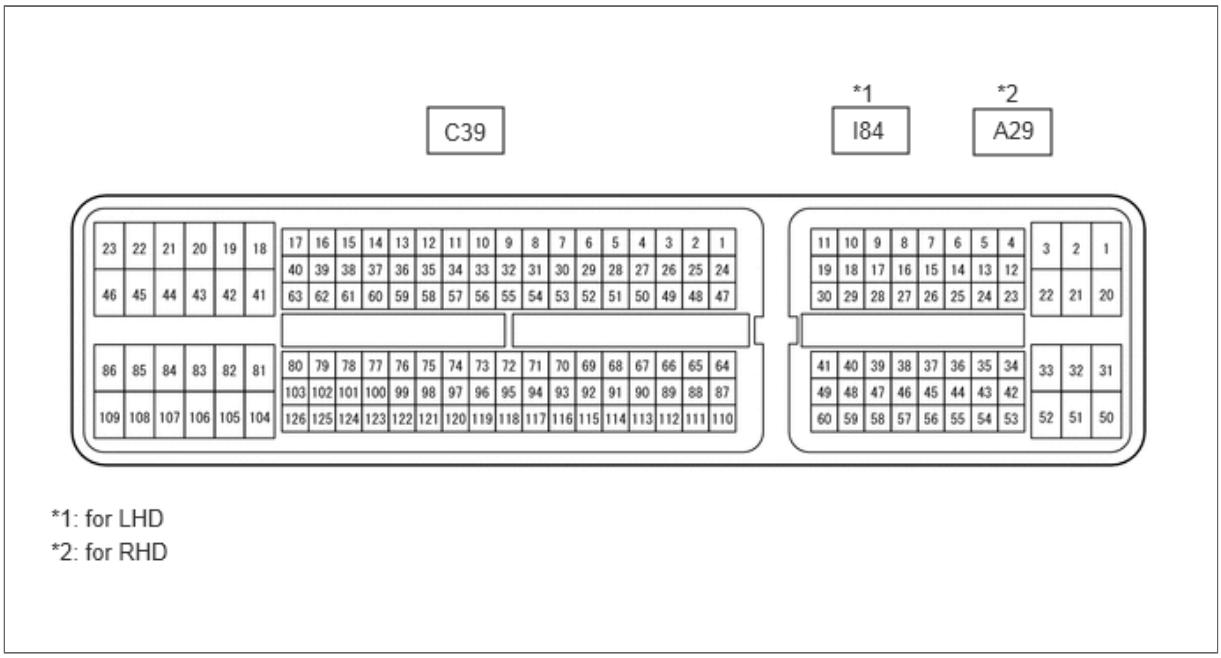
1GR-FE ENGINE CONTROL SFI SYSTEM TERMINALS OF ECM



HINT:

The standard normal voltage between each pair of ECM terminals is shown in the table below. The appropriate conditions for checking each pair of terminals are also indicated.

The result of checks should be compared with the standard normal voltage for that pair of terminals, displayed in the Specified Condition column.

The illustration above can be used as a reference to identify the ECM terminal locations.

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
I84*1-20 (BATT) - C39-81 (E1) A29*2-20 (BATT) - C39-81 (E1)	R-B - BR	Battery (for measuring the battery voltage and for the ECM memory)	Always	11 to 14 V
I84*1-3 (+BM) - C39-81 (E1) A29*2-3 (+BM) - C39-81 (E1)	R - BR	Power source of throttle actuator	Always	11 to 14 V
I84*1-28 (IGSW) - C39-81 (E1) A29*2-28 (IGSW) - C39-81 (E1)	B - BR	Ignition switch	Ignition switch ON	11 to 14 V
I84*1-2 (+B) - C39-81 (E1) A29*2-2 (+B) - C39-81 (E1)	L - BR	Power source of ECM	Ignition switch ON	11 to 14 V
I84*1-1 (+B2) - C39-81 (E1) A29*2-1 (+B2) - C39-81 (E1)	L - BR	Power source of ECM	Ignition switch ON	11 to 14 V
C39-58 (OC1+) - C39-57 (OC1-)	L-B - R-B	Camshaft timing oil control valve (OCV) (bank 1)	Ignition switch ON	Pulse generation (See waveform 1)
C39-52 (OC2+) - C39-51 (OC2-)	B - B-L	Camshaft timing oil control valve (OCV) (bank 2)	Ignition switch ON	Pulse generation (See waveform 1)
I84*1-44 (MREL) - C39-81 (E1) A29*2-44 (MREL) - C39-81 (E1)	W-G - BR	EFI MAIN relay	Ignition switch ON	11 to 14 V

