >5 sec TRUE U0001	4 sec Continuous	2nd
Gear error, hydraulic fault	P0731	Rationality	Calculation of actual gear ratio for 1st gear is not correct. abs(1 - GRCurrent/ 2nd GearRatio) **or**	< 4%	Current Gear Transmission Output Speed EngineTorque_noACC Transmission Input Speed	1st > 60rpm >= 60Nm (GEAR_1ST) <=6000rpm (gasoline engine)	2.5sec Continuous	2nd

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
			abs(1 - GRCurrent/ 3rd GearRatio)	< 4%	Transmission Input Speed	<=4000rpm (diesel engine)		
			or		ConditionA[13]	TRUE		
			abs(1 - GRCurrent/ 4th GearRatio)	< 4%				
	P0732	Rationality	Calculation of actual gear ratio for 2nd gear is not correct. (Criteria1 or Criteria2)				12 sec Continuous	2nd
			Criteria1:		Current gear	2nd		
			abs(1-GRCurrent/GRExpected)	>20%	Transmission Output Speed	>= 60rpm		
					ConditionA[13]	TRUE		
					No DTC set	P0732 (Criteria2)		
			Criteria2:				2.5 sec Accumulate	
			abs(1-Gear Ratio Current/ 3rd Gear Ratio)	<4%	Current gear	2nd		
			or		Transmission Output Speed	>= 60rpm		
			abs(1-Gear Ratio Current/ 4th Gear Ratio)	<4%	ConditionA[13]	TRUE		
			or		InTorque	>=30Nm or <=-20Nm		
			abs(1-Gear Ratio Current/ 6th Gear Ratio)	<4%				
	P0733	Rationality	Calculation of actual gear ratio for 3rd gear is not correct. (Criteria1 or Criteria2)				12 sec Continuous	2nd
			Criteria1:		Current gear	3rd		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
			abs(1-GRCurrent/GRExpected)	>20%	Transmission Output Speed	>= 60rpm		
					ConditionA[13]	TRUE		
					No DTC set	P0733 (Criteria2)		
			Criteria2:		Current gear	3rd	2.5 sec	
			abs(1-Gear Ratio Current/ 2nd Gear Ratio)	<4%	Transmission Output Speed	>= 60rpm	Accumulate	
			or		ConditionA[13]	TRUE		
			abs(1-Gear Ratio Current/ 4th Gear Ratio)	<4%	InTorque	>=30Nm or <=-20Nm		
			or abs(1-Gear Ratio Current/ 5th Gear Ratio)	<4%				
	P0734	Rationality	Calculation of actual gear ratio for 4th gear is not correct. (Criteria1 or Criteria2)				12 sec Continuous	2nd
			Criteria1:		Current gear	4th		
			abs(1-GRCurrent/GRExpected)	>20%	Transmission Output Speed	>= 60rpm		
					ConditionA[13]	TRUE		
					No DTC set	P0734 (Criteria2)		
			Criteria2:		Current gear	4th	2.5 sec	
			abs(1-Gear Ratio Current/ 2nd Gear Ratio)	<4%	Transmission Output Speed	>= 60rpm	Accumulate	

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
			or		ConditionA[13]	TRUE		
			abs(1-Gear Ratio Current/ 3rd Gear Ratio)	<4%	InTorque	>=30Nm or <=-20Nm		
			or					
			abs(1-Gear Ratio Current/ 5th Gear Ratio)	<4%				
			or					
			abs(1-Gear Ratio Current/ 6th Gear Ratio)	<4%				
	P0735	Rationality	Calculation of actual gear ratio for 5th gear is not correct. (Criteria1 or Criteria2)				12 sec Continuous	2nd
			Criteria1:		Current gear	5th		
			abs(1-GRCurrent/GRExpected)	>20%	Transmission Output Speed	>= 60rpm		
					ConditionA[13]	TRUE		
					No DTC set	P0735 (Criteria2)		
			Criteria2:		Current gear	5th	2.5 sec	
			abs(1-Gear Ratio Current/ 3rd Gear Ratio)	<4%	Transmission Output Speed	>= 60rpm	Accumulate	
			or		ConditionA[13]	TRUE		
			abs(1-Gear Ratio Current/ 4th Gear Ratio)	<4%	InTorque	>=30Nm or <=-20Nm		
			or					
			abs(1-Gear Ratio Current/ 6th Gear Ratio)	<4%				

