Cisco Industrial Asset Vision

Contents

Make your organization better, safer, and more efficient by monitoring assets and facilities using Cisco Industrial Asset Vision, a simple, all-in-one, cloud-managed sensor IoT solution.

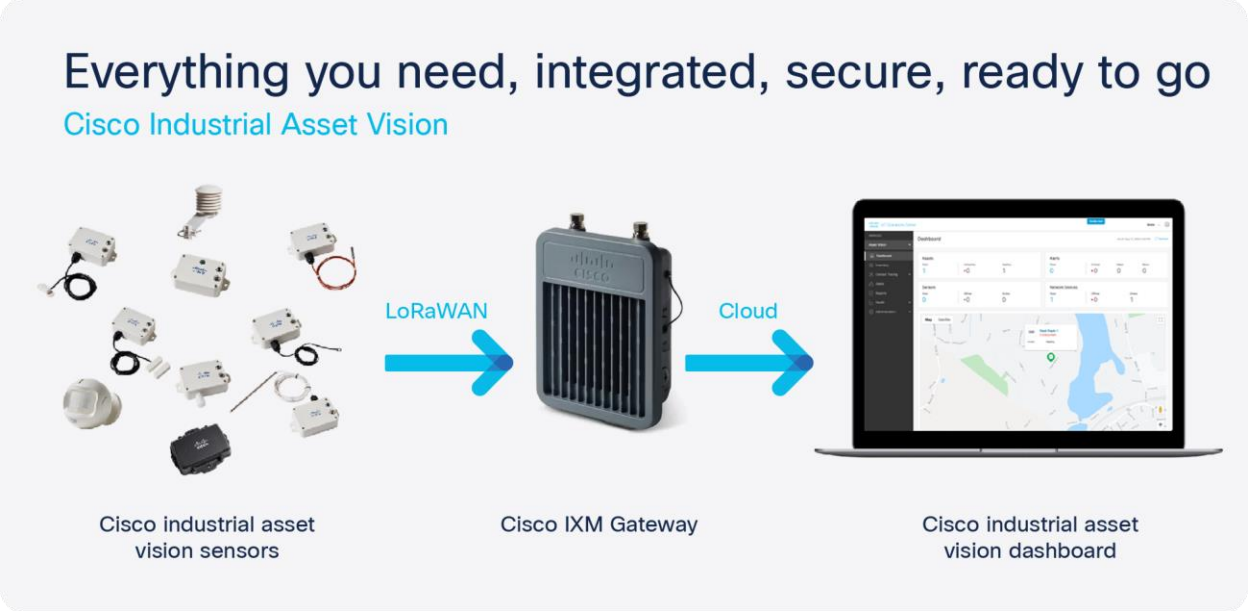

Figure 1.
Cisco Industrial Asset Vision components

Product overview

Today, data governs all aspects of business decision making, helping to improve efficiencies across the organization. But the impact of the pandemic is driving organizations to look to the Internet of Things (IoT) not just for efficiencies but also for resiliency. To adapt and thrive in the new normal, organizations need data and visibility into their operations even when no one is on the ground.

Monitoring assets and facilities using sensors helps businesses **become better**, **safer**, and **more resilient**. Data such as temperature, humidity, and ingress egress all impact the status of a facility or an asset, whether it is a motor, a refrigeration unit, or even the networking gear itself. Remote monitoring helps to:

- Improve employee safety and efficiency by preventing unnecessary site visits and reducing employee movement throughout facilities
- Reduce expenses by avoiding premature equipment failure
- Improve customer satisfaction by reducing unplanned network outages and operational downtime

Cisco® Industrial Asset Vision helps to improve safety, business resiliency, and operational efficiencies by monitoring assets and facilities in near real-time using sensors. It is a simple all-in-one, cloud-managed solution. Industrial Asset Vision has everything you need, from sensors to the gateways to the cloud-managed operations dashboard – integrated, secure, and ready to go.

The solution deploys in minutes using a simple QR or bar code, and scaling is designed to grow with your business. Users gain holistic and actionable insights in one easy-to-use cloud-native dashboard. The dashboard has been optimized to require minimal network expertise, thus reducing the burden on IT or the need for expensive service contracts. The dashboard provides a single view of the asset or facility health across all its associated sensors. It includes the ability to monitor health across related assets and facilities, even down to the gateway itself.

Features and benefits

Table 1. Features and benefits

Feature	Benefit
All-in-one simple solution	Other solutions lack integration between network, sensors, and management dashboards, causing long deployment cycles, complexity at scale, and missed insights. In contrast, Cisco Industrial Asset Vision has everything you need, including the sensors, gateways, and management capability, secure, integrated, and ready to deploy.
Cloud-based data operations and management dashboard	Gain holistic and actionable insights in one easy-to-use, cloud-based dashboard. The centralized management dashboard takes the guesswork out of which sensors and gateways monitor and connect to hundreds of locations and thousands of pieces of equipment. It offers a single view of the asset or facility health across all its associated sensors. And it includes the ability to monitor and troubleshoot the gateway itself. Drill-down menus for assets, sensors, alerts, and networks help both OT and IT staff to quickly see the status and resolve issues through a comprehensive troubleshooting capability. They can set alerts or generate reports to take notification action and to better service their facilities and equipment. Using the defacto standard MQTT connectivity protocol, Industrial Asset Vision can share data with enterprise systems such as enterprise resource planning (ERP), service management, inventory control, and analytics.
Cisco sensors	Cisco Industrial Asset Vision includes a family of industrial sensors that provide telemetry and tracking information for assets and facilities. They are preintegrated with the Cisco Wireless Gateway for LoRaWAN (IXM) and management dashboard. Most have IP65 and IP67 ratings, allowing them to be deployed in outdoor and industrial indoor environments. Deploy one or many to monitor a wide variety of conditions, including, humidity, leak detection, room temperature, machine temperature, product temperature, ingress and egress, vibration, lighting, occupancy, and asset location. All sensors come with a batteries and are easy to install.
Cyber security	Backed by Cisco security, investment, and industry expertise, our solutions run on Cisco's trusted networks so that your data is protected, available, and safe for you to use.
Easy sensor and gateway provisioning	Provisioning and installing Cisco Industrial Asset Vision's sensors and gateways requires minimal technical expertise. Using a mobile app and a QR code or bar code, the devices are provisioned in seconds and immediately generate either environmental, asset, or geolocation data. This dramatically improves the time to value and the ROI for these IoT projects. Scaling to thousands of sensors becomes a breeze.

