

# ENGINE IMMOBILISER SYSTEM

## HOW TO PROCEED WITH TROUBLESHOOTING

### HINT:

Use this procedure to troubleshoot the engine immobiliser system.

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

<b>1</b>	<b>VEHICLE BROUGHT TO WORKSHOP</b>
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NEXT

<b>2</b>	<b>CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK</b>
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NEXT

<b>3</b>	<b>CRANK ENGINE FOR MORE THAN 10 SECONDS</b>
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NEXT

<b>4</b>	<b>CHECK FOR DTCS</b>
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- (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 immobiliser 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 immobiliser system DTC reoccurs, proceed to C.

<b>B</b>	<b>Go to SFI SYSTEM</b>
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<b>C</b>	<b>Go to step 8</b>
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A

<b>5</b>	<b>READ VALUE OF INTELLIGENT TESTER</b>
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- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch ON and push the intelligent tester main switch ON.

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- (c) On the intelligent tester, enter the following menus: DIAGNOSIS/OBD MOBD/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 in the problem symptoms table, proceed to A.  
 (b) If the fault is listed in 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-21](#))  
 (1) Inspection with the intelligent tester (DATA LIST)  
 (2) Inspection with the intelligent tester (ACTIVE TEST)  
 (b) Terminals of ECU (See page [EI-15](#))

**NEXT**

## 8 ADJUST, REPAIR OR REPLACE

**NEXT**

## 9 CONFIRMATION TEST

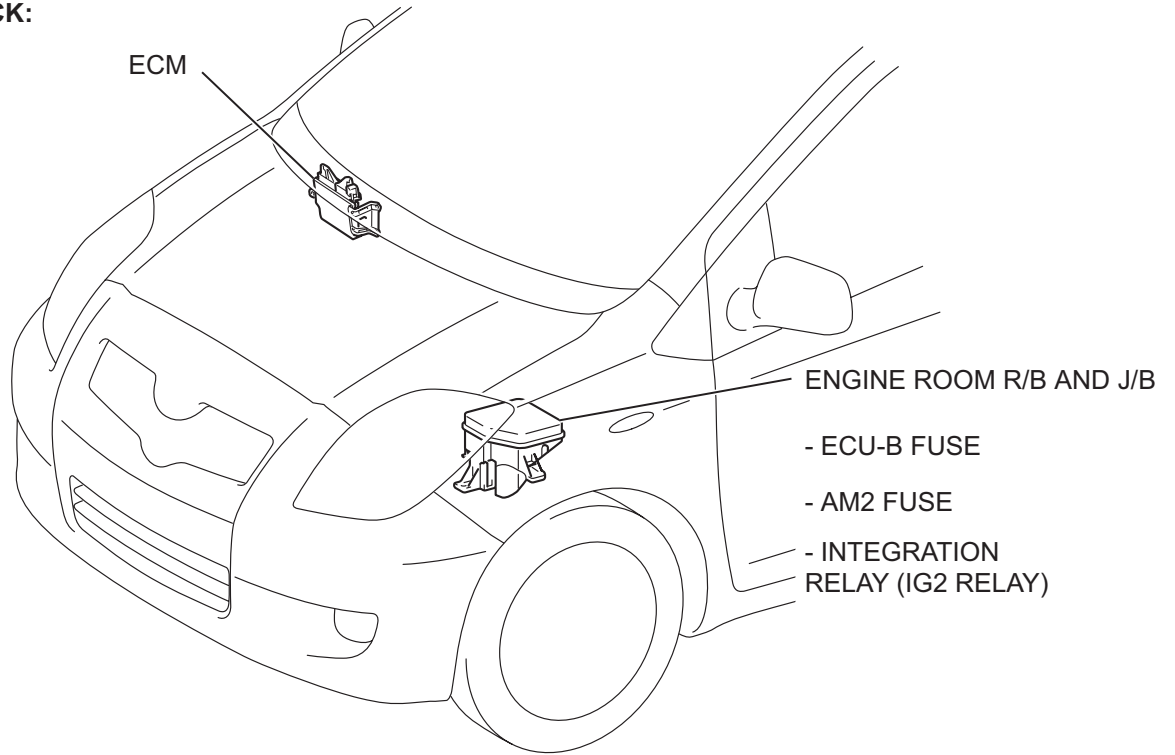
**NEXT**

**END**

# PARTS LOCATION

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HATCHBACK:



SECURITY INDICATOR LIGHT ASSEMBLY

TRANSPONDER KEY ECU ASSEMBLY

TRANSPONDER KEY AMPLIFIER

MAIN BODY ECU (INSTRUMENT PANEL J/B)

- IGN FUSE

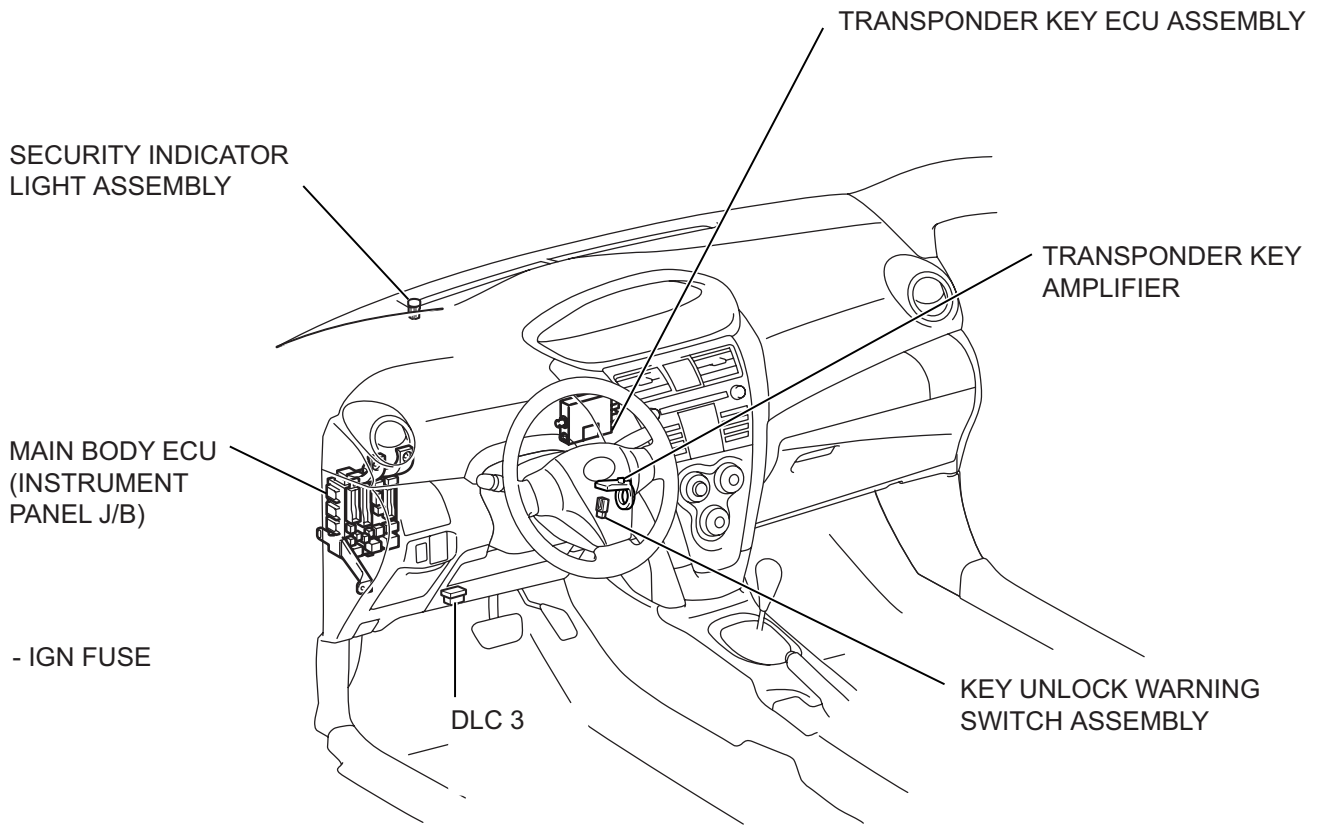
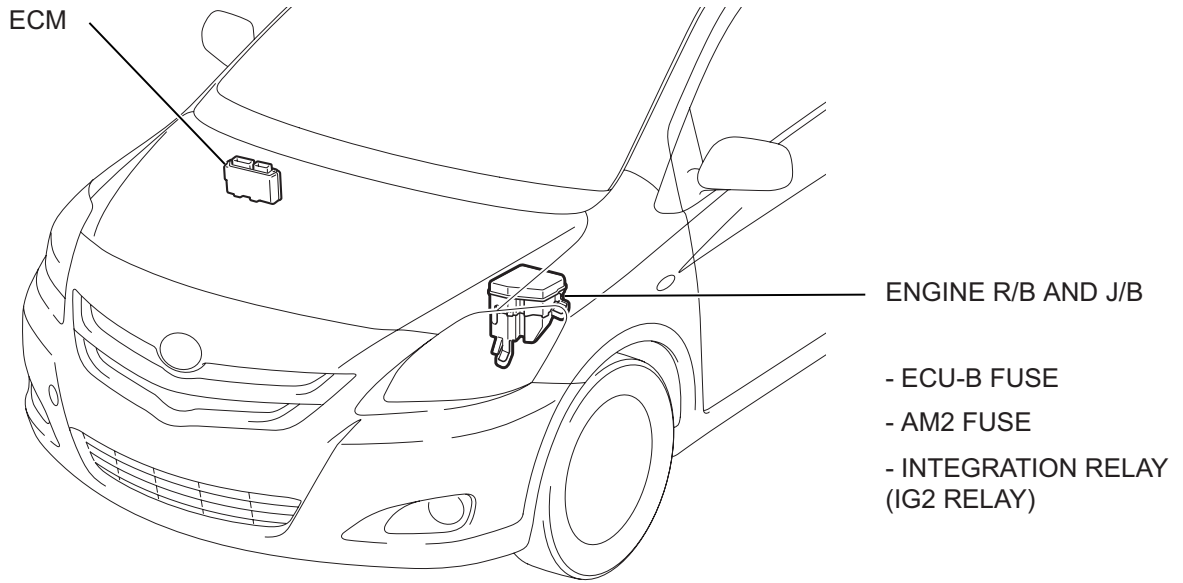
DLC3

UNLOCK WARNING SWITCH ASSEMBLY

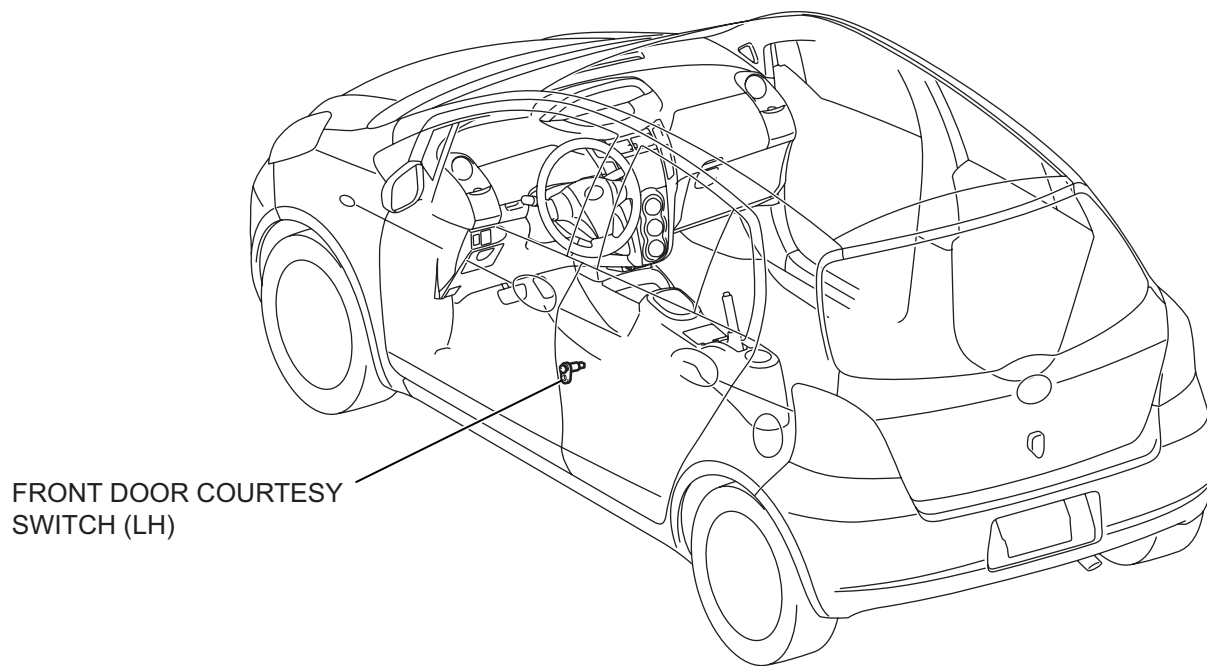
Y

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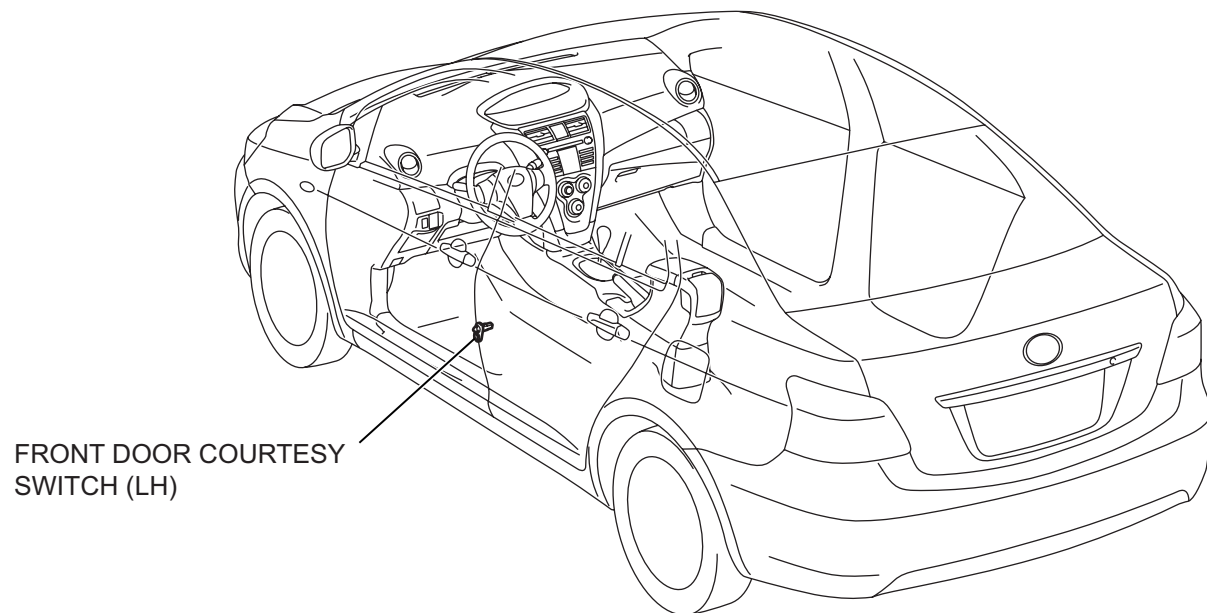
SEDAN:



