V2416 Series

x86 ready-to-run embedded computer with Intel Atom N270 CPU, VGA, DVI-I, audio, 2 Ethernet LAN ports, 4 serial ports, 6 DIs, 2 DOs, 3 USB ports, 1 CompactFlash slot, 2 hot-swappable storage trays

-40°C 70°C

> High performance network video recorder for rolling stock applications
> Compliant with EN 50121-4 and a portion of EN 50155 specifications
> IEC 61373 certified for shock and vibration resistance
> Two SATA II storage connectors with hot-swappable trays
> Custom APIs for independent control of LEDs and internal storage monitoring
> -40° to 70°C wide temperature models available

Windows Embedded Standard 7 RoHS c UL us LISTED CE FC

Introduction

The V2416 Series embedded computers are based on the Intel Atom N270 x86 processor and feature 4 RS-232/422/485 serial ports, dual LAN ports, and 3 USB 2.0 hosts. In addition, V2416 computers provide VGA and DVI-I outputs and are compliant with a portion of EN 50155 specifications, covering operating temperature, power input voltage, power surges, ESD, and vibration, making them particularly well-suited for railway and industrial applications.
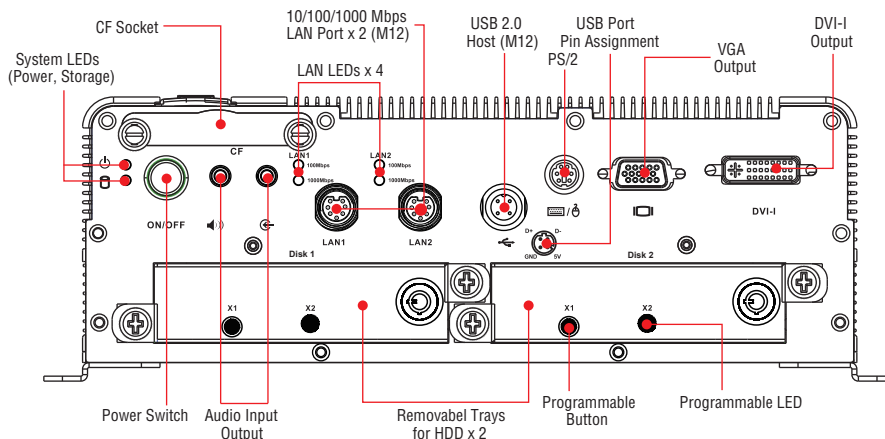
The CompactFlash socket, SATA connectors, and USB sockets provide the V2416 computers with further reliability, perfect for industrial applications that require data buffering and storage expansion. Most importantly, V2416 computers come with key enhancements for

mass storage media, such as two hot-swappable SATA drive trays for convenient and fast storage maintenance, user-programmable LEDs, and an API that simplifies customizing mass storage monitoring and management. Lastly, Moxa's MDM API is also included, giving users a convenient gateway-client model that eases the distributed automation and control of multiple devices by a single host device.
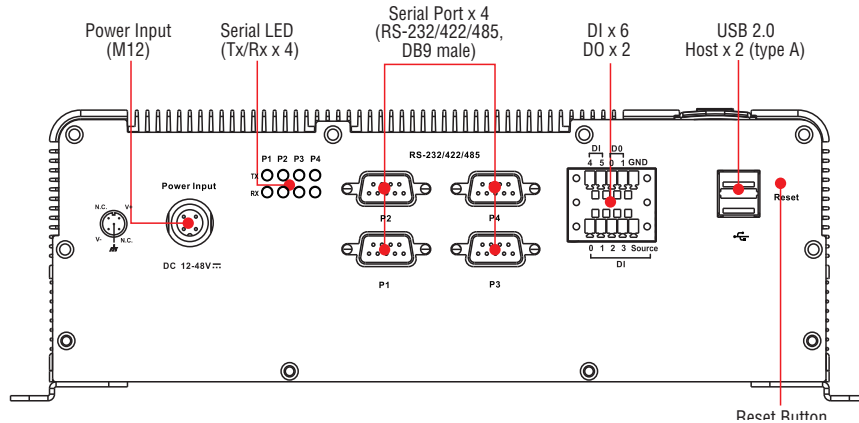
V2416 series computers come pre-installed with a choice of Linux, Windows Embedded Standard 2009, or Windows Embedded Standard 7, giving our customers their choice of software environments for the development of platform applications.

