

# TAP-323 Series

## Railway trackside dual radio 802.11n IP68 wireless AP



### Features and Benefits

- 2 dual-band radios, IEEE 802.11a/b/g/n compliant
- Rugged IP68-rated housing and -40 to 75°C operating temperature
- Controller-based Turbo Roaming (less than 50 ms)<sup>1</sup>
- 2 fiber SFP slots and 4 PoE ports with M12 LAN connectors
- Complies with all EN 50155 mandatory test items<sup>2</sup>
- Complies with EN 50121-4
- Wireless network redundancy with AeroLink Protection
- High transmission power for extended reach

### Certifications



## Introduction

The TAP-323 trackside wireless unit is designed for train-to-ground wireless communication. The TAP-323 is a highly compact and rugged wireless unit that integrates two access points, a managed fiber switch, and a wide-range AC/DC power supply into one box. The IP68 housing allows the unit to withstand harsh weather conditions, and the M12 connectors make the unit shock and vibration resistant. The TAP-323 supports advanced controller-based Turbo Roaming technology for train-to-ground wireless applications such as communication-based train control (CBTC) and CCTV. The unit can supply power to up to 4 PoE devices while providing reliable LAN communication with Moxa's Turbo Chain technology.

### Advanced Mobility and Reliability

- Controller-based L3 Turbo Roaming
- Mobile IP support
- 2 dual-band radios: 2.4 GHz and 5 GHz
- Turbo Chain support (100 ms recovery time)
- WPA/WPA2 and 802.11i supported
- IEEE 802.1X/RADIUS supported

### Built for Transportation Applications

- Isolated 110 to 220 VDC/VAC power input
- High transmission power, 400 mW (max)
- Supplies power through 4 PoE ports
- 2 fiber SFP ports for backbone installation
- Wide temperature (-40 to 75°C) range and IP68-rated housing

## Specifications

### WLAN Interface

|   |  |
|---|--|
| Channel Bandwidth                                 | 5 MHz, 10 MHz, 20 MHz, 40 MHz  |
| Frequency Band                                    | 5 GHz<br>2.4 GHz   |
| Frequency Band for EU (20 MHz operating channels) | 2.412 to 2.472 GHz (13 channels)<br>5.180 to 5.240 GHz (4 channels)<br>5.260 to 5.320 GHz (4 channels)<br>5.500 to 5.700 GHz (11 channels) |

1. The Turbo Roaming recovery time indicated herein is an average of test results documented, in optimized conditions, across APs configured with interference-free 20-MHz RF channels, WPA2-PSK security, and default Turbo Roaming parameters. The clients are configured with 3-channel roaming at 100 Kbps traffic load. Other conditions may also impact roaming performance. For more information about Turbo Roaming parameter settings, refer to the product manual.
2. This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed statement, click here: [www.moxa.com/doc/specs/EN\\_50155\\_Combpliance.pdf](http://www.moxa.com/doc/specs/EN_50155_Combpliance.pdf)