**HATCHBACK:**

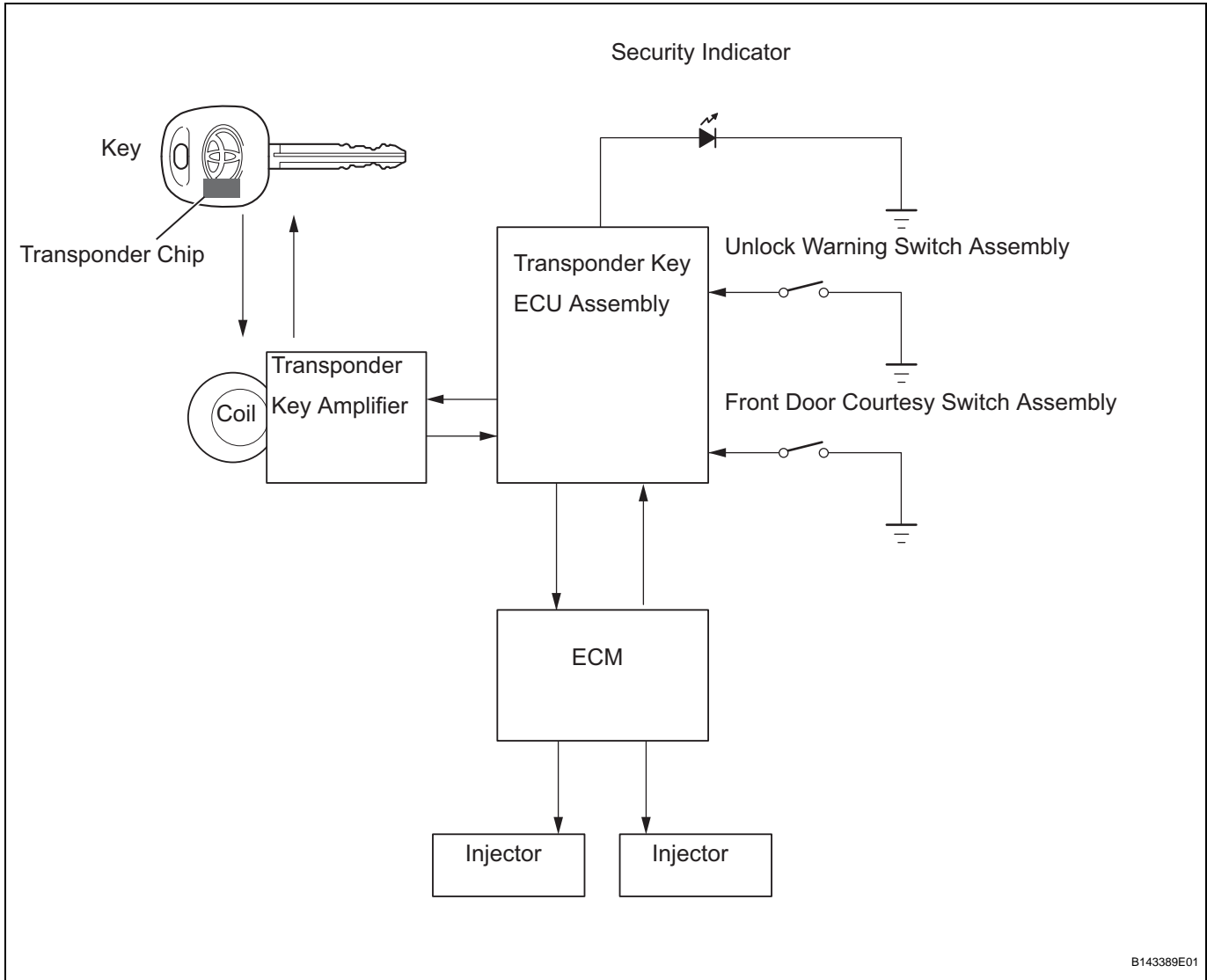


**SEDAN:**



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# SYSTEM DIAGRAM



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## SYSTEM DESCRIPTION

### 1. ENGINE IMMOBILISER SYSTEM DESCRIPTION

The engine immobiliser 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.

### 2. FUNCTIONS OF MAIN COMPONENTS

Component	Outline
Transponder key coil/amplifier	When key is inserted in ignition key cylinder, key coil receives key code. Then amplifier amplifies ID code and outputs it to transponder key ECU assembly.
Unlock warning switch assembly	Detects if key is in ignition key cylinder and outputs results to transponder key ECU assembly.
ECM	Through SFI communication, ECM receives ID verification results from transponder key ECU assembly. ECM also verifies ECUs. Then judges whether or not to enter immobiliser engine mode.
Security indicator light	Depending on operation of transponder key ECU, interior security indicator light comes on or starts blinking.

### 3. SYSTEM FUNCTION

- When the transponder key ECU assembly 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 compares 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 that they match: 1) the immobiliser 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 transponder key ECU. Then, the transponder key ECU turns OFF the security indicator light.

## REGISTRATION

### HINT:

The key has 2 codes: the key code (immobiliser code) and the wireless code (recognition code). Both of these codes need to be registered. Refer to the following pages for the 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 codes in the transponder key ECU.

Target ECU	See Procedure
Transponder key ECU	Procedure "A"

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

- (1) Register the key codes (immobiliser codes) in the new transponder key ECU.

Target ECU	See Procedure
Transponder key ECU	Procedure "B"

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

Target ECU	See Procedure
ECM	Procedure "C"

- (c) After replacing the ECM.

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

Target ECU	See Procedure
Transponder key ECU	Procedure "C"

- (d) After replacing the transponder key ECU and ECM.

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

Target ECU	See Procedure
Transponder key ECU	Procedure "C"

- (e) Erasure of key codes.

- (1) Erase the key code(s) of the lost key(s).

Target ECU	See Procedure
Transponder key ECU	Procedure "D"

### 2. NEW KEY CODE REGISTRATION (PROCEDURE "B")

- (a) New key code registration (When using intelligent tester).

#### Condition:

No key codes are registered in the transponder key ECU.



## HINT:

- In this mode, a maximum of 3 key codes for 2 master keys and 1 sub-key can be registered. The master keys and sub-key can be registered in any order because the transponder key ECU can distinguish between different types of key.
- New key codes must be registered with the battery connected. The ignition switch can be either ON or OFF.
- When a new transponder key ECU is installed, key codes must be registered in the transponder key ECU.

Procedure	Security Indicator Condition
1. START	- HINT: Until the first key is inserted.
2. Insert the key into the ignition key cylinder.	BLINKING
3. Select the following items on the tester: (1) Select IMMOBILISER (2) Select ID UTILITY (3) Select IMMOB CODE REG HINT: After the above operation, proceed to the next step in accordance with the prompts on the tester screen.	ON HINT: Within 2 minutes.
4. Remove the key and then push the NEXT button on the tester.	OFF for 1 second and then ON
5. Insert a master key or sub-key to be registered.	ON
6. Remove the key and then push the NEXT button on the tester.	OFF for 1 second and then ON
7. Insert a master key or sub-key to be registered.	OFF HINT: 0.5 seconds after turning ON
8. Remove the key.	BLINKING
9. END	

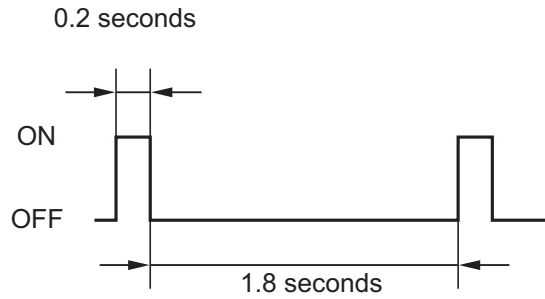
## HINT:

- The new key code registration mode can be deliberately ended by following procedure A or B below when the battery is connected, and at least 1 key code for the master key has been registered.
  - A (Without using intelligent tester)
    - (a) Insert the key into the ignition key cylinder.
    - (b) Turn the ignition switch from ON to OFF 5 times within 10 seconds.
    - (c) New key code registration mode ends.
  - B (When using intelligent tester)
    - (a) Insert the key into the ignition key cylinder and turn the intelligent tester on.
    - (b) Follow the instructions on the intelligent tester screen to end new key code registration mode.
    - (c) New key code registration mode ends.
- When the immobiliser system is operating normally and the key is removed, the security indicator blinks continuously.

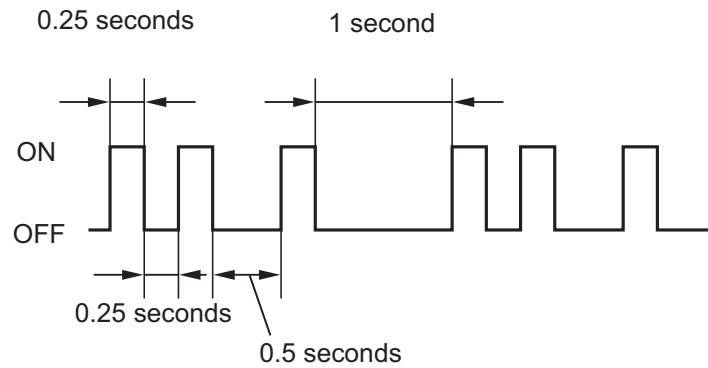
- If the new key code registration fails, code 2-1 is output by the security indicator. Trying to re-register an already registered key causes code 2-2 to be output when the key is inserted. If the number of registered key codes exceeds the limit, code 2-3 is output by the security indicator. The output details are shown below.

**Security Indicator:**

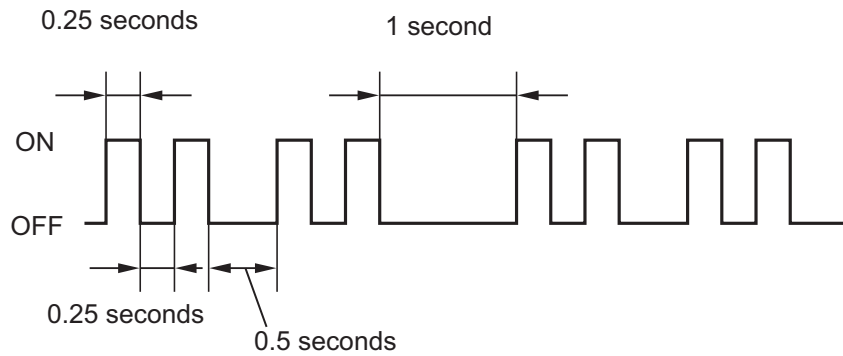
Normal (Immobiliser system is operating normally)



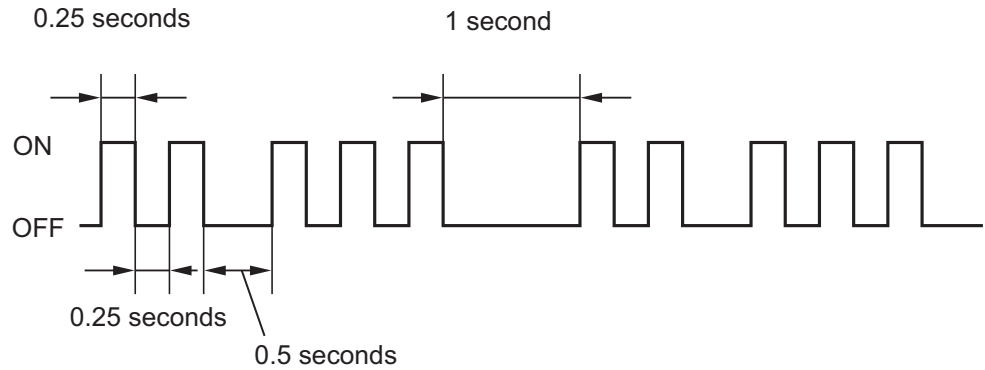
Code 2 - 1



Code 2 - 2



Code 2 - 3



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(b) New key code registration (Without using intelligent tester)

**Conditions:**

- No key codes are registered in the transponder key ECU.

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- All doors are closed, the ignition switch is OFF, and no key is inserted into the ignition key cylinder for 5 seconds or more.

