



IoA-1000
User Guide



Notice

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Federal Communications Commission (FCC) notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by VIAVI could void the user's authority to operate the equipment.

CAUTION:

- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. The End user must follow the specific operating instructions for satisfying RF exposure compliance.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Industry Canada requirements

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Device operation in the band 5150–5250 MHz is only for indoor use.

Dans la bande de fréquence 5150–5250 MHz, l'utilisation du produit doit être uniquement en intérieur.

Brazilian Anatel Regulation on Restricted Radiation Radio Communication Equipment (Resolution No. 680)

This equipment is not entitled to protection against harmful interference and may not cause interference with duly authorized systems.

Regulamento Anatel sobre equipamentos de Radiocomunicação de Radiação Restrita (Resolução nº 680)

Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados.

EU WEEE and battery directives

This product, and the batteries used to power the product, should not be disposed of as unsorted municipal waste and should be collected separately and disposed of according to your national regulations.

VIAVI has established a take-back process in compliance with the EU Waste Electrical and Electronic Equipment (WEEE) Directive, 2012/19/EU, and the EU Battery Directive, 2006/66/EC.

Instructions for returning waste equipment and batteries to VIAVI can be found in the WEEE section of the [VIAVI Standards and Policies web page](#).

If you have questions concerning disposal of your equipment or batteries, contact the VIAVI WEEE Program Management team at **WEEE.EMEA@ViaviSolutions.com**.

EU REACH

Article 33 of EU REACH regulation (EC) No 1907/2006 requires article suppliers to provide information if a listed Substance of Very High Concern (SVHC) is present in an article above a certain threshold.

For information on the presence of REACH SVHCs in VIAVI products, see the **Hazardous Substance Control** section of the [VIAVI Standards and Policies web page](#).

EU CE marking directives (LV, EMC, RoHS, RE)

This product conforms with all applicable CE marking directives. For details, please see the EU Declaration of Conformity documentation included in the shipping package and available on StrataSync.

China RoHS

China RoHS documentation is included in the shipping package and available on StrataSync.

California Proposition 65

California Proposition 65, officially known as the Safe Drinking Water and Toxic Enforcement Act of 1986, was enacted in November 1986 with the aim of protecting individuals in the state of California and the state's drinking water and environment from excessive exposure to chemicals known to the state to cause cancer, birth defects or other reproductive harm.

For the VIAVI position statement on the use of Proposition 65 chemicals in VIAVI products, see the **Hazardous Substance Control** section of the [VIAVI Standards and Policies web page](#).

Compliance with 2014/53/EU Radio Equipment Directive (RED)

In accordance with Article 10.8(a) and 10.8(b) of the RED, the instruments for sale in the EU operate in the 5-205 MHz frequency range at a maximum RF transmit power of +15dBm.

Please contact us for more information:

VIAVI Solutions
Network Service Enablement
6001 America Center Drive
San Jose, CA, 95002

Precautions



WARNING:

Pursuant to FCC 15.21 of the FCC rules, changes not expressly approved by VIAVI might cause harmful interference and void the FCC authorization to operate this product.



CAUTION:

Do not use the instrument in any manner not recommended by the manufacturer.



CAUTION:

A strong electromagnetic field may affect the measurement accuracy of the meter.



NOTE:

All spent batteries should be disposed of according to local laws and guidelines.



Contents

- About this Guide** **9**
 - Purpose and scope 9
 - Assumptions..... 9
 - Technical assistance..... 9
 - Safety and compliance information 10
 - Conventions 10
 - Typographical conventions..... 10
 - Keyboard and menu conventions..... 11
 - Symbol conventions 11
 - Safety definitions..... 12
 - What ships with the loA-1000 13
 - Preparation for use..... 13

- Chapter 1 Quick Tour** **15**
 - About the loA-1000 16
 - Attach and monitor 16
 - Real-time antenna alignment monitoring 16
 - From the field to your desk..... 16
 - Easy to set up..... 16
 - Benefits..... 17
 - Features 17
 - IoT SIM card requirements 17
 - loA display 18

- Chapter 2 loA Setup** **19**
 - loA setup via loA Manager 20
 - Device preparation (before physical installation) 21
 - Connecting to the loA server..... 22
 - Applying the tape..... 24

Chapter 3	IoA Installation	25
	Prepping the antenna surface.....	26
	Attaching the IoA.....	26
	Commissioning the IoA	27
Chapter 4	Appendix	29
	Installation chart.....	30
	Error messages	31
	Other hints and best practices	32
	Limited warranty	33
	Getting technical assistance	33
	Additional information.....	33
	Specifications.....	34



About this Guide

Thank you for purchasing the IoA-1000. This guide provides setup and operating instructions to get you up and running as soon as possible.

