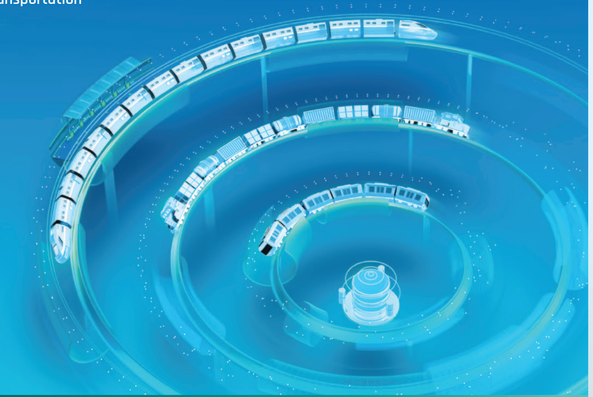
FORGING MOBILITY AHEAD

En route to smarter, safer transportation



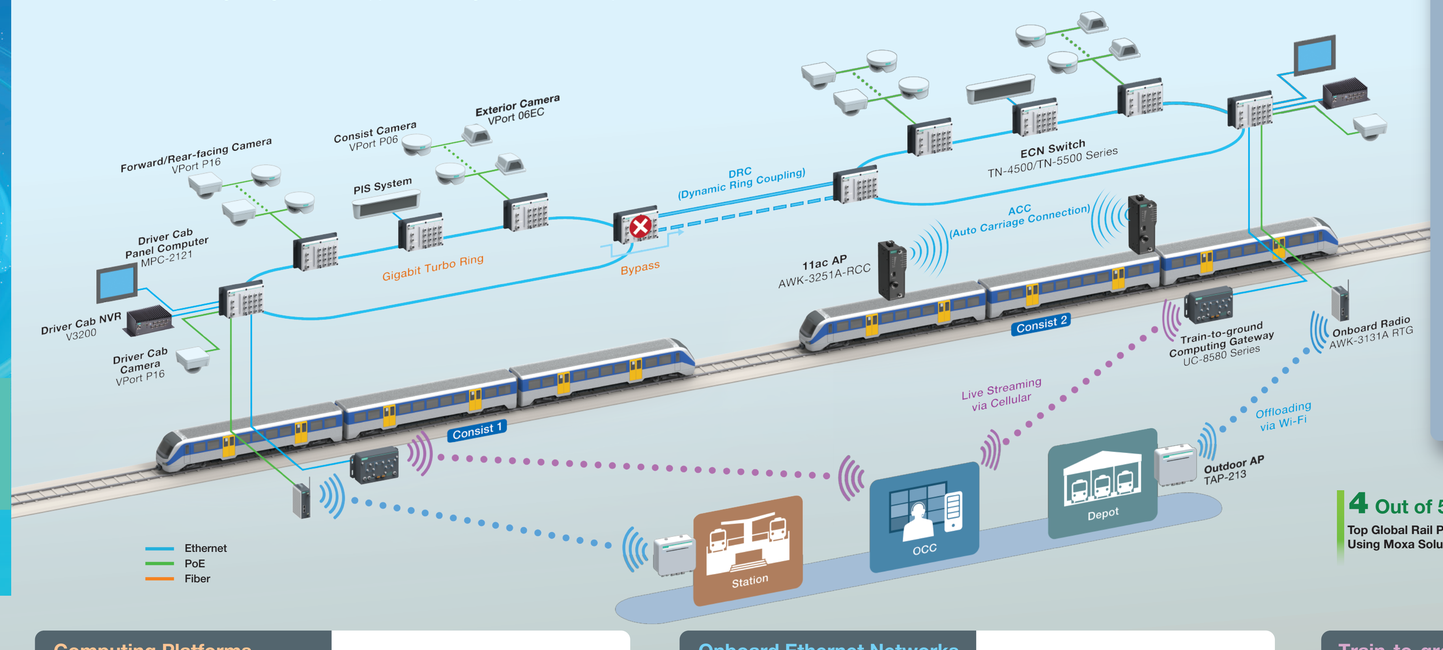
Industrial Communication and Computing Solutions for Onboard CCTV/PIS Systems

2023 Edition

MOXA

Delivering the Industry's Most Comprehensive Portfolio of Onboard CCTV/PIS Solutions Backed by a Proven Track Record

Onboard CCTV systems enable live viewing and data recording both on the train itself and remotely at Operations Control Centers. To make this possible, high performance network infrastructure for onboard and train-to-ground communications is crucial. 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. With Moxa, customers can enjoy the benefits of having a single-source supplier, meaning less product compliance issues and maintenance efforts.



