# WMG-821EPAD

## 》Introduction 》》》

### Overview

The WMG-821EPAD is designed to meet the requirements of EN 50155, EN 50121-4, UL 60950-1 for secured transmission in Transportation Automation such as trackside & railway applications, Rolling stock, vehicles and moving machine applications. The WMG-821EPAD is an Industrial 8x10/100Base-T(X) M12 UTP and 2x10/100/1000Base-T(X) M12 UTP and supports an extended operating temperature of -40 to 80°C. It comes with IP67 ingress protection against dust, humidity, oil and water submersion. It uses M12 connectors to ensure water tight, robust connections and to guarantee reliable connections against environmental disturbances, such as vibration and shock. For safety, it supports redundant and wide input range voltage (12/24/48-VDC) + (110/220VDC (88-300VDC) or 110/220VAC (88-264VAC)), reverse polarity protection and overload current protection

The WMG-821EPAD supports the most advanced Ethernet functions which include STP/RSTP/MSTP/ ITU-T G.8032 ERPS and multiple Direct-Ring for redundant cabling, IGMP, VLAN, QoS ,Security, IPv6, bandwidth control, port mirroring, cable diagnostic and IEEE802.3az EEE (Energy Efficient Ethernet) management to optimize the power consumption. Ethernet Direct EN 50155 switches come with auto bypass function in the event of sudden power loss, particularly in daisy chain or linear topology networks. When power failure occursin one of the switches on a train, the bypass relay function can activate, automatically bypassing the internal circuits and maintaining link between neighboring equipment.

With this function, secured data transmission from terminals to backbone and higher network availability can be 100% guaranteed. In addition, the EN 50155 certified covers power input voltage, surge, EFT, ESD, vibration and shock.

## 》Features 》》》

### High Performance Network Switching Technology
- Complies with IEEE standards
- Provides 8 x 10/100Base-T(X) with M12 connector (4-pin, female, D-Coded) and supporting of Green Ethernet IEEE802.3az EEE (Energy Efficient Ethernet) function
- Provides 2 x 10/100/1000Base-T(X) with M12 connector (8-pin, female, A-Coded) and supporting bypass function
- Supports various network redundant solutions, including Direct-Ring, Direct-Chain, Join-Ring, STP, RSTP, MSTP and ITU-T G.8032
- Proprietary ultra high speed redundant technology with < 10ms recovery time @ 250 devices
- Supports IEEE1588 PTP V2 for precise time synchronization, to operate in Ordinary-Boundary, Peer to Peer Transparent Clock, End to End Transparent Clock, Master, Slave mode by each port
- Supports various network security solutions, Port and MAC based IEEE802.1X, RADIUS, ACL, TACACS+, HTTP/HTTPS, SSL/SSH v2
- Supports DHCP Server/Client/Relay/Snooping/Snooping option 82/Relay option 82
- Network traffic priority, QoS, Traffic classification QoS, CoS, bandwidth control for Ingress/Egress, broadcast storm control, DiffServ
- Supports IEEE802.1Q VLAN, MAC-based VLAN, IP Subnet-based VLAN, Protocol-based VLAN, VLAN translation, GVRP/MVRP

- Supports IGMP/MLD snooping V1/V2/V3, IGMP Filtering/Throttling, IGMP query, IGMP proxy reporting, MLD snooping
- Supports dynamic IEEE 802.3ad LACP Link Aggregation, Static Link Aggregation
- Supports RMON, MIB II, Port mirroring, Syslog, IEEE802.1ab LLDP for network monitoring
- Supports IPv6 Telnet server, ICMPv6
- Supports CLI, Web based management, SNMP v1/v2c/v3, Telnet server for management
- Supports firmware upgrade via TFTP & HTTP with redundant firmware option

### Reliable Power Design
- Supports 12/24/48VDC + (110/220VDC (88-300VDC) or 110/220VAC (88-264VAC)) redundant power input with IP67 M23 connector
- Power reverse polarity protection and overload current protection

### Robust Industrial Design
- EN 50155 certified for Railway Applications and IEC 61373 test passed for vibration and shock resistant
- EN 50121-4 certified for Railway Applications (Track Side)
- EN 61000-6-2 and EN 61000-6-4 certified to use in heavy industrial environment
- Robust industrial design case complies with IP67 housing standard
- Supports operating temperature -40 to 80°C
- Wall mount or optional DIN-Rail mounting installation