Purpose and scope

The purpose of this guide is to help you successfully use the product features and capabilities. Additionally, this guide provides a complete description of the VIAVI warranty, services, and repair information.

Assumptions

This guide is intended for novice, intermediate, and experienced users who want to use the product effectively and efficiently. We are assuming that you have basic computer and mouse/track ball experience and are familiar with basic telecommunication concepts and terminology.

Technical assistance

If you require technical assistance, call 1-844-GO-VIAVI / 1.844.468.4284.

Outside US: +1-855-275-5378

Email: TAC@viavisolutions.com

For the latest TAC information, visit

<https://support.viavisolutions.com>

<https://www.viavisolutions.com/en/services-and-support/support/technical-assistance>

Safety and compliance information

Safety information is contained in a separate guide and is provided in printed format with the product.

For information about CE compliance, see the Declaration of Conformity. A copy of the declaration is included in the shipping package.

Conventions

This guide uses typographical and symbols conventions as described in the following tables.

Typographical conventions

Description	Example
User interface actions	On the Status bar, click Start .
Buttons or switches that you press on a unit	Press the ON switch.
Code and output messages	All results okay
Text you must type exactly as shown	Type: a:\set.exe in the dialog box
Variables	Type the new <i>hostname</i> .
Book references	Refer to <i>Newton's Telecom Dictionary</i>
A vertical bar means "or": only one option can appear in a single command.	platform [a b e]
Square brackets [] indicate an optional argument.	login [platform name]
Slanted brackets < > group required arguments.	<password>

Keyboard and menu conventions

Description	Example
A plus sign + indicates simultaneous keystrokes.	Press Ctrl+s
A comma indicates consecutive key strokes.	Press Alt+f,s
A slanted bracket indicates choosing a submenu from menu.	On the menu bar, click Start > Program Files .

Symbol conventions



This symbol indicates a note that includes important supplemental information or tips related to the main text.



This symbol represents a general hazard. It may be associated with either a DANGER, WARNING, CAUTION, or ALERT message. See the *"Safety definitions"* on [page 12](#) for more information.



This symbol represents an alert. It indicates that there is an action that must be performed in order to protect equipment and data or to avoid software damage and service interruption.



This symbol represents hazardous voltages. It may be associated with either a DANGER, WARNING, CAUTION, or ALERT message. See the *"Safety definitions"* on [page 12](#) for more information.



This symbol represents a risk of explosion. It may be associated with either a DANGER, WARNING, CAUTION or ALERT message. See the *"Safety definitions"* on [page 12](#) for more information.

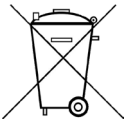


This symbol represents a risk of a hot surface. It may be associated with either a DANGER, WARNING, CAUTION, or ALERT message. See the *"Safety definitions"* on [page 12](#) for more information.

Symbol conventions (continued)



This symbol represents a risk associated with fiber optic lasers. It may be associated with either a DANGER, WARNING, CAUTION or ALERT message. See the *Safety Definitions* below for more information.



This symbol, located on the equipment, battery, or the packaging indicates that the equipment or battery must not be disposed of in a land-fill site or as municipal waste, and should be disposed of according to your national regulations.

Safety definitions

Term	Description
DANGER	Indicates a potentially hazardous situation that, if not avoided, will result in death or serious injury. It may be associated with either a general hazard, high voltage, or other symbol.
WARNING	Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury. It may be associated with either a general hazard, high voltage, or other symbol.
CAUTION	Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury and/or damage to equipment. It may be associated with either a general hazard, high voltage, or risk of explosion symbol. When applied to software actions, indicates a situation that, if not avoided, could result in loss of data or a disruption of software operation.
ALERT	Indicates that there is an action that must be performed in order to protect equipment and data or to avoid software damage and service interruption.

What ships with the IoA-1000

When you unpack the unit, the following items are included as standard.

- IoA-1000 unit
- SIM card tray
- Alcohol prep pad
- Perimeter tape strips (x2)
- Safety information sheet

Preparation for use

This section explains how to start using the unit. When you unpack your instrument, do the following:

- Inspect the unit for damage. If the instrument is damaged, put it back in the box and contact VIAVI customer service (see ["Technical assistance" on page 9](#)).
- If undamaged, save the box and packing materials in case you need to ship the instrument in the future.