Industry-tailored Value to Suit Your Project Needs

Complete Onboard CCTV/PIS Portfolio

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

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

Ruggedized Computing Platforms
- NVR/Live view display/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 10 GbE/GbE speeds
- 300 Mbps wireless 802.11n

Project-based Customization Services

Networking
- Customized software

Onboard IP Cameras
- Custom-tailored housing, colors, installation kits, etc.

Extensive Product Training

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

IRIS Certification

Onboard IP Cameras

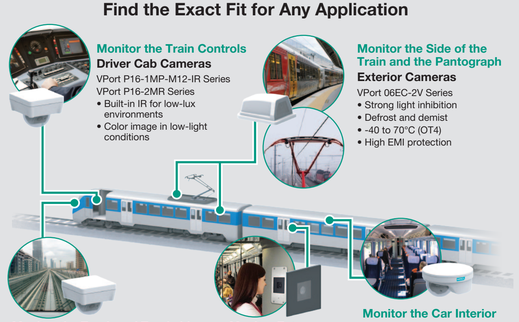
Ensure a Clear Field of View in Any Situation

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

Good 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
- Clear daylight image
- Compact size
- Line-in and built-in microphone

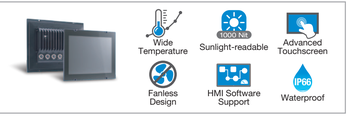
Computing Platforms

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

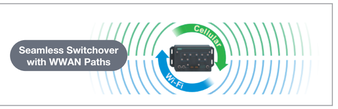
Multi-role Onboard Computers
Simultaneously functions as an NVR and train-to-ground media gateway
- Onboard video recording
- MQTT alarm/event data transimission
- 5G high-throughput communication

Note: SDK provided for NVR or media gateway software development

Live View Panel Computers
Serve 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



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 10G/GbE and PoE ports with bypass options
- Dynamic train network reconfiguration for operational flexibility

ACC
Auto Carriage Connections

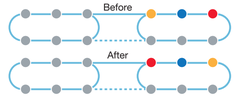
Scenario
Wireless carriage links need to be reconfigured when the train composition changes

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

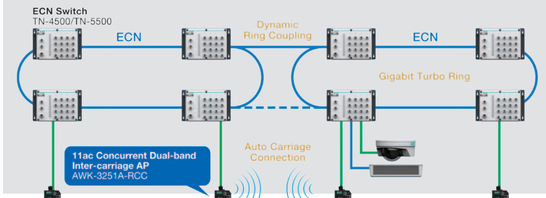
DRC
Dynamic Ring Coupling

Scenario
Train consists are frequently reconfigured mid-journey

Technology Highlight
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

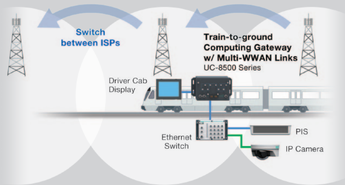
Deploy an Adaptable Train-to-ground Communication Architecture for Seamless Network Coverage

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 and 1 Wi-Fi modules to meet the needs of multi-network or transnational network services

Benefit
- Automatically switch between carrier networks to ensure uninterrupted data streaming