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
	P0729	Rationality	Calculation of actual gear ratio for 6th gear is not correct. (Criteria1 or Criteria2)				12 sec Continuous	2nd
			Criteria1: abs(1-GRCurrent/GRExpected)	 > 20%	Current gear Transmission Output Speed ConditionA[13] No DTC set	6th >= 60rpm TRUE P0729 (Criteria2)		
			Criteria2: abs(1-Gear Ratio Current/ 2nd Gear Ratio) **or** abs(1-Gear Ratio Current/ 4th Gear Ratio) **or** abs(1-Gear Ratio Current/ 5th Gear Ratio)	 <4% <4% <4%	Current gear Transmission Output Speed ConditionA[13] InTorque	6th >= 60rpm TRUE >=30Nm or <=-20Nm	2.5 sec Accumulate	
Torque Converter Clutch	P0741	Comparison of engine speed and transmission input speed	Converter is slipping with active lock-up on. (Engine Speed - Transmission Input Speed)	> 300rpm	DS Active EG V[16] Fdetect_inh[5] Shift position Time after N-D shifting control[10] ends Engine Torque Engine Speed	TRUE FALSE RANGE_D(defined) 8 sec >= 0 Nm < 4000 rpm	12 sec Continuous	2nd

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
					Time after SLU target current (_ir) >= 1000 mA	Time_SLU_Full[18] sec		
					Oil temperature	>= -7deg.C		
					Lock-up	FALSE		
					Not during garage control			
					T_GarageFin[14] msec after garage control			
					Not during shifting			
					T_ShiftFin[14] msec after shifting			
					No DTC set	P2763 P2764 P2761 P0715 P0717 P0720 P0722		
Un-usual shifting	P0869	SLC1 MAX	count fail SLC1MAX usft [17]	>= 5times	DS_Active_EG_V16	TRUE	1 time	2nd
					Fdetect inh[5]	FALSE		
					Time after N-D Shifting Control[10] ends	This timer is based on oil temperature.		
					Not during garage control			
		SLC2 MAX	count_fail_SLC2MAX_usft [17]	>= 5times	T_GarageFin[14] msec after garage control			
					Shift position	RANGE_D(defined)		
					Not during Neutral control			
		SLC3 MAX	count_fail_SLC3MAX_usft [17]	>= 5times	T_NConFin[14] msec after Neutral control			
					Time after neutral control ends	This timer is based on oil temperature.		
					wheel spin condition	FALSE		
		SLB1 MAX	count fail SLB1MAX usft [17]	>= 5times	Transmission Output Speed	>300rpm		
					Oil temperature	>= -20 ^{o}C		
					Tmr_inh_GE[14] sec after shift to safe gear			
					No DTC set	P0715		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
						P0717 P0720 P0722		
Neutral condition	P0965		**Step 1:**		DS_Active_EG_V[16]	TRUE	**Step 1:**	2nd
				<300rpm		FALSE		
			abs(Engine Speed - Transmission Input Speed) Transmission Input Speed (at D range)	> Transmission Output Speed x (1st gear ratio at RANGE_D) + revNfaildet[19] rpm	Fdetect_Inh[5] Oil temperature Shift position Not during shifting T_ShiftFin[14] msec after shifting Not during garage control(N-D) T_GarageFin[14] msec after garage control Not during Neutral control	>= -7deg.C RANGE_D(defined)	at D range: 3.3 sec if (0 <= X <= 1500) 1.3 sec if (1501 <= X <= 3000)	
			Step 2: Transmission Input Speed	<200rpm	T_NConFin[14] msec after Neutral control		0.8 sec if (3001 <= X)	
			Engine Speed	>600rpm	Transmission Output Speed	<=500rpm		
			Shift position	RANGE_D(defined)	Lockup Current gear QS_AirSuction[6]	FALSE 1 or 2 or 3 or 4 FALSE		

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
							Step 2:	
					Prohibit Neutral Judgment flag No DTC set	FALSE P0717 P0722 P0715 P0720	0.3sec	

[1)]DS_Active_V

DS_Active_V = TRUE when start condition for failure detection is fulfilled for 2.0 sec continuously.