## 》Specifications 》》》

### Hardware Specifications

### Interface
**Total Ports**: 10 ports
**M12 Ports**: 8 x 10/100Base-T(X) M12 connector (4-pin, female, D-Coded) and 2 x 10/100/1000Base-T(X) M12 connector (8-pin, female, A-Coded), auto-negotiation speed, Full/Half duplex, auto MDI/MDI-X
**Console Port**: RS-232, M12 connector (5-pin, male, A-Coded)
**LEDs**: System: Power 1 (Green), Power 2 (Green), Fault (Amber), CPU Act (Green), Ring Master (Amber)
M12 Ports: 10/100 Link/Active (Green), 1000 Link/Active (Amber)
**Alarm Contact**: 1A@24VDC, M12 connector (5-pin, male, A-Coded)
**CPU Watchdog**: Supported

### Power Requirements
**Power Input**: 12 to 48VDC + (110/220VDC (88-300VDC) or 110/220VAC (88-264VAC)), M23 connector (5-ping, male), redundant dual inputs
**Power Consumption**: 12VDC/8.8W, 24VDC/9.2W, 48VDC/10.6W, 110VAC_VDC/9.4W, 220VAC_VDC/9.4W
**Power Protection**: Reverse polarity protection, overload current protection

### Physical
**Dimensions**: IP67 standard, 240mm (W) x 168mm (H) x 70mm (D)
**Installation**: Wall mount or optioanl DIN-Rail mounting

### Environmental
**Operating Temperature**: -40 to 80°C

**Storage Temperature**: -40 to 85°C
**Operating Humidity**: 5% to 95% RH (Non-condensing)

### Technical
**Standard:**
IEEE 802.3 10Base-T Ethernet
IEEE 802.3u 100Base-TX/100Base-FX
IEEE 802.3ab 1000Base-T
IEEE 802.3x Flow Control
IEEE 802.3ad Port trunk with LACP
IEEE 802.3ac VLAN Tagging extension (Max. frame size extended to 1522 Bytes)
IEEE 802.3az EEE (Energy Efficient Ethernet)
IEEE 802.1D Spanning Tree
IEEE 802.1w Rapid Spanning Tree
IEEE 802.s Multiple Spanning Tree
IEEE 802.1p Class of Service
IEEE 802.1Q VLAN Tagging
IEEE 802.1X User Authentication (Radius)
IEEE 802.1AB LLDP
ITU-T G.8032 / Y.1344 ERPS (Ethernet Ring Protection Switching)
**Protocol Technology**: CSMA/CD
**Switching Architecture**: Store and Forward

## Regulatory Approvals

**EMC:** CE, EN 61000-6-2, EN 61000-6-4
**EMI:** FCC Part 15 Subpart B Class A,CE EN55022 Class A
**EMS:** EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8,
**Safety**: UL 60950-1
**Railway Application**: EN 50155 (Certified)

**Railway Application (Track Side)**: EN 50121-4 (Certified)
**Shock**: IEC 61373
**Vibration**: I  EC 61373
**Free Fall**    : IEC 60068-2-32
**Environmental**: WEEE, RoHS
**MTBF**: 281,168 hours based on Mil-Hdbk-217F, GB
**Warranty**: 5 years

## Software Specifications

**Redundancy:**
Direct-Ring, Direct-Chain, Join-Ring < 10ms recovery time,
(Each switch can configure up to 5 rings regardless of Direct-Ring, Direct-Chain, Join-Ring, and each ring can contents 250 units of switches), supports loop protection
STP/RSTP/MSTP
ITU-T G.8032 / Y.1344 ERPS with < 50ms recovery time
(Single Ring, Sub-Ring, Multiple ring topology networks)
Link Aggregation: Static supports up to 5 trunk groups
Dynamic (IEEE 802.3ad LACP) supports up to 5 trunk groups

**VLAN:**
VID 1 to 4094
VLAN group up to 4094 groups
IEEE 802.1ad Q-in-Q
MAC-based VLAN (256 entries)
IP Subnet-based VLAN (128 entries)
Protocol-based VLAN (Ethernet, SNAP, LLC), (128 entries)
VLAN Translation (256 entries)
GVRP (GARP VLAN Registration Protocol)
MVR (Multicast VLAN Registration)

**QoS:**
Port based and IEEE 802.1p based CoS
QoS determined by port, per port 8 active priorities queues
IP Precedence based Co, IP DSCP based CoS
DiffServ (RFC 2474) Remarking

**Bandwidth Control**:
Ingress/Egress

**Storm Control:**
Unicast, Broadcast, Multicast

**IGMP/MLD Snooping:**
IGMP Snooping v1/v2/v3, MLD Snooping v1/v2
Port Filtering Profile
Throttling, Fast Leave
Maximum Multicast Group: Up to 1022 entries
Query / Static Router Port

**Security:**
IEEE 802.1X (Port-based, MAC-based), RADIUS, TACACS+ 3.0
Supports ACL, no. of rules up to 256 entries
HTTP/HTTPS, SSL, SSH v2
Local Authentication
Remote Access Security: RADIUS, TACACS+
Management interface access filtering via Web, Telnet/SSH, CLI console

