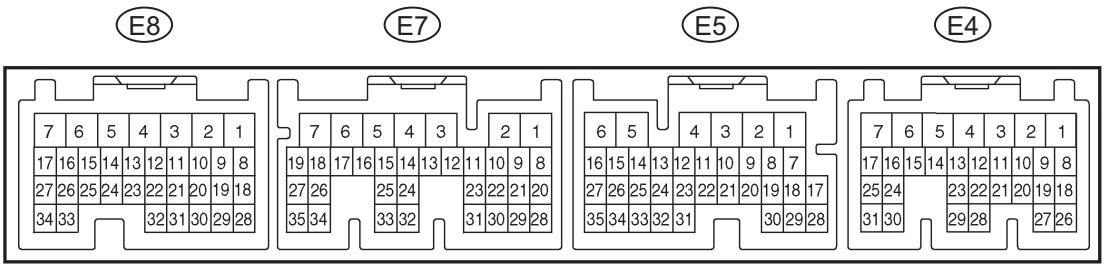
TERMINALS OF ECM



Y

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HINT:
The standard normal voltage between each pair of the ECM terminals is shown in the table below. The appropriate conditions for checking each pair of the terminals are also indicated. The result of checks should be compared with the standard normal voltage for that pair of the terminals, and displayed in the "Specified Conditions" column. The illustration above can be used as a reference to identify the ECM terminal locations.

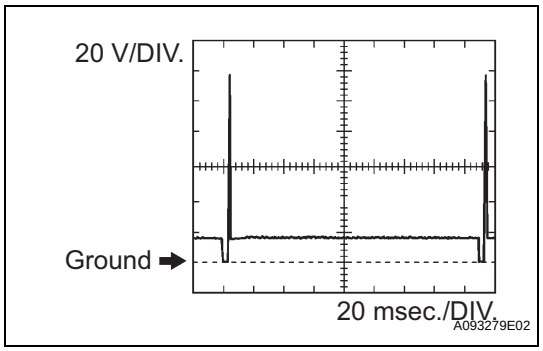
Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
E4-3 (BATT) - E8-3 (E1)	V - L	Battery (for measuring battery voltage and for ECM memory)	Always	9 to 14 V
E4-7 (+BM) - E8-3 (E1)	BR - L	Power source of throttle motor	Always	9 to 14 V
E4-9 (IGSW) - E8-3 (E1)	G - L	Ignition switch	Ignition switch ON	9 to 14 V
E4-1 (+B) - E8-3 (E1)	GR - L	Power source of ECM	Ignition switch ON	9 to 14 V
E4-2 (+B2) - E8-3 (E1)	O - L	Power source of ECM	Ignition switch ON	9 to 14 V
E8-13 (OC1+) - E8-12 (OC1-)	Y - W	Camshaft timing oil control valve (OCV)	Ignition switch ON	Pulse generation (See waveform 8)
E4-8 (MREL) - E8-7 (E01)	O - B	EFI relay	Ignition switch ON	9 to 14 V
E8-18 (VC) - E8-28 (E2)	V - R	Power source of sensor (specific voltage)	Ignition switch ON	4.5 to 5.5 V
E7-28 (VG) - E7-30 (E2G)	R - W	Mass air flow meter	Idling, shift lever position P or N position, A/C switch OFF	0.5 to 3.0 V
E7-29 (THA) - E8-28 (E2)	L - R	Intake air temperature sensor	Idling, intake air temp. 20°C (68°F)	0.5 to 3.4 V
E8-32 (THW) - E8-28 (E2)	G - R	Engine coolant temperature sensor	Idling, engine coolant temp. 80°C (176°F)	0.2 to 1.0 V
E8-20 (VTA1) - E8-28 (E2)	LG - R	Throttle position sensor (for engine control)	Ignition switch ON, accelerator pedal released	0.3 to 1.0 V
			Ignition switch ON, accelerator pedal depressed	3.2 to 4.9 V
E8-19 (VTA2) - E8-28 (E2)	BR - R	Throttle position sensor (for sensor malfunction detection)	Ignition switch ON, accelerator pedal released	2.1 to 3.1 V
			Ignition switch ON, accelerator pedal depressed	4.5 to 5.5 V

