

# Wzzard™ Mesh Wireless Sensors – for Industrial Applications

BB-WSD2x series

**ADVANTECH**

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## PRODUCT FEATURES

- + Ultra-low power 802.15.4e SmartMesh® IP technology
- + Communicates with SmartSwarm-342 gateway via scalable and reliable wireless mesh networks
- + Connect to most any industry standard sensors
- + Rugged, IP67 rated, fiber reinforced polyester PBT enclosure
- + MQTT and JSON IoT protocol to application platform
- + Sensor interface cable and antenna included
- + UL Listed C1/D2 for hazardous locations (conduit models only)

## Wireless Connectivity Where You Need It

The Wzzard™ intelligent wireless sensor platform creates a complete, quick and easy connectivity stack between your sensors and application – on your network or the Internet. The platform uses Wzzard mesh sensor edge nodes and a wireless 802.15.4e SmartMesh IP network to transmit sensor data to a SmartSwarm Gateway. The gateway can connect to the Internet via wired connections or cellular data networks and communicate with application platforms using the MQTT IoT protocol and JSON data formats.

Wzzard mesh wireless sensor nodes can accommodate virtually any industry-standard external sensors. Connections can be made via M12 connector or conduit fitting. The nodes provide a wide variety of sensor interface options, including general purpose analog input, digital input/output and thermocouple. All nodes contain an internal temperature sensor.

## Secure, Reliable and Highly Scalable Wireless Networking

The 802.15.4e Wzzard platform uses mesh networking and time-synchronized channel hopping to provide up to 99.999% connectivity, even in the most demanding RF environments. New nodes may be added at any time and the SmartMesh IP network will dynamically self-configure as new nodes are added or removed.

## Easy Configuration and Installation

Configuration of the Wzzard sensor platform is easy via the SmartSwarm Gateway. Nodes can be configured with scaling information, eng. units, friendly names, geo-location and other descriptive information.

The platform simplifies physical installation, too. Nodes can be attached to any surface via mounting ear flanges and screws or the embedded magnetic base. Magnetic mount is convenient for RF link location determination or other purposes. (Permanent use of the magnetic mount is not approved for UL installations.) The IP67 rated, fiber reinforced polyester PBT housing makes the units deployable in any industrial or commercial environment.

## Intelligence at the Network Edge

The Wzzard wireless platform places intelligence at the network edge. The Wzzard mesh wireless sensor nodes can be configured to communicate data only when specified threshold or alert levels are exceeded. When reporting, they can associate useful information like geo-location, device name and uptime. This eliminates unnecessary network traffic, eases the processing burden on upstream resources and cuts the cost of cellular data plans when the gateway is using the cellular data network. Thanks to low-power wireless technology and programmable time synchronization, the Wzzard mesh wireless sensor nodes can operate for many years on battery power.