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
C39-115 (VCV1) - C39-78 (ETHW)	L - BR	Power source of sensor (specific voltage)	Ignition switch ON	4.5 to 5.5 V
C39-113 (VCV2) - C39-74 (ETHA)	L - BR	Power source of sensor (specific voltage)	Ignition switch ON	4.5 to 5.5 V
C39-72 (VG) - C39-73 (E2G)	G-W - G-W	Mass air flow meter	Idling, shift lever in neutral, A/C switch off	0.5 to 3.0 V
C39-71 (THA) - C39-74 (ETHA)	Y-B - BR	Intake air temperature sensor	Idling, intake air temperature 20°C (68°F)	0.5 to 3.4 V
C39-79 (THW) - C39-78 (ETHW)	G-B - BR	Engine coolant temperature sensor	Idling, engine coolant temperature 80°C (176°F)	0.2 to 1.0 V
C39-96 (VCTA) - C39-97 (ETA)	L - B	Power source of throttle position sensor (specific voltage)	Ignition switch ON	4.5 to 5.5 V
C39-98 (VTA1) - C39-97 (ETA)	R-Y - B	Throttle position sensor (for engine control)	Ignition switch ON, throttle valve fully closed	0.5 to 1.1 V
			Ignition switch ON, throttle valve fully open	3.2 to 4.8 V
C39-99 (VTA2) - C39-97 (ETA)	Y-B - B	Throttle position sensor (for sensor malfunction detection)	Ignition switch ON, throttle valve fully closed	2.1 to 3.1 V
			Ignition switch ON, throttle valve fully open	4.6 to 5.0 V
I84*1-55 (VPA) - I84*1-59 (EPA) A29*2-55 (VPA) - A29*2-59 (EPA)	L-R - W	Accelerator pedal position sensor (for engine control)	Ignition switch ON, accelerator pedal fully released	0.5 to 1.1 V
			Ignition switch ON, accelerator pedal fully depressed	2.6 to 4.5 V
I84*1-56 (VPA2) - I84*1-60 (EPA2) A29*2-56 (VPA2) - A29*2-60 (EPA2)	R-B - BR	Accelerator pedal position sensor (for sensor malfunction detection)	Ignition switch ON, accelerator pedal fully released	1.2 to 2.0 V
			Ignition switch ON, accelerator pedal fully depressed	3.4 to 4.7 V
I84*1-57 (VCPA) - I84*1-59 (EPA) A29*2-57 (VCPA) - A29*2-59 (EPA)	BR-W - W	Power source of accelerator pedal position sensor (for VPA)	Ignition switch ON	4.5 to 5.5 V
I84*1-58 (VCP2) - I84*1-60 (EPA2) A29*2-58 (VCP2) - A29*2-60 (EPA2)	V - BR	Power source of accelerator pedal position sensor (for VPA2)	Ignition switch ON	4.5 to 5.5 V
C39-86 (HA1A) - C39-23 (E04)	L-R - W-B	Air fuel ratio (A/F) sensor heater	Idling	Below 3.0 V
C39-109 (HA2A) - C39-46 (E05)	G - W-B		Ignition switch ON	11 to 14 V
C39-93 (A1A+) - C39-81 (E1)	G - BR	A/F sensor	Ignition switch ON	3.3 V*3
C39-120 (A2A+) - C39-81 (E1)	V - BR	A/F sensor	Ignition switch ON	3.3 V*3
C39-116 (A1A-) - C39-81 (E1)	R - BR	A/F sensor	Ignition switch ON	2.9 V*3
C39-119 (A2A-) - C39-81 (E1)	P - BR	A/F sensor	Ignition switch ON	2.9 V*3
C39-48 (HT1B) - C39-104 (E03)	G - W-B	Heated oxygen sensor heater	Idling	Below 3.0 V
C39-47 (HT2B) - C39-104 (E03)	B - W-B		Ignition switch ON	11 to 14 V

