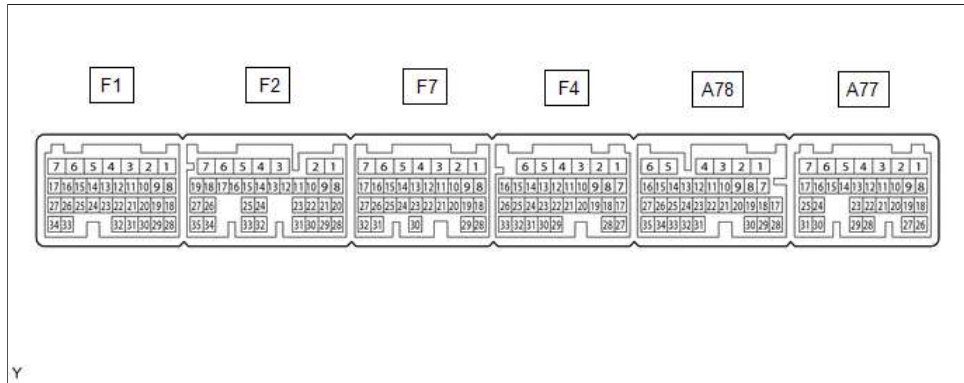


Last Modified: 02-13-2023	6.11:8.1.0	Doc ID: RM1000000018QGS
Model Year Start: 2018	Model: RC F	Prod Date Range: [11/2017 - 03/2019]
Title: 2UR-GSE (ENGINE CONTROL): SFI SYSTEM: TERMINALS OF ECM; 2018 - 2019 MY RC F [11/2017 - 03/2019]		

TERMINALS OF ECM



HINT:

The standard 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 voltage for that pair of terminals, and 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
A77-5 (BATT) - F4-1 (E1)	L - W-B	Battery (for measuring the battery voltage and for the ECM memory)	Always	11 to 14 V
F1-1 (+BM) - F4-1 (E1)	L - W-B	Power source of throttle actuator	Always	11 to 14 V
A77-15 (IGSW) - F4-1 (E1)	P - W-B	Engine switch	Engine switch on (IG)	11 to 14 V
A77-7 (+B) - F4-1 (E1)	B-R - W-B	Power source of ECM	Engine switch on (IG)	11 to 14 V
A77-6 (+B2) - F4-1 (E1)	B-R - W-B	Power source of ECM	Engine switch on (IG)	11 to 14 V
F1-17 (OE1+) - F1-16 (OE1-)	R - L	Camshaft timing oil control valve assembly (bank 1) operation signal	Idling	Pulse generation (see waveform 1)
F1-15 (OE2+) - F1-14 (OE2-)	BR - V	Camshaft timing oil control valve assembly (bank 2) operation signal	Idling	Pulse generation (see waveform 1)
A77-3 (MREL) - F4-1 (E1)	Y - W-B	EFI-MAIN and EFI MAIN NO. 2 relay operation signal	Engine switch on (IG)	11 to 14 V
F2-34 (VCTA) - F2-33 (ETA)	R - W	Power source for throttle position sensor (specific voltage)	Engine switch on (IG)	4.5 to 5.5 V
F2-26 (VC) - F4-1 (E1)	L - W-B	Power source for sensor (specific voltage)	Engine switch on (IG)	4.5 to 5.5 V
F1-23 (VG) - F1-24 (E2G)	BE - GR	Mass air flow meter sub-assembly signal	Engine switch on (IG)	Pulse generation (see waveform 25)
F1-21 (VCGV) - F1-24 (E2G)	B - GR	Power source of mass air flow meter sub-assembly (for VG)	Engine switch on (IG)	4.8 to 5.2 V
F7-31 (THA) - F1-24 (E2G)	V - GR	Intake air temperature sensor	Idling, intake air temperature 0 to 80°C (32 to 176°F)	0.5 to 3.4 V
F4-29 (THW) - F2-24 (E2)	R - BR	Engine coolant temperature sensor	Idling, engine coolant temperature 60 to 120°C (140 to 248°F)	0.2 to 1.0 V
F2-35 (VTA) - F2-33 (ETA)	G - W	Throttle position sensor signal (for engine control)	Accelerator pedal fully released Accelerator pedal fully depressed (engine running)	0.5 to 1.1 V 3.2 to 4.8 V
F2-25 (VTA2) - F2-33 (ETA)	L - W	Throttle position sensor signal (for sensor malfunction detection)	Accelerator pedal fully released Accelerator pedal fully depressed (engine running)	2.1 to 3.1 V 4.6 to 5.0 V
A78-29 (NSW) - F4-1 (E1)	L - W-B	Park/Neutral position switch assembly signal	Engine switch on (IG), shift lever in P or N	Below 1 V