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
E4-18 (VPA) - E4-20 (EPA)	W - BR	Accelerator pedal position sensor (for engine control)	Ignition switch ON, accelerator pedal released	0.5 to 1.1 V
			Ignition switch ON, accelerator pedal depressed	2.6 to 4.5 V
E4-19 (VPA2) - E4-21 (EPA2)	V - R	Accelerator pedal position sensor (for sensor malfunction detection)	Ignition switch ON, accelerator pedal released	1.2 to 2.0 V
			Ignition switch ON, accelerator pedal depressed	3.4 to 5.3 V
E4-26 (VCPA) - E4-20 (EPA)	L - BR	Power source of accelerator pedal position sensor (for VPA)	Ignition switch ON	4.5 to 5.5 V
E4-27 (VCP2) - E4-21 (EPA2)	P - R	Power source of accelerator pedal position sensor (for VPA2)	Ignition switch ON	4.5 to 5.5 V
E8-1 (HA1A) - E7-7 (E04)	O - W-B	A/F sensor heater	Idling	Below 3.0 V
			Ignition switch ON	9 to 14 V
E8-21 (A1A+) - E8-3 (E1)	O - L	A/F sensor	Ignition switch ON	3.0 to 3.6 V
E8-31 (A1A-) - E8-3 (E1)	W - L	A/F sensor	Ignition switch ON	2.7 to 3.3 V
E8-2 (HT1B) - E7-4 (E03)	L - BR	Heated oxygen sensor heater	Idling	Below 3.0 V
			Ignition switch ON	9 to 14 V
E8-25 (OX1B) - E8-28 (E2)	B - R	Heated oxygen sensor	Maintain engine speed at 2500 rpm for 2 minutes after warming up	Pulse generation (See waveform 6)
E7-6 (#1) - E8-7 (E01) E7-5 (#2) - E8-7 (E01) E7-2 (#3) - E8-7 (E01) E7-1 (#4) - E8-7 (E01)	L - B R - B Y - B W - B	Injector	Ignition switch ON	9 to 14 V
			Idling	Pulse generation (See waveform 1)
E8-29 (KNK1) - E8-30 (EKNK)	R - G	Knock sensor	Maintain engine speed at 4000 rpm after warming up engine	Pulse generation (See waveform 7)
E8-26 (G2+) - E8-34 (NE-)	P - G	Camshaft position sensor	Idling	Pulse generation (See waveform 3)
E8-27 (NE+) - E8-34 (NE-)	R - G	Crankshaft position sensor	Idling	Pulse generation (See waveform 3)
E8-17 (IGT1) - E8-3 (E1) E8-16 (IGT2) - E8-3 (E1) E8-15 (IGT3) - E8-3 (E1) E8-14 (IGT4) - E8-3 (E1)	G - L P - L B - L LG - L	Ignition coil with igniter (ignition signal)	Idling	Pulse generation (See waveform 2)
E8-23 (IGF1) - E8-3 (E1)	V - L	Ignition coil with igniter (ignition confirmation signal)	Ignition switch ON	4.5 to 5.5 V
			Idling	Pulse generation (See waveform 2)
E7-23 (PRG) - E8-7 (E01)	R - B	Purge VSV	Ignition switch ON	9 to 14 V
			Idling	Pulse generation (See waveform 9)
E5-8 (SPD) - E8-3 (E1)	V - L	Speed signal from combination meter	Ignition switch ON, rotate driving wheel slowly	Pulse generation (See waveform 11)
E4-12 (STA) - E8-3 (E1)	B - L	Starter signal	Shift lever position P or N, ignition switch START	9 to 14 V
E5-4 (STP) - E8-3 (E1)	L - L	Stop light switch	Brake pedal is depressed	7.5 to 14 V
			Brake pedal is released	Below 1.5 V
E4-16 (ST1-) - E8-3 (E1)	L - L	Stop light switch (opposite to STP terminal)	Ignition switch ON, Brake pedal is depressed	Below 1.5 V
			Ignition switch ON, Brake pedal is released	7.5 to 14 V
E4-30 (NSW)*1 - E8-3 (E1)	Y - L	Park/neutral position switch	Ignition switch ON, shift position at P or N	0 to 3.0 V
			Ignition switch ON, shift position is not P or N	9 to 14 V

