Advanced Card Systems Ltd.
Card & Reader Technologies

ACR3x
Mobile Card Reader

User Manual V1.02

Subject to change without prior notice

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1.0. Introduction

The ACR3x Mobile Card Reader serves as an interface for the communication between a mobile device and a magnetic stripe card or smart card. Different types of cards have different communication protocols which, in most cases, prevent direct communication between a card and a mobile device.The ACR3x Mobile Card Reader establishes a uniform interface from the mobile device to the card. By taking care of the card's particulars, it releases the computer software programmer from being responsible with the operations' technical details, which in many cases, are not relevant to the implementation of the card system.

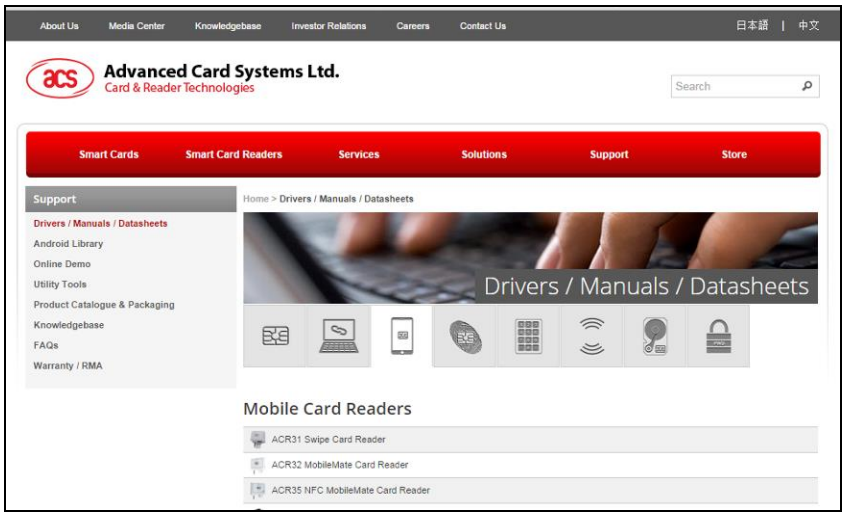
This document contains information regarding the installation and workflow of demo included in the Android™ and iOS library of the ACR3x Mobile Card Reader.

2.0. Installing the demo application

Download the device library from the download page of ACS's Mobile Card Reader below:

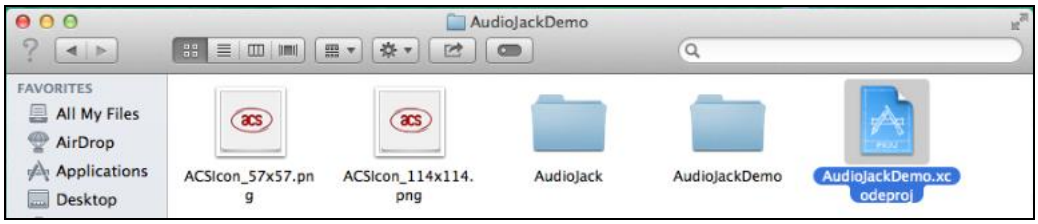
http://www.acs.com.hk/en/drivers/

The library supports both iOS and Android on AR31, ACR3201 and ACR35.



2.1. For iOS

1. Using XCode application, open the *AudioJackDemo.xcodeproj*.



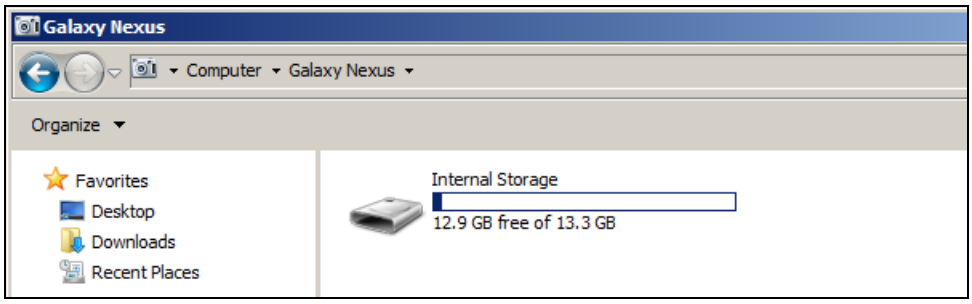
2. Transfer the *AudioJackDemo.xcodeproj* to your mobile device by choosing your mobile device and then clicking the play button.

   Note: *Make sure that your mobile device is connected to your computer.*

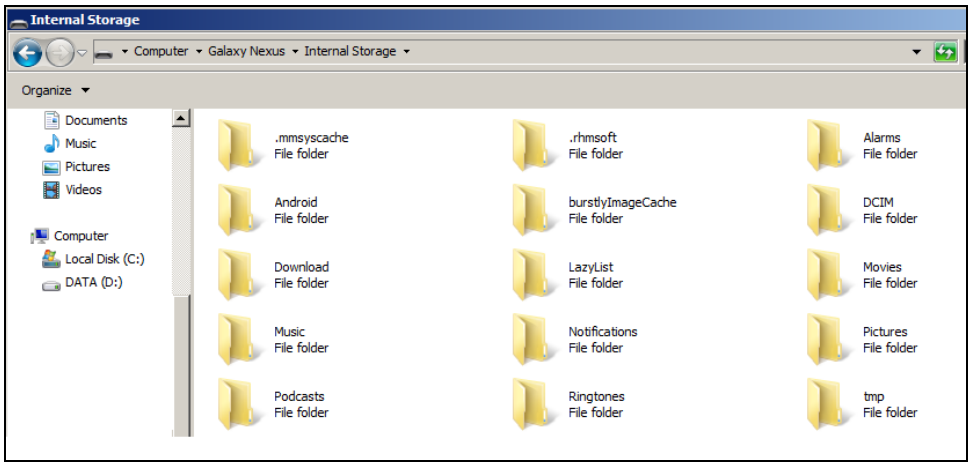
   Please include dummy.mm into your application development.