Feature	Benefit
Cisco Wireless Gateway for LoRaWAN (IXM gateway)	Industrial Asset Vision includes support for the Cisco IXM gateway. This gateway supports LoRaWAN for wireless connectivity and, like the sensors, is designed for outdoor and industrial indoor spaces. It is ideal for use cases that require long-range wireless connectivity and extended sensor battery life. Its cost-effective ruggedized form factor makes it ideal to deploy in a variety of places. It also provides a high sensor-to-gateway ratio, making deployments very cost-effective.
Subscription/SaaS model	IoT solutions need implementation models that can grow and scale with enterprise business demands. After a one-time fee for the sensors and gateway hardware, customers pay a low monthly subscription fee based on the number of connected sensors.

Prominent features

Cisco Industrial Asset Vision is **simple, scalable, and secure**

Sensors provide insights into the status of an asset or a facility, giving you the control you need to improve your operations and your business resilience without being onsite. But today, only a small portion of assets and facilities are connected with sensors. And these sensors are unreliable, unsecure, and difficult to use and scale. They lack the integration between the network, the sensors, and management, causing long deployment cycles, complexity, and missed insights. Cisco Industrial Asset Vision overcomes these challenges. It offers:

- **Accelerated time to value:** Sensors and networks from different vendors can lead to long testing cycles and unreliable pairing between sensors and gateways. Cisco Industrial Asset Vision uses Cisco sensors and Cisco LoRaWAN gateways that are fully validated, resulting in simple, quick, and reliable installation and provisioning.
- **Enterprise scale:** Installing and triaging multivendor solutions across sensors, the network, and dashboard applications is challenging — especially at scale. Most current sensor solutions use unmanaged networks with little to no ability to make network updates remotely and securely. These limitations can heavily burden IT or require expensive service contracts to operate at scale. However, Cisco Industrial Asset Vision brings the ability to make changes and updates remotely. For organizations with geographically dispersed assets and facilities, having this capability enables scaling to any size of sensor solution deployment anywhere.
- **Ability to make better and timelier decisions:** Without timely and relevant insights, there is a greater risk that problems will go undetected and opportunities to improve efficiencies will be missed. The network is typically non-integrated with the rest of the solution. If there is a problem with the network, it often manifests as a problem with the asset or the sensor environment itself. With Cisco Industrial Asset Vision's dashboard, customers need only one solution to correlate data and identify business-impacting trends.
- **Cyber Security:** Every sensor solution runs the risk of incurring various forms of data loss, intrusion, and malware. Since Cisco Industrial Asset Vision is built on the features and benefits of Cisco security, OT customers can be assured that their solution is running on Cisco's trusted and managed network. The integrated solution helps reduce complexity and minimize vulnerabilities.

Platform Support

Table 2. Platform support

Product family	Platforms supported	Cisco IOS® Software images (feature sets) supported
LoRaWAN gateway	Cisco IXM 900 MHz Cisco IXM 800 MHz	v2.1.0.2 (Plug and Play, Common Packet Forwarder)
LoRaWAN sensors	AV200, AV201, AV202, AV203 AV204, AV205, AV206, AV207 AV250, AV251, AV300	Supports LoRaWAN 1.0.2 and LoRaWAN 1.0.3
Cloud application	Cisco IOT Operations Center	Industrial Asset Vision, Edge Device Manager
Mobile Application	Apple IOS, Android	Apple App Store, Google Play Store

Licensing

Cisco Industrial Asset Vision subscription is purchased and licensed using the IOTAV-BUNDLE-US or IOTAV-BUNDLE-EU multiline bundle (MLB).

Table 3. Multiline bundles

Part number	Description	Geography or region
IOTAV-BUNDLE-US	Industrial Asset Vision Bundle (1yr, 3yr, or 5yr)	North America (US915)
IOTAV-BUNDLE-EU	Industrial Asset Vision Bundle (1yr, 3yr, or 5yr)	Europe (EU868)

Product specifications

Industrial Asset Vision includes a portfolio of sensor in two categories: location tracking and condition monitoring. There product specifications are detailed below.

Product specifications for the Cisco LoRaWAN IXM gateway may be found at this link.

1. AV200: Outdoor temperature and humidity sensor

Overview

AV200 sensor can detect the temperature and humidity of the environment and send data via wireless communication, compatible with LoRaWAN protocol standards. The sensor is IP43 rated but contained within an external housing, the mask. Inside the mask, the sensor body includes a temperature and humidity sensor, an indicator, a power button, and a DC socket.

Figure 2.
AV200 outdoor temperature and humidity sensor

Product specifications

Table 4. AV200 specifications

Specification	Description
Physical specifications	
Dimensions (L x W x H)	• 112 x 65 x 32 mm or 5 x 3 x 2 inches
Weight	• 141 g (0.31 lb)
IP rating	• IP43
Batteries	• 2 section 1.5V AA alkaline batteries
Working temperature	• -4° to 131°F (-20° to 55°C)
Storage temperature	• -40° to 185°F (-40° to 85°C)
Frequency range	• 470 to 510 MHz
Transmit (Tx) power	• US915 20 dBm • EU868 16 dBm
Receive (Rx) sensitivity	• -136 dBm (LoRa spreading factor = 12, bit rate = 293 bps) • -121 dBm (FSK, frequency deviation = 5 kHz, bit rate = 1.2 kbps)
Communication range	• Up to 10 km; actual transmission distance depends on the environment

Specification	Description
Data transfer rate	• 0.3 kbps to 50 kbps
Spread technique	• LoRa/FSK

