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Check	Fault Code	Monitoring Strategy	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
Shift solenoid 1 (GND short)	P0973	circuit continuity	Comparison of TCM output signal and monitoring leve	(GND short) Monitoring signal is Low at output ON	DS_Active_EG_V	TRUE	0.3sec	1D.C.
					Emergency mode	No		
Shift solenoid 1 (+B short, Open)	P0974	circuit continuity		(+B short / Open) Monitoring signal is High output OFF			0.5sec	1D.C.
Shift solenoid 2 (GND short)	P0976	circuit continuity					03sec	1D.C.
Shift solenoid 2 (+B short, Open)	P0977	circuit continuity					0.5sec	1D.C.
Shift solenoid 3 (GND short)	P0979	circuit continuity					0.3sec	1D.C.
Shift solenoid 3 (+B short, Open)	P0980	circuit continuity					0.5sec	1D.C.
Linear solenoid SLT (GND short, Open)	P0962	circuit continuity	Check the feedback current value	(GND short, Open) <=68	DS_Active_EG_V	TRUE	12.5sec	1D.C.
					Emergency mode	No		
Linear solenoid SLT (+B Short)	P0963	circuit continuity		(+B Short) >=1000	DS_Active_EG_V	TRUE	0.5sec	1D.C.
					Emergency mode	No		
					Pass time from no failure detection at another side	>= 1sec		
Linear solenoid SLU (GND Short/Open)	P0966	circuit continuity			DS_Active_EG_V	TRUE	12.5sec	1D.C.
					Emergency mode	No		
Linear solenoid SLU (+B Short)	P0967	circuit continuity			DS_Active_EG_V	TRUE	0.5sec	1D.C.
					Emergency mode	No		
					Pass time from no failure detection at another side	>= 1sec		
Linear solenoid SLU (Terminal Short)	P0965	circuit continuity	[Criterion1] Check the error current value (error current value : target current value - feed back current value)	[Criterion1] >80mA	DS_Active_EG_V	TRUE	[Criterion1] 2.75sec	1D.C.
					Emergency mode	No		
					During shift	No		
					Battery voltage	>11V, <16V and variation<0.2V		
			[Criterion2] Thermal Shut Down of Linear Solenoid Driver	[Criterion2] Occurrence	Oil temperature	>= 20ºC	[Criterion2] 6times	
					Oil temperature sensor (P0711, P0712, P0713)	Not fail		
					SLU current	>= 853mA		
					SLU target current value	No change		
Linear solenoid SLU (OFF Stuck)	P0741	functional check	Failure is detected if the following condition is satisfied.	>=2sec	DS_Active_EG_V	TRUE	6times	1D.C.
					Emergency mode	No		
			・Engine revolution - Input revolution	>=100rpm	Time after gear selector change to D, 3 range defined	>8sec		
					During shift	No		
					Time after shift change	>3sec		
					Time after lock up ON output	>2sec		
					Oil temperature	>=20ºC		
					Current Gear	>=2ND		
					Throttle	>=15%		
					Input revolution	>=150rpm, <=6000rpm		
					Engine torque	>=engine torque in MAP_A(*3) Nm		
					Engine revolution	>2000rpm		
					Shift solenoid (S1: P0973,P0974 S2: P0976,P0977 S3: P0979,P0980 SLT: P0962,P0963 SLU: P0965,P0966,P0967)	Not fail		
					Output revolution sensor(P0722)			
					Input revolution sensor(P0717)			
					Selector position switch(P0705)			
					Oil temperature sensor (P0711, P0712, P0713)			

