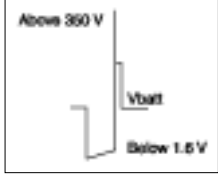
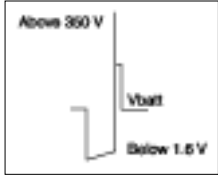


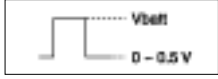
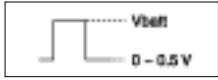
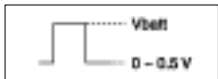
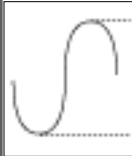
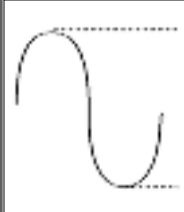


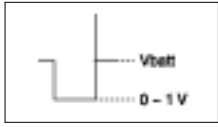
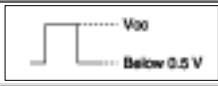
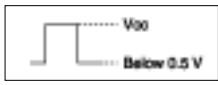
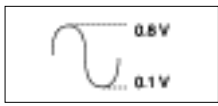
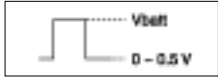

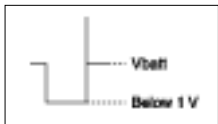


ECM TERMINAL INPUT/OUTPUT SIGNAL

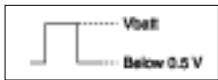

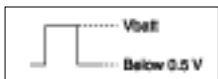
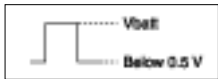
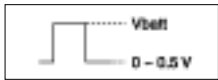
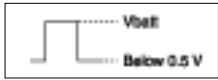
Pin No.	Description	Input, Output Value		Vehicle State	Test Result
		Type	Range		
1	ECU ground	Static Signal	0 ~ 0.5V	Always	0.3V
2	Power stage ground	Static Signal	0 ~ 0.5V	Always	0.3V
3	Direct battery voltage supply	Static Signal	Vbatt	Others	12.5 V (Vbatt Level)
				Running	13.7 V (Vbatt Level)
4	Ignition coil output 1,4	Pulse		Engine run	High: 14.03V Low: 0.78~1.13V Peak voltage: 348V Idle : 17.2Hz
5	Ignition coil output 2,3	Pulse		Engine run	High: 14.03V Low: 0.78~1.13V Peak voltage: 348V Idle : 17.2Hz
6	CAN LOW	DC	2.0 ~ 3.0V	Recessive	
		PWM	0.5 ~ 2.25V	Dominant	
7	CAN HIGH	DC	2.0 ~ 3.0V	Recessive	
		PWM	2.75~4.5V	Dominant	
8	HO2S Heater (B1/S1)	PWM		Engine run	High: 14.01V Low: 0.4V Frequency:10Hz
9	HO2S Heater (B1/S2)	PWM		Engine run	High: 14.01V Low: 0.4V Frequency:10Hz
10	Knock Sensor Input	Frequency	-0.5 ~ 0.7V	Knocking	0.3V
			0V	normal	0V

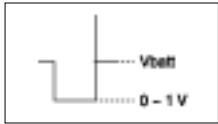
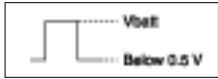
11	CVVT Oil Control Valve output	PWM		Engine run	High: 14.01V Low: 0.4V Frequency: 300Hz
12	Not connected				
13	Not connected				
14	Battery Voltage Supply after Main Relay	DC	Vbatt	IG ON	12.7V
			0 ~ 0.5V	IG OFF	0.3V
15	Not connected				
16	Not connected				
17	Wheel Speed Sensor(-)	Sensor signal	Approximately	Vehicle run	
			50rpm: 37Hz, 236mV pk-pk		
			100rpm: 76Hz, 376mV pk-pk		
18	Wheel Speed Sensor(+)	Sensor signal	Approximately	Vehicle run	
			50rpm: 37Hz, 236mV pk-pk		
			100rpm: 76Hz, 376mV pk-pk		
19	Linear lambda VG	Complex Signal	Approximately		
			50rpm: 37Hz, 236mV pk-pk		
			100rpm: 76Hz, 376mV pk-pk		
20	Not connected		Approximately		
			50rpm: 37Hz, 236mV pk-pk		
			100rpm: 76Hz, 376mV pk-pk		
21	Battery Voltage Supply after Main Relay	Static Signal	Vbatt	IG ON	12.7V
			0 ~ 0.5V	IG OFF	0.3V
22	Battery Voltage Supply after Ignition Key	Static Signal	Vbatt	IG ON	12.7V
			0 ~ 0.5V	IG OFF	0.3V
23	Injector output (cyl. 4)	Frequency		Idle: 6.25Hz 3000rpm: 12.6Hz	High: 14.01V Low: 0.3V Peak voltage: 58V

