# V2416A Series

*Compact, fanless, anti-vibration railway computers*

> Intel Celeron/Core i7 high performance network video recorder for rolling stock applications
> Two hot-swappable trays for 2.5" HDD/SSD storage expansion
> API Library for easy development and storage volume notification
> Dual independent DVI-I displays
> 2 Gigabit Ethernet ports with M12 X-coded connectors
> 2 CFast sockets for OS backup
> M12 A-coded power connector
> Compliant with EN 50121-4
> Complies with a portion of EN 50155 specifications
> IEC 61373 certified for shock and vibration resistance
> -40 to 70°C wide temperature models available
> Supports SNMP-based system configuration, control, and monitoring (Windows Embedded Standard 7 only)

Microsoft® Windows® Embedded   RoHS   c(UL)us LISTED   EN 50121   CE   FC
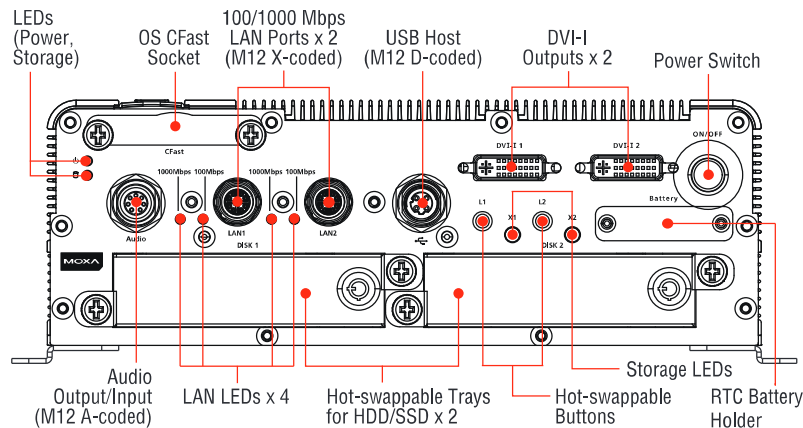
## Introduction

The V2416A Series embedded computers are based on the Intel 3rd generation processor and feature 4 RS-232/422/485 serial ports, dual LAN ports, and 3 USB 2.0 hosts. In addition, V2416A computers provide dual DVI-I outputs and comply with a portion of EN 50155 specifications, covering operating temperature, power input voltage, surge, ESD, and vibration, making them suitable for a variety of industrial applications.

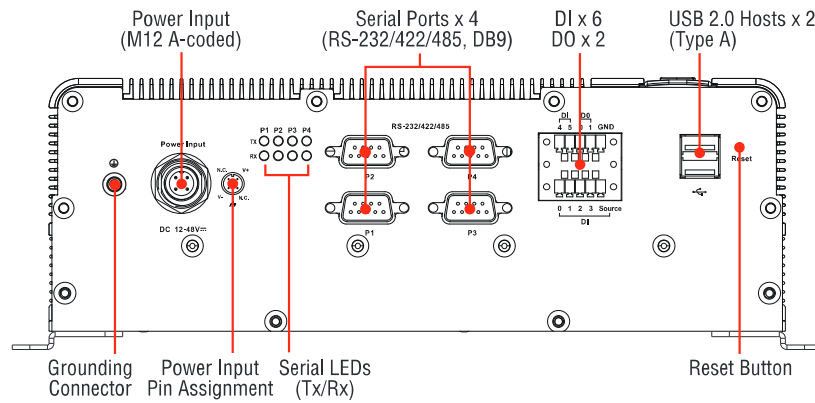The CFast socket, SATA connectors, and USB sockets provide the V2416A computers with further reliability, perfect for industrial applications that require data buffering and storage expansion. Most importantly, the V2416A computers come with 2 hot-swappable storage trays for inserting additional storage media, such as hard disk or solid-state drives, and support hot swapping for convenient, fast, and easy storage replacement. Each storage tray has its own LED to indicate whether or not a storage module is plugged in V2416A series computers come pre-installed with a choice of Linux Debian 7 or Windows Embedded Standard 7 to provide programmers with a familiar environment in which to develop sophisticated, bug-free application software at a low cost.

