Data Sheet

Cisco Industrial Wireless 3700 Series Access Points

Cisco IW3700 Series Access Points with industrial environmental qualifications and industry-leading 802.11ac Wi-Fi performance:

- Qualified for extreme industrial and outdoor environments
- Ideal for rail, transportation, mining, oil and gas, manufacturing, and other outdoor applications
- Extended operational temperature range
- Compact but rugged IP67-rated housing to protect against liquid and dust ingress
- Vibration-rated M12 Ethernet and DC power connectors
- Versatile RF coverage with external type N antenna connectors

Dual-band 2.4-GHz and 5-GHz radios with 802.11ac Wave 1 support on the 5-GHz radio Operational flexibility:

- Lightweight mode for controller-based deployment
- Autonomous and workgroup bridge (WGB) support

Troubleshooting forensics for faster interference resolution and proactive action:

- Classifies more than 20 different types of interference, including non-Wi-Fi interference, within 5 to 30 seconds.
- Automatic remedial action and less manual intervention.
- Historic interference information for back-in-time analysis and faster problem solving.
- 24-hour monitoring with remote access reduces travel and speeds resolution.
- Cisco Spectrum Expert Connect mode provides real-time, raw spectrum data to help with difficult-to-diagnose interference problems.
- Air quality index in Cisco CleanAir technology provides a snapshot of network performance and the impact of interference.

Robust Security and Policy Enforcement

- Industry's first access point with non-Wi-Fi detection for off-channel rogues.
- Supports rogue access point detection and detection of denial-of-service attacks.
- Management frame protection detects malicious users and alerts network administrators.
- Enables policies to prohibit devices that interfere with the Wi-Fi network or jeopardize network security.

The Cisco® Industrial Wireless 3700 (IW3700) Series Access Points deliver industry-leading performance and a high-density experience for industrial and outdoor use. The IW3700 offers industrial-grade environmental qualifications while providing higher speeds for video and other bandwidth-intensive applications and extending support to a new generation of Wi-Fi clients, such as smartphones, tablets, and high-performance laptops that have integrated 802.11ac support.

In its first implementation, 802.11ac Wave 1 provides a rate of up to 1.3 Gbps, roughly triple the rates offered by today's high-end 802.11n access points. This provides the necessary foundation for industrial, enterprise, and service provider networks to stay ahead of the performance, and bandwidth expectations and needs of their wireless users.

Due to its convenience, wireless access is increasingly the preferred form of network connectivity for industrial users. Along with this shift, there is an expectation that wireless should not slow down users' day-to-day work but should enable a high-performance experience while allowing users to move freely around the corporate environment.

The IW3700 offers a scalable and secure mesh architecture for high-performance Wi-Fi services.

High-Density Experience

Building on Cisco's heritage of RF excellence, the Cisco IW3700 Series Access Points use a purpose-built innovative chipset with the best-in-class RF architecture. This chipset provides a high-density experience for industrial and enterprise networks designed for mission-critical, high-performance applications. The IW3700 is a series of flagship access points, delivering environmentally qualified key requirements of industrial applications, industry-leading performance for highly secure and reliable wireless connections and a robust mobility experience that includes:

- 802.11ac with 4 x 4 multiple-input multiple-output (MIMO) technology with three spatial streams that offer sustained 1.3-Gbps rates over a greater range for more capacity and reliability than competing access points.
- Optimized access point roaming ensures clients are associated with the best access points offering the best data rate available.
- Cisco ClientLink 3.0 technology to improve downlink performance to all mobile devices, including one, two, and three spatial stream devices on 802.11ac while improving battery life on mobile devices, such as smartphones and tablets.
- Cisco CleanAir® technology enhanced with 80-MHz channel support provides proactive, high-speed spectrum intelligence across 20-, 40-, and 80-MHz wide channels to combat performance problems due to wireless interference.
- MIMO equalization optimizes uplink performance and reliability by reducing the impact of signal fade.

The new Cisco IW3700 Series Access Points sustain reliable connections at higher speeds farther from the access points than competing solutions, resulting in up to three times more availability of 1.3-Gbps rates and optimizing the performance of more mobile devices. The IW3700 carries forward the industry-leading features of the Cisco Aironet® 3700 Series.