Table 5. Thermistor SHT-30 specifications

Specification	Description
Power supply	• +3.3 VDC
Temperature detecting range	• -4° to 131°F (-20° to 55°C)
Temperature accuracy	• +/- 33°F (+/-0.8°C)
Humidity detecting range	• 10% to 90% relative humidity
Humidity accuracy	• +/-4% RH at 77°F (25°C)

Table 6. Product certification and compliance

Specification	Applicable regions
Safety	
EN60950-1	• EU
CB to IEC 60950-1	• EU and North America
CB to IEC 62368-1	• EU and North America
FCC Part 2	• USA
RSS 102	• Canada
RoHS	• EU
EMC immunity	
EN 301489-1	• EU
EN 301489-3	• EU

Specification	Applicable regions
Radio	
EU 863-870	• EU
EN300220-1	• EU
EN300220-2	• EU
CE RED	• EU
US 902-928	• USA
FCC 47 CFR Part 15 B and C	• USA
RSS210	• Canada
IC ICES-003	• Canada

2. AV201: Indoor temperature and humidity sensor

Overview

The AV201 is an IP65-rated wireless communication device that detects ambient air temperature and humidity and transmits the data to the gateway through the LoRaWAN wireless network. Many mounting options are available, including using its magnetic base to attach to a ferrous objects.

Figure 3.
AV201 indoor temperature and humidity sensor

Product specifications

Table 7. AV201 specifications

Specification	Description
Physical specifications	
Dimensions (L x W x H)	• 112 x 65 x 32 mm or 5 x 3 x 2 inches
Weight	• 141 g (0.31 lb)
IP rating	• IP65
Batteries	• 2 AA size 3.6V ER14505 batteries, not off the shelf 1.5V batteries • Contact Cisco customer support for replacement or recycling
Wakeup mode	• 6.3 mA at 3.3V
Sleeping mode	• 23 uA
Low voltage threshold	• 3.2V
Storage temperature	• -40° to 185°F (-40°C to 85°C)
Environment humidity range	• < 90% relative humidity (no condensation)
Environment temperature range	• -4° to 131°F (-20°C to 55°C)
Battery life	• Up to 5 years at 77°F (25°C), Tx power = 20 dBm, LoRa spreading factor (SF) = 10
Frequency range	• 863 to 928 MHz
Power output	• US915 20 dBm • EU868 16 dBm
Receive (Rx) sensitivity	• -136 dBm (LoRa spreading factor = 12, bit rate = 293 bps) • -121 dBm (FSK, frequency deviation = 5 kHz, bit rate = 1.2 kbps)
Communication range	• Up to 10 km; actual transmission distance depends on the environment
Data transfer rate	• 0.3 kbps to 50 kbps
Spread technique	• LoRa/FSK

Table 8. Thermistor SHT-30 specifications

Specification	Description
Power supply	• +3.3V DC
Temperature detecting range	• -4° to 131°F (-20°C to 55°C)
Temperature accuracy	• +/-33°F at 77°F max, +/-33°F at -4° to 131°F
Humidity detecting range	• 10% to 90% relative humidity
Humidity accuracy	• +/-4% RH at 77°F (25°C)

Table 9. Product certification and compliance

Specification	Applicable regions
Safety	
EN60950-1	• EU
CB to IEC 62368-1	• EU and North America
CB to IEC 60950-1	• EU and North America
FCC Part 2	• USA
RSS 102	• Canada
RoHS	• Meets EU RoHS Standards
EMC Immunit	
EN 301489-1	• EU
EN 301489-3	• EU
Radio	
EU 863-870	• EU
EN300220-1	• EU
EN300220-2	• EU
CE RED	• EU
US 902-928	• USA
FCC 47CFR Part 15 B and C	• USA
RSS210	• Canada
IC ICES-003	• Canada

3. AV202: Product temperature sensor

Overview

The AV202 is an IP65-rated thermistor-based temperature sensor, used to measure temperature using a probe. The sensor unit is connected to a stainless steel thermal resistor. The collected measurement data is sent to the gateway through the LoRaWAN protocol.

Figure 4.
AV202 product temperature sensor

Product specifications

Table 10. AV202 specifications

Specification	Description
Physical specifications	
Dimensions (L x W x H)	• 112 x 88.19 x 32 mm or 4.4 x 3.4 x 1.25 inches
Weight	• 141 g (0.31 lb)
IP rating	• IP65
Batteries	• 2 AA size 3.6V ER14505 batteries, not off the shelf 1.5V batteries • Contact Cisco customer support for replacement or recycling
Wakeup mode	• 9.94 mA
Sleeping mode	• 23 uA
Low voltage threshold	• 3.2V
Battery measurement accuracy	• ±0.1V
Environment humidity range	• < 90% relative humidity (no condensation)
Environment temperature range	• -4° to 131°F (-20°C to 55°C)
Frequency range	• 863 to 928 MHz
Power output	• US915 20 dBm • EU868 16 dBm

Specification	Description
Receive (Rx) sensitivity	• -136 dBm (LoRa spreading factor = 12, bit rate = 293 bps) • -121 dBm (FSK, frequency deviation = 5 kHz, bit rate = 1.2 kbps)
Communication range	• Up to 10 km; actual transmission distance depends on the environment
Data transfer rate	• 0.3 kbps to 50 kbps
Spread technique	• LoRa/FSK

Table 11. PT1000 thermal resistor specifications

Specification	Description
PT1000 temperature range	• -40° to 392°F (-40° to 200°C)
Lead length	• 2 m (default)
PT1000 accuracy	• ± (0.15+0.002*t) degrees
Probe specifications	• 1: Probe diameter 5 mm, long pointed probe 15 cm (316 stainless steel) • 2: Probe diameter 5 mm, round head probe 15 cm (316 stainless steel) • 3: Probe diameter 5 mm length 100+60 mm L-type probe (316 stainless steel). Choose one of the above probe specifications.
Wiring	• 4-wire system
Protection level	• IP67

Table 12. Module AV202 specifications

Specification	Description
Wakeup current	• 0.8 mA to 8 mA at 3.3V
RF receiving current (max)	• 11 mA/3.3V
RF transmitting current (max)	• 120 mA/3.3V

