

# DA-681A Series

**x86 1U 19-inch rackmount computers with 3rd Gen Intel® Core™ Celeron 1047UE 1.4GHz CPU, 2 isolated RS-232/422/485 and 10 isolated RS-485 ports, 6 LANs, VGA, mSATA, USB**



- > IEC 61850-3, IEEE 1613, and IEC 60255 compliant for power substation automation systems (DPP and DPP-T models only)
- > 3rd Gen Intel® Core™ Celeron 1047UE 1.4 GHz CPU
- > 1 built-in DDR3 memory socket
- > 1 mSATA for OS and 1 SATA III for storage expansion
- > 6 gigabit Ethernet ports for network redundancy
- > 4 USB 2.0 ports for high speed peripherals
- > 2 isolated RS-232/422/485 and 10 isolated RS-485 ports
- > Embedded Debian 8 Linux (W7E by CTOS)
- > Supports both 100 to 240 VAC and VDC power inputs (single power and dual power models available)
- > Optional IRIG-B expansion module available on DPP and DPP-T models



## Overview

The Moxa DA-681A Series x86-based rackmount embedded computers are designed for control, monitoring, data acquisition, and protocol conversion applications. With its robust design, the DA-681A is suitable for industrial automation applications, such as power automation, transportation, and oil and gas.

The DA-681A's main operating system is based on the 3rd Gen Intel® Core™ Celeron 1047UE 1.4 GHz CPU and HM65 chipset, which supports standard x86, 1 x VGA, 4 x USB, 6 gigabit LAN ports, 2 RS/232/422/485 3-in-1 serial ports, and 10 RS-485 (RS-422 by CV)

ports. The DA-681A has a mini PCIe socket for mSATA and comes with Linux pre-installed; Windows 7 Embedded is also supported by the CTOS (Configuration To Order Service) process.

Another plus is that the serial ports come with 2 kV digital galvanic isolation protection to guarantee communication reliability in harsh industrial environments. In addition, the state-of-art IEC 61850-3, IEEE 1613, and IEC 60255 compliance all-in-one design provides rich interfaces especially well suited for of power substation automation applications.

## Smart Recovery Function

The DA-681A's Smart Recovery function makes it easy to troubleshoot system software errors on computers to minimize downtime. Engineers who are experts in a particular vertical market may not have enough computer domain knowledge to know how to fix the operating

system problems. Moxa Smart Recovery™ is an automated BIOS-level software recovery system that allows engineers to automatically trigger OS recovery to minimize downtime.

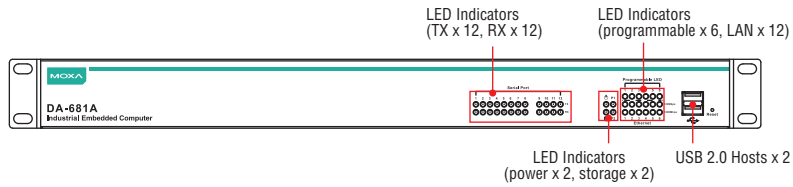
## Proactive Monitoring Function

The DA-681A's Proactive Monitoring function monitors the computer's health by keeping an eye on CPU usage, memory usage, storage partition usage, the operating temperature of the CPU and

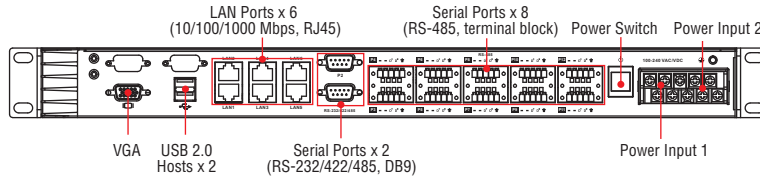
motherboard, and the redundant power monitor, and can trigger a relay to provide either visual or audio alarms.

## Appearance

### Front View

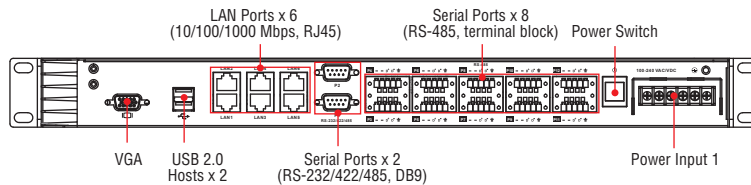


DA-681A-DPP & DA-681A-DPP-T



### Rear View

DA-681A-SP



## Hardware Specifications

### Computer

**CPU:** 3rd Gen Intel® Core™ Celeron 1047UE 1.4 GHz  
**OS:** Linux Debian 8 (pre-installed)  
*Note: W7E available by CTOS*  
**System Chipset:** Intel HM65  
**BIOS:** 64 Mbit Flash BIOS, PCI Plug & Play, ACPI  
**System Memory:** 8 GB capacity, 2 GB for Linux pre-installed; 1 slot of DDR3-1066/1333 SO-DIMM SDRAM  
**Expansion Bus:** PCI/104 onboard (DPP models only)  
**USB:** USB 2.0 hosts x 4, Type A connector, supports system boot up