All of these features help ensure the best possible end-user experience on the wireless network. Cisco also offers the industry's broadest selection of 802.11n and 802.11ac antennas, delivering optimal coverage for a variety of deployment scenarios.

Scalability

The Cisco IW3700 Series Access Points are a component of the Cisco Unified Wireless Network, which can scale to as many as 18,000 access points with full Layer 3 mobility across central or remote locations on the enterprise campus, in branch offices, and at remote sites. The Cisco Unified Wireless Network is the industry's most flexible, resilient, and scalable architecture, delivering highly secure access to mobility services and applications and offering the lowest TCO and investment protection with the ability to be integrated smoothly with the existing wired network.

Product Specifications

Table 1 lists the specifications for the Cisco IW3700 Series Access Points.

Table 1. Product Specifications

Item	Specification
Part numbers	**Cisco IW3700 Access Points** • IW3702-2E-UXK9: 2 antenna connectors on top and bottom for pole or wall mounting with direct attach antennas (4 antenna connectors total) • IW3702-4E-UXK9: 4 antenna connectors on one side for convenience in cabinet mount cabled scenarios **Cisco SMARTnet® Service for the Cisco IW3700 Series Access Points** • CON-SNT-IW37022E and CON-SNTP-IW37022E: SMARTnet for IW3702-2E-UXK9 • CON-SNT-IW37024E and CON-SNTP-IW37024E: SMARTnet for IW3702-4E-UXK9 **Cisco Wireless LAN Services** • AS-WLAN-CNSLT: Cisco Wireless LAN Network Planning and Design Service • AS-WLAN-CNSLT: Cisco Wireless LAN 802.11n Migration Service • AS-WLAN-CNSLT: Cisco Wireless LAN Performance and Security Assessment Service • AS-CIE-WRLS-CNSLT: Cisco IOT Wireless LAN Network Planning and Design Services (IOT Verticals: Manufacturing, Transportation, Mining, Oil & Gas)
Software	Cisco Unified Wireless Network Software Release with AireOS Wireless Controllers: • 8.0 MR2 or later for the Cisco IW3700 Series Access Point
Supported wireless LAN controllers	• Cisco 2500 Series Wireless Controllers, Cisco Wireless Controller Module for ISR G2, Cisco Wireless Services Module 2 (WiSM2) for Catalyst® 6500 Series Switches, Cisco 5500 Series Wireless Controllers, Cisco Flex® 7500 Series Wireless Controllers, Cisco 8500 Series Wireless Controllers, Cisco Virtual Wireless Controller
802.11ac Wave 1 capabilities	• 4 x 4 MIMO with 3 spatial streams • Maximal-ratio combining (MRC) • 802.11ac beamforming • 20-, 40-, and 80-MHz channels • PHY data rates up to 1.3 Gbps (80 MHz with 5 GHz) • Packet aggregation: A-MPDU (Tx/Rx), A-MSDU (Tx/Rx) • 802.11 dynamic frequency selection (DFS) • Cyclic shift diversity (CSD) support
802.11n version 2.0 (and related) capabilities	• 4 x 4 MIMO with 3 spatial streams • Maximal-ratio combining (MRC) • 802.11n and 802.11a/g beamforming • 20- and 40-MHz channels • PHY data rates up to 450 Mbps (40 MHz with 5 GHz) • Packet aggregation: A-MPDU (Tx/Rx), A-MSDU (Tx/Rx) • 802.11 dynamic frequency selection (DFS) • Cyclic shift diversity (CSD) support
Data rates supported	**802.11a: 6, 9, 12, 18, 24, 36, 48, and 54 Mbps**
	802.11g: 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, and 54 Mbps
	802.11n data rates in 2.4 GHz:

MCS Index[1]	**GI[2] = 800 ns**	**GI = 400 ns**	
	20 MHz Rate (Mbps)	**20 MHz Rate (Mbps)**	
0	6.5	7.2	
1	13	14.4	

[1] MCS Index: The Modulation and Coding Scheme (MCS) index determines the number of spatial streams, modulation, coding rate, and data rate values.