|   |   |
|---|---|
| Frequency Band for JP (20 MHz operating channels)               | 2.412 to 2.484 GHz (14 channels)<br>5.180 to 5.240 GHz (4 channels)<br>5.260 to 5.320 GHz (4 channels)<br>5.500 to 5.700 GHz (11 channels)  |
| Frequency Band for US (20 MHz operating channels)               | 2.412 to 2.462 GHz (11 channels)<br>5.180 to 5.240 GHz (4 channels)<br>5.260 to 5.320 GHz (4 channels) <sup>3</sup><br>5.500 to 5.700 GHz (8 channels) Excludes 5.600 to 5.640 <sup>3</sup><br>5.745 to 5.825 GHz (5 channels)  |
| Receiver Sensitivity for 802.11a (measured at 5.680 GHz)        | Typ. -90 @ 6 Mbps<br>Typ. -88 @ 9 Mbps<br>Typ. -88 @ 12 Mbps<br>Typ. -85 @ 18 Mbps<br>Typ. -81 @ 24 Mbps<br>Typ. -78 @ 36 Mbps<br>Typ. -74 @ 48 Mbps<br>Typ. -74 @ 54 Mbps<br>Note <sup>4</sup>   |
| Receiver Sensitivity for 802.11n (5 GHz; measured at 5.680 GHz) | Typ. -88 dBm @ MCS0 20 MHz<br>Typ. -85 dBm @ MCS1 20 MHz<br>Typ. -82 dBm @ MCS2 20 MHz<br>Typ. -79 dBm @ MCS3 20 MHz<br>Typ. -76 dBm @ MCS4 20 MHz<br>Typ. -71 dBm @ MCS5 20 MHz<br>Typ. -70 dBm @ MCS6 20 MHz<br>Typ. -69 dBm @ MCS7 20 MHz<br>Typ. -95 dBm @ MCS8 20 MHz<br>Typ. -91 dBm @ MCS9 20 MHz<br>Typ. -87 dBm @ MCS10 20 MHz<br>Typ. -80 dBm @ MCS11 20 MHz<br>Typ. -78 dBm @ MCS12 20 MHz<br>Typ. -74 dBm @ MCS13 20 MHz<br>Typ. -72 dBm @ MCS14 20 MHz<br>Typ. -71 dBm @ MCS15 20 MHz<br>Typ. -84 dBm @ MCS0 40 MHz<br>Typ. -81 dBm @ MCS1 40 MHz<br>Typ. -77 dBm @ MCS2 40 MHz<br>Typ. -75 dBm @ MCS3 40 MHz<br>Typ. -71 dBm @ MCS4 40 MHz<br>Typ. -67 dBm @ MCS5 40 MHz<br>Typ. -64 dBm @ MCS6 40 MHz<br>Typ. -63 dBm @ MCS7 40 MHz<br>Typ. -90 dBm @ MCS8 40 MHz<br>Typ. -85 dBm @ MCS9 40 MHz<br>Typ. -82 dBm @ MCS10 40 MHz<br>Typ. -81 dBm @ MCS11 40 MHz<br>Typ. -77 dBm @ MCS12 40 MHz<br>Typ. -73 dBm @ MCS13 40 MHz<br>Typ. -71 dBm @ MCS14 40 MHz<br>Typ. -68 dBm @ MCS15 40 MHz<br>Note <sup>4</sup> |
| Receiver Sensitivity for 802.11b (measured at 2.437 GHz)        | Typ. -93 dBm @ 1 Mbps<br>Typ. -93 dBm @ 2 Mbps<br>Typ. -93 dBm @ 5.5 Mbps<br>Typ. -88 dBm @ 11 Mbps   |
| Receiver Sensitivity for 802.11g (measured at 2.437 GHz)        | Typ. -88 dBm @ 6 Mbps<br>Typ. -86 dBm @ 9 Mbps<br>Typ. -85 dBm @ 12 Mbps<br>Typ. -85 dBm @ 18 Mbps<br>Typ. -85 dBm @ 24 Mbps<br>Typ. -82 dBm @ 36 Mbps<br>Typ. -78 dBm @ 48 Mbps<br>Typ. -74 dBm @ 54 Mbps  |

3. DFS (Dynamic Frequency Selection) channel support: In AP mode, when a radar signal is detected, the device will automatically switch to another channel. However, according to regulations, after switching channels, a 60-second availability check period is required before starting the service.
4. Due to a limitation in the receiver sensitivity performance for channels 153 and 161, it is recommended to avoid using these channels in your critical applications.