TERMINAL NO. (SYMBOL)	WIRING COLOR	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION						
A77-4 (IREL) - F4-1 (E1)	L - W-B	INJ NO. 1 and INJ NO. 2 relay operation signal	Engine switch on (IG)	11 to 14 V						
A77-26 (VPA) - A77-27 (EPA)	G - L	Accelerator pedal position sensor signal (for engine control)	Engine switch on (IG), accelerator pedal fully released	0.5 to 1.1 V						
			Engine switch on (IG), accelerator pedal fully depressed	2.6 to 4.5 V						
A77-28 (VPA2) - A77-29 (EPA2)	P - B	Accelerator pedal position sensor signal	Engine switch on (IG), accelerator pedal fully released	1.2 to 2.0 V						
			Engine switch on (IG), accelerator pedal fully depressed	3.4 to 4.75 V						
A77-20 (VCPA) - A77-27 (EPA)	R - L	Power source of accelerator pedal position sensor (for VPA)	Engine switch on (IG)	4.5 to 5.5 V						
A77-22 (VCP2) - A77-29 (EPA2)	R - B	Power source of accelerator pedal position sensor (for VPA2)	Engine switch on (IG)	4.5 to 5.5 V						
A77-10 (KD) - F4-1 (E1)	V - W-B	Kick down switch signal	Engine switch on (IG), accelerator pedal released	11 to 14 V						
F4-4 (HA1A) - F4-3 (E04)	L - W-B	Air fuel ratio sensor (sensor 1) heater operation signal	Engine switch on (IG)	11 to 14 V						
F4-5 (HA2A) - F7-1 (E05)	L - W-B		Idling	Pulse generation (see waveform 2)						
F7-23 (A1A+) - F4-1 (E1)	R - W-B	Air fuel ratio sensor (bank 1 sensor 1) signal	Engine switch on (IG)	3.3 V*						
F7-21 (A2A+) - F4-1 (E1)	B - W-B	Air fuel ratio sensor (bank 2 sensor 1) signal	Engine switch on (IG)	3.3 V*						
F7-22 (A1A-) - F4-1 (E1)	G - W-B	Air fuel ratio sensor (bank 1 sensor 1) signal	Engine switch on (IG)	2.9 V*						
F7-20 (A2A-) - F4-1 (E1)	W - W-B	Air fuel ratio sensor (bank 2 sensor 1) signal	Engine switch on (IG)	2.9 V*						
A78-4 (HT1B) - F4-3 (E04) A78-3 (HT2B) - F7-1 (E05)	G - W-B L - W-B	Heated oxygen sensor (sensor 2) heater operation signal	Engine switch on (IG)	11 to 14 V						
			Idling	Below 3.0 V						
F4-27 (OX1B) - F4-17 (EX1B) F4-28 (OX2B) - F4-18 (EX2B)	R - G B - W	Heated oxygen sensor (sensor 2) signal	Engine speed maintained at 2500 rpm for 2 minutes after warming up engine	Pulse generation (see waveform 3)						
F4-22 (#1) - F4-1 (E1) F4-12 (#2) - F4-1 (E1) F4-11 (#3) - F4-1 (E1) F4-21 (#4) - F4-1 (E1) F4-10 (#5) - F4-1 (E1) F4-20 (#6) - F4-1 (E1) F4-19 (#7) - F4-1 (E1) F4-9 (#8) - F4-1 (E1)	V - W-B LG - W-B R - W-B G - W-B G - W-B L - W-B B - W-B B - W-B	Fuel injector assembly (for direct injection) signal	Engine switch on (IG)	0 to 5.0 V						
			Idling with warm engine	Pulse generation (see waveform 4)						
			F7-17 (#10) - F2-2 (E01) F2-11 (#20) - F2-2 (E01) F7-16 (#30) - F2-2 (E01) F2-10 (#40) - F2-2 (E01) F7-15 (#50) - F2-2 (E01) F2-9 (#60) - F2-2 (E01) F7-14 (#70) - F2-2 (E01) F2-8 (#80) - F2-2 (E01)	L - W-B G - W-B W - W-B GR - W-B Y - W-B L - W-B R - W-B V - W-B	Fuel injector assembly (for port injection) signal	Engine switch on (IG)	0 to 5.0 V			
						Idling, engine coolant temperature 60°C or less	Pulse generation (see waveform 5)			
						F4-26 (KNK1) - F4-33 (EKNK)	W - B	Knock control sensor (bank 1 sensor 1) signal	Engine speed maintained at 4000 rpm after warming up engine	Pulse generation (see waveform 6)