Table 13. Product certification and compliance

Specification	Applicable regions
Safety	
EN60950-1	• EU
CB to IEC 60950-1	• EU and North America
CB to IEC 62368-1	• EU and North America
FCC Part 2	• USA

Specification	Applicable regions
RSS 102	• Canada
RoHS	• EU
IEC 60950-22	• EU and North America
IEC 60529	• Ingress Protection
EMC immunity	
EN 301489-1	• EU
EN 301489-3	• EU
Radio	
EU 863-870	• EU
EN300220-1	• EU
EN300220-2	• EU
CE RED	• EU
US 902-928	• USA
FCC 47CFR Part 15 B and C	• USA
RSS210	• Canada
IC ICES-003	• Canada

4. AV203: Refrigerator temperature and humidity sensor

Overview

The AV203 is an IP65-rated sensor used mainly to measure the temperature and humidity in low-temperature environments such as a freezers and refrigerators. Many mounting options are available, including using its magnetic base to attach to a ferromagnetic material object.

Figure 5.
AV203 refrigerator temperature and humidity sensor

Product specifications

Table 14. AV203 specifications

Specification	Description
Physical specifications	
Dimensions (L x W x H)	• 112 x 65 x 28 mm or 4.4 x 2.5 x 1.1 inches
Weight	• 141 g (0.31 lb)
IP rating	• IP65
Batteries	• 2 AA size 3.6V ER14505 batteries, not off the shelf 1.5V batteries • Contact Cisco customer support for replacement or recycling
Wakeup mode	• 7.11 mA (typical value) • Wakeup current range 0.8 mA to 20 mA (when not transmitting or receiving LoRa data)
Sleeping mode	• 20 uA
Low voltage threshold	• 3.2V
Battery measurement accuracy	• ±0.1V
Environment humidity range	• < 90% relative humidity (no condensation)
Environment temperature range	• -40° to 131°F (-40°C to 55°C)
Storage temperature	• -40° to 185°F (-40°C to 85°C)
Frequency range	• 863 to 928 MHz
Transmit (Tx) power	• US915 20 dBm • EU868 16 dBm
Receive (Rx) sensitivity	• -136 dBm (LoRa spreading factor = 12, bit rate = 293 bps) • -121 dBm (FSK, frequency deviation = 5 kHz, bit rate = 1.2 kbps)
Communication range	• Up to 10 km; actual transmission distance depends on the environment
Data transfer rate	• 0.3 kbps to 50 kbps
Spread technique	• LoRa/FSK
Battery life	• 5 years (conditions: ambient temperature 77°F [25°C], 15-min report once, Tx power = 20 dBm, LoRa spreading factor [SF] = 10)

Table 15. Thermistor SHT-35 specifications

Specification	Description
Power supply	• +3.3V DC
Temperature detecting range	• -40° to 131°F (-40°C to 55°C)
Temperature accuracy	• +/-32.9°F at 77°F (+/-0.5°C at 25°C)
Humidity detecting range	• 0% to 100% relative humidity
Humidity accuracy	• +/-3% RH at 77°F (25°C)

Table 16. Module AV203 specifications

Specification	Description
Wakeup current	• 0.8 mA to 8 mA at 3.3V
RF receiving current (max)	• 11 mA/3.3V
RF transmitting current (max)	• 120 mA/3.3V

Table 17. Product certification and compliance

Specification	Applicable regions
Safety	
EN60950-1	• EU
CB to IEC 60950-1	• EU and North America
CB to IEC 62368-1	• EU and North America
FCC Part 2	• USA
RSS 102	• Canada
RoHS	• EU
IEC 60950-22	• EU and North America
IEC 60529	• Ingress Protection
EMC immunity	
EN 301489-1	• EU
EN 301489-3	• EU

Specification	Applicable regions
Radio	
EU 863-870	• EU
EN300220-1	• EU
EN300220-2	• EU
CE RED	• EU
US 902-928	• USA
FCC 47CFR Part 15 B and C	• USA
RSS210	• Canada
IC ICES-003	• Canada

5. AV204: Door and window sensor

Overview

The AV204 is an IP65-rated wireless communication device that detects door and window switch states. It can perform wireless alarm and other functions through the built-in LoRaWAN wireless module. It is equipped with a hall measurement sensor.

Figure 6.
AV204 door and window sensor

Product specifications

Table 18. AV204 specifications

Specification	Description
Physical specifications	
Dimensions (L x W x H)	• 112 x 65 x 32 mm or 4.4 x 2.55 x 1.25 inches
Weight	• 150 g (0.33 lb)
IP rating	• IP65

Specification	Description
Batteries	• 2 AA size 3.6V ER14505 batteries, not off the shelf 1.5V batteries • Contact Cisco customer support for replacement or recycling
Wakeup mode	• 6.3 mA at 3.3V
Sleeping mode	• 23 uA
Low voltage threshold	• 3.2V
Storage temperature	• -40° to 185°F (-40° to 85°C)
Environment humidity range	• < 90% relative humidity (no condensation)
Environment temperature range	• -4° to 131°F (-20° to 55°C)
Frequency range	• 863 to 928 MHz
Transmit (Tx) power	• US915 20 dBm • EU868 16 dBm
Receive (Rx) sensitivity	• -136 dBm (LoRa spreading factor = 12, bit rate = 293 bps) • -121 dBm (FSK, frequency deviation = 5 kHz, bit rate = 1.2 kbps)
Communication range	• Up to 10 km; actual transmission distance depends on the environment
Data transfer rate	• 0.3 kbps to 50 kbps
Spread technique	• LoRa/FSK
Battery life	• Up to 10 years at Tx power = 20 dBm, LoRa spreading factor (SF) = 10

Table 19. AV204 sensor specifications

Specification	Description
External sensor housing size (L x W x H)	• 42 x 13 x 12 mm or 1.65 x 0.51 x 0.5 inches
Sensor operating temperature	• 104° to 185°F (40° to 85°C)
Sensor supply voltage range	• 1.65 to 5.5V DC
Sensor sensing distance	• Less than 3 cm

Table 20. Product certification and compliance

Specification	Applicable regions
Safety	
EN60950-1	• EU
CB to IEC 60950-1	• EU and North America
CB to IEC 62368-1	• EU and North America
FCC Part 2	• USA
RSS 102	• Canada
RoHS	• EU
EMC immunity	
EN 301489-1	• EU
EN 301489-3	• EU
Radio	
EU 863-870	• EU
EN300220-1	• EU
EN300220-2	• EU
CE RED	• EU
US 902-928	• USA
FCC 47CFR Part 15 B and C	• USA
RSS210	• Canada
IC ICES-003	• Canada

6. AV205: Water leak sensor

Overview

The AV205 is an IP67-rated LoRaWAN device, compatible with the LoRaWAN protocol. When the sensor detects a water leak, it sends an alarm message to the gateway. When it no longer senses a water leak, it sends a normal status message.