24	Injector output (cyl. 1)	Frequency		Idle: 6.25Hz 3000rpm: 12.6Hz	High: 14.01V Low: 0.3V Peak voltage: 58V
25	Spare Sensor supply	Static Signal	Vcc	IG ON	5V
			0 ~ 0.5V	IG OFF	0.3V
26	Purge Control Solenoid Valve (PCSV) PWM output	PWM Pulse		Inactive Active (after warm up & racing)	High: 14.01V Low: 0.3V Frequency: 20Hz
27	Crankshaft Position Sensor ground	Static Signal	0 ~ 0.5V	Always	0.2 V
28	Not connected				
29	Crankshaft Position Sensor input	Frequency		Idle: 740Hz 3000rpm: 3126Hz	5V 0.3V
30	Camshaft Position Sensor ground	Static Signal		Always	
31	Engine Coolant Temperature Sensor input	Analog	-40 °C ~ 293 °C 4.9V ~ 0.322V	176°C	1.25V
32	Throttle Position Sensor input	Analog	0.25 ~ 0.8V	Idle	0.3V
			4.15 ~ 4.7V	W.O.T	4.16V
33	Fuel Tank Pressure Sensor input	Analog		Engine run	2.3V
34	Fuel Tank Pressure Sensor ground	Static Signal	0 ~ 0.5V	Always	0.3V
35	Not connected				
36	Not connected				
37	HO2S (B1/S2) ground	Static Signal	0 ~ 0.5V	Always	0.3V
38	Throttle Position Sensor ground	Static Signal	0 ~ 0.5V	Always	0.3V
39	Vehicle Speed Sensor input	Pulse		Vehicle run	High : 5V Low : 0.9V
40	Linear lambda VIP	Complex Signal			
41	Linear lambda VN	Complex Signal			
42	HO2S (B1/S2) input	Analog Pulse		3000rpm After warm up	0.8V 0.1V Frequency: 1.1Hz
43	Not Connected				

44	MAFS, IATS supply	Static Signal	5V	IG ON	5.1V
			0 ~ 0.5V	IG OFF	0.3V
45	Throttle Position Sensor supply	Static Signal	5V	IG ON	4.9V
			0 ~ 0.5V	IG OFF	0.4V
46	Spare Sensor supply 2	Static Signal	5V	IG ON	5V
			0 ~ 0.5V	IG OFF	0.3V
47	Immobilizer Data Line	Pulse		IG ON	High: 14V Low: 0.5V
48	MAFS, IATS ground	Static Signal	0 ~ 0.5V	Always	0.4V
49	Not connected				
50	Air Conditioner Compressor Switch input	DC	Vbatt	SW ON	13V
			0 ~ 0.5V	SW OFF	0.3V
51	Air Conditioner Pressure switch input	DC	Vbatt	SW ON	12.9V
			0 ~ 0.5V	SW OFF	0.4V
52	Oil Temperature Sensor input	Analog	-40 °C ~ 266 °C 4.9V ~ 0.4V	183.2 °C	1.29V
53	Linear Lambda VRC	Complex Signal			
54	Knock Sensor ground	Static Signal	0 ~ 0.5V	Always	0.3V
55	Ignition shield ground	Static Signal	0 ~ 0.5V	Always	0.3V
56	Intake Air Temperature Sensor input	Analog	-40 °C ~ 266 °C 4.9V ~ 0.34V	Idle	2.3V
57	Not connected				
58	Air Conditioner Request Switch input	DC	Vbatt	SW ON	12.9V
			0 ~ 0.5V	SW OFF	0.4V
59	Sensor ground	Static Signal	0 ~ 0.5V	Always	0.3V
60	Mass Air Flow Sensor signal input	Analog		Idle	1.0V
				3000 rpm	2.3V
61	Injector output (cyl.3)	Frequency		Idle: 6.25Hz	High: 14.01V
				3000rpm: 12.6Hz	Low: 0.3V Peak voltage: 58V
62	Injector output (cyl.2)	Frequency		Idle: 6.25Hz	High: 14.01V
				3000rpm: 12.6Hz	Low: 0.3V Peak voltage: 58V
63	Not connected				
64	Cooling Fan Relay - High control output	DC	Vbatt	SW OFF	12.9V
				SW ON	0.4V
	Cooling Fan Relay -		Vbatt	SW OFF	13V

ECM TERMINAL INPUT/OUTPUT SIGNAL

65	Low control output	DC		SW ON	0.5V
66	Engine Speed signal output	Frequency		Engine run	High: 10.5V Low: 0.4V Idle: 24.7Hz 3000 rpm: 104.6Hz
67	Main Relay control output	DC	0 ~ 1V	IG ON	0.9V
			Vbatt	IG OFF	13.5V
68	Air Conditioner Compressor Relay control output	DC	0 ~ 0.5V	A/C ON	0.2V
			Vbatt	A/C OFF	12.5V
69	Fuel Pump Relay control output	DC	Vbatt	IG ON	13.08V
			0 ~ 0.5V	Idle	0.3V
70	Malfunction Indicator Lamp (MIL) output	DC	0 ~ 0.5V	IG ON	0.4V
			Vbatt	Vbatt	13.6V
71	Immobilizer ground	Static Signal	0 ~ 0.5V	Always	0.4V
72	Camshaft Position Sensor input	Frequency		Idle: 6.3 Hz 3000 rpm: 25 Hz	High: 5V Low: 0.6V
73	Engine Coolant Temperature Sensor ground	Static Signal	0 ~ 0.5V	Always	0.4V
74	Throttle Position PWM output	PWM		Engine run	High: 12.75V Low: 0.5V Frequency: 100Hz C.T: 5% duty W.O.T : 90% duty
75	Fuel Consumption signal output	PWM		Engine run	High: 12.75V Low: 0.5V Frequency: 100Hz
76	Oil Temperature Sensor ground	Static Signal	0 ~ 0.5V	Always	0.4V
77	Diagnosis line (k-line)	Pulse		IG ON	High: 14V Low: 0.5V
78	Idle Speed Control Actuator PWM output2	PWM		Idle	High : 15V Low : 0.3V Frequency: 250Hz

79	Canister Close Valve output	PWM Pulse		Engine run	High: 14.01V Low: 0.3V Peak voltage: 58V Frequency: 10Hz
80	Idle Speed Control Actuator PWM output1	PWM		Idle	High : 15V Low : 0.3V Frequency: 250Hz
81	Malfunction Indicator Lamp output	DC	0 ~ 0.5V	IG ON	0.4V
			Vbatt	Cranking	13.6V