2.2. For Android™

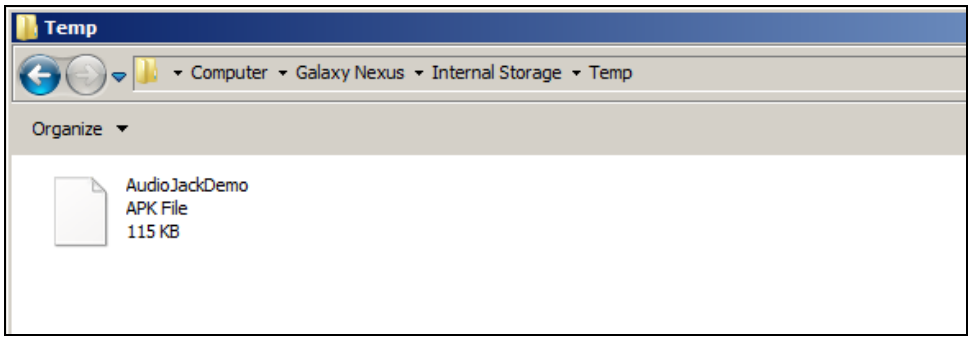
1. Connect your mobile device to the computer.



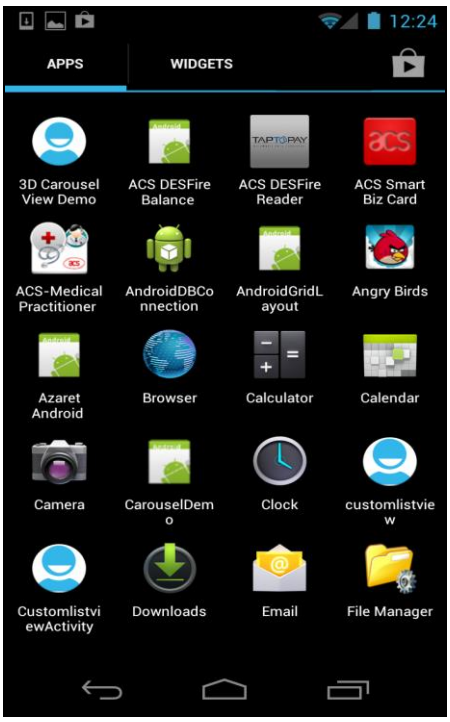
2. In the internal storage of your device, create a folder where the ACR3X Android demo will be placed.



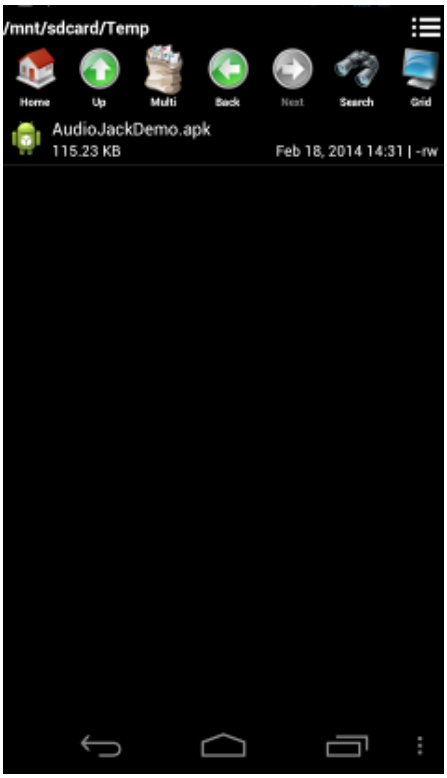
3. Copy the *AudioJackDemo.apk* file from the downloaded ACR31 Android library into the previously created folder.



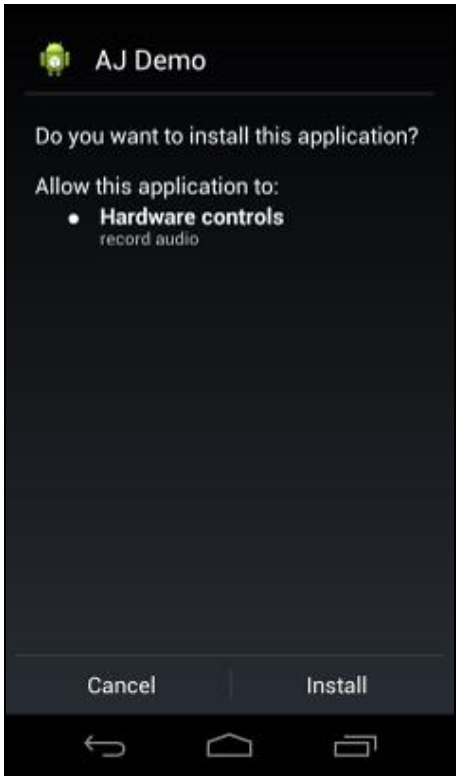
4. Disconnect your mobile device from the computer, and then locate the *AudioJackDemo.apk* using a file manager application.



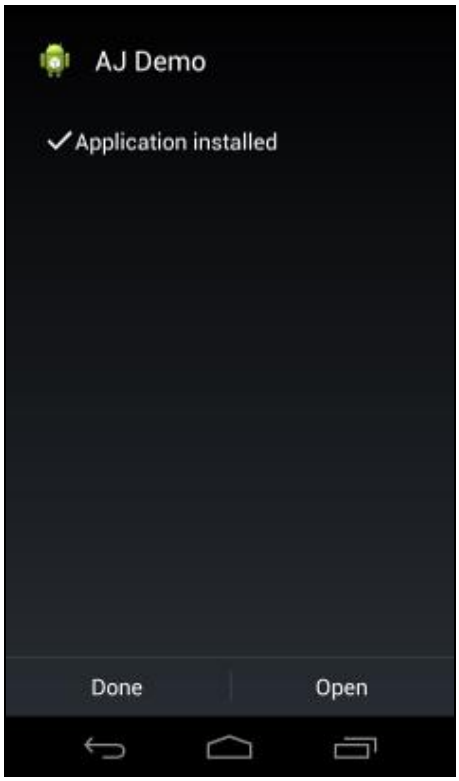
5. Tap the *AudioJackDemo.apk* file to start the installation process.



6. A prompt will ask for hardware control access. Tap **Install** to proceed.



7. Once the installation is complete, you may now open the AJ Demo application.



3.0. Using the application with ACR31 mobile card reader

This section provides a simple step-by-step procedure on how to use the ACR31 mobile card reader with a magnetic stripe, ICC or PICC card using the AudioJack demo application.