Appearance

Front View

Power Input
(M12)

Serial LED
(Tx/Rx x 4)

Serial Port x 4
(RS-232/422/485,
DB9 male)

DI x 6
DO x 2

USB 2.0
Host x 2 (type A)

Rear View

P1 P2 P3 P4

Tx
Rx

RS-232/422/485

P2

P1

P4

P3

DI D0
4 5 0 1 GND

0 1 2 3 Source
DI

Reset

Reset Button

Power Input

N.C.   V+

V-   N.C.

DC 12-48V

: Hardware Specifications

Computer
CPU: Intel Atom N270 1.6 GHz processor
System Chipset: Intel 945GSE + ICH7-M
BIOS: 8 Mbit PLCC, with ACPI
FSB: 533 MHz
System Memory: 2 GB capacity, 1 GB (LX and XPE models)/2 GB (W7E models) pre-installed: 1 slot of 200 pin DDR2-533 SO-DIMM SDRAM
USB: 3 bootable USB 2.0 ports: 2 type A, 1 M12
OS (pre-installed): Debian 5 ("Lenny"), Windows Embedded Standard 2009, or Windows Embedded Standard 7

Storage
Built-in: 2 GB (LX and XPE models)/8 GB (W7E models) onboard industrial DOM to store OS
Storage Expansion: 1 type I/II CompactFlash slot for memory expansion
HDD Support:
2 hot-swappable SATA-II connectors for mass storage, with removable trays.

Other Peripherals
KB/MS: 1 PS/2 interface; supports keyboard and mouse via a Y cable
Audio: Line-in, line-out interface

Display
Graphics Controller: Intel Generation 3.5 Integrated Graphics Engine, 250 MHz core render clock and 200 MHz core display clock at 1.05-V core voltage
DVI Interface: DVI-I connector (Chrontel CH7307 SDVO to DVI transmitter), up to 1600 x 1200 resolution
VGA Interface: DB15 female connector, up to 2048 x 1536 resolution

Ethernet Interface
LAN: 2 auto-sensing 10/100 Mbps M12 ports

Serial Interface
Serial Standards: 4 software-selectable RS-232/422/485 ports* (DB9 male)
*COM1's pin 9 signal can be set by jumper as N/C (default), +5 V, or +12 V
ESD Protection: 4 kV for all signals

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: Indicators for power, storage, plus 2 programmable LEDs on each storage tray
LAN: 2 on each port: 100 Mbps & 1000 Mbps
Serial: 2 on each serial port: 1 Tx & 1 Rx

Switches and Buttons
Power Switch: Recessed / flush front panel button
Reset Button: For warm reboot (front panel)
Programmable Button: 1 recessed button on each removable tray

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

Environmental Limits
Operating Temperature: (without HDD installed)
Standard models: -25 to 60°C (-13 to 140°F)
Wide temp. models: -40 to 70°C (-40 to 158°F)
Storage Temperature: (without HDD installed)
-40 to 85°C (-40 to 185°F)
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 connector)
Note: Compliant with EN 50155 on 24 VDC

Power Consumption: 26 W
• 2.16 A @ 12 VDC
• 1.08 A @ 24 VDC
• 542 mA @ 48 VDC

Standards and Certifications

Safety: UL 60950-1, CSA C22.2 No. 60950-1-07, EN 60950-1
EMC: EN 55022 Class A, EN 61000-3-2 Class D, EN 61000-3-3, EN 55024, FCC Part 15 Subpart B Class A
Green Product: RoHS, CRoHS, WEEE

Rail Traffic: EN 50155*, EN 50121-2-3, EN 50121-4, IEC 61373
*Complies with a portion of EN 50155 specifications. Please contact Moxa or a Moxa distributor for details.

Reliability

Automatic Reboot Trigger: Built-in WDT (watchdog timer) supporting 1-255 level time interval system reset, software programmable

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 does not apply to accessories such as power adaptors and cables.

