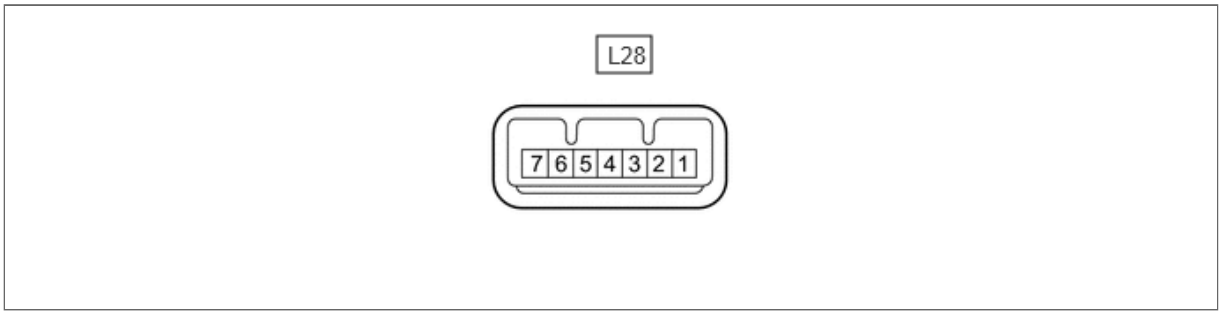
CHECK TRANSPONDER KEY AMPLIFIER



a. Disconnect the L28 transponder key amplifier connector.

b. Measure the resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

Terminal No. (Symbol)	Input/Output	Wiring Color	Terminal Description	Condition	Specified Condition	Related Data List Item/DTC
L28-7 (AGND) - Body ground	-	W-B - Body ground	Ground	Always	Below 1 Ω	-

c. Reconnect the L28 transponder key amplifier connector.

d. Measure the voltage and check for pulses according to the value(s) in the table below.

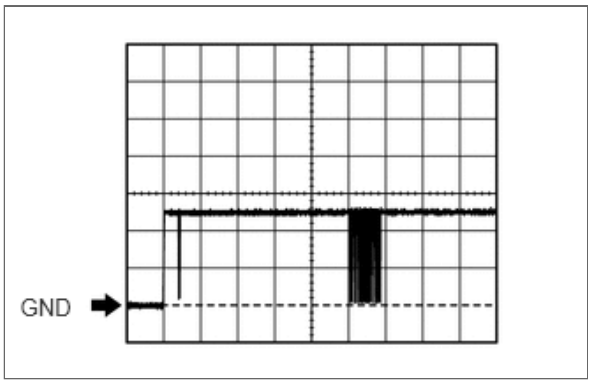
Tester Connection	Input/Output	Wiring Color	Terminal Description	Condition	Specified Condition	Related Data List Item/DTC
L28-1 (VC5) - L28-7 (AGND)	Input	L-R - W-B	Power source	No key in ignition key cylinder	Below 1 V	-
				Key inserted in ignition key cylinder	4.6 to 5.4 V	
L28-4 (CODE) - L28-7 (AGND)	Output	L-B - W-B	Demodulated signal of key code data	No key in ignition key cylinder	Below 1 V	-
				Key inserted in ignition key cylinder	Pulse generation (See waveform 1)	
L28-5 (TXCT) - L28-7 (AGND)	Input	R-Y - W-B	Key code output signal	No key in ignition key cylinder	Below 1 V	-
				Key inserted in ignition key cylinder	Pulse generation (See waveform 2)	

e. Inspect using an oscilloscope.

NOTICE:

The waveform shown in the illustration is an example for reference only. Noise, chattering, etc. are not shown.

i.

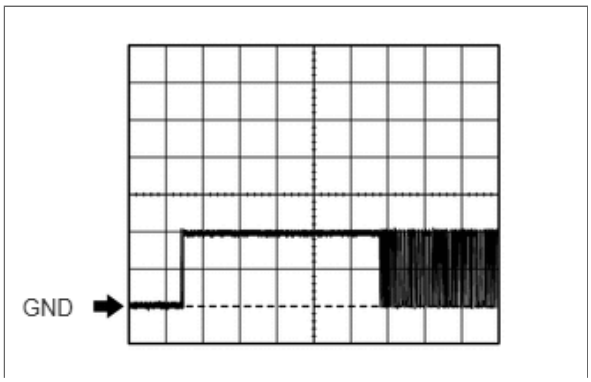


Waveform 1 (Reference)

Measurement Condition

Item	Content
Tester Connection	L28-4 (CODE) - L28-7 (AGND)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Key inserted in ignition key cylinder

ii.

