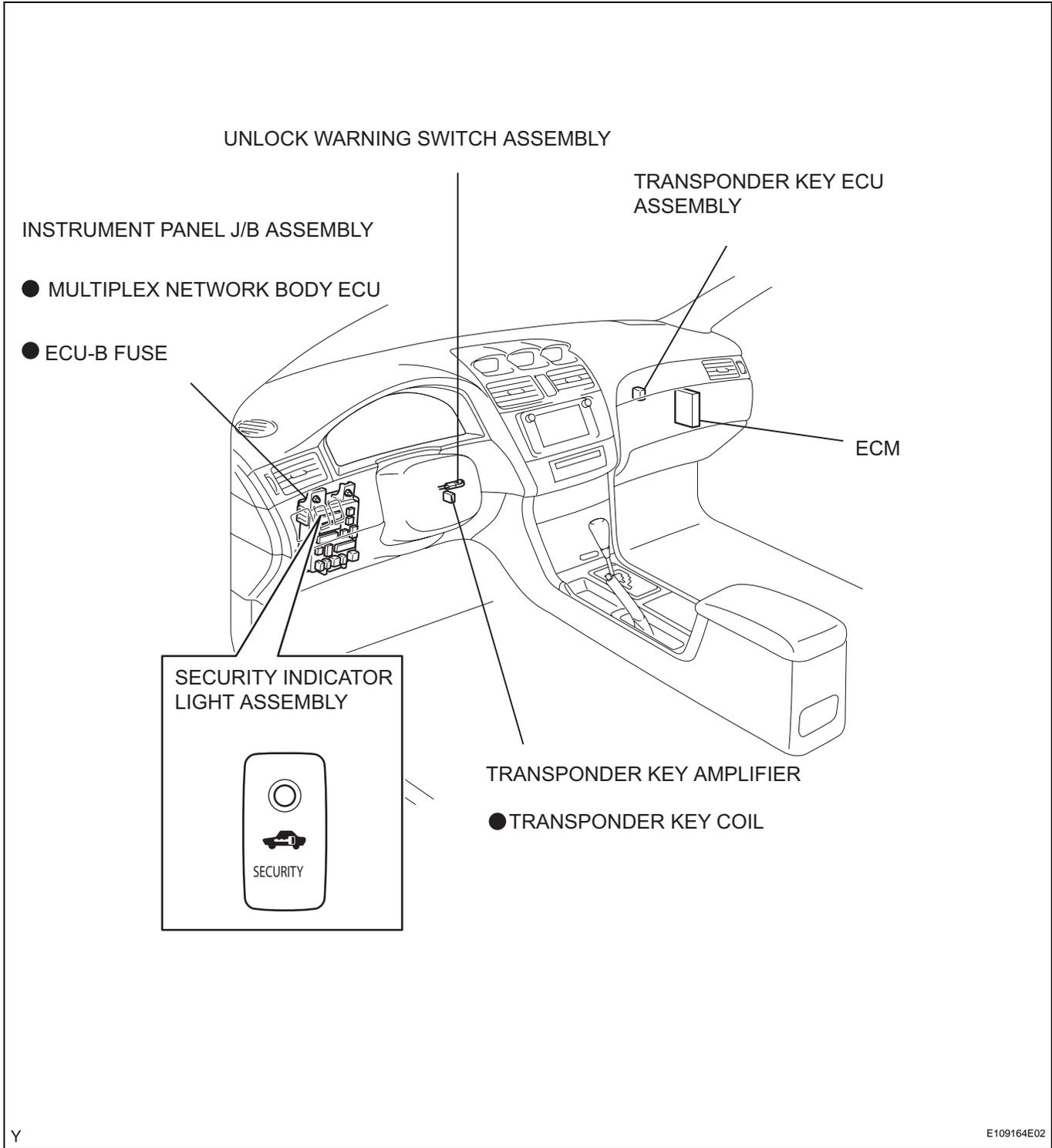
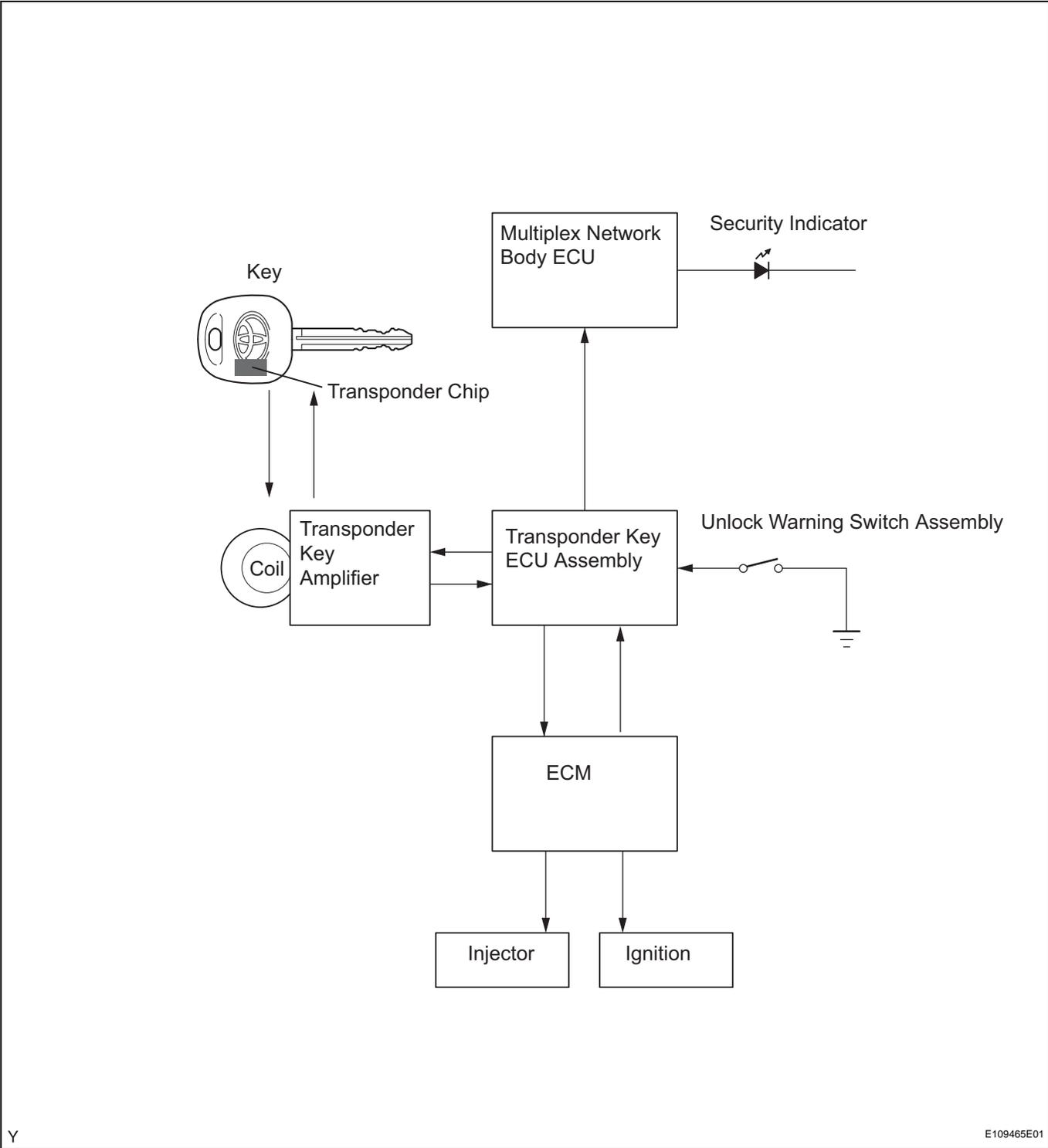


# PARTS LOCATION



# SYSTEM DIAGRAM



EI

## SYSTEM DESCRIPTION

### 1. ENGINE IMMOBILIZER SYSTEM DESCRIPTION

- The engine immobilizer system is designed to prevent the vehicle from being stolen. This system uses a transponder key ECU that stores the key codes of authorized ignition keys. If an attempt is made to start the engine using an unauthorized key, the ECU sends a signal to the ECM to prohibit fuel delivery and ignition, effectively disabling the engine.
- When the ECU detects that the unlock warning switch is ON, the ECU provides current to the transponder key coil and produces a faint electric wave. A transponder chip in the key grip receives the faint electric wave. Upon receiving the faint electric wave, the transponder chip outputs a key ID code signal. The transponder key coil receives this signal, the transponder key amplifier amplifies it, and then the signal is transmitted to the ECU. The ECU matches the key's ID code with the vehicle's ID code, which was previously registered in the ECU and then communicates the results to the ECM using the SFI communication.
- After the identification results show that the key's ID code matches the vehicle's ID code and the ECU has confirmed their match: 1) the immobilizer system is canceled and the engine starting controls (fuel injection control and ignition control) enter standby mode; and 2) the ECU transmits a security indicator signal that communicates "indicator OFF" to the multiplex network body ECU. Then, the multiplex network body ECU turns OFF the security indicator lamp.

## REGISTRATION

### HINT:

The key has 2 codes: the key code (immobilizer code), the wireless code (recognition code). Both of these codes need to be registered. Refer to the following pages for key code registration procedures and refer to page for the wireless code registration procedures.

### 1. DESCRIPTION OF CODE REGISTRATION

- (a) When adding master keys and sub-keys (additional registration).

- (1) Register the key code in the transponder key ECU.

Target ECU	See Procedure
Transponder key ECU	Procedure "A"

- (b) When replacing the transponder key ECU (new registration).

- (1) Register the key code in the transponder key ECU.

Target ECU	See Procedure
Transponder key ECU	Procedure "B"

- (2) Register the ECU COMMUNICATION ID between the ECM and the transponder key ECU.

Target ECU	See Procedure
ECM	Procedure "C"

- (c) When replacing the ECM.

- (1) Register the ECU COMMUNICATION ID between the ECM and the transponder key ECU.

Target ECU	See Procedure
Transponder key ECU	Procedure "C"

### 2. KEY REGISTRATION IN AUTOMATIC REGISTRATION (PROCEDURE "B")

- (a) When an ignition key is inserted into the ignition key cylinder, the key code registration is automatic. In this mode, a maximum of 4 key codes for 3 master keys and 1 sub-key can be registered. Any order of registration for the master keys and sub-key is fine because the transponder key ECU can distinguish between different types of keys.

#### HINT:

- When a new transponder key ECU is installed, key codes must be registered in the transponder key ECU.
- New transponder key ECUs are automatically set to automatic key code registration mode.

**Automatic Key Code Registration (New Registration)**

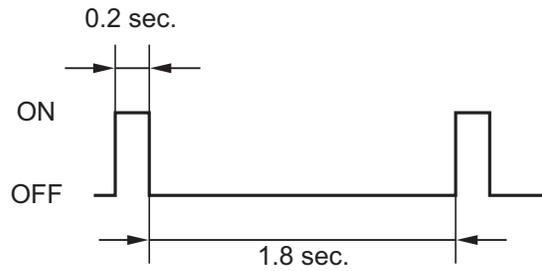
Procedure	Security Indicator Condition
1. START (Procedure "D")	BLINKING HINT: Until the first key is inserted.
2. Insert the ignition key cylinder.	ON
3. Registration begins. HINT: The registration is completed approx. 1 second after the key is inserted.	OFF HINT: Approx. 1 second.
4. Remove the key.	ON HINT: When the maximum number of key codes are registered, the security indicator remains OFF until the last key registered is removed. After it is removed, the security indicator starts blinking.
5. Register another key? Yes: Go to procedure "D" No: Go to procedure "E"	
6. END (Procedure "E")	

**HINT:**

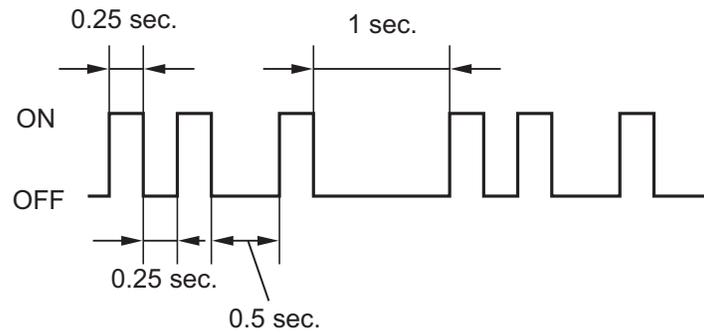
- When no key is inserted in the key cylinder in automatic key code registration mode, the security indicator remains ON.
- When the immobilizer system is operating normally and the key is pulled out, the security indicator blinks continuously.
- If the key code registration has failed in automatic key code registration mode, code 2-1 will be output from the security indicator. Trying to re-register an already registered key will cause code 2-2 to be output when the key is inserted. If the number of registered key codes exceeds the limit, code 2-3 will be output from the security indicator. The output details are shown below.