Procedure	Time (Operation completion time)	Security Indicator Condition
1. START	-	- HINT: Until the first key is inserted.
2. Insert a previously registered key into the ignition key cylinder. Remove and insert it again. Repeat this 4 times.	Within 35 seconds	BLINKING
3. Open and close the driver door 6 times.		ON
4. Remove the key.		ON
5. Insert the master key to be registered into the ignition key cylinder.	Within 10 seconds	BLINKING
6. After 60 seconds, the key is registered. HINT: Security indicator goes off.	-	BLINKING
7. Remove the key.		BLINKING
8. END		

## HINT:

- Only the master key can be registered.
- Unless the key is inserted into the ignition key cylinder within 10 seconds in step 5, the ECU cancels registration mode.
- Follow the additional key code registration procedure to register 2 or more keys.
- If the new key code registration has failed, the security indicator blinks as follows.
  - (a) Code 2-1 is output when the transponder key ECU fails to receive a key ID code.
  - (b) Code 2-3 is output when a sub-key is inserted.

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

## HINT:

- A maximum of 5 master key codes and 3 sub-key codes can be registered.
- Additional key code registration mode ends if any step is not completed within the specified time.
- When proceeding to the next step while the timer is running, the timer is reset and begins the countdown for the next step.
- 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 new master key to register other keys.

**NOTICE:**

When the ignition key cylinder has been replaced, locking and unlocking doors is possible with the new master key once the transmitter module from the original master key has been transferred to it. 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 transmitter module battery fails, the original master key can be used to lock and unlock doors through the door key cylinder.

- (a) Additional key code registration

**Condition:**

At least one key code must be registered in the transponder key ECU

Procedure	Time (Operation completion time)	Security Indicator Condition
1. START	-	BLINKING HINT: Until the first key is inserted.
2. Insert a previously registered master key into the ignition key cylinder, turn the ignition switch to the ON position, and turn the intelligent tester on.	-	OFF
3. Select the following items on the tester: (1) IMMOBILISER (2) ID UTILITY (3) IMMOB CODE REG		ON
4. Remove the master key and then push the NEXT button on the tester. Immediately after above operation insert a previously registered master key into the ignition key cylinder, turn the ignition switch to the ON position, and then push the NEXT button on the tester.	Within 120 seconds	BLINKING→ON
5. Remove the master key and then push the NEXT button on the tester.	Within 20 seconds HINT: After the tester instruction.	ON
6. Insert the key to be registered into the ignition key cylinder.	Within 10 seconds.	BLINKING
7. After 60 seconds, the key is registered. HINT: The security indicator goes off.	-	OFF
8. Remove the key and then push the NEXT button on the tester.		BLINKING
9. The tester screen displays the number of registered keys.		
10. END		

**HINT:**

- If the key is removed within 60 seconds in step 6, additional key code registration mode is canceled.
- 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 immobiliser system is operating normally and the key is removed, the security indicator blinks continuously.

- If the additional key code registration fails, code 2-1 is output by the security indicator. Trying to re-register a previously registered key causes code 2-2 to be output when the key is inserted. If the number of registered key codes exceeds the limit, code 2-3 is output by the security indicator. The output details are shown in procedure "B".

#### 4. ERASURE OF KEY CODE (PROCEDURE "D")

##### 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, the key code must be re-registered.

##### (a) Erasure of key code

##### Condition:

At least two key codes must be registered in the transponder key ECU.

Procedure	Time (Operation completion time)	Security Indicator Condition
1. START	-	BLINKING HINT: Until the first key is inserted.
2. Insert a previously registered master key into the ignition key cylinder, turn the ignition switch to the ON position, and turn the intelligent tester on.	-	OFF
3. Select the following items on the tester: (1) IMMOBILISER (2) ID UTILITY (3) IMMOB CODE ERS	-	OFF
4. Remove the key and then push the NEXT button on the tester. Immediately after the above operation insert a previously registered master key into the ignition key cylinder, turn the ignition switch to the ON position, and then push the NEXT button on the tester.	Within 120 seconds	BLINKING→ ON for 1 second then OFF.
5. Remove the master key.	Within 10 seconds HINT: After the tester instruction.	BLINKING
6. END		

##### HINT:

- To cancel erasure mode after the erasure request is sent from the tester to the ECU, leave the master key inserted until the timer times out.
- 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 immobiliser system is operating normally and the key is removed, the security indicator blinks continuously.

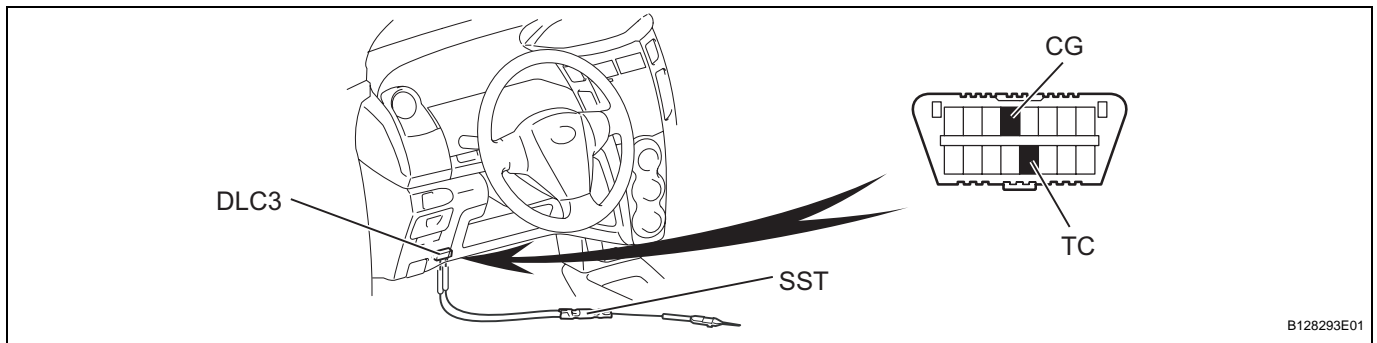
## 5. ECU - ECM COMMUNICATION ID REGISTRATION (PROCEDURE "C")

### 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 IDs match.
- Do not disconnect the battery while the ECU - ECM communication ID is being set.
- Do not turn the ignition switch from ON to OFF 20 times or more before setting the ECU - ECM communication ID. If this operation is likely to be performed 20 times or more, disconnect the negative battery terminal cable in order to avoid engine start disablement. Failure to do so will result in the engine not starting unless the transponder key ECU is replaced with a new one.

- (a) After replacing the transponder key ECU
  - (1) Register the key code(s) by following the new key code registration procedure. (Procedure "B")
  - (2) Using SST, connect the TC and CG terminals of the DLC3 before inserting the key into the key cylinder.

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- (3) Insert a previously registered key into the ignition key cylinder, turn the ignition switch ON (do not start the engine), and leave it as is for 30 minutes.
- (4) Turn the ignition switch OFF and disconnect terminals TC and CG.
- (5) Start the engine.
- (6) Check that the engine starts and stays on for more than 3 seconds. The registration is complete.

- (b) After replacing the ECM.  
 (1) Register the ECU - ECM communication ID

Procedure	Security Indicator Condition
1. Insert a previously registered key into the ignition key cylinder.	OFF
2. Start the engine.	
3. Check that the engine starts and stays on for more than 3 seconds. The registration is complete.	

- (c) After replacing the transponder key ECU and ECM  
 (1) Register the key code(s) by following the new key code registration procedure. (Procedure "B")  
 (2) Register the ECU - ECM communication ID

Procedure	Security Indicator Condition
1. Insert a previously registered key into the ignition key cylinder.	OFF
2. Start the engine.	
3. Check that the engine starts and stays on for more than 3 seconds. The registration is complete.	



## PROBLEM SYMPTOMS TABLE

### HINT:

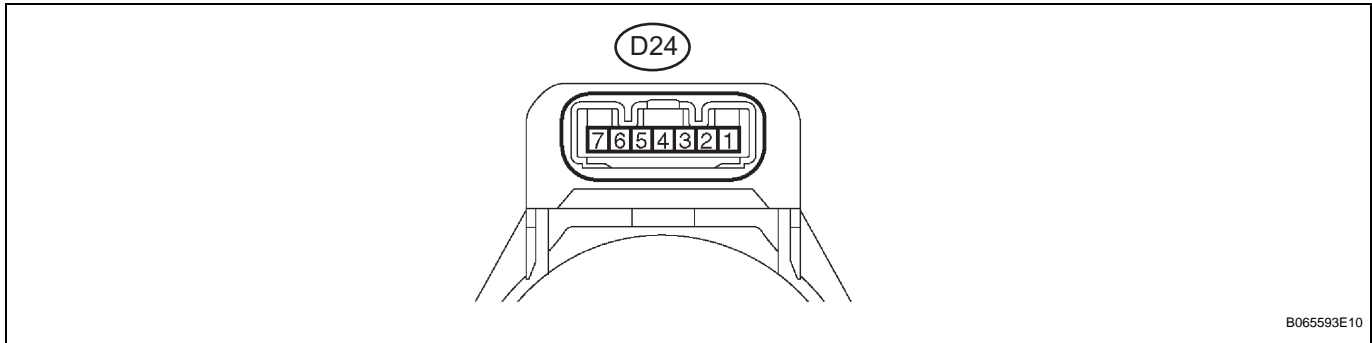
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Symptom	Suspected area	See page
Engine does not start	1. ECU power source circuit	<a href="#">EI-44</a>
	2. Transponder key ECU assembly	<a href="#">EI-15</a>
	3. SFI system	<a href="#">ES-24</a>

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# TERMINALS OF ECU

## 1. CHECK TRANSPONDER KEY AMPLIFIER



- (a) Disconnect the D24 transponder key amplifier connector.
- (b) Measure the resistance of the wire harness side connector.

### Standard resistance

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (D24-7) - Body ground	GR - Body ground	Ground	Always	Below 1 Ω

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

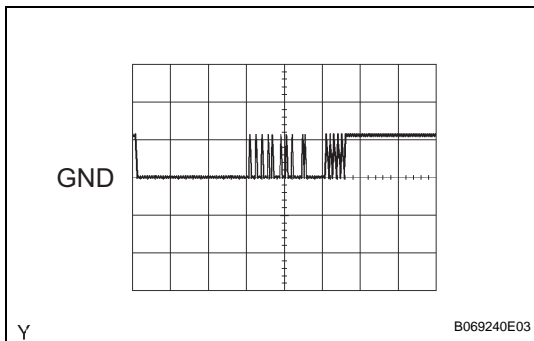
- (c) Reconnect the D24 transponder key amplifier connector.
- (d) Measure the resistance and voltage of the connector.

### Standard

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
VC5 (D24-1) - AGND (D24-7)	P- GR	Power source	1: No key in ignition key cylinder → 2: Key inserted	1: 0 V → 2: 4.6 to 5.4 V
CODE (D24-4) - AGND (D24-7)	G- GR	Demodulated signal of key code data	No key in ignition key cylinder → Key inserted	Pulse generation (see waveform 1)
TXCT (D24-5) - AGND (D24-7)	V- GR	Key code output signal	1: No key in ignition key cylinder → 2: Key inserted	Pulse generation (see waveform 2)
AGND (D24-7) - Body ground	GR- Body ground	Ground	Always	Below 1 Ω

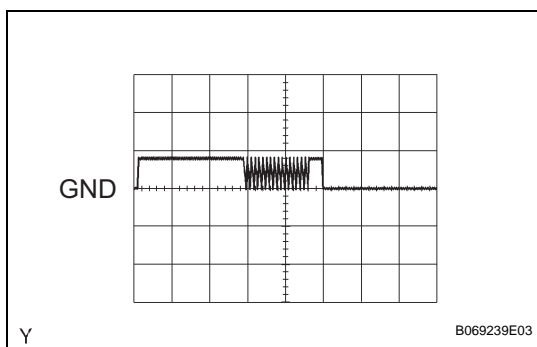
If the result is not as specified, there may be a malfunction in the amplifier.

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



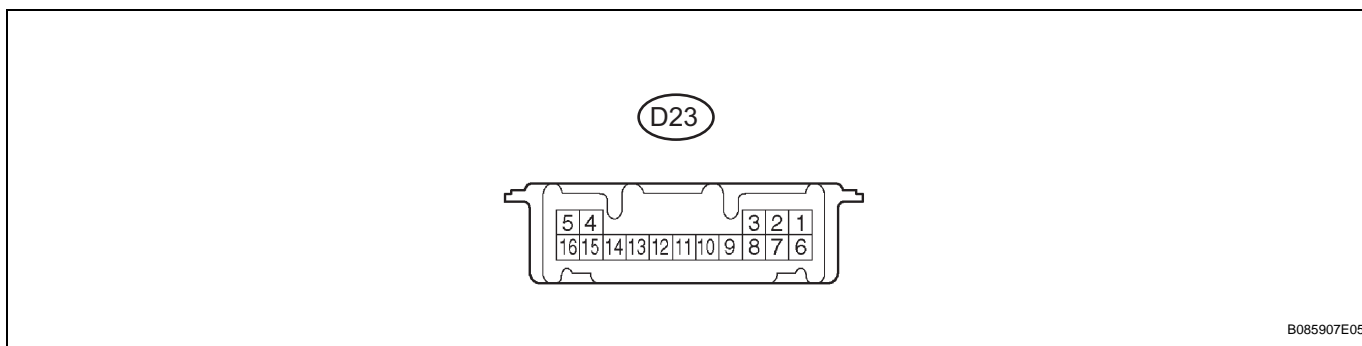
Terminal	CODE (D24-4) - AGND (D24-7)
Tool Setting	5 V/DIV., 20 ms/DIV.
Condition	No key in ignition key cylinder → Key inserted

(2) Waveform 2



Terminal	TXCT (D24-5) - AGND (D24-7)
Tool Setting	5 V/DIV., 20 ms/DIV.
Condition	No key in ignition key cylinder → Key inserted

**2. CHECK TRANSPONDER KEY ECU ASSEMBLY**



- (a) Disconnect the D23 transponder key ECU connector.
- (b) Measure the voltage and resistance of the wire harness side connector.

