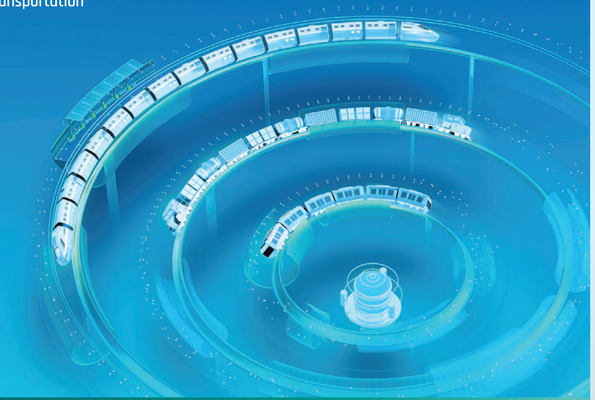
FORGING MOBILITY AHEAD

En route to smarter, safer transportation



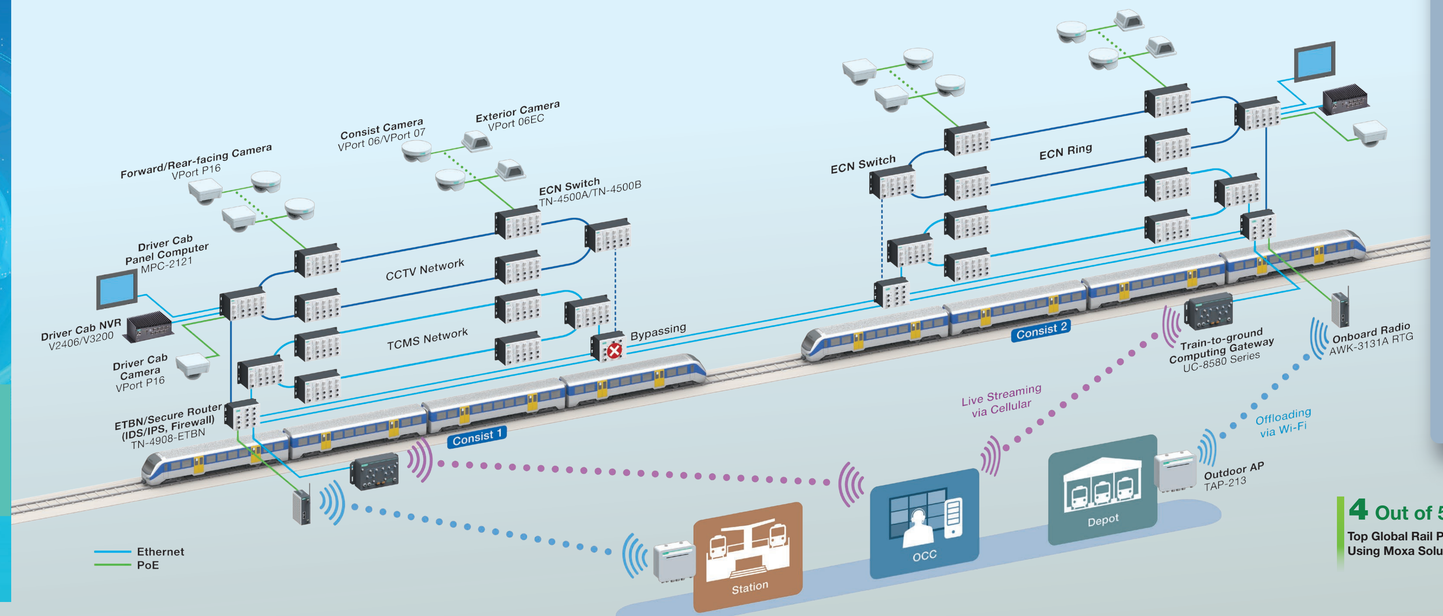
Industrial Communication and Computing Solutions for Onboard CCTV/PIS Systems

2024 Edition

MOXA

The Industry's Most Comprehensive Portfolio and World's First IEC 62443-4-2 Certified Secure Networking Solutions for Onboard CCTV/PIS

Moxa offers the industry's most complete onboard CCTV portfolio that covers all elements, ranging from diverse IP cameras and versatile computers to high-speed wired and wireless networking solutions. Besides implementing network segmentation to protect against potential threats, incorporating security features into onboard networking solutions is important for ensuring the integrity and confidentiality of data. Moxa's comprehensive portfolio not only addresses the functional aspects of onboard surveillance, but also integrates advanced security measures to effectively mitigate potential risks.