TERMINAL NO. (SYMBOL)	WIRING COLOR	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
F4-25 (KNK2) - F4-32 (EKN2)	G - R	Knock control sensor (bank 2 sensor 1) signal	Engine speed maintained at 4000 rpm after warming up engine	Pulse generation (see waveform 6)
F4-24 (KNK3) - F4-31 (EKN3)	R - W	Knock control sensor (bank 1 sensor 2)	Engine speed maintained at 4000 rpm after warming up engine	Pulse generation (see waveform 6)
F4-23 (KNK4) - F4-30 (EKN4)	B - G	Knock control sensor (bank 2 sensor 2)	Engine speed maintained at 4000 rpm after warming up engine	Pulse generation (see waveform 6)
F1-19 (VV1+) - F1-29 (VV1-)	BR - R	VVT sensor (for intake camshaft of bank 1) signal	Idling with warm engine	Pulse generation (see waveform 7)
F1-20 (VV2+) - F1-30 (VV2-)	R - W	VVT sensor (for intake camshaft of bank 2) signal	Idling with warm engine	Pulse generation (see waveform 7)
F1-26 (EV1+) - F1-33 (EV1-)	B - P	VVT sensor (for exhaust camshaft of bank 1) signal	Idling with warm engine	Pulse generation (see waveform 8)
F1-27 (EV2+) - F1-34 (EV2-)	Y - P	VVT sensor (for exhaust camshaft of bank 2) signal	Idling with warm engine	Pulse generation (see waveform 8)
F1-18 (G2+) - F1-28 (G2-)	R - Y	Camshaft position sensor signal	Idling with warm engine	Pulse generation (see waveform 9)
F1-32 (NE+) - F1-31 (NE-)	W - R	Crankshaft position sensor signal	Idling with warm engine	Pulse generation (see waveform 10)
F7-27 (IGT1) - F4-1 (E1)	BR - W-B	No. 1 ignition coil assembly (ignition signal)	Idling with warm engine	Pulse generation (see waveform 11)
F2-23 (IGT2) - F4-1 (E1)	L - W-B	No. 2 ignition coil assembly (ignition signal)	Idling with warm engine	Pulse generation (see waveform 11)
F7-26 (IGT3) - F4-1 (E1)	B - W-B	No. 3 ignition coil assembly (ignition signal)	Idling with warm engine	Pulse generation (see waveform 11)
F2-22 (IGT4) - F4-1 (E1)	B - W-B	No. 4 ignition coil assembly (ignition signal)	Idling with warm engine	Pulse generation (see waveform 11)
F7-25 (IGT5) - F4-1 (E1)	P - W-B	No. 5 ignition coil assembly (ignition signal)	Idling with warm engine	Pulse generation (see waveform 11)
F2-21 (IGT6) - F4-1 (E1)	V - W-B	No. 6 ignition coil assembly (ignition signal)	Idling with warm engine	Pulse generation (see waveform 11)
F7-24 (IGT7) - F4-1 (E1)	V - W-B	No. 7 ignition coil assembly (ignition signal)	Idling with warm engine	Pulse generation (see waveform 11)
F2-20 (IGT8) - F4-1 (E1)	P - W-B	No. 8 ignition coil assembly (ignition signal)	Idling with warm engine	Pulse generation (see waveform 11)
F7-32 (IGF1) - F4-1 (E1)	LG - W-B G - W-B	Ignition coil assembly (ignition confirmation signal)	Engine switch on (IG)	4.5 to 5.0 V
F2-28 (IGF2) - F4-1 (E1)			Idling with warm engine	Pulse generation (see waveform 11)
F2-7 (PRG) - F4-1 (E1)	R - W-B	Purge VSV for EVAP system operation signal	Engine switch on (IG)	11 to 14 V
			Idling, under purge control	Pulse generation (see waveform 12)
A78-23 (SPD) - F4-1 (E1)	L - W-B	Vehicle speed signal from combination meter assembly	Driving at 20 km/h (12 mph)	Pulse generation (see waveform 13)
A78-20 (STA) - F4-1 (E1)	R - W-B	Starter signal	Cranking	5.5 V or higher
A77-13 (STP) - F4-1 (E1)	R - W-B	Stop light switch assembly signal	Brake pedal depressed	7.5 to 14 V
			Brake pedal released	Below 1.5 V
A77-12 (ST1-) - F4-1 (E1)	P - W-B	Stop light switch assembly signal (opposite to STP terminal)	Engine switch on (IG), brake pedal depressed	Below 1.5 V
			Engine switch on (IG), brake pedal released	7.5 to 14 V

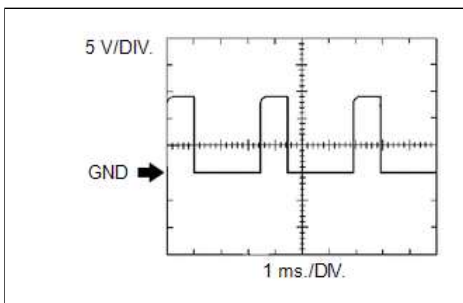
TERMINAL NO. (SYMBOL)	WIRING COLOR	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
F1-5 (M+) - F1-6 (ME01)	W - W-B	Throttle actuator operation signal (positive terminal)	Idling with warm engine	Pulse generation (see waveform 14)
F1-4 (M-) - F1-6 (ME01)	B - W-B	Throttle actuator operation signal (negative terminal)	Idling with warm engine	Pulse generation (see waveform 15)
A78-1 (FC) - F4-1 (E1)	L - W-B	C/OPN relay operation signal	Engine switch on (IG)	11 to 14 V
A77-14 (DI) - F4-1 (E1)	V - W-B	Fuel pump control (for low pressure)	Engine switch on (IG)	0 to 3 V
A77-17 (FPC) - F4-1 (E1)	P - W-B	Fuel pump control (for low pressure)	Engine stopped, engine switch on (IG)	Below 1.5 V
A77-19 (TC) - F4-1 (E1)	V - W-B	Terminal TC of DLC3	Engine switch on (IG)	11 to 14 V
A78-18 (TACH) - F4-1 (E1)	BE - W-B	Engine speed signal	Idling with warm engine	Pulse generation (see waveform 16)
A78-15 (VPMP) - F4-1 (E1)	W - W-B	Vent valve (built into canister pump module)	Engine switch on (IG)	11 to 14 V
A78-5 (MPMP) - F4-1 (E1)	B - W-B	Leak detection pump (built into canister pump module)	Leak detection pump on	9 to 14 V
A78-27 (PPMP) - F4-1 (E1)	LG - W-B	Canister pressure sensor (built into canister pump module)	Engine switch on (IG)	3.0 to 3.6 V
F2-14 (INJ1) - F4-1 (E1)	P - W-B	Fuel injector assembly (for direct injection) confirmation signal	Idling with warm engine	Pulse generation (see waveform 4)
F2-13 (INJ2) - F4-1 (E1)	LG - W-B	Fuel injector assembly (for direct injection) confirmation signal	Idling with warm engine	Pulse generation (see waveform 4)
F2-16 (INJ3) - F4-1 (E1)	L - W-B	Fuel injector assembly (for direct injection) confirmation signal	Idling with warm engine	Pulse generation (see waveform 4)
F2-15 (INJ4) - F4-1 (E1)	V - W-B	Fuel injector assembly (for direct injection) confirmation signal	Idling with warm engine	Pulse generation (see waveform 4)
F7-10 (FPF1) - F4-1 (E1)	R - W-B	Fuel pump (for high pressure side) (bank 1) signal	Idling with warm engine	Pulse generation (see waveform 17)
F7-11 (FPD) - F4-1 (E1)	W - W-B	Fuel pump (for high pressure side) (bank 1) signal	Idling with warm engine	Pulse generation (see waveform 17)
F7-12 (FPF2) - F4-1 (E1)	GR - W-B	Fuel pump (for high pressure side) (bank 2) signal	Idling with warm engine	Pulse generation (see waveform 17)
F7-13 (FPD2) - F4-1 (E1)	P - W-B	Fuel pump (for high pressure side) (bank 2) signal	Idling with warm engine	Pulse generation (see waveform 17)
F7-29 (PR) - F7-19 (EPR)	R - BR	Fuel pressure sensor signal (for engine control)	Idling with warm engine	0.9 to 1.2 V
F7-28 (VCPR) - F7-19 (EPR)	L - BR	Power source of fuel pressure sensor (specific voltage)	Engine switch on (IG)	4.75 to 5.25 V
A77-31 (NEO) - F4-1 (E1)	B - W-B	Engine speed signal sent to certification ECU (smart key ECU assembly)	Idling with warm engine	Pulse generation (see waveform 20)
A78-26 (RFC) - F4-1 (E1)	G - W-B	Cooling fan control	Engine switch on (IG), A/C switch on (max cool)	Pulse generation (see waveform 21)
A78-13 (CANH) - F4-1 (E1)	R - W-B	CAN communication line	Engine switch on (IG)	Pulse generation (see waveform 18)
A78-11 (CANP) - F4-1 (E1)	L - W-B	CAN communication line	Engine switch on (IG)	Pulse generation (see waveform 18)
A78-9 (CAN+) - F4-1 (E1)	B - W-B	CAN communication line	Engine switch on (IG)	Pulse generation (see waveform 18)