**Standard**

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND (D23-16) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
+B (D23-1) - GND (D23-16)	L - W-B	Battery	Always	11 to 14 V
IG (D23-2) - GND (D23-16)	R - W-B	Ignition switch	Ignition switch 1: OFF → 2: Key inserted	1: 0 V → 2: 11 to 14 V

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

- (c) Reconnect the D23 transponder key ECU connector.
- (d) Measure the voltage of the connector.

**Standard voltage**

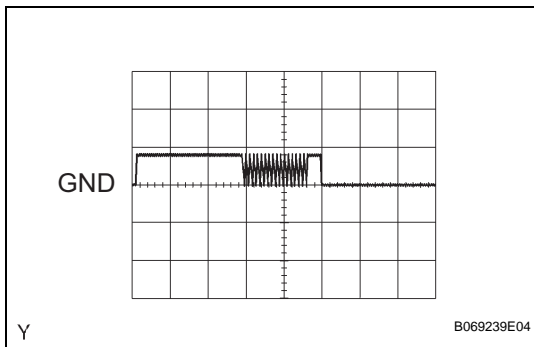
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
KSW (D23-3) - AGND (D23-5)	O - GR	Unlock warning switch	1: No key in ignition key cylinder → 2: Key inserted	1: 11 to 14 V → 2: Below 1 V
VC5 (D23-14) - AGND (D23-5)	P - GR	Power source	1: No key in ignition key cylinder → 2: Key inserted	1: 0 V → 2: 4.6 to 5.4 V
TXCT (D23-4) - AGND (D23-5)	V - GR	Transponder key amplifier communication signal	1: No key in ignition key cylinder → 2: Key inserted	Pulse generation (see waveform 1)
CODE (D23-15) - AGND (D23-5)	G - GR	Transponder key amplifier communication signal	1: No key in ignition key cylinder → 2: Key inserted	Pulse generation (see waveform 2)
EFIO (D23-13) - EGND (D23-11)	W - BR	ECM output signal	Ignition switch OFF → ON	Pulse generation (see waveform 3)

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
EFII (D23-12) - EGND (D23-11)	O - BR	ECM input signal	Ignition switch OFF → ON	Pulse generation (see waveform 4)
CTY (D23-7) - GND (D23-16)	B - W-B	Courtesy signal	1: Driver side door open → 2: closed	1: 11 to 14 V → 2: Below 1 V
IND (D23-8) - GND (D23-16)	LG - W-B	Security indicator signal	Engine immobiliser system 1: SET → 2: UNSET	1: 3 to 5 V → 2: Below 1 V
D (D23-9) - GND (D23-16)	W - W-B	Diagnosis tester communication	Ignition switch ON	Pulse generation

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

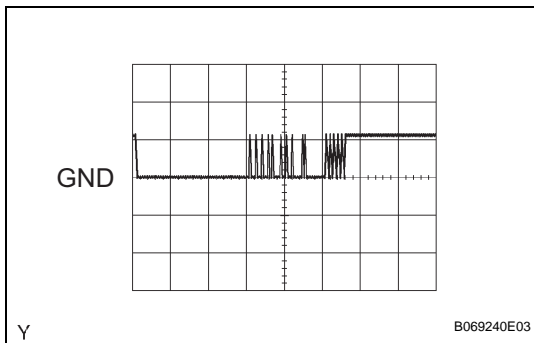
(e) Inspect using an oscilloscope.

(1) Waveform 1



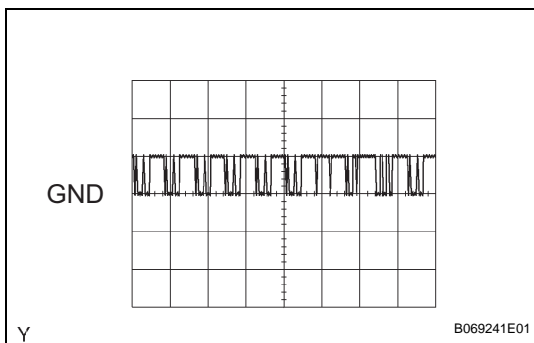
Terminal	TXCT (D23-4) - AGND (D23-5)
Tool Setting	5 V/DIV., 20 ms/DIV.
Condition	Ignition switch 1: No key in ignition key cylinder → 2: Key inserted

(2) Waveform 2



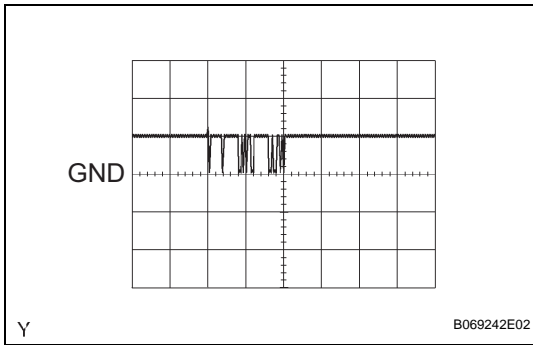
Terminal	CODE (D23-15) - AGND (D23-5)
Tool Setting	5 V/DIV., 20 ms/DIV.
Condition	Ignition switch 1: No key in ignition key cylinder → 2: Key inserted

(3) Waveform 3



Terminal	EFIO (D23-13) - EGND (D23-1)
Tool Setting	10 V/DIV., 500 ms/DIV.
Condition	Ignition switch OFF → ON

(4) Waveform 4



Terminal	EFII (D23-12) - EGND (D23-11)
Tool Setting	10 V/DIV., 500 ms/DIV.
Condition	Ignition switch OFF → ON

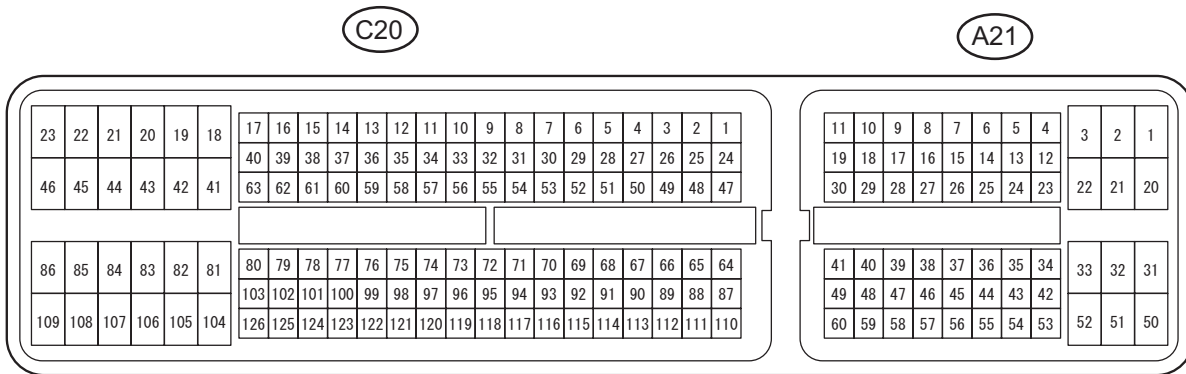
- (f) Measure the resistance between each pair of connector terminal.

Standard resistance

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (D23-5) - GND (D23-16)	GR - W-B	Amplifier ground circuit	Always	Below 1 Ω
EGND (D23-11) - GND (D23-16)	BR - W-B	ECM ground circuit	Always	Below 1 Ω

3. CHECK ECM

1NZ-FE, 2NZ-FE:



B116297E01

- (a) Disconnect the A21 ECM connector.  
 (b) Measure the voltage and resistance of the wire harness side connector.

Standard

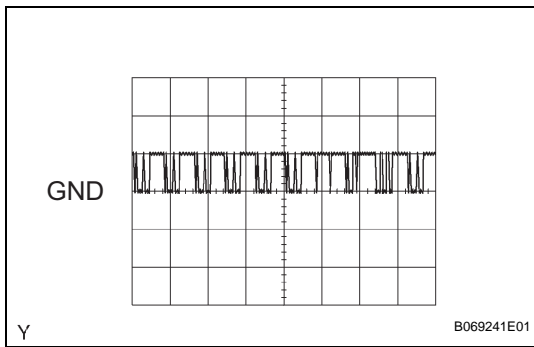
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IMI (A21-11) - EOM (A21-9)	W - BR	Transponder key ECU input signal	No key in ignition key cylinder → Key inserted	Pulse generation (see waveform 1)
IMO (A21-10) - EOM (A21-9)	O - BR	Transponder key ECU output signal	1: No key in ignition key cylinder → 2: Key inserted	Pulse generation (see waveform 2)
EOM (A21-9) - 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) Reconnect the A21 ECM connector.

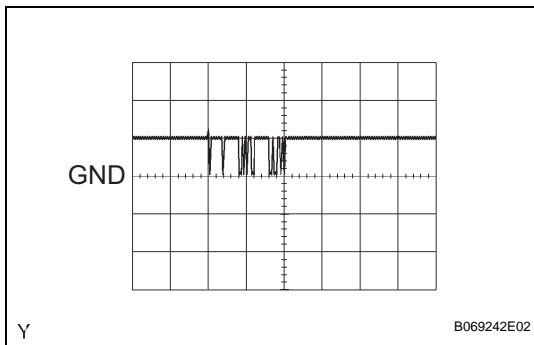
(d) Inspect using an oscilloscope.

(1) Waveform 1



Terminal	IMI (A21-11) - EOM (A21-9)
Tool Setting	10 V/DIV., 500 ms/DIV.
Condition	No key in ignition key cylinder → Key inserted

(2) Waveform 2



Terminal	IMO (A21-10) - EOM (A21-9)
Tool Setting	10 V/DIV., 500 ms/DIV.
Condition	No key in ignition key cylinder → Key inserted

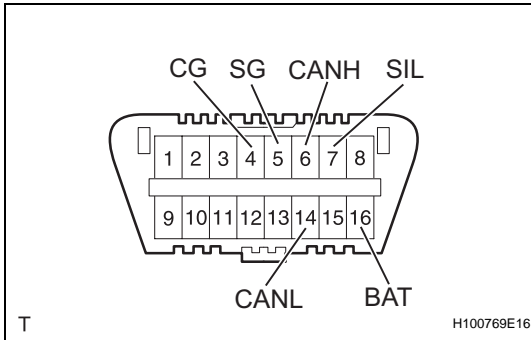
## DIAGNOSIS SYSTEM

### 1. DESCRIPTION

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

### 2. CHECK DLC3

- (a) The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

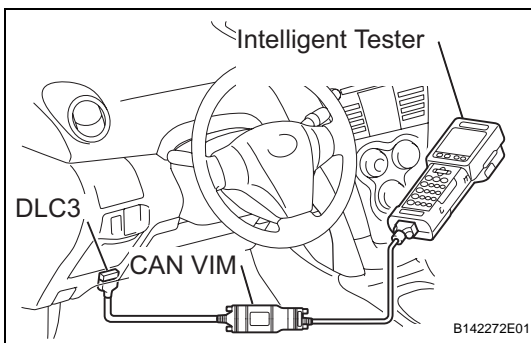


Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 $\Omega$
SG (5) - Body ground	Signal ground	Always	Below 1 $\Omega$
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch OFF*	54 to 69 $\Omega$
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 $\Omega$ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 $\Omega$ or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch OFF*	6 k $\Omega$ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch OFF*	6 k $\Omega$ or higher

#### NOTICE:

\*: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.

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



- (b) Intelligent tester

#### HINT:

Connect the cable of the intelligent tester to the CAN VIM, connect the CAN VIM to the DLC3, turn the ignition switch ON and attempt to use the tester. If the display indicates that a communication error has occurred, 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 not possible 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****Standard voltage:****11 to 14 V**

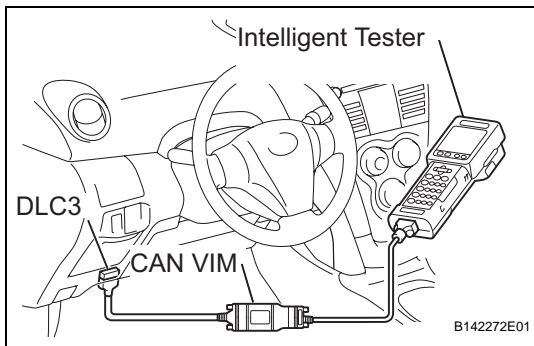
If the voltage is below 11 V, recharge or replace the battery before proceeding.

**DTC CHECK / CLEAR****1. CHECK DTC**

- (a) Connect the intelligent tester with CAN VIM to the DLC3.
- (b) Turn the ignition switch ON.
- (c) Turn the tester ON.
- (d) Select the following menu items: DIAGNOSIS / OBD/MOBD / IMMOBILISER / DTC INFO / CURRENT CODES.
- (e) Check the DTC(s) and then write them down.
- (f) See page [EI-22](#) to check the details of the DTC(s).

**2. CLEAR DTC**

- (a) Connect the intelligent tester to the DLC3.
- (b) Turn the ignition switch ON.
- (c) Turn the tester ON.
- (d) Select the following menu items: DIAGNOSIS / OBD/MOBD / IMMOBILISER / DTC INFO / CLEAR CODES.
- (e) Press the YES button.