[2] GI: A guard interval (GI) between symbols helps receivers overcome the effects of multipath delay spreads.

Item	Specification							
	2	19.5	21.7					
	3	26	28.9					
	4	39	43.3					
	5	52	57.8					
	6	58.5	65					
	7	65	72.2					
	8	13	14.4					
	9	26	28.9					
	10	39	43.3					
	11	52	57.8					
	12	78	86.7					
	13	104	115.6					
	14	117	130					
	15	130	144.4					
	16	19.5	21.7					
	17	39	43.3					
	18	58.5	65					
	19	78	86.7					
	20	117	130					
	21	156	173.3					
	22	175.5	195					
	23	195	216.7					
	802.11ac data rates (5 GHz):							
	MCS Index	**Spatial Streams**	**GI[2] = 800ns**			**GI = 400ns**		
			20 MHz Rate (Mbps)	**40 MHz Rate (Mbps)**	**80 MHz Rate (Mbps)**	**20 MHz Rate (Mbps)**	**40 MHz Rate (Mbps)**	**80 MHz Rate (Mbps)**
	0	1	6.5	13.5	29.3	7.2	15	32.5
	1	1	13	27	58.5	14.4	30	65
	2	1	19.5	40.5	87.8	21.7	45	97.5
	3	1	26	54	117	28.9	60	130
	4	1	39	81	175.5	43.3	90	195
	5	1	52	108	234	57.8	120	260
	6	1	58.5	121.5	263.3	65	135	292.5
	7	1	65	135	292.5	72.2	150	325
	8	1	78	162	351	86.7	180	390
	9	1	-	180	390	-	200	433.3
	0	2	13	27	58.5	14.4	30	65
	1	2	26	54	117	28.9	60	130
	2	2	39	81	175.5	43.3	90	195
	3	2	52	108	234	57.8	120	260

[2] GI: A guard interval (GI) between symbols helps receivers overcome the effects of multipath delay spreads.

Item	Specification							
	4	2	78	162	351	86.7	180	390
	5	2	104	216	468	115.6	240	520
	6	2	117	243	526.5	130	270	585
	7	2	130	270	585	144.4	300	650
	8	2	156	324	702	173.3	360	780
	9	2	78	780	780	-	400	866.7
	0	3	19.5	40.5	87.8	21.7	45	97.5
	1	3	39	81	175.5	43.3	90	195
	2	3	58.5	121.5	263.3	65	135	292.5
	3	3	78	162	351	86.7	180	390
	4	3	117	243	526.5	130	270	585
	5	3	156	324	702	173.3	360	780
	6	3	175.5	364.5	-	195	405	-
	7	3	195	405	877.5	216.7	450	975
	8	3	234	486	1053	260	540	1170
	9	3	260	540	1170	288.9	600	1300

