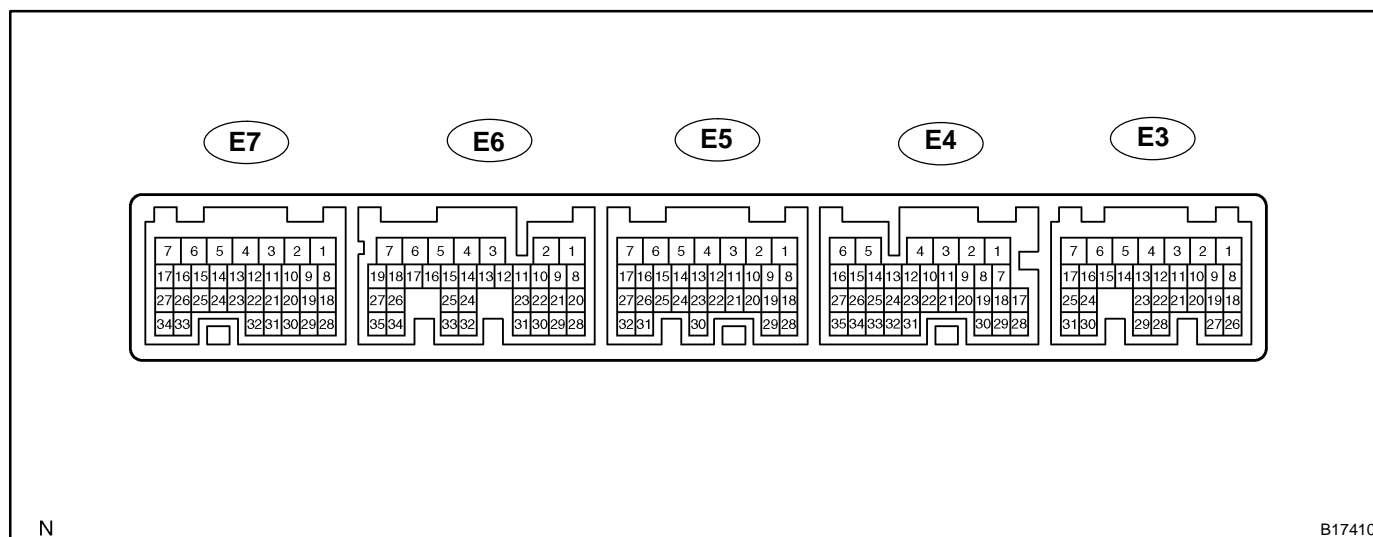


TERMINALS OF ECM



N

B17410

Each ECM terminals' standard voltage is shown in the table below. In the table, first follow the information under "Condition".

Look under "Symbols (Terminals No.)" for the terminals to be inspected.

The standard voltage between the terminals is shown under "STD Voltage".

Use the illustration above as a reference for the ECM terminals.

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage
BATT (E3-3) – E1 (E5-1)	B-R – BR*2 B-Y – BR*3	Always	9 to 14 V
+BM (E3-7) – E1 (E5-1)	G-Y – BR*2 W-G – BR*3		
IGSW (E3-9) – E1 (E5-1)	B-O – BR	IG switch ON	9 to 14 V
+B (E3-1) – E1 (E5-1)	W-L – BR*2 B-R – BR*3		
+B2 (E3-2) – E1 (E5-1)	W-L – BR*2 B-R – BR*3		
MREL (E3-8) – E1 (E5-1)	GR-G – BR*2 B-W – BR*3	IG switch ON	9 to 14 V
VC (E7-23) – E2 (E7-28)	G-B – B-W	IG switch ON	4.5 to 5.5 V
VG (E7-30) – E2G (E7-29)	R-Y – B-Y	Idling, P or N position, A/C switch OFF	0.5 to 3.0 V
THA (E7-22) – E2 (E7-28)	Y-G – B-W	Idling, Intake air temp. 20°C (68°F)	0.5 to 3.4 V
THW (E7-21) – E2 (E7-28)	G – B-W	Idling, Engine coolant temp. 80°C (176°F)	0.2 to 1.0 V
VTA1 (E7-20) – E2 (E7-28)	GR – B-W	IG switch ON, Accelerator pedal released	0.5 to 1.2 V
		IG switch ON, Accelerator pedal depressed	3.2 to 4.8 V
VTA2 (E7-19) – E2 (E7-28)	P-L – B-W	IG switch ON, Accelerator pedal released	2.0 to 3.1 V
		IG switch ON, Accelerator pedal depressed	4.7 to 5.1 V
VPA (E3-18) – E2 (E7-28)	R-G – B-W	IG switch ON, Accelerator pedal released	0.3 to 0.9 V
		IG switch ON, Accelerator pedal depressed	3.2 to 4.8 V
VPA2 (E3-19) – E2 (E7-28)	L – B-W	IG switch ON, Accelerator pedal released	1.8 to 2.7 V
		IG switch ON, Accelerator pedal depressed	4.7 to 5.1 V
VCPA (E3-26) – EPA (E3-20)	P-G – V-R*2 P-G – V*3	IG switch ON	4.5 to 5.5 V