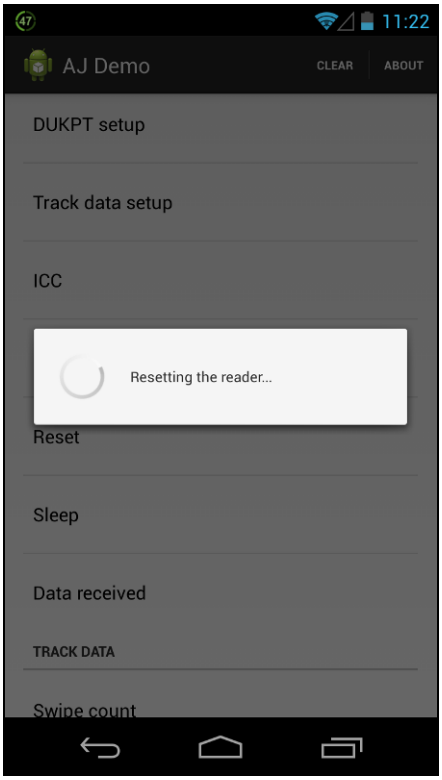
3.1. Using a magnetic stripe card

1. Open the **AJ Demo application**.
2. Connect the ACR31 to the audio port of your mobile device.

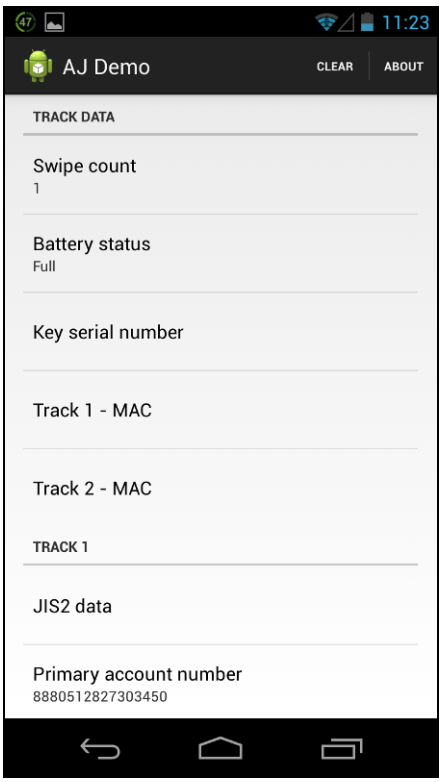
   Note: *Make sure that the volume is set to its maximum level to allow communication between the ACR31 reader and your mobile device.*

3. The reader is in sleep mode by default. Tap **Reset** to wake up the reader.

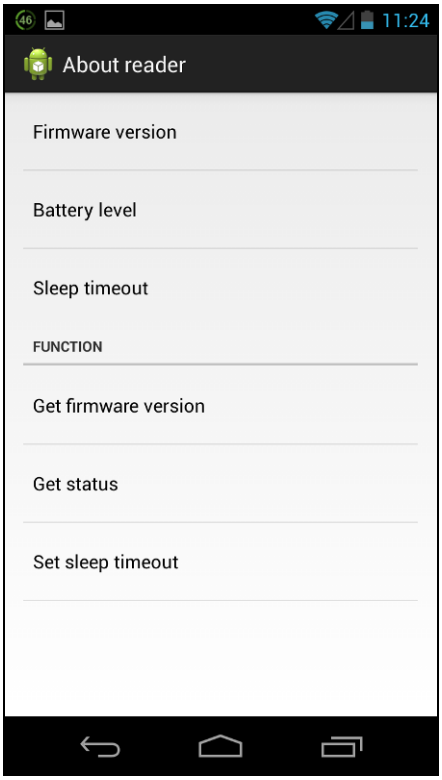
   Note: *By default, the reader will enter sleep mode if there is no operation after 4 seconds.(default).*



4. Swipe your magnetic stripe card to the reader. The reader and card details will be displayed on the screen.



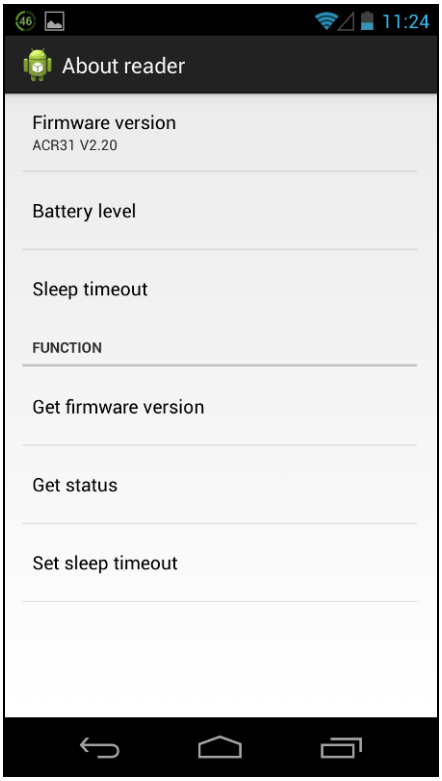
5. Tap **About reader** to know more about the firmware version, battery status and sleep timeout.



3.1.1. Get firmware version

To get the reader's firmware version:

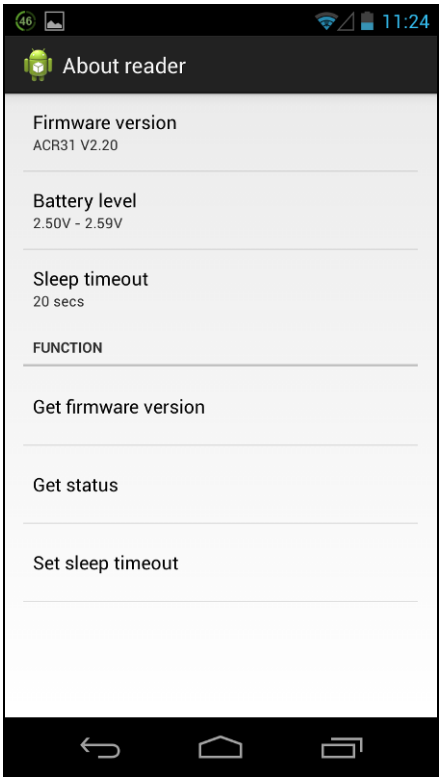
1. Go to **About reader**, and then tap **Get firmware version**.



3.1.2. Get battery status

To get the battery status:

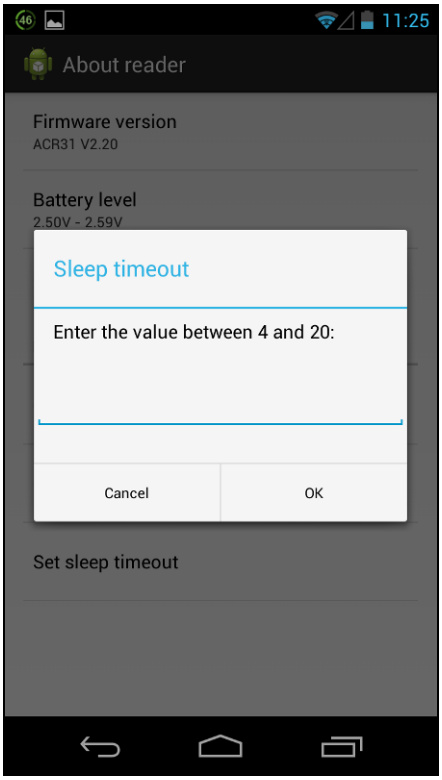
1. Go to **About reader**, and then tap **Get status**.