Security Indicator:

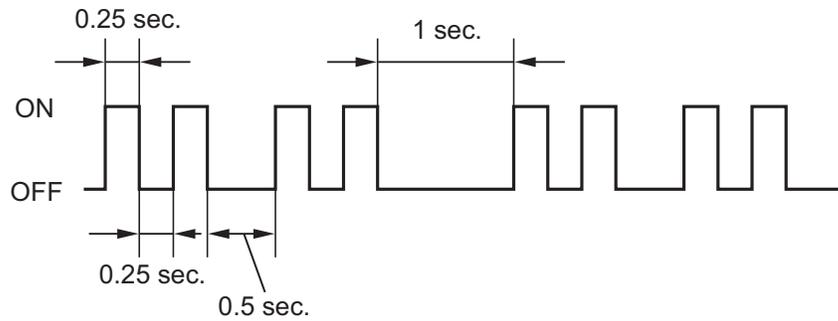
Normal (Immobiliser system is operating normally)



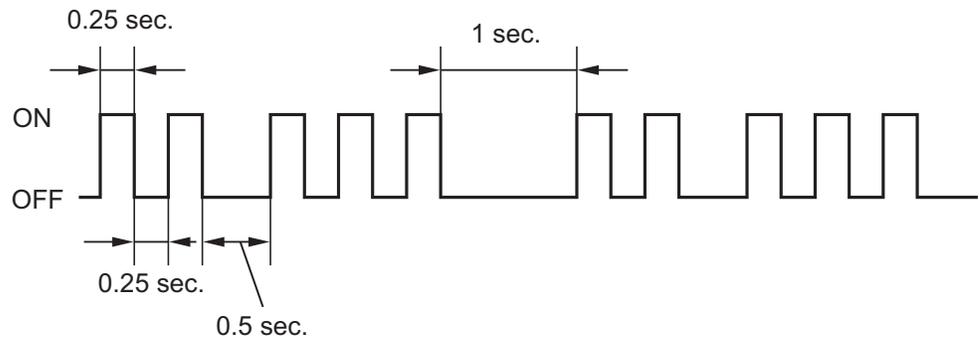
Code 2 - 1



Code 2 - 2



Code 2 - 3



N

B111593E01

EI

- (b) Finish the automatic key code registration mode. The automatic key code registration mode can be forced to end when at least 1 key code for the master key has been registered.

- (1) Turn the ignition switch ON and OFF 5 times within 10 seconds using the already registered master key.

### 3. REGISTRATION OF ADDITIONAL KEY (PROCEDURE "A")

- (a) Register an additional key by the intelligent tester.

**HINT:**

- A maximum of 5 master key codes and 3 sub-key codes can be registered.
- Registration mode will end if each step is not completed within the specified time.
- When the ignition cylinder or the key cylinder set is replaced, remove the transmitter module from the original master key. Then install this transmitter module to a new key and use the new key as the master key. If necessary, use this master key to register other key.

**NOTICE:**

**When the ignition key cylinder has been replaced, locking and unlocking doors is possible with the new master key's transmitter module (taken from the original master key). However, the new master key will not be able to lock and unlock doors through the door key cylinder. Keep the original master key. If the new master key's transmitter module's battery fails, the original master key can be used to lock and unlock doors through the door key cylinder.**

#### Additional Registration

Procedure	Time (Operation completion time)	Security Indicator Condition
1. START		
2. Insert the already registered master key in the ignition key cylinder and turn the ignition switch ON.	-	BLINKING HINT: Until the first key is inserted.
3. Intelligent tester operation. (1) Select IMMOBILIZER (2) Select ID UTILITY (3) Select TRANS CODE REG HINT: After the above operation, proceed to the next step according to the prompts on the tester screen.	Within 120 sec.	OFF
4. Remove the master key.	Within 20 sec. HINT: After the tester instruction.	ON
5. Insert the key to be registered in the ignition key cylinder.	Within 10 SEC.	
6. After 60 seconds, the key is registered. HINT: The security indicator turns off.		BLINKING
7. Next		OFF
8. END		

## HINT:

- A brief outline of the procedures for key code registration is shown above. For more detailed information, please refer to the intelligent tester screen's instructions.
- When the immobilizer system is operating normally and the key is pulled out, the security indicator blinks continuously.
- If the key code registration has failed in automatic key code registration mode, code 2-1 will be output from the security indicator. Try to re-register an already registered key will cause code 2-2 to be output when the key is inserted. If the number of registered key codes exceeds the limit, code 2-3 will be output from the security indicator. The output details are shown in procedure "B".

**4. ERASURE OF KEY CODE**

- (a) Erase key codes using the intelligent tester.

## HINT:

- All key codes are erased except for the master key, which is used for erasing the key codes. In order to use a key whose code has been erased, a new key code must be registered.
- Registration will be cancelled if each step is not completed within the specified time.

**Erasing Key Code**

Procedure	Time (Operation completion time)	Security Indicator Condition
1. START		BLINKING
2. Insert the already registered master key in the ignition key cylinder and turn the ignition switch ON.	-	HINT: Until the first key is inserted.
3. Intelligent tester operation. (1) Select IMMOBILIZER (2) Select ID UTILITY (3) Select TRANS CODE ERS HINT: After the above operation, proceed to the next step in accordance with the tester screen's instructions.	Within 120 sec.	OFF
4. Remove the master key.	Within 10 sec. HINT: After the tester instruction.	ON for 1 second then OFF.
5. Next	-	BLINKING
6. END		

## HINT:

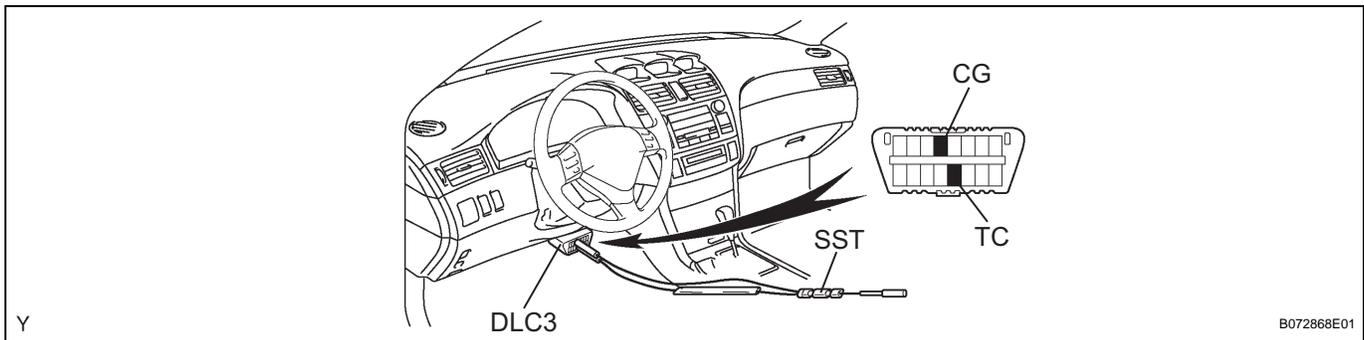
- A brief outline of the procedures for key code erasure is shown above. For more detailed information, please refer to the intelligent tester screen's instructions.
- When the immobilizer system is operating normally and the key is pulled out, the security indicator blinks continuously.

## 5. ECU COMMUNICATION ID REGISTRATION (PROCEDURE "C")

### NOTICE:

- The ECU communication ID should be registered when the transponder key ECU and/or the ECM is replaced in order to match the ECM COMMUNICATION ID.
- The engine cannot be started unless the ECM COMMUNICATION ID matches.

(a) Register the ECU communication ID



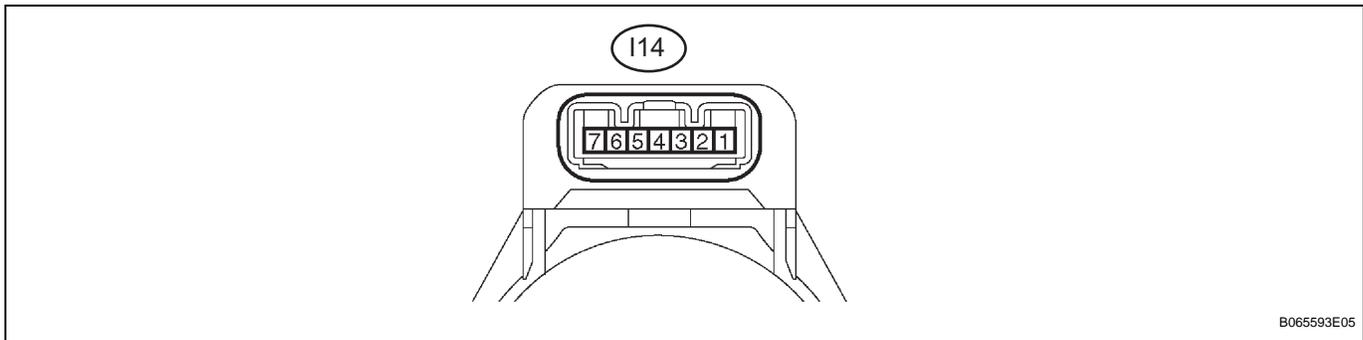
- (1) Using SST, connect terminals TC and CG of the DLC3  
**SST 09843-18040**
- (2) Turn the ignition switch ON (do not start the engine) and leave it as is for 30 minutes.
- (3) Turn the ignition switch OFF and disconnect terminals TC and CG.
- (4) Check that the engine starts.

**PROBLEM SYMPTOMS TABLE**

Symptom	Suspected area	See page
Engine does not start	1. ECU power source circuit	<a href="#">EI-37</a>
	2. Transponder key ECU assembly	<a href="#">EI-37</a>

## TERMINALS OF ECU

### 1. CHECK TRANSPONDER KEY AMPLIFIER



- (a) Disconnect the I14 amplifier connector.
- (b) Measure the resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND (I14-7) - Body ground	BR-R* 1- Body ground	Ground	Always	Below 1 $\Omega$
GND (I14-7) - Body ground	BR* 2- Body ground	Ground	Always	Below 1 $\Omega$

If the result is not as specified, there may be a malfunction on the wire harness side.