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
E8-5 (M+) - E7-3 (ME01)	B - W-B	Throttle actuator	Idling	Pulse generation (See waveform 4)
E8-4 (M-) - E7-3 (ME01)	W - W-B	Throttle actuator	Idling	Pulse generation (See waveform 5)
E4-25 (FC) - E8-7 (E01)	L - B	Fuel pump control	Ignition switch ON	9 to 14 V
E5-30 (W) - E8-3 (E1)	G - L	MIL	Ignition switch ON	Below 3.0 V
			Idling	9 to 14 V
E4-15 (ELS1) - E8-3 (E1)	B - L	Electric load	Light control switch OFF	0 to 1.5 V
			Light control switch is in TAIL position	9 to 14 V
E5-3 (ELS3) - E8-3 (E1)	O - L	Electric load	Rear defogger switch OFF (Rear defogger system is not operating)	0 to 1.5 V
			Rear defogger switch ON (Rear defogger system is operating)	9 to 14 V
E5-17 (TC) - E8-3 (E1)	R - L	Terminal TC of DLC 3	Ignition switch ON	9 to 14 V
E5-1 (TACH) - E8-3 (E1)	B - L	Engine speed	Idling	Pulse generation (See waveform 10)
E7-32 (PSW) - E8-3 (E1)	R - L	P/S pressure switch	Ignition switch ON	9 to 14 V
E4-5 (VPMP) - E8-7 (E01)	G - B	Vent valve (built into canister pump module)	Ignition switch ON	9 to 14 V
E4-6 (MPMP) - E8-7 (E01)	L - B	Leak detection pump (built into canister pump module)	Leak detection pump OFF	Below 3 V
			Leak detection pump ON	9 to 14 V
E4-31 (PPMP) - E8-28 (E2)	LG - BR	Canister pressure sensor (built into canister pump module)	Ignition switch ON	3 to 3.6 V
E4-14 (FANH) - E8-7 (E01)	GR - B	Fan No. 2, 3 relay	Idling with high engine coolant temperature	Below 1.5 V
E8-10 (ALT) - E8-3 (E1)	Y - L	Generator	Ignition switch ON	9 to 14 V
E5-33 (CANH) - E8-3 (E1)	B - L	CAN communication line	Ignition switch ON	Pulse generation (See waveform 12)
E5-34 (CANL) - E8-3 (E1)	W - L	CAN communication line	Ignition switch ON	Pulse generation (See waveform 13)

HINT:

*1: A/T only

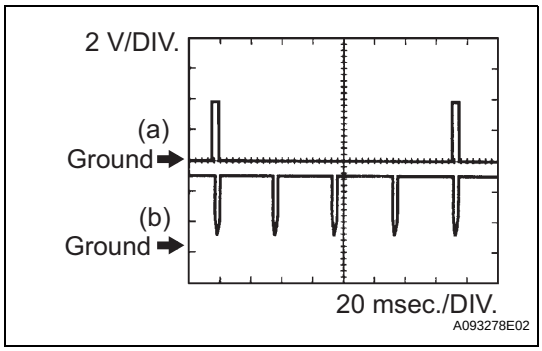


1. WAVEFORM 1
Fuel injector

Item	Content
ECM Terminal Names	Between #1 (to 4) and E01
Tester Ranges	20 V/DIV., 20 msec./DIV.
Conditions	Idling

HINT:

The wavelength becomes shorter as the engine rpm increases.