Frequency band and 20-MHz operating channels	**A (A regulatory domain):** • 2.412 to 2.462 GHz; 11 channels • 5.180 to 5.320 GHz; 8 channels • 5.500 to 5.700 GHz; 6 channels (excludes 5.600 to 5.640 GHz) • 5.745 to 5.825 GHz; 5 channels **C (C regulatory domain):** • 2.412 to 2.472 GHz; 13 channels • 5.745 to 5.825 GHz; 5 channels **D (D regulatory domain):** • 2.412 to 2.462 GHz; 11 channels • 5.180 to 5.320 GHz; 8 channels • 5.745 to 5.825 GHz; 5 channels **E (E regulatory domain):** • 2.412 to 2.472 GHz; 13 channels • 5.180 to 5.320 GHz; 8 channels • 5.500 to 5.700 GHz; 8 channels (excludes 5.600 to 5.640 GHz) **H (H regulatory domain):** • 2.412 to 2.472 GHz; 13 channels • 5.150 to 5.350 GHz; 8 channels • 5.745 to 5.825 GHz; 5 channels **I (I regulatory domain):** • 2.412 to 2.472 GHz; 13 channels • 5.180 to 5.320 GHz; 8 channels **K (K regulatory domain):** • 2.412 to 2.472 GHz; 13 channels • 5.180 to 5.320 GHz; 8 channels • 5.500 to 5.620 GHz; 7 channels • 5.745 to 5.805 GHz; 4 channels	**N (N regulatory domain):** • 2.412 to 2.462 GHz; 11 channels • 5.180 to 5.320 GHz; 8 channels • 5.745 to 5.825 GHz; 5 channels **Q (Q regulatory domain):** • 2.412 to 2.472 GHz; 13 channels • 5.180 to 5.320 GHz; 8 channels • 5.500 to 5.700 GHz; 11 channels **R (R regulatory domain):** • 2.412 to 2.472 GHz; 13 channels • 5.180 to 5.320 GHz; 8 channels • 5.660 to 5,805 GHz; 7 channels **S (S regulatory domain):** • 2.412 to 2.472 GHz; 13 channels • 5.180 to 5.320 GHz; 8 channels • 5.500 to 5.700 GHz; 11 channels • 5.745 to 5.825 GHz; 5 channels **T (T regulatory domain):** • 2.412 to 2.462 GHz; 11 channels • 5.280 to 5.320 GHz; 3 channels • 5.500 to 5.700 GHz; 8 channels (excludes 5.600 to 5.640 GHz) • 5.745 to 5.825 GHz; 5 channels **Z (Z regulatory domain):** • 2.412 to 2.462 GHz; 11 channels • 5.180 to 5.320 GHz; 8 channels • 5.500 to 5.700 GHz; 8 channels (excludes 5.600 to 5.640 GHz) • 5.745 to 5.825 GHz; 5 channels
Note: Customers are responsible for verifying approval for use in their individual countries. Not all regulatory domains are available for the IW3700. To verify approval and to determine availability of the regulatory domain that corresponds to a particular country, visit http://www.cisco.com/go/aironet/compliance.		

<table>
<tr><th>Item</th><th colspan="3">Specification</th></tr>
<tr><td>Maximum number of nonoverlapping channels</td><td colspan="2">2.4 GHz
802.11b/g:
20 MHz: 3
802.11n:
20 MHz: 3</td><td>5 GHz
802.11a:
20 MHz: 19
802.11n:
20 MHz: 19
40 MHz: 8
802.11ac:
20 MHz: 19
40 MHz: 8
80 MHz: 4</td></tr>
<tr><td colspan="4">Note: This varies by regulatory domain. Refer to the product documentation for specific details for each regulatory domain.</td></tr>
<tr><td rowspan="2">Receive sensitivity</td><td>802.11b (CCK)
-101 dBm @ 1 Mbps
-98 dBm @ 2 Mbps
-92 dBm @ 5.5 Mbps
-89 dBm @ 11 Mbps</td><td>802.11g (non HT20)
-91 dBm @ 6 Mbps
-91 dBm @ 9 Mbps
-91 dBm @ 12 Mbps
-90 dBm @ 18 Mbps
-87 dBm @ 24 Mbps
-85 dBm @ 36 Mbps
-80 dBm @ 48 Mbps
-79 dBm @ 54 Mbps</td><td>802.11a (non HT20)
-93 dBm @ 6 Mbps
-93 dBm @ 9 Mbps
-93 dBm @ 12 Mbps
-92 dBm @ 18 Mbps
-89 dBm @ 24 Mbps
-86 dBm @ 36 Mbps
-82 dBm @ 48 Mbps
-80 dBm @ 54 Mbps</td></tr>
<tr><td>2.4 GHz
802.11n (HT20)
-90 dBm @ MCS0
-90 dBm @ MCS1
-90 dBm @ MCS2
-88 dBm @ MCS3
-85 dBm @ MCS4
-80 dBm @ MCS5
-78 dBm @ MCS6
-77 dBm @ MCS7
-90 dBm @ MCS8
-90 dBm @ MCS9
-89 dBm @ MCS10
-86 dBm @ MCS11
-82 dBm @ MCS12
-78 dBm @ MCS13
-77 dBm @ MCS14
-75 dBm @ MCS15
-90 dBm @ MCS16
-89 dBm @ MCS17
-87 dBm @ MCS18
-84 dBm @ MCS19
-81 dBm @ MCS20
-76 dBm @ MCS21
-75 dBm @ MCS22
-74 dBm @ MCS23</td><td>5 GHz
802.11n (HT20)
-93 dBm @ MCS0
-93 dBm @ MCS1
-92 dBm @ MCS2
-89 dBm @ MCS3
-86 dBm @ MCS4
-81 dBm @ MCS5
-80 dBm @ MCS6
-79 dBm @ MCS7
-93 dBm @ MCS8
-93 dBm @ MCS9
-90 dBm @ MCS10
-87 dBm @ MCS11
-84 dBm @ MCS12
-80 dBm @ MCS13
-79 dBm @ MCS14
-77 dBm @ MCS15
-93 dBm @ MCS16
-92 dBm @ MCS17
-89 dBm @ MCS18
-86 dBm @ MCS19
-83 dBm @ MCS20
-79 dBm @ MCS21
-77 dBm @ MCS22
-76 dBm @ MCS23</td><td>5 GHz
802.11n (HT40)
-90 dBm @ MCS0
-90 dBm @ MCS1
-89 dBm @ MCS2
-86 dBm @ MCS3
-83 dBm @ MCS4
-78 dBm @ MCS5
-77 dBm @ MCS6
-76 dBm @ MCS7
-90 dBm @ MCS8
-90 dBm @ MCS9
-87 dBm @ MCS10
-84 dBm @ MCS11
-81 dBm @ MCS12
-77 dBm @ MCS13
-76 dBm @ MCS14
-74 dBm @ MCS15
-90 dBm @ MCS16
-89 dBm @ MCS17
-86 dBm @ MCS18
-83 dBm @ MCS19
-80 dBm @ MCS20
-76 dBm @ MCS21
-74 dBm @ MCS22
-73 dBm @ MCS23</td></tr>
</table>