Dimensions

275 (10.83)
262.5 (10.33)
Unit: mm (inch)
86 (3.39)
154 (6.06)
85.75 (3.38)
6 (0.24)
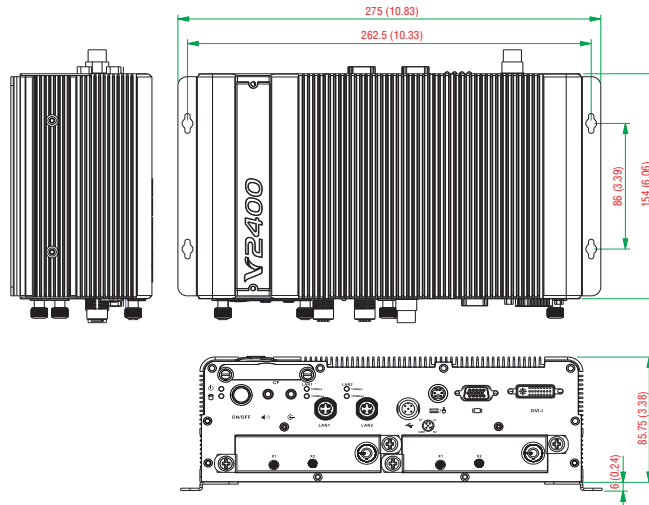
Software Specifications

Linux

OS: Debian Linux 5.0, "Lenny", kernel 2.6.26
File System: EXT2/EXT3
Internet Protocol Suite: TCP, UDP, IPv4, SNMPv1/v2c/v3, ICMP, ARP, HTTP, CHAP, PAP, SSH 1.0/2.0, SSL, DHCP, NTP, NFS, Telnet, FTP, TFTP, PPP, PPPoE
Internet Security: OpenVPN, iptables firewall
Web Server (Apache): Allows you to create and manage web sites; supports PHP and XML
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 PPP protocol, as a PPP server or client. Works with 'chat', '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: Features a hardware function to trigger system reset in a user specified time interval (Moxa API provided)
Application Development Software:
• Moxa API Library (Watchdog timer, Moxa serial I/O control, Moxa DI/DO API)
• GNU C/C++ compiler
• GNU C library
• Perl
Tailored MIB File for SNMP Control: SNMP allows centralized network monitoring and control. With Moxa's proprietary MIB file, trap notifications keep network overhead low while providing monitoring and control of key BIOS settings; internal hardware sensors; interface connectivity for DI/DO, USB, and UART; and other peripheral devices.

Windows Embedded Standard 7

Core OS:
• 32-bit support
• Remote Client
• 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
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

File Systems and Data Store:
- Windows Data Access Components
- Windows Backup and Restore

Windows XP Embedded

OS: Windows Embedded Standard 2009 SP3
File System: NTFS
Internet Protocol Suite: DHCP, DNS, FTP, HTTP, SNTP, NTP, Telnet, SMTP, SNMPv2, TCP, UDP, IPv4, ICMP, IGMP, IPsec, TAPI, ICS, PPP, CHAP, EAP, PPPoE, PPTP, NetBIOS
Web Server (IIS): Allows users to create and manage websites
Silverlight 2.0: Silverlight is a powerful development tool for creating engaging, interactive user experiences for Web and mobile applications using the .NET framework.

Remote Desktop: The Terminal Server Remote Desktop component provides remote access for the desktop of a computer running Terminal Services
Remote Registry Service: Enables remote users to modify registry settings on this computer
Watchdog: Features a hardware function to trigger system reset in a user specified time interval up to 60 seconds (Moxa API provided)
Enhanced Write Filter: Redirect disk write operations to volatile (RAM) or non-volatile (disk) storage
File-based Write Filter: The File Based Write Filter (FBWF) component redirects all write requests directed at protected volumes to the overlay cache, which records and displays the changes while preserving the protected status of the target volume.

Application Development Software:
- Moxa API Library
- Microsoft .Net Framework 3.5 with SP1
- Active Directory Service Interface (ADSI) Core
- Active Template Library (ATL), ASP.NET 2.0
- Common Control Libraries
- Common File Dialogs
- Direct3D, DirectPlay, DirectShow, and Direct show filters
- Mapi32 Libraries
- Message Queuing (MSMQ) Core
- Microsoft Visual C++ Run Time Libraries
- Power Management dynamic-link library
- RPC
- Windows API, Script Engines, and WMI

Tailored MIB File for SNMP Control: SNMP allows centralized network monitoring and control. With Moxa's proprietary MIB file, trap notifications keep network overhead low while providing monitoring and control of key BIOS settings; internal hardware sensors; interface connectivity for DI/DO, USB, and UART; and other peripheral devices.

