



Advanced Card Systems Ltd.
Card & Reader Technologies

ACR89U-A2 Handheld Smart Card Reader



Technical Specifications V1.01



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1.0. Introduction

As smart card technology becomes more widely accepted in the market, developers find an opportunity to offer better usage experience and security by adding more features to smart card reading devices. The ACR89U-A2 Handheld Smart Card Reader with NFC tag support is primarily designed for multi-application that can access any contact and contactless smart cards following the ISO 7816 and ISO 14443 standards.

ACR89U-A2 is a versatile dual interface smart card reader with PIN-pad which can be used to access ISO 7816 MCU cards, ISO 14443 Type A and B contactless cards, Mifare, FeliCa and ISO 18092 or NFC tags. It can operate in both office and field-based environments by using it on PC-linked and standalone modes, respectively. It comes with a built-in keypad, LCD, rechargeable battery and large programmable memory features. It is reliable reader that can support the rigorous performance requirements of highly demanding smart card applications, though operates under low energy consumption.

ACR89U-A2 also supports Secure PIN Entry (SPE) which allows users to securely input data such as PIN, through the device's PIN-pad. This security measure prevents PINs from getting exposed to a security vulnerable PC's or workstation and successfully eliminates the possibility of Virus/Trojan or USB Sniffer getting hold of them.

Furthermore, ACR89U-A2 has User Firmware Upgradeability that can be done through its USB Interface. This capability makes ACR89U-A2 very accessible and ideal for many applications.



2.0. Features

- 32-bit RISC Processor running Embedded FreeRTOS
- User-programmable by C Language
- Dual Operation Modes:
 - PC-linked
 - Standalone
- 2 Full-sized Contact Card Slots
- 3 SAM-sized Card Slots
- Firmware Upgradeable by USB
- Easy-to-Read, High Resolution Backlit LCD
- Highly Durable Chemical Resistant Keypad
- 4 LED Status Indicators
- Monotone Buzzer
- Tamper Detection Switch to protect against unauthorized intrusion
- Real-time Clock (RTC) with independent backup battery
- Supports Secure PIN Entry (SPE)
- Supports PPS (Protocol and Parameters Selection) with 115,200 – 206,451 bps in reading and writing smart cards
- Hand-held size and weight
- Detachable Printer Cradle (On Request)
- Compliant with the following standards:
 - ISO 7816
 - ISO 14443
 - PC/SC
 - CCID
 - USB Full Speed
 - CE
 - FCC
 - EMV Contact L1
 - RoHS
 - Microsoft® WHQL



3.0. Supported Card Types

3.1. MCU Cards

The ACR89U-A2 operates with MCU cards that follow:

- T=0 or T=1 protocol
- ISO 7816 Compliant Class A, B, C (5 V, 3 V, 1.8 V)

3.2. Memory-based Smart Cards (Synchronous Interface)

The ACR89U-A2 supports the following memory cards:

- Cards following the I2C bus protocol (free memory cards) such as:
 - Atmel: AT24C01/02/04/08/16
- SLE4432/5542 intelligent 256 bytes EEPROM with write protect function:
 - SLE4432, SLE5542
- SLE4418/5528 intelligent 1K bytes EEPROM with write-protect function:
 - SLE4418, SLE5528

3.3. Contactless Cards

The ACR89U-A2 supports the following contactless cards:

- ISO 14443 Compliant, Type A and B Standard, Parts 1 to 4
- T=CL protocol
- Mifare Classics
- FeliCa cards