## SPECIFICATIONS

| POWER                           |                                                                                                                                                                                                                                                                                 |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Internal                        | (2) 3.6V 2400 mA AH Lithium Thionyl Chloride AA Batteries                                                                                                                                                                                                                       |
| Battery Life                    | >5 years – based on 1 min. sensor sampling and reporting                                                                                                                                                                                                                        |
| Optional External Input Voltage | 10-30 VDC @ 40mA peak                                                                                                                                                                                                                                                           |
| SENSOR POWER OUT                |                                                                                                                                                                                                                                                                                 |
| Switched Vbat                   | Battery Power – Turned on at time of measurement (20 mA max)                                                                                                                                                                                                                    |
| Switched Vref                   | 3.3V (+/- 0.1%) – Turned on at time of measurement (20 mA max)                                                                                                                                                                                                                  |
| MECHANICAL                      |                                                                                                                                                                                                                                                                                 |
| Connection Options              | Conduit (UL Type 3 outdoor approved): 12.7mm (0.5 in)<br>- includes (1) one sensor interface cable - 8-pin 26-gauge wire harness, 1.8 m (6 ft) (Model# BB-WSCACO-6)<br>M12 connector (Not UL rated for outdoor installations.)                                                  |
| Sensors                         | Analog Input (0 -10 VDC, 0 - 20 mA, 4 - 20 mA)<br>Digital Input (0 - 48 VDC)<br>Digital Input Frequency 1-1K Hz (accuracy +/- 1 Hz)<br>Digital Input Counter<br>Integrated Temperature<br>Thermocouple (J, K, N, R, S, T, B, E)<br>Digital Output, Sinking, up to 100mA @ 30VDC |
| External Antenna (included)     | RP-SMA, Omni-directional, 3.8 dBi, 2.4 GHz (included)<br>Dimensions: 194 mm (7.64 in)                                                                                                                                                                                           |
| Mounting Options                | (4) Mounting Ears, M5 (#10) screws (UL approved option)<br>Magnetic Mounting (via internal enclosure magnet)<br>Pull Force 2.13 kg (4.7 lb)<br>Note: Magnetic mounting (all models) not rated for UL installations.                                                             |
| Enclosure                       | IP67 rated fiber reinforced polyester PBT                                                                                                                                                                                                                                       |
| Weight                          | 0.34 kg (0.75 lb)                                                                                                                                                                                                                                                               |
| TECHNOLOGY                      |                                                                                                                                                                                                                                                                                 |
| Wireless                        | 802.15.4e, SmartMesh IP                                                                                                                                                                                                                                                         |
| Protocols                       | MQTT, JSON                                                                                                                                                                                                                                                                      |
| LED                             | Network Connectivity                                                                                                                                                                                                                                                            |
| ENVIRONMENTAL                   |                                                                                                                                                                                                                                                                                 |
| Installation                    | Indoor/Outdoor<br>Note: M12 models are rated for outdoor use (except in UL installations).                                                                                                                                                                                      |
| Operating Temperature           | -40 to +80 °C (-40 to +176 °F)                                                                                                                                                                                                                                                  |
| Storage Temperature             | -40 to +85 °C (-40 to +185 °F)                                                                                                                                                                                                                                                  |
| Operating Humidity              | 0 to 95% Non-condensing                                                                                                                                                                                                                                                         |
| WIRELESS SECURITY               |                                                                                                                                                                                                                                                                                 |
| Device Authentication           | 128-bit, AES-based Encryption – with multiple keys                                                                                                                                                                                                                              |
| Message Integrity Check (MIC)   | Synchronized Key Changeovers                                                                                                                                                                                                                                                    |
| Customized Key Rotation         |                                                                                                                                                                                                                                                                                 |

All product specifications are subject to change without notice.  
BB-WSD2x\_WzzardIndustrialSensorNodes\_4020ds

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## ORDERING INFORMATION

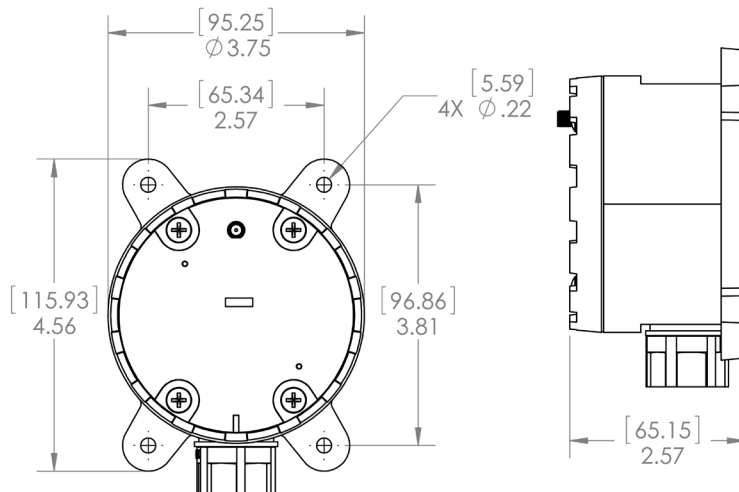
| MODEL NUMBER     | DESCRIPTION                   | CONNECTOR | INCLUDES                                                                                                   | UL LISTED C1/D2                                |
|------------------|-------------------------------|-----------|------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| BB-WSD2C21150    | Industrial Cooler/HVAC Node   | Conduit   | 2 Analog Inputs, 1 Digital Input, 1 Digital Output, 2 Thermocouples, 2 Thermistors, Internal Temperature   | Indoor / Outdoor, w/ mounting ear installation |
| BB-WSD2C06010    | Industrial Digital Input Node | Conduit   | 6 Digital Inputs, Internal Temperature                                                                     | (pending)                                      |
| BB-WSD2C31010    | Industrial Power Monitor Node | Conduit   | 3 Analog Inputs, 1 Digital Input, Internal Temperature                                                     | Indoor / Outdoor, w/ mounting ear installation |
| BB-WSD2M06010    | Industrial Digital Input Node | M12       | 6 Digital Inputs, Internal Temperature                                                                     | No (M12 connector not UL.)                     |
| BB-WSD2M31010    | Industrial Power Monitor Node | M12       | 3 Analog Inputs, 1 Digital Input, Internal Temperature                                                     | No (M12 connector not UL.)                     |
| BB-WSD2M3101P2K  | Industrial Power Monitor Node | M12       | 2 Analog Inputs, Vbat measurement, 1 Digital Input, Internal Temperature, Switched Vbat Power Out (2 sec.) | No (M12 connector not UL.)                     |
| BB-WSD2M3101R100 | Industrial Power Monitor Node | M12       | 2 Analog Inputs, Vref measurement, 1 Digital Input, Internal Temperature, Switched 3.3V Power Out (100 ms) | No (M12 connector not UL.)                     |