Industry-tailored Value to Suit Your Project Needs

Complete Onboard CCTV/PIS Portfolio

Complete Networking
- Onboard router/L2 Ethernet switches
  - High-density 10GbE, GbE, PoE, and bypass connectivity
- Wireless carriage-to-carriage links
- Train-to-ground via Wi-Fi or cellular

Versatile Onboard IP Cameras
- Flexible mounting options
- Multiple housing types, form factors, and resolutions

Ruggedized Computing Platforms
- NVR/media gateways, train operator display (TOD) panel computers, multi-WWAN computers

Innovative Rail-tailored Technologies

Intelligent Inter-consist and Inter-carriage Connectivity
- Dynamic Ring Coupling (DRC)
- Auto Carriage Connection (ACC)
- Auto Configuration to simplify mass deployments

High Bandwidth
- Wired speeds of up to 10GbE
- 300 Mbps 802.11n wireless for train-to-ground communication
- 866 Mbps 802.11ac Wave 2 wireless for carriage-to-carriage connections

Cyber-resilient Networks

IEC 62443-4-2 SL2 Certified Devices for Secure Networking
- Network segmentation, filtering, and access control
- Advanced security technologies (IDS, IPS, DPI)

IEC 62443-4-1 Certified Process Management
- Software Development Life Cycle (SDLC)
- Dedicated Moxa Product Security Incident Response Team (PSIRT)

4 Out of 5
Top Global Rail Players Are Using Moxa Solutions

500+
Success Cases Worldwide in CCTV/PIS/PA

EN 50155
EN 50121-3-2
EN 50121-4
IEC 61375
IEC 62443-4-2

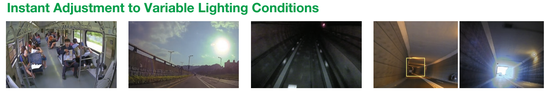
IRIS Certification

Onboard IP Cameras

Ensure a Clear Field of View in Any Situation

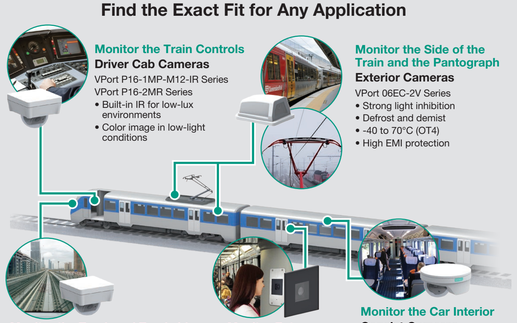
Broad Choice of EN 50155 IP Cameras
- Mounting: Ceiling, panel, flush, and vertical mounting
- Lenses: Optional fixed focal length lenses (2.8, 3.6, 4.2, 6, 8 mm) for different viewing angles and distances
- Form factors: Metal or plastic housing with vandal, rain, and dust protection

Instant Adjustment to Variable Lighting Conditions



Solid WDR performance | Strong light inhibition | Clear color image in low-lux areas | Quickly adapts to sudden lighting changes

Find the Exact Fit for Any Application



Monitor the Train Controls
Driver Cab Cameras
VPort P16-1MP-M12-IR Series
VPort P16-2MR Series
- Built-in IR for low-lux environments
- Color image in low-light conditions

Monitor the Side of the Train and the Pantograph
Exterior Cameras
VPort 06EC-2V Series
- Strong light inhibition
- Defrost and demist
- -40 to 70°C (OT4)
- High EMI protection

Monitor the Track and Trackside
Forward/Rear-facing Cameras
VPort P16-1MP-M12 Series
VPort P16-2MR Series
- Clear color image day and night
- Large viewing angles and distances

Monitor Entrances
Hidden Cameras
VPort P06HC-1V Series
- Compact size
- Flush-mountable
- HD at 30 FPS

Monitor the Car Interior
Consist Cameras
VPort P06-1MP-M12 Series
VPort 06/P06-2 Series
VPort 07/P07-3 Series
- Clear daylight image
- Compact size
- Line-in and built-in microphone

Computing Platforms

Enable Live Viewing and CCTV Recording on the Train and at Remote OCCs

Multi-role Onboard Computers
Simultaneously functions as an NVR and train-to-ground media gateway
- Onboard video recording
- MQTT alarm/event data transmission
- 5G high-throughput communication

Note: SDK provided for NVR or media gateway software development

Train Operator Display (TOD) Panel Computers
Serves as a common display for both PIS and CCTV to optimize driver cab space
- Featuring a rugged, fanless enclosure that can endure constant vibration, temperature swings, and harsh outdoor conditions

Wide Temperature | Sunlight-readable (1000 Nit) | Advanced Touchscreen | Fanless Design | HMI Software Support | Waterproof (IP66)

Multi-WWAN Computers
Enable reliable train-to-ground WWAN communication for uninterrupted wireless access
- Support for up to 4 WWAN connections and 2 SIM card slots per cellular module (with 3 cellular and 1 Wi-Fi module slots)

Compliant With EN 50155 Anti-vibration Standards

Onboard Ethernet Networks

Simplify Network Design, Installation, and Maintenance

Solution Strengths
- High-density 10GbE/GbE and PoE ports with bypass options
- Dynamic train network reconfiguration for operational flexibility

ACC
Auto Carriage Connection

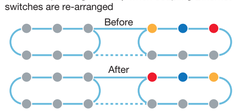
Scenario
Wireless carriage links need to be reconfigured when the train composition changes