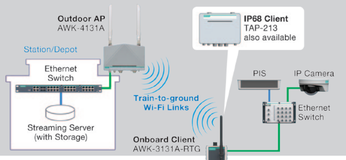


Quickly Offload Recorded Data to Stations or Depots Over Wi-Fi

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

Series	TN-5916	TN-4908	TN-4916
Input/Output Interface			
Alarm Contact Channels	2 x relay output with current carrying capacity of 1 A @ 30 VDC	–	–
Digital Input Channels	–	–	–
Ethernet Interface			
10/100BaseT(X) Ports (M12 D-coded 4-pin female connector)	12	–	–
10/100BaseT(X) Ports (M12 D-coded 4-pin female connector with bypass relay)	4	–	–
PoE Ports (10/100BaseT(X), M12 D-coded 4-pin female connector)	–	–	8
10/100/1000BaseT(X) Ports (M12 X-coded female connector)	–	8	–
10/100/1000BaseT(X) Ports (M12 X-coded 8-pin female connector with bypass relay)	–	up to 4	4
PoE Ports (10/100/1000BaseT(X), M12 X-coded 8-pin female connector)	–	up to 4	4
Ethernet Software Features			
Management	Back Pressure Flow Control, DHCP server, Flow control, HTTP, IPv4, LLDP, Port Mirror, QoS/CoS/ToS, RARP, SMTP, SNMP Inform, SNMP Trap, SNMPv1/v2c/v3, Syslog, Telnet, TFTP, Account Management	Back Pressure Flow Control, DHCP server, Flow control, HTTP, IPv4, LLDP, Port Mirror, QoS/CoS/ToS, RARP, SMTP, SNMP Inform, SNMP Trap, SNMPv1/v2c/v3, Syslog, Telnet, TFTP, Account Management	Back Pressure Flow Control, DHCP server, Flow control, HTTP, IPv4, LLDP, Port Mirror, QoS/CoS/ToS, RARP, SMTP, SNMP Inform, SNMP Trap, SNMPv1/v2c/v3, Syslog, Telnet, TFTP, Account Management
Multicast Routing	Static Multicast Routing, DVMRP, PIM-SM	Static Multicast Routing, DVMRP, PIM-SM	Static Multicast Routing, DVMRP, PIM-SM
Routing Redundancy	VRRP	VRRP	VRRP
Time Management	NTP Server/Client, SNTP	NTP Server/Client	NTP Server/Client
Unicast Routing	Static Route, RIPV1/V2, OSPF	Static Route, RIPV1/V2, OSPF	Static Route, RIPV1/V2, OSPF
Filter	802.1Q, IGMP v1/v2, Static Multicast	802.1Q, IGMP v1/v2, Static Multicast	802.1Q, IGMP v1/v2, Static Multicast
DoS and DDoS Protection			
Technology	DoS Protection	DoS Protection	DoS Protection
Firewall			
Deep Packet Inspection	–	–	–
Stateful Inspection	Router firewall, Transparent (bridge) firewall	• Stateful inspection • Router firewall and transparent (bridge) firewall • Filter: IP and MAC address, ports, ICMP, DDoS, Ethernet protocols • Quick Automation Profiles: EtherCAT, EtherNet/IP, Foundation Fieldbus, LonWorks, Modbus/TCP, PROFINET, IEC 60870-5-104, DNP, FTP, SSH, Telnet, HTTP, IPsec, L2TP, PPTP, RADIUS, TRDP • Session policy firewall	• Stateful inspection • Router firewall and transparent (bridge) firewall • Filter: IP and MAC address, ports, ICMP, DDoS, Ethernet protocols • Quick Automation Profiles: EtherCAT, EtherNet/IP, Foundation Fieldbus, LonWorks, Modbus/TCP, PROFINET, IEC 60870-5-104, DNP, FTP, SSH, Telnet, HTTP, IPsec, L2TP, PPTP, RADIUS, TRDP • Session policy firewall
IPsec VPN			
Concurrent VPN Tunnels (max.)	30 (Start to initiate), 100 (Wait for connecting)	256	256
Open VPN			
Concurrent VPN Tunnels	–	–	–
Protocols	–	–	–
Power Parameters			
Connection	M23 connector	M12 K-coded male connector	M12 K-coded male connector
Input Voltage	24/36/48/72/96/110 VDC, redundant dual inputs	24/36/48/72/96/110 VDC, redundant dual inputs	24/36/48/72/96/110 VDC, redundant dual inputs
Physical Characteristics			
Housing	Metal	Metal	Metal
Installation	DIN-rail mounting (optional), wall mounting	Wall mounting	Wall mounting
Environmental Limits			
Operating Temperature	-40 to 75°C (-40 to 167°F)	-40 to 70°C (-40 to 158°F)	-40 to 70°C (-40 to 158°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)	-40 to 85°C (-40 to 185°F)	-40 to 85°C (-40 to 185°F)
Ambient Relative Humidity	5 to 95% (non-condensing)	5 to 95% (non-condensing)	5 to 95% (non-condensing)
Standards and Certifications			
Safety	IEC 60905-1, UL 61010-2-201	IEC/UL 62368	IEC/UL 62368
EMC	EN 55032/24	EN 55032/35	EN 55032/35
Railway	EN 50121-4, EN 50155[1], IEC 60571	EN 50121-4, EN 50155[1], IEC 60571	EN 50121-4, EN 50155[1], IEC 60571
Railway Fire Protection	EN 45545-2	EN 45545-2	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 visit our website.