3.1.3. Set sleep timeout

To set the sleep timeout:

1. Go to **About reader**, and then tap **Sleep timeout**.
2. Enter a value between 4 and 20, and then tap **OK**.



3.1.3.1. Customize ID

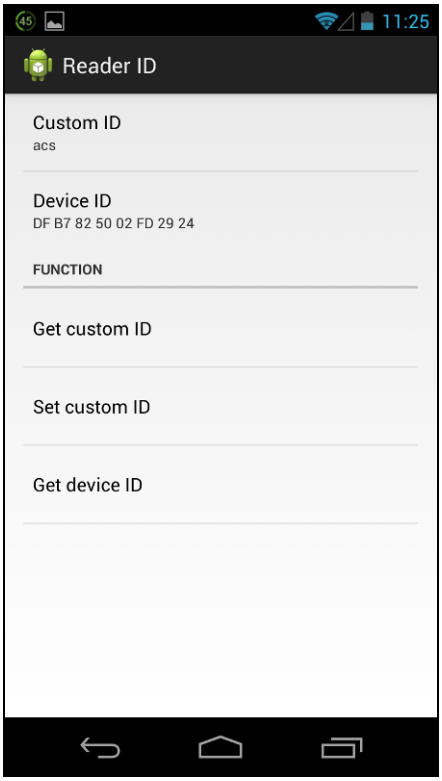
To change the Custom ID:

1. Go to **Reader ID**, and then tap **Set custom ID**.
2. Type in your preferred ID text, and then tap **OK**.

3.1.3.2. Get Device ID

To get the Device ID:

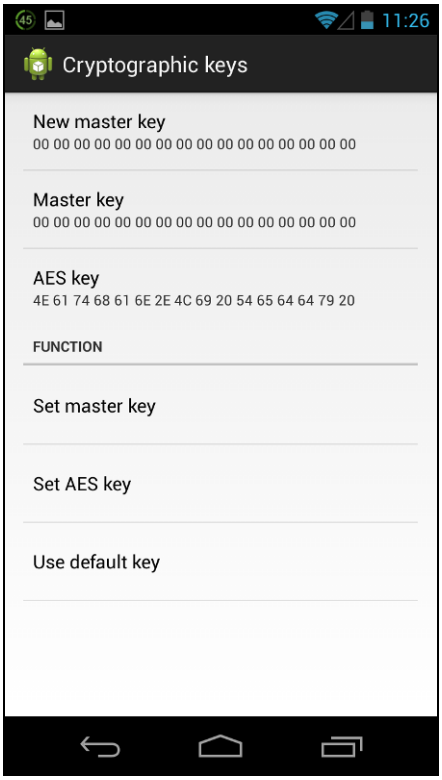
1. Go to **Reader ID**, and then tap **Get device ID**.



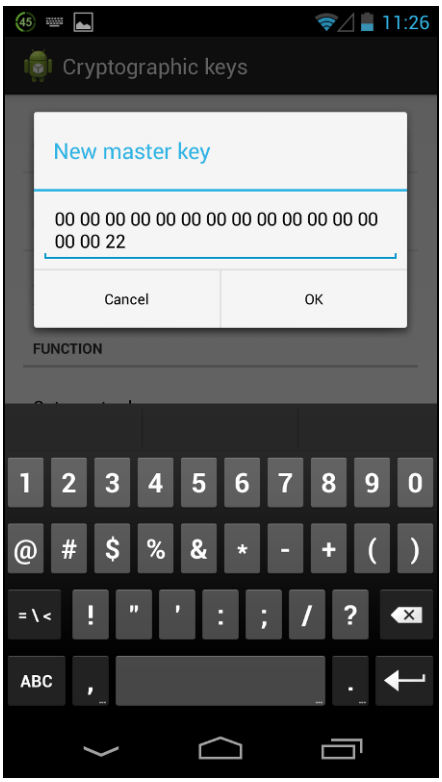
3.1.3.3. Change master key

The master key is used to change the setting in the application and the reader (e.g., Custom ID and AES Key). In order to use the new master key, authentication is required.

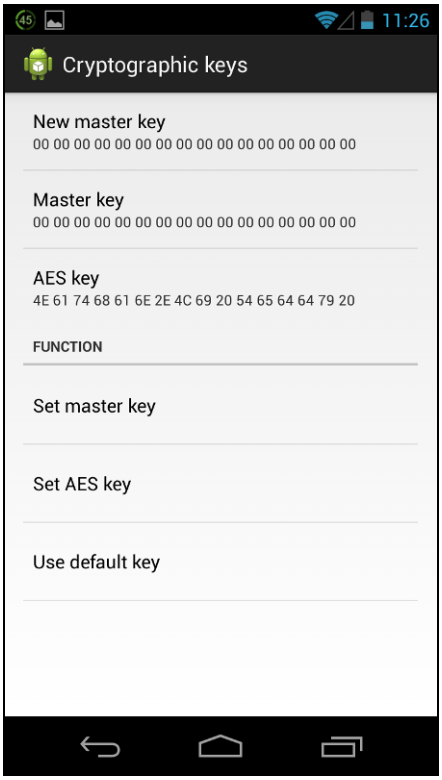
1. Go to **Cryptographic keys**, and then tap **New master key**.



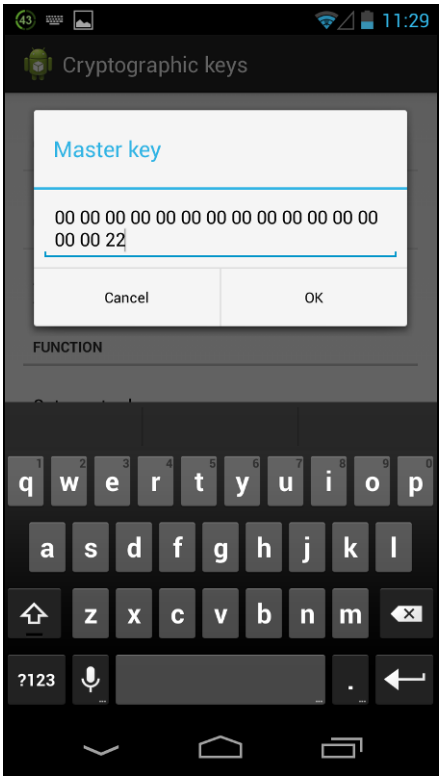
2. Type in your preferred value (in hexadecimal format), and then tap **OK**.