VCP2 (E3-27) – EPA2 (E3-21)	G – R – LG – R	IG switch ON	4.5 to 5.5 V
#10 (E5-2) – E01 (E7-7)	R – W – B	IG switch ON	9 to 14 V
#20 (E5-3) – E01 (E7-7)	W – W – B		
#30 (E5-4) – E01 (E7-7)	G – W – B	Idling	Pulse generation (See waveform 1)
#40 (E5-5) – E01 (E7-7)	R – B – W – B		
#50 (E5-6) – E01 (E7-7)	L – W – B		
#60 (E5-7) – E01 (E7-7)	Y – W – B		
#70 (E7-3) – E01 (E7-7)	L – R – W – B		
#80 (E7-2) – E01 (E7-7)	R – W – W – B		
KNK1 (E6-29) – EKNK (E6-28)	G – R	Maintain engine speed at 4,000 rpm after warming up	Pulse generation (See waveform 2)
KNK2 (E6-21) – EKN2 (E6-20)	W – B		
OC1+ (E5-17) – OC1– (E5-16)	G – B – L – Y	Accelerate slowly after engine warmed-up	Pulse generation (See waveform 3)
OC2+ (E5-15) – OC2– (E5-14)	P – L – W – R	Accelerate slowly after engine warmed-up	Pulse generation (See waveform 3)
VV1+ (E5-25) – VV1– (E5-24)	G – L	Idling	Pulse generation (See waveform 4)
VV2+ (E5-18) – VV2– (E5-28)	W – B	Idling	Pulse generation (See waveform 4)
G2+ (E5-19) – G2– (E5-29)	Y – L	Idling	Pulse generation (See waveform 5)
NE+ (E5-21) – NE– (E5-20)	G – L	Idling	Pulse generation (See waveform 5)
PRG (E7-34) – E1 (E5-1)	W – G – BR	IG switch ON	9 to 14 V
SPD (E4-8) – E1 (E5-1)	G – O – BR	IG switch ON, Rotate driving wheel slowly	Pulse generation (See waveform 6)
M+ (E7-5) – E1 (E5-1)	R – BR	Idling	Pulse generation (See waveform 7)
M– (E7-4) – E1 (E5-1)	W – BR	Idling	Pulse generation (See waveform 8)
FPR (E5-30) – E1 (E5-1)	R – G – BR	IG switch ON	0 to 3.0 V
FC (E3-10) – E1 (E5-1)	Y – BR	IG switch ON	9 to 14 V
IGT1 (E7-8) – E1 (E5-1)	L – Y – BR	Idling	Pulse generation (See waveform 9)
IGT2 (E7-15) – E1 (E5-1)	LG – B – BR		
IGT3 (E7-11) – E1 (E5-1)	L – BR		
IGT4 (E7-10) – E1 (E5-1)	G – R – BR		
IGT5 (E7-13) – E1 (E5-1)	W – R – BR		
IGT6 (E7-12) – E1 (E5-1)	V – BR		
IGT7 (E7-14) – E1 (E5-1)	P – BR		
IGT8 (E7-9) – E1 (E5-1)	LG – BR		
IGF1 (E7-24) – E1 (E5-1)	L – B – BR	IG switch ON	4.5 to 5.5 V
IGF2 (E7-25) – E1 (E5-1)	L – W – BR	Idling	Pulse generation (See waveform 9)
A1A+ (E6-22) – E1 (E5-1)	G – BR	Always (Ignition switch ON)	3.3 V*1
A1A– (E6-30) – E1 (E5-1)	L – BR	Always (Ignition switch ON)	3.0 V*1
A2A+ (E6-23) – E1 (E5-1)	V – BR	Always (Ignition switch ON)	3.3 V*1
A2A– (E6-31) – E1 (E5-1)	P – BR	Always (Ignition switch ON)	3.0 V*1
HT1B (E7-1) – E1 (E5-1)	R – L – BR	Idling	Below 3.0 V
HT2B (E6-5) – E1 (E5-1)	Y – B – BR	IG switch ON	9 to 14 V
OX1B (E7-18) – E2 (E7-28)	B – B – W	Idling	Pulse generation (See waveform 10)