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Check	Fault Code	Monitoring Strategy	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
					Engine torque signal(P2637)			
					Throttle signal(P1125)			
Output revolution senso	P0722	circuit continuity	Check the output revolution pulse while detecting input revolution sensor signal 10 pulse.	No pulse	DS_Active_EG_V	TRUE	500times	1D.C.
					Time after gear selector change from P, R or N range to others (at oil temp >=20deg.C and oil temp sensor is no failure(P0711,P0712,P0713) or Vehicle Speed calculated by output revolution sensor >= 66 km/h)	>=10sec (>=2.5sec)		
					Selector position switch	Defined		
					Vehicle speed	> 7 km/h (1st Gear) > 13 km/h (2nd Gear) > 18 km/h (3rd Gear) > 26 km/h (4th Gear)		
					Shift solenoid (S1: P0973,P0974 S2: P0976,P0977 S3: P0979,P0980) Selector position switch(P0705)	Not fail		
Input revolution sensor	P0717	circuit continuity	Check the input revolution pulse while detecting output revolution sensor signal 6 pulse.	No pulse	DS_Active_EG_V	TRUE	500times	1D.C.
					Time after gear selector change from P, R or N range to others (at oil temp >=20deg.C and oil temp sensor is no failure(P0711,P0712,P0713) or Vehicle Speed calculated by output revolution sensor >= 66 km/h)	>=10sec (>=2.5sec)		
					Selector position switch	Defined		
					Vehicle speed	> 7 km/h		
					Shift solenoid (S1: P0973,P0974 S2: P0976,P0977 S3: P0979,P0980) Selector position switch(P0705)	Not fail		
Selector position switch	P0705	circuit continuity	Pattern of the switches	illegal pattern	DS_Active_EG_V	TRUE	0.5sec	1D.C.
					Emergency mode	No		
Transmission oil temperature sensor (GND short)	P0712	circuit continuity	Input A/D value	<10	DS_ACTIVE_EG_V	TRUE	5min	1D.C.
					Emergency mode	No		
Transmission oil temperature sensor (Open, +B Short)	P0713	circuit continuity	Input A/D value	>=1000	DS_ACTIVE_EG_V	TRUE	12sec	1D.C.
					Emergency mode	No		
					Selector position switch	D, 3, 2, 1 range defined		
					Output revolution	> 600rpm for 10min.		
					Output revolution sensor(P0722) Selector position switch(P0705)	Not fail		
Transmission oil temperature sensor (Stuck)	P0711	functional check	Criteria flag 1. INITIAL status Criteria flag = FALSE OT_base = Init Oil temperature OT_base_AD = Init Oil A/D value Goto "WAITING" status 2. WAITING status Criteria flag = FALSE OT = Oil temperature OT_AD = Oil A/D value	TRUE (Criteria timer shall keep at HOLD status)	DS_Active_EG_V	TRUE	10min	1D.C.
					Emergency mode	No		
					Oil temperature sensor AD	>=10,<943		

Check	Fault Code	Monitoring Strategy	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
			OT_base = Init Oil temperature OT_base_AD = Init Oil A/D value If cond1 is satisfied, goto "CRITERIA" status 3. CRITERIA status Criteria flag = TRUE If cond5 is satisfied, goto "WAITING" status If cond2 is satisfied, goto "NORMAL" status If cond3 is satisfied, goto "HOLD" status 4. NORMAL status Criteria flag = FALSE OT = Oil Temperature OT_AD = Oil A/D value OT_base = Init Oil Temperature OT_base_AD = Init Oil A/D value If cond5 is satisfied, goto "WAITING" status If cond1 is satisfied, goto "CRITERIA" status 5. HOLD status Criteria flag = FALSE If cond5 is satisfied, goto "WAITING" status If cond4 is satisfied, goto "CRITERIA"status Cond1: (OT < 20deg.C or OT_base < 20deg.C) AND Range!=(P,R or N) AND Vehicle speed >= 40km/h at once (if state Vehicle speed parameter is reseted) Cond2: | OT_AD - input A/D value | > 10* OR | OT_base_AD - input A/D value | >10* Cond3: Range = (P,R or N) Cond4: Range !=(P,R or N) Vehicle speed >= 40km/h at once Cond5: Window condition is not satisfied	*When A/D value +/- 10 changes, it is about +/- 1 deg C, depends on temperature, transfer function is non-linear.				
Battery voltage (Low voltage)	P0562	circuit continuity	Battery voltage	< 9V	Input revolution(P0717)	>=800 rpm	1time	1D.C.
Battery voltage (High voltage)	P0563	circuit continuity	Battery voltage	> 18V	Input revolution(P0717)	>=800 rpm	1time	1D.C.
Gear Ratio	P0730	functional check	The relationship between NC1 cycle time (A/T input and SP cycle time (A/T output signal) is not correct (Error detection condition is the difference of gear ratio more than equal to 10%)	>=2.5sec	DS_ACTIVE_EG_V	TRUE	2times	1D.C.
					Emergency mode	No		
					Throttle	>=10%		
					Output revolution	>=500rpm		
					Selector position switch	D, 3, 2, 1 range defined		
					1st gear	No		
					Time after gear selector change	>=7sec		
					Time after shift change	>=3sec		
					Oil temperature	>=20ºC		
					Shift solenoid (S1: P0973,P0974 S2: P0976,P0977 S3: P0979,P0980)	Not fail		