Technology Highlights
- Automatically forms wireless links between train cars without modifying existing cabling and couplers
- Inter-carriage wireless links can be applied as a cost-efficient alternative to building the train backbone for refurbishment projects

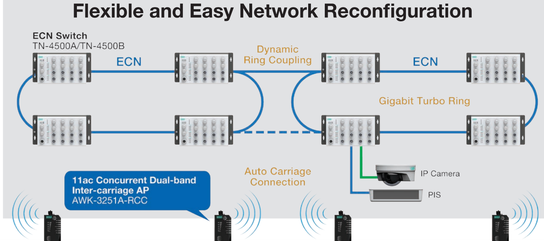
DRC
Dynamic Ring Coupling

Scenario
Train consists are frequently reconfigured mid-journey

Technology Highlights
- All IP devices (e.g. IP cameras, access points, PIS) continue operating normally when coupling Ethernet switches are re-arranged



Flexible and Easy Network Reconfiguration



Train-to-ground Communications

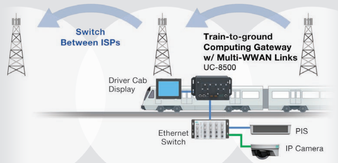
Deploy an Adaptable Train-to-ground Communication Architecture for Seamless Network Coverage

Deliver Live CCTV Streams to the OCC Over Cellular During Operation

Scenario
Trains need to switch between multiple regional carrier networks during transit

Moxa Solutions
Ruggedized T2G computing platforms with up to 3 cellular modules and 1 Wi-Fi module to meet the needs of multi-network or transnational network services

Benefit
Automatically switch between carrier networks to ensure uninterrupted data streaming

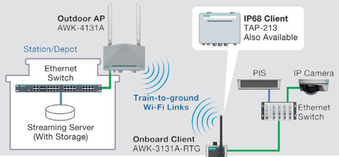


Quickly Offload Recorded Data to Stations or Depots Over Wi-Fi

Scenario
When trains enter the station or return to the depot, all onboard data is offloaded over Wi-Fi

Moxa Solutions
Onboard 802.11n clients connect to outdoor APs at the station to send video data from the train to the station

Benefit
Reduce carrier service charges



EN 50155 Routers

Product Series	TN-4908	TN-4908-PoE	TN-4916	TN-4916-PoE
Input/Output Interface				
Serial Console Port	RS-232 (M12 B-coded 5-pin female connector)			
USB Storage Port	M12 A-coded 5-pin female connector (for ABC-02 USB storage)			
Ethernet Interface				
Max. Number of Ports	8	8	16	16
10/100BaseT(X) Ports (M12 D-coded 4-pin Female Connector)	Up to 8	–	Up to 12	–
10/100/1000BaseT(X) Ports (M12 X-coded 8-pin Female Connector)	Up to 8	Up to 4	Up to 4	Up to 4
10/100BaseT(X) Ports (M12 D-coded 4-pin Female Connector With Bypass Relay)	Up to 4	–	–	–
10/100/1000BaseT(X) Ports (M12 X-coded 8-pin Female Connector With Bypass Relay)	Up to 4	Up to 4	Up to 4	Up to 4
PoE Ports (10/100BaseT(X), M12 D-coded 4-pin Female Connector)	–	–	–	Up to 12
PoE Ports (10/100/1000BaseT(X), M12 X-coded 8-pin Female Connector)	–	4	–	Up to 4
Ethernet Software Features				
Management	Back Pressure Flow Control, SNMP Inform, LLDP, Syslog, HTTP, HTTPS, Flow Control, SMTP, QoS/CoS/ToS, Port Mirror, SNMP Trap, SNMPv1/v2c/v3, IPv4, Telnet, DHCP Server, SFTP, SCP, TFTP, RARP, Account Management, DHCP Client (Option 1/3/12/50/51/53/54/55/57/61/66/67/124/255), DHCP Server (Option 1/3/6/12/15/28/42/50/55), DHCP Relay Agent			
Filter	802.1Q, IGMP v1/v2, Static Multicast			
Unicast Routing	Static Route, RIPv1/v2, OSPF			
Multicast Routing	Static Multicast Routing, DVMRP, PIM-SM			
Routing Redundancy	VRRP			
Redundancy Protocols	RSTP, Static Port Trunk, Turbo Ring v2, STP			
Time Management	SNTP, NTP Server/Client			
DoS and DDoS Protection				
Technology	NMAP-ID Scan, ARP-Flood, SYN/FIN Scan, Null Scan, ICMP-Flood, FIN Scan, SYN-Flood, TCP Sessions Without SYN, Xmas Scan, NMAP-Xmas Scan, SYN/RST Scan			
Firewall				
Filter	ICMP, MAC address, Ethernet protocols, Ports, IP address, DDoS			
Stateful Inspection	Router firewall, Transparent (bridge) firewall			
Throughput	Max. 350,000 packets per second			
IPsec VPN				
Authentication	MD5 and SHA (SHA-256), RSA (key size: 1024-bit, 2048-bit), X.509 v3 certificate			
Encryption	3DES, DES, AES-128, AES-192, AES-256			
Concurrent VPN Tunnels	Max. 250 IPsec VPN tunnels			
Power Parameters				
Power Connector	M12 K-coded male connector			
Input Voltage	24/36/48/72/96/110 VDC, Redundant dual inputs			
Total PoE Power Budget	–	50 W	–	95 W
Physical Characteristics				
Housing	Metal			
Installation	Wall mounting			
Environmental Limits				
Operating Temperature	-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)			
Standards and Certifications				
Safety	IEC/UL 62368			
EMC	EN 55032/35			
Industrial Cybersecurity	IEC 62443-4-1, IEC 62443-4-2			
Railway	EN 50121-4, EN 50155[1], IEC 60571			
Railway Fire Protection	EN 45545-2			