\* 1: Coupe

\* 2: Convertible

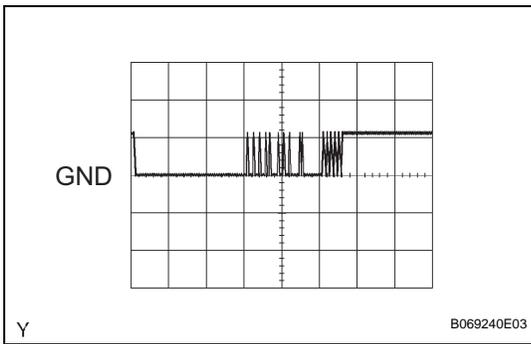
- (c) Reconnect the I14 amplifier connector.
- (d) Measure the resistance and voltage of the connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
VC5 (I14-1) - GND (I14-7)	Y-B* 1- BR-R	Power source	1: No key in ignition key cylinder → 2: Key inserted	1: 0 V → 2: 4.6 to 5.4 V
VC5 (I14-1) - GND (I14-7)	R-L* 2- BR-R	Power source	1: No key in ignition key cylinder → 2: Key inserted	1: 0 V → 2: 4.6 to 5.4 V
CODE(I14-4) - GND (I14-7)	Y* 1- BR-R	Demodulated signal of key code data	1: No key in ignition key cylinder → 2: Key inserted	Pulse generation (see waveform 1)
CODE(I14-4) - GND (I14-7)	G-W* 2- BR-R	Demodulated signal of key code data	1: No key in ignition key cylinder → 2: Key inserted	Pulse generation (see waveform 1)
TXCT (I14-5) - GND (I14-7)	Y-R* 1- BR-R	Key code output signal	1: No key in ignition key cylinder → 2: Key inserted	Pulse generation (see waveform 2)
TXCT (I14-5) - GND (I14-7)	L-Y* 2- BR-R	Key code output signal	1: No key in ignition key cylinder → 2: Key inserted	Pulse generation (see waveform 2)
GND (I14-7) - Body ground	BR-R* 1- Body ground	Ground	Always	Below 1 $\Omega$
GND (I14-7) - Body ground	BR* 2- Body ground	Ground	Always	Below 1 $\Omega$

If the result is not as specified, there may be a malfunction on the amplifier.

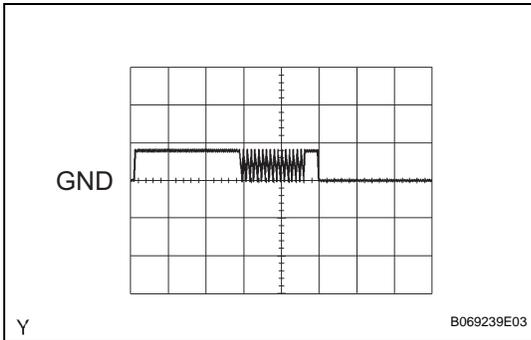
\* 1: Coupe

\* 2: Convertible



- (e) Inspect using an oscilloscope.  
 (1) Waveform 1 (Reference)

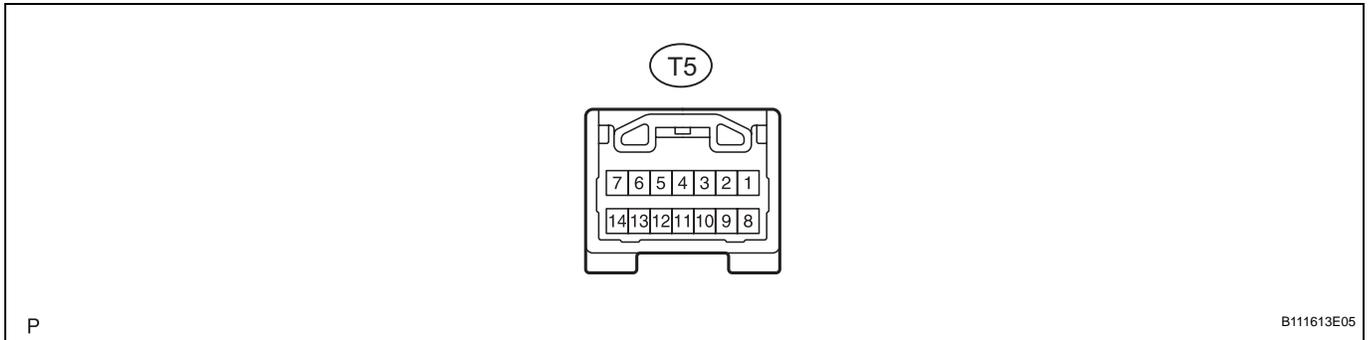
Terminal	CODE - GND
Tool Setting	5 V/DIV., 20 ms/DIV.
Condition	1: No key in ignition key cylinder → 2: Key inserted



- (2) Waveform 2 (Reference)

Terminal	TXCT - GND
Tool Setting	5 V/DIV., 20 ms/DIV.
Condition	1: No key in ignition key cylinder → 2: Key inserted

**2. CHECK TRANSPONDER KEY ECU ASSEMBLY**



- (a) Disconnect the T5 ECU connector.  
 (b) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (T5-13) - Body ground	BR-R* 1- Body ground	Ground	Always	Below 1 Ω
AGND (T5-13) - Body ground	BR* 2- Body ground	Ground	Always	Below 1 Ω
+B (T5-1) - GND (T5-14)	B-O - W-B	Battery	Always	10 to 14 V
IG (T5-2) - AGND (T5-13)	B-O - BR-R* 1	Ignition switch	Ignition switch 1: OFF → 2: Key inserted	1: 0 V → 2: 10 to 14 V
IG (T5-2) - AGND (T5-13)	B-O - BR* 2	Ignition switch	Ignition switch 1: OFF → 2: Key inserted	1: 0 V → 2: 10 to 14 V
KSW (T5-10) - AGND (T5-13)	L - BR-R* 1	Unlock warning switch	1: No key in ignition key cylinder → 2: Key inserted	1: 10 kΩ or higher → 2: Below 1 Ω
KSW (T5-10) - AGND (T5-13)	L - BR* 2	Unlock warning switch	1: No key in ignition key cylinder → 2: Key inserted	1: 10 kΩ or higher → 2: Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

\* 1: Coupe

\* 2: Convertible

(c) Reconnect the T5 ECU connector.

(d) Measure the voltage of the connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
VC5 (T5-8) - AGND (T5-13)	Y-B* 1- BR-R* 1	Power source	Ignition switch 1: OFF → 2: ON	1: 0 V → 2: 4.6 to 5.4 V
VC5 (T5-8) - AGND (T5-13)	R-L* 2- BR* 2	Power source	Ignition switch 1: OFF → 2: ON	1: 0 V → 2: 4.6 to 5.4 V
TXCT (T5-12) - AGND (T5-13)	Y-R* 1- BR-R* 1	Transponder key amplifier communication signal	Ignition switch 1: OFF → 2: ON	Pulse generation (see waveform 1)
TXCT (T5-12) - AGND (T5-13)	L-Y* 2- BR* 2	Transponder key amplifier communication signal	Ignition switch 1: OFF → 2: ON	Pulse generation (see waveform 1)
CODE (T5-11) - AGND (T5-13)	Y* 1- BR-R* 1	Transponder key amplifier communication signal	Ignition switch 1: OFF → 2: ON	Pulse generation (see waveform 2)
CODE (T5-11) - AGND (T5-13)	G-W* 2- BR* 2	Transponder key amplifier communication signal	Ignition switch 1: OFF → 2: ON	Pulse generation (see waveform 2)
EFIO (T5-6) - AGND (T5-13)	V-G* 1- BR-R* 1	ECM output signal	Ignition switch 1: OFF → 2: ON	Pulse generation (see waveform 3)
EFIO (T5-6) - AGND (T5-13)	BR-R* 2- BR-R* 2	ECM output signal	Ignition switch 1: OFF → 2: ON	Pulse generation (see waveform 3)
EFII (T5-7) - AGND (T5-13)	BR-W - BR-R* 1	ECM input signal	Ignition switch 1: OFF → 2: ON	Pulse generation (see waveform 4)
EFII (T5-7) - AGND (T5-13)	BR-W - BR* 2	ECM input signal	Ignition switch 1: OFF → 2: ON	Pulse generation (see waveform 4)

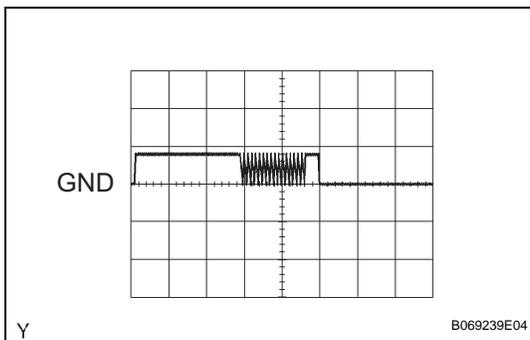
If the result is not as specified, there may be a malfunction on the ECU.

\* 1: Coupe

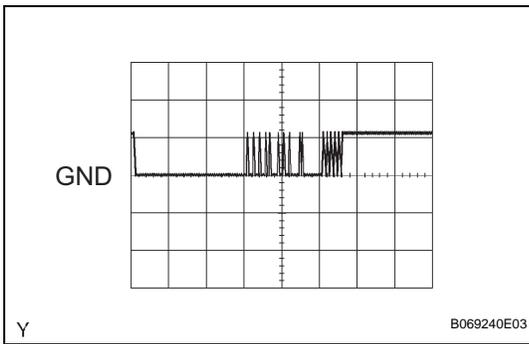
\* 2: Convertible

(e) Inspect using an oscilloscope.

(1) Waveform 1 (Reference)

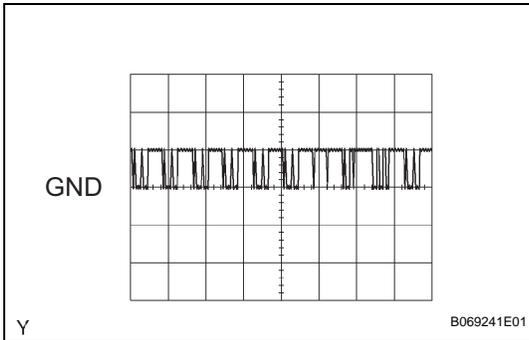


Terminal	TXCT - GND
Tool Setting	5 V/DIV., 20 ms/DIV.
Condition	Ignition switch 1: OFF → 2: ON



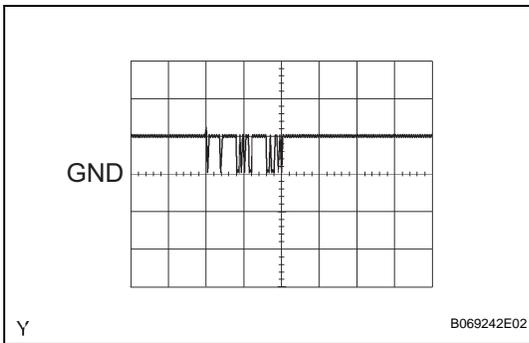
(2) Waveform 2 (Reference)

Terminal	CODE - GND
Tool Setting	5 V/DIV., 20 ms/DIV.
Condition	Ignition switch 1: OFF → 2: ON



(3) Waveform 3 (Reference)

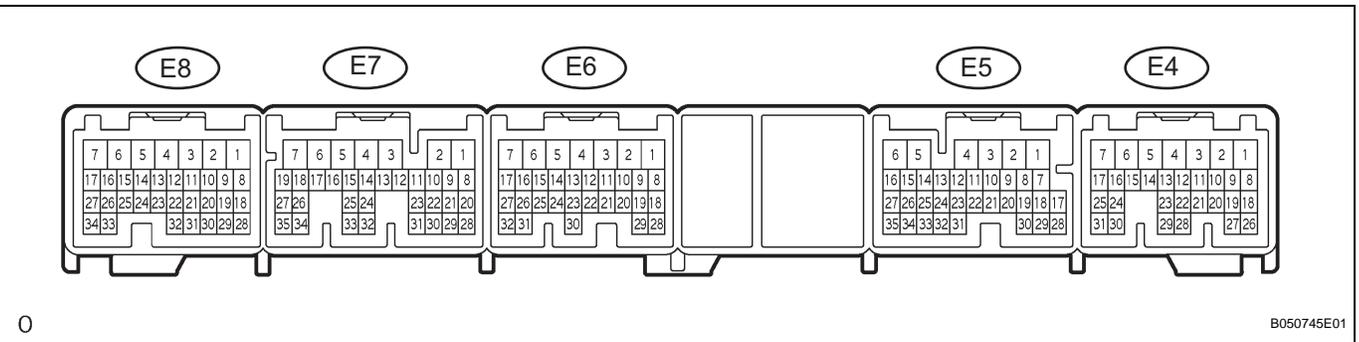
Terminal	EFIO - GND
Tool Setting	10 V/DIV., 500 ms/DIV.
Condition	Ignition switch 1: OFF → 2: ON



(4) Waveform 4 (Reference)

Terminal	EFII - GND
Tool Setting	10 V/DIV., 500 ms/DIV.
Condition	Ignition switch 1: OFF → 2: ON

**3. CHECK ECM (3MZ-FE)**



- (a) Disconnect the E5 and E6 ECM connectors.
- (b) Measure the voltage and resistance of the wire harness side connectors.

