



Advanced Card Systems Ltd.
Card & Reader Technologies

ACR321 Ticket Validator

For Automatic Fare Collection

User Manual

Version 1.00

Document Name:
03-USR-ACR321





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1.0. Introduction



ACR321 – Ticket Validator is designed specifically for the use in Automatic Fare Collection (AFC) systems for public transport, e.g. for buses, ferries, trams, railway and other transportation means.

ACR321 supports all smart cards/tags compliant to ISO14443 Type A & B, Mifare, and Near Field Communication (NFC) standard. By virtue of the embedded powerful 32bit ARM 11 processor, ACR321 enables a high speed transaction processing and transaction records collection. ACR321 supports various advanced connection modes for data transfer, including Wi-Fi, WCDMA, GSM/GPRS and USB thumb drive for data collection. It also equips with GPS enabling you to locate the vehicle, fleet management and set fare flexibly with reference to distance.

There are four SAM card slots for holding Purchase SAM cards to ensure the security and integrity of the transactions. This allows users to use their own unique secret encryption algorithm.

With its compact, light and trendy design, ACR321 allows users to operate it by mounting on the pole or as a handheld ticket validator powered by rechargeable lithium-ion battery.

ACR321 is furthermore integrated with a 640 x 480 high resolution VGA 5.7" LCD, speaker, 4 LED indicators with different colors, 4 backlit buttons. Adding to a strict shocking, vibration, water and dust Ingress protection and reliability testing, ACR321 is the best choice of your AFC projects application.



Touch Screen could be an option to further enhance the features of ACR321 that enables it suitable to be a Driver console and POS terminal.



2.0. Specifications

- 32-Bit ARM11 Processor running embedded Linux
- Flash 512 MB and RAM 256 MB
- 5.7 inches TFT-LCD Color Screen
- 4 LED for transaction Indicators (1 Blue, 1 Yellow, 1 Green and 1 Red)
- 4 Buttons with Backlight
- Speaker with loud around 70dB in 1-meter distance
- Tamper Detection Switch to Protect Against Unauthorized Intrusion
- Supports Micro-SD memory card expansion slot
- Input : 10V to 36V unregulated DC power
- With Rechargeable Lithium-ion Battery
- Operating temperature -20 to 60 degree C
- Humidity 15% to 95% non-condensing

- Communications
 - Quad-band GSM/GPRS: 850/900/1800/1900 MHz
 - WCDMA (3G)
 - Wifi: IEEE 802.11 b/g
 - Built-in 10/100-base-T Ethernet
 - USB
 - Serial – RS232,RS485
 - GPIO

- Supported Card Types
 - Contactless cards
 - ISO 14443 Compliant Type A & B standard
 - Mifare classics, Ultralight, Ultralight C, Mifare Plus, Mifare Desfire
 - 4 SAM cards and 1 SIM card
 - Support T=0,1 and ISO 7816 Parts 1-3