Quick Tour

This chapter provides an overview of the unit and display, including the following:

- "About the IoA-1000" on page 16
- "IoA display" on page 18

About the loA-1000

Attach and monitor

loA – IoT for Antennas is an IoT antenna sensor that monitors alignment in three dimensions: azimuth, tilt and roll. The loA-1000 (loA unit) utilizes LTE CAT-M1/NB-IoT to alert users to any undesired changes to antennas being monitored.

Real-time antenna alignment monitoring

loA offers real-time antenna alignment monitoring on all wireless network antenna arrays. Data captured with loA's patented monitoring technology is made available over the cloud, allowing operators to remotely view the history of all physical antenna alignment changes.

From the field to your desk

Each antenna can be individually identified on a tower or throughout the entire network. With loA, operators can set thresholds for changes in azimuth, tilt and roll. When these thresholds are exceeded, an alarm will be generated, and the operator will be notified. In case of emergencies, priority lists can be easily created using available alignment data, allowing for faster disaster recovery.

Easy to set up

Installing loA is a quick process designed with the technician in mind. Simply insert an IoT-enabled SIM card and attach loA to the back of the antenna to start reporting antenna alignment data to the cloud. Use the software to set alignment thresholds.



Benefits

- Easily attach to and monitor antenna alignment in real time from the field to your desk using your own customized software
- Easy to set up

Features

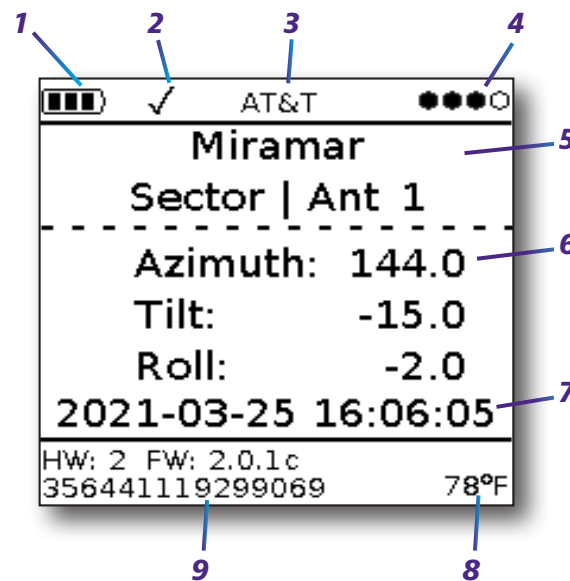
- LTE CAT-M1/NB-IoT ready
- E-paper display for status & alerts
- 5+ year battery life (depending on reporting interval)
- IP67 rated
- Alarm capable
- Weather-resistant adhesive
- No maintenance required
- Cloud data management capabilities

IoT SIM card requirements

- Nano SIM card
- NB-IoT (NB-1) or LTE CAT-M1 enabled
- Auto-APN provisioning (no username, password or PIN required)
- PCO or ePCO enabled
- SIM card / IoT service must be registered and activated per the IoT provider's specific process prior to installing into the IoA sensor

Important: The SIM card is not provided by VIAVI. Check with your IoA Administrator or your local IoT cellular network provider.

IoA display



1. **Power status** – Available battery life on the unit or if plugged into USB
 - **3 bars** – 80-100%
 - **2 bars** – 50-79%
 - **1 bar** – 0-49% (may not transmit at this level)
 - **Plug** – USB power
2. **Commissioned** – Shows if device has been commissioned or not (X or ✓)
3. **Carrier** – Current cellular carrier the device is connected to
4. **Signal strength** – Current signal strength
 - **4 dots** – ≥ -80 dB
 - **3 dots** – -80dB to -90dB
 - **2 dots** – -90dB to -95dB
 - **1 dot** – ≤ -95 dB
5. **Site, Sector, and Antenna** – Site information from the IoA Manager
6. **Azimuth, Tilt, and Roll** – Current mechanical position of the unit
7. **Date / Time** – Date of the last transmission in UTC
8. **Temperature** – Current temperature around the device
9. **IMEI number** – IMEI of the device

IoA Setup

This chapter describes steps to set up your IoA, including the following:

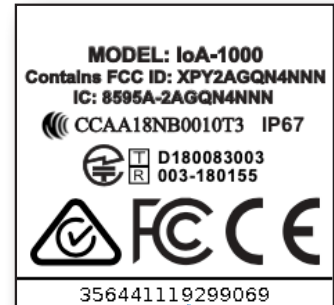
- "IoA setup via IoA Manager" on page 20
- "Device preparation (before physical installation)" on page 21
- "Connecting to the IoA server" on page 22
- "Applying the tape" on page 24

IoA setup via IoA Manager

Use the following steps to set up the IoA device using the VIAVI IoA Manager website or your company's IoA Console software.