## 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 shorten labor time.

- Connect the intelligent tester to the DLC3.
- Turn the ignition switch ON and push the intelligent tester main switch ON.
- On the intelligent tester, enter the following menus:  
DIAGNOSIS/OBD MOBD/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	Immobiliser system status/ SET or UNSET	UNSET: Ignition switch ON SET: Without key	-
PERMIT (START)	Start control system starting control / OK or NG	OK: Start control system starting is permitted NG: Start control system starting is not permitted	-
RESPONSE	Transponder chip data/ NG or OK	NG: Data error OK: Data OK	-
FRAME ERROR	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: Matched sub-key code is sent	-
MASTER KEY	Master key code signal/ NOMATCH or MATCH	NOMATCH: Unmatched master key code is sent MATCH: Matched master key code is sent	-
REGIST SUB CODE	Number of registered sub-keys/ min. 0, max. 15	Number of registered sub-keys	-
REGIST MAS CODE	Number of registered master keys/ min. 0, max. 15	Number of registered master keys	-
REG CODE SPACE	Memory space for key code registration/ NOT FUL or FULL	NOT FUL: Possible to register more key codes FULL: Cannot register any more key codes	-
+B	+B judgment / NORMAL or BREAK	NORMAL: Battery supply is normal BREAK: Battery supply is malfunctioning	-
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 and push the intelligent tester main switch ON.
- (c) On the intelligent tester, enter the following menus: DIAGNOSIS/OBD MOBD/ACTIVE TEST.

**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	EI-24
B2784	Antenna Coil Open / Short	1. Wire harness 2. Transponder key amplifier 3. Transponder key ECU assembly	EI-27
B2793	Transponder Chip Malfunction	1. Key	EI-29
B2794	Unmatched Encryption Code	1. Key	EI-30
B2795	Unmatched Key Code	1. Key	EI-31
B2796	No Communication in Immobiliser System	1. Key 2. Transponder key amplifier 3. Wire harness 4. Transponder key ECU assembly	EI-32
B2797	Communication Malfunction No. 1	1. Key 2. Wire harness 3. Transponder key amplifier 4. Transponder key ECU assembly	EI-35
B2798	Communication Malfunction No. 2	1. Key	EI-32

### ECM DIAGNOSTIC TROUBLE CODE CHART

DTC No.	Detection Item	Trouble Area	See page
B2799	Engine Immobiliser System	1. Wire harness 2. ECM	EI-38

**NOTICE:**

The DTCs for the immobiliser 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>
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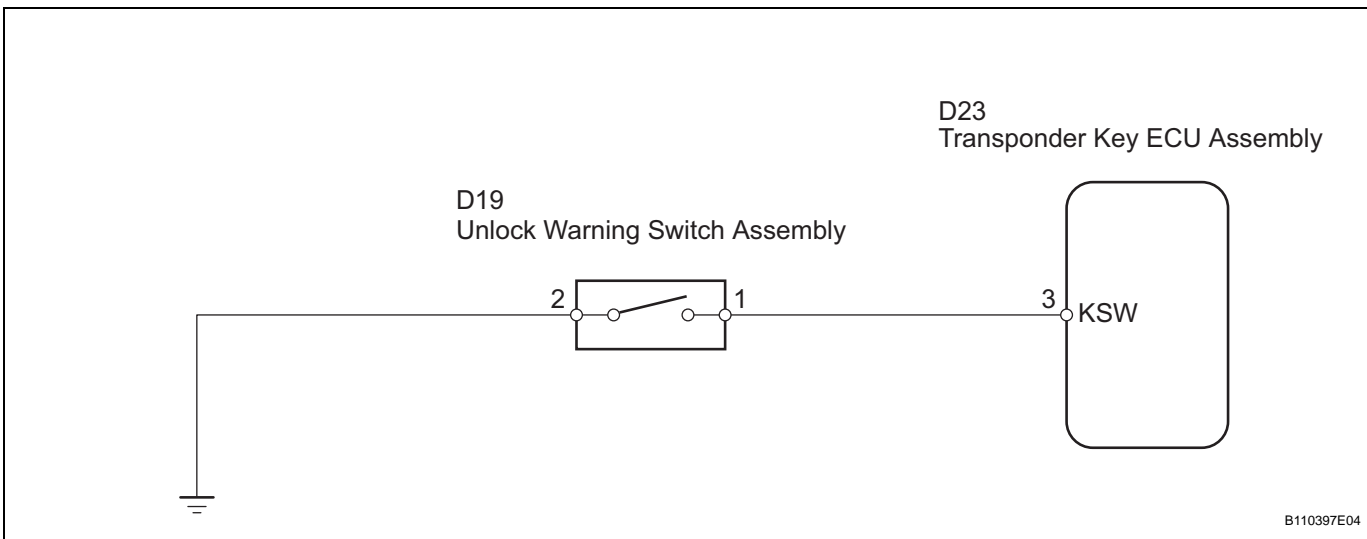
**DESCRIPTION**

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>

**EI**

**WIRING DIAGRAM**



**INSPECTION PROCEDURE**

<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/OBD MOBD/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:**

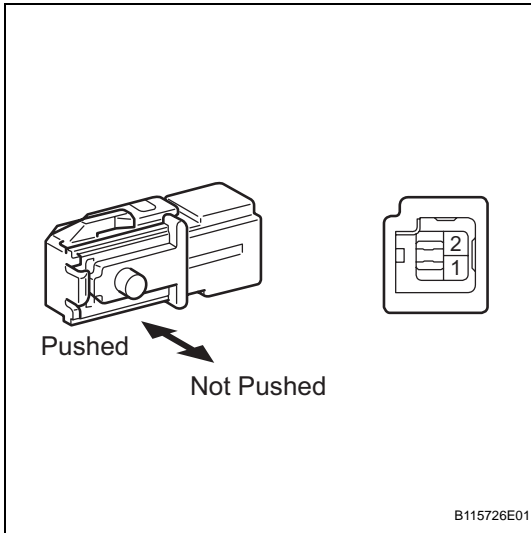
**"ON" (key is in ignition key cylinder) appears on the screen.**

<b>NG</b>	<b>Go to step 2</b>
-----------	---------------------

OK

## REPLACE TRANSPONDER KEY ECU ASSEMBLY

## 2 INSPECT UNLOCK WARNING SWITCH ASSEMBLY



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

**Standard resistance**

Tester Connection	Switch Condition	Specified Condition
1 - 2	Pushed	Below 1 $\Omega$
1 - 2	Not pushed	10 k $\Omega$ or higher

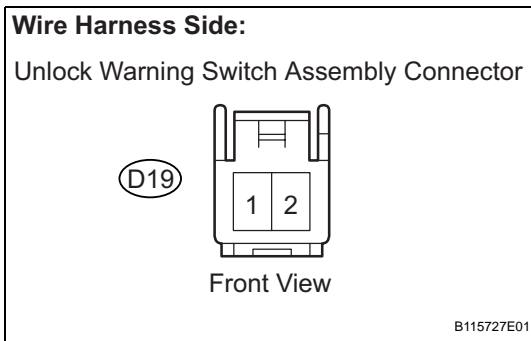
- (c) Reinstall the unlock warning switch assembly.

NG

**REPLACE UNLOCK WARNING SWITCH ASSEMBLY**

OK

## 3 CHECK HARNESS AND CONNECTOR (UNLOCK WARNING SWITCH ASSEMBLY - BODY GROUND)



- (a) Disconnect the D19 Unlock warning switch assembly connector.  
 (b) Measure the resistance of the wire harness side connector.

**Standard resistance**

Tester Connection	Specified Condition
D19-2 - Body ground	Below 1 $\Omega$

- (c) Reconnect the D19 unlock warning switch assembly connector.

NG

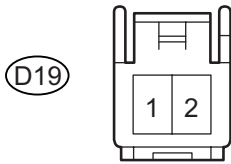
**REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

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

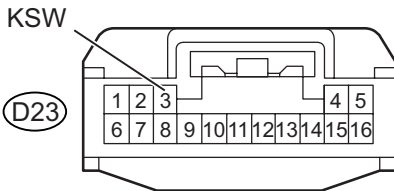
**Wire Harness Side:**

Unlock Warning Switch Connector



Front View

Transponder Key ECU Connector



Front View

B115728E03

- (a) Disconnect the D23 transponder key ECU connector.
- (b) Disconnect the D19 unlock warning switch assembly connector.
- (c) Measure the resistance of the wire harness side connectors.

**Standard resistance**

Tester Connection	Specified Condition
D23-3 (KSW) - D19-1	Below 1 Ω

- (d) Reconnect the D23 transponder key ECU connector.
- (e) Reconnect the D19 unlock warning switch assembly connector.

**NG**

**REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK**

**REPLACE TRANSPONDER KEY ECU ASSEMBLY**

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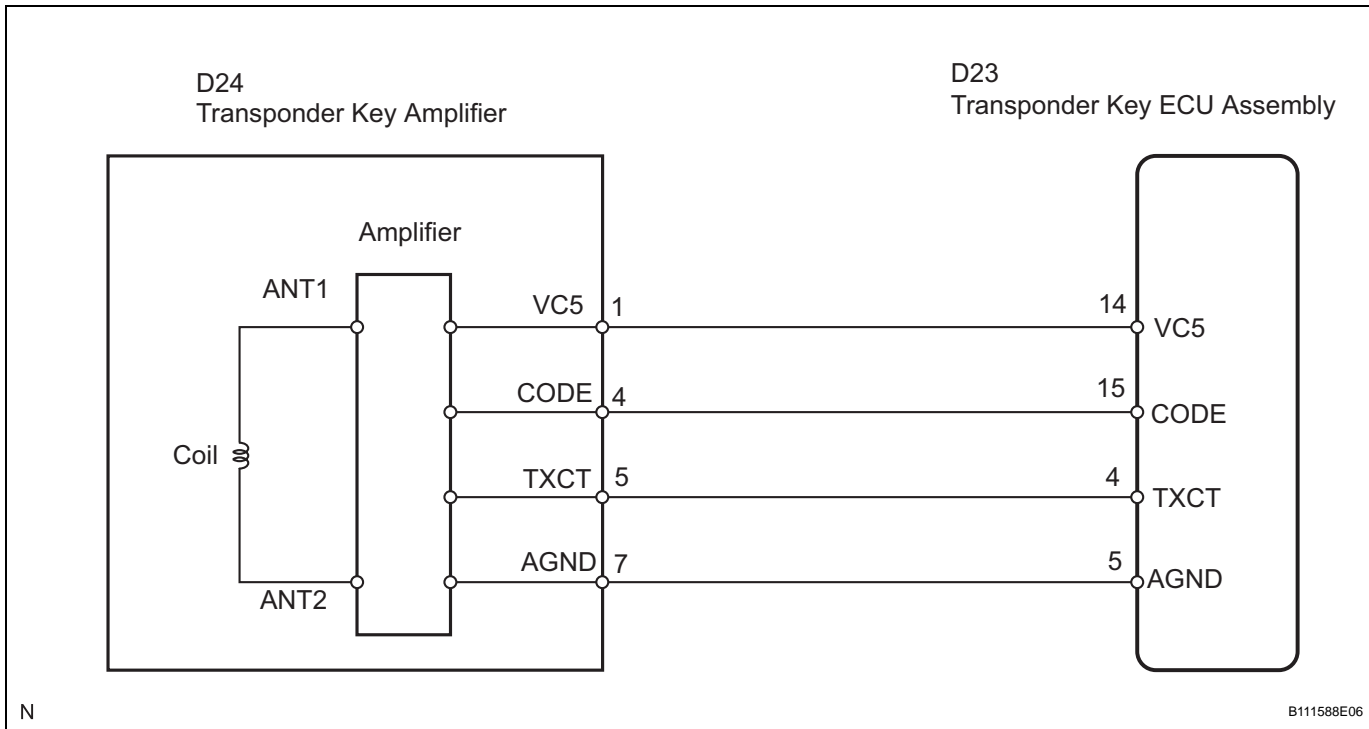
**DESCRIPTION**

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

EI

**WIRING DIAGRAM**



**INSPECTION PROCEDURE**

<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/OBD MOBD/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

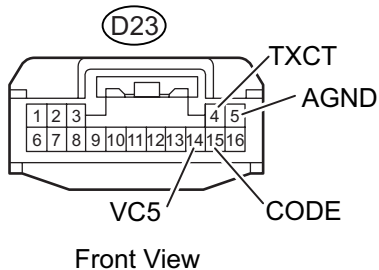
**REPLACE TRANSPONDER KEY ECU ASSEMBLY**

EI

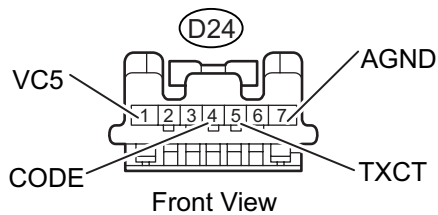
**2 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - TRANSPONDER KEY AMPLIFIER)**

**Wire Harness Side:**

Transponder Key ECU Connector



Transponder Key Amplifier Connector



B110403E15

- (a) Disconnect the D23 transponder key ECU connector.
- (b) Disconnect the D24 transponder key amplifier connector.
- (c) Measure the resistance of the wire harness side connectors.

**Standard resistance**

Tester Connection	Specified Condition
D23-14 (VC5) - D24-1 (VC5)	Below 1 Ω
D23-15 (CODE) - D24-4 (CODE)	Below 1 Ω
D23-4 (TXCT) - D24-5 (TXCT)	Below 1 Ω
D23-5 (AGND) - D24-7 (AGND)	Below 1 Ω
D23-14 (VC5) or D24-1 (VC5) - Body ground	10 kΩ or higher
D23-15 (CODE) or D24-4 (CODE) - Body ground	10 kΩ or higher
D23-4 (TXCT) or D24-5 (TXCT) - Body ground	10 kΩ or higher
D23-5 (AGND) or D24-7 (AGND) - Body ground	10 kΩ or higher

- (d) Reconnect the D23 transponder key ECU connector.
- (e) Reconnect the D24 transponder key amplifier connector.

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

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

**INSPECTION PROCEDURE****1****RE-REGISTER KEY**

- (a) Delete the DTC (See page [EI-22](#)).
- (b) Re-register the key (See page [EI-7](#)), and check that the engine starts with the key.