2. WAVEFORM 2

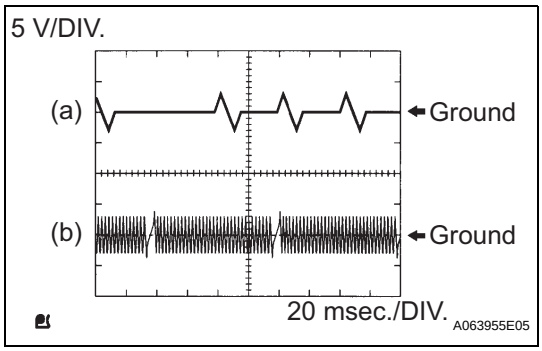
(a) Igniter IGT signal (from ECM to igniter)

Item	Content
ECM Terminal Names	Between IGT (1 to 4) and E1
Tester Ranges	2 V/DIV., 20 msec./DIV.
Conditions	Idling

(b) Igniter IGF signal (from igniter to ECM)

Item	Content
ECM Terminal Names	Between IGF1 and E1
Tester Ranges	2 V/DIV., 20 msec./DIV.
Conditions	Idling

HINT:
The wavelength becomes shorter as the engine rpm increases.



3. WAVEFORM 3

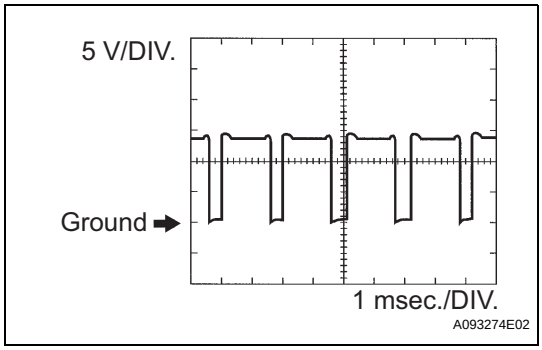
(a) Camshaft position sensor

Item	Content
ECM Terminal Names	Between G2+ and NE-
Tester Ranges	5 V/DIV., 20 msec./DIV.
Conditions	Idling

(b) Crankshaft position sensor

Item	Content
ECM Terminal Names	Between NE+ and NE-
Tester Ranges	5 V/DIV., 20 msec./DIV.
Conditions	Idling

HINT:
The wavelength becomes shorter as the engine rpm increases.

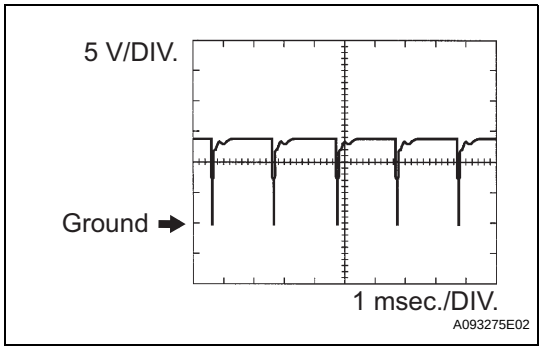


4. WAVEFORM 4

Throttle actuator positive terminal

Item	Content
ECM Terminal Names	Between M+ and ME01
Tester Ranges	5 V/DIV., 1 msec./DIV.
Conditions	Idling with warm engine

HINT:
The duty ratio varies depending on the throttle actuator operation.