: Ordering Information

Available Models

V2416-XPE: x86 ready-to-run embedded computer with Intel Atom N270 CPU, VGA, DVI-I, audio, 2 Ethernet LAN ports, 4 serial ports, 6 DIs, 2 DOs, 3 USB ports, 1 CompactFlash slot, 2 hot-swappable storage trays, Windows Embedded Standard 2009, -25 to 60°C operating temperature (EN 50155 Class T1)

V2416-LX: x86 ready-to-run embedded computer with Intel Atom N270 CPU, VGA, DVI-I, audio, 2 Ethernet LAN ports, 4 serial ports, 6 DIs, 2 DOs, 3 USB ports, 1 CompactFlash slot, 2 hot-swappable storage trays, Debian Linux 5.0 "Lenny", -25 to 60°C operating temperature (EN 50155 Class T1)

V2416-W7E: x86 ready-to-run embedded computer with Intel Atom N270 CPU, VGA, DVI-I, audio, 2 Ethernet LAN ports, 4 serial ports, 6 DIs, 2 DOs, 3 USB ports, 1 CompactFlash slot, 2 hot-swappable storage trays, Windows Embedded Standard 7, -25 to 60°C operating temperature (EN 50155 Class T1)

V2416-T-XPE: x86 ready-to-run embedded computer with Intel Atom N270 CPU, VGA, DVI-I, audio, 2 Ethernet LAN ports, 4 serial ports, 6 DIs, 2 DOs, 3 USB ports, 1 CompactFlash slot, 2 hot-swappable storage trays, Windows Embedded Standard 2009, -40 to 70°C operating temperature (EN 50155 Class T1)

V2416-T-LX: x86 ready-to-run embedded computer with Intel Atom N270 CPU, VGA, DVI-I, audio, 2 Ethernet LAN ports, 4 serial ports, 6 DIs, 2 DOs, 3 USB ports, 1 CompactFlash slot, 2 hot-swappable storage trays, Debian Linux 5.0 "Lenny", -40 to 70°C operating temperature (EN 50155 Class T1)

V2416-T-W7E: x86 ready-to-run embedded computer with Intel Atom N270 CPU, VGA, DVI-I, audio, 2 Ethernet LAN ports, 4 serial ports, 6 DIs, 2 DOs, 3 USB ports, 1 CompactFlash slot, 2 hot-swappable storage trays, Windows Embedded Standard 7, -40 to 70°C operating temperature (EN 50155 Class T1)

Note: Conformal Coating is available on request.

Optional Accessories (can be purchased separately)

PWR-24250-DT-S1: Power adapter
PWC-C7US-2B-183: Power cord with 2-pin connector, USA plug
PWC-C7EU-2B-183: Power cord with 2-pin connector, Euro plug
PWC-C7UK-2B-183: Power cord with 2-pin connector, British plug
PWC-C7AU-2B-183: Power cord with 2-pin connector, Australia plug
PWC-C7CN-2B-183: Power cord with 2-pin connector, China plug
DK-DC50131-01: DIN rail mounting kit

Package Checklist
- V2416 embedded computer
- PS2 to KB/MS Y-type cable
- Documentation and software CD or DVD
- Quick installation guide (printed)
- Warranty card
- Wall mounting Kit

M12 Connectors (can be purchased separately)

M12A-5P-IP68: Field-installation A-coded screw-in power connector, 5-pin female M12 connector, IP68-rated

M12A-5PMM-IP68: D-coded screw-in USB connector, 5-pin male M12 connector, IP68-rated

M12A-8PMM-IP68: Field-installation A-coded screw-in Gigabit Ethernet connector, 8-pin female M12 connector, IP68-rated

M12 Cables (can be purchased separately)

CBL-M12(FF5P)/Open-100 IP67: 1-meter A-coded M12-to-5-pin power cable, 5-pin female M12 connector, IP67-rated

CBL-M12MM8PRJ45-BK-100-IP67: 1-meter A-coded M12-to-RJ45 Cat-5E UTP Gigabit Ethernet cable, 8-pin male M12 connector, IP67-rated