### Storage

**Built-in:** 8 GB for Linux (pre-installed in mSATA)  
**Storage Expansion:** SATA 3.0 interface

### Display

**Graphics Controller:** Intel® HD Graphics (Integrated)  
**Display Memory:** Dynamic video memory (shares up to 32 MB of system memory)  
**Display Interface:** 1 VGA output (DB15 female connector)  
**Resolution:** CRT display mode with pixel resolution up to 2048 x 1536 at 75 Hz

### Ethernet Interface

**LAN:** Auto-sensing 10/100/1000 Mbps ports x 6  
**Magnetic Isolation Protection:** 1.5 kV built-in

### Serial Interface

**Serial Standards:**

- 2 RS-232/422/485 ports (DB9 male)
- 10 RS-485 ports (terminal block)

**ESD Protection:** 15 kV for all signals  
**Surge Protection:** 4 kV (DA-681A-I-DPP-T only)  
**Isolation:** 2 kV digital galvanic isolation

### Serial Communication Parameters

**Data Bits:** 5, 6, 7, 8  
**Stop Bits:** 1, 1.5, 2  
**Parity:** None, Even, Odd, Space, Mark  
**Flow Control:** RTS/CTS, XON/XOFF  
**Baudrate:** 50 bps to 115.2 kbps

**Serial Signals**

**RS-232:** TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND  
**RS-422:** TxD+, TxD-, RxD+, RxD-, GND  
**RS-485-4w:** TxD+, TxD-, RxD+, RxD-, GND  
**RS-485-2w:** Data+, Data-, GND

### LEDs

**System:** Power, Storage  
**LAN:** 100M x 6, 1000M x 6  
**Serial:**  
 RS-232/422/485: 2 x Tx, 2 x Rx  
 RS-485: 10 x Tx, 10 x Rx  
**Programmable:** 6 LEDs  
**Power Failure:** LED x 2 (dual power models)

### Switches and Buttons

**Power Button:** On/Off (on rear panel)  
**Reset Button:** Hard Reset (on front panel)

### Physical Characteristics

**Housing:** SECC sheet metal (1 mm)  
**Weight:** 4.5 kg (10 lb)  
**Dimensions:** 440 x 315 x 45 mm (17.32 x 12.40 x 1.77 in), 19-inch 1U height  
**Mounting:** Standard 19-inch rackmount

## Environmental Limits

### Operating Temperature:

SP Models: -25 to 55°C (-13 to 131°F)

DPP Models: -25 to 55°C (-13 to 131°F)

DPP-T Models: -40 to 70°C (-40 to 158°F)

**Storage Temperature:** -40 to 85°C (-40 to 185°F)

**Ambient Relative Humidity:** 5 to 95% (non-condensing)

**Anti-Vibration:** 7 mm (2-9 Hz), 20 m/s/s (9-200 Hz), 15 m/s/s (200-500 Hz) @ IEC-61850-3, IEC 60870-2-2/Cm/(3M6)/(4M6), sine wave, 2-500 Hz, 1 Oct/min, 10 cycles, 2 hrs 40 mins per axis

**Anti-Shock:** 300 m/s<sup>2</sup> @ IEC-61850-3, IEC 60870-2-2/Cm/(3M6)/(4M6), half sine wave, 11 ms

## Power Requirements

**Input Voltage:** 100 to 240 VAC; 100 to 240 VDC

**Input Current:** 0.80 A @ 100 VAC; 0.41 A @ 100 VDC

**Power Consumption:** 25 W

## Standards and Certifications

**Safety:** UL 60950-1, IEC 60950-1, EN 60950-1

**Electrical Substation:** IEC 61850-3, IEEE 1613, IEC 60255

**Protection Relay:** IEC 60255

**EMC:** EN 61000-6-2/6-4

**EMI:** CISPR 22, FCC Part 15B Class A

### EMS:

IEC 61000-4-2 ESD: Contact: 8 kV; Air: 15 kV

IEC 61000-4-3 RS: 80 MHz to 1 GHz: 10 V/m

IEC 61000-4-4 EFT: Power: 4 kV; Signal: 4 kV

IEC 61000-4-5 Surge: Power: 4 kV; Signal: 4 kV

IEC 61000-4-6 CS: 10 V

IEC 61000-4-8

IEC 61000-4-11

For DPP models only:

IEC 61000-4-16: 30 V / 300 V

IEC 61000-4-17: 10% nominal DC voltage

IEC 61000-4-18:

100 kHz: 25K VCM; 1 kv DIM

1 MHz: 2.5 kv CM; 1 kv DM

IEC 61000-4-29: 30% reduction, 0.1 sec.