|   |   |
|---|---|
| Receiver Sensitivity for 802.11n (2.4 GHz; measured at 2.437 GHz) | <p>Typ. -89 dBm @ MCS0 20 MHz<br/> Typ. -85 dBm @ MCS1 20 MHz<br/> Typ. -85 dBm @ MCS2 20 MHz<br/> Typ. -82 dBm @ MCS3 20 MHz<br/> Typ. -78 dBm @ MCS4 20 MHz<br/> Typ. -74 dBm @ MCS5 20 MHz<br/> Typ. -72 dBm @ MCS6 20 MHz<br/> Typ. -70 dBm @ MCS7 20 MHz<br/> Typ. -95 dBm @ MCS8 20 MHz<br/> Typ. -90 dBm @ MCS9 20 MHz<br/> Typ. -87 dBm @ MCS10 20 MHz<br/> Typ. -83 dBm @ MCS11 20 MHz<br/> Typ. -80 dBm @ MCS12 20 MHz<br/> Typ. -74 dBm @ MCS13 20 MHz<br/> Typ. -71 dBm @ MCS14 20 MHz<br/> Typ. -69 dBm @ MCS15 20 MHz<br/> Typ. -87 dBm @ MCS0 40 MHz<br/> Typ. -83 dBm @ MCS1 40 MHz<br/> Typ. -83 dBm @ MCS2 40 MHz<br/> Typ. -80 dBm @ MCS3 40 MHz<br/> Typ. -76 dBm @ MCS4 40 MHz<br/> Typ. -73 dBm @ MCS5 40 MHz<br/> Typ. -69 dBm @ MCS6 40 MHz<br/> Typ. -67 dBm @ MCS7 40 MHz<br/> Typ. -93 dBm @ MCS8 40 MHz<br/> Typ. -88 dBm @ MCS9 40 MHz<br/> Typ. -85 dBm @ MCS10 40 MHz<br/> Typ. -82 dBm @ MCS11 40 MHz<br/> Typ. -78 dBm @ MCS12 40 MHz<br/> Typ. -73 dBm @ MCS13 40 MHz<br/> Typ. -69 dBm @ MCS14 40 MHz<br/> Typ. -67 dBm @ MCS15 40 MHz</p> |
| Modulation Type   | DSSS<br>OFDM  |
| Transmission Rate   | <p>802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps<br/> 802.11b: 1, 2, 5.5, 11 Mbps<br/> 802.11n HT40: 13.5 to 300 Mbps (MCS0 to MCS15)</p>  |
| Transmitter Power for 802.11a                                     | <p>23±1.5 dBm @ 6 Mbps<br/> 23±1.5 dBm @ 12 Mbps<br/> 23±1.5 dBm @ 24 Mbps<br/> 21±1.5 dBm @ 36 Mbps<br/> 20±1.5 dBm @ 48 Mbps<br/> 18±1.5 dBm @ 54 Mbps</p>  |
| Transmitter Power for 802.11n (5 GHz)                             | <p>23±1.5 dBm @ MCS0 20 MHz<br/> 20±1.5 dBm @ MCS1 20 MHz<br/> 20±1.5 dBm @ MCS2 20 MHz<br/> 20±1.5 dBm @ MCS3 20 MHz<br/> 19±1.5 dBm @ MCS4 20 MHz<br/> 18±1.5 dBm @ MCS5 20 MHz<br/> 18±1.5 dBm @ MCS6 20 MHz<br/> 18±1.5 dBm @ MCS7 20 MHz<br/> 23±1.5 dBm @ MCS8 20 MHz<br/> 20±1.5 dBm @ MCS9 20 MHz<br/> 20±1.5 dBm @ MCS10 20 MHz<br/> 20±1.5 dBm @ MCS11 20 MHz<br/> 19±1.5 dBm @ MCS12 20 MHz<br/> 19±1.5 dBm @ MCS13 20 MHz<br/> 18±1.5 dBm @ MCS14 20 MHz<br/> 18±1.5 dBm @ MCS15 20 MHz<br/> 23±1.5 dBm @ MCS0 40 MHz<br/> 20±1.5 dBm @ MCS1 40 MHz<br/> 20±1.5 dBm @ MCS2 40 MHz<br/> 20±1.5 dBm @ MCS3 40 MHz<br/> 19±1.5 dBm @ MCS4 40 MHz<br/> 18±1.5 dBm @ MCS5 40 MHz<br/> 18±1.5 dBm @ MCS6 40 MHz<br/> 18±1.5 dBm @ MCS7 40 MHz<br/> 23±1.5 dBm @ MCS8 40 MHz<br/> 20±1.5 dBm @ MCS9 40 MHz</p>   |