TERMINAL NO. (SYMBOL)	WIRING COLOR	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
A78-14 (CANL) - F4-1 (E1)	B - W-B	CAN communication line	Engine switch on (IG)	Pulse generation (see waveform 19)
A78-12 (CANN) - F4-1 (E1)	B - W-B	CAN communication line	Engine switch on (IG)	Pulse generation (see waveform 19)
A78-10 (CAN-) - F4-1 (E1)	W - W-B	CAN communication line	Engine switch on (IG)	Pulse generation (see waveform 19)
F1-7 (AICV) - F4-1 (E1)	GR - W-B	Vacuum switching valve for air intake control valve operation signal	Engine switch on (IG)	11 to 14 V
A77-25 (SPCN) - F4-1 (E1)	G - W-B	Drive mode switch signal (NORMAL mode)	Engine switch on (IG)	11 to 14 V
			Engine switch on (IG), NORMAL mode switch being pushed and held (NORMAL mode)	Below 1.5 V
A77-21 (PWMS) - F4-1 (E1)	B - W-B	Drive mode switch signal (SPORT mode)	Engine switch on (IG)	11 to 14 V
			Engine switch on (IG), SPORT mode switch being turned and held at SPORT position (SPORT mode)	Below 1.5 V
A77-16 (SNWI) - F4-1 (E1)	P - W-B	SNOW mode switch signal	Engine switch on (IG)	11 to 14 V
			Engine switch on (IG), SNOW mode switch being pushed and held (SNOW mode)	Below 1.5 V
F4-13 (R) - F4-1 (E1)	G - W-B	R shift position switch signal	Engine switch on (IG), shift lever in R	11 to 14 V
			Engine switch on (IG), shift lever not in R	Below 1 V
F4-16 (D) - F4-1 (E1)	R - W-B	D shift position switch signal	Engine switch on (IG), shift lever in D or M	11 to 14 V
			Engine switch on (IG), shift lever not in D or M	Below 1 V
F4-15 (N) - F4-1 (E1)	L - W-B	N shift position switch signal	Engine switch on (IG), shift lever in N	11 to 14 V
			Engine switch on (IG), shift lever not in N	Below 1 V
F4-14 (P) - F4-1 (E1)	W - W-B	Park/Neutral position switch signal	Engine switch on (IG), shift lever in P	11 to 14 V
			Engine switch on (IG), shift lever not in P	Below 1 V
A78-6 (S) - F4-1 (E1)	W - W-B	M shift position switch signal	Engine switch on (IG), shift lever in M	11 to 14 V
			Engine switch on (IG), shift lever not in M	Below 1 V
A78-28 (SFTD) - F4-1 (E1)	R - W-B	Down-shift position switch signal	Engine switch on (IG), shift lever in M	11 to 14 V
			Engine switch on (IG), shift lever "-" position (down shift)	Below 1 V
A78-29 (SFTU) - F4-1 (E1)	Y - W-B	Up-shift position switch signal	Engine switch on (IG), shift lever in M	11 to 14 V
			Engine switch on (IG), shift lever "+" position (up switch)	Below 1 V
F7-9 (EMD1) - F4-1 (E1)	W - W-B	Camshaft timing control motor (bank 1) signal	Idling with warm engine	Pulse generation (see waveform 22)
F2-31 (EMD2) - F4-1 (E1)	P - W-B	Camshaft timing control motor (bank 2) signal	Idling with warm engine	Pulse generation (see waveform 22)
F4-6 (EDT1) - F4-1 (E1)	B - W-B	Camshaft timing control motor (bank 1) signal	Idling with warm engine	Pulse generation (see waveform 23)
F2-12 (EDT2) - F4-1 (E1)	G - W-B	Camshaft timing control motor (bank 2) signal	Idling with warm engine	Pulse generation (see waveform 23)
F7-18 (EMR1) - F4-1 (E1)	P - W-B	Camshaft timing control motor (bank 1) signal	Idling with warm engine	Pulse generation (see waveform 24)
F2-29 (EMR2) - F4-1 (E1)	W - W-B	Camshaft timing control motor (bank 2) signal	Idling with warm engine	Pulse generation (see waveform 24)
F7-8 (EMF1) - F4-1 (E1)	G - W-B	Camshaft timing control motor (bank 1) signal	Idling with warm engine	0.3 to 1.3 V
F2-30 (EMF2) - F4-1 (E1)	B - W-B	Camshaft timing control motor (bank 2) signal	Idling with warm engine	0.3 to 1.3 V
F2-19 (GE01) - F4-1 (E1)	BR - W-B	Shielded earth (ground) circuit of throttle actuator	Always	Below 1 Ω