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td></td><td>802.11ac Receive Sensitivity</td></tr>
<tr><td></td><td>8.2.11ac (non-HT80)
-86 dBm @ 6 Mbps
-76 dBm @ 54 Mbps</td></tr>
<tr><td></td><td>
<table>
<tr><th>MCS Index[3]</th><th>Spatial Streams</th><th colspan="6"></th></tr>
<tr><th></th><th></th><th>VHT20</th><th>VHT40</th><th>VHT80</th><th>VTH20-STBC</th><th>VHT40-STBC</th><th>VHT80-STBC</th></tr>
<tr><td>0</td><td>1</td><td>-94 dBm</td><td>-91 dBm</td><td>-86 dBm</td><td>-94 dBm</td><td>-91 dBm</td><td>-86 dBm</td></tr>
<tr><td>8</td><td>1</td><td>-77 dBm</td><td></td><td></td><td>-77 dBm</td><td></td><td></td></tr>
<tr><td>9</td><td>1</td><td></td><td>-72 dBm</td><td>-69 dBm</td><td></td><td>-73 dBm</td><td>-70 dBm</td></tr>
<tr><td>0</td><td>2</td><td>-94 dBm</td><td>-91 dBm</td><td>-86 dBm</td><td></td><td></td><td></td></tr>
<tr><td>8</td><td>2</td><td>-75 dBm</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>9</td><td>2</td><td></td><td>-71 dBm</td><td>-67 dBm</td><td></td><td></td><td></td></tr>
<tr><td>0</td><td>3</td><td>-94 dBm</td><td>-91 dBm</td><td>-86 dBm</td><td></td><td></td><td></td></tr>
<tr><td>9</td><td>3</td><td>-71 dBm</td><td>-70 dBm</td><td>-65 dBm</td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Maximum transmit power</td><td>2.4 GHz
802.11b
23 dBm, 4 antennas
802.11g
23 dBm, 4 antennas
802.11n (HT20)
23 dBm, 4 antennas</td><td>5 GHz
802.11a
23 dBm, 4 antennas
802.11n (HT20)
23 dBm, 4 antennas
802.11n (HT40)
23 dBm, 4 antennas
802.11ac
non-HT80: 23 dBm, 4 antennas
VHT20 23 dBm, 4 antennas
VHT40: 23 dBm, 4 antennas
VHT80: 23 dBm, 4 antennas
VHT20-STBC: 23 dBm, 4 antennas
VHT40-STBC: 23 dBm, 4 antennas
VHT80-STBC: 23 dBm, 4 antennas</td></tr>
<tr><td colspan="2">Note: The maximum power setting varies by channel and according to individual country regulations. Refer to the product documentation for specific details.</td></tr>
<tr><td>Available transmit power settings</td><td>2.4 GHz
23 dBm (200 mW)
20 dBm (100 mW)
17 dBm (50 mW)
14 dBm (25 mW)
11 dBm (12.5 mW)
8 dBm (6.25 mW)
5 dBm (3.13 mW)
2 dBm (1.56 mW)</td><td>5 GHz
23 dBm (200 mW)
20 dBm (100 mW)
17 dBm (50 mW)
14 dBm (25 mW)
11 dBm (12.5 mW)
8 dBm (6.25 mW)
5 dBm (3.13 mW)
2 dBm (1.56 mW)</td></tr>
<tr><td>External antenna (sold separately)</td><td colspan="2">Certified for use with antenna gains up to 13 dBi (2.4 GHz and 5 GHz)
Cisco offers the industry's broadest selection of antennas, delivering optimal coverage for a variety of deployment scenarios</td></tr>
<tr><td>Interfaces</td><td colspan="2">10/100/1000BASE-T autosensing (M12 8P female connector with X-coding per IEC 61076-2), PoE In (802.3af), PoE+ In (802.3at)
10/100/1000BASE-T autosensing (M12 8P female connector with X-coding per IEC 61076-2), PoE Out (802.3af)
Management console port (serial with RJ-45 connector)</td></tr>
</table>