Figure 7.
AV205 water leak sensor

Product specifications

Table 21. AV205 specifications

Specification	Description
Physical specifications	
Dimensions (L x W x H)	• 112 x 88.2 x 32 mm or 4.4 x 3.4 x 1.3 inches
Weight	• 141 g (0.31 lb)
IP rating	• IP67
Batteries	• 2 AA size 3.6V ER14505 batteries, not off the shelf 1.5V batteries • Contact Cisco customer support for replacement or recycling
Operating voltage	• DC 3.1V to 3.65V
Wakeup mode	• 7.12 mA (typical value) • Wakeup current range 0.8mA to 20 mA (when not transmitting or receiving LoRa data)
Sleeping mode	• 20 uA
Low voltage threshold	• 3.2V
Battery measurement accuracy	• ±0.1V
Environment humidity range	• < 90% relative humidity (no condensation)
Environment temperature range	• -4° to 131°F (-20° to 55°C)
Storage temperature	• -40° to 185°F (-40° to 85°C)

Specification	Description
Frequency range	• 863 to 928 MHz
Transmit (Tx) power	• US915 20 dBm • EU868 16 dBm
Receive (Rx) sensitivity	• -136 dBm (LoRa spreading factor = 12, bit rate = 293 bps) • -121 dBm (FSK, frequency deviation = 5 kHz, bit rate = 1.2 kbps)
Communication range	• Up to 10 km; actual transmission distance depends on the environment
Data transfer rate	• 0.3 kbps to 50 kbps
Spread technique	• LoRa/FSK
Battery life	• 5 years (conditions: ambient temperature 25° C, 15-min report once, Tx power = 20 dBm, LoRa Spreading Factor [SF] = 10)

Table 22. AV205 specifications

Specification	Description
Wakeup current	• 0.8 mA to 8 mA at 3.3V
RF receiving current (max)	• 11 mA/ 3.3V
RF transmitting current (max)	• 120 mA/ 3.3V

Table 23. Water leak sensor wiring feature

Specification	Description
Water line max. working temperature	• 176° F (80° C)
Water line diameter	• 2 mm or 0.07 inch
Water line length	• 1000 mm (±5 mm) or 39.4 inches (±0.2 inch)
Water line flame resistance rating	• VW-1
Water line length limit	• 300 m (theoretical value)
Water sensor size (L x W x H)	• 8.5 mm x 11.9 x 13.7 mm or 0.33 x 0.46 x 0.53 inches

Table 24. Product certification and compliance

Specification	Applicable regions
Safety	
EN60950-1	• EU
CB to IEC 62368-1	• EU and North America
CB to IEC 60950-1	• EU and North America
FCC Part 2	• USA
RSS 102	• Canada
RoHS	• EU
IEC 60950-22	• EU and North America
IEC 60529	• Ingress Protection
EMC Immunity	
EN 301489-1	• EU
EN 301489-3	• EU
Radio	
EU 863-870	• EU
EN300220-1	• EU
EN300220-2	• EU
CE RED	• EU
US 902-928	• USA
FCC 47CFR Part 15 B and C	• USA
RSS210	• Canada
IC ICES-003	• Canada

7. AV206: Light level sensor

Overview

The AV206 is an IP67-rated device that has a built-in light sensor that can be used to detect ambient light intensity. It detects the ambient light intensity value (LUX) and transmits it to the gateway.

Figure 8.
AV206 light level sensor

Product specifications

Table 25. AV206 specifications

Specification	Description
Physical specifications	
Dimensions (L x W x H)	• 112 x 65 x 32 mm or 4.4 x 2.5 x 1.2 inches
Weight	• 141 g (0.31 lb)
IP rating	• IP67
Batteries	• 2 AA size 3.6V ER14505 batteries, not off the shelf 1.5V batteries • Contact Cisco customer support for replacement or recycling
Operating voltage	• DC 3.1V to 3.65V
Wakeup mode	• 7.5 mA (typical value) • Wakeup current range 0.8 mA to 20 mA (when not transmitting or receiving LoRa data)
Sleeping mode	• 18 uA
Low voltage threshold	• 3.2V
Battery measurement accuracy	• ±0.1V
Environment humidity range	• < 90% relative humidity (no condensation)
Environment temperature range	• -4° to 131°F (-20° to 55°C)
Storage temperature	• -40° to 185°F (-40°C to 85°C)
Frequency range	• 863 to 928 MHz

Specification	Description
Transmit (Tx) power	• US915 20 dBm • EU868 16 dBm
Receive (Rx) sensitivity	• -136 dBm (LoRa spreading factor = 12, bit rate = 293 bps) • -121 dBm (FSK, frequency deviation = 5 kHz, bit rate = 1.2 kbps)
Communication range	• Up to 10 km; actual transmission distance depends on the environment
Data transfer rate	• 0.3 kbps to 50 kbps
Spread technique	• LoRa/FSK
Battery life	• 5 years (conditions: ambient temperature 25° C, 15-min report once, Tx power = 20 dBm, LoRa spreading factor [SF] = 10)

Table 26. Module AV206 specifications

Specification	Description
Wakeup current	• 0.8 mA to 8 mA at 3.3V
RF receiving current (max)	• 11 mA/ 3.3V
RF transmitting current (max)	• 120 mA /3.3V