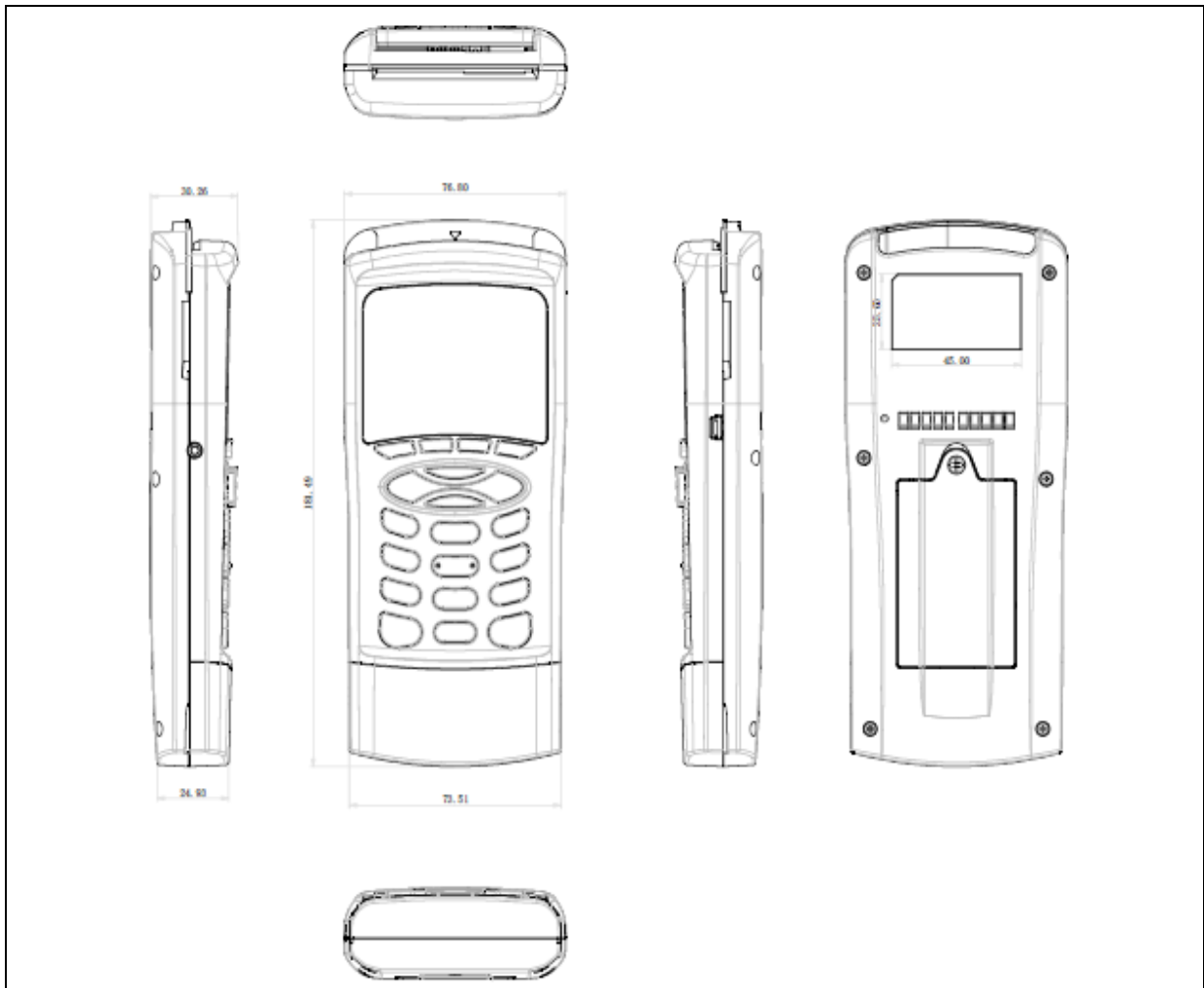


4.0. Typical Applications

- e-Healthcare
- e-Government
- e-Banking and e-Payment
- Transportation
- Loyalty Program
- Time and Attendance Checking



5.0. Technical Specifications



Processor

32-bit RISC processor

Operating System

Embedded FreeRTOS

Device and User Programmable Memory

Programmable Language C
 Compiler Provided Yes
 RAM 20 KB
 NOR Flash (Firmware Memory)..... 512 KB (default)/1MB (upon request)
 Serial Flash 384 KB (for data storage/for multilingual storage)
 EEPROM (Data Storage)..... 32 KB (default)/64KB (upon request)
 Tamper Protected Memory 238 Bytes (for sensitive data storage with API provided)

Power

Operating Voltage 3.7 V
 Operation Mode PC-linked and Standalone
 PC-linked Mode Automatically switches to USB bus power, always ON
 Standalone Mode..... Automatically switches to Lithium rechargeable battery power, soft ON/OFF switch
 Standby Time..... 6 months
 Operation Time..... 10 hours
 Power Consumption..... Less than 60 mA (excluding card and backlight power)
 Backup Battery..... Independent rechargeable backup battery for RTC

Connectivity

USB USB 2.0
 RS232 3 lines Rx/D, Tx/D and GND (vendor cable upon request)

Contact Smart Card Interface

Standard ISO 7816 Class A, B, C (5 V, 3 V, 1.8 V), T=0 and T=1
 Supply Current Max. 60 mA
 Smart Card Read/Write Speed 12,903-206,451 bps (primary/secondary slot)



CLK Frequency 4.8 MHz
 Card Connector Type Landing/Contact (primary/secondary slot)
 Card Insertion Cycles Min. 300,000/min 100,000 (primary/secondary slot)
 Short Circuit Protection +5 V/GND on all pins

Contactless Smart Card Interface

Standard ISO 14443 A and B Parts 1-4, FeliCa
 Protocol Mifare Classics Protocols, T=CL
 Smart Card Read/Write Speed 106, 212, 424 kbps
 Operating Distance 40 mm
 Operating Frequency 13.56 MHz

SAM Card Interface

Card Connector Type Contact
 Smart Card Read/Write Speed 12,903 -206,451 bps

Firmware Upgrade Interface

Firmware Upgradeable USB cable
 Power Source From USB (USB power adapter on request)
 Lithium Rechargeable Battery

Built-in Peripherals

Keypad 20 keys (4 function keys, 4x4 keypad)
 (1) Number keys 0 – 9 with character input support similar to mobile phone;
 (2) Direction keys Up, Down, Left, Right; (3) Clear and Enter keys; and
 (4) Function keys F1 – F4
 LCD Display 128 x 64 dot matrix black and white graphic LCD with backlighting
 Window Size: 49 mm x 29 mm; Active area size: 46 mm x 28 mm
 Number of characters on LCD: User-definable (max: 21 characters x 8 rows)
 Buzzer Monotone buzzer with software controlled ON/OFF
 LED Status Indicators 4 LEDs for indicating status
 Tamper Switch Internal anti-intrusion detection and protection
 Detachable Printer Cradle (Upon request)

Physical Specifications

Dimensions Device: 181.0 mm (L) x 77.0 mm (W) x 30.5 mm (H)
 Case Color Black
 Weight Device: 235 g

Operating Conditions

Temperature 0 °C to 50 °C
 Humidity 40% to 80%, non-condensing

Certifications/Compliances

CE, FCC, RoHS, ISO 7816, ISO 14443, PC/SC, CCID, EMV Contact L1

Other Features

Real-time Clock

Device Driver Operating System Support

Windows® 2000, XP, Vista, 7, Server 2003, Server 2008, Server 2008 R2
 Linux, Mac, Android™ 3.1 and above