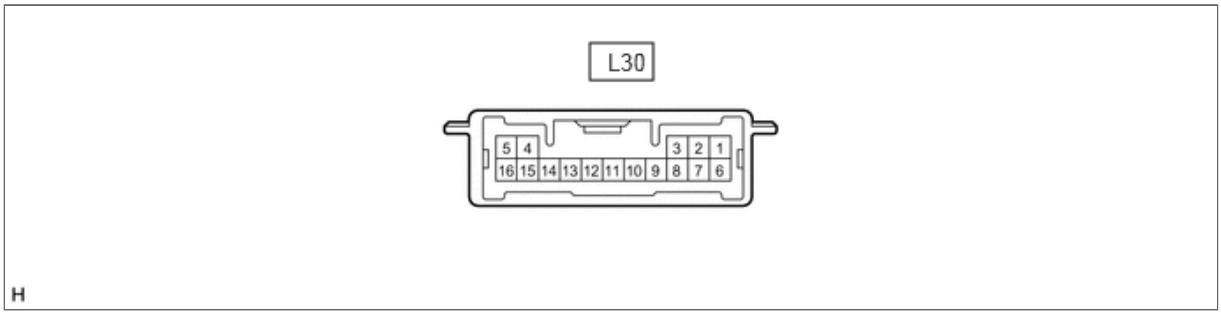


Waveform 2 (Reference)

Measurement Condition

Item	Content
Tester Connection	L28-5 (TXCT) - L28-7 (AGND)
Tool Setting	2 V/DIV., 10 ms./DIV.
Condition	Key inserted in ignition key cylinder

CHECK TRANSPONDER KEY ECU ASSEMBLY



a. Disconnect the L30 transponder key ECU assembly connector.

b. Measure the resistance and voltage according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

Terminal No. (Symbol)	Input/Output	Wiring Color	Terminal Description	Condition	Specified Condition	Related Data List Item/DTC
L30-1 (+B) - L30-16 (GND)	Input	P - W-B	Battery	Always	11 to 14 V	+B
L30-2 (IG) - L30-16 (GND)	Input	B-Y - W-B	Ignition switch signal	Ignition switch off	Below 1 V	IG SW
				Ignition switch ON	11 to 14 V	
L30-3 (KSW) - L30-16 (GND)	Input	B-R - W-B	Unlock warning switch signal	No key in ignition key cylinder	10 kΩ or higher	· B2780 · Key SW
				Key inserted in ignition key cylinder	Below 1 Ω	
L30-7 (CTY) - L30-16 (GND)	Input	B-W - W-B	Front door courtesy light switch (for Driver Side)	Driver door closed	10 kΩ or higher	-
				Driver door open	Below 1 Ω	
L30-16 (GND) - Body ground	-	W-B - Body ground	Ground	Always	Below 1 Ω	-

c. Reconnect the L30 transponder key ECU assembly connector.

d. Measure the voltage and check for pulses according to the value(s) in the table below.

Terminal No. (Symbol)	Input/Output	Wiring Color	Terminal Description	Condition	Specified Condition	Related Data List Item/DTC
L30-8 (IND) - L30-16 (GND)	Output	G-R - W-B	Security indicator signal	Immobiliser system set	Pulse generation	Immobiliser
				Immobiliser system unset	Below 1 V	
L30-9 (D) - L30-16 (GND)	Input/Output	W - W-B	DLC3 communication	Without communication	Below 1 V	-
				During communication	Pulse generation	
L30-14 (VC5) - L30-5 (AGND)	Output	L-R - W-B	Transponder key amplifier power source	No key in ignition key cylinder	Below 1 V	-
				Key inserted in ignition key cylinder	4.6 to 5.4 V	
L30-15 (CODE) - L30-5 (AGND)	Input	L-B - W-B	Transponder key amplifier communication signal	No key in ignition key cylinder	Below 1 V	-
				Key inserted in ignition key cylinder	Pulse generation (See waveform 1)	
L30-4 (TXCT) - L30-5 (AGND)	Output	R-Y - W-B	Transponder key amplifier communication signal	No key in ignition key cylinder	Below 1 V	-
				Key inserted in ignition key cylinder	Pulse generation (See waveform 2)	