[3] MCS Index: The Modulation and Coding Scheme (MCS) index determines the number of spatial streams, modulation, coding rate, and data rate values.

Item	Specification
Indicators	• Status LED indicates boot loader status, association status, operating status, boot loader warnings, boot loader errors
System memory	• 512 MB DRAM • 64 MB flash
Dimensions (W x L x H)	• Access point (not including connectors): 11.3 x 8.0 x 2.3 in (28.7 x 20.3 x 5.9 cm) • Volume: 148 cubic inches (2.4 liters)
Weight	• 6.7 lb (3.0 kg)
Environmental	• Nonoperating (storage) temperature: -40° to +185°F (-40° to +85°C) • Nonoperating (storage) altitude test: +25°C, 15,000 ft. • Operating temperature: -40° to +158°F (-40° to +70°C) with solar load and still air • Extended operating temperature (DC powered): -58° to +167°F (-50° to +75°C) without solar loading, still air, and cold start limited to -40°C • Operating type test: +85°C for 16 hours • Operating humidity: 5% to 95% (noncondensing) • Operating altitude: 15,000 ft.
Surge	• Surge protection to ± 2 kV (line-earth) and ± 1 kW (line-line) on DC power input • Surge protection to ± 4 kV on Ethernet ports
Input power requirements	• 12V to 48V DC, -20% to +25% (M12 4P male connector with A-coding per IEC 61076-2) • PoE and PoE+ (M12 8P female connector with X-coding per IEC 61076-2)
Power Draw	* This is the power required at the power sourcing equipment (PSE)

Power Input Type	Environment Condition/Heaters	Wi-Fi Radio Mode	PoE Out	Power Budget (Watts)
PoE 802.3af	> -20°C No heaters active	3x3:3 on 2.4/5 GHz	N/A	15.4
PoE+ 802.3at	> -20°C No heaters active	4x4:3 on 2.4/5 GHz	N/A	21
PoE+ 802.3at[4]	-50°C to -20°C Still air 1 heater active	4x4:3 on 2.4/5 GHz	N/A	30
DC In	> -20°C No heaters active	4x4:3 on 2.4/5 GHz	No	20
DC In	-50°C to -20°C Still air 1 heater active	4x4:3 on 2.4/5 GHz	No	37
DC In	-50°C to -20°C Wind cooling 2 heaters active	4x4:3 on 2.4/5 GHz	No	53
DC In	> -20°C No heaters active	4x4:3 on 2.4/5 GHz	Yes	38
DC In	-50°C to -20°C Still air 1 heater active	4x4:3 on 2.4/5 GHz	Yes	55
DC In	-50°C to -20°C Wind cooling 2 heaters active	4x4:3 on 2.4/5 GHz	Yes	71

Warranty	5-year limited hardware warranty

[4] Enabled in 8.0 MR3 and higher software releases.