[1] This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed description, please see: www.moxa.com/doc/specs/EN_50155_Compliance.pdf.

Railway Wireless LAN

Product Series	TAP-323	AWK-3131A-SSC-RTG	TAP-213	AWK-3131A-M12-RTG	AWK-3251A-RCC
Applications	Wayside Radio		Onboard Radio		Onboard Inter-carriage AP
WLAN Interface					
Number of Antenna Connectors	5	2	2	2	2
Number of RF Modules	2	1	1	1	1
WLAN Antenna Connector	N-type (female)	QMA	N-type (female)	QMA	QMA
WLAN Standards	802.11a/b/g/n WPA/WPA2 Wireless Security				802.11a/b/g/n/ac Wave 2 WPA3 Wireless Security
Ethernet Interface					
Number of LAN Ports	6	1	2	1	1
LAN Port Type	4 x M12 D-coded 4-pin female connector, 2 x fiber	1 x SC connector	1 x M12 X-coded 8-pin female connector, 1 x fiber	1 x M12 D-coded 4-pin female connector	1 x M12 X-coded 8-pin female connector
LAN Port Speed	10/100BaseSFP, 1000BaseSFP	10/100BaseFX	10/100/1000BaseT(X), 1000BaseSFP	100BaseFX	10/100/1000BaseT(X)
Serial Interface					
Console Port	USB-M12 console (M12 B-coded 5-pin female connector)	RS-232 (RJ45 connector)	USB-M12 console (M12 B-coded 5-pin female connector)	RS-232 (RJ45 connector)	
Input/Output Interface					
DI/DO	–	✓	–	✓	✓
DI/DO Connector Type	–	1 removable 10-contact terminal block	–	1 removable 10-contact terminal block	
Power Parameters					
Input Voltage	110/220 VAC/VDC (85 to 264 VAC, 88 to 300 VDC), Dual inputs	12 to 48 VDC, Dual inputs	24 to 110 VDC, Dual inputs	12 to 48 VDC, Dual inputs	12 to 48 VDC, Dual inputs
Power Connector	M23 6-pin connector	1 removable 10-contact terminal block	M12 A-coded 4-pin male connector	1 removable 10-contact terminal block	
PoE Support	✓ (PSE)	–	✓ (PD)		
Source of Input Power	PoE (IEEE 802.3af)		PoE (IEEE 802.3at)	PoE (IEEE 802.3af)	PoE (IEEE 802.3at)
Physical Characteristics					
IP Rating	IP68	IP30	IP68	IP30	
Installation	Wall mounting (standard)	DIN-rail mounting, Wall mounting (with optional kit)	Wall mounting (standard), DIN-rail mounting (optional), Pole mounting (optional)	DIN-rail mounting, Wall mounting (with optional kit)	
Standards and Certifications					
Railway	EN 50121-4, EN 50155[1]				

[1] This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed description, please see: www.moxa.com/doc/specs/EN_50155_Compliance.pdf.

Wireless Access Controllers

Product Series	WAC-2004A
Ethernet Interface	
10/100/1000BaseT(X) Ports (RJ45 connector)	2 Port 1: Communications port for WAC/HA Port 2: Reserved
Serial Interface	
Console Port	RS-232 (DB9 male)
Wireless Access Control	
Turbo Roaming for Layer 2 Networks	✓
Turbo Roaming for Layer 3 Networks	✓
Power Parameters	
Input Voltage	100 to 240 VAC
Source of Input Power	Power sockets for AC power inputs
PoE Support	–
Physical Characteristics	
IP Rating	IP30
Installation	19-inch rack mounting