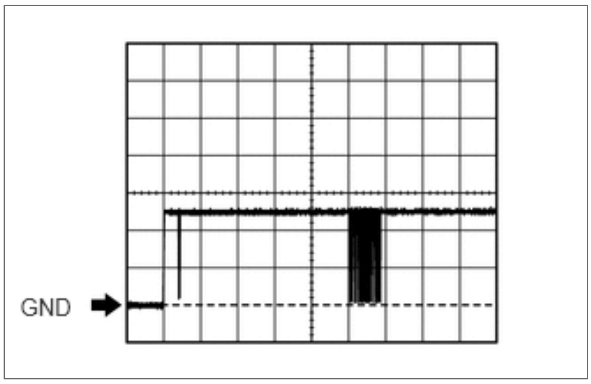
Terminal No. (Symbol)	Input/Output	Wiring Color	Terminal Description	Condition	Specified Condition	Related Data List Item/DTC
L30-12 (EFII) - L30-16 (GND)	Input	G - W-B	ECM input signal	Within 3 seconds of starter operation and initial combustion, or within 3 seconds of ignition switch first being turned to ON after cable disconnected and reconnected to negative (-) battery terminal	Pulse generation Pulse generation	-
L30-13 (EFIO) - L30-16 (GND)	Output	G-Y - W-B	ECM output signal	Ignition switch off	Below 1 V	-
				Within 3 seconds of starter operation and initial combustion, or within 3 seconds of ignition switch first being turned to ON after cable disconnected and reconnected to negative (-) battery terminal	Pulse generation (See waveform 4)	

e. Using an oscilloscope, check the waveform.

NOTICE:

The waveform shown in the illustration is an example for reference only. Noise, chattering, etc. are not shown.

i.

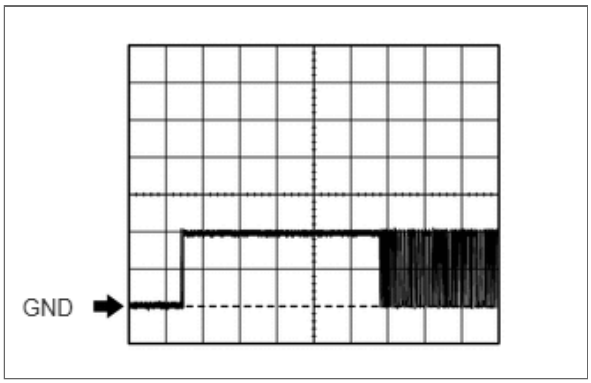


Waveform 1 (Reference)

Measurement Condition

Item	Content
Tester Connection	L30-15 (CODE) - L30-5 (AGND)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Key inserted in ignition key cylinder

ii.

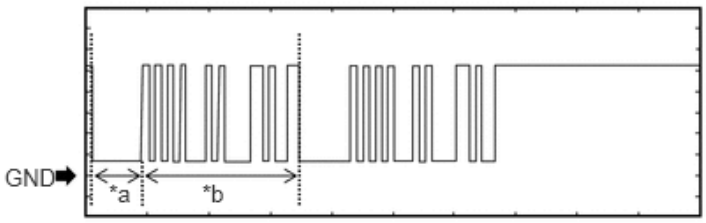


Waveform 2 (Reference)

Measurement Condition

Item	Content
Tester Connection	L28-5 (TXCT) - L28-7 (AGND)
Tool Setting	2 V/DIV., 10 ms./DIV.
Condition	Key inserted in ignition key cylinder

iii. Waveform 3 (Reference)