## Appearance

LEDs (Power, Storage)   OS CFast Socket   100/1000 Mbps LAN Ports x 2 (M12 X-coded)   USB Host (M12 D-coded)   DVI-I Outputs x 2   Power Switch

**Front View**

Audio Output/Input (M12 A-coded)   LAN LEDs x 4   Hot-swappable Trays for HDD/SSD x 2   Hot-swappable Buttons   Storage LEDs   RTC Battery Holder

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Power Input
(M12 A-coded)   Serial Ports x 4
(RS-232/422/485, DB9)   DI x 6
DO x 2   USB 2.0 Hosts x 2
(Type A)

**Rear View**

Grounding      Power Input        Serial LEDs                                Reset Button
Connector    Pin Assignment       (Tx/Rx)

## Hardware Specifications

### Computer
**CPU:**
• Intel Celeron 1047UE processor (2M cache, 1.40 GHz) for the V2416A-C2 series
• Intel Core i7-3517UE processor (6M cache, 1.7 GHz) for the V2416A-C7 series
**OS:** Windows Embedded Standard 7 or Linux Debian 7
**System Chipset:** Mobile Intel® HM65 Express
**System Memory:** 1 DDR3-1600 SO-DIMM SDRAM slot, 8 GB max., 4 GB pre-installed
**USB:** 3 bootable USB 2.0 ports (2 type A, 1 M12 D-coded)

### Storage
**HDD/SSD Support:** 2 hot-swappable trays for 2.5" HDD/SSD storage expansion*
*Storage drive not included. Must be purchased separately.
**CFast Support:** 1 slot for OS*, 1 slot for backup storage
*32-bit W7E requires at least an 8 GB CFast card
*64-bit W7E requires at least a 16 GB CFast card (optional)
*Linux Debian 7 requires at least an 8 GB CFast card (must be purchased separately)

### Other Peripherals
**Audio:** Line-in, line-out interface (M12 A-coded)

### Display
**Graphics Controller:** Intel® HD Graphics 4000 (integrated)
**Connector Type:** 2 DVI-I connectors
**Display Interface:**
DVI up to 1920x1200 resolution @ 60 Hz
VGA up to 1920x1200 resolution @ 60 Hz
VGA up to 2048x1536 resolution @ 75 Hz

### Ethernet Interface
**LAN:** 2 auto-sensing 10/100/1000 Mbps ports (M12 X-coded)
**Isolation Protection:** 1.5 kV

### Serial Interface
**Serial Standards:** 4 software-selectable RS-232/422/485 ports (DB9 male)
**ESD Protection:** 4 kV for all signals
**Isolation Protection:** 1.5 kV

### 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, ADDC® (automatic data direction control) for RS-485
**Baudrate:** 50 bps to 921.6 kbps (non-standard baudrates supported; see user's manual for details)

### 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

### Digital Input
**Input Channels:** 6, source type
**Input Voltage:** 0 to 30 VDC at 25 Hz
**Digital Input Levels for Dry Contacts:**
• Logic level 0: Close to GND
• Logic level 1: Open
**Digital Input Levels for Wet Contacts:**
• Logic level 0: +3 V max.
• Logic level 1: +10 V to +30 V (Source to DI)
**Isolation:** 3 kV optical isolation

### Digital Output
**Output Channels:** 2, sink type
**Output Current:** Max. 200 mA per channel
**On-state Voltage:** 24 VDC nominal, open collector to 30 VDC
**Connector Type:** 10-pin screw-fastened Euroblock terminal (6 inputs, 2 outputs, DI Source, GND)
**Isolation:** 3 kV optical isolation

### LEDs
**System:** Power x 1, Storage x 1, hot-swappable trays x 2
**LAN:** 2 per port (10/100/1000 Mbps)
**Serial:** 2 per port (Tx and Rx)