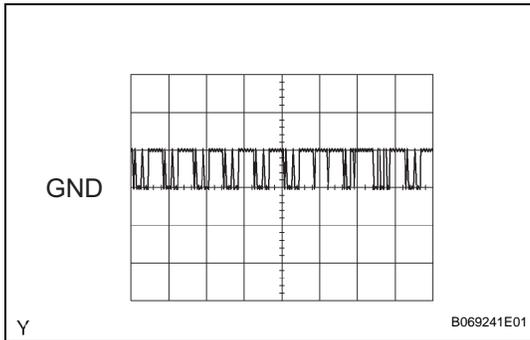
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IMI (E5-27) - E1 (E6-1)	V-G* 1- BR	Transponder key ECU input signal	1: No key in ignition key cylinder → 2: Key inserted	Pulse generation (see waveform 1)
IMI (E5-27) - E1 (E6-1)	BR-R* 2- BR	Transponder key ECU input signal	1: No key in ignition key cylinder → 2: Key inserted	Pulse generation (see waveform 1)

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IMO (E5-26) - E1 (E6-1)	BR-W - BR	Transponder key ECU output signal	1: No key in ignition key cylinder → 2: Key inserted	Pulse generation (see waveform 2)
E1 (E6-1) - Body ground	BR - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

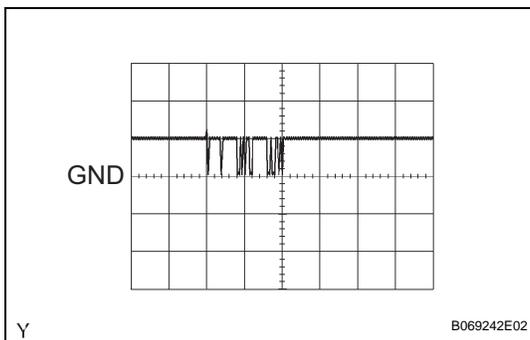
- \* 1: Coupe
- \* 2: Convertible

- (c) Inspect using an oscilloscope.  
(1) Waveform 1 (Reference)



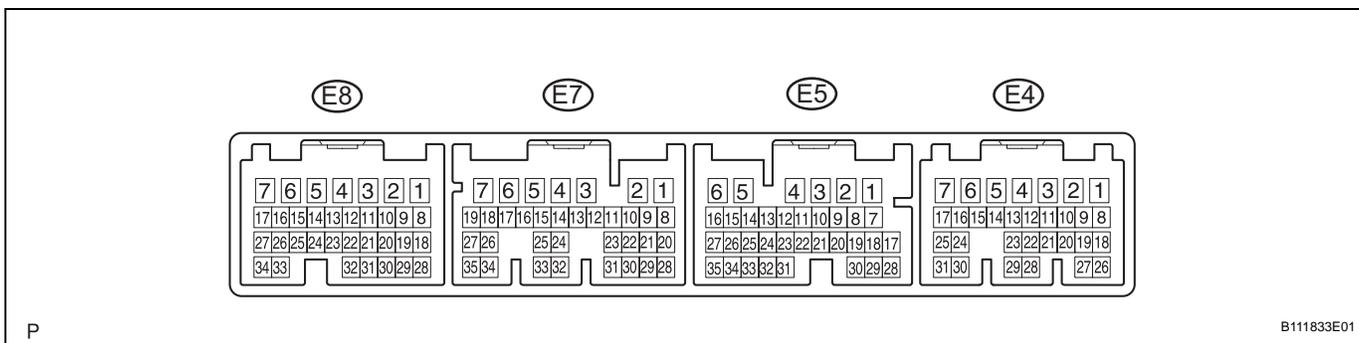
Terminal	IMI - GND
Tool Setting	10 V/DIV., 500 ms/DIV.
Condition	1: No key in ignition key cylinder → 2: Key inserted

- (2) Waveform 2 (Reference)



Terminal	IMO - GND
Tool Setting	10 V/DIV., 500 ms/DIV.
Condition	1: No key in ignition key cylinder → 2: Key inserted

#### 4. CHECK ECM (3AZ-FE)

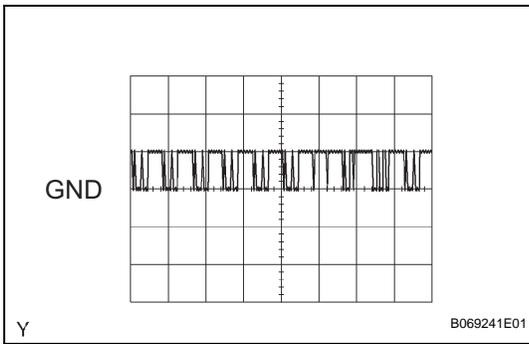


- (a) Disconnect the E5 and E8 ECM connectors.  
(b) Measure the voltage and resistance of the wire harness side connectors.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IMI (E5-16) - E1 (E8-3)	V-G - BR	Transponder key ECU input signal	1: No key in ignition key cylinder → 2: Key inserted	Pulse generation (see waveform 1)
IMO (E5-15) - E1 (E8-3)	BR-W - BR	Transponder key ECU output signal	1: No key in ignition key cylinder → 2: Key inserted	Pulse generation (see waveform 2)
E1 (E8-3) - Body ground	BR - Body ground	Ground	Always	Below 1 Ω

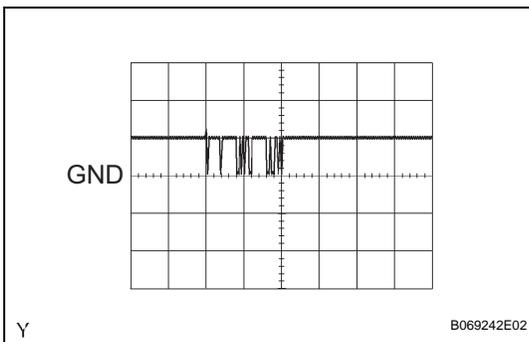
If the result is not as specified, there may be a malfunction on the wire harness side.

- (c) Inspect using an oscilloscope.
  - (1) Waveform 1 (Reference)



Terminal	IMI - GND
Tool Setting	10 V/DIV., 500 ms/DIV.
Condition	1: No key in ignition key cylinder → 2: Key inserted

- (2) Waveform 2 (Reference)



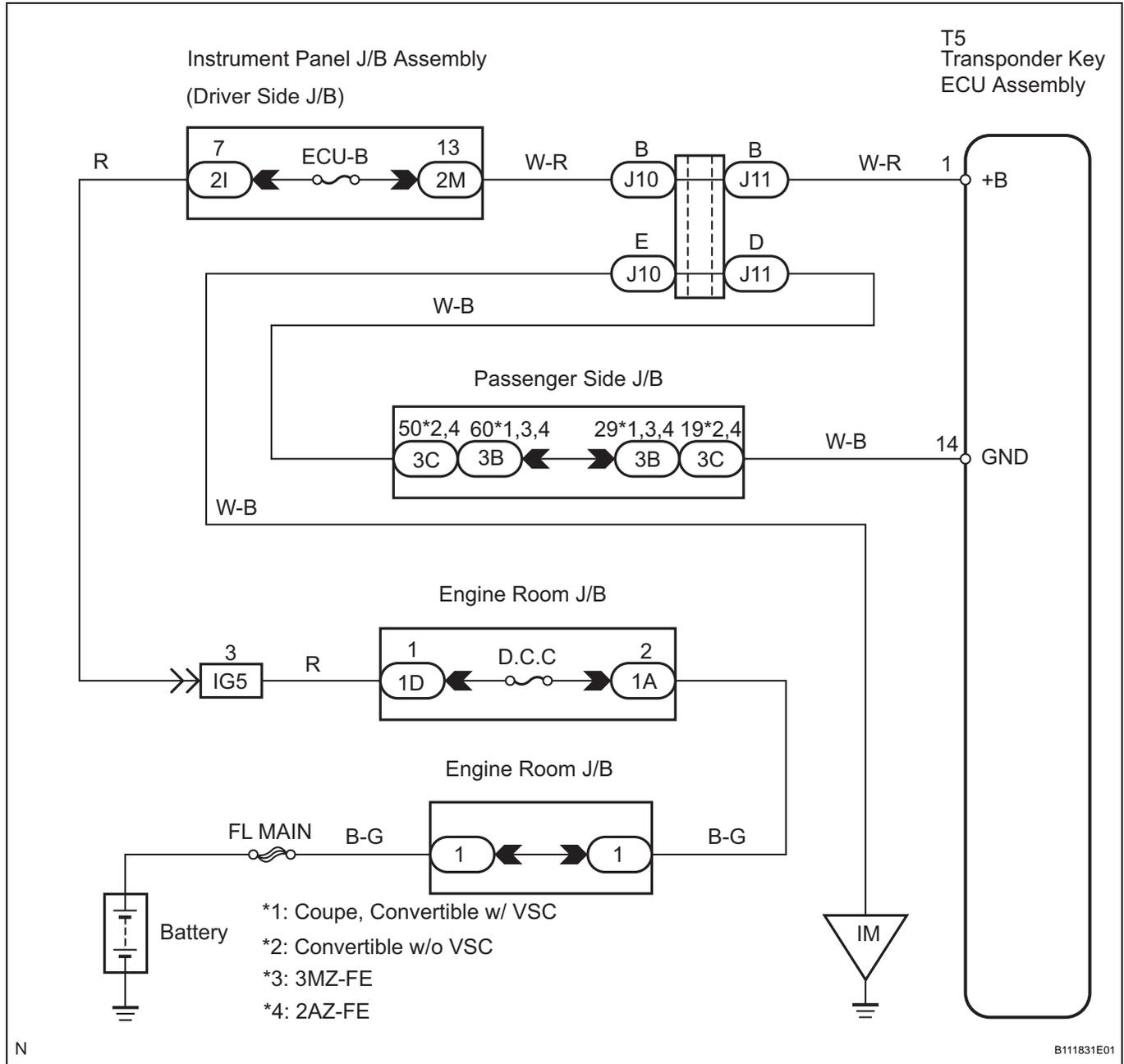
Terminal	IMO - GND
Tool Setting	10 V/DIV., 500 ms/DIV.
Condition	1: No key in ignition key cylinder → 2: Key inserted

## ECU Power Source Circuit

### DESCRIPTION

This circuit provides power to operate the transponder key ECU assy.

### WIRING DIAGRAM



1

### INSPECT FUSE (ECU-B)

- Remove the ECU-B fuse from the instrument panel J/B.
- Measure the resistance of the fuse.