TERMINAL NO. (SYMBOL)	WIRING COLOR	TERMINAL DESCRIPTION	CONDITION	SPECIFIED CONDITION
F1-6 (ME01) - Body ground	W-B - -	Ground	Always	Below 1 Ω
A77-1 (EC) - Body ground	W-B - -	Ground	Always	Below 1 Ω
F4-1 (E1) - Body ground	W-B - -	Ground	Always	Below 1 Ω
F2-2 (E01) - Body ground	W-B - -	Ground	Always	Below 1 Ω
F2-1 (E02) - Body ground	W-B - -	Ground	Always	Below 1 Ω
F4-3 (E04) - Body ground	W-B - -	Ground	Always	Below 1 Ω
F7-1 (E05) - Body ground	W-B - -	Ground	Always	Below 1 Ω

*: The ECM terminal voltage is constant regardless of the output voltage from the sensor.

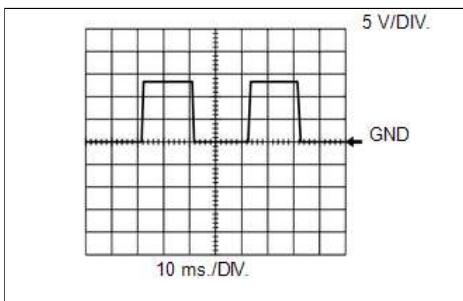
WAVEFORM 1



Camshaft Timing Oil Control Valve Assembly Operation Signal

ECM Terminal Name	Between OE1+ and OE1-, or OE2+ and OE2-
Tester Range	5 V/DIV., 1 ms./DIV.
Condition	Idling

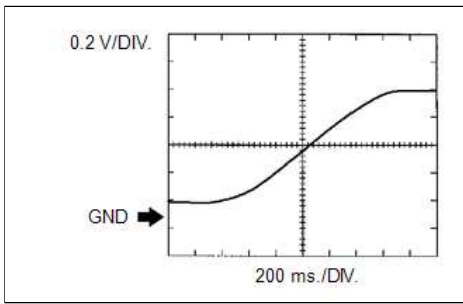
WAVEFORM 2



Air Fuel Ratio Sensor (Sensor 1) Heater Operation Signal

ECM Terminal Name	Between HA1A and E04, or HA2A and E05
Tester Range	5 V/DIV., 10 ms./DIV.
Condition	Idling

WAVEFORM 3



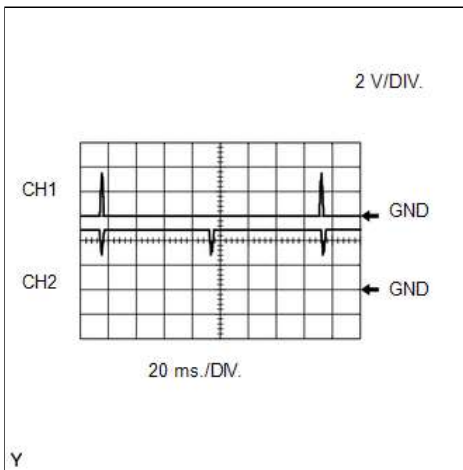
Heated Oxygen Sensor (Sensor 2) Signal

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

HINT:

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

WAVEFORM 4



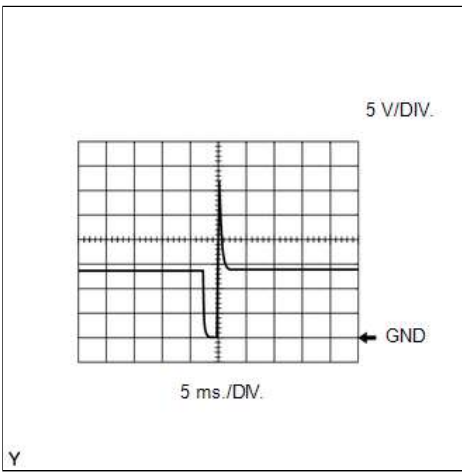
Fuel Injector Assembly (for Direct Injection) Signal and Injection Confirmation Signal

ECM Terminal Name	CH1: Between #1 or #6 and E1 CH2: Between INJ1 and E1
	CH1: Between #4 or #7 and E1 CH2: Between INJ2 and E1
	CH1: Between #5 or #8 and E1 CH2: Between INJ3 and E1
	CH1: Between #2 or #3 and E1 CH2: Between INJ4 and E1
Tester Range	2 V/DIV, 20 ms./DIV.
Condition	Idling with warm engine

HINT:

- The wavelength becomes shorter as the engine speed increases.
- When the direct injection injectors are operating, Direct is displayed for Injection Way of the Data List.