|   |   |
|---|---|
|   | <p>20±1.5 dBm @ MCS10 40 MHz<br/> 20±1.5 dBm @ MCS11 40 MHz<br/> 19±1.5 dBm @ MCS12 40 MHz<br/> 19±1.5 dBm @ MCS13 40 MHz<br/> 18±1.5 dBm @ MCS14 40 MHz<br/> 18±1.5 dBm @ MCS15 40 MHz</p>   |
| Transmitter Power for 802.11b                             | <p>26±1.5 dBm @ 1 Mbps<br/> 26±1.5 dBm @ 2 Mbps<br/> 26±1.5 dBm @ 5.5 Mbps<br/> 25±1.5 dBm @ 11 Mbps</p>  |
| Transmitter Power for 802.11g                             | <p>23±1.5 dBm @ 6 Mbps<br/> 23±1.5 dBm @ 12 Mbps<br/> 23±1.5 dBm @ 24 Mbps<br/> 21±1.5 dBm @ 36 Mbps<br/> 20±1.5 dBm @ 48 Mbps<br/> 18±1.5 dBm @ 54 Mbps</p>  |
| Transmitter Power for 802.11n (2.4 GHz)                   | <p>23±1.5 dBm @ MCS0 20 MHz<br/> 21±1.5 dBm @ MCS1 20 MHz<br/> 21±1.5 dBm @ MCS2 20 MHz<br/> 21±1.5 dBm @ MCS3 20 MHz<br/> 20±1.5 dBm @ MCS4 20 MHz<br/> 19±1.5 dBm @ MCS5 20 MHz<br/> 18±1.5 dBm @ MCS6 20 MHz<br/> 18±1.5 dBm @ MCS7 20 MHz<br/> 23±1.5 dBm @ MCS8 20 MHz<br/> 21±1.5 dBm @ MCS9 20 MHz<br/> 21±1.5 dBm @ MCS10 20 MHz<br/> 21±1.5 dBm @ MCS11 20 MHz<br/> 20±1.5 dBm @ MCS12 20 MHz<br/> 19±1.5 dBm @ MCS13 20 MHz<br/> 18±1.5 dBm @ MCS14 20 MHz<br/> 18±1.5 dBm @ MCS15 20 MHz<br/> 23±1.5 dBm @ MCS0 40 MHz<br/> 20±1.5 dBm @ MCS1 40 MHz<br/> 20±1.5 dBm @ MCS2 40 MHz<br/> 20±1.5 dBm @ MCS3 40 MHz<br/> 19±1.5 dBm @ MCS4 40 MHz<br/> 19±1.5 dBm @ MCS5 40 MHz<br/> 18±1.5 dBm @ MCS6 40 MHz<br/> 17±1.5 dBm @ MCS7 40 MHz<br/> 23±1.5 dBm @ MCS8 40 MHz<br/> 20±1.5 dBm @ MCS9 40 MHz<br/> 20±1.5 dBm @ MCS10 40 MHz<br/> 20±1.5 dBm @ MCS11 40 MHz<br/> 20±1.5 dBm @ MCS12 40 MHz<br/> 19±1.5 dBm @ MCS13 40 MHz<br/> 18±1.5 dBm @ MCS14 40 MHz<br/> 17±1.5 dBm @ MCS15 40 MHz</p> |
| Wireless Security   | <p>WEP encryption (64-bit and 128-bit)<br/> WPA/WPA2-Enterprise (IEEE 802.1X/RADIUS, TKIP, AES)<br/> WPA/WPA2-Personal</p>  |
| WLAN Antenna Connector                                    | 5 N-type female   |
| WLAN Operation Mode                                       | Access point  |
| WLAN Standards  | <p>802.11a/b/g/n<br/> 802.11i Wireless Security</p>   |
| <b>Ethernet Interface</b>                                 |   |
| 1000BaseSFP Slots   | 2   |
| 10/100BaseT(X) Ports (M12 D-coded 4-pin female connector) | 4   |
| Standards   | <p>IEEE 802.1p for Class of Service<br/> IEEE 802.1Q for VLAN Tagging</p>   |

|                  |  |
|------------------|--|
|                  | IEEE 802.3 for 10BaseT<br>IEEE 802.3ab for 1000BaseT(X)<br>IEEE 802.3af for PoE<br>IEEE 802.3u for 100BaseT(X) |
| Total Port Count | 6  |
| Highest Speed    | 1G   |
| Connections      | PoE<br>M12<br>Fiber  |