**Resistance:**  
**Below 1  $\Omega$**

NG

REPLACE FUSE

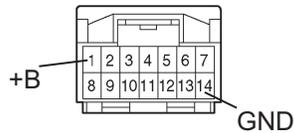
OK

2

## CHECK WIRE HARNESS (TRANSPONDER KEY ECU - BATTERY AND BODY GROUND)

## Wire Harness Side

T5  
Transponder Key ECU Assembly



B084466E01

- (a) Disconnect the T5 ECU connector.  
 (b) Measure the voltage of the wire harness side connector.

**Voltage**

Tester Connection	Specified Condition
T5-1 (+B) - Body ground	10 to 14 V

- (c) Measure the resistance of the wire harness side connector.

**Resistance**

Tester Connection	Specified Condition
T5-14 (GND) - Body ground	Below 1 $\Omega$

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE TRANSPONDER KEY ECU ASSEMBLY

# ENGINE IMMOBILISER SYSTEM

## PRECAUTION

**NOTICE:**

When disconnecting the negative (-) battery terminal, initialize the following system(s) after the terminal is reconnected.

System Name	See Procedure
Power Window Control System (Coupe)	<a href="#">IN-24</a>
Sliding Roof System	<a href="#">IN-24</a>

## HOW TO PROCEED WITH TROUBLESHOOTING

### HINT:

Use this procedure to troubleshoot the engine immobilizer system.

The intelligent tester should be used in steps 4, 5 and 7.

**1** VEHICLE BROUGHT TO WORKSHOP

NEXT

**2** CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK

NEXT

**3** CRANK ENGINE FOR MORE THAN 10 SECONDS

NEXT

**4** CHECK FOR DTCS

- (a) Check for DTCS and note any codes that are output.
- (b) Delete the DTC.
- (c) Recheck for DTCS. Based on the DTC output in (a), try to force output of the same SFI system DTC or engine immobilizer system DTC by simulating the original activity indicated by the DTC.
  - (1) If the DTC does not reoccur, proceed to A.
  - (2) If the SFI system DTC reoccurs, proceed to B.
  - (3) If the engine immobilizer system DTC reoccurs, proceed to C.

**B** Go to SFI SYSTEM

**C** Go to step 8

A

**5** READ VALUE OF INTELLIGENT TESTER

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch ON and push the intelligent tester main switch ON.

- (c) On the intelligent tester, enter the following menus:  
DIAGNOSIS/ENHANCED OBD II/DATA LIST/  
IMMOBILISER/KEY SW. Read the values.

### Transponder key ECU assembly

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
KEY SW	Unlock warning switch signal/ ON or OFF	OFF: No key is in ignition key cylinder ON: Key is in ignition key cylinder	-

**OK:**

"ON" (key is in ignition key cylinder) appears on the screen.

**NG**

Go to DTC B2780

**OK**

## 6 PROBLEM SYMPTOMS TABLE

- (a) If the fault is not listed on the problem symptoms table, proceed to A.  
(b) If the fault is listed on the problem symptoms table, proceed to B.

**B**

Go to step 8

**A**

## 7 OVERALL ANALYSIS AND TROUBLESHOOTING

- (a) DATA LIST/ACTIVE TEST (See page [EI-18](#))  
(1) Inspection with the intelligent tester (DATA LIST)  
(2) Inspection with the intelligent tester (ACTIVE TEST)  
(b) Terminals of ECU (See page [EI-11](#))

**NEXT**

## 8 ADJUST, REPAIR OR REPLACE

**NEXT**

## 9 CONFIRMATION TEST

**NEXT**

**END**

## DIAGNOSIS SYSTEM

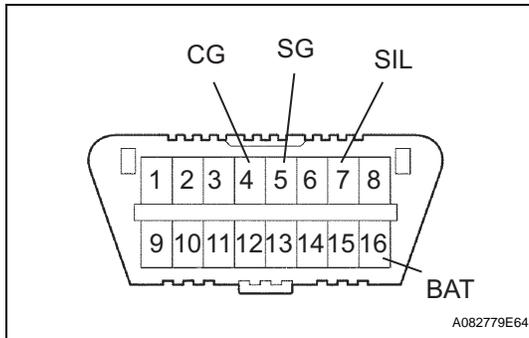
### 1. DESCRIPTION

- (a) The ECM controls the vehicle's immobilizer system functions. Immobilizer system data and the DTCs can be read through the vehicle's DLC3.

In some cases, a malfunction may be occurring in the immobilizer system even though the security indicator light is not illuminated. When the system seems to be malfunctioning, use the intelligent tester to check for a malfunctions and perform repairs.

### 2. CHECK DLC3

- (a) The vehicle uses ISO 9141-2 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.



Symbols (Terminals No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 $\Omega$
SG (5) - Body ground	Signal ground	Always	Below 1 $\Omega$
BAT (16) - Body ground	Battery positive	Always	11 to 14 V

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

#### HINT:

Connect the cable of the intelligent tester to the DLC3, turn the ignition switch ON and attempt to use the intelligent tester. If the screen displays the message UNABLE TO CONNECT TO VEHICLE, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still impossible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

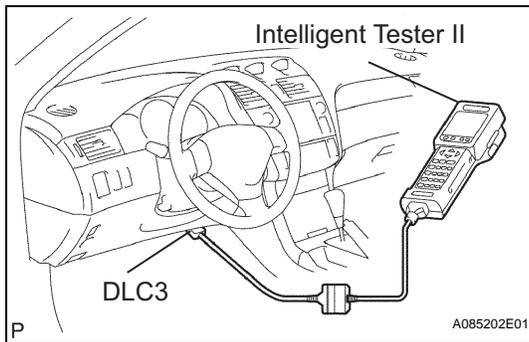
### 3. INSPECT BATTERY VOLTAGE

- (a) Inspect battery voltage.

#### Voltage:

**11 to 14 V**

If the voltage is below 11 V, replace the battery before proceeding.



## DTC CHECK / CLEAR

### 1. CHECK DTC

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch ON.
- (c) Read the DTCs by following the directions on the tester's screen.

HINT:

Refer to the intelligent tester operator's manual for further details.

### 2. CLEAR DTC

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch ON.
- (c) Erase the DTCs by following the directions on the tester's screen.

HINT:

Refer to the intelligent tester operator's manual for further details.

## DATA LIST / ACTIVE TEST

### 1. DATA LIST

#### HINT:

Using the intelligent tester DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch ON.
- (c) Read the DATA LIST.

### Transponder key ECU assembly

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
KEY SW	Unlock warning switch signal/ ON or OFF	OFF: No key is in ignition key cylinder ON: Key is in ignition key cylinder	-
IG SW	Ignition switch signal/ ON or OFF	OFF: Ignition switch OFF or ACC ON: Ignition switch ON	-
IMMOBILISER	Immobilizer system status/ SET or UNSET	UNSET: Ignition switch ON SET: Without key	-
RESPONSE	Transponder chip data/ NG or OK	NG: Data error OK: Data OK	-
FRAME	Transponder chip data/ NG or OK	NG: Data error OK: Data OK	-
SERIAL NUMBER	Transponder chip data/ NG or OK	NG: Data error OK: Data OK	-
ENCRYPT CODE	Transponder chip data/ NG or OK	NG: Data error OK: Data OK	-
STATUS	Transponder chip data/ NG or OK	NG: Data error OK: Data OK	-
BCC	Transponder chip signal/ NG or OK	NG: Incorrect data sending OK: Correct data sending	-
SUB KEY	Sub-key code signal/ NOMATCH or MATCH	NOMATCH: Unmatched sub-key code is sent MATCH: Sub-key code is sent	-
MASTER KEY	Master key code signal/ NOMATCH or MATCH	NOMATCH: Unmatched master key code is sent MATCH: Master key code is sent	-
REGIST SUB CODE	Number of registered sub-key/ min. 0, max. 15	Number of registered sub-keys	-
REGIST MAS CODE	Number of registered master key/ min. 0, max. 15	Number of registered master keys	-
REG CODE SPACE	Memory space for key codes registration/ NOT FUL or FULL	NOT FUL: Possible to register more key codes FULL: Cannot register any more key codes	-
ANTENNA COIL	Antenna coil condition/ NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is malfunctioning	-

### 2. ACTIVE TEST

#### HINT:

Performing the intelligent tester ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch ON.

- (c) Perform the ACTIVE TEST according to the display on the tester.

**Transponder key ECU assembly**

Item	Normal Condition	Diagnostic Note
SECURITY INDIC	Turn security indicator ON/OFF	-

## DIAGNOSTIC TROUBLE CODE CHART

### TRANSPONDER KEY ECU DIAGNOSTIC TROUBLE CODE CHART

DTC No.	Detection Item	Trouble Area	See page
B2780	Push Switch / Key Unlock Warning Switch Malfunction	1. Unlock warning switch assembly 2. Wire harness 3. Transponder key ECU assembly	<a href="#">EI-21</a>
B2784	Antenna Coil Open / Short	1. Wire harness 2. Transponder key amplifier 3. Transponder key ECU assembly	<a href="#">EI-24</a>
B2793	Transponder Chip Malfunction	1. Key	<a href="#">EI-26</a>
B2794	Unmatched Encryption Code	1. Key	<a href="#">EI-27</a>
B2795	Unmatched Key Code	1. key	<a href="#">EI-28</a>
B2796	No Communication in Immobiliser System	1. key 2. Transponder key amplifier 3. Wire harness 4. Transponder key ECU assembly	<a href="#">EI-29</a>
B2797	Communication Malfunction No. 1	1. Key 2. Wire harness 3. Transponder key amplifier 4. Transponder key ECU assembly	<a href="#">EI-32</a>
B2798	Communication Malfunction No. 2	1. Key	<a href="#">EI-29</a>

### ECM DAIAGNOSTIC TROUBLE CODE CHART

DTC No.	Detection Item	Trouble Area	See page
B2799	Engine Immobiliser System	1. Wire harness 2. ECM	<a href="#">EI-35</a>

**NOTICE:**

The DTCs for the immobilizer system are specified above. If the other codes are output, check the DTC(s) chart for the engine control system.