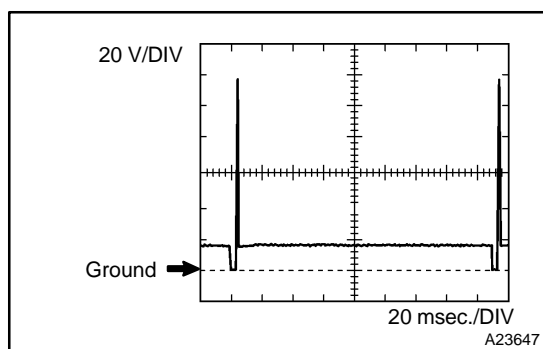
DIAGNOSTICS – ENGINE (2UZ-FE)

OX2B (E6-33) – E2 (E7-28)	W – B-W	Idling	Pulse generation (See waveform 10)
STP (E3-15) – E1 (E5-1)	G-W – BR* ² W-R – BR* ³	Brake pedal is depressed	7.5 to 14 V
		Brake pedal is released	Below 1.5 V
ST1- (E3-16) – E1 (E5-1)	B – BR* ² G – BR* ³	Brake pedal is depressed	Below 1.5 V
		Brake pedal is released	7.5 to 14 V
STA (E5-11) – E1 (E5-1)	P – BR	Shift lever position P or N, Ignition switch START	6.0 V or more
STSW (E5-12) – E1 (E5-1)	R-L – BR	Shift lever position P or N, ignition switch START	6.0 V or more
NSW (E6-8) – E1 (E5-1)	L-R – BR	IG switch ON, Other shift position in P, N	9 to 14 V
		IG switch ON, Shift position in P, N	0 to 3.0 V
W (E4-30) – E1 (E5-1)	V-G – BR	Idling	9 to 14 V
		IG switch ON	Below 3.0 V
TACH (E4-1) – E1 (E5-1)	L-W – BR* ² B – BR* ³	Idling	Pulse generation (See waveform 11)
ACIS (E7-33) – E1 (E5-1)	G-W – BR	IG switch ON	9 to 14 V
VPMP (E3-5) – E1 (E5-1)	L-B – BR	Ignition switch ON	9 V to 14 V
MPMP (E3-6) – E1 (E5-1)	R-W – BR	• Vacuum pump OFF	0 V to 3 V
		• Vacuum pump ON	9 V to 14 V
PPMP (E3-22) – E1 (E5-1)	L-W – BR	Ignition switch ON	3 V to 3.6 V
AIV1 (E7-27) – E1 (E5-1)	B-L – BR	Ignition switch ON	9 to 14 V
AIV2 (E7-26) – E1 (E5-1)	G-Y – BR	Ignition switch ON	9 to 14 V
AIRV (E3-4) – E1 (E5-1)	G-B – BR	Ignition switch ON	9 to 14 V
AIRP (E3-25) – E1 (E5-1)	P – BR	Ignition switch ON	9 to 14 V
AIP (E7-32) – E1 (E5-1)	W-L – BR	Ignition switch ON	3 V to 3.6 V

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

*2: Access Cab, Standard Cab

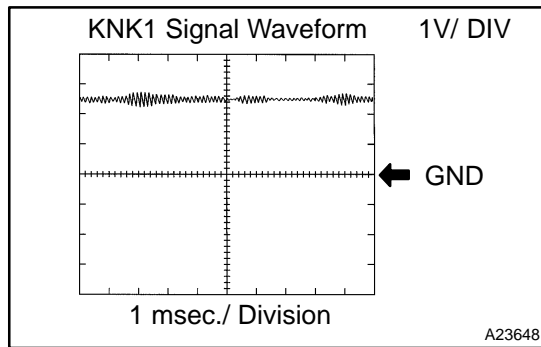
*3: Double Cab

**WAVEFORM 1****Fuel injector**

ECM Terminal Names	Between #10 (to 40) and E01
Tester Ranges	20 V/DIV, 20 msec./DIV
Conditions	Idling

HINT:

The wavelength becomes shorter as the engine rpm increases.

