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

IEC 61850-3
IEEE 1613

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.
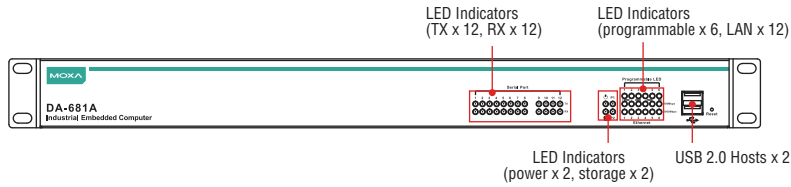
Proactive Monitoring Function

The DA-681A's Proactive Monitoring function monitors the computer's health by keeping an eye on CPU usage, memory usage, storage partition u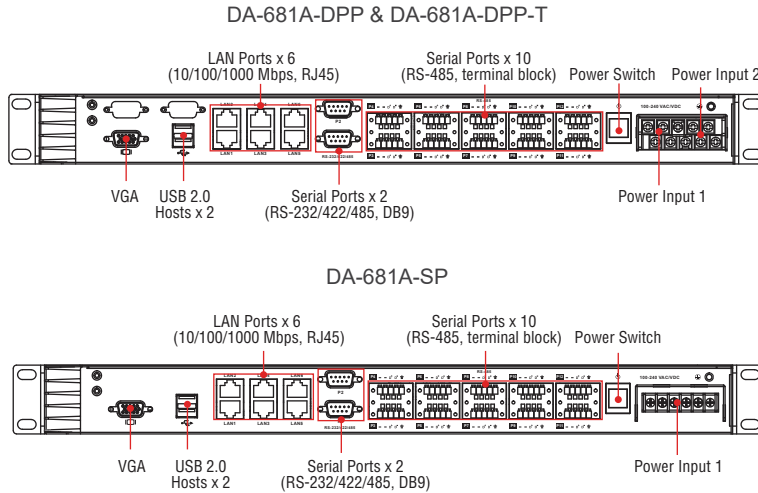sage, the operating temperature of the CPU and motherboard, and the redundant power monitor, and can trigger a relay to provide either visual or audio alarms.

Appearance

Front View

LED Indicators
(TX x 12, RX x 12)

LED Indicators
(programmable x 6, LAN x 12)

DA-681A
Industrial Embedded Computer

LED Indicators
(power x 2, storage x 2)

USB 2.0 Hosts x 2

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

LAN Ports x 6
(10/100/1000 Mbps, RJ45)

Serial Ports x 10
(RS-485, terminal block)

Power Switch   Power Input 2

VGA   USB 2.0
Hosts x 2

Serial Ports x 2
(RS-232/422/485, DB9)

Power Input 1

Rear View

DA-681A-SP

LAN Ports x 6
(10/100/1000 Mbps, RJ45)

Serial Ports x 10
(RS-485, terminal block)   Power Switch

VGA   USB 2.0
Hosts x 2

Serial Ports x 2
(RS-232/422/485, DB9)

Power Input 1

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/s2 @ 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
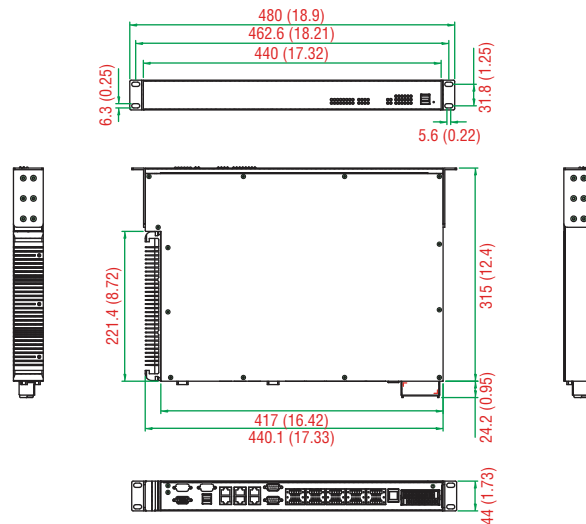**Standard:** Telcordia (Bellcore) Standard TR/SR

Warranty
Warranty Period: 3 years
Details: See www.moxa.com/warranty

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 | System | | | Power | Relay | IEC 61850-3 IEEE/1613 IEC 60255 |
	3-in-1	RS-485		SATA	mSATA	USB	PCI-104 (for IRIG-B)	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.