3. Tap **Set master key** to change the master key inside the ACR31.



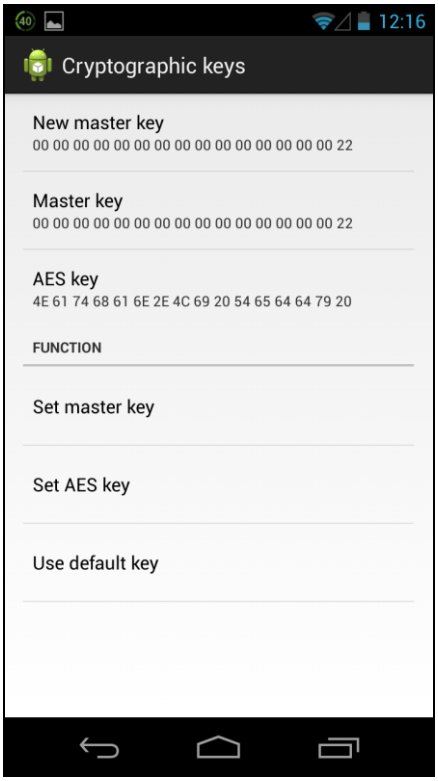
4. Tap **Master key** to make it similar with the **New master key** so that the master keys between the reader and application are the same. Otherwise, they cannot authenticate each other.



3.1.3.4. Change AES key

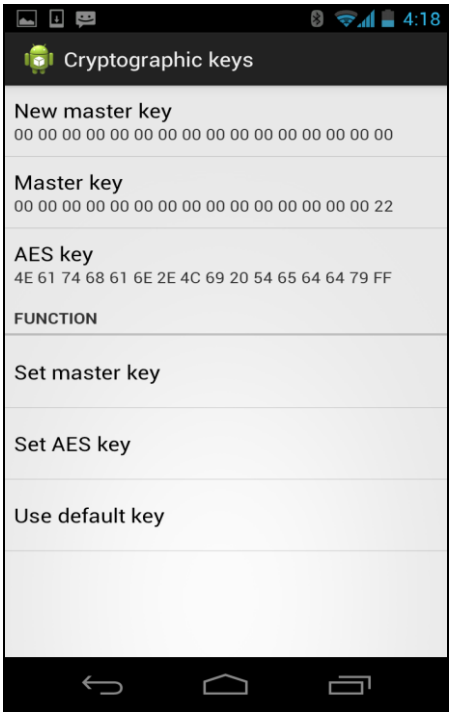
To change the AES key:

1. Go to **Cryptographic keys**, and then tap **AES Key.**



2. Type in your preferred value (in hexadecimal format), and then tap **OK**.

3. Tap **Set AES key** to load the new AES to ACR31.
4. To set the keys back to its default state for any new default ACR31, tap **Use default key**.



4.0. Using the application with ACR3201 mobile card reader

This section provides a simple step-by-step procedure on how to use the ACR3201 mobile card reader with various card types using the AudioJack demo application.

4.1. Using a magnetic stripe card

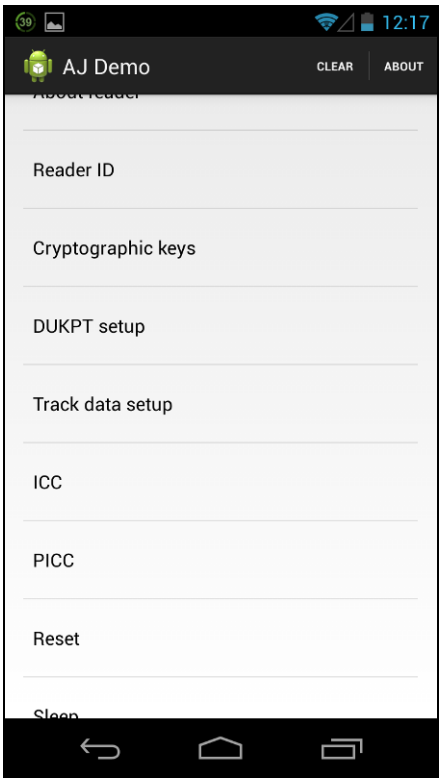
For instructions on how to use a magnetic stripe card with ACR3201, please refer to **Section 3.1** of this document.

4.2. Using a contact smart card (ICC)

1. Connect the ACR3201 to the audio port of your mobile device.

   Note: *Make sure that the volume is set to its maximum level to allow communication between the ACR3201 reader and your mobile device.*

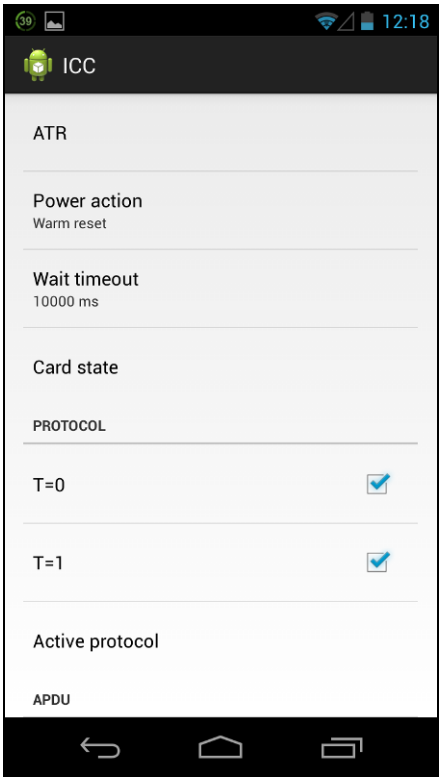
2. Tap **ICC** to explore the functions of a contact smart card.