WAVEFORM 5



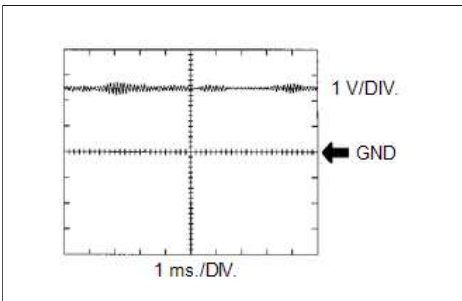
Fuel Injector Assembly (for Port Injection) Signal

ECM Terminal Name	Between #10 (to #80) and E01
Tester Range	5 V/DIV, 5 ms./DIV.
Condition	Idling, engine coolant temperature 60°C or less

HINT:

- The wavelength becomes shorter as the engine speed increases.
- When the port injection injectors are operating, Port is displayed for Injection Way of the Data List.

WAVEFORM 6



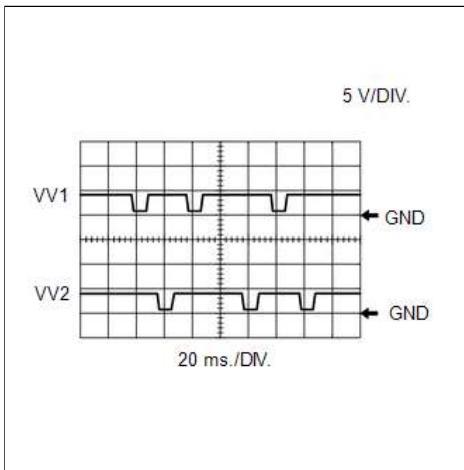
Knock Control Sensor Signal

ECM Terminal Name	Between KNK1 and EKNK Between KNK2 and EKN2 Between KNK3 and EKN3 Between KNK4 and EKN4
Tester Range	1 V/DIV, 1 ms./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 differ slightly depending on the vehicle condition.

WAVEFORM 7



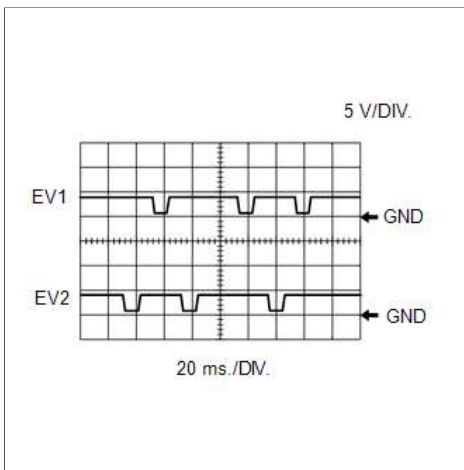
VVT Sensor (for Intake Camshaft) Signal

ECM Terminal Name	Between VV1+ and VV1- Between VV2+ and VV2-
Tester Range	5 V/DIV., 20 ms./DIV.
Condition	Idling with warm engine

HINT:

The wavelength becomes shorter as the engine speed increases.

WAVEFORM 8



VVT Sensor (for Exhaust Camshaft) Signal

ECM Terminal Name	Between EV1+ and EV1- Between EV2+ and EV2-
Tester Range	5 V/DIV., 20 ms./DIV.
Condition	Idling with warm engine

HINT:

The wavelength becomes shorter as the engine speed increases.

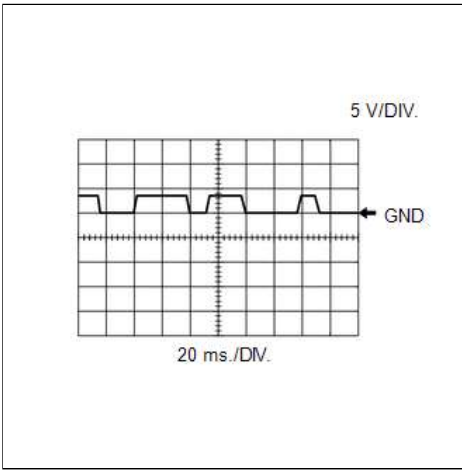
WAVEFORM 9

Camshaft Position Sensor Signal

ECM Terminal Name	Between G2+ and G2-
Tester Range	5 V/DIV., 20 ms./DIV.
Condition	Idling with warm engine

HINT:

The wavelength becomes shorter as the engine speed increases.



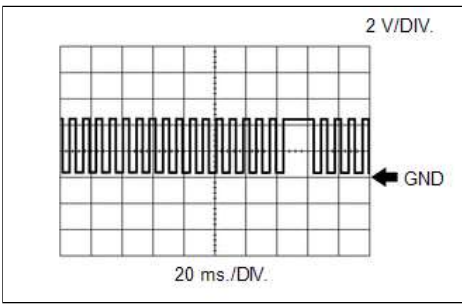
WAVEFORM 10

Crankshaft Position Sensor Signal

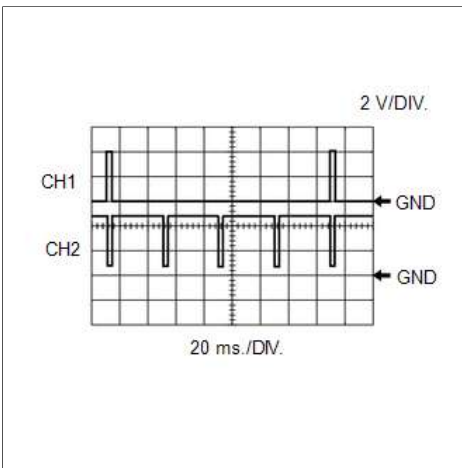
ECM Terminal Name	Between NE+ and NE-
Tester Range	2 V/DIV, 20 ms./DIV.
Condition	Idling with warm engine

HINT:

The wavelength becomes shorter as the engine speed increases.