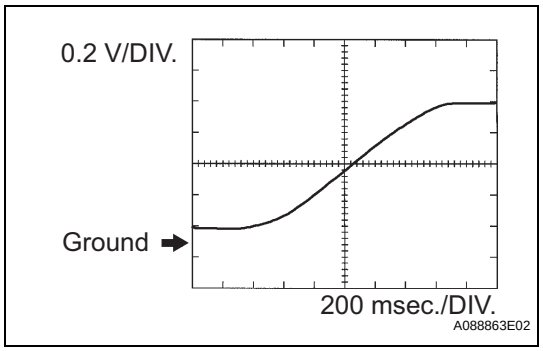


5. WAVEFORM 5

Throttle actuator negative terminal

Item	Content
ECM Terminal Names	Between M- and ME01
Tester Ranges	5 V/DIV., 1 msec./DIV.
Conditions	Idling with warm engine

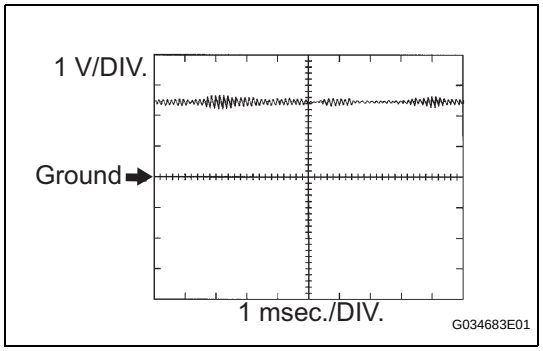
HINT:
The duty ratio varies depending on the throttle actuator operation.



6. WAVEFORM 6
Heated oxygen sensor

Item	Content
ECM Terminal Names	Between OX1B and O1B
Tester Ranges	0.2 V/DIV., 200 msec./DIV.
Conditions	Engine speed maintained at 2,500 rpm for 2 minutes after warming up sensor

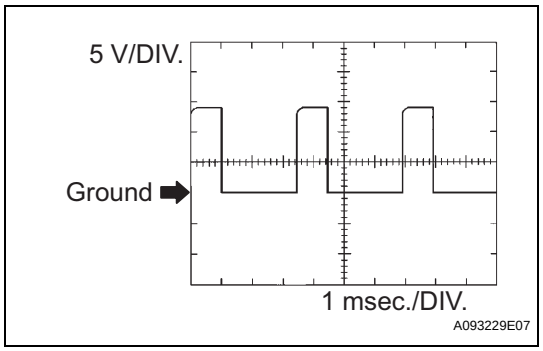
HINT:
In the DATA LIST, item O2S B1S2 shows the ECM input values from the heated oxygen sensor.



7. WAVEFORM 7
Knock sensor

Item	Content
ECM Terminal Names	Between KNK1 and EKNK
Tester Ranges	0.01 to 10 V/DIV., 0.01 to 10 msec./DIV.
Conditions	Engine speed at 4,000 rpm after warming up engine

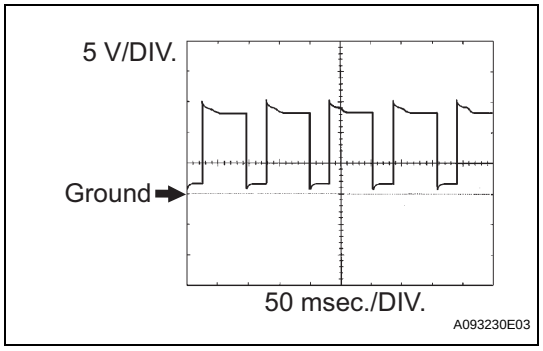
HINT:
- The wavelength becomes shorter as the engine rpm increases.
- The waveforms and amplitudes displayed differ slightly depending on the vehicle.



8. WAVEFORM 8
Camshaft timing oil control valve (OCV)

Item	Content
ECM Terminal Names	Between OC1+ and OC1-
Tester Ranges	5 V/DIV., 1 msec./DIV.
Conditions	Idling

HINT:
The wavelength becomes shorter as the engine rpm increases.