See the *IoA Manager User Guide* or your IoA Administrator for more information.

1. From the IoA Manager website or your IoA Console, add a sensor to a new or existing site by entering the IMEI from the IoA display.
2. Create a new site or sector as needed.
3. If necessary, add the target values for the azimuth, tilt, and roll for the antenna using existing information or measurements taken on-site with the 3Z RF Vision Antenna Alignment tool.
4. Note the site, sector, and antenna on which this IoA will be installed.

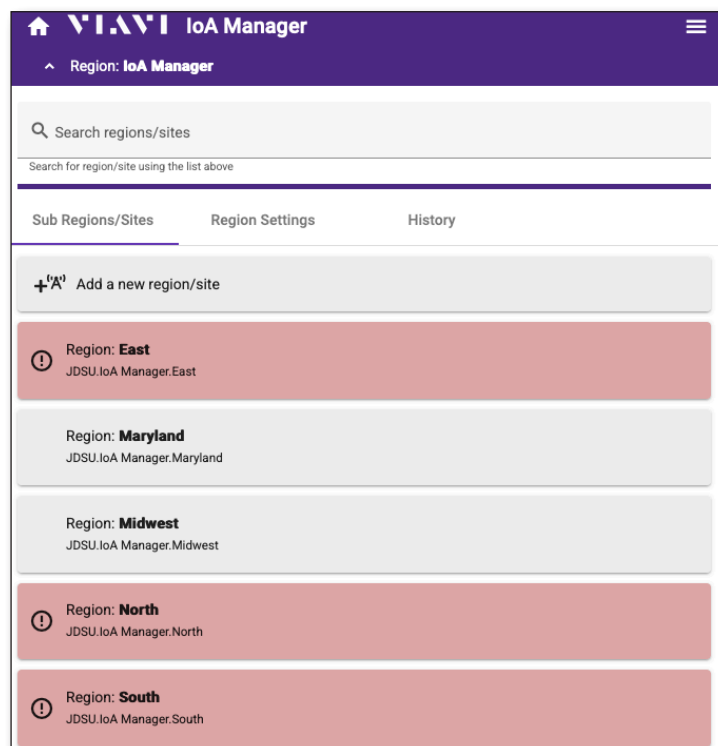


IMEI number

IMPORTANT:



The SIM card is not provided by VIAVI. Check with your IoA Administrator or your local IoT cellular network provider.



VIAVI IoA Manager Main menu

Device preparation (before physical installation)

The device preparation is recommended to be done prior to arriving onsite. This ensures the IoA is ready to install without any issues.

Note: For best results and minimum delay of setup, the unit should be within 59° F to 122° F (15°–50° C) during device preparation.

Important: Prior to installing the IoA unit on the antenna, set up the IoA using the VIAVI IoA Manager website or your company's IoA Console software. See the *IoA Manager User Guide* or your IoA Administrator for more information.

Your organization's IoA Console software will help you add sites, add IoAs to sites, and configure IMEI, Azimuth, Tilt, and Roll values of IoAs added to sites.

1. Remove the IoA, SIM card tray, and alcohol pad from the packaging. The device will show a standard welcome screen with the IMEI number of the device at the bottom, as shown here.

Important: The SIM card is not provided by VIAVI. Check with your IoA Administrator or your local IoT cellular network provider. It should be provisioned for automatic APN and not require a PIN.

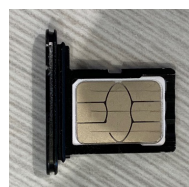
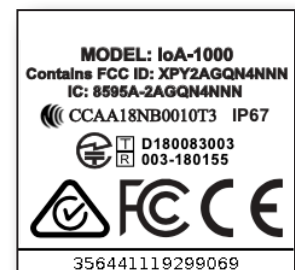
2. Place the SIM card in the tray. Notice the contacts of the SIM card should be facing up, with the notch of the SIM card in the upper left, as you face the front of the IoA.
3. Carefully insert the SIM card tray into the IoA.

Once the SIM card tray is inserted, listen for two "clicks". The second "click" may take up to 7 seconds to occur.

After the second "click", the screen should show the QR code containing the IMEI of the device, showing the device is ready for setup.

The IMEI from this screen will be required as part of IoA configuration using the IoA Manager or your organization's IoA Console software. See your IoA Administrator for more information.

If Error 101 displays, please ensure the SIM card is seated properly in the tray.