### Switches and Buttons
**Power Switch:** on/off (front panel)
**Reset Button:** For warm reboot (front panel)
**Hot-swappable:** trigger (on each removable tray)

### Physical Characteristics
**Housing:** Aluminum
**Weight:** 4 kg
**Dimensions:**
Without ears: 250 x 86 x 154 mm (9.84 x 3.38 x 6.06 in)
With ears: 275 x 92 x 154 mm (10.83 x 3.62 x 6.06 in)
**Mounting:** DIN rail, wall, VESA

### Environmental Limits
**Operating Temperature*:**
Standard models: -25 to 55°C (-13 to 131°F)
Wide temp. models: -40 to 70°C (-40 to 158°F)
**Storage Temperature*:** -40 to 85°C (-40 to 185°F)
*without HDD installed
**Ambient Relative Humidity:** 5 to 95% (non-condensing)
**Anti-Vibration:** EN 50155 standard
**Anti-Shock:** EN 50155 standard
**Conformal Coating:** Available on request

### Power Requirements
**Input Voltage:** 12 to 48 VDC (M12 A-coded)
Note: Compliant with EN 50155 at 24 VDC
**Power Consumption:**
• 3.3 A @ 12 VDC, 39.6 W
• 0.82 A @ 48 VDC, 39.4 W

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## Standards and Certifications
**Safety:** UL 60950-1, EN 60950-1
**EMC:** EN 55022/24
**EMI:**
CISPR 22, FCC Part 15B Class A
**EMS:**
IEC 61000-4-2 ESD: Contact 6 kV; Air 8 kV
IEC 61000-4-3 RS: 20 V/m (80 MHz to 1 GHz)
IEC 61000-4-4 EFT: Power 2 kV; Signal 2 kV
IEC 61000-4-5 Surge: Power 2 kV; Signal 2 kV
IEC 61000-4-6 CS: 10 V

IEC 61000-4-8
**Green Product:** RoHS, CRoHS, WEEE
**Rail Traffic:** EN 50155*, EN 50121-3-2, EN 50121-4, IEC 60571
*Complies with a portion of EN 50155 specifications. Please contact Moxa or a Moxa distributor for details.

## Reliability
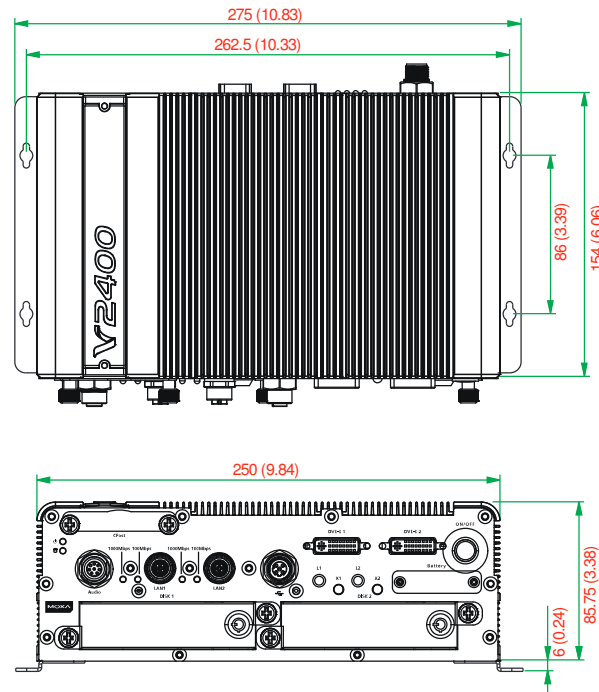**Automatic Reboot Trigger:** Software-programmable watchdog timer configurable from 1 to 255 seconds

## Warranty
**Warranty Period:** 3 years
**Details:** See www.moxa.com/warranty
Note: These hardware specifications describe the embedded computer unit itself, but not its official accessories. In particular, the wide temperature specification

## Dimensions



Unit: mm (inch)

275 (10.83)
262.5 (10.33)
86 (3.39)
154 (6.06)
250 (9.84)
85.75 (3.38)
6 (0.24)