#### Ethernet Software Features

|                 |  |
|-----------------|--|
| Management      | SNMPv1/v2c/v3, DHCP Server/Client, IPv4, Syslog, TCP/IP, Telnet, TFTP, UDP, Web Console, Wireless Search Utility |
| Security        | HTTPS/SSL, RADIUS, SSH   |
| Time Management | SNTP   |

#### Switch Properties

|               |               |
|---------------|---------------|
| VLAN ID Range | VID 1 to 4094 |
|---------------|---------------|

#### USB Interface

|               |   |
|---------------|---|
| M12 Connector | M12 A-coded 5-pin female (for ABC-02 USB storage) |
|---------------|---|

#### Firewall

|        |                                |
|--------|--------------------------------|
| Filter | IP address, MAC address, Ports |
|--------|--------------------------------|

#### NAT

|          |                 |
|----------|-----------------|
| Features | Port forwarding |
|----------|-----------------|

#### Serial Interface

|              |  |
|--------------|--|
| Console Port | USB-M12 console (M12 B-coded 5-pin female connector) |
| Parity       | None, Even, Odd, Space, Mark                         |

#### Power Parameters

|                             |   |         |         |         |         |
|-----------------------------|---|---------|---------|---------|---------|
| Input Current               | AC input: 110 to 220 VAC, 50 to 60 Hz, 1.1 A (max.)<br>DC input: 110 to 220 VDC, 1.1 A (max.) |         |         |         |         |
| Input Voltage               | Redundant dual inputs, 110/220 VAC/VDC (85 to 264 VAC, 88 to 300 VDC)                         |         |         |         |         |
| Power Connector             | 6-pin M23 Connector   |         |         |         |         |
| Power Consumption           | 85 W (max.)   |         |         |         |         |
|                             | PSE/Voltage   | 110 VDC | 110 VAC | 220 VDC | 220 VAC |
|                             | 0 PSE port in use   | 17.4 W  | 16.2 W  | 17.6 W  | 17.5 W  |
|                             | 1 PSE port in use   | 34.15 W | 32.6 W  | 33.8 W  | 33.55 W |
|                             | 2 PSE ports in use  | 50.9 W  | 49 W    | 49.9 W  | 49.6 W  |
|                             | 3 PSE ports in use  | 67.65 W | 65.4 W  | 66 W    | 65.65 W |
| 4 PSE ports in use          | 84.4 W  | 81.8 W  | 82.1 W  | 81.7 W  |         |
| Reverse Polarity Protection | Supported   |         |         |         |         |
| Source of Input Power       | PoE (IEEE 802.3af)  |         |         |         |         |