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

<b>DTC</b>	<b>B2794</b>	<b>Unmatched Encryption Code</b>
------------	--------------	----------------------------------

**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

**INSPECTION PROCEDURE****EI**

<b>1</b>	<b>REPLACE KEY</b>
----------	--------------------

**NEXT**

<b>END</b>
------------

**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

**INSPECTION PROCEDURE****1**

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

- (a) Delete the 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**

**END (BECAUSE OF KEY RE-REGISTRATION)**

**EI**

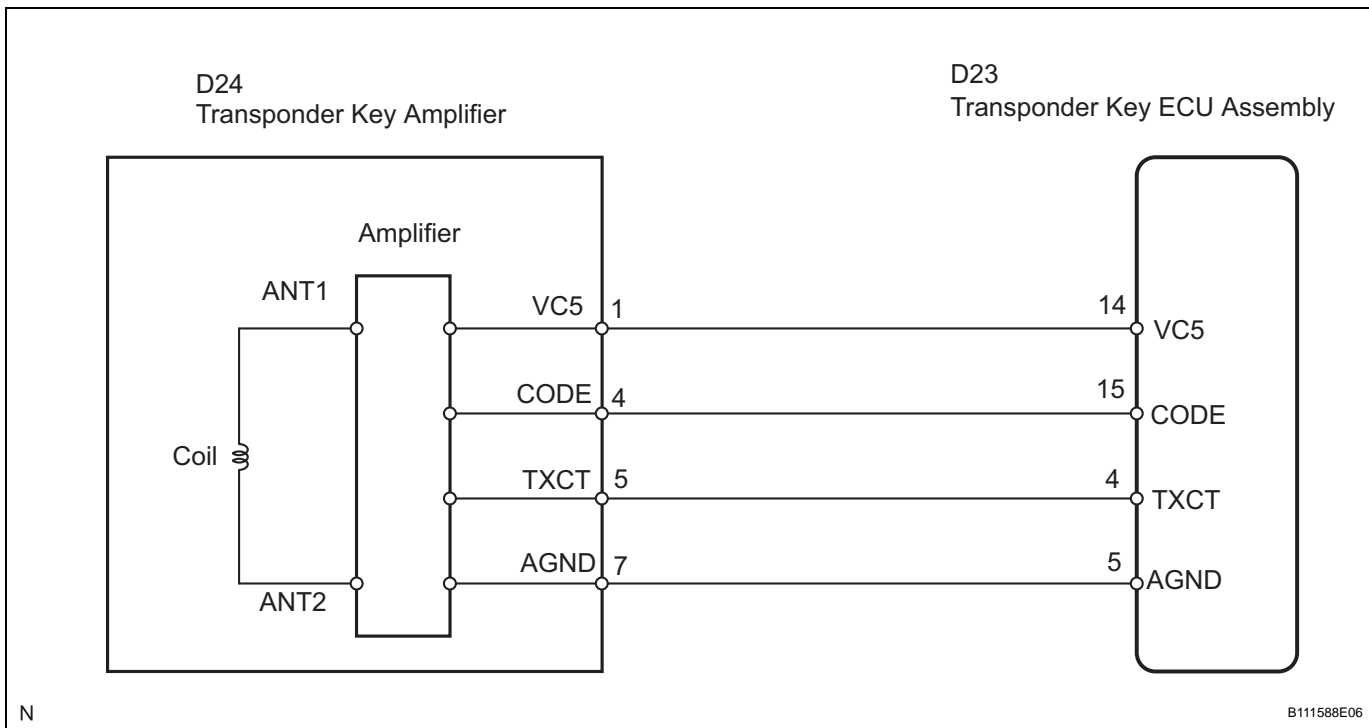
<b>DTC</b>	<b>B2796</b>	<b>No Communication in Immobiliser System</b>
<b>DTC</b>	<b>B2798</b>	<b>Communication Malfunction No. 2</b>

## 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



## INSPECTION PROCEDURE

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

- Connect the intelligent tester to the DLC3.
- Turn the ignition switch ON with the key that cannot start the engine.

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

**Transponder key ECU assembly**

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
IMMOBILISER	Immobiliser 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**

**EI**

**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 cannot start the engine.
- (c) On the intelligent tester, enter the following menus: DIAGNOSIS/OBD MOBD/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.

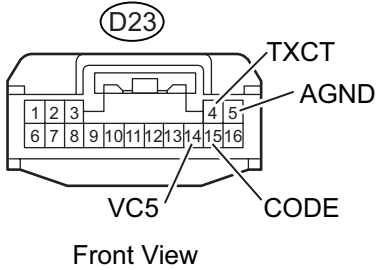
**NG** → **REPLACE TRANSPONDER KEY AMPLIFIER**

OK

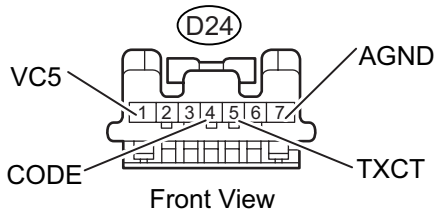
**4 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - TRANSPONDER KEY AMPLIFIER)**

**Wire Harness Side:**

Transponder Key ECU Connector



Transponder Key Amplifier Connector



B110403E15

- (a) Disconnect the D23 transponder key ECU connector.
- (b) Disconnect the D24 transponder key amplifier connector.
- (c) Measure the resistance of the wire harness side connectors.

**Standard resistance**

Tester Connection	Specified Condition
D23-14 (VC5) - D24-1 (VC5)	Below 1 Ω
D23-15 (CODE) - D24-4 (CODE)	Below 1 Ω
D23-4 (TXCT) - D24-5 (TXCT)	Below 1 Ω
D23-5 (AGND) - D24-7 (AGND)	Below 1 Ω
D23-14 (VC5) or D24-1 (VC5) - Body ground	10 kΩ or higher
D23-15 (CODE) or D24-4 (CODE) - Body ground	10 kΩ or higher
D23-4 (TXCT) or D24-5 (TXCT) - Body ground	10 kΩ or higher
D23-5 (AGND) or D24-7 (AGND) - Body ground	10 kΩ or higher

- (d) Reconnect the D23 transponder key ECU connector.
- (e) Reconnect the D24 transponder key amplifier connector.

**NG** REPAIR OR REPLACE HARNESS OR 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

**END (TRANSPONDER KEY AMPLIFIER DEFECTIVE)**

<b>DTC</b>	<b>B2797</b>	<b>Communication Malfunction No. 1</b>
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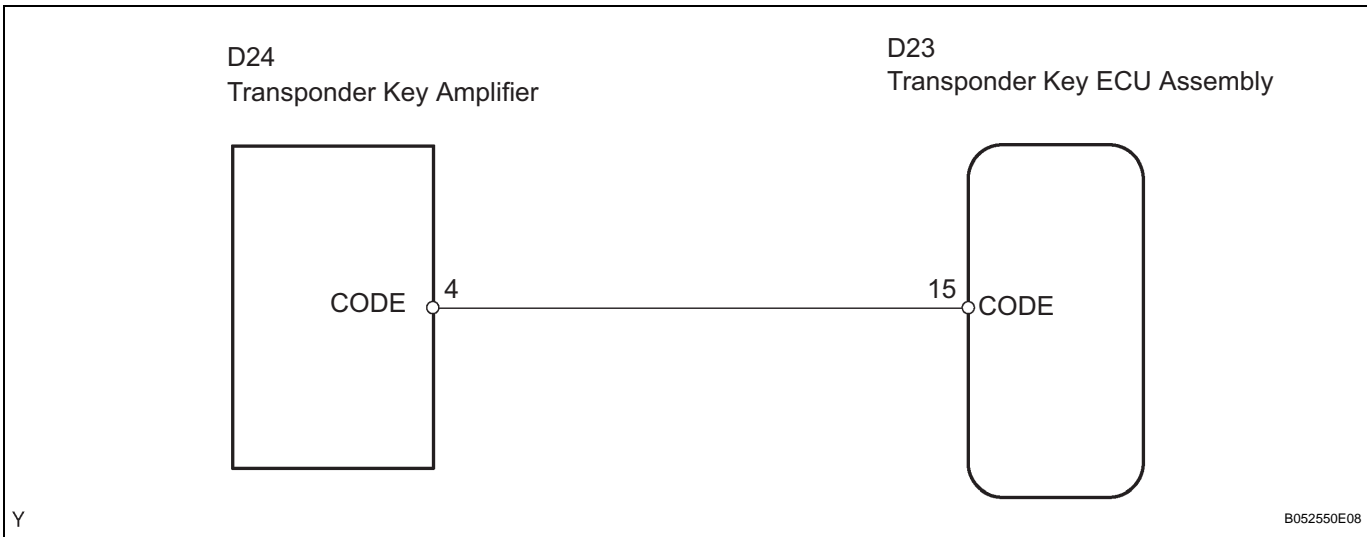
**DESCRIPTION**

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>

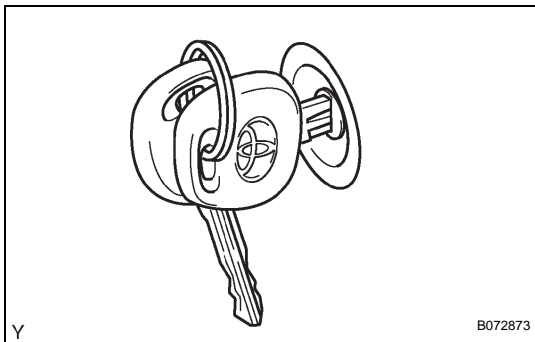
EI

**WIRING DIAGRAM**



**INSPECTION PROCEDURE**

<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 ring is in contact with the key grip.	A
The key is not near other keys and/or the key ring is not in contact with the key grip.	B



**2 CHECK DTC**

- (a) Separate the keys from each other and/or remove the key ring.
- (b) Delete the DTC (See page EI-22).
- (c) Insert a key into the ignition cylinder. Remove it. Repeat for all the other keys.
- (d) Check that no code is output.

**OK:**

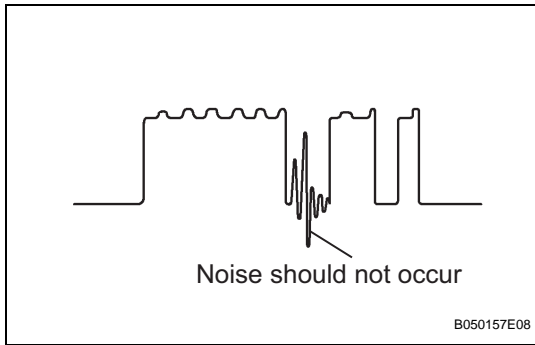
**No code is output.**

**NG** → **Go to step 3**

**OK**

**END (INSPECTION FINISHED)**

**3 CHECK TRANSPONDER KEY ECU ASSEMBLY**



- (a) Using an oscilloscope or the intelligent tester, check for noise in the waveform between the terminals of the D24 transponder key amplifier connector and D23 transponder key ECU connector.

**Result**

Tester Connection	Specified Condition
D23-15 (CODE) - D24-4 (CODE)	No noise is occur

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

**NG** → **FIND CAUSE OF NOISE AND REMOVE IT**

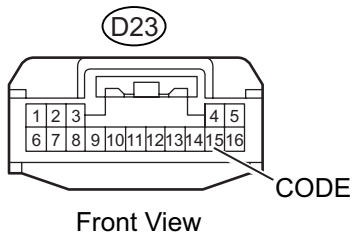
**OK**



#### 4 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - TRANSPONDER KEY AMPLIFIER)

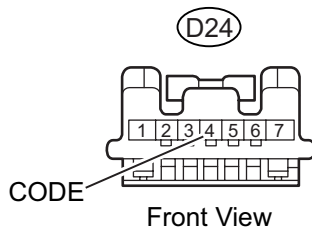
##### Wire Harness Side:

Transponder Key ECU Connector



Front View

Transponder Key Amplifier Connector



Front View

B110403E16

- Disconnect the D23 transponder key ECU connector.
- Disconnect the D24 transponder key amplifier connector.
- Measure the resistance of the wire harness side connectors.

##### Standard resistance

Tester Connection	Specified Condition
D23-15 (CODE) - D24-4 (CODE)	Below 1 $\Omega$

- Reconnect the D23 transponder key ECU connector.
- Reconnect the D24 transponder amplifier connector.