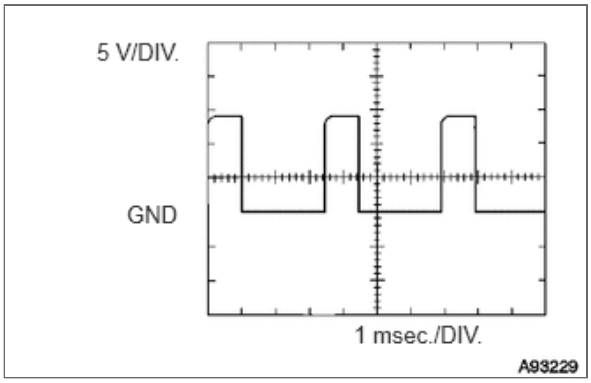
Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
C39-88 (OX1B) - C39-65 (EX1B)	B - B-R	Heated oxygen sensor	Engine speed maintained at 2500 rpm for 2 minutes after warming up engine	Pulse generation (See waveform 2)
C39-87 (OX2B) - C39-64 (EX2B)	B - BR			
C39-45 (#10) - C39-22 (E01)	R-L - W-B	Fuel injector	Ignition switch ON	11 to 14 V
C39-85 (#20) - C39-22 (E01)	L - W-B			
C39-44 (#30) - C39-22 (E01)	R-B - W-B			
C39-84 (#40) - C39-22 (E01)	Y - W-B		Idling	Pulse generation (See waveform 3)
C39-43 (#50) - C39-22 (E01)	G - W-B			
C39-83 (#60) - C39-22 (E01)	R - W-B			
C39-95 (KNK1) - C39-94 (EKNK)	B - W	Knock sensor (bank 1)	Engine speed maintained at 4000 rpm after warming up engine	Pulse generation (See waveform 4)
C39-118 (KNK2) - C39-117 (EKN2)	G - R	Knock sensor (bank 2)	Engine speed maintained at 4000 rpm after warming up engine	Pulse generation (See waveform 4)
C39-69 (VV1+) - C39-92 (VV1-)	R - L-R	Variable Valve Timing (VVT) sensor (bank 1)	Idling	Pulse generation (See waveform 5)
C39-67 (VV2+) - C39-90 (VV2-)	P - G	Variable Valve Timing (VVT) sensor (bank 2)	Idling	Pulse generation (See waveform 5)
C39-110 (NE+) - C39-111 (NE-)	B - W	Crankshaft position sensor	Idling	Pulse generation (See waveform 5)
C39-40 (IGT1) - C39-81 (E1)	B-R - BR	Ignition coil Assembly (ignition signal)	Idling	Pulse generation (See waveform 6)
C39-39 (IGT2) - C39-81 (E1)	R - BR			
C39-38 (IGT3) - C39-81 (E1)	B - BR			
C39-37 (IGT4) - C39-81 (E1)	L-W - BR			
C39-36 (IGT5) - C39-81 (E1)	G - BR			
C39-35 (IGT6) - C39-81 (E1)	G - BR			
C39-106 (IGF) - C39-81 (E1)	G-B - BR	Ignition coil Assembly (ignition confirmation signal)	Ignition switch ON	4.5 to 5.5 V
			Idling	Pulse generation (See waveform 6)
C39-108 (PRG) - C39-81 (E1)	L-B - BR	Purge VSV	Ignition switch ON	11 to 14 V
			Idling	Pulse generation (See waveform 7)
I84*1-8 (SPD) - C39-81 (E1) A29*2-8 (SPD) - C39-81 (E1)	G - BR	Speed signal from combination meter	Ignition switch ON, wheel rotated slowly	Pulse generation (See waveform 8)
I84*1-48 (STA) - C39-81 (E1) A29*2-48 (STA) - C39-81 (E1)	B-W - BR	Starter signal	Cranking	11 to 14 V
I84*1-36 (STP) - C39-81 (E1) A29*2-36 (STP) - C39-81 (E1)	W - BR	Stop light switch	Brake pedal depressed	7.5 to 14 V
			Brake pedal released	Below 1.5 V
I84*1-35 (ST1-) - C39-81 (E1) A29*2-35 (ST1-) - C39-81 (E1)	R-L - BR	Stop light switch (opposite to STP terminal)	Ignition switch ON, brake pedal depressed	Below 1.5 V