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## : Software Specifications

### Linux
**OS:** Linux Debian 7
**File System:** EXT 4
**Internet Protocol Suite:** TCP, UDP, IPv4, SNMPv1/v2c/v3, ICMP, ARP, HTTP, SSH 1.0/2.0, SSL, DHCP, NTP, NFS, Telnet, FTP, TFTP, PPP, PPPoE
**Internet Security:** OpenVPN, Netfilter/iptables
**Web Server (Apache):** Allows you to create and manage web sites; supports PHP and XML
**Secure Shell for Remote Access:** SSH allows remote logins to a secure encrypted console from any connected network dial-up
**Terminal Server (SSH):** Provides secure encrypted communications between two un-trusted hosts over an insecure network
**Dial-up Networking:** PPP Daemon for Linux that allows Unix machines to connect to the Internet through dialup lines, using the Point-to-Point Protocol (PPP). Works with 'chat', 'dip', and 'dialup', 'dip', and 'diald', among (many) others. Supports IP, TCP, UDP, and (for Linux) IPX (Novell)
**File Server:** Enables remote clients to access files and other resources over the network
**Watchdog:** A watchdog timer that triggers a system reset upon software freezes, for both specific applications and system-wide failures.

**Application Development Software:**
• Moxa API Library (Watchdog timer, Moxa serial I/O control, Moxa DI/DO API)
• GNU C library
• Perl

### Windows Embedded Standard 7
**Core OS:**
• 32-bit or 64-bit supported
• Remote Client
• Remote Procedure Call
**Applications and Services Development:**
• .Net Framework 4.5
• Remote Desktop Protocol 7.1
• COM OLE Application Support
• COM+ Application Support
• MSMQ
**Internet Services:**
• Internet Explorer 11
• IIS 7.0
**File Systems and Data Storage:**
• Windows Data Access Components
• Windows Backup and Restore

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**Diagnostics:**
- Common Diagnostic Tools
- Problem Reports and Solutions

**Fonts:** Chinese (Trad. and Simp.), Japanese, Korean, Western, Middle Eastern, South East Asian, and South Asian 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 Diagnostic Software:** SNMP-based remote scripting layer for monitoring, reporting, and control
**SmartRecovery:** BIOS level system recovery tool

## Ordering Information

| Type | CTO Models | | | | | | Pre-Configured Models | | |
|---|---|---|---|---|---|---|---|---|---|
| Model | V2416A-C2 | V2416A-C2-T | V2416A-C2-CT-T | V2416A-C7 | V2416A-C7-T | V2416A-C7-CT-T | V2416A-C2-T-W7E | V2416A-C2-T-W7E | V2416A-C7-T-W7E |
| **Computer** | | | | | | | | | |
| CPU | Intel Celeron 1047UE 1.4 GHz | | | Intel Core i7-3517UE 1.7 GHz | | | Intel Celeron 1047UE 1.4 GHz | | Intel Core i7-3517UE 1.7 GHz |
| Operating System (CTO*) | Optional<br>Note: Windows Embedded Standard 7 (32-bit/64-bit) or Linux Debian 7 (64-bit) | | | | | | Windows Embedded Standard 7 (32-bit) | | |
| Memory (CTO*) | 4 GB pre-installed, can be upgraded to 8 GB | | | | | | 4 GB pre-installed | | |
| USB | USB 2.0 (Type A) x 2<br>USB 2.0 (M12 D-coded) x 1 | | | | | | | | |
| Power Input Voltage | 12 to 48 VDC (M12 A-coded) | | | | | | | | |
| **Storage** | | | | | | | | | |
| OS CFast Storage (CTO*) | Optional<br>Note: 32-bit W7E requires at least an 8 GB CFast card, 64-bit W7E requires at least a 16 GB CFast card, and 64-bit Debian7 requires at least an 8 GB CFast card | | | | | | 8 GB CFast card pre-installed | | |
| Backup CFast Storage (CTO*) | Optional | | | | | | | | |
| SSD / HDD Storage (CTO*) | EN50155 Anti-vibration 2.5" SSD / HDD hot-swappable storage tray x 2<br>Note: Storage drive to be purchased separately | | | | | | | | |
| **Interface** | | | | | | | | | |
| Display Interface | DVI-I x 2 | | | | | | | | |
| Audio Interface | Line in/out (M12 A-coded) x 1 | | | | | | | | |
| Ethernet Interface | 10/100/1000 Mbps (M12 X-coded) x 2 | | | | | | | | |
| Serial Port | RS-232/422/485 (DB9) x 4 | | | | | | | | |
| Digital Input Channel | 6 | | | | | | | | |
| Digital Output Channel | 2 | | | | | | | | |
| **Environmental Limits** | | | | | | | | | |
| Operating Temperature | T1: -25 to 55°C | TX: -40 to 70°C | | T1: -25 to 55°C | TX: -40 to 70°C | | T1: -25 to 55°C | TX: -40 to 70°C | |
| Conformal Coating | – | Yes | | – | Yes | | – | | |