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Check	Fault Code	Monitoring Strategy	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
					Output speed sensor(P0722) Input revolution(P0717) Selector position switch(P0705) Oil temperature sensor (P0711, P0712, P0713)			
Shift Mechanism	P0780	functional check	Unexpected downshift	Occurrence	DS_ACTIVE_V Emergency mode Selector position switch During shift Neutral control Time after gear selector change Shift solenoid (S1: P0973,P0974 S2: P0976,P0977 S3: P0979,P0980) Selector position switch(P0705) Time after gear selector change from P, R or N range to others (at oil temp >=20deg.C and oil temp sensor is no failure(P0711,P0712,P0713) or Vehicle Speed calculated by output revolution sensor >= 66 km/h)	TRUE No D, 3, 2, 1 range defined No No >=3sec Not fail >=10sec (>=2.5sec)	1280msec	1D.C.
Neutral Control (Engine flare at C1 apply)	P079A	functional check	TCM detects A/T input rev. is more than (A/T input rev. apply start + A/T output rev. * gear ratio + 400rpm)	>=0.3 sec	DS_ACTIVE_EG_V Emergency mode During apply control Oil temperature sensor Selector position switch Pressure control solenoid value	TRUE No Yes >=10ºC D, 3, 2, 1 range defined >=3.0Kg/cm²	1time	1D.C.
Neutral Control (Engine flare at neutral control OFF)	P0762	functional check	A/T Input revolution is more than (A/T output * gear ratio + 500 rpm.)	>=10sec	DS_ACTIVE_EG_V Emergency mode Neutral control All of the following conditions are satisfied after output revolution >= 250 rpm During shift Selector position switch Oil temperature Output revolution Engine revolution	TRUE No No No D, 3, 2, 1 range defined >=10ºC <250rpm >0rpm	3times	1D.C.
Bus Off counter over ru	U2104	Check the bus condition	If MPU receive “BUS OFF” state from CAN controller	-	DS_ACTIVE_V Time after IG ON	TRUE >=3sec	1time	1D.C.
Lost communication with ECM	U0100	Check the CAN signal from ECM	If TCM cannot detect frame of GENERAL STATUS ECM (Node ID: $300)	>=4sec	DS_ACTIVE_V Time after IG ON InRpm or EgRpm	TRUE >=3sec >=400rpm	1time	1D.C.
Flash ROM	P0601	Check sum (Only 1time at IG ON)	To detect that the value of checksum calculations executed after IG ON. If there are a differences from the correct checksum value stored in FLASH ROM, the second calculation is made.	Difference at stored value	-	-	2times	1D.C.
Non volatile memory (EEPROM)	P0603	Check sum (Only 1time at IG ON)	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.	Difference at stored value	-	-	1time	1D.C.
Random access memory	P0604	Check the write data	To detect different value between write and read	-	-	-	1time	1D.C.

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Check	Fault Code	Monitoring Strategy	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Required	MIL Illumination
(RAM)		(Only 1time at IG ON)	(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.					

Notes
1. Failure detection starts when start condition for failure detection (condition 1) is fulfilled for 2.0 sec continuously
(DS_Active_EG_V = TRUE)

2. All failure detection quits when permission condition for failure detection (condition 2) is not fulfilled
(DS_Active_EG_V = FALSE)

3. Failure detection for CAN signal starts when start condition for failure detection (condition 1 without engine revolution condition) is fulfilled for 2.0 sec continuously
(DS_Active_V = TRUE)

4. Failure detection for CAN signal quits when permission condition for failure detection (condition 2 without engine revolution condition) is not fulfilled
(DS_Active_V = FALSE)

5. However, failure detection for IG voltage operates regardless the following conditions

Start condition for failure detection (condition 1)

Ignition ON	and
10.2 V < Battery voltage < 15.5 V	and
Not in service mode (*1)	and
Reading non volatile memory finish	and
Engine revolution > 400rpm and no failure detection (*2)	

Permission condition for failure detection (condition 2)

Ignition ON	and
9.0 V < Battery voltage < 16.5 V	and
Not in service mode (*1)	and
Engine revolution > 400rpm and no failure detection (*2)	

*1: Service mode: Diagnostic service mode (ClearDiagnosticInformation, InputOutputControl, DisableNormalMessageTransmission).
TCU will prevent the failure detection when TCU will prevent the miss detection during InputOutputControl function. Because the CAN signal is not transmitted, the failure detection cannot be done

*2: Not in "Engine speed signal"failure(P0727)
Not in “Bus off” failure(U2104)
Not in “Lost Communicationwith ECM” failure(U0100)

*3: MAP_A

turbine rev[rpm]	1000	2000	3000	4000	5000	6000
engine torque[Nm]	47	47	50	65	65	65