SIM card placed in tray



Inserting SIM tray in IoA

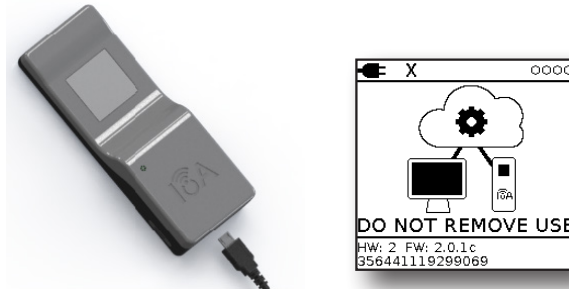
Important: THE SIM TRAY MUST BE INSERTED BEFORE MOVING TO THE NEXT STEP.

Connecting to the IoA server

The next step is to connect the IoA to the server for final configuration.

1. Remove the USB cover sticker and provide power via the USB connection on the bottom of the IoA in order to download the configuration from the server immediately (approx. 1-2 mins).

Once connected to USB power, the IoA screen will indicate it is retrieving its configuration from the server, as shown here.



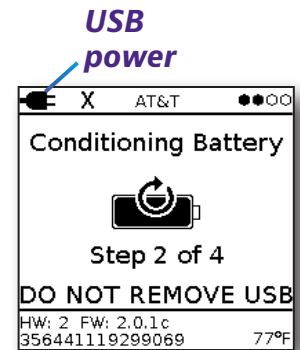
Important: DO NOT REMOVE USB POWER UNTIL INSTRUCTED TO DO SO.

2. Next, the device will show the following "Conditioning Battery" screen. This step is to ensure that the batteries within the device are ready for field deployment.

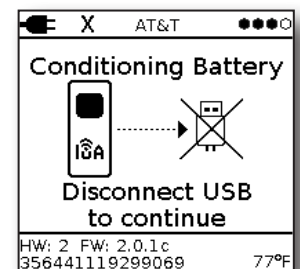
A message is shown on the screen depicting which step the device is currently on. Depending on the signal strength, this procedure can take up to 10 mins.

If Error 103 displays, please ensure you have the correct SIM card. Check with your IoA Administrator or your local IoT cellular network provider. It should be provisioned for automatic APN and not require a PIN.

If Error 401 displays, please configure your IoA using the IoA Manager website or your IoA Console software and add your IoA to the correct site. Check with your IoA Administrator for more details.

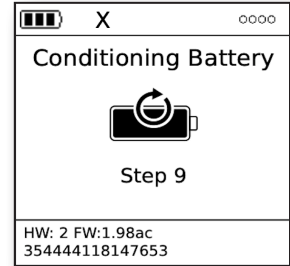


3. Once the first cycle has finished, a "Disconnect to Continue" message will appear. You may now safely remove the USB power while the device continues with its automated battery check.

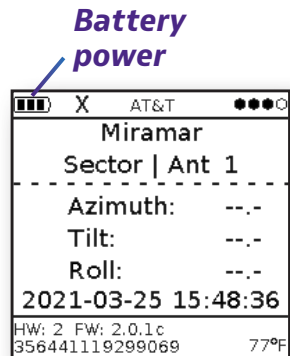


- Once the power is disconnected, another "Conditioning Battery" screen will appear, this time it will take at least 10 iterations.

Note: You do not need to be present during this step and the IoA can be left to complete this task completely autonomously. This step can take around 20 mins depending on the signal strength of the device.



- After the battery check and conditioning is complete, the device will show the configuration that it obtained from the server. The device will show the default reporting screen, as shown here.



Applying the tape

Finally, apply the perimeter tape along the side of the IoA, making sure to cover the SIM tray and USB slots of the unit.

For best results, surfaces must be clean and free of dirt, debris, and grease. Tape should be applied when surface temperature is between 50°–80° F (10°–27° C).

Before tape application, make sure SIM tray is fully inserted and is flush with the bottom enclosure.

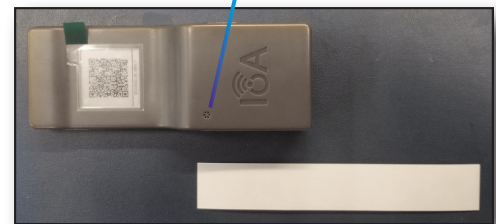
1. Start tape application aligned with the vent hole on the front. Keep tape seal flush to the back of the bottom enclosure.

DO NOT peel backer all the way off to prevent debris from getting on adhesive during application.