EN 50155 Ethernet Switches

Product Series	TN-G4516	TN-G6512	TN-4528A-PoE TN-4528A-PoE-ODC	TN-4524A-PoE	TN-4516A TN-4516A-PoE TN-4516A-PoE-ODC
Ethernet Interface					
Max. Number of Ports	16	12	28	24	16
10/100/1000BaseT(X) Ports (M12 X-coded 8-pin female connector)	4	4	–	–	TN-4516A: Up to 4
10/100BaseT(X) Ports (M12 D-coded 4-pin female connector)	–	–	8	8	TN-4516A: 12
10G Ports (M12 connector with bypass relay)	Up to 2	–	–	–	–
PoE Ports (10/100BaseT(X), M12 D-coded 4-pin female connector)	–	–	16	16	TN-4516A-PoE: 12 TN-4516A-PoE-ODC: 12
PoE Ports (100/1000BaseT(X), M12 X-coded 8-pin female connector)	8	8	TN-4528A-PoE: Up to 4 TN-4528A-PoE-ODC: 2	–	TN-4516A-PoE: Up to 4 TN-4516A-PoE-ODC: 2
PoE Ports (10G BaseT(X), M12 connector)	Up to 4	–	–	–	–
10/100/1000BaseT(X) Ports (M12 X-coded 8-pin female connector with bypass relay)	–	–	TN-4528A-PoE: Up to 2	–	TN-4516A: Up to 4 TN-4516A-PoE: Up to 2
10/100/1000BaseT(X) Ports, Q-ODC Fiber Connector	–	–	TN-4528A-PoE-ODC: 2	–	TN-4516A-PoE-ODC: 2
Filter					
802.1Q	✓	✓	✓	✓	✓
IGMP v1/v2/v3	✓	✓	✓	✓	✓
Port-based VLAN	✓	✓	✓	✓	✓
Management					
DHCP Option 66/67/82	✓	✓	✓	✓	✓
IPv4/IPv6	✓	✓	✓	✓	✓
QoS/CoS/ToS	✓	✓	✓	✓	✓
Redundancy Protocols					
MSTP	✓	✓	✓	✓	✓
RSTP	✓	✓	✓	✓	✓
Turbo Ring v1/v2	✓	✓	✓	✓	✓
Turbo Ring With DRC	✓	✓	✓	✓	✓
Security					
HTTPS/SSL	✓	✓	✓	✓	✓
TACACS+	✓	✓	✓	✓	✓
Port Lock	✓	✓	✓	✓	✓
RADIUS	✓	✓	✓	✓	✓
Time Management					
IEEE 1588 PTP v1/v2	–	–	✓	✓	✓
NTP Server/Client	✓	✓	✓	✓	✓
Power Parameters					
Input Voltage	24/36/48/72/96/110 VDC, redundant dual inputs				
Power Connector	M12 K-coded male connector		M23 connector		
Total PoE Power Budget	120 W	96 W	120 W (for PoE model)		
Physical Characteristics					
IP Rating	IP40	IP67	IP42		
Protection	-CT models: PCB conformal coating (optional)				
Environmental Limits					
Operating Temperature	-40 to 70°C (-40 to 158°F)		-40 to 75°C (-40 to 167°F)		
Standards and Certifications					
EN 50121-4	✓	✓	✓	✓	✓
EN 50155[1]	✓	✓	✓	✓	✓
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 visit our website.