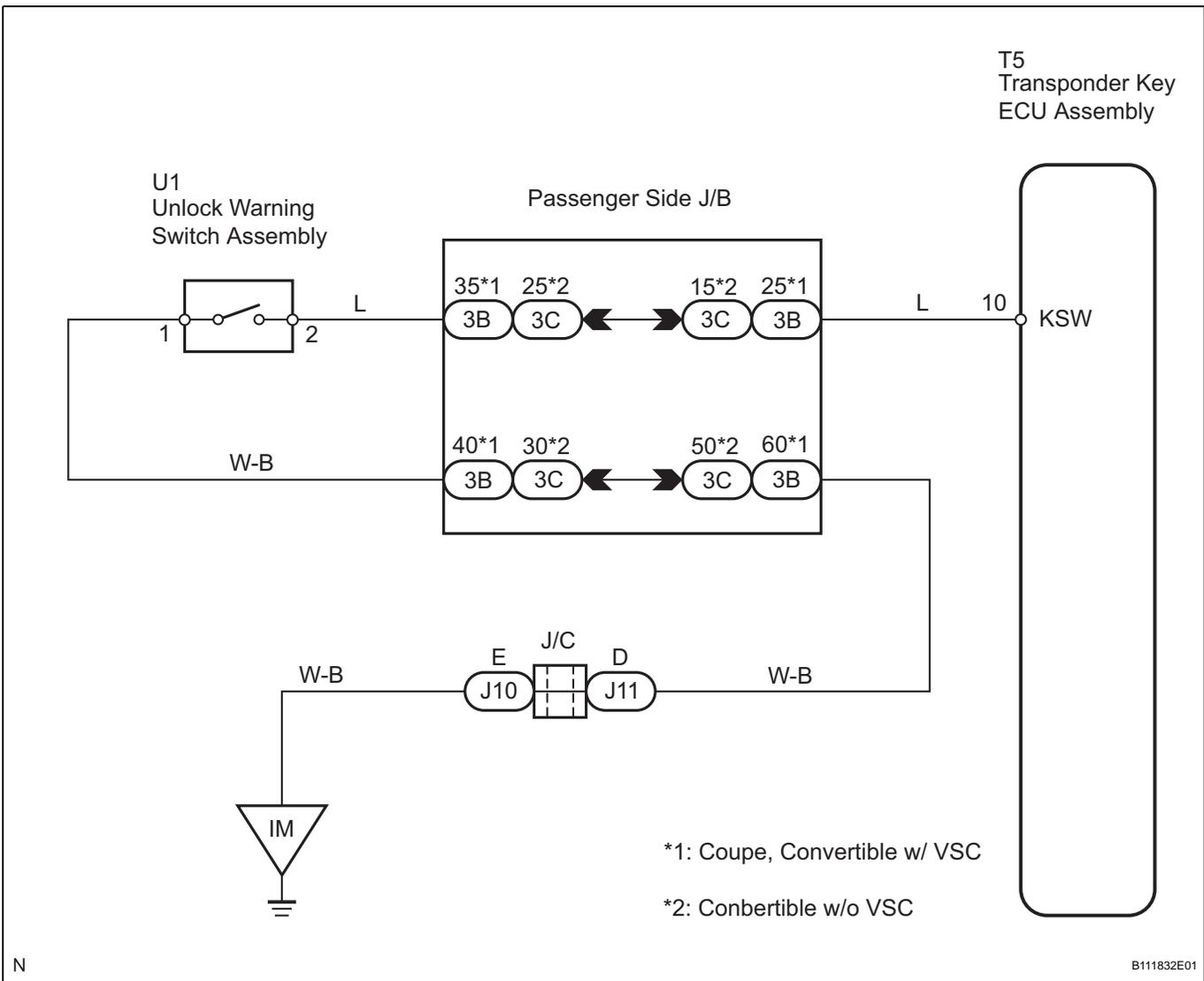
<b>DTC</b>	<b>B2780</b>	<b>Push Switch / Key Unlock Warning Switch Malfunction</b>
------------	--------------	--

**DESCRIPTION**

This DTC will be output if the transponder key ECU does not detect that the unlock warning switch is ON even when the ignition switch is ON. Under normal conditions, the unlock warning switch is ON when the ignition switch is ON.

DTC No.	DTC Detection Condition	Trouble Area
B2780	Unlock warning switch ON is not detected when ignition switch is ON	<ul style="list-style-type: none"> <li>• Unlock warning switch assembly</li> <li>• Wire harness</li> <li>• Transponder key ECU assembly</li> </ul>

**WIRING DIAGRAM**



EI

<b>1</b>	<b>READ VALUE OF INTELLIGENT TESTER</b>
----------	---

(a) Connect the intelligent tester to the DLC3.

- (b) Turn the ignition switch ON with the key that cannot start the engine.
- (c) On the intelligent tester, enter the following menus: DIAGNOSIS/ENHANCED OBD II/DATA LIST/IMMOBILISER/KEY SW. Read the values.

**Transponder key ECU assembly**

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
KEY SW	Unlock warning switch signal/ ON or OFF	OFF: No key is in ignition key cylinder ON: Key is in ignition key cylinder	-

**OK:**  
"ON" (key is in ignition key cylinder) appears on the screen.

**NG** → **Go to step 2**

**OK**

**REPLACE TRANSPONDER KEY ECU ASSEMBLY**

**2 INSPECT UNLOCK WARNING SWITCH ASSEMBLY**

**Unlock Warning Switch Assembly**

Not Pushed

Pushed

P B111614E03

- (a) Remove the switch.
- (b) Measure the resistance of the switch.

**Resistance**

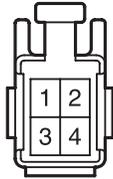
Tester Connection	Switch Condition	Specified Condition
1 - 2	Pushed	Below 1 Ω
1 - 2	Not pushed	10 kΩ or higher

**NG** → **REPLACE UNLOCK WARNING SWITCH ASSEMBLY**

**OK**

**3 CHECK WIRE HARNESS (UNLOCK WARNING SWITCH ASSEMBLY - BODY GROUND)**

Wire Harness Side



U1 Unlock Warning Switch Assembly

P

B111599E02

- (a) Disconnect the U1 switch connector.
- (b) Measure the resistance of the wire harness side connector.

**Resistance**

Tester Connection	Specified Condition
U1-1 - Body ground	Below 1 Ω

**NG**

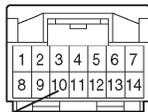
**REPAIR OR REPLACE HARNESS AND CONNECTOR**

**OK**

**4 CHECK WIRE HARNESS (TRANSPONDER KEY ECU - UNLOCK WARNING SWITCH ASSEMBLY)**

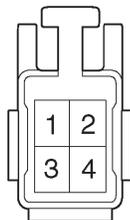
Wire Harness Side

T5  
Transponder Key ECU Assembly



KSW

U1  
Unlock Warning Switch Assembly



B064973E02

- (a) Disconnect the T5 ECU connector.
- (b) Disconnect the U1 switch connector.
- (c) Measure the resistance of the wire harness side connectors.

**Resistance**

Tester Connection	Specified Condition
T5-10 (KSW) - U1-2	Below 1 Ω

**NG**

**REPAIR OR REPLACE HARNESS AND CONNECTOR**

**OK**

**REPLACE TRANSPONDER KEY ECU ASSEMBLY**

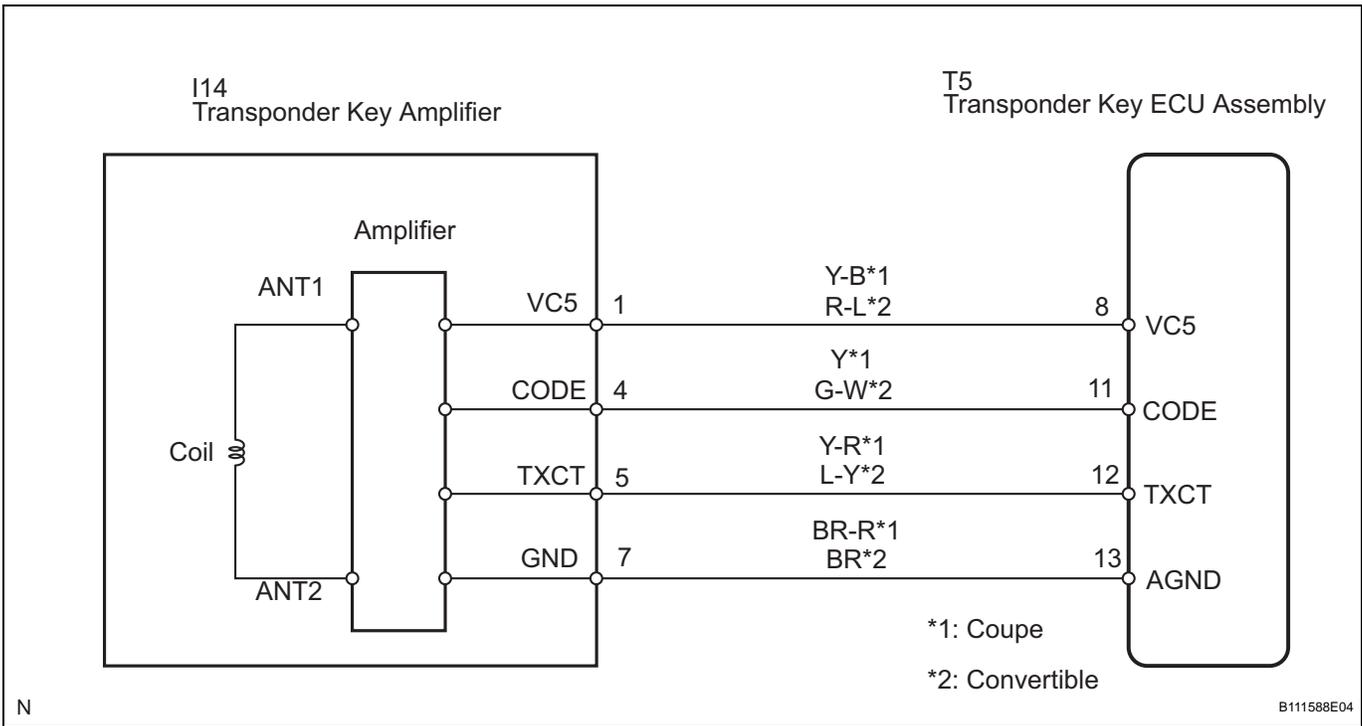
<b>DTC</b>	<b>B2784</b>	<b>Antenna Coil Open / Short</b>
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**DESCRIPTION**

The transponder key coil receives key code signals from key's transponder chip. The coil is built into the transponder key amplifier, which amplifies the key code signals and output the signals to the transponder key ECU.

DTC No.	DTC Detection Condition	Trouble Area
B2784	Antenna coil is open/short	<ul style="list-style-type: none"> <li>Wire harness</li> <li>Transponder key amplifier</li> <li>Transponder key ECU assembly</li> </ul>

**WIRING DIAGRAM**



<b>1</b>	<b>READ VALUE OF INTELLIGENT TESTER</b>
----------	---

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch ON with the key that cannot start the engine.
- (c) On the intelligent tester, enter the following menus: DIAGNOSIS/ENHANCED OBD II/DATA LIST/IMMOBILISER/ANTENNA COIL. Read the values.

**Transponder key ECU assembly**

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
ANTENNA COIL	Antenna coil condition/ NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is malfunctioning	-

OK:

"NORMAL" (antenna coil is normal) appears on the screen.

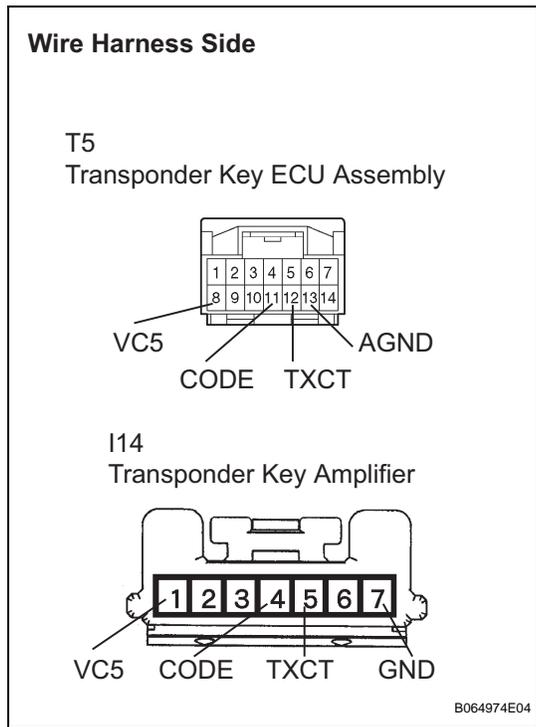
NG

Go to step 2

OK

REPLACE TRANSPONDER KEY ECU ASSEMBLY

2 CHECK WIRE HARNESS (TRANSPONDER KEY ECU - TRANSPONDER KEY AMPLIFIER)



- (a) Disconnect the T5 ECU connector.
- (b) Disconnect the I14 amplifier connector.
- (c) Measure the resistance of the wire harness side connectors.