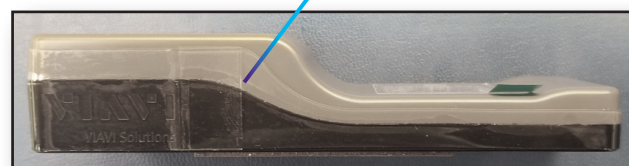
2. Press out as many air bubbles in the tape as possible. Then, firmly press all surfaces and seams to make sure tape is adhered to all surfaces properly.

When finished, the tape may overlap the factory-applied tape around the LCD, which is normal.

Vent hole



Finish here



IoA Installation

This chapter describes the IoA antenna installation process, including the following:

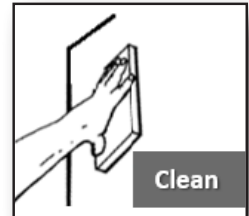
- "Prepping the antenna surface" on page 26
- "Attaching the IoA" on page 26
- "Commissioning the IoA" on page 27

Prepping the antenna surface

Behind the host antenna, determine the best placement for the IoA, away from any metal. Using the provided alcohol pad, clean all existing dust, residue, paint, etc.

If additional cleaning is required, it is recommended to use a 50:50 mixture of isopropyl alcohol (IPA) and water as the cleaning agent.

Wipe the target surface area dry to ensure no moisture exists prior to attaching the IoA.



Attaching the IoA

Important: Please install your IoA on the back surface of the antenna. As best practice, VIAVI recommends that the IoA be placed on the top 1/2 of the antenna's back surface, and no closer than 2 inches from the left and right edges.

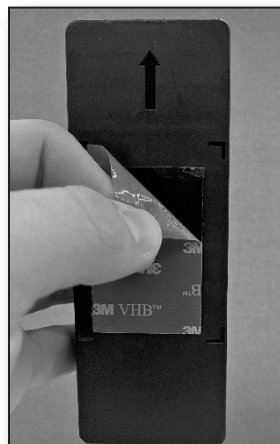
Keep in mind the IoA should also be at least 2 inches away from any ferrous metals that may be used for antenna mounting and support.

On the reverse side of the IoA, carefully remove the red protective adhesive tab exposing the black adhesive tape underneath.

An arrow on the back cover on the IoA will indicate which direction is the top.

Once the correct orientation is identified, attach to the target surface area. Firmly apply pressure on the face of the IoA Sensor for 15 seconds.

Congratulations, installation is complete!



Commissioning the IoA

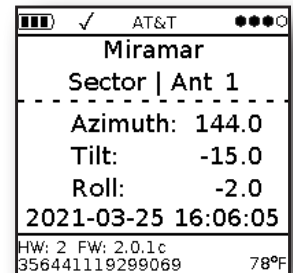
Once the IoA device physical installation is complete, use the VIAVI IoA Manager website or your IoA Console to commission the device.

See the *IoA Manager User Guide* for more details on commissioning an IoA sensor.

1. From the IoA Manager website or your IoA Console, navigate to the IoA that is being set up.
2. This will then show all the relevant information about the IoA device.
3. Verify the IMEI, azimuth, tilt, and roll values for the IoA.
4. When ready, activate the IoA via the IoA Manager or your IoA Console.

The device will now perform the commissioning process and the device screen will display a checkmark to the left of the carrier information the next time it transmits to the server.

This could take up to 24 hours depending on the time of the installation.



The screenshot shows a mobile status bar at the top with signal strength, a checkmark, and the carrier 'AT&T'. Below the status bar, the text 'Miramar' is displayed. A dashed line separates the header from the data. The data includes 'Sector | Ant 1', 'Azimuth: 144.0', 'Tilt: -15.0', and 'Roll: -2.0'. A timestamp '2021-03-25 16:06:05' is shown below the data. At the bottom, hardware and firmware information is listed: 'HW: 2 FW: 2.0.1c' and '356441119299069' next to a temperature indicator '78°F'.

Miramar	
Sector Ant 1	
Azimuth:	144.0
Tilt:	-15.0
Roll:	-2.0
2021-03-25 16:06:05	
HW: 2 FW: 2.0.1c	
356441119299069	78°F