Product Series	TN-5508A TN-5508A-8PoE	TN-5510A TN-5510A-8PoE TN-5510A-ODC	TN-5516A TN-5516A-8PoE	TN-5518A TN-5518A-8PoE
Ethernet Interface				
Max. Number of Ports	8	10	16	18
10/100/1000BaseT(X) Ports (M12 X-coded 8-pin female connector)	–	TN-5510A: Up to 2 TN-5510A-8PoE: Up to 2	–	Up to 2
10/100BaseT(X) Ports (M12 D-coded 4-pin female connector)	TN-5508A: 8	TN-5510A: 8 TN-5510A-ODC: Up to 8	TN-5516A: 16 TN-5516A-8PoE: 8	TN-5518A: 16 TN-5518A-8PoE: 8
PoE Ports (10/100BaseT(X), M12 D-coded 4-pin female connector)	TN-5508A-8PoE: 8	TN-5510A-8PoE: 8 TN-5510A-ODC: Up to 8	TN-5516A-8PoE: 8	TN-5518A-8PoE: 8
PoE Ports (100/1000BaseT(X), M12 X-coded 8-pin female connector)	–	–	–	–
10/100/1000BaseT(X) Ports (M12 X-coded 8-pin female connector with bypass relay)	–	TN-5510A: Up to 2 TN-5510A-8PoE: Up to 2	–	Up to 2
10/100/1000BaseT(X) Ports, Q-ODC Fiber Connector	–	TN-5510A-ODC: 2	–	–
Filter				
802.1Q	✓	✓	✓	✓
IGMP v1/v2/v3	✓	✓	✓	✓
Port-based VLAN	✓	✓	✓	✓
Management				
DHCP Option 66/67/82	✓	✓	✓	✓
IPv4/IPv6	✓	✓	✓	✓
QoS/CoS/ToS	✓	✓	✓	✓
Redundancy Protocols				
MSTP	✓	✓	✓	✓
RSTP	✓	✓	✓	✓
Turbo Ring	✓	✓	✓	✓
Turbo Ring With DRC	✓	✓	✓	✓
Security				
HTTPS/SSL	✓	✓	✓	✓
TACACS+	✓	✓	✓	✓
Port Lock	✓	✓	✓	✓
RADIUS	✓	✓	✓	✓
Time Management				
IEEE 1588 PTP v1/v2	✓	✓	✓	✓
NTP Server/Client	✓	✓	✓	✓
Power Parameters				
Input Voltage	24/36/48/72/96/110 VDC, redundant dual inputs			
Power Connector	M23 connector			
Total PoE Power Budget	TN-5508A-8PoE: 120 W	TN-5510A-8PoE: 120 W TN-5510A-ODC: 120 W (for PoE model)	TN-5516A-8PoE: 120 W	TN-5518A-8PoE: 120 W
Physical Characteristics				
IP Rating	IP54			
Protection	TN-5500A Series -CT models: PCB conformal coating (optional)			
Environmental Limits				
Operating Temperature	-40 to 75°C (-40 to 167°F)			
Standards and Certifications				
EN 50121-4	✓	✓	✓	✓
EN 50155[1]	✓	✓	✓	✓
EN 45545-2	✓	✓	✓	✓