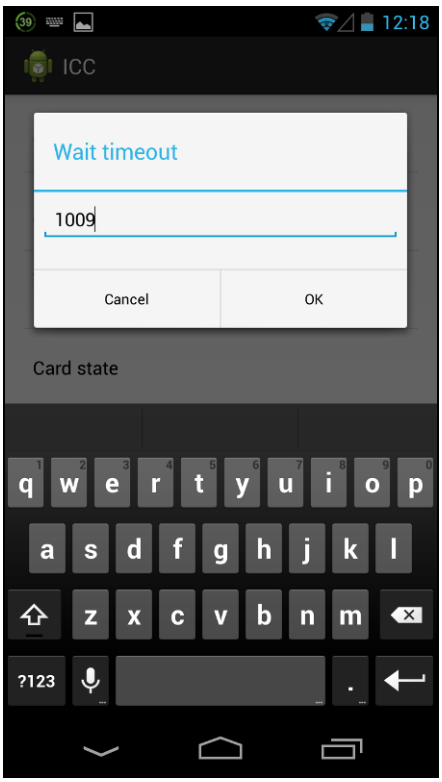
4.2.1. Change timeout setting

To change the timeout setting of the reader:

1. Go to **ICC**, and then tap **Wait timeout**.



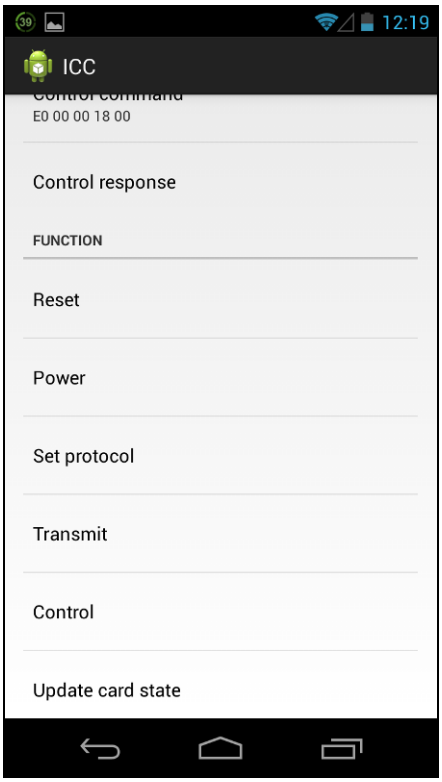
2. Type in your preferred value, and then tap **OK**.



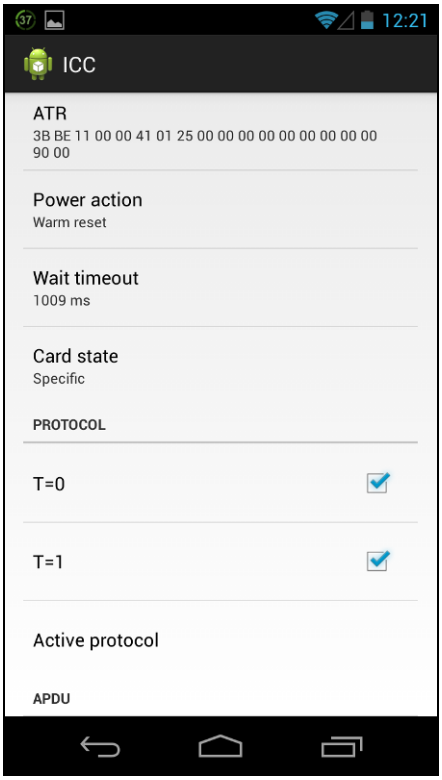
4.2.2. Get ATR

To get the ATR of the card:

1. Go to **ICC**.
2. Insert smart card into the ACR3201.
3. Tap **Reset**, and then tap **Power** to wake up the smart card.



4. The ATR will be displayed.

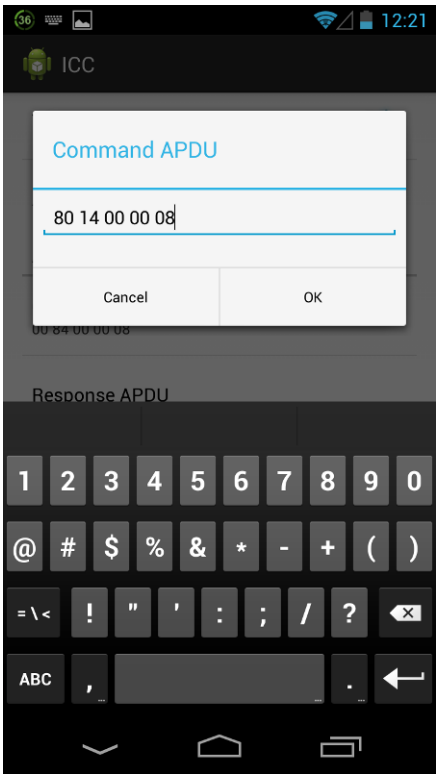


4.2.3. Transmit command APDU

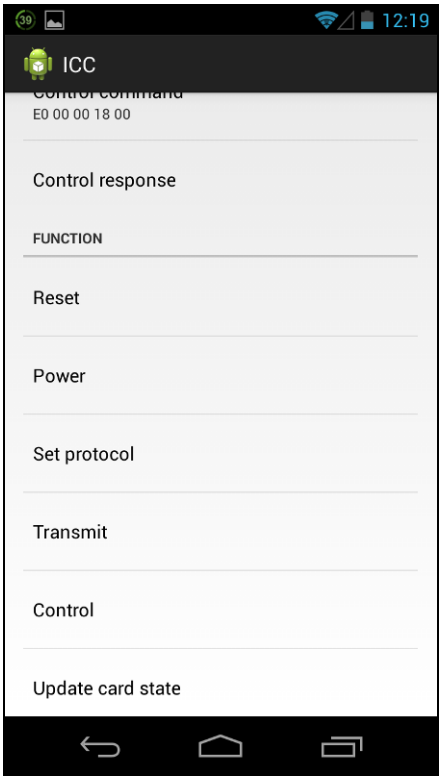
To send message to the card:

1. Go to **ICC**.
2. Insert smart card into the ACR3201.
3. Under **APDU**, tap **Command APDU**.
4. Type in the command (in hexadecimal format), and then tap **OK**.