Appendix

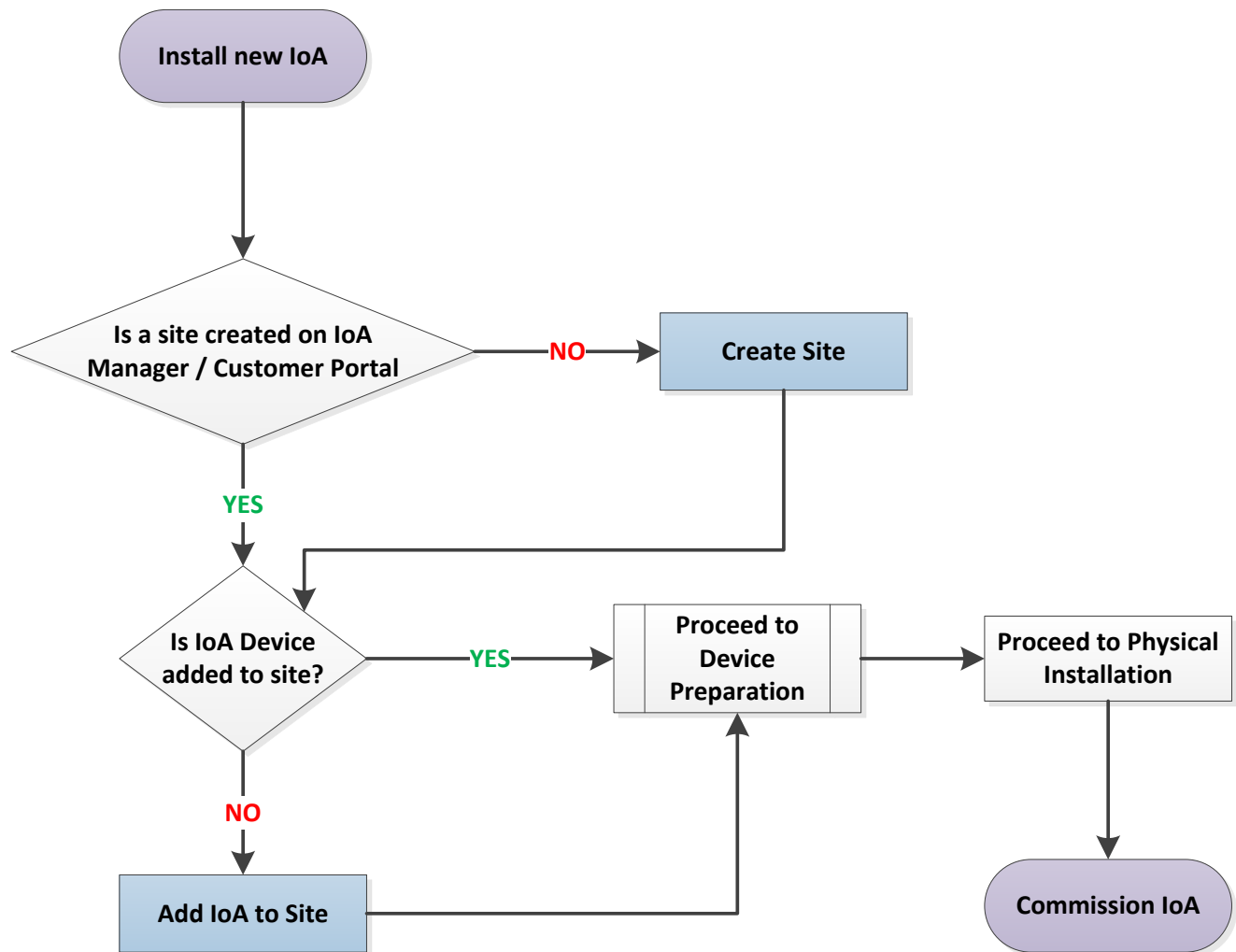
This appendix includes troubleshooting and supplemental information, including the following:

- "Installation chart" on page 30
- "Error messages" on page 31
- "Limited warranty" on page 33
- "Getting technical assistance" on page 33
- "Additional information" on page 33
- "Specifications" on page 34

Installation chart

Before installing loAs onto antennas, please ensure that you have requested and configured a StrataSync account for managing your loAs via the loA Manager.

See the *loA Manager User Guide* for more information.



Error messages

Error Code	Description	Possible Causes	Possible Solutions
101	No SIM found	SIM not inserted, not inserted properly, or bad SIM	<p>Confirm proper SIM orientation (SIM contacts upward, inserted from the bottom of the tray, corner notch aligned with tray notch in upper left) and reinsert the SIM tray.</p> <p>Listen for 2 audible clicks to confirm proper installation.</p> <p>If properly inserted, SIM card is potentially bad.</p>
102	Sensor failure	Internal loA sensor malfunctioning	Contact VIAVI Technical Support; replace the loA
103	Modem boot failure	<p>Modem is malfunctioning.</p> <p>Battery capacity is too low.</p>	<p>Confirm that battery is not in low capacity state.</p> <p>If Error code persists across multiple reporting cycles, contact VIAVI Technical Assistance.</p> <p>If the loA is accessible, remove the SIM card tray and reinsert to see if failure clears.</p>
105	Real-Time Clock failure	The RTC encountered an error	Verify they SIM tray is fully inserted. If condition persists, contact VIAVI Technical Support
107	Low battery	Battery voltage is below level required for loA operation	loA needs to be replaced