## Overload Protection

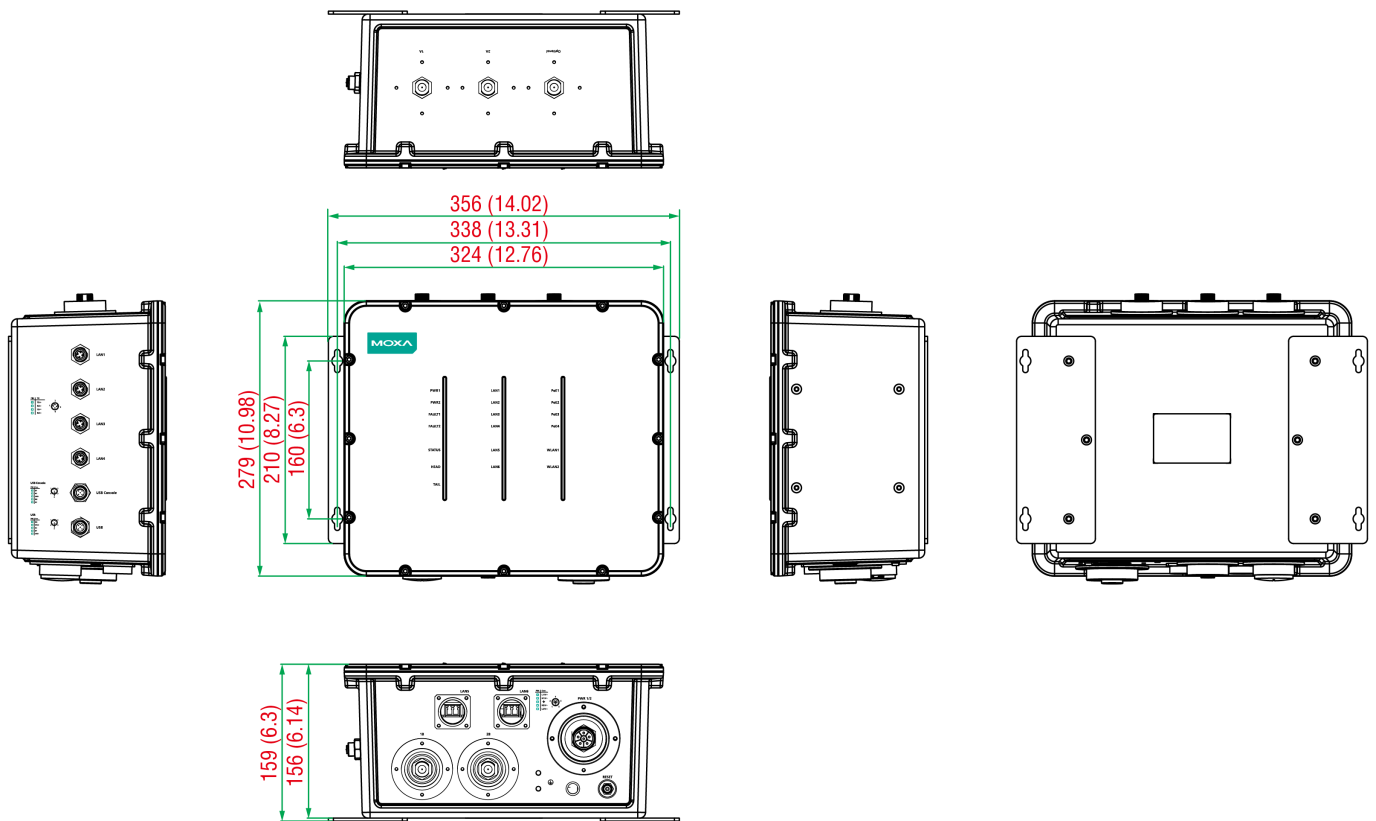
|  |   |
|--|---|
| Protection Type                        | Current   |
| <b>Physical Characteristics</b>        |   |
| Housing                                | Metal   |
| IP Rating                              | IP68  |
| Dimensions                             | 324 x 279 x 156 mm (12.76 x 10.98 x 6.142 in)   |
| Weight                                 | 10,000 g (22.22 lb)   |
| Installation                           | Wall mounting (standard), DIN-rail mounting (optional), Pole mounting (optional)  |
| Protection                             | PCB conformal coating   |
| <b>Environmental Limits</b>            |   |
| Operating Temperature                  | -40 to 75°C (-40 to 167°F)  |
| Storage Temperature (package included) | -40 to 85°C (-40 to 185°F)  |
| Ambient Relative Humidity              | 5 to 95% (non-condensing)   |
| <b>Standards and Certifications</b>    |   |
| EMC                                    | EN 61000-6-2/-6-4, EN 55032/24  |
| EMI                                    | CISPR 32, FCC Part 15B Class A  |
| EMS                                    | IEC 61000-4-2 ESD: Contact: 8 kV; Air: 15 kV<br>IEC 61000-4-3 RS: 80 MHz to 1 GHz: 20 V/m<br>IEC 61000-4-4 EFT: Power: 2 kV; Signal: 2 kV<br>IEC 61000-4-5 Surge: Power: 2 kV; Signal: 2 kV<br>IEC 61000-4-6 CS: 10 V<br>IEC 61000-4-8 PFMF |
| Radio Frequency                        | FCC, IC, WPC, RED   |
| Radio                                  | MIC   |
| Railway                                | EN 50121-4, EN 50155  |
| Railway Fire Protection                | EN 45545-2  |
| Safety                                 | EN 60950-1, UL 60950-1, IEC 60950-1   |
| <b>MTBF</b>                            |   |
| Time                                   | 290,937 hrs   |
| Standards                              | Telcordia SR332   |
| <b>Warranty</b>                        |   |
| Warranty Period                        | 5 years   |
| Details                                | See <a href="http://www.moxa.com/warranty">www.moxa.com/warranty</a>  |