EN 50155 Ethernet Switches

Product Series	TN-4508B	TN-4512B	TN-4516B	TN-4520B	TN-4524B	TN-4528B
Ethernet Interface						
Max. Number of Ports	8	12	16	20	24	28
10/100BaseT(X) Ports (M12 D-coded 4-pin Female Connector)	8	Up to 12	Up to 16	–	–	–
10/100/1000BaseT(X) Ports (M12 X-coded 8-pin Female Connector)	–	Up to 4	Up to 8	Up to 4	Up to 4	Up to 4
10/100/1000BaseT(X) Ports (M12 X-coded 8-pin Female Connector With Bypass Relay)	–	–	Up to 4	Up to 4	Up to 4	Up to 4
PoE Ports (10/100BaseT(X), M12 D-coded 4-pin Female Connector)	–	Up to 8	Up to 8	12	16	20
PoE Ports (100/1000BaseT(X), M12 X-coded 8-pin Female Connector)	–	–	Up to 4	4	4	4
Filter						
802.1Q	✓	✓	✓	✓	✓	✓
IGMP v1/v2/v3	✓	✓	✓	✓	✓	✓
Port-based VLAN	✓	✓	✓	✓	✓	✓
Static Multicast	✓	✓	✓	✓	✓	✓
Management						
RARP	–	–	–	–	–	✓
DHCP Option 66/67/82	✓	✓	✓	✓	✓	✓
IPv4/IPv6	✓	✓	✓	✓	✓	✓
QoS/CoS/ToS	✓	✓	✓	✓	✓	✓
DNS Server	✓	✓	✓	✓	✓	✓
Redundancy Protocols						
MRP	–	–	–	–	–	✓
MSTP	✓	✓	✓	✓	✓	✓
RSTP	✓	✓	✓	✓	✓	✓
Turbo Ring V2	✓	✓	✓	✓	✓	✓
Turbo Ring With DRC	✓	✓	✓	✓	✓	✓
Port Trunk	✓	✓	✓	✓	✓	✓
Security						
HTTPS/SSL	✓	✓	✓	✓	✓	✓
TACACS+/RADIUS	✓	✓	✓	✓	✓	✓
Port Lock	✓	✓	✓	✓	✓	✓
Time Management						
NTP Server/Client	✓	✓	✓	✓	✓	✓
SNTP	✓	✓	✓	✓	✓	✓
Power Parameters						
Input Voltage	24/36/48/72/96/110 VDC, Redundant dual inputs					
Power Connector	M12 K-coded connector					
Total PoE Power Budget	–	PoE models: 80 W	PoE models: 150 W	150 W	150 W	150 W
Physical Characteristics						
IP Rating	IP42					
Protection	-CT models: PCB conformal coating					
Environmental Limits						
Operating Temperature	-40 to 70°C (-40 to 158°F)					
Standards and Certifications						
Railway	EN 50121-4, EN 50155[1], IEC 60571					
Railway Fire Protection	EN 45545-2					

[1] This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed description, please see: www.moxa.com/doc/specs/EN_50155_Compliance.pdf.

EN 50155 Train-to-ground Computing Gateways

Product Series	UC-8540	UC-8580
Computer		
CPU	Armv7 Cortex-A7 (dual-core, 1 GHz)	
System Memory Preinstalled	1 GB DDR3L	
Storage Preinstalled	8 GB eMMC flash	
Storage Slot	1 x mSATA slot	
Computer Interface		
Ethernet Ports	2 x Auto-sensing 10/100/1000 Mbps ports (M12 X-coded)	
Serial Ports	1 x RS-232/422/485 port (software-selectable, DB9 male)	2 x RS-232/422/485 ports (software-selectable, DB9 male)
Digital Input	–	3 x DIs
Digital Output	–	3 x DOs
Power Ignition Control	✓	✓
Expansion Slot	2 x Mini PCIe (for Wi-Fi/LTE)	4 x Mini PCIe (for Wi-Fi/LTE)
USB 3.0	1 x USB 3.0 host (type-A connector)	
GPS Interface		
Heading Accuracy	0.3 degrees	
Industrial Protocols	NMEA 0183 v4.0 (v2.3 or v4.1 configurable), UBX, RTCM	
Receiver Types	72-channel u-blox M8 engine	
Time Pulse	0.25 Hz to 10 MHz	
Velocity Accuracy	0.05 ms	
Power Parameters		
Input Voltage	24 to 110 VDC	
Power Connector	M12 A-coded 4-pin (male)	
Power Consumption (Max.)	40 W	
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) With LTE module: -40 to 60°C (-40 to 140°F)	
Standards and Certifications		
Railway	EN 50121-4, EN 50155[1]	
Railway Fire Protection	EN 45545-2	

[1] This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed description, please see: www.moxa.com/doc/specs/EN_50155_Compliance.pdf.

