Advanced Card Systems Ltd.
Card & Reader Technologies

ACR89U
Handheld
Smart Card Reader

Technical Specifications

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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. In this light, the new ACR89 is a contact smart card reader that features a keypad as well as optional contactless card support, fingerprint scanner and thermal printer to bring optimal security and convenience in many types of smart card application.

ACR89 is an electronic device designed primarily to operate in both office and field-based environments using it PC-linked and standalone modes, respectively. It comes with a built-in keypad, LCD, rechargeable battery and large programmable memory features. ACR89 is reliable reader that can support the rigorous performance requirements of highly demanding smart card applications, though operates under low energy consumption.

ACR89 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, ACR89 has User Firmware Upgradability that can be done through its USB Interface. This capability makes ACR89 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
- (Optional) Contactless Version
- (On Request) Detachable Printer Cradle
- Certification / Compliance
  - ISO 7816
  - ISO 14443 *(for contactless version)*
  - PC/SC
  - USB Full Speed
  - CE
  - FCC
  - EMV contact Level 1 *(in progress)*
  - RoHS
  - Microsoft® WHQL

3.0. Supported Card Types

3.1. MCU Cards

The ACR89 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 ACR89 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 (Optional)

The ACR89 supports the following memory cards:

- ISO 14443 Compliant, Type A & 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
Complier Provided .... Yes
RAM .... 20 KB
NOR Flash... 512 KB (default)/ 1MB (On Request)
Serial Flash .... 384 KB (for User Programmable/for Multilingual Storage)
EEPROM.. 32 KB (default)/ 64KB (On 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 Lithium rechargeable battery power, soft ON/OFF switch
Standby Time……………………………6 months
Operation Time…………………………..Without contactless: 15 hours (in normal use)
⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀ With contactless: 10 hours (in normal use)
Power consumption .... Without contactless: Less than 40 mA (excluding card and backlight)
⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀⠀ With contactless: 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 RxD, TxD and GND (Vendor Cable Upon Request)

Smart Card Interface
Contact – Standard
Standard... ISO 7816 Class A, B, C (5 V, 3 V, 1.8V), 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

Contact - SAM
Card connector type .... Contact
Smart card read / write speed............... 12,903 -206,451bps

Contactless (Optional)
Standard... ISO 14443 A & B part 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

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: 49mm x 29mm; 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……………… (On Request)

Physical Specifications

Dimensions... Device: 181mm (L) x 77mm (W) x 30.5 mm (H)
Case Color .... Black
Weight .... Device: 235g

Operating Conditions

Temperature.. 0 °C to 50 °C
Humidity .... 10% to 90%, non-condensing

Certifications/Compliances

CE, FCC, RoHS, ISO 7816, ISO 14443 (for contactless version) , PC/SC, EMV contact Level 1 (in progress)

Other Features

Real-time Clock

Device Driver Operating System Support

Windows 2000, Windows XP, Windows Vista , Windows 7 , Windows Server 2003, Windows Server 2008, Windows Server 2008 R2, Linux, Mac