   Note: *For the list of APDU commands, please refer to the Reference Manual of the card in use.*



5. Tap **Reset**, and then tap **Power** to wake up the smart card.



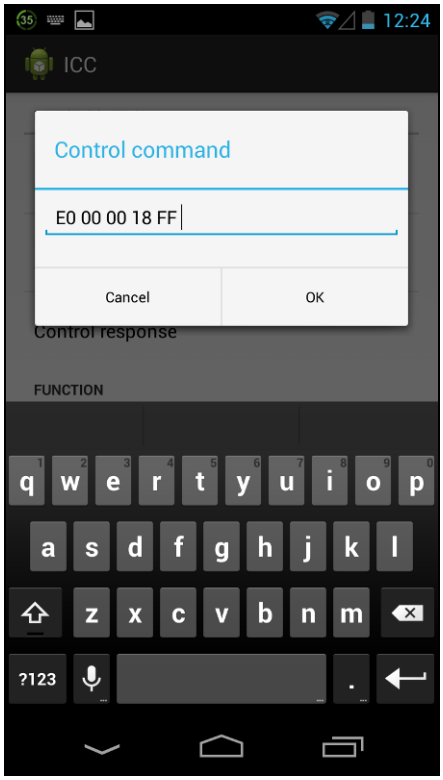
6. Under **Function**, tap **Transmit** to execute the APDU command. The reponse will be displayed under Response APDU.

4.2.4. Execute a command

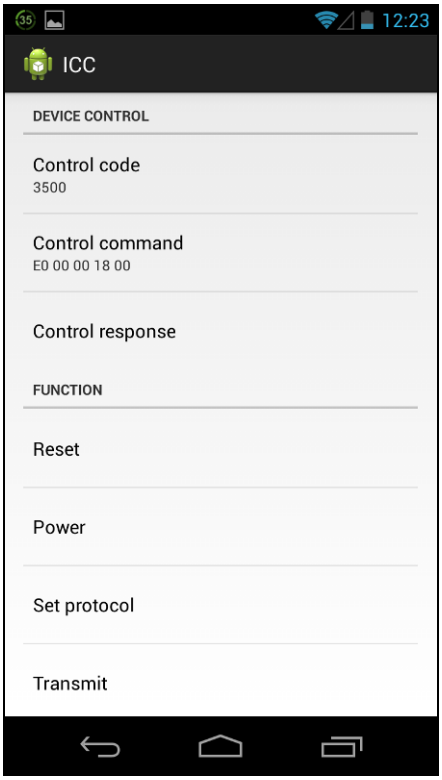
To send message to the reader:

1. Go to **ICC**, and then tap **Control Command**.
2. Insert smart card into the ACR3201.
3. Type in the command (in hexadecimal format), and then tap **OK**.

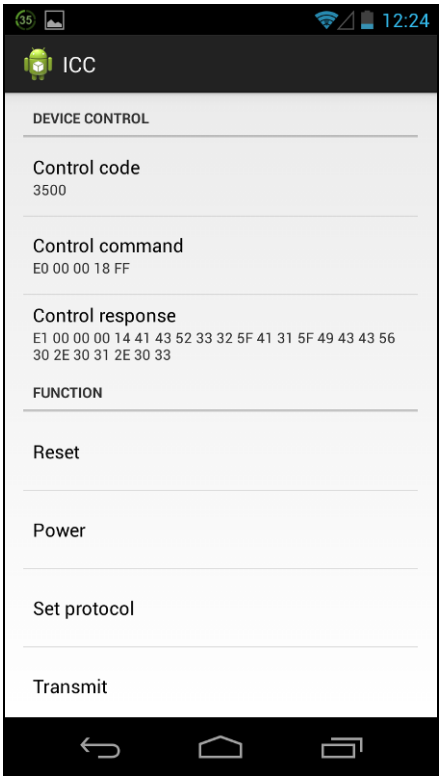
   Note: *For a list of APDU commands, please refer to the Reference Manual of ACR3201 mobile card reader.*



4. Tap **Reset**, and then tap **Power** to wake up the smart card.



5. Tap **Control** to execute the APDU command. The reponse will be displayed under **Control Response**.



5.0. Using the application with ACR35 mobile card reader

This section provides a simple step-by-step procedure on how to use the ACR35 mobile card reader with various card types using the AudioJack demo application.

5.1. Using a magnetic stripe card

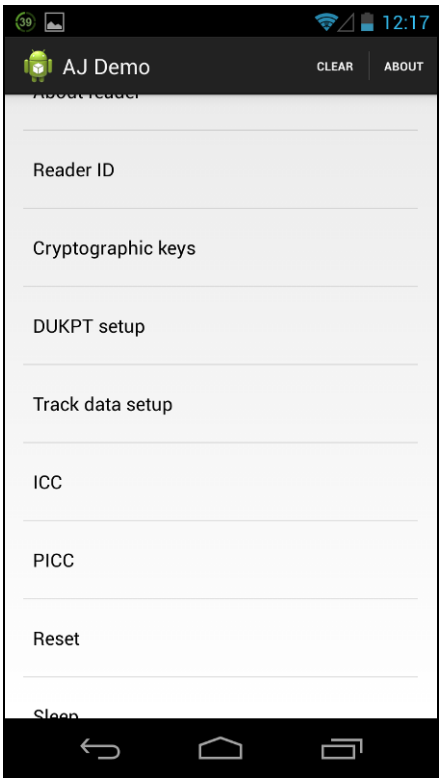
For instructions on how to use a magnetic stripe card with ACR35, please refer to **Section 3.1** of this document.

5.2. Using a contactless smart card (PICC)

1. Connect the ACR35 to the audio port of your mobile device.

   Note: *Make sure that the volume is set to its maximum level to allow communication between the ACR31 reader and your mobile device.*

2. Tap **PICC** to explore the functions of a contactless smart card.

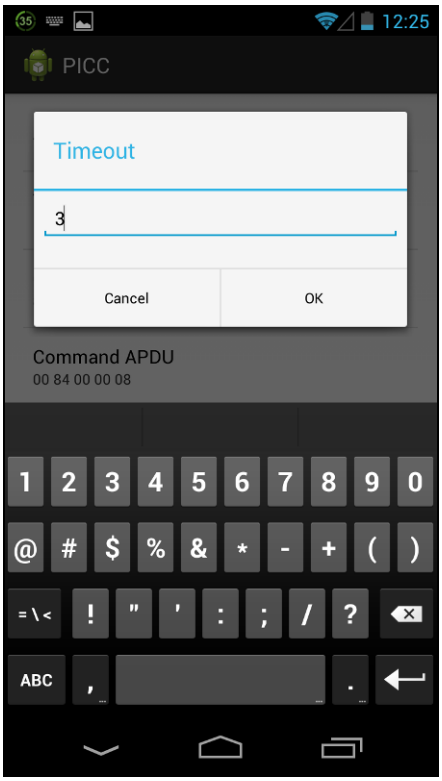


5.2.1. Change timeout setting

Timeout is the value of response time (in seconds) before a card starts to poll. To change the timeout setting of the reader:

1. Go to **PICC**, and then tap **Timeout**.

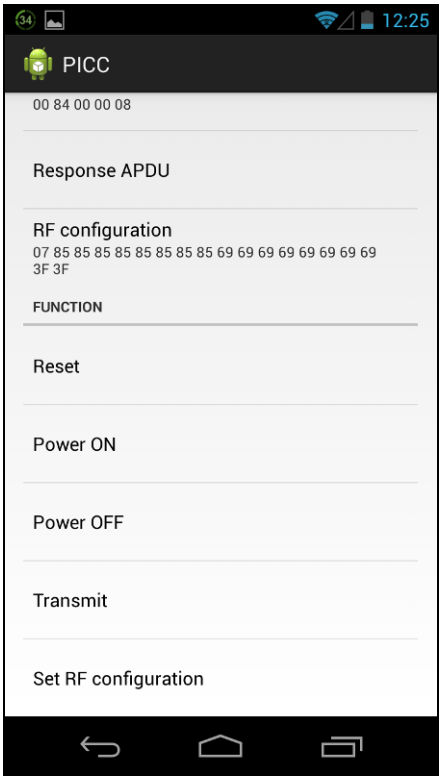
2. Type in a value between 1 to 5, and then tap **OK**.



5.2.2. Get the ATR

To get the ATR of the card:

1. Go to **PICC**.
2. Tap **Reset**, and then tap **Power ON** to power up the reader.



3. Quickly tap the contactless smart card to the ACR35 to display the ATR of the card.

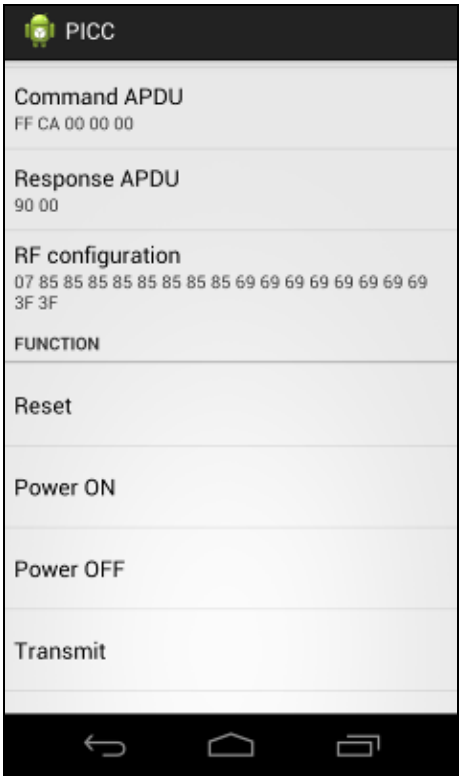
5.2.3. Transmit command APDU

To send message to the card:

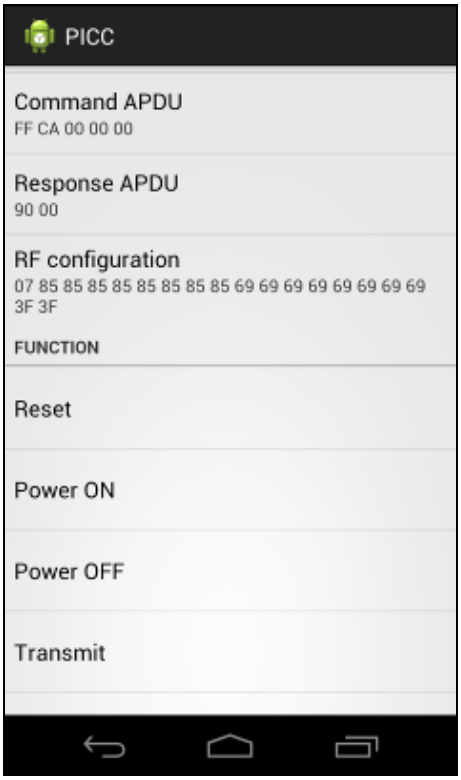
1. Go to **PICC**, and then tap **Command APDU**.
2. Type in the command (in hexadecimal), and then tap **OK**.

   Note: *For a list of APDU commands, please refer to the Reference Manual of the card in use.*

3. Tap **Reset**, and then tap **Power ON** to wake up the reader and start polling.



4. Tap **Transmit**, and then quickly tap the contactless smart card to the ACR35 to send the APDU command. The response will be displayed under Response APDU.



5.2.4. Configure radio frequency

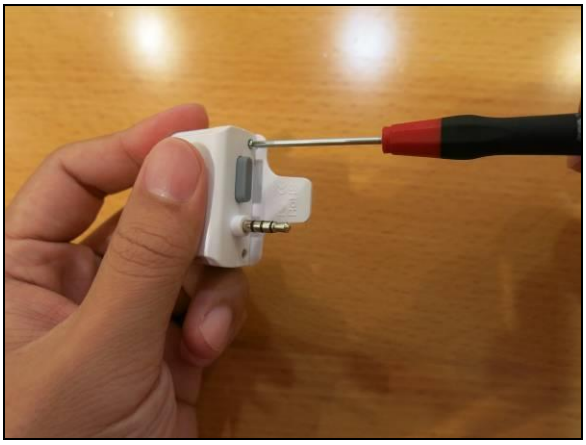
The RF Configuration sets the antenna setting parameter. For more information, please contact ACS.

6.0. Replacing the ACR31 battery

ACR31 uses a CR2016 3.0 V coin battery. You may need to replace the battery when you see the battery status in an application (e.g., AJ Demo Application) is running low.

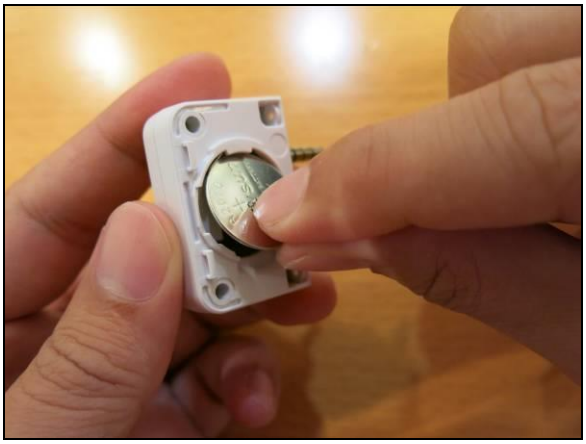
To replace the battery:

1. Using a Phillips screwdriver, remove the screws on each side.



2. Remove the battery cover and take out the old battery.

3. Replace the battery with a new one. Make sure that positive contact is facing up.



4. Place the battery cover back and close.

5. Put the screws back.

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