EN 50155 Panel Computers

Product Series	MPC-2101	MPC-2121
Computer		
CPU	Intel Atom® E3845	
Graphics Controller	Intel® HD Graphics	
System Memory Preinstalled	4 GB DDR3L (8 GB max.)	
Preinstalled OS	Optional support	
Supported OS	• Windows Embedded Standard 7 (64-bit) • Windows 10 IoT Enterprise LTSC 2019 Value (64-bit) • Windows 10 IoT Enterprise LTSC 2021 Entry (64-bit)	
Storage Slot	1 x CFast, 1 x SD	
Computer Interface		
Ethernet Ports	2 x Auto-sensing 10/100 Mbps ports (M12 D-coded 4P connector)	
Serial Ports	1 x RS-232/422/485 (M12)	
USB 2.0	1 x USB 2.0 (M12)	
Digital Input	4 x DIs (M12)	
Digital output	2 x DOs (M12)	
Display		
Aspect Ratio	4:3	
Light Intensity (Brightness)	500 or 1000 nits	
Panel Size	10.4 in	12.1 in
Pixels	1024 x 768	
Viewing Angles	176° (left and right); 176° (top and bottom)	178° (left and right); 178° (top and bottom)
Touch Function		
Touch Type	Projective capacitive (PCAP)	
Glove Support	✓	
Power Parameters		
Input Voltage	24 to 110 VDC	
Physical Characteristics		
IP Rating	IP66	
Dimensions	256.9 x 214.4 x 58.9 mm (10.11 x 8.44 x 2.32 in)	297 x 248 x 59 mm (11.69 x 9.76 x 2.32 in)
Weight	2,080 g (4.59 lb)	2,850 g (6.28 lb)
Environmental Limits		
Operating Temperature	-40 to 70°C (-40 to 158°F)	
Storage Temperature (Package Included)	-40 to 70°C (-40 to 158°F)	
Ambient Relative Humidity	5 to 95% (non-condensing)	
Standards and Certifications		
Railway	EN 50155: 2017[1]	
Warranty		
Warranty Period	LCD: 1 year System: 3 years	

[1] This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed description, please see: www.moxa.com/doc/specs/EN_50155_Compliance.pdf.

EN 50155 Onboard Computers

Product Series	V2406C	V3200	V3200 (W/ Built-in Wireless Module)[1]
Computer			
CPU	• KL1 models: Intel® Celeron® 3965U • KL3 models: Intel® Core™ i3-7100U • KL5 models: Intel® Core™ i5-7300U • KL7 models: Intel® Core™ i7-7600U • WL1 models: Intel® Celeron® 4305UE • WL3 models: Intel® Core™ i3-8145UE • WL5 models: Intel® Core™ i5-8365UE • WL7 models: Intel® Core™ i7-8665UE	• TL1-4L/-5L models: Intel® Celeron® 6305E • TL3-4L/-5L models: Intel® Core™ i3-1115G4E • TL5-4L/-5L models: Intel® Core™ i5-1145G7E • TL7-4L models: Intel® Core™ i7-1185G7E • TL7-4L-TSN/-5L-TSN models: Intel® Core™ i7-1185GRE	• Intel® Core™ i3-1115G4E processor (2C/4T, 6M Cache, 2.2 GHz) • Intel® Core™ i7-1185G7E processor (4C/8T, 12M Cache, 1.8 GHz)
System Memory Slot	2 x SODIMM DDR4 slots (32 GB max.)	2 x SODIMM DDR4 slots (16 GB preinstalled, 64 GB max.)	2 x SODIMM DDR4 slots (16 GB preinstalled, 64 GB max.)
Supported OS	• Linux Debian 11/Ubuntu 20.04/ CentOS 7.9 drivers • KL models: Linux Debian 9 • WL models: Moxa Industrial Linux 2.x (Debian 10) • Windows 10 IoT Enterprise LTSC 2019/2021 (64-bit)	• Linux Debian 11/Ubuntu 20.04/ CentOS 7.9 (drivers)[2] • Windows 10 IoT Enterprise LTSC 2021 (64-bit)	• Linux Debian 12 and Ubuntu 22.04.3 (driver) • Moxa Industrial Linux 3.0 • Windows 10 IoT Enterprise LTSC 2021 (64-bit)
Storage Slot	2 x 2.5-inch HDD/SSD slots (hot-swappable) 1 x mSATA slot	2 x 2.5-inch SSD slots (quick-swappable) 1 x M.2 M key 2280 slot (128 GB preinstalled)	2 x 2.5-inch SSD slots (quick-swappable) 1 x M.2 M key 2280 slot (128 GB preinstalled)
Wireless Function			
Wireless Module	Optional accessories (LTE, Wi-Fi 5)	Optional accessories (5G, LTE, Wi-Fi 5, Wi-Fi 6)	1 x 5G module (built-in, 5 GMA connectors) 1 x Wi-Fi 6 module (built-in, 2 GMA connectors)
Computer Interface			
Ethernet Ports	2 x Auto-sensing 10/100/1000 Mbps ports (M12 X-coded)	4-port models: • 1 x Auto-sensing 1000/2500 Mbps port • 3 x Auto-sensing 10/100/1000 Mbps ports (M12 X-coded) 8-port models: • 1 x Auto-sensing 1000/2500 Mbps port • 7 x Auto-sensing 10/100/1000 Mbps ports (M12 X-coded)	4-port models: • 1 x Auto-sensing 1000/2500 Mbps port • 3 x Auto-sensing 10/100/1000 Mbps ports (M12 X-coded) 8-port models: • 1 x Auto-sensing 1000/2500 Mbps port • 7 x Auto-sensing 10/100/1000 Mbps ports (M12 X-coded)
Serial Ports	4 x RS-232/422/485 ports (software-selectable, DB9 male connector)	2 x RS-232/422/485 ports (software-selectable, DB9 male connector)	2 x RS-232/422/485 ports (software-selectable, DB9 male connector)
USB 3.0	4 x USB 3.0 hosts (type-A connector)	2 x USB 3.0 hosts (type-A connector)	2 x USB 3.0 hosts (type-A connector)
Digital Input	6 x DIs	2 x DIs	2 x DIs
Digital Output	2 x DOs	2 x DOs	2 x DOs
Expansion Slots	2 x Mini PCIe	• 2 x M.2 B key 3052/3050 (5G with 4 Micro SIMs) • 1 x M.2 E key (Wi-Fi 6) • 1 x Mini PCIe (LTE with 2 Micro SIMs, Wi-Fi 5, or I/O)	• 2 x M.2 B key 3052/3050 (5G with 4 Micro SIMs) • 1 x M.2 E key (Wi-Fi 6) • 1 x Mini PCIe (LTE with 2 Micro SIMs, Wi-Fi 5, or I/O)
TPM v2.0	Optional	Built-in	Built-in
Video Output	1 x VGA, 1 x HDMI		
Power Parameters			
Input Voltage	24 to 110 VDC		
Physical Characteristics			
Dimensions	250 x 75 x 150 mm (9.84 x 2.95 x 5.91 in)	250 x 96.7 x 180 mm (9.84 x 3.81 x 7.09 in)	TBD[3]
Installation	Wall mounting (standard)		
Environmental Limits			
Operating Temperature	-40 to 70°C (-40 to 158°F)		-40 to 70°C (-40 to 158°F) with wireless module
Standards and Certifications			
Railway	EN 50121-4, EN 50121-3-2, EN 50155[4]		
Railway Fire Protection	EN 45545-2		