WAVEFORM 11



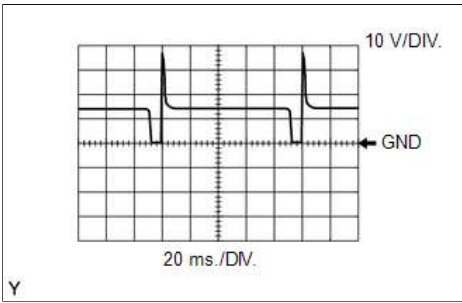
Ignition Coil Assembly Signal (IGT and IGF Signal)

ECM Terminal Name	CH1: IGT1, 4, 6 or 7 and E1 CH2: IGF1 and E1
	CH1: IGT2, 3, 5 or 8 and E1 CH2: IGF2 and E1
Tester Range	2 V/DIV, 20 ms./DIV.
Condition	Idling with warm engine

HINT:

The wavelength becomes shorter as the engine speed increases.

WAVEFORM 12



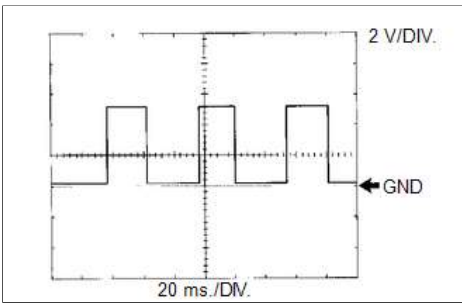
Purge VSV Operation Signal

ECM Terminal Name	Between PRG and E1
Tester Range	10 V/DIV, 20 ms./DIV.
Condition	Idling, under purge control

HINT:

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

WAVEFORM 13



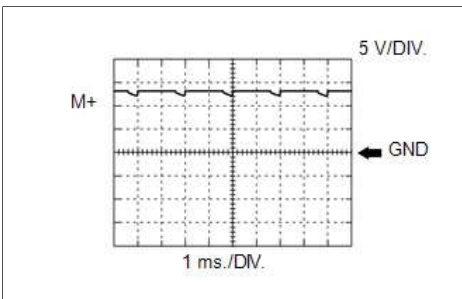
Vehicle Speed Signal

ECM Terminal Name	Between SPD and E1
Tester Range	2 V/DIV, 20 ms./DIV.
Condition	Driving at 20 km/h (12 mph)

HINT:

The wavelength becomes shorter as the vehicle speed increases.

WAVEFORM 14



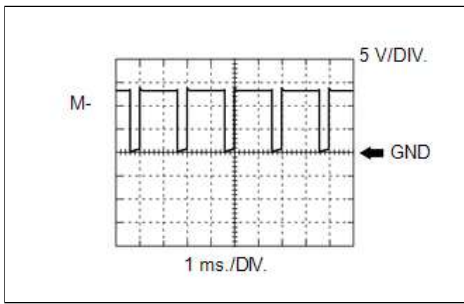
Throttle Actuator Positive Terminal Signal

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

HINT:

The duty ratio varies depending on the throttle actuator operation.

WAVEFORM 15



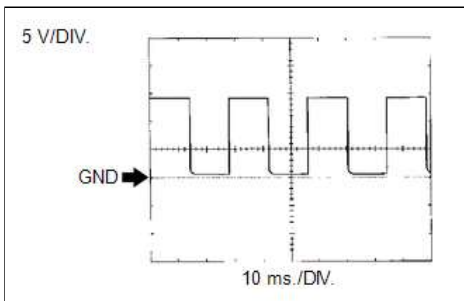
Throttle Actuator Negative Terminal Signal

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

HINT:

The duty ratio varies depending on the throttle actuator operation.

WAVEFORM 16



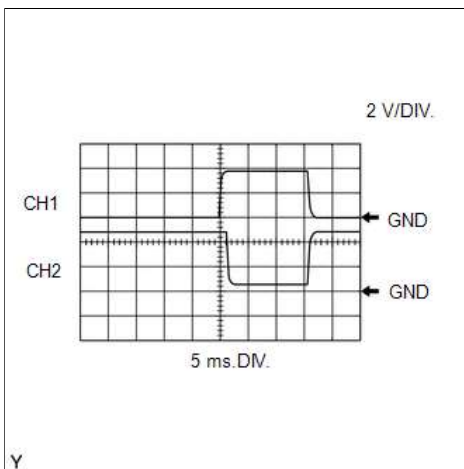
Engine Speed Signal

ECM Terminal Name	Between TACH and E1
Tester Range	5 V/DIV, 10 ms./DIV.
Condition	Idling with warm engine

HINT:

The wavelength becomes shorter as the engine speed increases.

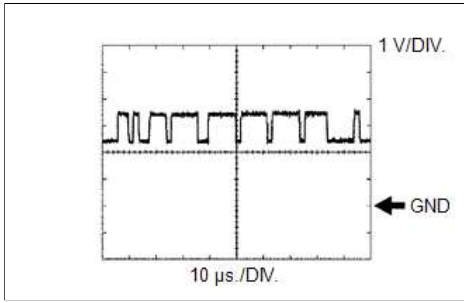
WAVEFORM 17



Fuel Pump for High Pressure Side Signal (Spill Control Valve)

ECM Terminal Name	CH1: Between FPD and E1 CH2: Between FPF1 and E1
	CH1: Between FPD2 and E1 CH2: Between FPF2 and E1
Tester Range	2 V/DIV, 5 ms./DIV.
Condition	Idling with warm engine

WAVEFORM 18



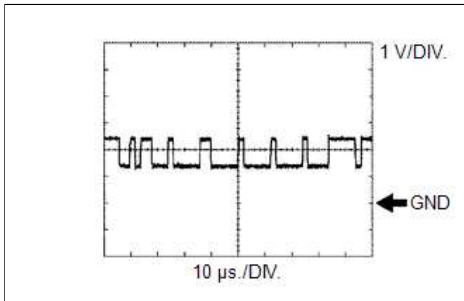
CAN Communication Signal (Reference)

ECM Terminal Name	Between CANH and E1 Between CANP and E1 Between CAN+ and E1
Tester Range	1 V/DIV, 10 μs./DIV.
Condition	Engine switch on (IG)

HINT:

The waveform varies depending on the CAN communication signal.