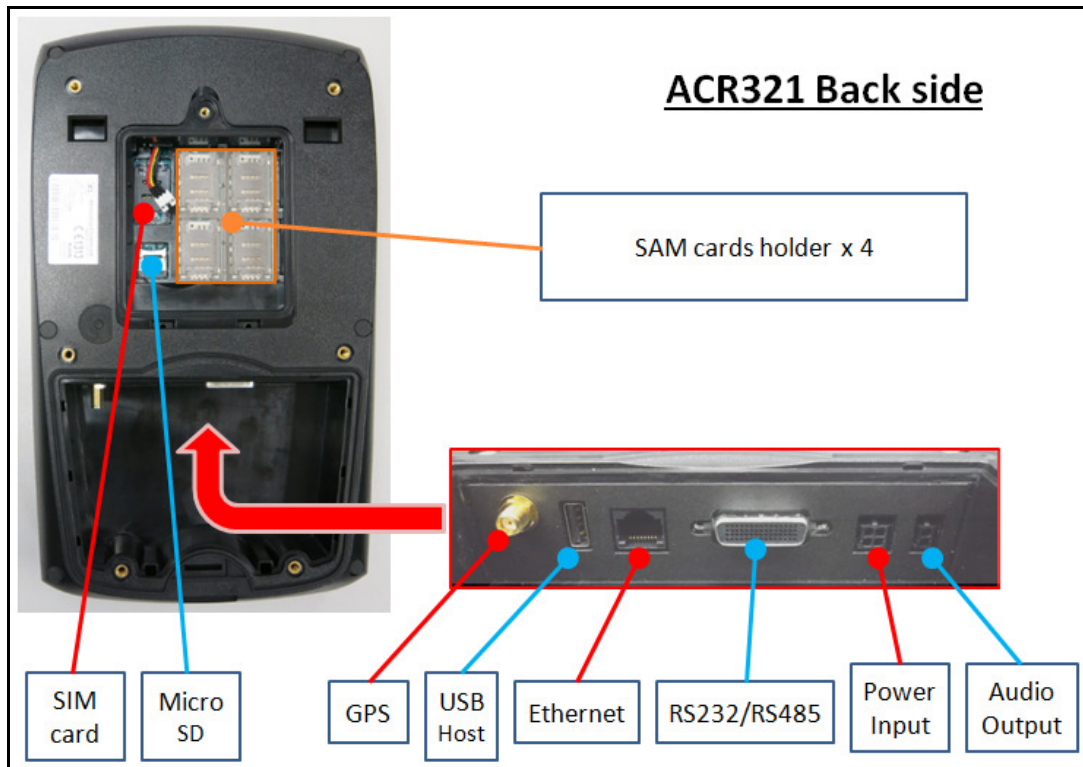
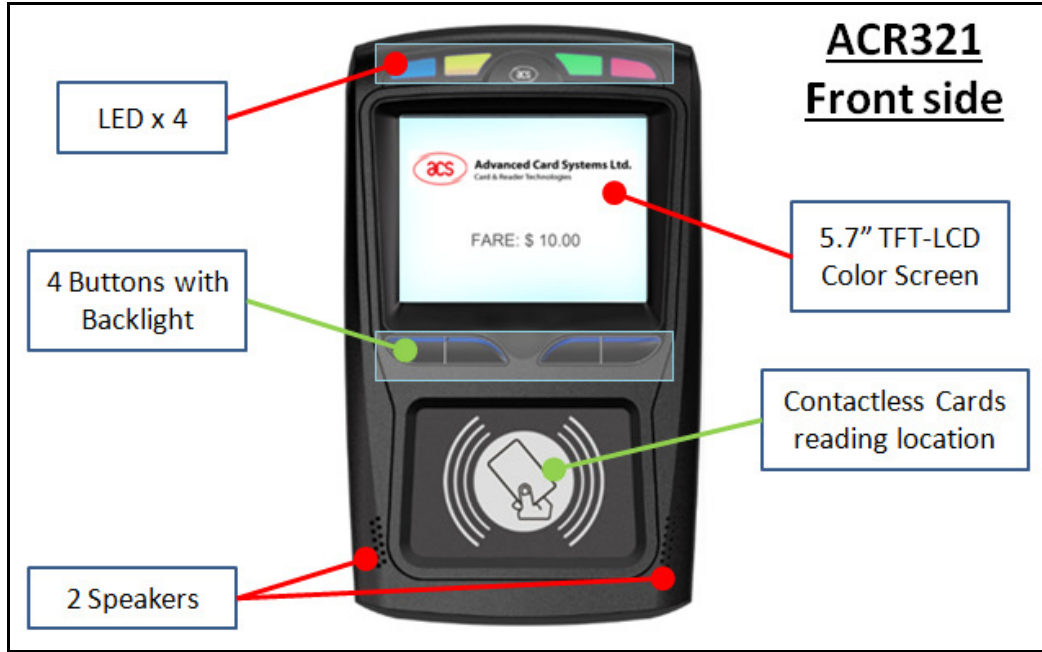
- Certification / Compliance
 - CE
 - FCC
 - RoHS
 - EMV contactless
 - PBOC 3.0 contactless



3.0. Illustration

3.1. ACR321 device and parts

The main components on the front side of the ACR320 are shown below:





3.2. Battery

A rechargeable Li-ion battery supplies energy to the device once the external power source cannot supply power to the device. So, transactions can still be processed even the power supply of the bus is out of order. The battery locates at back of the device. In order to change the battery, turn the screw in the circle in the figure below to left to remove the battery cover. Follow the direction of the red arrow to take away the cover.