**Green Product:** RoHS, CRoHS, WEEE

## Reliability

### Alert Tools:

- Built-in buzzer and RTC (real-time clock) with battery lithium backup
- Built-in 1 relay for visual/audio alarm.

**Automatic Reboot Trigger:** Built-in watchdog timer, configurable for restarts at 1 to 255 second intervals

**MTBF** (mean time between failures)

### Time:

DA-681A-I-SP: 240,784 hrs

DA-681A-I-DPP: 215,436 hrs

DA-681A-I-DPP-T: 215,436 hrs

**Standard:** Telcordia (Bellcore) Standard TR/SR

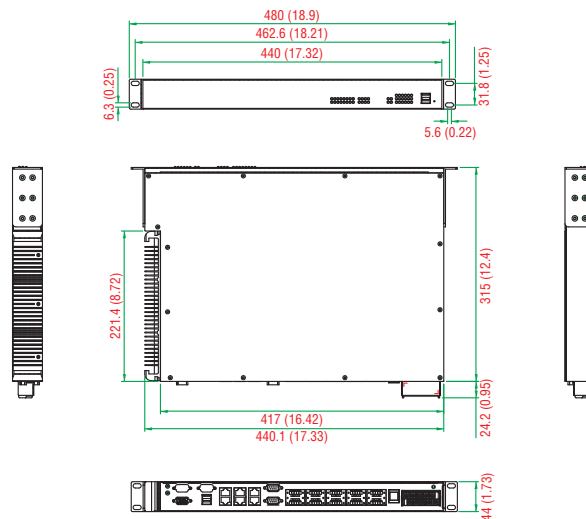
## Warranty

**Warranty Period:** 3 years

**Details:** See [www.moxa.com/warranty](http://www.moxa.com/warranty)

## Dimensions

Unit: mm (inch)



## Software Specifications

### Linux

**OS:** Linux Debian 8, 64-bit

**Terminal Server (SSH):** Provides secure encrypted communications between two un-trusted hosts over an insecure network

**Kernel Version:** GNU/Linux 3.16

**System Shell:** DASH (default), BASH

**File System:** EXT2, EXT3, EXT4

**Internet Protocol Suite:** TCP, UDP, IPv4, IPv6, SNMPv2, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, SSH, PPP, SFTP, RSYNC, SSL

**Programming Language Support:** PHP, Perl, Python

**Internet Security Suite:** OpenVPN, iptables

**Secure Shell for Remote Access:** SSH allows remote logins to a secure encrypted console from any connected network

**Watchdog:** Features a hardware function to trigger system reset in a user specified time interval (Linux standard API)

**Windows Embedded Standard 7** (by CTOS)

### Core OS:

- Windows 7 Embedded, 32-bit/64-bit
- Sensor and Location Platform
- Remote Procedure Call

**Applications and Services Development:**

- .Net Framework 3.5
- Remote Desktop Protocol 7.1
- COM OLE Application Support
- COM+ Application Support
- MSMQ

**Internet Services:**

- Internet Explorer 8.0
- IIS 7.0

**File Systems and Data Storage:**

- Windows Data Access Components
- Windows Backup and Restore

**Diagnostics:**

- Common Diagnostic Tools
- Problem Reports and Solutions

**Fonts:**

- Chinese (Trad. and Simp.), Middle East, South East Asian, South Asian Fonts
- True Type Fonts

**Graphics and Multimedia:**

- MPEG DTV-DVD Audio Decoder (MPEG-2, AAC)
- MPEG Layer-3 Audio Codecs(MP3)
- MPEG4 Decoders
- Windows Media Video VC-1 (WMV) Codecs
- DirectX and Windows Device Experience
- Windows Media Player 12

**Management:**

- Group Policy Management
- Windows Management Instrument (WMI)
- Windows Update

**Networking:**

- Extensible Authentication Protocol (EAP)
- Internet Authentication Service
- Telnet Server
- Bluetooth
- Domain Services
- Network Access Protection
- Network and Sharing Center
- Quality of Service
- Remote Access Service (RAS)
- Telephony API Client
- Windows Firewall
- Wireless Networking

**Security:**

- Credential Roaming Service
- Credentials and Certificate Management
- Windows Authorization Manager (AZMAN)
- Windows Security Center
- Active Directory Rights Management
- Security Base
- Encrypted File System (EFS)

**Embedded Features:**

- Enhanced Write Filter (EWF)
- File-Based Write Filter (FBWF)
- Message Box Default Reply
- Registry Filter
- WSDAPI for .NET