*CTO = Configure To Order
Note:
Please refer to the Component Compatibility Guide (CCG) for the list of components that Moxa has validated to be compatible with this product. You can download the CCG from the Moxa product website.
For components with a Moxa P/N, you can order the components together with your product from Moxa and we will install the selected components in your product. Moxa guarantees the compatibility of the components installed in your product though CTO.

### Package Checklist
- V2416A series embedded computer
- Wall mounting kit
- 8 screws for hot-swappable HDD trays
- 8 HDD soft washers
- 2 keys for hot-swappable HDD trays
- Documentation and software CD or DVD
- Quick installation guide (printed)
- Warranty card

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## Optional Accessories (can be purchased separately)

| Type | Model | Description |
|------|-------|-------------|
| Cable & Connector | CBL-M12XMM8PRJ45-BK-100-IP67 | 1-meter X-coded M12-to-RJ45 Cat-5E UTP Gigabit Ethernet cable, 8-pin male M12 connector, IP67-rated |
| Connector | M12X-8PMM-IP67 | Field-installation X-coded screw-in Gigabit Ethernet connector, 8-pin male M12 connector, IP67-rated |
| **Mounting Kit** | | |
| Isolated Wall Mounting Kit | V2400 Isolated Wall Mounting Kit | Wall mounting kit with isolation protection. Including two wall mount brackets and four screws |
| DIN-rail Mounting Kit | DK-DC50131-01 | DIN-rail mounting kit. Including two DIN-rail brackets and eight screws |
| **Power** | | |
| Cable | CBL-M12(FF5P)/Open-100 IP67 | 1-meter A-coded M12-to-5-pin power cable, 5-pin female M12 connector, IP67-rated |
| Connector | M12A-5P-IP68 | Field-installation A-coded screw-in power connector, 5-pin female M12 connector, IP68-rated |
| Adapter | PWR-24250-DT-S1 | Power adapter with input: 100 to 240 VAC, 50 to 60 Hz, 1.5 A, output: 24 VDC,2.5 A, 60 W, for test and system development in the office under ambient temperature |
| Power Cord | PWC-C7US-2B-183 | Power cord with 2-pin connector, USA plug |
| Power Cord | PWC-C7EU-2B-183 | Power cord with 2-pin connector, Euro plug |
| Power Cord | PWC-C7UK-2B-183 | Power cord with 2-pin connector, British plug |
| Power Cord | PWC-C7AU-2B-183 | Power cord with 2-pin connector, Australia plug |
| Power Cord | PWC-C7CN-2B-183 | Power cord with 2-pin connector, China plug |
| **Audio** | | |
| Connector | M12A-8PMM-IP67 | Field-installation A-coded 8-pin male screw-in M12 connector, IP67-rated |
| **USB** | | |
| Connector | M12A-5PMM-IP68 | D-coded screw-in USB connector, 5-pin male M12 connector, IP68-rated |
| **Battery** | | |
| Battery Kit | RTC Battery Kit | Lithium battery with built-in connector for easy replacement |