NG

**REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

#### 5 REPLACE TRANSPONDER KEY AMPLIFIER

- 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

**END (TRANSPONDER KEY AMPLIFIER DEFECTIVE)**

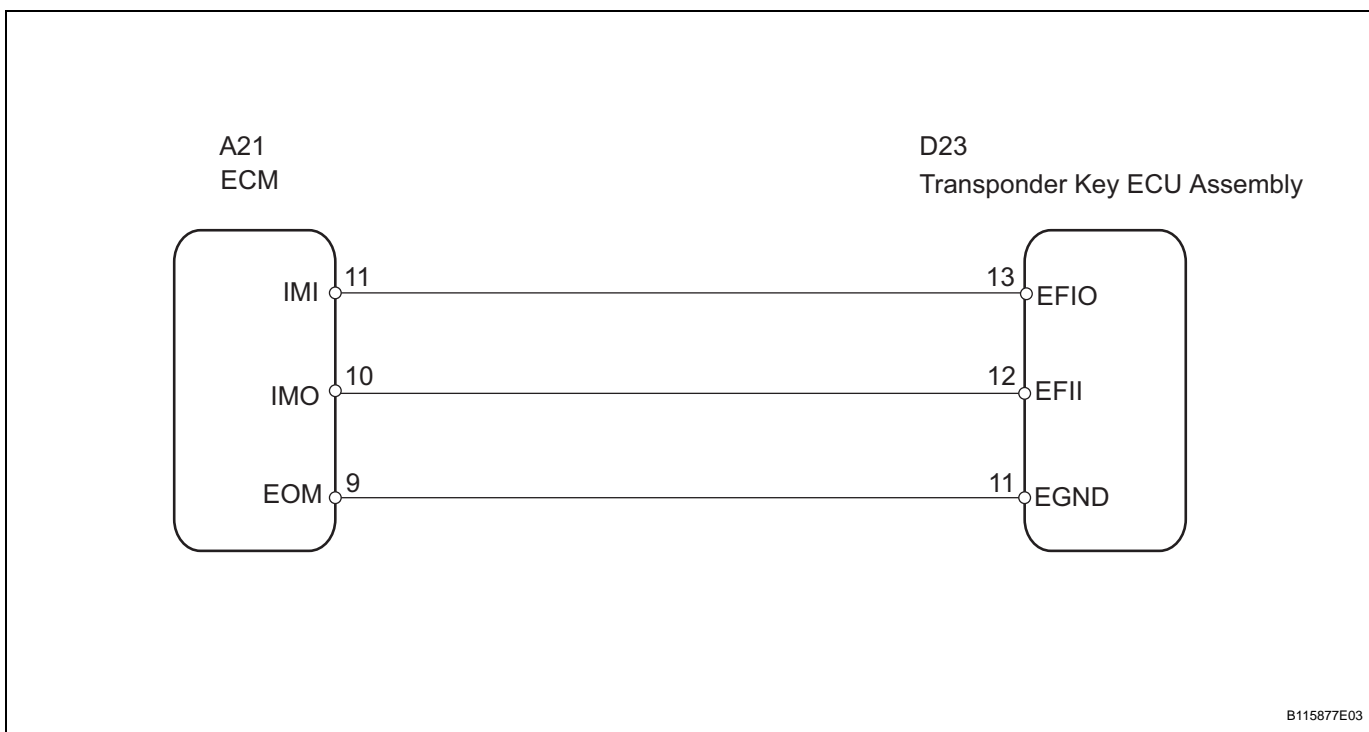
<b>DTC</b>	<b>B2799</b>	<b>Engine Immobiliser System Malfunction</b>
------------	--------------	--

**DESCRIPTION**

This DTC is output when: 1) the ECM detects errors in its own communication with the transponder key ECU; 2) the ECM detects errors in the communication lines; and 3) the ECU - ECM communication IDs 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.

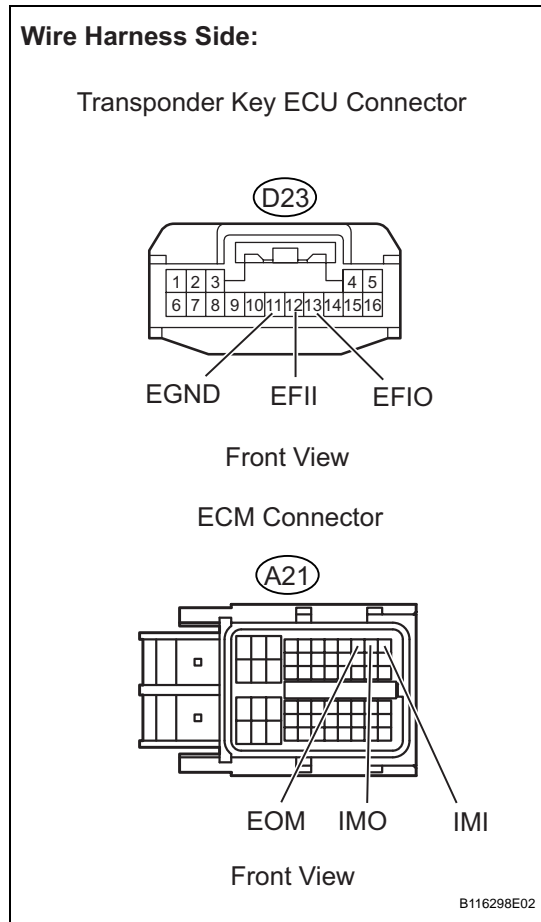
DTC No.	DTC Detection Condition	Trouble Area
B2799	<ul style="list-style-type: none"> <li>Error in communication between ECM and transponder key ECU, or in communication line</li> <li>Communication ID in transponder key ECU is different</li> </ul>	<ul style="list-style-type: none"> <li>Wire harness</li>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

**WIRING DIAGRAM**



**INSPECTION PROCEDURE**

**1 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU ASSEMBLY - ECM)**



- (a) Disconnect the D23 transponder key ECU connector.
- (b) Disconnect the A21 ECM connector.
- (c) Measure the resistance of the wire harness side connectors.

**Standard resistance**

Tester Connection	Specified Condition
D23-13 (EFIO) - A21-11 (IMI)	Below 1 Ω
D23-12 (EFII) - A21-10 (IMO)	Below 1 Ω
D23-11 (EGND) - A21-9 (EOM)	Below 1 Ω
D23-13 (EFIO) or A21-11 (IMI) - Body ground	10 kΩ or higher
D23-12 (EFII) or A21-10 (IMO) - Body ground	10 kΩ or higher

- (d) Reconnect the D23 transponder key ECU connector.
- (e) Reconnect the A21 ECM connector.

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

**OK**

**REPLACE ECM**

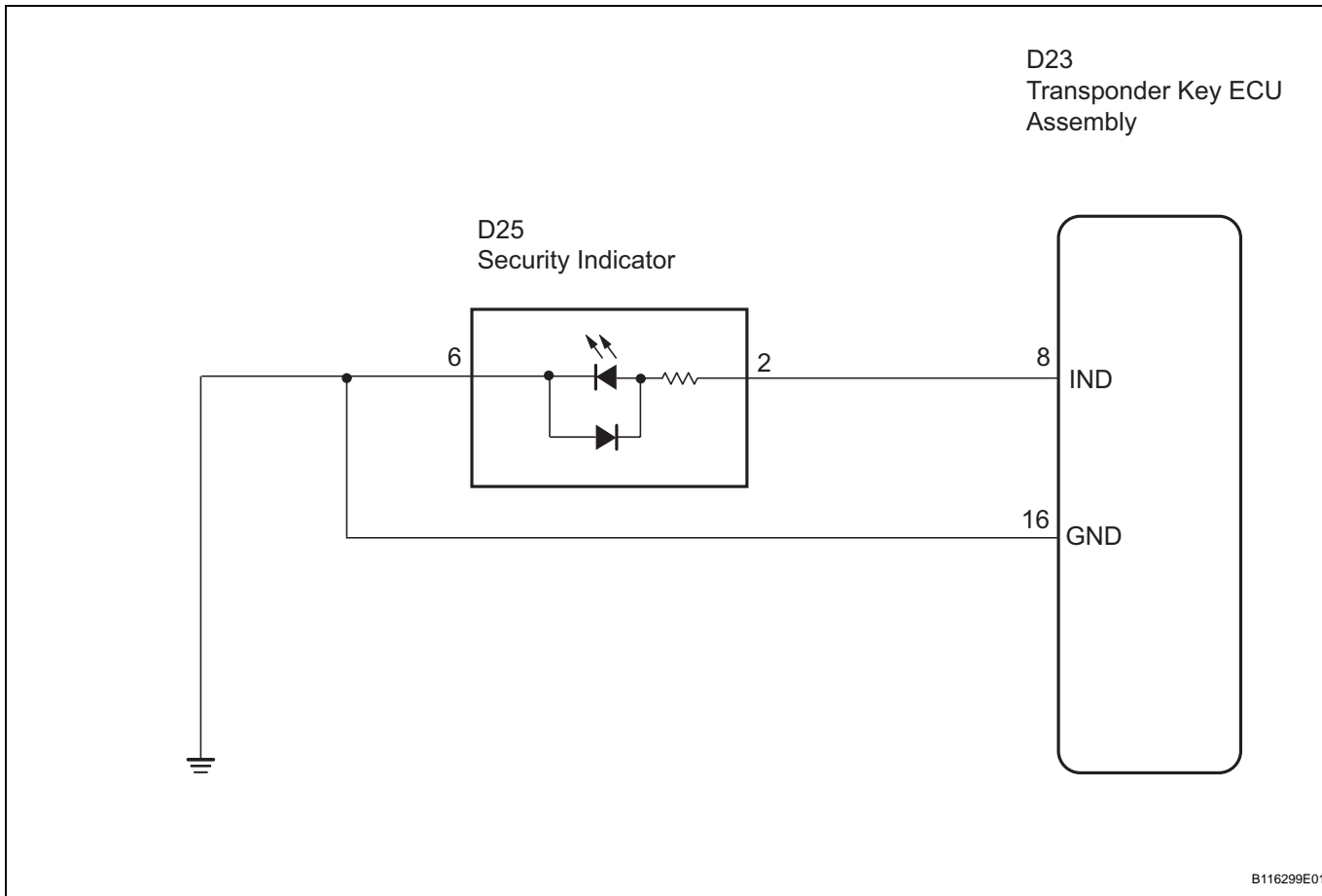
**EI**

## Security Indicator Light Circuit

### DESCRIPTION

When the transponder key is registered, the transponder key ECU assembly outputs the key registration condition by lighting up, blinking or turning off the security indicator.

### WIRING DIAGRAM



### INSPECTION PROCEDURE

#### 1 PERFORM ACTIVE TEST BY INTELLIGENT TESTER

- (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

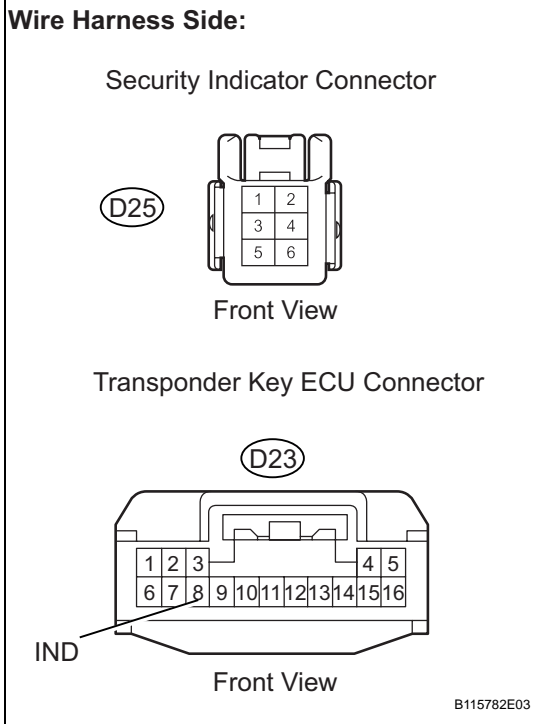
Item	Tester Details	Diagnostic Note
SECURITY INDIC	Turn security indicator ON/OFF	-

**OK:**  
Security indicator turns ON and OFF



NG

**2 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - SECURITY INDICATOR LIGHT)**



- (a) Disconnect the D23 transponder key ECU connector.
- (b) Disconnect the D25 security indicator connector.
- (c) Measure the resistance.

**Standard resistance**

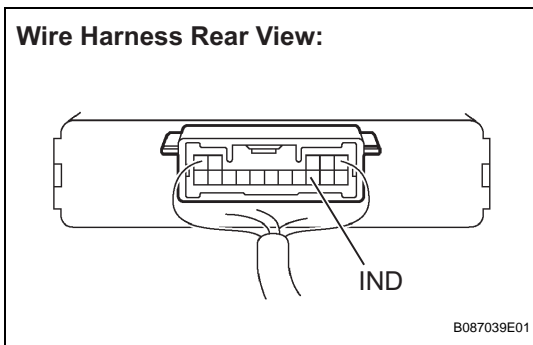
Tester Condition	Specified Condition
D23-8 (IND) - D25-2	Below 1Ω
D23-8 (IND) - Body ground	10 kΩ or higher

- (d) Reconnect the D23 transponder key ECU connector.
- (e) Reconnect the D25 security indicator connector.

**NG REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

**3 INSPECT TRANSPONDER KEY ECU ASSEMBLY**



- (a) Measure the voltage.
- Standard voltage**

Tester Condition	Condition	Specified Condition
D23-8 (IND) - Body ground	Immobiliser set	11 to 14 V and below 1 V output alternately