WAVEFORM 19



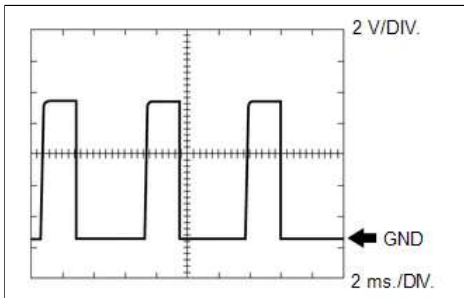
CAN Communication Signal (Reference)

ECM Terminal Name	Between CANL and E1 Between CANN and E1 Between CAN- and E1
Tester Range	1 V/DIV, 10 μs./DIV.
Condition	Engine switch on (IG)

HINT:

The waveform varies depending on the CAN communication signal.

WAVEFORM 20



Engine Speed Signal

ECM Terminal Name	Between NEO and E1
Tester Range	2 V/DIV, 2 ms./DIV.
Condition	Idling with warm engine

HINT:

The wavelength becomes shorter as the engine speed increases.

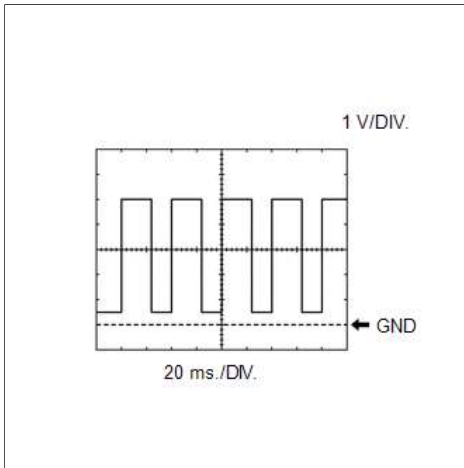
WAVEFORM 21

Cooling Fan Control Signal

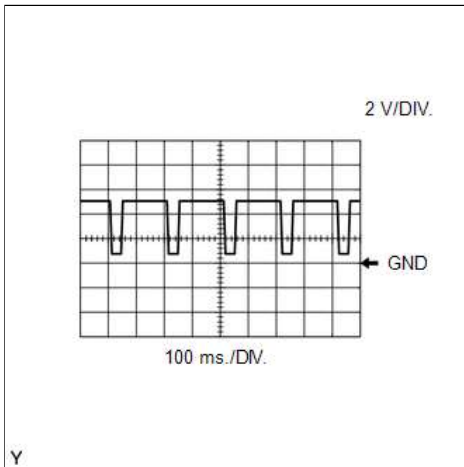
ECM Terminal Name	Between RFC and E1
Tester Range	1 V/DIV., 20 ms./DIV.
Condition	Engine switch on (IG), A/C switch on (max cool)

HINT:

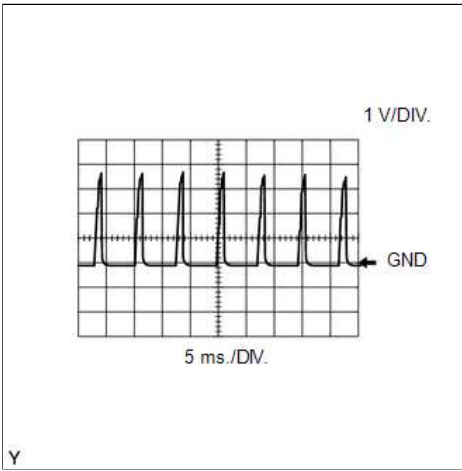
The duty ratio varies depending on the engine coolant temperature.

**WAVEFORM 22****Camshaft Timing Control Motor EMD Signal**

ECM Terminal Name	Between EMD1 and E1
	Between EMD2 and E1
Tester Range	2 V/DIV., 100 ms./DIV.
Condition	Idling with warm engine

**WAVEFORM 23****Camshaft Timing Control Motor EDT Signal**

ECM Terminal Name	Between EDT1 and E1
	Between EDT2 and E1
Tester Range	1 V/DIV., 5 ms./DIV.
Condition	Idling with warm engine



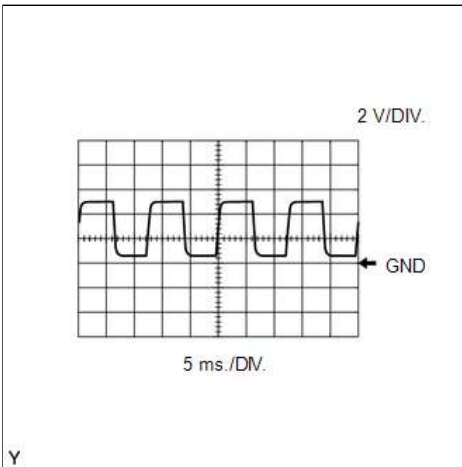
WAVEFORM 24

Camshaft Timing Control Motor EMR Signal

ECM Terminal Name	Between EMR1 and E1
	Between EMR2 and E1
Tester Range	2 V/DIV, 5 ms./DIV.
Condition	Idling with warm engine

HINT:

The wavelength becomes shorter as the engine speed increases.



WAVEFORM 25

Mass Air Flow Meter Sub-assembly Signal

ECM Terminal Name	Between VG and E2G
Tester Range	1 V/DIV, 100 μ s./DIV.
Condition	Engine switch on (IG)

