

# ACR3x Mobile Card Reader

User Manual V1.00

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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<sup>™</sup> and iOS library of the ACR3x Mobile Card Reader.

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# 2.0. Installing the demo application

## 2.1. For iOS

1. Download the device library from the link below:

http://acs.com.hk/en/products/227/acr31-swipe-card-reader/.



2. Using XCode application, open the AudioJackDemo.xcodeproj.



3. 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.



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## 2.2. For Android™

1. Connect your mobile device to the computer.



 In the internal storage of your device, create a folder where the ACR31 Android demo will be placed.



3. Download the ACR31 Android library from the link below:

http://www.acs.com.hk/index.php?pid=product&prod sections=0&id=ACR31



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



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



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6. Tap the AudioJackDemo.apk file to start the installation process.



7. Complete the action using **Package Installer**.



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



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



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## 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 card using the AudioJack demo application.

#### 3.1. Using a magnetic stripe card

1. 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.

- 2. Open the AJ Demo application.
- 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.

👘 AJ Demo	CLEAR
DEVICE	
About reader	
Reader ID	
Comtographia kawa	
Resetting the reader	
ICC	
PICC	
Reset	
Class	

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

📮 AJ Demo CLEAR
Swipe count
Battery status Full
Data received 23 00 87 50 C1 FB 8B 32 65 29 4F 77 8C 44 69 70 AE 56 51 B1 4E 2F 23 29 14 60 F9 50 EA 4A 59 C8 FA 0A B1 54 DF 34 4C 90 A3 31 97 5C AE 93 0D AA 15 1A 80 16 C9 B2 3B 30 97 A5 9B 73 85 8C B7 AE CE 20 D8 A3 9E 50 56 9A 0B E6 A6 0E E4 A4 7F 95 18 A0 41 2E CD 91 E9 B2 C3 86 75 39 4E 29 26 59 0F 0D 94 89 27 EB F8 18 BB 2D 01 F5 34 7D CA DE EE 79 0E 46 71 A0 76 BB 26 95 EA 97 DF E8 73 F1 69 FB 2D 94 0D 01 16 18 DA A6 (Checksum OK)
Key serial number
TRACK 1
JIS2 data

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

📦 AJ Demo	CLEAR
DEVICE	
About reader	
Reader ID	
Cryptographic keys	
DUKPT setup	
ICC	
PICC	
Reset	
Class	

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## 3.1.1. Getting the firmware version

To get the reader's firmware version:

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

🤠 About reader
Firmware version ACR31 V2.20
Battery level
Sleep timeout
FUNCTION
Get firmware version
Get status
Set sleep timeout

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## 3.1.2. Getting the battery status

To get the battery status:

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

🟮 About reader
Firmware version ACR31 V2.20
Battery level 2.90V - 2.99V
Sleep timeout 4 secs
FUNCTION
Get firmware version
Get status
Set sleep timeout
f (

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## 3.1.3. Setting the 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**.

	About reader		
Firn ACR:	Firmware version ACR31 V2.20		
Bat	tery level		
SI	Sleep timeout		
FU	Enter the value be	tween 4 and 20:	ł
Ge	Cancel	ок	
Set	sleep timeout		

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## 3.1.3.1. Customizing 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**.

ţ	Reader ID		
Cu	istom ID		
De	vice ID		
FU	Custom ID		
Ge	Enter the text (ma characters):	iximum 10	
Ge	Cancel	ок	
	$\leftarrow$		

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## 3.1.3.2. Getting the Device ID

To get the Device ID:

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

	8 😪 🛔 🛓 2:45
👼 Reader ID	
Custom ID acs_01	
<b>Device ID</b> 64 99 82 50 05 FD 29 24	
FUNCTION	
Get custom ID	
Set custom ID	
Get device ID	
$ \qquad \qquad$	

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## 3.1.3.3. Changing the master key

To change the master key:

1. Go to Cryptographic keys, and then tap Master key.

🤠 Cryptographic keys
New master key 00 00 00 00 00 00 00 00 00 00 00 00 00
Master key 00 00 00 00 00 00 00 00 00 00 00 00 00
AES key 4E 61 74 68 61 6E 2E 4C 69 20 54 65 64 64 79 20
FUNCTION
Set master key
Set AES key
Use default key

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



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3. To set the keys back to its default value, tap Use default key.