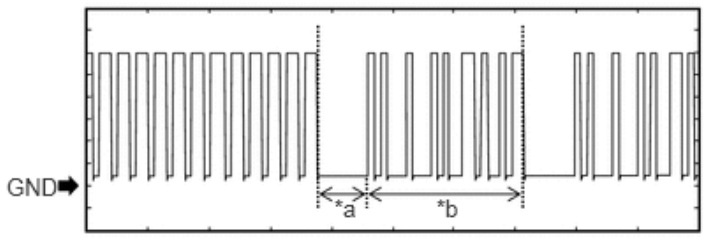


*a	Approximately 160 ms	*b	Approximately 510 ms

Measurement Condition

Item	Content
Tester Connection	L30-12 (EFII) - L30-16 (GND)
Tool Setting	2 V/DIV., 200 ms./DIV.
Condition	Within 3 seconds of starter operation and initial combustion, or within 3 seconds of ignition switch first being turned to ON after cable disconnected and reconnected to negative (-) battery terminal

iv. Waveform 4 (Reference)

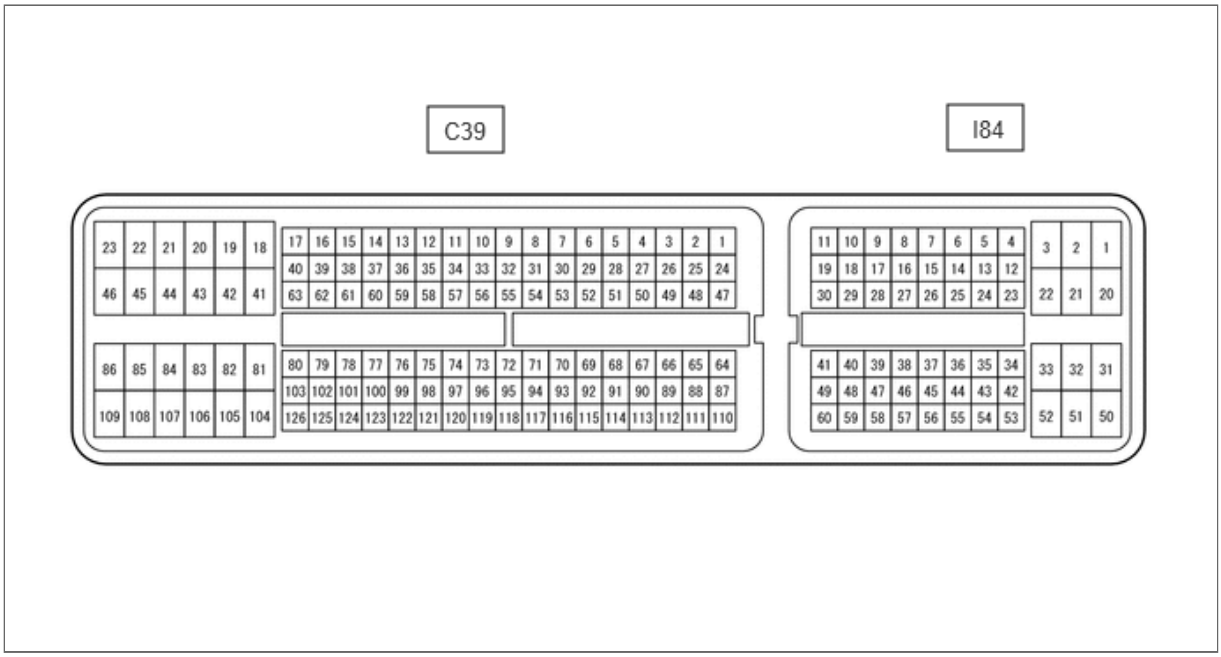


*a	Approximately 160 ms	*b	Approximately 510 ms

Measurement Condition

Item	Content
Tester Connection	L30-13 (EFIO) - L30-16 (GND)
Tool Setting	2 V/DIV., 200 ms./DIV.
Condition	Within 3 seconds of starter operation and initial combustion, or within 3 seconds of ignition switch first being turned to ON after cable disconnected and reconnected to negative (-) battery terminal

CHECK ECM (for 1GR-FE)



a. Measure the voltage and check for pulses according to the value(s) in the table below.