[1] Q2, 2024 update to support Debian 12 and Ubuntu 22.04.3 (driver).
Q4, 2024 support for Moxa Industrial Linux 3.0.
[2] Ready in Q4, 2024.
[3] Dimensions information will be available in Q4, 2024.
[4] This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed description, please see: www.moxa.com/doc/specs/EN_50155_Compliance.pdf.

Unmanaged Ethernet Switches

Product Series	TN-5305A	TN-5308A	TN-5308A-PoE
Ethernet Interface			
Max. Number of Ports	5	8	8
10/100BaseT(X) Ports (M12 D-coded 4-pin Female Connector)	5	8	–
PoE Ports (10/100BaseT(X), M12 D-coded 4-pin Female Connector)	–	–	8
Power Parameters			
Input Voltage	24/36/48/72/96/110 VDC		
Power Connector	M12 4-pin A-coded male connector		
Total PoE Power Budget	–	–	50.2 W
Physical Characteristics			
IP Rating	IP54 (IP67 on request)		
Protection	-CT models: PCB conformal coating		
Environmental Limits			
Operating Temperature	-40 to 70°C (-40 to 158°F)		
Standards and Certifications			
Railway	EN 50121-4, EN 50155[1]		
Railway Fire Protection	EN 45545-2		

[1] This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed description, please see: www.moxa.com/doc/specs/EN_50155_Compliance.pdf.