Product Series	TN-5305	TN-5308	TN-5308-PoE
Ethernet Interface			
Max. Number of Ports	5	8	8
10/100/1000BaseT(X) Ports (M12 X-coded 8-pin female connector)	–	–	–
10/100BaseT(X) Ports (M12 D-coded 4-pin female connector)	5	8	Up to 4
10/100BaseT(X) Ports (M12 D-coded 4-pin female connector with bypass relay)	–	–	–
PoE Ports (10/100BaseT(X), M12 D-coded 4-pin female connector)	–	–	Up to 8
PoE Ports (100/1000BaseT(X), M12 X-coded 8-pin female connector)	–	–	–
10/100/1000BaseT(X) Ports (M12 X-coded 8-pin female connector with bypass relay)	–	–	–
10/100/1000BaseT(X) Ports, Q-ODC Fiber Connector	–	–	–
Filter			
802.1Q	–	–	–
IGMP v1/v2/v3	–	–	–
Port-based VLAN	–	–	–
Management			
DHCP Option 66/67/82	–	–	–
IPv4/IPv6	–	–	–
QoS/CoS/ToS	–	–	–
Redundancy Protocols			
MSTP	–	–	–
RSTP	–	–	–
Turbo Ring	–	–	–
Turbo Ring With DRC	–	–	–
Security			
HTTPS/SSL	–	–	–
TACACS+	–	–	–
Port Lock	–	–	–
RADIUS	–	–	–
Time Management			
IEEE 1588 PTP v1/v2	–	–	–
NTP Server/Client	–	–	–
Power Parameters			
Input Voltage	18 to 30 VAC (47 to 63 Hz), 24 to 36 VDC	-LV Series: 12 to 48 VDC -MV Series: 72 to 110 VDC	48 VDC
Power Connector	M12 A-coded male connector	-LV Series: M12 A-coded male connector -MV Series: M23 connector	M12 A-coded male connector
Total PoE Power Budget	–	–	15.4 W
Physical Characteristics			
IP Rating	IP67	IP40	
Protection	–	-CT models: PCB conformal coating	
Environmental Limits			
Operating Temperature	Standard Models: -25 to 60°C (-13 to 140°F) Wide Temp. Models: -40 to 75°C (-40 to 167°F)		
Standards and Certifications			
EN 50121-4	✓	✓	✓
EN 50155[1]	✓	✓	✓
EN 45545-2	✓	✓	✓

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 802.11i 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	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	10/100BaseT(X), 1000BaseSFP	10/100BaseFX	10/100/1000BaseT(X), 1000BaseSFP	10/100BaseT(X)	10/100/1000BaseT(X)
Serial Interface					
Console Port	USB-M12 console (M12 B-coded 5-pin female connector)	RS-232 (RJ45-type)	USB-M12 console (M12 B-coded 5-pin female connector)	RS-232 (RJ45-type)	
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 DC power 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 (optional), pole mounting (TAP-213: optional, TAP-323: N/A)	DIN-rail mounting, wall mounting (with optional kit)	Wall mounting (standard), DIN-rail mounting (optional), pole mounting (TAP-213: optional, TAP-323: N/A)	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 visit our website.

Wireless Access Controllers

Product Series	WAC-1001	WAC-2004A
Ethernet Interface		
10/100/1000BaseT(X) Ports (RJ45 connector)	1	1
Total Port Count	1	2
Serial Interface		
Console Port	RS-232 (RJ45)	RS-232 (DB9 male)
Wireless Access Control		
Turbo Roaming for Layer 2 Networks	✓	✓
Turbo Roaming for Layer 3 Networks	–	✓
Power Parameters		
Input Voltage	12 to 48 VDC, redundant dual inputs	100 to 240 VAC
Source of Input Power	10-pin terminal block	Power sockets for AC power inputs
PoE Support	✓ (IEEE 802.3af)	–
Physical Characteristics		
IP Rating	IP30	IP30
Installation	DIN-rail mounting, wall mounting (with optional kit)	19-inch rack mounting

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	4 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 (terminal block)
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 2.0	–	–
USB 3.0	1 (type-A connector)	
GPS Interface		
Heading Accuracy	0.3 degrees	
Industrial Protocols	NMEA 0183, version 4.0 (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	
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	
Power Parameters		
Input Voltage	24 to 110 VDC	
Power Connector	M12 A-coded 4-pin (male)	
Power Consumption (max.)	40 W	