### ACCESSORIES - sold separately

| MODEL NUMBER       | DESCRIPTION                                                                                                   | COMPATIBLE NODES       |
|--------------------|---------------------------------------------------------------------------------------------------------------|------------------------|
| BB-ACH2-DBAT-DP002 | Antenna - dipole, 2.4/5 GHz, 2dBi, RPSMA, rubber duck, hinged (Replacement; 1 included with all nodes.)       | All Industrial Nodes   |
| BB-ZXTMT           | Kit - Zlinx™ Xtreme conduit cable gland & hub                                                                 | All Conduit Nodes      |
| BB-WSCACO-6        | Sensor interface cable, 8-pin 26-gauge wire harness, 1.8m (6ft) (Replacement; 1 included with conduit nodes.) | All Conduit Nodes      |
| BB-WSCAM12-6       | Cable - M12 pigtail, 8-pin, 1.8 m (6 ft)                                                                      | All M12 Nodes          |
| BB-JC10F50-V       | Sensor - 50A clamp-on AC current, 0-5VDC Out                                                                  | All Analog Input Nodes |
| BB-JC24S250-V      | Sensor - 250A clamp-on AC current, 0-5VDC Out                                                                 | All Analog Input Nodes |
| BB-JC36S500-V      | Sensor - 500A clamp-on AC current, 0-5VDC Out                                                                 | All Analog Input Nodes |
| BB-WCD-TM2M        | Thermistor cable                                                                                              | BB-WSD2C21150          |
| BB-WTJ-10-36-TT    | Sensor - J-type thermocouple, #10 mounting hole, ungrounded                                                   | BB-WSD2C21150          |
| BB-HS-104T2505402  | Sensor - low power vibration/temperature sensor, 250mV/g                                                      | BB-WSD2M3101P2K        |
| BB-WSDCBL-ACL-2    | M12 signal conditioning cable for model# BB-HS-104T2505402                                                    | BB-WSD2M3101P2K        |
| BB-T9602-3-A-1-G2  | Sensor cable - temperature/humidity, 1.8 m (6 ft)                                                             | BB-WSD2M3101R100       |

## MECHANICAL DIAGRAM

Units = [Millimeters] Inches



# Wzzard™ Mesh Wireless Sensors

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### SENSOR INTERFACE SPECIFICATIONS