**Embedded Self-Health Diagnostics:** SNMP-based remote scripting layer for monitoring, reporting, and control

**Ordering Information**

**Available Models**

**DA-681A-I-SP:** 6 Ethernet ports, VGA, 2 RS-232/422/485 ports, 10 RS-485 ports, mSATA, SATA, USB, single power (RAM, mSATA, OS not included), -25 to 55°C operating temperature

**DA-681A-I-SP-LX:** 6 Ethernet ports, VGA, 2 RS-232/422/485 ports, 10 RS-485 ports, mSATA, SATA, USB, single power, Linux Debian 8, -25 to 55°C operating temperature

**DA-681A-I-DPP:** IEC 61850-3 computer with VGA, 6 LAN ports, 2 RS-232/422/485 ports, 10 RS-485 ports, mSATA, SATA, USB, dual power (RAM, mSATA, OS not included), -25 to 55°C operating temperature

**DA-681A-I-DPP-LX:** IEC 61850-3 computer with VGA, 6 LAN ports, 2 RS-232/422/485 ports, 10 RS-485 ports, mSATA, SATA, USB, dual power, Linux Debian 8, -25 to 55°C operating temperature

**DA-681A-I-DPP-T:** IEC 61850-3 computer with VGA, 6 LAN ports, 2 RS-232/422/485 ports, 10 RS-485 ports, mSATA, SATA, USB, dual power (RAM, mSATA, OS not included), -40 to 70°C operating temperature

**DA-681A-I-DPP-T-LX:** IEC 61850-3 computer with VGA, 6 LAN ports, 2 RS-232/422/485 ports, 10 RS-485 ports, mSATA, SATA, USB, dual power, Linux Debian 8, -40 to 70°C operating temperature

**Note:** To order a DA-681A system with a pre-installed W7E OS, please contact a Moxa sales representative.

**Package Checklist**

- DA-681A rackmount computer
- 19-inch rackmount kit
- Documentation CD or DVD
- Quick installation guide (printed)
- Warranty card

**Recommended Configurations**

Operating System	System Memory	mSATA for OS
Windows Embedded Standard 7 32 bit	≥ 4 GB	≥ 8 GB
Windows Embedded Standard 7 64 bit	≥ 4 GB	≥ 16 GB
Linux Debian 8	≥ 2 GB	≥ 4 GB


### Comparison of DA-Series Models

Model Name	Serial Ports		Giga LAN Port	Storage			Expansion PCI-104 (for IRIG-B)	System			Power	Relay	IEC 61850-3 IEEE/1613 IEC 60255
	3-in-1	RS-485		SATA	mSATA	USB		OS	RAM	mSATA			
DA-681A-I-SP	2	10	6	1	1	4	–	–	–	–	1	–	–
DA-681A-I-SP-LX	2	10	6	1	1	4	–	Linux	2G	8G	1	–	–
DA-681A-I-DPP	2	10	6	1	1	4	1	–	–	–	2	1	✓
DA-681A-I-DPP-LX	2	10	6	1	1	4	1	Linux	2G	8G	2	1	✓
DA-681A-I-DPP-T	2	10	6	1	1	4	1	–	–	–	2	1	✓
DA-681A-I-DPP-T-LX	2	10	6	1	1	4	1	Linux	2G	8G	2	1	✓


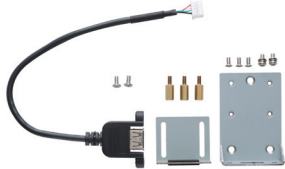
### Optional Accessories

Model Name	Expansion Module	Accessory	
	DA-IRIGB-4DIO-PCI104-EMC4	USB Dongle	DA-681A HDD Kit
DA-681A-I-SP	–	✓	✓
DA-681A-I-SP-LX	–	✓	✓
DA-681A-I-DPP	✓	✓	✓
DA-681A-I-DPP-LX	✓	✓	✓
DA-681A-I-DPP-T	✓	✓	✓
DA-681A-I-DPP-T-LX	✓	✓	✓

### Expansion Modules (can be purchased separately)

	Model	Description
	DA-IRIGB-4DIO-PCI104-EMC4	Time-synchronization expansion module, 1 IRIG-B signal input port, 3 digital inputs, 4 digital outputs (DA-681A-I-DPP series only)

### Optional Accessories (can be purchased separately)

	Model	Description
	DA-681A HDD Kit	HDD/SSD installation package, supports single HDD/SSD.
	USB Dongle Kit	USB dongle kit installation package. This kit can be installed inside the DA-681A and is suited for security applications. For example, the license activate USB dongle for SCADA or the backup image storage for Smart Recovery.