Terminal No. (Symbol)	Wiring Color	Terminal Description	Condition	Specified Condition
			Ignition switch ON, brake pedal released	7.5 to 14 V
C39-19 (M+) - C39-20 (ME01)	R - BR	Throttle actuator	Idling with warm engine	Pulse generation (See waveform 9)
C39-18 (M-) - C39-20 (ME01)	G - BR	Throttle actuator	Idling with warm engine	Pulse generation (See waveform 10)
I84*1-7 (FC) - C39-81 (E1) A29*2-7 (FC) - C39-81 (E1)	R-W - BR	C/OPN relay operation signal (fuel pump control)	Ignition switch ON	11 to 14 V
			Idling with warm engine	Below 1.5 V
I84*1-24 (W) - C39-81 (E1) A29*2-24 (W) - C39-81 (E1)	R-W - BR	MIL	Ignition switch ON	Below 3.0 V
			Idling	11 to 14 V
I84*1-27 (TC) - C39-81 (E1) A29*2-27 (TC) - C39-81 (E1)	G - BR	Terminal TC of DLC3	Ignition switch ON	11 to 14 V
I84*1-15 (TACH) - C39-81 (E1) A29*2-15 (TACH) - C39-81 (E1)	B - BR	Engine speed	Idling	Pulse generation (See waveform 11)
C39-107 (ACIS) - C39-81 (E1)	L-B - BR	VSV for ACIS	Ignition switch ON	11 to 14 V
C39-70 (PSW) - C39-81 (E1)	L - BR	Power Steering Pressure Switch	Ignition switch ON	11 to 14 V
I84*1-41 (CANH) - C39-81 (E1) A29*2-41 (CANH) - C39-81 (E1)	B - BR	CAN communication line	Ignition switch ON	Pulse generation (See waveform 12)
I84*1-49 (CANL) - C39-81 (E1) A29*2-49 (CANL) - C39-81 (E1)	W - BR	CAN communication line	Ignition switch ON	Pulse generation (See waveform 13)
C39-59 (FPR) - C39-81 (E1)	G-W - BR	Fuel pump control	Ignition switch ON	11 to 14 V
			Idling	Below 1.5 V

HINT:

- *1: for LHD
- *2: for RHD
- *3: The ECM terminal voltage is constant regardless of theoutput voltage from the sensor.

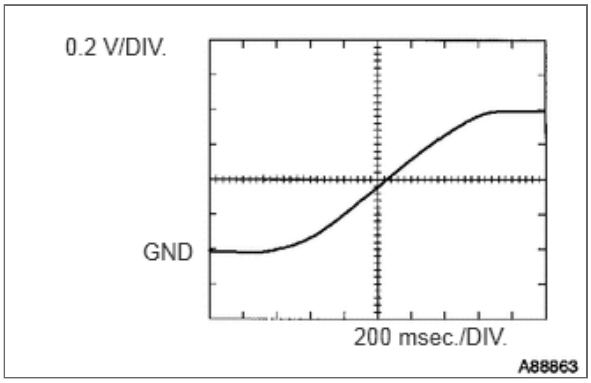
WAVEFORM 1



Camshaft Timing Oil Control Valve (OCV)

ECM Terminal Name	Between OC1+ and OC1- or OC2+ and OC2-
Tester Range	5 V/DIV., 1 msec./DIV.,
Condition	Idling