## Package Contents

|                  |  |
|------------------|--|
| Device           | 1 x TAP-323 Series wireless access point   |
| Installation Kit | 1 x cap, metal, for ABC-02 USB storage port<br>1 x cap, metal, for USB console port<br>1 x metal M23 male 6-pin crimp<br>1 x plastic M23 dust cover for power<br>1 x fiber panel mounting kit<br>1 x wall-mounting kit<br>3 x antenna glands for top side antenna<br>4 x cap, metal, for LAN port<br>5 x metal protective caps for 4 antenna ports and 1 optional antenna port |
| Documentation    | 1 x quick installation guide<br>1 x warranty card  |

## Dimensions

Unit: mm (inch)



## Ordering Information

| Model Name      | Band | Standard      | Application                             | Operating Temp. | Indoor/Outdoor, IP Rating | Single/Dual RF |
|-----------------|------|---------------|---|-----------------|---------------------------|----------------|
| TAP-323-EU-CT-T | EU   | 802.11a/b/g/n | Railway trackside wireless access point | -40 to 75°C     | Outdoor, IP68             | Dual RF        |
| TAP-323-US-CT-T | US   | 802.11a/b/g/n | Railway trackside wireless access point | -40 to 75°C     | Outdoor, IP68             | Dual RF        |
| TAP-323-JP-CT-T | JP   | 802.11a/b/g/n | Railway trackside wireless access point | -40 to 75°C     | Outdoor, IP68             | Dual RF        |

## Accessories (sold separately)

### Communication Modules

|               |   |
|---------------|---|
| SFP-1FELLC-T  | SFP module with 1 100Base single-mode with LC connector for 80 km transmission, -40 to 85°C operating temperature |
| SFP-1GLSXLC-T | SFP module with 1 1000BaseLSX port with LC connector for 500 m transmission, -40 to 85°C operating temperature    |
| SFP-1FEMLC-T  | SFP module with 1 100Base multi-mode with LC connector for 4 km transmission, -40 to 85°C operating temperature   |
| SFP-1GLHXLCT  | SFP module with 1 1000BaseLHX port with LC connector for 40 km transmission, -40 to 85°C operating temperature    |
| SFP-1GSXLCT   | SFP module with 1 1000BaseSX port with LC connector for 300/550 m transmission, -40 to 85°C operating temperature |
| SFP-1GLHLCT   | SFP module with 1 1000BaseLH port with LC connector for 30 km transmission, -40 to 85°C operating temperature     |
| SFP-1FESLCT   | SFP module with 1 100Base single-mode with LC connector for 40 km transmission, -40 to 85°C operating temperature |
| SFP-1GLXLCT   | SFP module with 1 1000BaseLX port with LC connector for 10 km transmission, -40 to 85°C operating temperature     |

### M12 Connector Caps

|              |                                    |
|--------------|------------------------------------|
| A-CAP-M12F-M | Metal cap for M12 female connector |
|--------------|------------------------------------|

### Connectors

|              |   |
|--------------|---|
| M12D-4P-IP68 | M12 D-coded screw-in sensor connector, male, IP68 |
|--------------|---|

### Wireless Connector Caps

|           |                                     |
|-----------|-------------------------------------|
| A-CAP-N-M | Metal cap to cover N-type connector |
|-----------|-------------------------------------|

### Cables

|                                |  |
|--------------------------------|--|
| CBL-M12D(MM4P)/RJ45-100 IP67   | M12-to-RJ45 cable, IP67-rated, 1 m   |
| CBL-M23(FF6P)/OPEN-BK-100 IP67 | M23 to 6-pin power cable, IP67-rated female 6-pin M23 connector, IP67, 1 m |

### Storage Kits

|              |   |
|--------------|---|
| ABC-02-USB   | Configuration backup and restoration tool, firmware upgrade, and log file storage tool for managed Ethernet switches and routers, 0 to 60°C operating temperature   |
| ABC-02-USB-T | Configuration backup and restoration tool, firmware upgrade, and log file storage tool for managed Ethernet switches and routers, -40 to 75°C operating temperature |

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