Then, unplug the battery and a new battery can be replaced in the carrier.

The battery is recharged once the external power source resumes supplying power to the device.



3.3. SAM card slots

There are 4 SAM card holders on ACR320. Each holder can contain 1 SAM card, so ACR320 has 4 SAM card slots in total. They are located behind the battery. In order to insert or change SAM cards, please follow some simple steps below.

1. Follow the instruction in chapter 3.2 to remove the battery cover
2. Unplug and remove the Li-ion battery and the SAM card slots will be seen



Slot no of the SAM readers

Slot 0	Slot 2
Slot 1	Slot 3



3.4. Pin assignment

GPIO is provided for reading status like door open/close and driving devices such as external buzzer or release a turnstile. Here is the pin assignment and some input/output circuit examples.

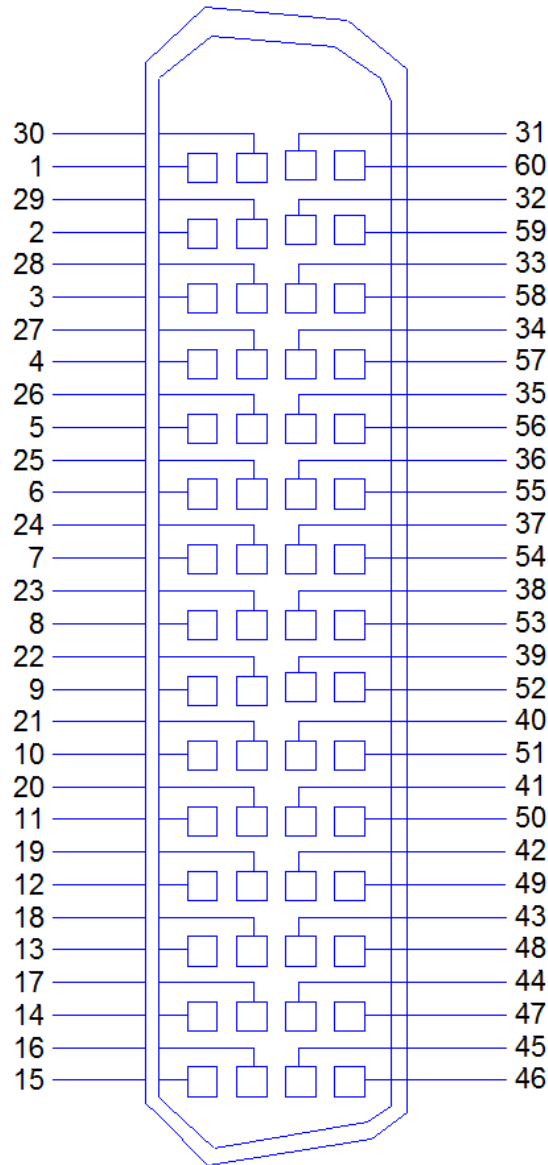


Figure 1: 60-pin connector layout



Signal	Signal Name	Signal Description	Signal Level
1	RS232/485	Port 1: 3.3V or open->RS232, 0V-> RS485	3.3V logic
2	TXD1	RS232 Port 1, Data Transmit	RS-232 signal standard
3	RXD1	RS232 Port 1, Data Receive	RS-232 signal standard
4	RS485-A	RS485 Non-inverting, Port 1	RS485 signal standard
5	RS485-B	RS485 Inverting, Port 1	RS485 signal standard
6	GND	Digital Ground	Digital Ground for Serial port interface
7	TXD2	RS232 Port 2, Data Transmit	RS-232 signal standard
8	RXD2	RS232 Port 2, Data Receive	RS-232 signal standard
9	GND	Digital Ground	Digital Ground for Serial port interface
10	N.C.	No connection	
11	N.C.	No connection	
12	N.C.	No connection	
13	N.C.	No connection	
14	N.C.	No connection	
15	Reserved	(Don't connect)	
16	N.C.	No connection	
17	N.C.	No connection	
18	N.C.	No connection	
19	Reserved	(Don't connect)	
20	Reserved	(Don't connect)	
21	Reserved	(Don't connect)	
22	Reserved	(Don't connect)	
23	OUTPUT-8	OUTPUT port 8	3V/5V Logic Level
24	OUTPUT-7	OUTPUT port 7	3V/5V Logic Level
25	OUTPUT-6	OUTPUT port 6	3V/5V Logic Level
26	OUTPUT-5	OUTPUT port 5	3V/5V Logic Level
27	N.C.	No connection	
28	N.C.	No connection	
29	N.C.	No connection	
30	N.C.	No connection	