EN 50155 IP Cameras

Preliminary

Product Series	VPort 07/P07-3	VPort P16-2MR	VPort 06/P06-2	VPort 06EC-2V	VPort P16-1MP-M12-3V VPort P16-1MP-M12	VPort P06-1MP-M12	VPort P06HC-1V
Video Performance							
Resolution (Max.)	2048 x 1536	1920 x 1080	1920 x 1080	1920 x 1080	1280 x 800	1280 x 800	1280 x 800
FPS (Max.)	20 (@ 2048 x 1536) 30 (@ 1920 x1080)	30	30	30	30	30	30
Connections (Max.)	10 unicast 50 multicast RTSP	10 unicast 50 multicast RTSP	10 unicast 50 multicast RTSP	10 unicast 50 multicast RTSP	10 unicast 50 multicast RTSP	10 unicast 50 multicast RTSP	10 unicast 50 multicast RTSP
Video Stream							
No. of Streams	4	4	4	4	3	3	3
H.265	✓	–	–	–	–	–	–
H.264	✓	✓	✓	✓	✓	✓	✓
MJPEG	✓	✓	✓	✓	✓	✓	✓
DynaStream™	✓	✓	✓	✓	✓	✓	✓
CBR Pro™	✓	✓	✓	✓	✓	✓	✓
Camera							
Image Sensor	1/3" CMOS	1/3" CMOS	1/3" CMOS	1/3" CMOS	1/2.7" CMOS	1/2.7" CMOS	1/2.7" CMOS
Lens (mm)	2.4, 3.6, 4.2, 6.0, 8.0	3.6, 4.2, 6.0, 8.0	2.8, 3.6, 4.2, 6.0, 8.0	3.6, 4.2, 6.0, 8.0	3.6, 8.0	2.8, 3.6, 4.2, 6.0, 8.0	2.8, 3.6, 4.2, 6.0, 8.0
Day & Night	–	✓	–	✓	✓	–	–
Minimum Illumination	0.2 Lux @ F1.2, color	0.2 Lux @ F1.2, Color 0.05 Lux @ F1.2, B/W	0.2 Lux @ F1.2, color	0.2 Lux @ F1.2, color 0.05 Lux @ F1.2, B/W	0.2 Lux @ F1.2, color 0.05 Lux @ F1.2, B/W (0 Lux if IR illuminator is on)	0.2 Lux @ F1.2, color	0.2 Lux @ F1.2, color
White Balance	ATW/AWB	ATW/AWB	ATW/AWB	ATW/AWB	ATW/AWB	ATW/AWB	ATW/AWB
Electronic Shutter (Sec)	Auto (1/30 to 1/25000)	Auto (1/30 to 1/25000)	Auto (1/30 to 1/25000)	Auto (1/30 to 1/25000)	Auto (1/30 to 1/25000)	Auto (1/30 to 1/25000)	Auto (1/30 to 1/25000)
AGC Control	✓	✓	✓	✓	✓	✓	✓
Wide Dynamic Range	✓	✓	✓	✓	✓	✓	✓
Auto Exposure	✓	✓	✓	✓	✓	✓	✓
Image Rotation	Flip, Mirror, 90°, 180°, 270° rotation	Flip, Mirror, 90°, 180°, 270° rotation	Flip, Mirror, 90°, 180°, 270° rotation	Flip, Mirror, 90°, 180°, 270° rotation	Flip, Mirror, 180° rotation	Flip, Mirror, 180° rotation	Flip, Mirror, 180° rotation
Digital Noise Reduction	✓	✓	✓	✓	✓	✓	✓
Ethernet Interface							
10/100BaseT(X) Ports (M12 Connector)	1	1	1	1	1	1	1
Peripherals							
Audio	1 x Line-in or mic-in	1 x Mic-in	1 x Line-in or mic-in	–	1 x Mic-in (M12-IR)	1 x Line-in or mic-in	–
DI/Relay	1 x DI	1 x DI	1 x DI	1 x DI	1 x DI (M12-IR)	–	–
SD Slot	✓	✓	✓	✓	–	–	–
Network Management and Control							
Web Interface	✓	✓	✓	✓	✓	✓	✓
SNMPv1/v2c/v3	✓	✓	✓	✓	✓	✓	✓
RTSP (Real-time Streaming Protocol)	✓	✓	✓	✓	✓	✓	✓
Multicast (IGMP)	v3	v3	v3	v3	v3	v3	v3
DoS	✓	✓	✓	✓	✓	✓	✓
Automatic Configuration	DHCP Option 66/67	DHCP Option 66/67	DHCP Option 66/67	DHCP Option 66/67	DHCP Option 66/67	DHCP Option 66/67	DHCP Option 66/67
Form Factor							
Ingress Protection	IP66	IP66	IP66	IP67	IP66	IP66	IP30
Surface/Ceiling Mounting	✓	✓	✓	✓	✓	✓	–
Flush Mounting	✓	✓	✓	–	✓	✓	✓
Power Parameters							
Power Over Ethernet (PoE)	✓	✓	✓	✓ (for camera only)	✓	✓	✓
12/24 VDC, 24 VAC	✓	–	✓	✓ (for de-frost heater)	–	–	–
Alarms							
Video Motion Detection (VMD)	✓	✓	✓	✓	✓	✓	✓
Alarm Snapshot Image	✓	✓	✓	✓	✓	✓	✓
Tamper Alarm	✓	✓	✓	✓	✓	✓	✓
Operating Temperature							
Standard Models	-40 to 55°C (-40 to 131°F)	-25 to 55°C (-13 to 131°F)	-25 to 55°C (-13 to 131°F)	-25 to 55°C (-13 to 131°F)	-25 to 55°C (-13 to 131°F)	-25 to 55°C (-13 to 131°F)	-40 to 55°C (-40 to 131°F)
Wide Temp. Models	-40 to 70°C (-40 to 158°F)	-40 to 70°C (-40 to 158°F)	-40 to 70°C (-40 to 158°F)	-40 to 70°C (-40 to 158°F)	-40 to 70°C (-40 to 158°F)	-40 to 70°C (-40 to 158°F)	–
Standards and Certifications							
CE/FCC	✓	✓	✓	✓	✓	✓	✓
UL 60950-1/UL62368-1	✓	✓	✓	✓	✓	✓	✓
EN 50155[1]	✓	✓	✓	✓	✓	✓	✓
EN 50121-3-2	✓	✓	✓	✓	✓	✓	✓
IK Rating (EN 62262)	IK8	IK8	IK8	IK7	IK10	IK10	–
ONVIF Profile S	✓	✓	✓	✓	✓	✓	✓
Warranty and MTBF							
Warranty Period	5 years	5 years	5 years	5 years	5 years	5 years	5 years
MTBF	3,826,277 hrs	957,474 hrs	1,039,008 hrs	480,269 hrs	1,052,184 hrs (M12-IR)	1,944,687 hrs	578,467 hrs

[1] This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed description, please see: www.moxa.com/doc/specs/EN_50155_Compliance.pdf.