| DIGITAL INPUTS        |                                                                                                                                                                                                          |                          |                            |                             |                       |  |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|----------------------------|-----------------------------|-----------------------|--|
| Voltage Range         | 0-48 VDC                                                                                                                                                                                                 |                          |                            |                             |                       |  |
| V <sub>IL</sub>       | 0.4 V, maximum                                                                                                                                                                                           |                          |                            |                             |                       |  |
| V <sub>IH</sub>       | 2.5 V, minimum                                                                                                                                                                                           |                          |                            |                             |                       |  |
| Pull-up Current       | 65 $\mu$ A                                                                                                                                                                                               |                          |                            |                             |                       |  |
| Type                  | Sinking input (NPN)                                                                                                                                                                                      |                          |                            |                             |                       |  |
| Isolation             | None                                                                                                                                                                                                     |                          |                            |                             |                       |  |
| RATE/FREQUENCY INPUTS |                                                                                                                                                                                                          |                          |                            |                             |                       |  |
| Frequency             | Performs a 1 second measurement at each measurement/publish interval<br>Digital input frequency: 1 - 1KHz (accuracy +/- 1 Hz)<br>Uses falling edge or rising edge – based on Invert Enabled Setting      |                          |                            |                             |                       |  |
| COUNTER INPUT         |                                                                                                                                                                                                          |                          |                            |                             |                       |  |
| Counter Inputs        | 1                                                                                                                                                                                                        |                          |                            |                             |                       |  |
| Channels              | Actively counts either falling edge (Invert Enabled) or rising edge (Invert Disabled)<br>Can use a multiplier to convert to a unit type or count<br>Shared with digital inputs<br>Rolls over at 999999.9 |                          |                            |                             |                       |  |
| ANALOG INPUTS         |                                                                                                                                                                                                          |                          |                            |                             |                       |  |
| Analog Inputs         | 2 or 3 (model dependent)                                                                                                                                                                                 |                          |                            |                             |                       |  |
| Input Range           | 0-10 VDC, 0-20 mA (software selectable)                                                                                                                                                                  |                          |                            |                             |                       |  |
| Resolution            | 0.3 mV/1.3 $\mu$ A                                                                                                                                                                                       |                          |                            |                             |                       |  |
| Input Load Resistance | 59 K Ohms                                                                                                                                                                                                |                          |                            |                             |                       |  |
| Accuracy Variance     | +/-25mV +/-0.05 mA                                                                                                                                                                                       |                          |                            |                             |                       |  |
| THERMOCOUPLE INPUT    |                                                                                                                                                                                                          |                          |                            |                             |                       |  |
| Types Supported       | J, K, N, R, S, T, B, E                                                                                                                                                                                   |                          |                            |                             |                       |  |
| Accuracy              | <b>THERMOCOUPLE</b>                                                                                                                                                                                      | <b>Temperature Range</b> | <b>Ambient Temperature</b> | <b>Worst Case RSS Error</b> | <b>Probe Error</b>    |  |
|                       | <b>Type B</b>                                                                                                                                                                                            | +95 to +1798 °C          | B Type @ +25 °C            | 9.4 °C                      | 0.5% of T, 0.25% of T |  |
|                       |                                                                                                                                                                                                          |                          | B Type @ -40 to +85 °C     | 47.1 °C                     | 0.5% of T, 0.25% of T |  |
|                       | <b>Type E</b>                                                                                                                                                                                            | -200 to +1000 °C         | C Type @ +25 °C            | 1.4 °C                      | 1.7 °C, 1 °C          |  |
|                       |                                                                                                                                                                                                          |                          | C Type @ -40 to +85 °C     | 5.2 °C                      | 1.7 °C, 1 °C          |  |
|                       | <b>Type J</b>                                                                                                                                                                                            | -210 to +1200 °C         | J Type @ +25 °C            | 1.5 °C                      | 2.2 °C, 1.1 °C        |  |