Terminal No. (Symbol)	Input/Output	Wiring Color	Terminal Description	Condition	Specified Condition	Related Data List Item / DTC
I84-10 (IMO) - C39-81 (E1)	Output	G - BR	Transponder key ECU assembly communication output	Within 3 seconds of starter operation and initial combustion, or within 3 seconds of ignition switch first being turned to ON after cable disconnected and reconnected to negative (-) battery terminal	Pulse generation (See waveform 1)	-
I84-11 (IMI) - C39-81 (E1)	Input	G-Y - BR	Transponder key ECU assembly communication input	Ignition switch off	Below 1 V	-

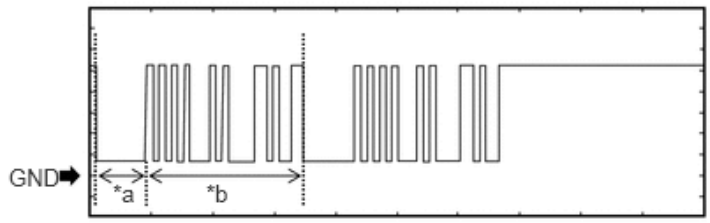
Terminal No. (Symbol)	Input/Output	Wiring Color	Terminal Description	Condition	Specified Condition	Related Data List Item / DTC
				Within 3 seconds of starter operation and initial combustion, or within 3 seconds of ignition switch first being turned to ON after cable disconnected and reconnected to negative (-) battery terminal	Pulse generation (See waveform 2)	-

b. Using an oscilloscope, check the waveform.

NOTICE:

The waveform shown in the illustration is an example for reference only. Noise, chattering, etc. are not shown.

i. Waveform 3 (Reference)

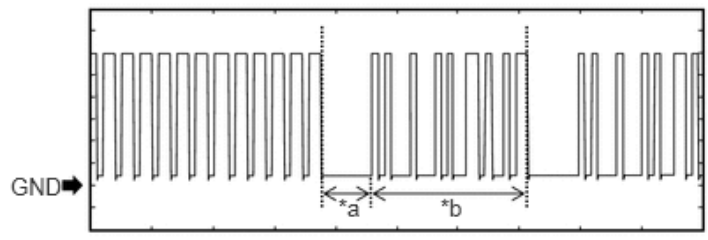


*a	Approximately 160 ms	*b	Approximately 510 ms

Measurement Condition

Item	Content
Tester Connection	I84-10 (IMO) - C39-81 (E1)
Tool Setting	2 V/DIV., 200 ms./DIV.
Condition	Within 3 seconds of starter operation and initial combustion, or within 3 seconds of ignition switch first being turned to ON after cable disconnected and reconnected to negative (-) battery terminal

ii. Waveform 4 (Reference)