DS_Active_V = FALSE when permission condition for failure detection is not fulfilled.

Start Condition for failure detection:

Ignition ON and

10.2V < Battery Voltage <= 32V and

Not in service mode and

Reading EEPROM finish

Permission condition for failure detection:

Ignition ON and

9.0V < Battery Voltage <= 32V and

Not in service mode

[2)] DS_Active_CAN

DS_Active_CAN = TRUE when the start condition for CAN failure detection is fulfilled for 5.0 sec continously.

DS_Active_CAN = FALSE when the permission condition for CAN failure detection is not fulfilled.

Start Condition for failure detection:

Ignition ON and

10.2V < Battery Voltage <= 32V and

Not in service mode and

Reading EEPROM finish

Permission condition for failure detection:

Ignition ON and

9.0V < Battery Voltage <= 32V and

Not in service mode

[3)]DS_Active_EG_V

DS_Active_EG_V = TRUE when start condition for failure detection is fulfilled for 2.0 sec continuously.

DS_Active_EG_V = FALSE when permission condition for failure detection is not fulfilled.

Start Condition for failure detection:

Ignition ON and

10.2V < Battery Voltage <= 32V and

Not in service mode and

Reading EEPROM finish and

Egrpm > 400rpm and Egrpm = Q_NORMAL[16]

Bus off, ECU no communication = Q_NORMAL[16]

Permission condition for failure detection:

Ignition ON and

9.0V < Battery Voltage <= 32V and

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.

Not in service mode and
Egrpm > 400rpm and Egrpm = Q_NORMAL[16]
Bus off, ECU no communication = Q_NORMAL[16]

[4] DS_Active_ACC
DS_Active_ACC = TRUE when the start condition for failure detection is fulfilled for 2.0 sec continously.
DS_Active_ACC = FALSE when the permission condition for failure detection is not fulfilled.
Start Condition for failure detection:
Accessory ON **or** Ignition ON and
10.2V < Battery Voltage <= 32V and
Not in service mode and
Reading EEPROM finish
Permission condition for failure detection:
Accessory ON **or** Ignition ON and
9.0V < Battery Voltage <= 32V and
Not in service mode

[5] Fdetech_Inh = TRUE if:
In Emergency mode **or**
Spinning[7] = TRUE **or**
within 10.0 sec after spinning[7] detection end **or**
DTC set: P0973, P0974, P0966, P0967, P0970, P0971, P2720, P2721, P2729, P2730, P0962, P0963, P2763, P0717, P0722, P0705, P0707, P0708, U0001, U0100, P0601, P0711, P0712, P0713, P2534, P0604, P0778, P0798, P2716, P0748, P2761, P2727, P0657, P0720, P0715,

Not in Neutral avoidance control
Not in Engine stall avoidance control
Egrpm = Q NORMAL[16]
Egtrq = Q NORMAL[16]
Accel = Q NORMAL[16]

[6]QS_AirSuction : Quick stop detection flag for the prevention of failure misdetection for Air suction, is set if the vehicle brakes hard.

[7] Spinning : If “LateralACC > 7.00m/s^2”, Spinning is TRUE.
LateralACC[m/s^2] = (WheelDiff[m/s] * WheelSpeedABS[m/s]) / WheelWidth[m])
WheelDiff ... “WheelSpeed RR” - “WheelSpeed RL”
WheelWidth... The width of the Wheel.

[8] Wheel spin condition
(1) 300 rpm < outRpm < 3000rpm
(2) Egtorque_noACC > -500Nm
(3) ABS (vehicle front wheels average speed - vehicle rear wheels average speed) > 5.0 km/h
(4) Throttle > 70 %
(5) outRpmSpeed < -50rpm/sec
{(1)and(2)and(3)}or{ (1)and(4)and(5)}continuously detected for 300 msec
After that, Wheel spin condition = TRUE continuously 10000 msec

[9] EngineTorque_noACC
Engine output torque, acceleration inertia torque not included.