1. This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed description, please visit our website.

EN 50155 Onboard Computers

Product Series	V2406C	V3200
Computer		
CPU	• Intel® Celeron® 3965U processor (2M Cache, 2.2 GHz) • Intel® Core™ i3-7100U processor (3M Cache, 2.4 GHz) • Intel® Core™ i5-7300U processor (3M Cache, 2.6 GHz) • Intel® Core™ i7-7600U processor (4M Cache, 2.8 GHz)	• Intel® Celeron® 6305E processor (2C/2T, 4M Cache, 1.8 GHz) • Intel® Celeron® 6305E processor (2C/2T, 4M Cache, 1.8 GHz) • Intel® Core™ i3-1115G4E processor (2C/4T, 6M Cache, 2.2 GHz) • Intel® Core™ i5-1145G7E processor (4C/8T, 8M Cache, 1.5 GHz) • Intel® Core™ i7-1185G7E processor (4C/8T, 12M Cache, 1.8 GHz) • Intel® Core™ i7-1185GRE processor (4C/8T, 12M Cache, 1.8 GHz)
System Memory Slot	2 x SODIMM DDR4 slots (max. 32 GB)	2 x SODIMM DDR4 slots (max. 64 GB)
Supported OS	• Linux Debian 9 • Windows 10 Embedded IoT Ent 2019 LTSC 64-bit	• Linux Debian 11/Ubuntu 20.04/ CentOS 7.9 drivers • Windows 10 Embedded IoT Ent 2021 LTSC 64-bit
Storage Slot	2 x 2.5-inch HDD/SSD slots 1 x mSATA slot	2 x 2.5-inch SSD slots 1 x M.2 M key 2280 slot
Computer Interface		
Ethernet Ports	2 x Auto-sensing 10/100/1000 Mbps ports (M12 X-coded)	4-port Model: • 1 x Auto-sensing 1000/2500 Mbps Ethernet • 3 x Auto-sensing 10/100/1000 Mbps Ethernet (M12 X-coded) 8-port Model: • 1 x Auto-sensing 1000/2500 Mbps Ethernet • 7 x Auto-sensing 10/100/1000 Mbps Ethernet (M12 X-coded)
Serial Ports	4 x RS-232/422/485 ports, software-selectable (DB9 male)	2 x RS-232/422/485 ports, software selectable (DB9 male)
USB 3.0	4 x USB 3.0 hosts, type-A connectors	2 x USB 3.0 hosts, type-A connectors
Digital Input	6 x DIs	2 x DIs
Digital Output	2 x DOs	2 x DOs
Expansion Slots	2 x Mini PCIe (for wireless module)	• 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 (Cellular with 2 Micro SIMs, Wi-Fi 5, or I/O)
TPM	Option	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)	249 x 88.9 x 180 mm (9.80 x 3.49 x 7.08 in)
Installation	Wall mounting (standard)	
Environmental Limits		
Operating Temperature	-40 to 70°C (-40 to 158°F)	
Standards and Certifications		
Railway	EN 50121-4 EN 50121-3-2 EN 50155:2017	

EN 50155 Panel Computers

Product Series	MPC-2101	MPC-2121
Computer		
CPU	Intel Atom® E3845	
Graphics Controller	Intel® HD Graphics	
System Memory Preinstalled	4 (8 GB max.) GB DDR3L	
Preinstalled OS	Optional support	
Supported OS	• Windows Embedded Standard 7 (64-bit) • Windows 10 Professional (64-bit) • Windows 10 Embedded IoT Enterprise 2016 LTSB Entry (64-bit) • Windows 10 Embedded IoT Enterprise 2019 LTSC (64-bit) • Linux Debian 9	
Storage Slot	1 x CFast, 1 x SD	
Computer Interface		
Ethernet Ports	2 x M12	
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 inches (4:3)	12.1 inches (4:3)
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	Capacitive	
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	
Warranty		
Warranty Period	LCD: 1 year System: 3 years	