|                       |                                                                                                                                                                                                          |                          | J Type @ -40 to +85 °C     | 5.9 °C                      | 2.2 °C, 1.1 °C        |  |
|                       | <b>Type K</b>                                                                                                                                                                                            | -200 to +1372 °C         | K Type @ +25 °C            | 1.8 °C                      | 2.2 °C, 1.1 °C        |  |
|                       |                                                                                                                                                                                                          |                          | K Type @ -40 to +85 °C     | 7.3 °C                      | 2.2 °C, 1.1 °C        |  |
|                       | <b>Type N</b>                                                                                                                                                                                            | -200 to +1300 °C         | N Type @ +25 °C            | 2.3 °C                      | 2.2 °C, 1.1 °C        |  |
|                       |                                                                                                                                                                                                          |                          | N Type @ -40 to +85 °C     | 10.3 °C                     | 2.2 °C, 1.1 °C        |  |
|                       | <b>Type R</b>                                                                                                                                                                                            | -50 to +1768 °C          | R Type @ +25 °C            | 5.4 °C                      | 1.5 °C, 0.6 °C        |  |
|                       |                                                                                                                                                                                                          |                          | R Type @ -40 to +85 °C     | 26.0 °C                     | 1.5 °C, 0.6 °C        |  |
|                       | <b>Type S</b>                                                                                                                                                                                            | -50 to +1768 °C          | S Type @ +25 °C            | 6.7 °C                      | 1.5 °C, 0.6 °C        |  |
|                       |                                                                                                                                                                                                          |                          | S Type @ -40 to +85 °C     | 33.0 °C                     | 1.5 °C, 0.6 °C        |  |
|                       | <b>Type T</b>                                                                                                                                                                                            | -200 to +400 °C          | T Type @ +25 °C            | 1.7 °C                      | 1 °C, 0.5 °C          |  |
|                       |                                                                                                                                                                                                          |                          | T Type @ -40 to +85 °C     | 7.2 °C                      | 1 °C, 0.5 °C          |  |
| Resolution            | 0.0078 °C                                                                                                                                                                                                |                          |                            |                             |                       |  |
| Accuracy Variance     | 0.20% of full-scale reading (0.25%, maximum)                                                                                                                                                             |                          |                            |                             |                       |  |
| THERMISTOR INPUT      |                                                                                                                                                                                                          |                          |                            |                             |                       |  |
| Type Supported        | 10K NTC                                                                                                                                                                                                  |                          |                            |                             |                       |  |
| Temperature Range     | -40 to +85 °C                                                                                                                                                                                            |                          |                            |                             |                       |  |
| Resolution            | 0.01 °C                                                                                                                                                                                                  |                          |                            |                             |                       |  |
| Accuracy              | <b>THERMISTOR</b>                                                                                                                                                                                        | <b>Typ. Error</b>        | <b>Worst Case Error</b>    | <b>Worst Case RSS Error</b> | <b>Probe Error</b>    |  |
|                       |                                                                                                                                                                                                          | 853 ppm (0.1 °C)         | 4103 ppm                   | 2101 ppm                    | n/a                   |  |
| Accuracy Variance     | Maximum +/- 0.5 °C over -40 to +85 °C temperature range                                                                                                                                                  |                          |                            |                             |                       |  |
| DIGITAL OUTPUTS       |                                                                                                                                                                                                          |                          |                            |                             |                       |  |
| Voltage Range         | 0-30 VDC                                                                                                                                                                                                 |                          |                            |                             |                       |  |
| Output Type           | Open drain                                                                                                                                                                                               |                          |                            |                             |                       |  |
| Output Current        | Not to be less than 100 mA                                                                                                                                                                               |                          |                            |                             |                       |  |
| Protection            | Current limit protection                                                                                                                                                                                 |                          |                            |                             |                       |  |
| Isolation             | None                                                                                                                                                                                                     |                          |                            |                             |                       |  |