Component/ System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.

10) Shifting Control

"Shifting Control" is activated when the transmission is in between two gears (undefined gear ratio), until applied pressure has reached to full

11) "Neutral Control"

Neutral Control is activated if the vehicle is at stand still and in range D with the brake pressed for 2 seconds until the brake is released.

12) "Garage Shifting"

"Garage Shifting Control" is activated when the range selector changes from N to D or R until appropriate Gear Ratio is detected.

13) ConditionA = TRUE if:

DS Active EG V[3] = TRUE **and**
Fdetect_Inh[5] = FALSE **and**
Garage shifting control[12](N-D or N-R) = FALSE **and**
T_GarageFin sec [14] after garage shift control[12] end **and**
Neutral control[11] = FALSE **and**
T_NConFin[14] after neutral control[11] end **and**
Shifting control[10] = FALSE **and**
T_ShiftFin[14] after shifting control[10] end **and**
RANGE_D (defined signal) **and**
Oil temperature >= -20 deg.C **and**
QS_AirSuction[6] = FALSE **and**
No DTC set: P0717, P0715, P0722, P0720

14)

Const Data	< -20 deg.C	>= -20 deg.C< -10 deg.C	>= -10 deg.C< 20 deg.C	>= 20 deg.C
T_GarageFin [msec]	50000	8000	2000	1000
T_NConFin [msec]	50000	8000	2000	1000
T_ShiftFin [msec]	50000	2000	1000	500
Tmr_inh_GE [msec]	50000	2000	1000	500

15)

Const Data / oiltemp	< GE_OT 1	>= GE_OT1 < GE_OT2	>= GE_OT2
T_C1ctrlFin [msec]	50000	20000	8000
T_C3ctrlFin [msec]	50000	20000	8000

16) Q_NORMAL

Q_NORMAL menas that no failure is detected

17) count_fail_SLC1MAX_usft, count_fail_SLC2MAX_usft,count_fail_SLC3MAX_usft, count_fail_SLB1MAX_usft

When the following shift conditions are satisfied, increments the counter of count_fail_SLXXMAX_usft.

Condition / count	A-1*	A-2*	B-1*	B-2*	D*	E*
SLC1MAX_usft	4-5, 4-6, 2-6, 3-5	-	-	-	6-2, 5-3	5-6, 6-5, 6-4, 5-4
SLC2MAX_usft	-	4-3, 4-2, 5-3, 6-2	-	-	2-6, 3-5, 2-1, 1-1EB	1-2, 1-3, 2-3, 2-4, 3-4, 3-2, 3-1, 2-1

15 OBDG04 TCM Summary Tables (Unusual Shifting)

Component/ System	Fault Code	Monitor Strategy Description		Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Required	MIL Illumin.
SLC3MAX_usft	3-4, 5-6	5-4, 3-2	-	-	2-6, 4-5, 4-6, 4-2 4-3, 6-2	1-2, 1-3, 2-3, 2-4, 4-3, 4-2, 2-1, 2-1EB, 1EB-1, 1-1EB, 4-5, 4-6, 6-5, 6-4			
SLB1MAX_usft	2-3, 2-4	6-5, 6-4, 2-1EB	3-4	4-3	3-5, 4-5, 4-6, 5-6, 3-1, 3-2, 4-2, 5-3, 5-4	1-2, 1-3, 3-4, 3-2, 3-1, 1EB-1,1-1EB, 4-5, 4-6, 5-6, 5-4, 4-2			

*Refer to Un-usual shifting Condition for the detail of "A-1, A-2, B-1, B-2, D, E"

18)

OilTemp [deg.C]	OT < 20 deg.C	OT >= 20 deg.C
Time_SLU_Full [msec]	3000	3000

19)

OilTemp [deg.C]		OT < 0 deg.C	OT >= 0 deg.C
revNfaildet [rpm]	R range	1200	1000
	D range	400	400