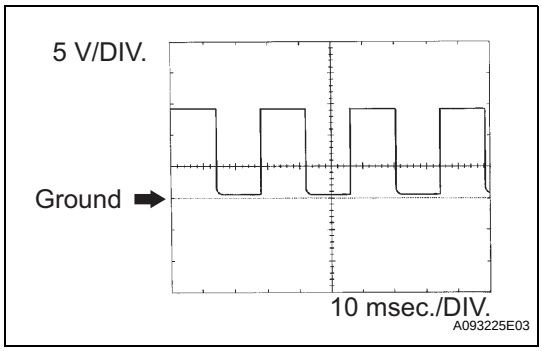


9. WAVEFORM 9
Purge VSV

Item	Content
ECM Terminal Names	Between PRG and E1
Tester Ranges	5 V/DIV., 50 msec./DIV.
Conditions	Idling

HINT:
If the waveform is not similar to the illustration, check the waveform again after idling for 10 minutes or more.

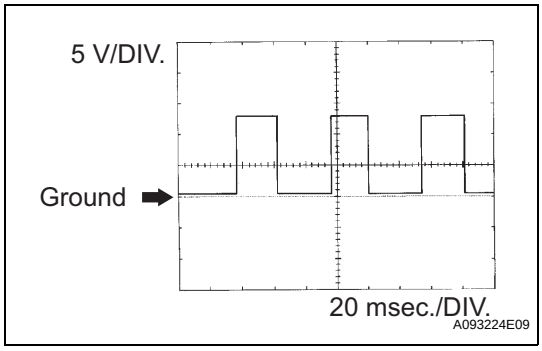
ES



10. WAVEFORM 10
Engine speed signal

Item	Content
ECM Terminal Names	Between TACH and E1
Tester Ranges	5 V/DIV., 10 msec./DIV.
Conditions	Idling

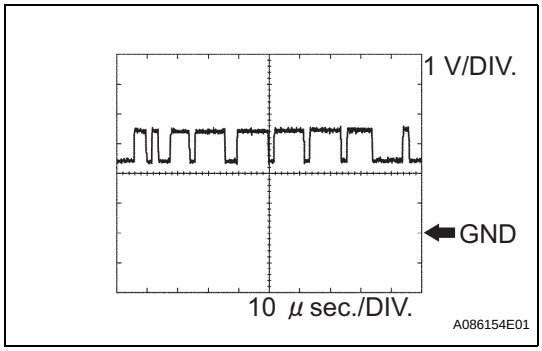
HINT:
The wavelength becomes shorter as the engine rpm increases.



11. WAVEFORM 11
Vehicle speed signal

Item	Content
ECM Terminal Names	Between SPD and E1
Tester Ranges	5 V/DIV., 20 msec./DIV.
Conditions	Driving at 12 mph (20 km/h)

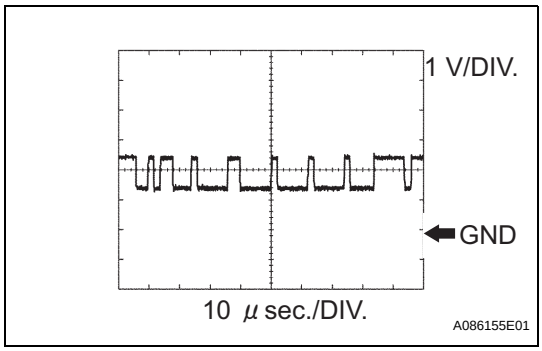
HINT:
The wavelength becomes shorter as the vehicle speed increases.



12. WAVEFORM 12
CAN communication signal:

ECM Terminal Names	Between CANH and E1
Tester Ranges	1 V/DIV., 10 μsec./DIV.
Conditions	Engine stops and ignition switch to the ON position

HINT:
The waveform varies depending on the CAN communication signal.



13. WAVEFORM 13
CAN communication signal:

ECM Terminal Names	Between CANL and E1
Tester Ranges	1 V/DIV., 10 μsec./DIV.
Conditions	Engine stops and ignition switch to the ON position

HINT:
The waveform varies depending on the CAN communication signal.