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## INTEGRATED SENSORS

| TEMPERATURE | CONDITIONS                       | MINIMUM | TYPICAL   | TYPICAL | UNITS   |
|-------------|----------------------------------|---------|-----------|---------|---------|
| Offset      | Temperature Offset Error @ 25 °C |         | +/- 0.25  |         | °C      |
| Slope Error | -                                |         | +/- 0.033 |         | °C / °C |

## SMARTMESH IP 802.15.4E RADIO SPECIFICATIONS

| PARAMETER               | CONDITIONS                                                             | MINIMUM | TYPICAL         | MAXIMUM | UNITS |
|-------------------------|------------------------------------------------------------------------|---------|-----------------|---------|-------|
| Frequency Band          |                                                                        | 2.400   |                 | 2.4835  | GHz   |
| Number of Channels      |                                                                        |         | 15              |         |       |
| Channel Separation      |                                                                        |         | 5               |         | MHz   |
| Channel Clear Frequency | Where k = 11 to 25, as defined by IEEE 802.4.15                        |         | 2405 + 5*(k-11) |         | MHz   |
| Modulation              | IEEE 802.15.4 Direct Sequence Spread Spectrum (DSSS)                   |         |                 |         |       |
| Raw Data Rate           |                                                                        |         | 250             |         | kbps  |
| Range                   | 25 °C, 50% RH, +2dBi Omni-Directional Antenna, Antenna 2m above ground |         |                 |         |       |
|                         | Indoor                                                                 |         | 100             |         | m     |
|                         | Outdoor                                                                |         | 300             |         | m     |
| Receiver Sensitivity    | Packet Data Error Rate (PER) = 1%                                      |         |                 | -93     | dBm   |
|                         | P.E.R. = 50%                                                           |         |                 | -95     | dBm   |
| Output Power            | Delivered to a 50 Ω load                                               |         |                 | 8       | dBm   |

## THIONYL CHLORIDE LITHIUM BATTERIES (2 supplied with product)

| CHARACTERISTICS   | CONDITIONS    |
|-------------------|---------------|
| Temperature Range | -40 to +85 °C |
| Nominal Capacity  | 2.4 Ah        |
| Nominal Voltage   | 3.6 V         |
| Diameter          | 14.5mm        |
| Height            | 50.5mm        |

\*Potential Hazard: Do not recharge, crush, disassemble or heat above 100 °C (212 °F).

## APPROVALS, DIRECTIVES, STANDARDS – BB-WSD2x Industrial Sensor Nodes

|                                                                       |                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FCC, IC                                                               |                                                                                                                                                                                                                                   |
| FCC Part 15 Class A, FCC Part 15.247                                  |                                                                                                                                                                                                                                   |
| ICES-003                                                              | ITE Emissions for Canada                                                                                                                                                                                                          |
| UL (All models w/ mounting ear installation; M12 model indoors only.) |                                                                                                                                                                                                                                   |
| UL/CSA Class 1/Division 2, Groups A, B, C, D (Conduit Models Only)    |                                                                                                                                                                                                                                   |
| CE                                                                    |                                                                                                                                                                                                                                   |
| CE - Directives                                                       | 2014/35/EU Low Voltage Directive<br>2014/53/EU Radio Equipment Directive<br>2011/65/EU amended by (EU) 2015/863 Reduction of Hazardous Substances Directive (RoHS)<br>2012/19/EU Waste Electrical and Electronic Equipment (WEEE) |
| CE - Standards                                                        | Radio Equipment Directive (RED)                                                                                                                                                                                                   |
| CE - EMC                                                              |                                                                                                                                                                                                                                   |
| ETSI EN 300 328 v2.1.1                                                | EMC & Radio Spectrum Matters (ERM)<br>Wideband Transmission Systems, 2.4 GHz ISM Band                                                                                                                                             |
| ETSI EN 301 489-1 v2.1.1<br>ETSI EN 301 489-17 v3.2.0                 | Applied in accordance with the specific requirements of: EMC and Radio Spectrum Matters: Broadband Data Systems                                                                                                                   |
| EN 55032+AC, Class A                                                  | Information Technology Equipment (ITE) - RF Emissions                                                                                                                                                                             |
| EN 55024                                                              | Information Technology Equipment (ITE) - Immunity Characteristics - Limits and Methods of Measurement                                                                                                                             |
| CE - SAFETY                                                           |                                                                                                                                                                                                                                   |
| EN/IEC 61010-1 (3rd ed.)                                              | Safety requirements for electrical equipment for measurement, control, and laboratory use (general requirements).                                                                                                                 |
| EN/IEC 61010-2-201 (1st ed.)                                          | Particular requirements for control equipment                                                                                                                                                                                     |
| CE - RF EXPOSURE                                                      |                                                                                                                                                                                                                                   |
| EN 62479                                                              | Assessment of compliance of low power electronics and electrical equipment with basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)                                                        |
| ENVIRONMENTAL                                                         |                                                                                                                                                                                                                                   |
| IEC 60068-2-6                                                         | Sine Vibration: 4G, 10-500 Hz, 0.06 in. displacement                                                                                                                                                                              |
| IEC 60068-2-27                                                        | Mechanical Shock: 50G, 11ms, 18 pulses                                                                                                                                                                                            |

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