EN 50155 IP Cameras

	VPort P16-2MR	VPort 06-2	VPort 06EC-2V	VPort P16-1MP-M12-IR	VPort P16-1MP-M12	VPort P06-1MP-M12	VPort P06HC-1V
Video Performance							
Resolution (max.)	1920 x 1080	1920 x 1080	1920 x 1080	1280 x 800	1280 x 800	1280 x 800	1280 x 800
FPS (max.)	30	30	60	30	30	30	30
Connections (max.)	5 unicast 50 multicast RTSP	5 unicast 50 multicast RTSP	5 unicast 50 multicast RTSP	5 unicast 50 multicast RTSP	5 unicast 50 multicast RTSP	5 unicast 5 mulitcast RTSP	5 unicast 50 multicast RTSP
Video Stream							
H.264	✓	✓	✓	✓	✓	✓	✓
MJPEG	✓	✓	✓	✓	✓	✓	✓
No. of Streams	4	4	4	3	3	3	3
DynaStream™	✓	✓	✓	✓	✓	✓	✓
CBR Pro™	✓	✓	✓	✓	✓	✓	✓
Camera							
Image Sensor	1/3" CMOS	1/3" CMOS	1/3" CMOS	1/2.7" CMOS	1/2.7" CMOS	1/2.7" CMOS	1/2.7" CMOS
Lens (mm)	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	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 0.05 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	0.2 Lux @ F1.2, color 0.05 Lux @ F1.2, B/W	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, 180° rotation	Flip, mirror, 180° rotation	Flip, mirror, 180° rotation	Flip, mirror, 180° rotation
Digital Noise Reduction	✓	✓	✓	✓	✓	✓	✓
Network Connections							
10/100 Mbps, M12 Connector	1	1	1	1	1	1	1
Peripherals							
Audio	1 built-in microphone	1 line-in or mic-in	–	1 built-in microphone	–	1 line-in or mic-in	–
DI/Relay	1 DI	1 DI	1 DI	1 DI	–	–	–
SD Slot	✓	✓	✓	–	–	–	–
Network Management and Control							
Web Browser	✓	✓	✓	✓	✓	✓	✓
SNMP Protocols	v1/v2c/v3	v1/v2c/v3	v1/v2c/v3	v1/v2c/v3	v1/v2c/v3	v1/v2c/v3	v1/v2c/v3
RTSP (Real Time Streaming Protocol)	✓	✓	✓	✓	✓	✓	✓
Multicast (IGMP)	v3	v3	v3	v3	v3	v3	v3
QoS	✓	✓	✓	✓	✓	✓	✓
Automatic Configuration	DHCP Opt 66/67	DHCP Opt 66/67	DHCP Opt 66/67	DHCP Opt 66/67	DHCP Opt 66/67	DHCP Opt 66/67	DHCP Opt 66/67
Form Factor							
Ingress Protection Marking	IP66	IP66	IP67	IP66	IP66	IP66	IP30
Surface/Ceiling Mounting	✓	✓	✓	✓	✓	✓	–
Flush Mounting	✓	✓	–	✓	✓	✓	✓
Power Requirements							
Power-over-Ethernet (PoE)	✓	✓	✓ (for camera only)	✓	✓	✓	✓
12/24 VDC, 24 VAC	–	✓	✓ (for de-frost heater)	–	–	–	–
Alarms							
VMD (Video Motion Detection)	✓	✓	✓	✓	✓	✓	✓
Alarm Snapshot Image	✓	✓	✓	✓	✓	✓	✓
Tamper Alarm	✓	✓	✓	✓	✓	✓	✓
Supported Operating Temperature Ranges							
Standard Models	-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 75°C (-40 to 167°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)			–
Regulatory Approvals							
CE/FCC	✓	✓	✓	✓	✓	✓	✓
UL 60950-1/UL62368-1	✓	✓	✓	✓	✓	✓	✓
EN 50155	✓	✓	✓	✓	✓	✓	✓
EN 50121-3-2	✓	✓	✓	✓	✓	✓	✓
IK Rating (EN 62262)	IK8	IK8	IK7	IK10	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 (Mean Time Between Failures)	997,474 hours	1,039,008 hours	480,269 hours	1,052,184 hours	1,602,553 hours	1,944,687 hours	578,467 hours