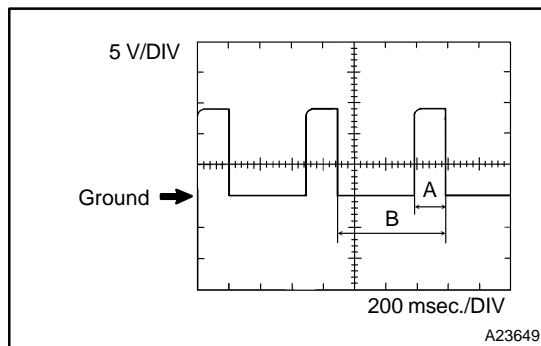
**WAVEFORM 2**

Knock sensor

ECM Terminal Name	Between KNK1 and EKNK Between KNK2 and EKN2
Tester Range	1 V/DIV, 1 msec./DIV
Condition	Maintain engine RPM at 2,000 rpm after engine warmed-up

HINT:

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

**WAVEFORM 3**

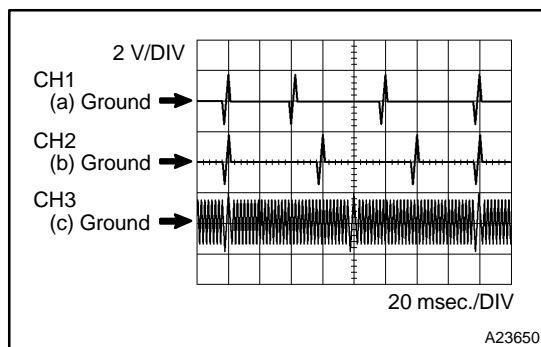
VVT OCV

ECM Terminal Name	Between OC1+ and OC1– Between OC2+ and OC2–
Tester Range	0.2 V/DIV, 200 msec./DIV
Condition	Accelerate slowly after engine warmed-up

HINT:

In the DATA LIST, the items VVT OCV DUTY B1 and B2 show the duty ratio of voltage flowing to the OCV (see illustration on left).

$$\text{VVT OCV DUTY B1, B2} = \frac{A}{B} \times 100 (\%)$$

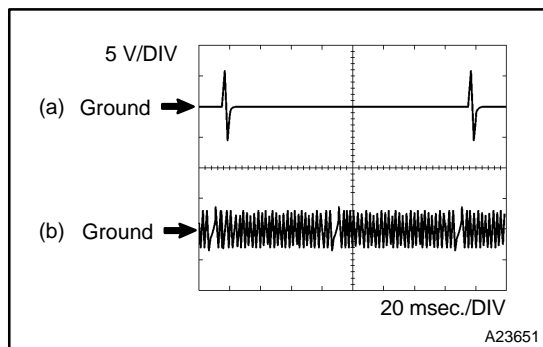
**WAVEFORM 4**

- VVT sensor bank 1
- VVT sensor bank 2
- Crankshaft position sensor

ECM Terminal Name	(a) Between VV1+ and VV1– (b) Between VV2+ and VV2– (c) Between NE+ and NE–
Tester Range	2 V/DIV, 20 msec./DIV
Condition	Idle after engine warmed-up

HINT:

The wavelength becomes shorter as the engine rpm increases.

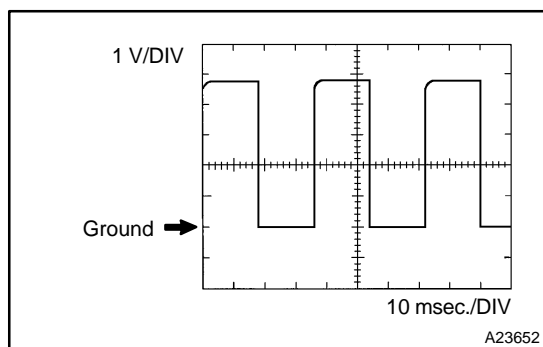
**WAVEFORM 5**

- (a) Camshaft position sensor
(b) Crankshaft position sensor

ECM Terminal Name	(a) Between G2+ and G2- (b) Between NE+ and NE-
Tester Range	5 V/DIV, 20 msec./DIV
Condition	Idle after engine warmed-up

HINT:

The wavelength becomes shorter as the engine rpm increases.