Table 27. Light sensor

Specification	Description
Supply voltage range	• 2.3V to 3.3V DC
Illuminance range	• 3 Lux to 220K Lux
Illuminance accuracy	• < 15%
Communication method	• I^2C communication

Table 28. Product certification and compliance

Specification	Applicable regions
Safety	
EN60950-1	• EU
CB to IEC 60950-1	• EU and North America
CB to IEC 60950-1	• EU and North America
FCC Part 2	• USA
RSS 102	• Canada

Specification	Applicable regions
RoHS	• EU
IEC 60950-22	• EU and North America
IEC 60529	• Ingress Protection
EMC immunity	
EN 301489-1	• EU
EN 301489-3	• EU
Radio	
EU 863-870	• EU
EN300220-1	• EU
EN300220-2	• EU
CE RED	• EU
US 902-928	• USA
FCC 47CFR Part 15 B and C	• USA
RSS210	• Canada
IC ICES-003	• Canada

8. AV207: Indoor occupancy sensor

Overview

The AV207 is a wireless indoor occupancy sensor. With real-time motion detection, the AV207 senses the movement of people, animal, or objects, and if a person or an object moves in the monitoring area, the sensor detects the infrared signal and reports the status information to the LoRaWAN gateway. The AV207 is intended for indoor use only.

Figure 9.
AV207 indoor occupancy sensor

Product specifications

Table 29. AV207 specifications

Specification	Description
Physical specifications	
Dimensions (L x W x H)	• 78 x 78.8 x 82.2 mm or 3 x 3.1 x 3.2 inches
Weight	• 125.8 g (0.27 lb)
Batteries	• 2 AA size 3.6V ER14505 batteries, not off the shelf 1.5V batteries • Contact Cisco customer support for replacement or recycling
Operating voltage	• DC 3.1V to 3.65V
Wakeup mode	• 9.78 mA (typical value) • Wakeup current range 0.8 mA to 20 mA (when not transmitting or receiving LoRa data)
Standby mode	• 110 uA
Low voltage threshold	• 3.2V
Battery measurement accuracy	• ±0.1V
Operating humidity	• < 90% relative humidity (no condensation)
Operating temperature range	• -4° to 131°F (-20° to 55℃)
Storage temperature	• -40° to 185°F (-40℃ to 85℃)
Frequency range	• 863 to 928 MHz
Transmit (Tx) power	• US915 20 dBm • EU868 16 dBm
Receive (Rx) sensitivity	• -136 dBm (LoRa spreading factor = 12, bit rate = 293 bps) • -121 dBm (FSK, frequency deviation = 5 kHz, bit rate = 1.2 kbps)
Communication range	• Up to 10 km; actual transmission distance depends on the environment
Data transfer rate	• 0.3 kbps to 50 kbps
Spread technique	• LoRa/FSK
Battery life	• 5 years (conditions: ambient temperature 77°F [25°C], 15-min report once, Tx power = 20 dBm, LoRa Spreading Factor [SF] = 10)

Table 30. Module AV207 specifications

Specification	Description
Wakeup current	• 0.8 to 8 mA at 3.3V
RF receiving current (max)	• 11 mA / 3.3V
RF transmitting current (max)	• 120 mA/ 3.3V

Table 31. Sensing range

Specification	Description
Mounting height	• 2 to 2.2 m (6.5 to 7.2 ft) above ground level
Mounting angle	• Tilt 15° downward
Sensing angle	• Horizontal 110°, vertical 60°
Sensing distance	• 2 to 12 m (6.5 to 40 ft)
Object moving speed to send alarm	• ≥ 0.2 m per second
Battery measurement accuracy	• ±0.1V

Table 32. Product certification and compliance

Specification	Applicable regions
Safety	
EN60950-1	• EU
CB to IEC 60950-1	• EU and North America
CB to IEC 62368-1	• EU and North America
FCC Part 2	• USA
RSS 102	• Canada
RoHS	• EU
EMC immunity	
EN 301489-1	• EU
EN 301489-3	• EU

Specification	Applicable regions
Radio	
EU 863-870	• EU
EN300220-1	• EU
EN300220-2	• EU
CE RED	• EU
US 902-928	• USA
FCC 47CFR Part 15 B and C	• USA
RSS210	• Canada
IC ICES-003	• Canada

9. AV250: Machine temperature sensor

Overview

The AV250 is used for monitoring the temperature of equipment. It detects the temperature of the object via a thermocouple connector.

Figure 10.
AV250 machine temperature sensor

Product specifications

Table 33. AV250 specifications

Specification	Description
Physical specifications	
Dimensions (L x W x H)	• 112 x 88.19 x 32 mm or 4.49 x 3.47 x 1.25 inches
Weight	• 141 g (0.31 lb)
Batteries	• 2 AA size 3.6V ER14505 batteries, not off the shelf 1.5V batteries • Contact Cisco customer support for replacement or recycling
Operating voltage	• DC 3.1V to 3.65V

Specification	Description
Wakeup mode	• 6.3 mA at 3.3V
Standby mode	• 34 uA
Low voltage threshold	• 3.2V
Battery measurement accuracy	• ±0.1V
Operating humidity	• < 90% relative humidity (no condensation)
Operating temperature range	• -4° to 131ºF (-20° C to 55 °C)
Storage temperature	• -40° to 185ºF (-40° C to 85° C)
Frequency range	• 863 to 928 MHz
Transmit (Tx) power	• US915 20 dBm • EU868 16 dBm
Receive (Rx) sensitivity	• -136 dBm (LoRa spreading factor = 12, bit rate = 293 bps) • -121 dBm (FSK, frequency deviation = 5 kHz, bit rate = 1.2 kbps)
Communication range	• Up to 10 km; actual transmission distance depends on the environment
Data transfer rate	• 0.3 kbps to 50 kbps
Spread technique	• LoRa/FSK
Battery life	• 4.8 years (conditions: ambient temperature 77ºF [25° C], 15-min report once, Tx power = 20 dBm, LoRa Spreading Factor [SF] = 10)

Table 34. Module AV250 specifications

Specification	Description
Wakeup current	• 0.8 mA to 8 mA at 3.3V
RF receiving current (max)	• 11 mA/ 3.3V
RF transmitting current (max)	• 120 mA /3.3V