**NG REPLACE TRANSPONDER KEY ECU ASSEMBLY**

OK

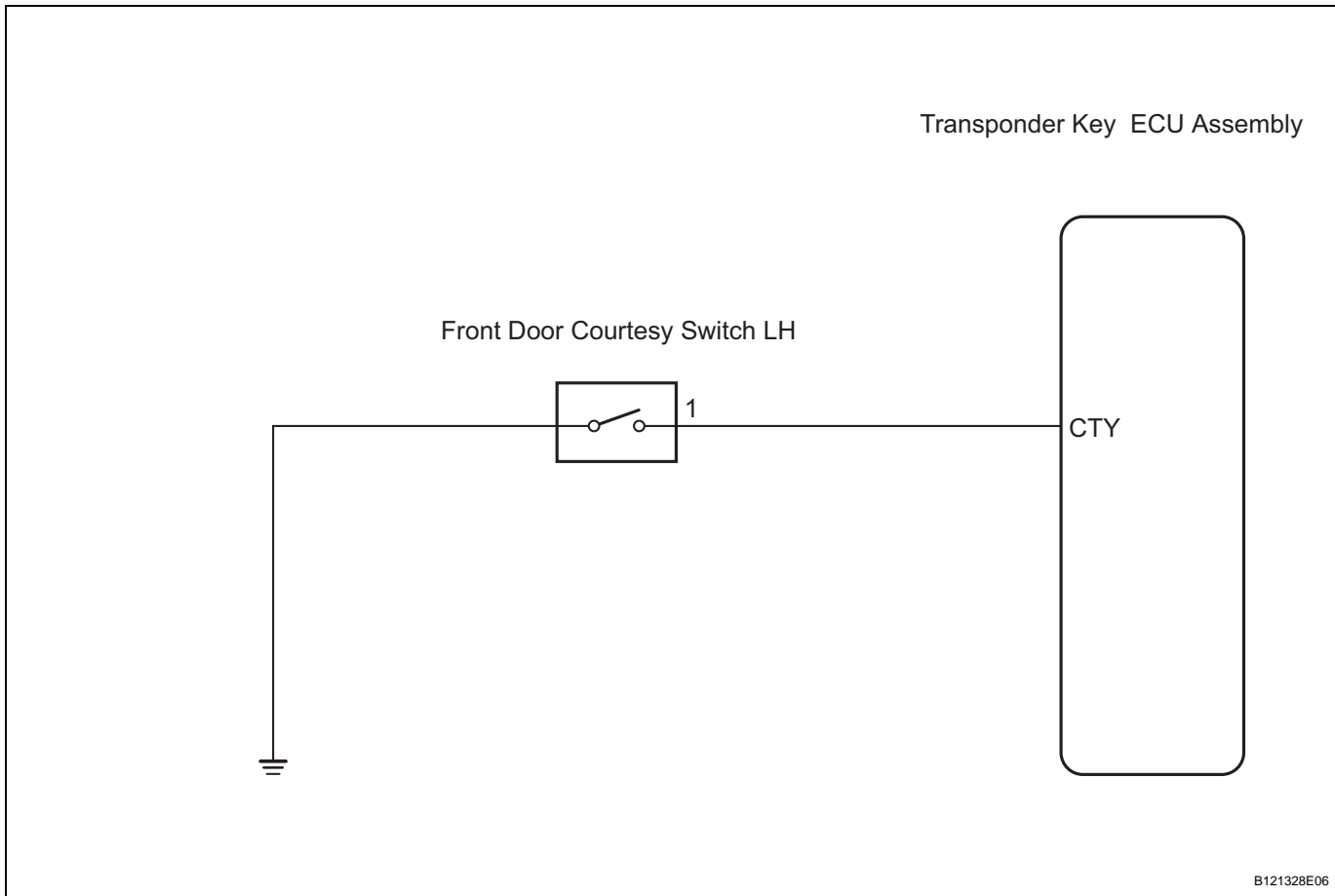
**REPLACE SECURITY INDICATOR LIGHT**

## Door Courtesy Switch Circuit

### DESCRIPTION

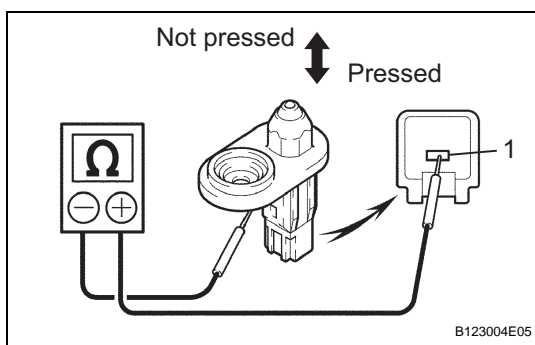
When an additional transponder key is registered, the transponder key ECU assembly detects the front door courtesy light switch open/closed condition to register the key.

### WIRING DIAGRAM



### INSPECTION PROCEDURE

#### 1 INSPECT FRONT DOOR COURTESY SWITCH ASSEMBLY



- (a) Remove the driver side front door courtesy switch.
- (b) Measure the resistance.

#### Standard resistance

Tester Connection	Condition	Specified Condition
1 - Switch body	Switch pressed	10 k $\Omega$ or higher
1 - Switch body	Switch free	Below 1 $\Omega$

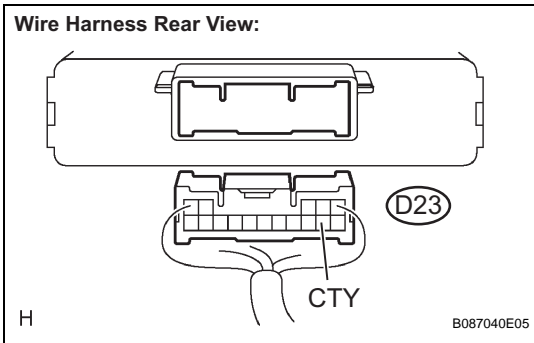
- (c) Reinstall the driver side front door courtesy switch.

**NG**

**REPLACE FRONT DOOR COURTESY SWITCH ASSEMBLY**

OK

**2 CHECK HARNESS AND CONNECTOR (FRONT DOOR COURTESY SWITCH CIRCUIT)**



- (a) Disconnect the D23 ECU connector.
- (b) Measure the resistance.

**Standard resistance**

Tester Connection	Condition	Specified Condition
D23-7 (CTY) - Body ground	Courtesy switch pushed	10 k $\Omega$ or higher
D23-7 (CTY) - Body ground	Courtesy switch free	Below 1 $\Omega$

- (c) Reconnect the ECU connector.

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

OK

**PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

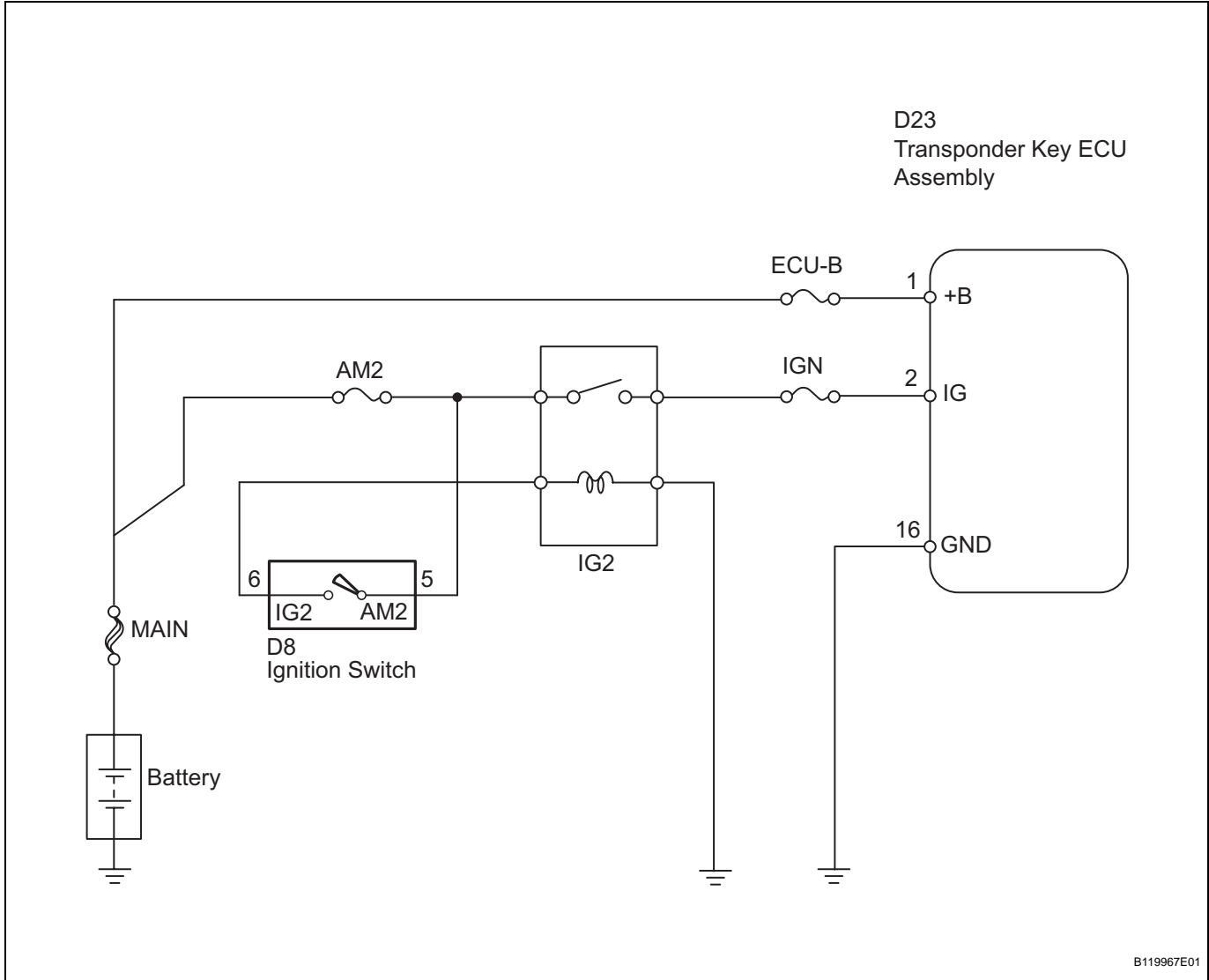
EI

# ECU Power Source Circuit

## DESCRIPTION

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

## WIRING DIAGRAM

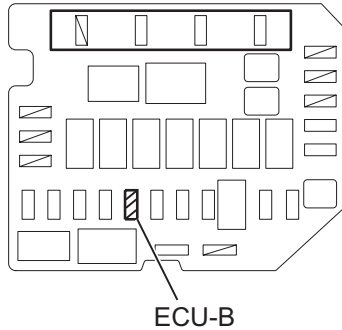




## INSPECTION PROCEDURE

## 1 INSPECT FUSE (ECU-B)

Engine Room R/B:



(a) Remove the ECU-B fuse from the engine room R/B and J/B.

(b) Measure the ECU-B fuse resistance.

**Standard resistance:**

**Below 1  $\Omega$**

(c) Reinstall the ECU-B fuse.

NG

REPLACE FUSE

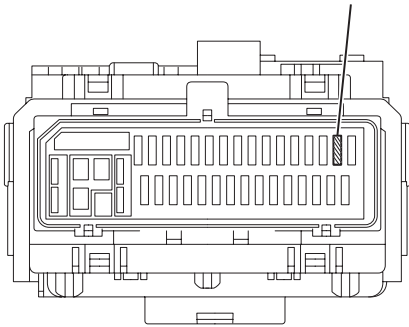
EI

OK

## 2 INSPECT FUSE (IGN)

Main Body ECU:

IGN Fuse



(a) Remove the IGN fuse from the main body ECU.

(b) Measure the IGN fuse resistance.

**Standard resistance:**

**Below 1  $\Omega$**

(c) Reinstall the IGN fuse.

NG

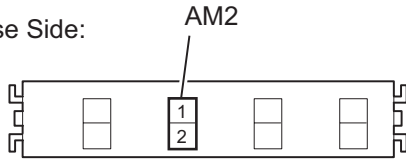
REPLACE FUSE

OK

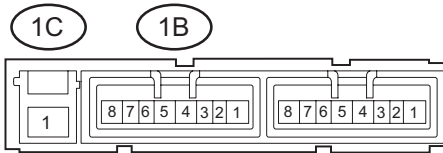
**3 INSPECT INTEGRATION RELAY (IG2 RELAY AND AM2 FUSE)**

**Integration Relay:**

Fuse Side:



Connector Side:



Y

A107921E11

- (a) Remove the integration relay from the engine room R/B and J/B.
- (b) Inspect the AM2 fuse.
  - (1) Remove the AM2 fuse from the integration relay.
  - (2) Measure the resistance of the AM2 fuse.
 

**Standard resistance:**  
**Below 1 Ω**
  - (3) Reinstall the AM2 fuse.
- (c) Inspect the IG2 relay.
  - (1) Measure the resistance between the terminals shown below.
 

**Standard resistance**

Tester Connections	Specified Conditions
1C-1-1B-4	10 kΩ or higher
	Below 1 Ω (when battery voltage is applied to terminals 1B-2 and 1B-3)
1C-1-1B-1	Below 1 Ω

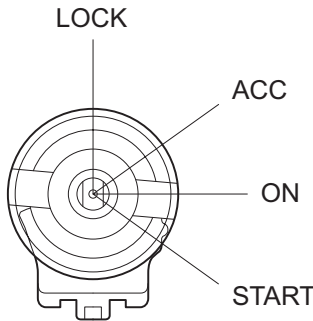
- (2) Reinstall the integration relay.

**NG** → **REPLACE INTEGRATION RELAY**

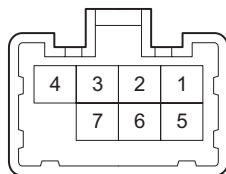
**OK**

**4 INSPECT IGNITION SWITCH ASSEMBLY**

**Component Side :**



Ignition Switch



Front View

Y

A107906E01

- (a) Disconnect the D8 ignition switch connector.
- (b) Measure the resistance between the terminals shown below.
 

**Standard resistance**

Key Position	Tester Connection	Specified Condition
LOCK	-	10 kΩ or higher
ACC	2-4	Below 1 Ω
ON	1-2-4	Below 1 Ω
	5-6	Below 1 Ω
START	1-3-4	Below 1 Ω
	5-6-7	Below 1 Ω

- (c) Reconnect the D8 ignition switch connector.

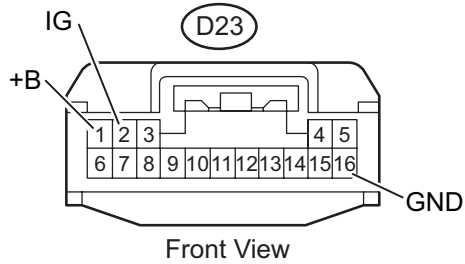
**NG** → **REPLACE IGNITION SWITCH ASSEMBLY**

**OK**

**5 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - BATTERY AND BODY GROUND)**

Wire Harness Side:

Transponder Key ECU Connector



B110782E07

- (a) Disconnect the D23 transponder key ECU connector.
- (b) Measure the voltage of the wire harness side connector.

**Standard voltage**

Tester Connection	Condition	Specified Condition
D23-1 (+B) - Body ground	Always	11 to 14 V
D23-2 (IG) - Body ground	Ignition switch OFF	Below 1 V
	Ignition switch ON	11 to 14 V

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

**Standard resistance**

Tester Connection	Specified Condition
D23-16 (GND) - Body ground	Below 1 Ω

- (d) Reconnect the D23 transponder key ECU connector.

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

**OK**

**REPLACE TRANSPONDER KEY ECU ASSEMBLY**