WAVEFORM 2



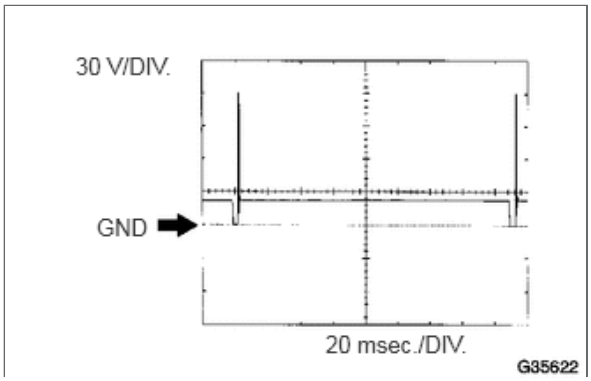
Heated Oxygen Sensor

ECM Terminal Name	Between OX1B and EX1B or OX2B and EX2B
Tester Range	0.2 V/DIV., 200 msec./DIV.
Condition	Engine speed maintained at 2500 rpm for 2 minutes after warming up engine

HINT:

In the Data List, item O2S B1S2 or O2S B2S2 shows the ECM input values from the heated oxygen sensor.

WAVEFORM 3



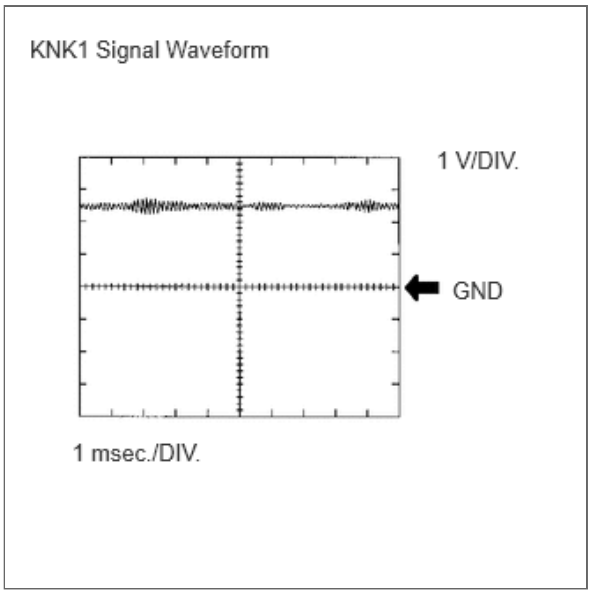
Fuel Injector

ECM Terminal Name	Between #10 (to #60) and E01
Tester Range	30 V/DIV., 20 msec./DIV.
Condition	Idling

HINT:

The wavelength becomes shorter as the engine speed increases.

WAVEFORM 4



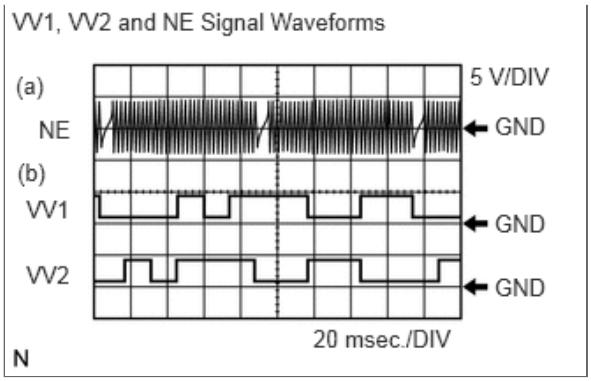
Knock Sensor

ECM Terminal Name	Between KNK1 and EKNK or KNK2 and EKN2
Tester Range	1 V/DIV., 0.01 to 1 msec./DIV.
Condition	Engine speed maintained at 4000 rpm after warming up engine

HINT:

- The wavelength becomes shorter as the engine speed increases.
- The waveforms and amplitudes displayed on the tester differ slightly depending on the vehicle.

WAVEFORM 5



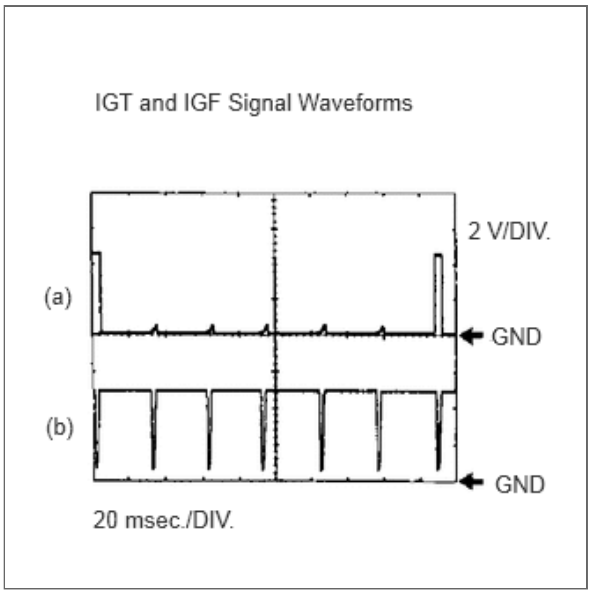
Crankshaft Position Sensor and VVT Sensor