**Resistance**

Tester Connection	Specified Condition
T5-8 (VC5) - I14-1 (VC5)	Below 1 Ω
T5-11 (CODE) - I14-4 (CODE)	Below 1 Ω
T5-12 (TXCT) - I14-5 (TXCT)	Below 1 Ω
T5-13 (AGND) - I14-7 (GND)	Below 1 Ω
T5-8 (VC5) or I14-1 (VC5) - Body ground	10 kΩ or higher
T5-11 (CODE) or I14-4 (CODE) - Body ground	10 kΩ or higher
T5-12 (TXCT) or I14-5 (TXCT) - Body ground	10 kΩ or higher
T5-13 (AGND) or I14-7 (GND) - Body ground	10 kΩ or higher

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

EI

OK

REPLACE TRANSPONDER KEY AMPLIFIER

**DTC****B2793****Transponder Chip Malfunction****DESCRIPTION**

This DTC is output when: 1) during key code registration, a key malfunction occurs; or 2) the key code was unable to be registered properly. Follow the inspection procedure below.

DTC No.	DTC Detection Condition	Trouble Area
B2793	Transponder chip malfunction	Key

**1****RE-REGISTER KEY**

- (a) Delete the DTC (See page [EI-20](#)).
- (b) Re-register the key (See page [EI-5](#)), and check that the engine starts with the key.

**OK:****Engine starts.****NG****REPLACE KEY****OK****NORMAL (INSPECTION FINISHED)**

**DTC****B2794****Unmatched Encryption Code****DESCRIPTION**

This DTC is output when a key with an incomplete key code is inserted into the ignition key cylinder.

DTC No.	DTC Detection Condition	Trouble Area
B2794	Key with incomplete key code is inserted	Key

**1****REPLACE KEY****NEXT****END**

**DTC****B2795****Unmatched Key Code****DESCRIPTION**

This DTC is output when a key with a key code that has not been registered in the ECU is inserted into the ignition key cylinder.

DTC No.	DTC Detection Condition	Trouble Area
B2795	Key with unregistered key code is inserted	Key

**1**

**DELETE DTC AND INSERT ALL PRESENTLY AVAILABLE KEYS TO CHECK WHETHER ENGINE STARTS OR NOT**

- (a) Delete DTC and insert all presently available keys to check whether engine starts or not.

**OK:****Engine starts.****NG**

**REPLACE KEY THAT CANNOT START ENGINE**

**OK**

**NO PROBLEM (BECAUSE OF KEY RE-REGISTRATION)**

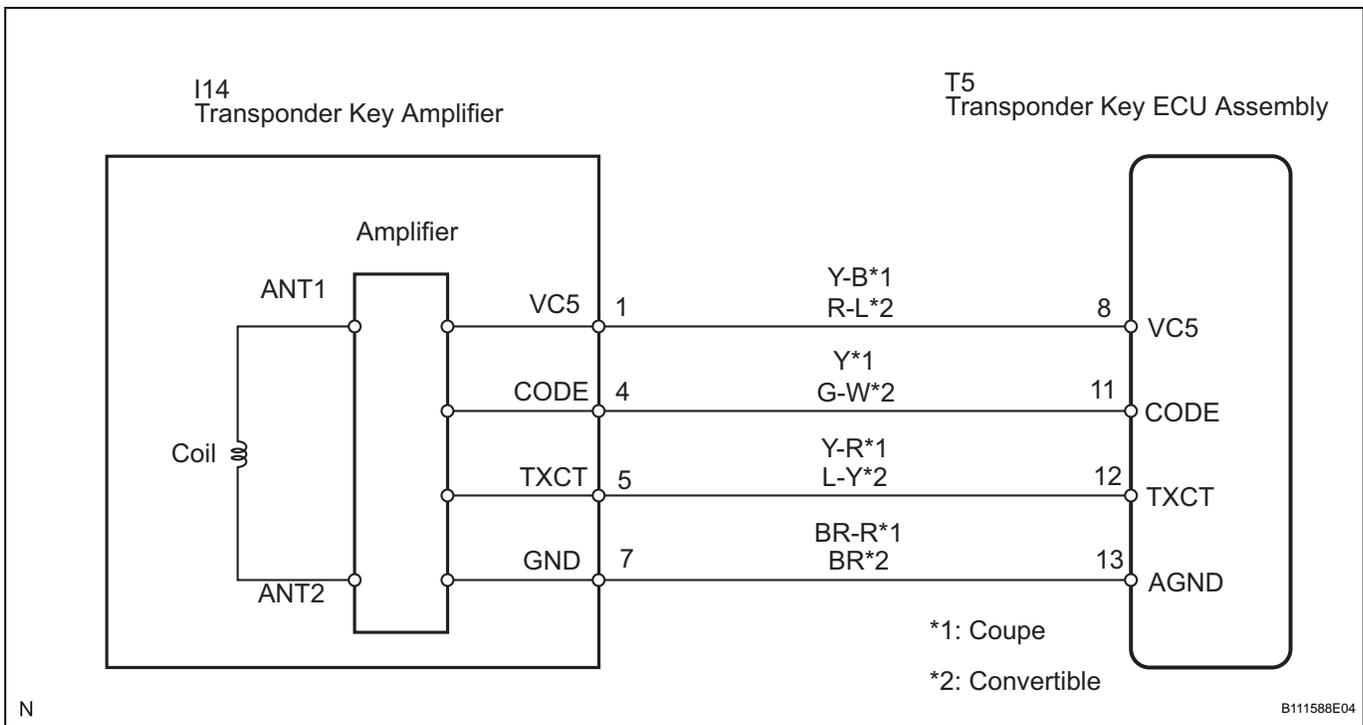
<b>DTC</b>	<b>B2796</b>	<b>No Communication in Immobiliser System</b>
<b>DTC</b>	<b>B2798</b>	<b>Communication Malfunction No. 2</b>

**DESCRIPTION**

This DTC is output when a key that does not have a transponder chip is inserted into the ignition key cylinder or if communication between the key and transponder key ECU is not possible.

DTC No.	DTC Detection Condition	Trouble Area
B2796	No communication	<ul style="list-style-type: none"> <li>• Key</li> <li>• Wire harness</li> <li>• Transponder key amplifier</li> <li>• Transponder key ECU assembly</li> </ul>
B2798	Communication error	Key

**WIRING DIAGRAM**



EI

**1 READ VALUE OF INTELLIGENT TESTER**

- Connect the intelligent tester to the DLC3.
- Turn the ignition switch ON with the key that cannot start the engine.
- On the intelligent tester enter the following menus:  
 DIAGNOSIS/ENHANCED OBD II/DATA LIST/  
 IMMOBILISER/IMMOBILISER. Read the values.

**Transponder key ECU assembly**

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
IMMOBILISER	Immobilizer system status/ SET or UNSET	UNSET: Ignition switch ON SET: Without key	-

OK:  
"UNSET" (ignition switch ON) appears on the screen.

NG

Go to step 2

OK

**REPLACE TRANSPONDER KEY ECU ASSEMBLY**

**2 CHECK WHETHER ENGINE STARTS WITH OTHER KEYS**

(a) Check whether the engine starts with the vehicle's other keys.

OK:  
Engine starts.

NG

Go to step 3

OK

**RE-REGISTER OR REPLACE KEY THAT CANNOT START ENGINE**

**3 READ VALUE OF INTELLIGENT TESTER**

- (a) Connect the intelligent tester to the DLC3.  
 (b) Turn the ignition switch ON with the key that will not start the engine.  
 (c) On the intelligent tester, enter the following menus:  
 DIAGNOSIS/ENHANCED OBD II/DATA LIST/  
 IMMOBILISER/ANTENNA COIL. Read the values.

EI

**Transponder key ECU assembly**

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
ANTENNA COIL	Antenna coil condition/ NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is malfunctioning	-

OK:  
"NORMAL" (antenna coil is normal) appears on the screen.

NG

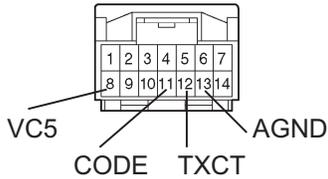
REPLACE TRANSPONDER KEY AMPLIFIER

OK

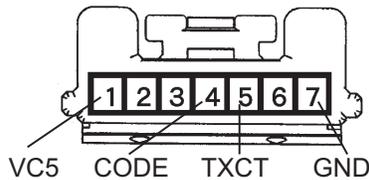
**4 CHECK WIRE HARNESS (TRANSPONDER KEY ECU - TRANSPONDER KEY AMPLIFIER)**

**Wire Harness Side**

T5  
Transponder Key ECU Assembly



I14  
Transponder Key Amplifier



B064974E04

- (a) Disconnect the T5 ECU connector.
- (b) Disconnect the I14 amplifier connector.
- (c) Measure the resistance of the wire harness side connectors.

**Resistance**

Tester Connection	Specified Condition
T5-8 (VC5) - I14-1 (VC5)	Below 1 Ω
T5-11 (CODE) - I14-4 (CODE)	Below 1 Ω
T5-12 (TXCT) - I14-5 (TXCT)	Below 1 Ω
T5-13 (AGND) - I14-7 (GND)	Below 1 Ω
T5-8 (VC5) or I14-1 (VC5) - Body ground	10 kΩ or higher
T5-11 (CODE) or I14-4 (CODE) - Body ground	10 kΩ or higher
T5-12 (TXCT) or I14-5 (TXCT) - Body ground	10 kΩ or higher
T5-13 (AGND) or I14-7 (GND) - Body ground	10 kΩ or higher

**NG**

**REPAIR OR REPLACE HARNESS AND CONNECTOR**

**OK**

**5 REPLACE TRANSPONDER KEY AMPLIFIER**

- (a) After replacing the transponder key amplifier with a normally functioning amplifier, check that the engine starts.

**OK:**

**Engine starts.**

**NG**

**REPLACE TRANSPONDER KEY ECU ASSEMBLY**

**OK**

**NORMAL (TRANSPONDER KEY AMPLIFIER DEFECTIVE)**

**EI**

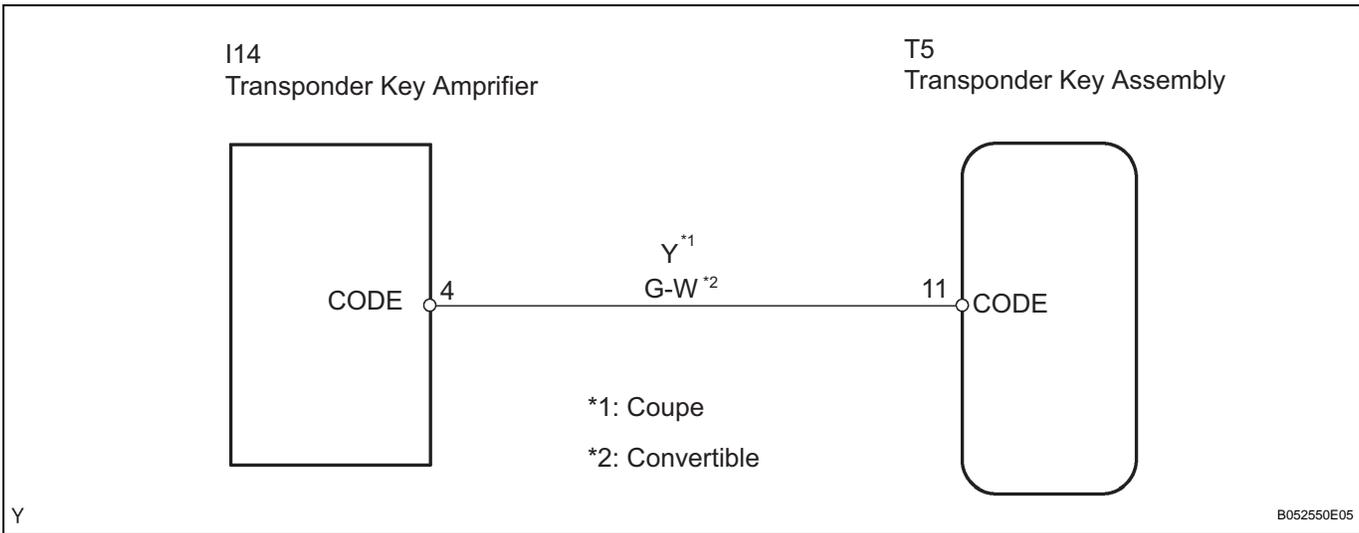
<b>DTC</b>	<b>B2797</b>	<b>Communication Malfunction No. 1</b>
------------	--------------	--

**DESCRIPTION**

This DTC is output when a communication error occurs between the transponder key amplifier and transponder key ECU. Some possible reasons for the communication error are: 1) 2 or more ignition keys are positioned too close together, or 2) noise is occurring in the communication line.