Item	Specification
Industrial Compliance Standards	Sections of the following standards are referenced for Cisco IW3700 Series Access Points certifications:
Environmental	EN 60529 IP67 UL50E IEC 60068-2-1 (Cold) IEC 60068-2-2 (Dry Heat) IEC 60068-2-14 (Change of Temperature) IEC 60068-2-30 (Damp Heat) IEC 60068-2-6 (Vibration) IEC 60068-2-27 (Shock) IEC 60068-2-32 (Freefall) IEC 60068-3-3 (Seismic)
Electromagnetic Compatibility	FCC 47 CFR Part 15 Class A EN 55022A Class A VCCI Class A AS/NZS CISPR 22 Class A CISPR 11 Class A CISPR 22 Class A ICES 003 Class A CNS13438 Class A EN 300 386 KN22 KN 301 489-1 KN 301 489-17 EN55024 CISPR 24 KN24 KN 301 489-1 KN 301 489-17 EN 61000-4-2 - Electro Static Discharge EN 61000-4-3 - Radiated RF EN 61000-4-4 - Electromagnetic Fast Transients EN 61000-4-5 - Surge EN 61000-4-6 - Conducted RF EN 61000-4-8 - Power Frequency Magnetic Field EN 61000-4-9 - Pulse Magnetic Field EN 61000-4-18 - Damped Oscillatory Wave EN-61000-4-29 - DC Voltage Dips
Safety Standards & Certifications	**Information Technology Equipment** UL 60950-1 CAN/CSA-C22.2 No. 60950-1 IEC 60950-1 EN 60950-1

Item	Specification
Industry-Specific Standards	**Rail** AREMA C&S Manual Section 11.5.1 AAR S9401 Rail - Rolling stock cab, wayside outside EN 50155 Rail - Electronic Equipment on Rolling Stock Class TX (EMC, Environmental) EN 61373 Rail - Environmental EN 50121-4 Rail - Signaling and Telecommunications Apparatus EN 50121-3-2 Rail - Apparatus for Rolling Stock EN 61373 - Shock and Vibration
	Flammability EN 45545 DIN 5510-2
	Industrial EN 61000-6-2 - Industrial EN 61000-6-4 - Industrial EN 61000-6-1 - Light Industrial EN 61326 - EMC for equipment used for measurement, control, and lab use EN 61132-2 - Programmable controllers
Wireless Communication Standards	**Radio approvals:** • FCC Part 15.247, 15.407 • RSS-210 (Canada) • EN 300.328, EN 301.893 (Europe) • ARIB-STD 66 (Japan) • ARIB-STD T71 (Japan) • EMI and susceptibility (Class B) • FCC Part 15.107 and 15.109 • ICES-003 (Canada) • VCCI (Japan) • EN 301.489-1 and -17 (Europe) • EN 60601-1-2 - EMC requirements for the Medical Directive 93/42/EEC **IEEE Wi-Fi and security standards:** • IEEE 802.11a/b/g, 802.11n, 802.11h, 802.11d • IEEE 802.11ac Draft 5 • IEEE 802.11i, Wi-Fi Protected Access 2 (WPA2), WPA • IEEE 802.1X • Advanced Encryption Standards (AES), Temporal Key Integrity Protocol (TKIP) **Extensible Authentication Protocol (EAP) types:** • EAP-Transport Layer Security (TLS) • EAP-Tunneled TLS (TTLS) or Microsoft Challenge Handshake Authentication Protocol Version 2 (MSCHAPv2) • Protected EAP (PEAP) v0 or EAP-MSCHAPv2 • EAP-Flexible Authentication via Secure Tunneling (FAST) • PEAP v1 or EAP-Generic Token Card (GTC) • EAP-Subscriber Identity Module (SIM) **Multimedia:** • Wi-Fi Multimedia (WMM) **Other:** • FCC Bulletin OET-65C • RSS-102

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