**Management:**
SNMP, Web, Telnet/SSH, CLI management
TFTP/HTTP backup/restore configurations
Firmware upgrade via TFTP/HTTP, supports dual firmware
RMON I (1, 2, 3, 9 group), RMON II
RFC1213 MIB II, Private MIB
Supports UPnP, IP Source Guard, Port Mirroring
Warning message sends to syslog, e-mail, alarm relay
DNS Client, Proxy
LLDP: LLDP-MED

**System Log:**
Supports local system log and remote Syslog server

**DHCP:**
Server, Client, Relay, Snooping
Snooping option 82, Relay option 82

**Time Management:**
**IEEE1588 PTP V2:** Ordinary-Boundary, Peer to Peer Transparent Clock, End to End Transparent Clock, Master, Slave
NTP/SNTP Client

**IPv6:**
IPv6 Management Telnet Server/ICMP v6
SNMP over IPv6, HTTP over IPv6, SSH over IPv6, IPv6 Telnet, IPv6 NTP (Client), IPv6 SNTP (Client), IPv6 TFTP, IPv6 QoS, IPv6 ACL (256 entries)
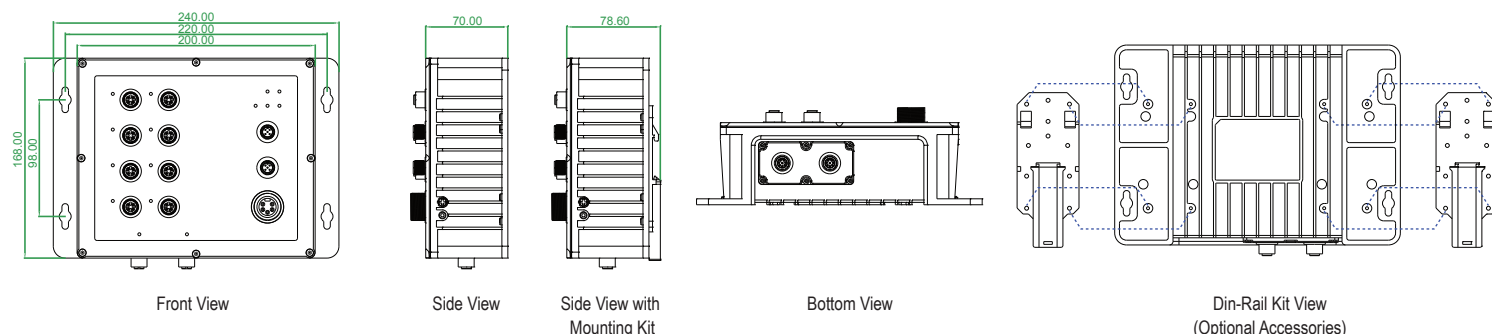
**Green Ethernet:**
Supports IEEE802.3az EEE (Energy Efficient Ethernet): Management to optimize the power consumption
Determine the cable length and lowering the power for ports work with short cable
Lower the power for a port when there is no link
LED Power Management: Adjustment on LEDs intensity

**Cable Diagnostic: (Copper ports only)**
Shows physical status of the UTP cable, in order to get more accurate result the cable length suggestion is 7-140 meters

## Dimensions (unit=mm)



Front View     Side View     Side View with Mounting Kit     Bottom View     Din-Rail Kit View (Optional Accessories)

## Ordering Information

| WMG-821EPAD-X | Industrial 8 x 10/100Base-T(X) + 2 x 10/100/1000Base-T(X) EN 50155 IP67 M12 Gigabit Managed Ethernet Switch, -40 to 80°C, (IEEE 1588 PTP) |
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## Optional Accessories

### Cables

| WA-M12AM8-RJ-1M | WA-M12DM4-RJ-1M | WA-M12AF5-O-1M | WA-M23F5-O-1M |
|---|---|---|---|
| M12 A-Code Male (8-Pin) to RJ-45 Gigabit Etherent Cable AWG 24, IP67, 1M | M12 D-Coded Male (4-Pin) to RJ-45 Fast Ethernet Cable AWG 24, IP67, 1M | M12 A-Coded Female (5-Pin) to Open Wire Alarm Contact Cable AWG 22, IP67, 1M | M23 Female (5-Pin) to Open Wire Power Cable AWG 16, IP67, 1M |

**Note: All cable length customisable.

### Connectors & Others

| WA-M12AM8C | WA-M12DM4C | WA-M12AF5C | WA-001D |
|---|---|---|---|
| M12 A-Coded Male (8-Pin) Connector | M12 D-Coded Male (4-Pin) Connector | M12 A-Coded Female (5-Pin) Connector | Din-Rail Mounting Kit |

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