Table 35. Thermocouple characteristics

Specification	Description
Measurement accuracy	• Measurement error that the wire causes: ≦ 35.6ºF (2℃)
Thermocouple wire length	• 1 m (3.3 ft)

Table 36. Product certification and compliance

Specification	Applicable regions
Safety	
EN60950-1	• EU
CB to IEC 60950-1	• EU and North America
CB to IEC 62368-1	• EU and North America
FCC Part 2	• USA
RSS 102	• Canada
RoHS	• EU
EMC Immunity	
EN 301489-1	• EU
EN 301489-3	• EU
Radio	
EU 863-870	• EU
EN300220-1	• EU
EN300220-2	• EU
CE RED	• EU
US 902-928	• USA
FCC 47CFR Part 15 B and C	• USA
RSS210	• Canada
IC ICES-003	• Canada

10. AV251: Machine vibration sensor

Overview

The AV251 can be used to detect the movement or vibration of a device. It sends a signal to the LoRaWAN gateway for processing, and externally connects one NTC thermistor to detect the surface temperature of the measured object.

Figure 11.
AV251 machine vibration sensor

Product specifications

Table 37. AV251 specifications

Specification	Description
Physical specifications	
Dimensions (L x W x H)	• 112 x 88.19 x 32 mm or 5 x 4 x 1 inches
Weight	• 141 g (0.31 lb)
Batteries	• 2 AA size 3.6V ER14505 batteries, not off the shelf 1.5V batteries • Contact Cisco customer support for replacement or recycling
Operating voltage	• DC 3.1V to 3.65V
Wakeup mode	• 8.68 mA (typical value) • Wakeup current range 0.8 mA to 20 mA (when not transmitting or receiving LoRa data)
Standby mode	• 80 uA
Low voltage threshold	• 3.2V
Battery measurement accuracy	• ±0.1V
Operating humidity	• < 90% relative humidity (no condensation)
Operating temperature range	• -4° to 131ºF (-20℃ to 55℃)
Storage temperature	• -40° to 18 ºF (-40℃ to 85℃)
Frequency range	• 863 to 928 MHz

Specification	Description
Transmit (Tx) power	• US915 20 dBm • EU868 16 dBm
Receive (Rx) sensitivity	• -136 dBm (LoRa spreading factor = 12, bit rate = 293 bps) • -121 dBm (FSK, frequency deviation = 5 kHz, bit rate = 1.2 kbps)
Communication range	• Up to 10 km; actual transmission distance depends on the environment
Data transfer rate	• 0.3 kbps to 50 kbps
Spread technique	• LoRa/FSK
Battery life	• 3 years (conditions: ambient temperature 77ºF [25° C], 15-min report once, Tx power = 20 dBm, LoRa spreading factor [SF] = 10)

Table 38. Module AV251 specifications

Specification	Description
Wakeup current	• 0.8 mA to 8 mA at 3.3V
RF receiving current (max)	• 11 mA/3.3V
RF transmitting current (max)	• 120 mA/3.3V

Table 39. NTC thermistor sensor specifications

Specification	Description
NTC temperature range	• -40° to 257ºF (-40℃ to 125℃)
25-degree resistance value	• 10k (typical)
B value B25/50	• 3990
Temperature measurement accuracy	• Basic error limit of NTC thermistor: ±37.4 ºF (±3° C) • Measurement error caused by the wire: ≦35.6ºF (2° C)

Table 40. 3-axis acceleration sensor

Specification	Description
Operating voltage range	• 1.8V to 3.6V
Operating temperature range	• -40° to 185ºF (-40℃ to 85℃)
DAC maximum resolution	• 13 bits
Communication form	• SPI communication
3-axis acceleration longitude	• ±16g

Table 41. Product certification and compliance

Specification	Applicable regions
Safety	
EN60950-1	• EU
CB to IEC 60950-1	• EU and North America
CB to IEC 62368-1	• EU and North America
FCC Part 2	• USA
RSS 102	• Canada
RoHS	• EU
EMC immunity	
EN 301489-1	• EU
EN 301489-3	• EU
Radio	
EU 863-870	• EU
EN300220-1	• EU
EN300220-2	• EU
CE RED	• EU
US 902-928	• USA
FCC 47CFR Part 15 B and C	• USA
RSS210	• Canada
IC ICES-003	• Canada

11. AV300: Outdoor GPS sensor

Overview

The AV300 sensor is a GPS tracking sensor with a long battery life, helping to keep track of assets and detect unauthorized movement of assets. The IP67-rated sensor can be mounted on nonpowered assets exposed to rain, dust, and marine conditions. The device has built-in antennas for GPS reception and for LoRaWAN communication, a 3D accelerometer, a high-performance GPS that can track both GPS and GLONASS satellites simultaneously. Adaptive tracking technology sends frequent updates when the asset is moving and scales down update frequency when the asset is stationary, which preserves battery life.

Figure 12.
AV300 outdoor GPS sensor

Product specifications

Table 42. AV300 specifications

Specification	Description
Physical specifications	
Dimensions (L x W x H)	• 108 x 86 x 31 mm or 4.25 x 3.38 x 1.22 inches
Housing	• Ultra-rugged nylon glass
Weight	• 188 g (0.41 lb)
IP rating	• IP67
Operating voltage	• 4 to 6V DC
Batteries	• Off-the-shelf 3 AA size 1.5V lithium batteries
Wakeup mode	• 4.4 mA
Sleeping mode	• 10 µA
Low voltage threshold	• 2.20 to 2.28V
Operating temperature range	• -4° to 140° F (-20°C to +60°C) • For operation in extreme temperatures, the sensor must be fitted with lithium batteries.
Accuracy/tracking sensitivity	• -167 dBm
Data transfer rate	• Usually the minimum is 0 and the maximum is between 4 and 7 (radio regulations, network, and battery capacity may prove to be limiting factors)