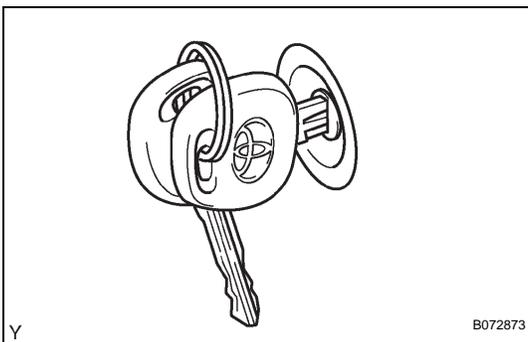
DTC No.	DTC Detection Condition	Trouble Area
B2797	Keys are positioned too close to each other, or noise occurred in communication line	<ul style="list-style-type: none"> <li>• Key</li> <li>• Wire harness</li> <li>• Transponder key amplifier</li> <li>• Transponder key ECU assembly</li> </ul>

**WIRING DIAGRAM**



**E**

<b>1</b>	<b>CHECK KEYS</b>
----------	-------------------



- (a) Check if the ignition key being used is near other ignition keys, as shown in the illustration. Also, check if the key ring is in contact with the key grip.

**Result**

Result	Proceed to
The key is near other keys and/or the key rings is in contact with key grip.	A
The key is not near other keys and/or the key ring is not in contact with the key grip.	B



<b>2</b>	<b>CHECK FOR DTC</b>
----------	----------------------

- (a) Separate the keys from each other and/or remove the key ring.

- (b) Delete the DTC (See page EI-20).
- (c) Insert a key into the ignition cylinder. Remove it. Repeat for all the other keys.
- (d) Check that no code is output.

**OK:**

**No code is output.**

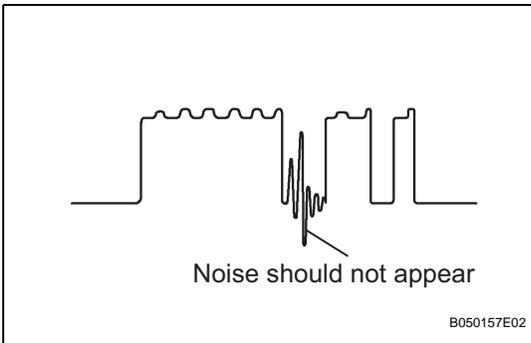
**NG**

**Go to step 3**

**OK**

**NORMAL (INSPECTION FINISHED)**

**3 CHECK TRANSPONDER KEY ECU ASSEMBLY**



- (a) Using an oscilloscope or the intelligent tester II check for noise in the waveform between the terminals of the I14 amplifier connector and T5 ECU connector.

**Result**

Tester Connection	Specified Condition
T5-11 (CODE) - I14-4 (CODE)	No noise is present

Tool Setting	5 V/DIV., 20 ms/DIV.
Condition	Ignition switch 1: OFF → 2: ON

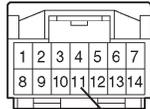
**NG**

**FIND CAUSE OF NOISE AND REMOVE IT**

**OK**

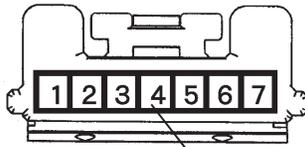
**4 CHECK WIRE HARNESS (TRANSPONDER KEY ECU - TRANSPONDER KEY AMPLIFIER)****Wire Harness Side**

T5  
Transponder Key ECU Assembly



CODE

I14  
Transponder Key Amplifier



CODE

B064974E06

- (a) Disconnect the T5 ECU connector.
- (b) Disconnect the I14 amplifier connector.
- (c) Measure the resistance of the wire harness side connectors.

**Resistance**

Tester Connection	Specified Condition
T5-11 (CODE) - I14-4 (CODE)	Below 1 $\Omega$

**NG**

**REPAIR OR REPLACE HARNESS AND CONNECTOR**

**OK**

**5 REPLACE TRANSPONDER KEY AMPLIFIER**

- (a) After replacing the transponder key amplifier with a normally functioning amplifier, check that the engine starts.

**OK:**

Engine starts.

**NG**

**REPLACE TRANSPONDER KEY ECU ASSEMBLY**

**OK**

**NORMAL (TRANSPONDER KEY AMPLIFIER DEFECTIVE)**

<b>DTC</b>	<b>B2799</b>	<b>Engine Immobiliser System</b>
------------	--------------	----------------------------------

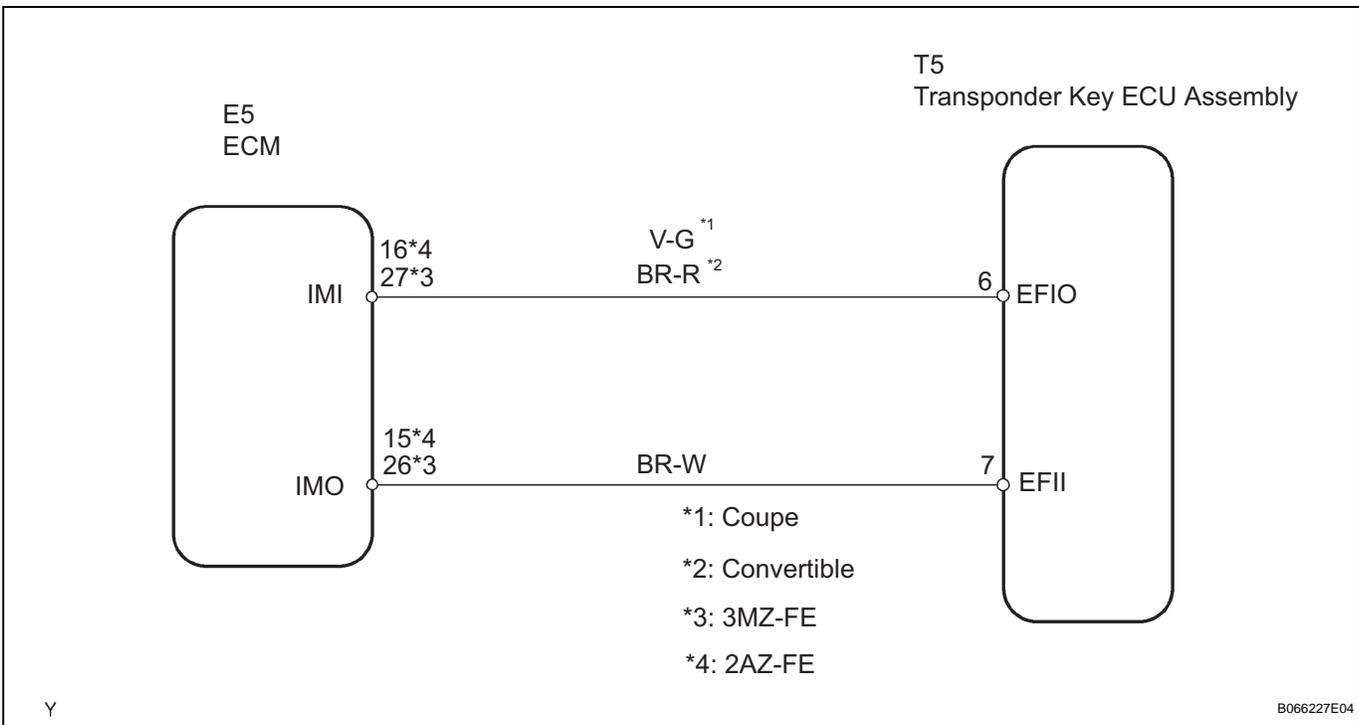
**DESCRIPTION**

This DTC is output when: 1) the ECM detects errors in its own communications with the transponder key ECU; 2) the ECM detects errors in the communication lines; and 3) the ECU communication ID between the transponder key ECU and the ECM are different and an engine start is attempted.

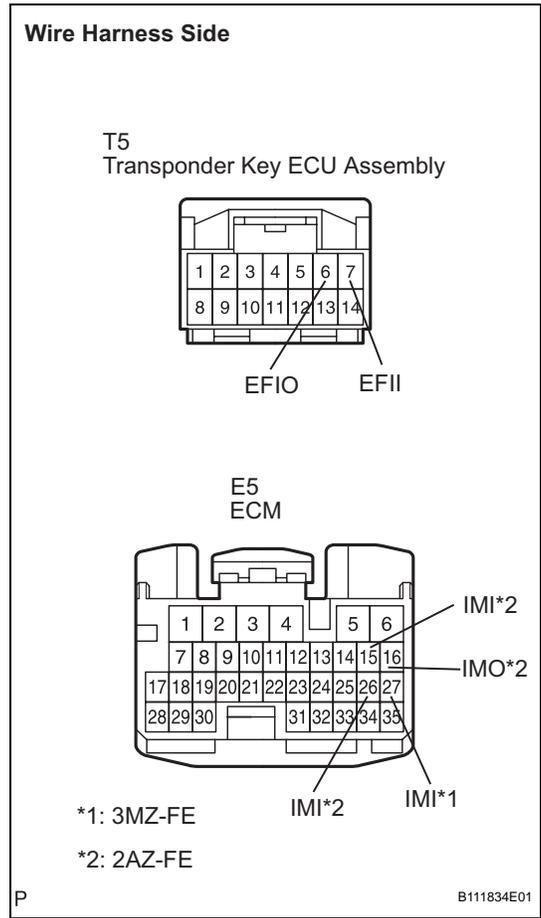
Before troubleshooting for this DTC, make sure no transponder key ECU DTCs are present. If present, troubleshoot the transponder key ECU DTCs first.

DTC No.	DTC Detection Condition	Trouble Area
B2799	<ul style="list-style-type: none"> <li>Error in communication between ECM and transponder key ECU, and in communication line</li> <li>Communication ID is different during communication with transponder key ECU</li> </ul>	<ul style="list-style-type: none"> <li>Wire harness</li> <li>ECM</li> </ul>

**WIRING DIAGRAM**



**1 CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSMBLY - ECM)**



- (a) Disconnect the T5 ECU connector.
- (b) Disconnect the E5 ECM connector.
- (c) Measure the resistance of the wire harness side connectors.

**Resistance**

Tester Connection	Specified Condition
T5-6 (EFIO) - E5-27*1 (IMI)	Below 1 Ω
T5-6 (EFIO) - E5-16*2 (IMI)	Below 1 Ω
T5-7 (EFII) - E5-26*1 (IMO)	Below 1 Ω
T5-7 (EFII) - E5-15*2 (IMO)	Below 1 Ω
T5-6 (EFIO) or E5-27*1 (IMI) - Body ground	10 kΩ or higher
T5-6 (EFIO) or E5-16*2 (IMI) - Body ground	10 kΩ or higher
T5-7 (EFII) or E5-26*1 (IMO) - Body ground	10 kΩ or higher
T5-7 (EFII) or E5-15*2 (IMO) - Body ground	10 kΩ or higher

\*1: 3MZ-FE

\*2: 2AZ-FE

**NG** **REPAIR OR REPLACE HARNESS AND CONNECTOR**

**OK**

**REPLACE ECM**