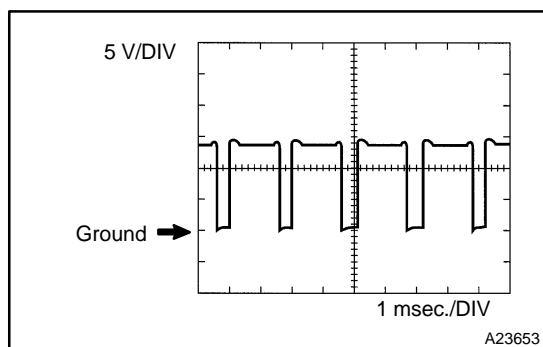
**WAVEFORM 6**

Vehicle speed signal

ECM Terminal Name	Between SP2+ and SP2-
Tester Range	5 V/DIV, 10 msec./DIV
Condition	Driving by 40 km/h (25 mph)

HINT:

The wavelength becomes shorter as vehicle speed increases.

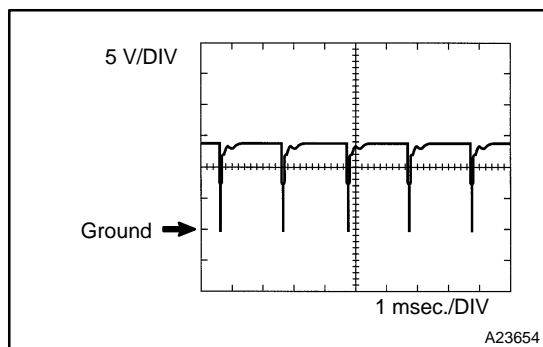
**WAVEFORM 7**

Throttle actuator positive terminal

ECM Terminal Name	Between M+ and ME01
Tester Range	5 V/DIV, 1 msec./DIV
Condition	Idle after engine warmed-up

HINT:

The duty ratio varies depending on the throttle opening operation.

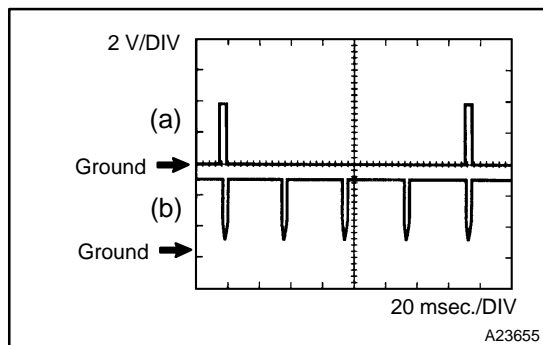
**WAVEFORM 8**

Throttle actuator negative terminal

ECM Terminal Name	Between M- and ME01
Tester Range	5 V/DIV, 1 msec./DIV
Condition	Idle after engine warmed-up

HINT:

The duty ratio varies depending on the throttle opening operation.

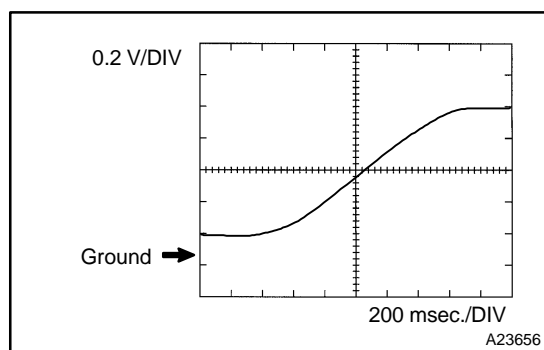
**WAVEFORM 9**

- (a) Igniter IGT signal (from ECM to igniter)
(b) Igniter IGF signal (from igniter to ECM)

ECM Terminal Name	(a) Between IGT1 (to IGT8) and E1 (b) Between IGF1 (IGF2) and E1
Tester Range	2 V/DIV, 20 msec./DIV
Condition	Idling

HINT:

The wavelength becomes shorter as vehicle speed increases.

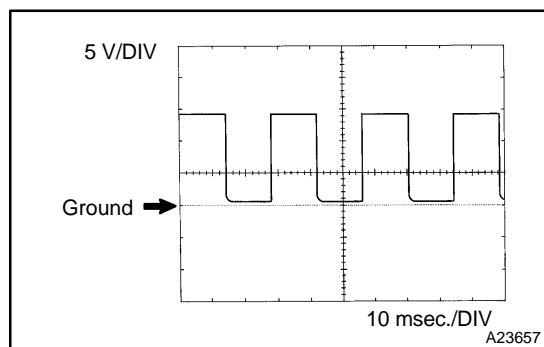
**WAVEFORM 10**

Heated oxygen sensor

ECM Terminal Names	Between OX1B and E2
Tester Ranges	0.2 V/DIV, 200 msec./DIV
Conditions	Engine speed maintained 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.

**WAVEFORM 11**

Engine speed signal

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

HINT:

The wavelength becomes shorter as vehicle speed increases.