31	Reserved	(Don't connect)	
32	Reserved	(Don't connect)	
33	Reserved	(Don't connect)	
34	Reserved	(Don't connect)	
35	V_EXTIN2	Isolated power-in for Input port 5-8	3V/5V
36	V_EXTIN2	Isolated power-in for Input port 5-8	3V/5V
37	G_EXTIN2	Isolated GND for Input port 5-8	Ground signal for input port
38	G_EXTIN2	Isolated GND for Input port 5-8	Ground signal for input port
39	V_EXTOUT2	Isolated power-in for Output port 5-8	3V/5V
40	V_EXTOUT2	Isolated power-in for Output port 5-8	3V/5V
41	N.C.	No connection	
42	N.C.	No connection	
43	CAR-GND	CAR Battery Ground	Car battery Ground
44	CAR-GND	CAR Battery Ground	Car battery Ground
45	CAR-GND	CAR Battery Ground	Car battery Ground
46	CAR-DC	Car Battery +	Car Battery Positive (12V~24V)
47	CAR-DC	Car Battery +	Car Battery Positive (12V~24V)
48	CAR-DC	Car Battery +	Car Battery Positive (12V~24V)
49	N.C.	No connection	
50	G_EXTOUT2	Isolated GND for Output port 5-8	Ground signal for output port
51	G_EXTOUT2	Isolated GND for Output port 5-8	Ground signal for output port
52	TACHOMETER_IN	INPUT port 8, Tachometer	3V/5V Logic Level
53	EXT_IO_IN7A	INPUT port 7	3V/5V Logic Level
54	EXT_IO_IN6A	INPUT port 6	3V/5V Logic Level
55	EXT_IO_IN5A	INPUT port 5	3V/5V Logic Level
56	N.C.	No connection	
57	N.C.	No connection	
58	N.C.	No connection	
59	N.C.	No connection	
60	N.C.	No connection	

Table 1: 60-way connector signal level and description

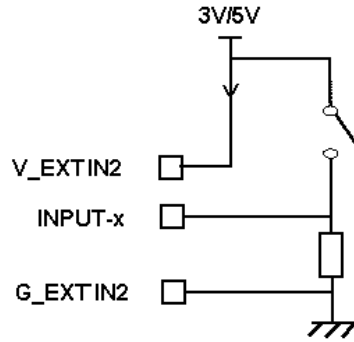


Figure 2: Input circuit example

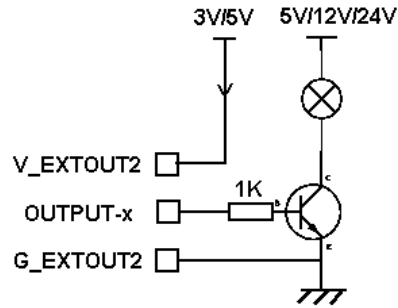


Figure 3: Output controlling example - Lamp

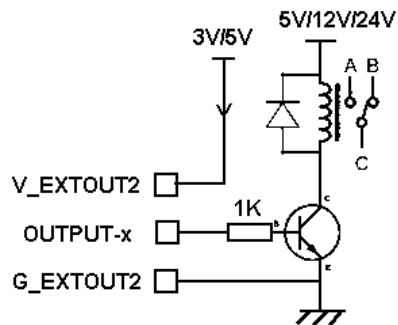


Figure 4: Output controlling example - Relay

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.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

IMPORTANT NOTE:**FCC Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.