ECM Terminal Name	(a) Between NE+ and NE- (b) Between VV1+ and VV1- or VV2+ and VV2-
Tester Range	5 V/DIV., 20 msec./DIV.
Condition	Idling

HINT:

The wavelength becomes shorter as the engine speed increases.

WAVEFORM 6



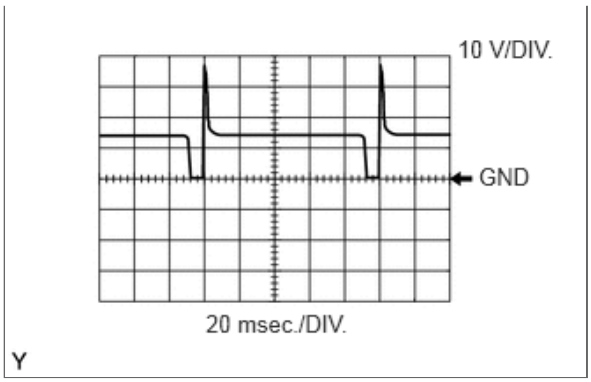
Ignition coil Assembly Signal (IGT and IGF Signal)

ECM Terminal Name	(a) Between IGT (1 to 6) and E1 (b) Between IGF and E1
Tester Range	2 V/DIV., 20 msec./DIV.
Condition	Idling

HINT:

The wavelength becomes shorter as the engine speed increases.

WAVEFORM 7



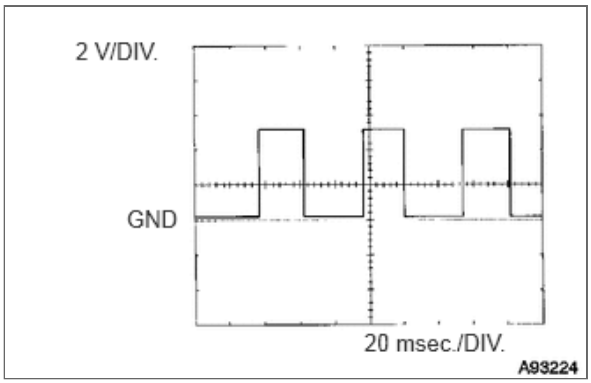
Purge VSV

ECM Terminal Name	Between PRG and E1
Tester Range	10 V/DIV., 20 msec./DIV.
Condition	Idling

HINT:

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

WAVEFORM 8



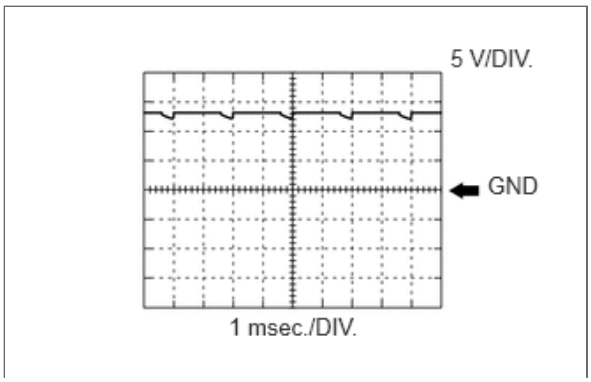
Vehicle Speed Signal

ECM Terminal Name	Between SPD and E1
Tester Range	2 V/DIV., 20 msec./DIV.
Condition	Ignition switch ON, wheel rotated slowly

HINT:

The wavelength becomes shorter as the vehicle speed increases.