👘 Cryptographic keys
New master key 00 00 00 00 00 00 00 00 00 00 00 00 00
Master key 00 00 00 00 00 00 00 00 00 00 00 00 00
AES key 4E 61 74 68 61 6E 2E 4C 69 20 54 65 64 64 79 20
FUNCTION
Set master key
Set AES key
Use default key
τ Ω

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## 3.1.3.4. Changing the AES key

To change the AES key:

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

🟮 Cryptographic keys
New master key 00 00 00 00 00 00 00 00 00 00 00 00 00
Master key 00 00 00 00 00 00 00 00 00 00 00 00 00
AES key 4E 61 74 68 61 6E 2E 4C 69 20 54 65 64 64 79 20 FUNCTION
Set master key
Set AES key
Use default key

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



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3. To set the keys back to its default state, tap **Use default key**.

	👂 📚 🛋 🛔 4:18
👘 Cryptographic keys	
New master key 00 00 00 00 00 00 00 00 00 00 00 00	00 00 00 00 00
Master key 00 00 00 00 00 00 00 00 00 00 00 00	00 00 00 00 22
AES key 4E 61 74 68 61 6E 2E 4C 69 20 54 6 FUNCTION	65 64 64 79 FF
Set master key	
Set AES key	
Use default key	
$( \  \   )$	

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## 4.0. Using the application with ACR32 mobile card reader

This section provides a simple step-by-step procedure on how to use the ACR32 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 ACR32, please refer to **Section 3.1** of this document.

## 4.2. Using a contact smart card (ICC)

1. Connect the ACR32 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 ACR32 reader and your mobile device.

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

🗊 AJ Demo	CLEAR
DEVICE	
About reader	
Reader ID	
Cryptographic keys	
DUKPT setup	
ICC	
PICC	
Reset	
Clean	
τ Ω	

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## 4.2.1. Changing the timeout setting

To change the timeout setting of the reader:

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

icc		
ATR		
Power action Warm reset		
Wait timeout		
PROTOCOL		
T=0		
T=1		
Active protocol		
APDU		
Command APDU 00 84 00 00 08		
Û	$\bigcirc$	

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

10		;							
A	Wa	it tir	neo	ut					1
Wa	100	9							
W 99		Cano	el				ок		
PRO	тосо	L							
	2	2	Λ	5	6	7	•	0	0
	4	2	4	2	•	-	•	9	0
,	•	1		:	;	?	!	•	
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6		9		-		•	×		Ļ
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## 4.2.2. Getting the ATR

To get the ATR of the card:

- 1. Go to **ICC**.
- 2. Tap **Reset**, and then tap **Power** to wake up the smart card.

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3500
Control command E0 00 00 18 FF
Control response
FUNCTION
Reset
Power
Set protocol
Transmit
Control
τ Γ

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3. Insert the smart card to the ACR32 to display the ATR.

ବ୍ଟା ICC
ATR 38 BE 11 00 00 41 01 38 04 00 03 00 00 00 00 00 01 90 00
Power action Cold reset
Wait timeout 10000 ms
PROTOCOL
T=0
T=1
Active protocol
APDU
Command APDU 80 14 00 00 08
φ Ω

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## 4.2.3. Transmitting command APDU

To send message to the card:

- 1. Go to **ICC**.
- 2. Under APDU, tap Command APDU.
- 3. 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.