Specification	Description
Transmit (Tx) power	• 2 to 18.5 dBm
Receive (Rx) sensitivity	• - 135.5 dBm (spreading factor = 12, at 125 kHz bandwidth) • - 133.0 dBm (spreading factor = 12 at 250 kHz bandwidth)
Battery life	• Up to 4 years at one position per day (at 25° C) and up to 1 year with detailed tracking

Table 43. Product certification and compliance

Specification	Applicable regions
Safety	
CE	• Europe
CANADA	• Canada
EN60950-1	• EU
CB to IEC 60950-1	• EU and North America
CB to IEC 62368-1	• EU and North America
FCC Part 2	• USA
RSS 102	• Canada
RoHS	• EU
IEC 60950-22	• EU and North America
IEC 60529	• Ingress Protection
EMC emission	
FCC	• United States
EMC immunity	
EN 301489-1	• EU
EN 301489-3	• EU
EN301489-19	• EU

Specification	Applicable regions
Radio	
EU 868	• Europe
US 915	• Australia and North America

Ordering Information

Cisco Industrial Asset Vision is provided with two components: (1) one-time hardware purchase for sensors and gateways, and (2) SaaS subscription metered on each sensor to be connected in 1-, 3-, or 5-year terms.

A Cisco Industrial Asset Vision subscription is purchased using the IOTAV-BUNDLE-US or IOTAV-BUNDLE-EU multiline bundle (MLB).

Table 44. Ordering multiline bundles

Part number	Description	Geography or region
IOTAV-BUNDLE-US	Industrial Asset Vision bundle	North America (US915)
IOTAV-BUNDLE-EU	Industrial Asset Vision bundle	Europe (EU868)

Table 45. Ordering gateway hardware

Part number	Description	Geography or region
IXM-LPWA-900-16-K9	Cisco wireless gateway for LoRaWAN	North America (US915)
IXM-LPWA-800-16-K9	Cisco wireless gateway for LoRaWAN	Europe (EU868)

Table 46. Ordering sensor hardware

Part number	Description	Geography or region
IOTAV-L-GPS-L1-US **IOTAV-L-GPS-L1-EU**	Cisco Outdoor GPS Sensor	LoRaWAN 900 MHz (US915) LoRaWAN 800 MHz (EU868)
IOTAV-L-ENV-O1-US **IOTAV-L-ENV-O1-EU**	Cisco Outdoor Temp/Humidity Sensor	LoRaWAN 900 MHz (US915) LoRaWAN 800 MHz (EU868)
IOTAV-L-ENV-I1-US **IOTAV-L-ENV-I1-EU**	Cisco Indoor Temp/Humidity Sensor	LoRaWAN 900 MHz (US915) LoRaWAN 800 MHz (EU868)
IOTAV-L-PTM-I1-US **IOTAV-L-PTM-I1-EU**	Cisco Product Temperature Sensor	LoRaWAN 900 MHz (US915) LoRaWAN 800 MHz (EU868)
IOTAV-L-FRZ-O1-US **IOTAV-L-FRZ-O1-EU**	Cisco Refrigerator Temp/Humidity Sensor	LoRaWAN 900 MHz (US915) LoRaWAN 800 MHz (EU868)

Part number	Description	Geography or region
IOTAV-L-HAL-I1-US **IOTAV-L-HAL-I1-EU**	Cisco Door/Window Sensor	LoRaWAN 900 MHz (US915) LoRaWAN 800 MHz (EU868)
IOTAV-L-WLK-O1-US **IOTAV-L-WLK-O1-EU**	Cisco Water Leak Sensor	LoRaWAN 900 MHz (US915) LoRaWAN 800 MHz (EU868)
IOTAV-L-LUX-I1-US **IOTAV-L-LUX-I1-EU**	Cisco Light Level Sensor	LoRaWAN 900 MHz (US915) LoRaWAN 800 MHz (EU868)
IOTAV-L-MTM-O1-US **IOTAV-L-MTM-O1-EU**	Cisco Machine Temperature Sensor	LoRaWAN 900 MHz (US915) LoRaWAN 800 MHz (EU868)
IOTAV-L-VIB-O1-US **IOTAV-L-VIB-O1-EU**	Cisco Machine Vibration Sensor	LoRaWAN 900 MHz (US915) LoRaWAN 800 MHz (EU868)
IOTAV-L-OCU-I1-US **IOTAV-L-OCU-I1-EU**	Cisco Indoor Occupancy Sensor	LoRaWAN 900 MHz (US915) LoRaWAN 800 MHz (EU868)

Cisco environmental sustainability

Information about Cisco's environmental sustainability policies and initiatives for our products, solutions, operations, and extended operations or supply chain is provided in the "Environmental Sustainability Approach" section of Cisco's Corporate Social Responsibility (CSR) Report.

Reference links to information about key environmental sustainability topics (mentioned in the "Environmental Sustainability Approach" section of the CSR Report) are provided in the following table.

Table 47. Environmental sustainability information

Sustainability topic	Reference
Information on product-material-content laws and regulations	Materials
Information on electronic waste laws and regulations, including products, batteries, and packaging	WEEE Compliance

Reference links to product-specific environmental sustainability information that is mentioned in relevant sections of this data sheet are provided in the following table.

Table 48. Product-specific environmental sustainability information

Sustainability topic	Reference
General	
Eco-Design Compliance (EU ErP Lot, Etc.)	Table AA. Product Compliance
Environmental Certifications (EPEAT, Energy Star, Etc.)	Table BB. Product Compliance or Platform Features/Benefits
Power	
Idle, Typical or Max Product Power	Table CC. Product Specifications
Hardware Enabled Energy Features	Table DD. Platform Features/Benefits
Software Enabled Energy Features	Table EE. Platform Features/Benefits
Power Supply Information	Table FF. Product Specifications
Power Calculator	Table GG. Product Specifications
Material	
Unit Weight	Table HH. Product Specifications
System Weight (Product + Packaging)	Table II. Product Specifications
Recycled Content	Table JJ. Product Specifications

Cisco makes the packaging data available for informational purposes only. It may not reflect the most current legal developments, and Cisco does not represent, warrant, or guarantee that it is complete, accurate, or up to date. This information is subject to change without notice.

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