WAVEFORM 9



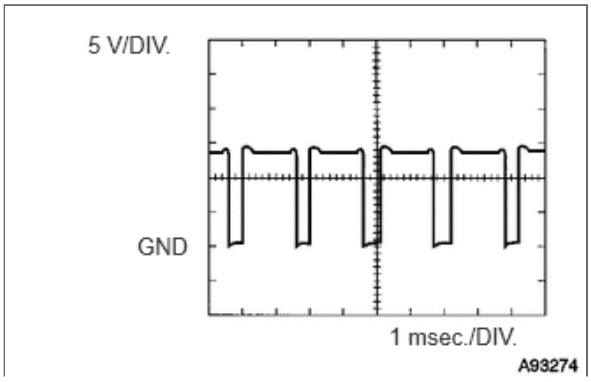
Throttle Actuator Positive Terminal

ECM Terminal Name	Between M+ and ME01
Tester Range	5 V/DIV., 1 msec./DIV.
Condition	Idling with warm engine

HINT:

The duty ratio varies depending on the throttle actuator operation.

WAVEFORM 10

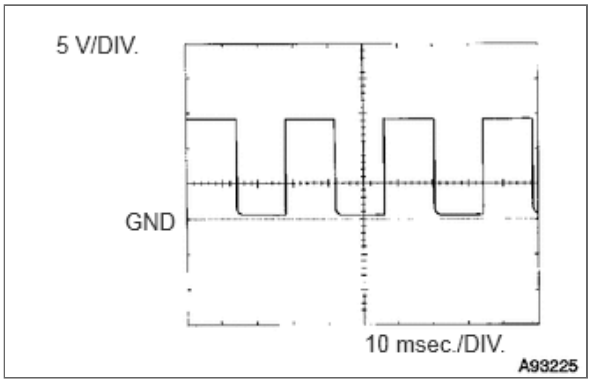


Throttle Actuator Negative Terminal

ECM Terminal Name	Between M- and ME01
Tester Range	5 V/DIV., 1 msec./DIV.
Condition	Idling with warm engine

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

WAVEFORM 11

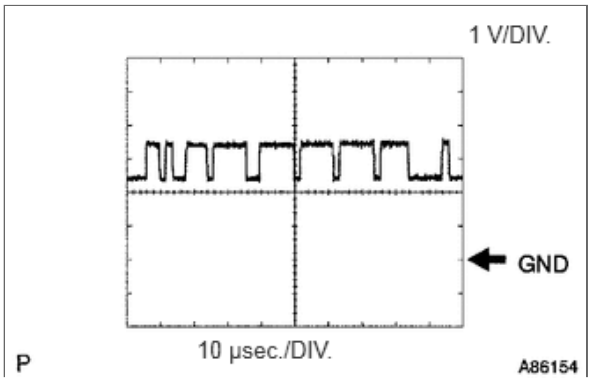


Engine Speed Signal

ECM Terminal Name	Between TACH and E1
Tester Range	5 V/DIV., 10 msec./DIV.
Condition	Idling

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

WAVEFORM 12

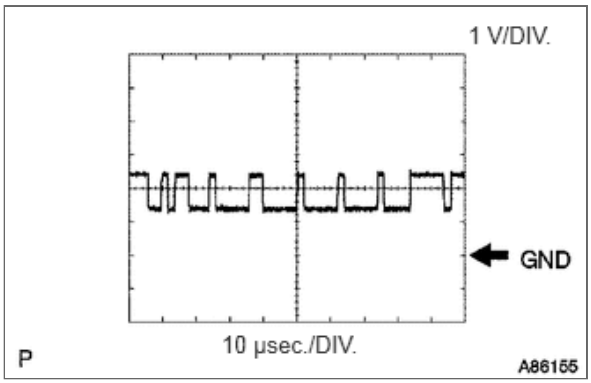


CAN Communication Signal (Reference)

ECM Terminal Name	Between CANH and E1
Tester Range	1 V/DIV., 10 µsec./DIV.
Condition	Ignition switch ON

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

WAVEFORM 13



CAN Communication Signal (Reference)

ECM Terminal Name	Between CANL and E1
Tester Range	1 V/DIV., 10 µsec./DIV.
Condition	Ignition switch ON

HINT:

The wavelength varies depending on the CAN communication signal.