AP Command AF	יסט
80 14 00 00 08	
Re Cancel	ок
DEVICE CONTROL	
Control code	
<b>q w e r t</b>	<sup>6</sup> <sup>7</sup> <sup>8</sup> <sup>9</sup> <sup>0</sup> <b>y</b> u i o p
a s d f	ghjk I
t z x c	vbnm 🕶
<sup>123</sup> <sub>?#*</sub> <sup>⊥</sup>	י En +י
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4. Tap **Reset**, and then tap **Power** to wake up the smart card.

୍ରତା 😳
3500
Control command E0 00 00 18 FF
Control response
FUNCTION
Reset
Power
Set protocol
Transmit
Control
Ĵ Ĵ

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

ରୁ ।୦୦
APDU
Command APDU 80 14 00 00 08
Response APDU 47 DF 99 1C 9A 34 8A 4A 90 00
DEVICE CONTROL
Control code 3500
Control command E0 00 00 18 FF
Control response
FUNCTION
Reset
Power

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## 4.2.4. Executing a command

To send message to the reader:

- 1. Go to ICC, and then tap Control Command.
- 2. 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 ACR32 mobile card reader.

्वा ।cc
3500
Control command E0 00 00 18 FF
Control response E1 00 00 00 14 41 43 52 33 32 5F 41 31 5F 49 43 43 56 30 2E 30 31 2E 30 33
FUNCTION
Reset
Power
Set protocol
Transmit
Control
τ Γ

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

🏚 ।୦୦
3500
Control command E0 00 00 18 FF
Control response
FUNCTION
Reset
Power
Set protocol
Transmit
Control

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

ooi 🤹
3500
Control command E0 00 00 18 FF
Control response
FUNCTION
Reset
Power
Set protocol
Transmit
Control

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## 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.

🧔 AJ Demo	CLEAR
DEVICE	
About reader	
Reader ID	
Cryptographic keys	
DUKPT setup	
ICC	
PICC	
Reset	
Class	

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## 5.2.1. Changing the 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**.

DICC
ATR
Timeout 1 secs
Card type BF
Command APDU 00 84 00 00 08
Response APDU
RF configuration 07 85 85 85 85 85 85 85 85 69 69 69 69 69 69 69 69 69 3F 3F
FUNCTION
Reset

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



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## 5.2.2. Getting 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.

👘 PICC
Command APDU FF CA 00 00 00
Response APDU 90 00
RF configuration 07 85 85 85 85 85 85 85 85 69 69 69 69 69 69 69 69 3F 3F FUNCTION
Reset Power ON
Power OFF
Transmit

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

👘 PICC
ATR 38 8F 80 01 80 4F 0C A0 00 00 03 06 03 00 01 00 00 00 00 6A
Timeout 10 secs
Card type <sup>8F</sup>
Command APDU FF CA 00 00 00
Response APDU
RF configuration 07 85 85 85 85 85 85 85 85 69 69 69 69 69 69 69 69 69 3F 3F FUNCTION
Reset
Ĵ Ĵ

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## 5.2.3. Transmitting 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.

<u>(8</u> :	I PIC	C)							
A'	Сог	nma	and	API	DU				
10	<u>FF</u> (	CA 00	00 0	00					
Ca 8F	Cancel			ок					
Cor FF 8	nma 2 00 0	nd Al	PDU FF FF I	FFFF	FF FF				
1	2	3	4	5	6	7	8	9	0
,	•	7		:	;	?	!	•	"
<b>√1</b> ,	/4+	@	&	^	~	(	)	*	#
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3. Tap **Reset**, and then tap **Power ON** to wake up the reader and start polling.

Command APDU FF CA 00 00 00
Response APDU 90 00
RF configuration 07 85 85 85 85 85 85 85 85 69 69 69 69 69 69 69 69 3F 3F
FUNCTION
Reset
Power ON
Power OFF
Transmit

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.

n PICC
Command APDU FF CA 00 00 00
Response APDU 90 00
RF configuration 07 85 85 85 85 85 85 85 69 69 69 69 69 69 69 69 69 3F 3F
FUNCTION
Reset
Power ON
Power OFF
Transmit

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#### 5.2.4. Configuring radio frequency

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

FCC Caution:

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.