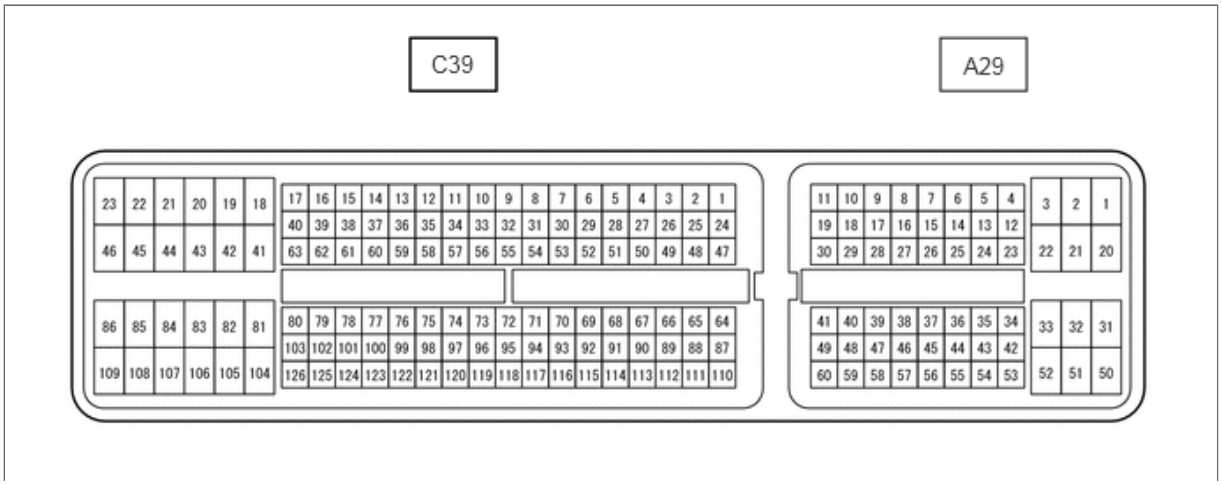


*a	Approximately 160 ms	*b	Approximately 510 ms

Measurement Condition

Item	Content
Tester Connection	I84-11 (IMI) - C39-81 (E1)
Tool Setting	2 V/DIV., 200 ms./DIV.
Condition	Within 3 seconds of starter operation and initial combustion, or within 3 seconds of ignition switch first being turned to ON after cable disconnected and reconnected to negative (-) battery terminal

CHECK ECM (for 1VD-FTV)



a. Measure the voltage and check for pulses according to the value(s) in the table below.

Terminal No. (Symbol)	Input/Output	Wiring Color	Terminal Description	Condition	Specified Condition	Related Data List Item / DTC
A29-10 (IMO) - C39-81 (E1)	Output	G - BR	Transponder key ECU assembly communication output	Within 3 seconds of starter operation and initial combustion, or within 3 seconds of ignition switch first being turned to ON after cable disconnected and reconnected to negative (-) battery terminal	Pulse generation (See waveform 1)	-
A29-11 (IMI) - C39-81 (E1)	Input	G-Y - BR	Transponder key ECU assembly communication input	Ignition switch off	Below 1 V	-

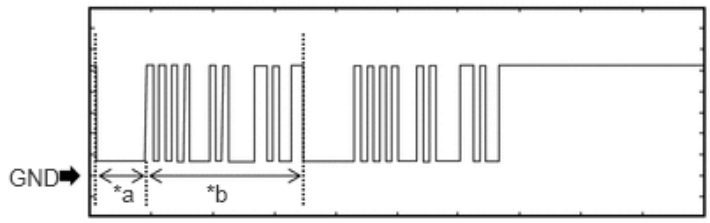
Terminal No. (Symbol)	Input/Output	Wiring Color	Terminal Description	Condition	Specified Condition	Related Data List Item / DTC
				Within 3 seconds of starter operation and initial combustion, or within 3 seconds of ignition switch first being turned to ON after cable disconnected and reconnected to negative (-) battery terminal	Pulse generation (See waveform 2)	-

b. Using an oscilloscope, check the waveform.

NOTICE:

The waveform shown in the illustration is an example for reference only. Noise, chattering, etc. are not shown.

i. Waveform 3 (Reference)

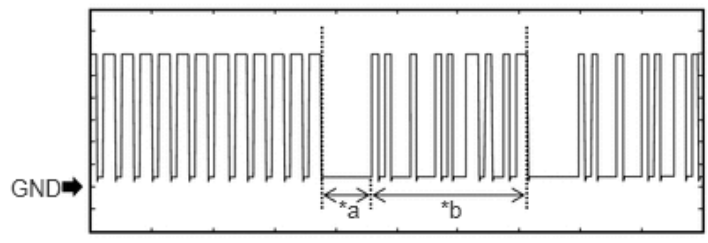


*a	Approximately 160 ms	*b	Approximately 510 ms

Measurement Condition

Item	Content
Tester Connection	A29-10 (IMO) - C39-81 (E1)
Tool Setting	2 V/DIV., 200 ms./DIV.
Condition	Within 3 seconds of starter operation and initial combustion, or within 3 seconds of ignition switch first being turned to ON after cable disconnected and reconnected to negative (-) battery terminal

ii. Waveform 4 (Reference)



*a	Approximately 160 ms	*b	Approximately 510 ms

Measurement Condition

Item	Content
Tester Connection	A29-11 (IMI) - C39-81 (E1)
Tool Setting	2 V/DIV., 200 ms./DIV.
Condition	Within 3 seconds of starter operation and initial combustion, or within 3 seconds of ignition switch first being turned to ON after cable disconnected and reconnected to negative (-) battery terminal