Error Code	Description	Possible Causes	Possible Solutions
401	IoA sensor IMEI not present on the Cloud Server	IoA sensor has not been added to Cloud server through IoA Manager	Use the IoA Manager web application and add the IoA sensor to the Cloud Database. (See the <i>IoA Manager User Guide</i> for details)
404	No connection to IoT network	There is no communications link between the IoA and the Cloud Server	<p>Ensure proper SIM type and configuration: CAT-M1 or NB-IoT, auto-APN enabled, no username or password required.</p> <p>If Signal strength indicator on the IoA display indicates weak signal (no dots are filled in), move the IoA to a location with stronger signal and cycle 5V power on the IoA USB interface to force the IoA to attempt network connection every 60 seconds.</p> <p>If Signal strength shows one solid dot or more, contact your IoT service provider to confirm that the SIM registration is complete and that service is active for your SIM.</p>

Other hints and best practices

- Ensure that you have acquired a VIAVI StrataSync account, configured the account to manage IoAs and that IoA Manager web UI is operational for the account before trying to install IoAs in your network
- SIM card must be provided by the user. Please confirm that SIM registration / activation is complete, and that IoT service is operational.
- SIM type = NB-IoT or CAT-M1 IoT networks only.
- If IoA is accidentally commissioned prior to installation on the target antenna, use the IoA Manager web application to decommission then recommission the IoA in place. This will reset the IoA to its configured antenna alignment parameters.

Limited warranty

For the latest warranty information, visit

<https://www.viavisolutions.com/literature/viavi-solutions-inc-general-terms-en.pdf>

<https://www.viavisolutions.com/en-us/literature/viavi-manufacturer-warranty-nse-products-en.pdf>

Getting technical assistance

If you require technical assistance, call 1-844-GO-VIAVI / 1.844.468.4284.

Outside US: +1-855-275-5378

Email: TAC@viavisolutions.com

For the latest TAC information, visit

<https://support.viavisolutions.com>

<https://www.viavisolutions.com/en/services-and-support/support/technical-assistance>

Additional information

For more detailed information, contact us at TAC@viavisolutions.com for these additional documents.

[IoA-1000 Quick Start Guide](#)

[IoA Manager User Guide](#)

Specifications

Accuracy	
Azimuth	1° RMS
Mechanical Tilt	1° RMS
Roll	1° RMS
Remote Monitoring	
User-defined alarm thresholds	
E-paper display	
Power	
DC Input voltage	5.0 V, 1 A (max) external USB power
Battery ¹	3.6 VDC, 2000mAh/cell
Battery Life ²	5+ years
Dimensions	
Length	5.2" (132 mm)
Width	2" (48.5 mm)
Height ³	1" (26 mm)
Weight	3.8 oz (108 g)
General	
Operating Temperature Range	-4° F to 149° F (-20° C to 65° C)
IP Rating	IP67
Adhesion to Antenna	
High strength bonding tape	
Instant bond	
Extreme temperature and UV resistant	
Expansion and contraction	
20+ year bonding	
Compliance	
LTE CAT-M1/NB-IoT	
FCC Part 15 compliant	
IC & CE compliant	

RF Specifications	
Output Power	UE Class 3 (23 dBm); according to 3GPP TS 36.521-1
Modulation	QPSK
Antenna Type	SMD chip antenna
Antenna Gain	
698-798 MHz: Peak: 0.4 dBi, Average: -2.0 dBi	
824-960 MHz: Peak: 1.6 dBi, Average: -1.1 dBi	
1710-2170 MHz: Peak: 3.5 dBi, Average: -2.0 dBi	
Frequencies/Bands	
Band 2	1850-1910 MHz Up, 1930-1990 MHz Down
Band 3	1710-1785 MHz Up, 1805-1880 MHz Down
Band 4	1710-1755 MHz Up, 2110-2155 MHz Down
Band 5	824-849 MHz Up, 869-894 MHz Down
Band 8	880-915 MHz Up, 925-960 MHz Down
Band 12	699-716 MHz Up, 729-746 MHz Down
Band 13	777-787 MHz Up, 746-756 MHz Down
Band 17	704-716 MHz Up, 734-746 MHz Down
Band 20	832-862 MHz Up, 791-821 MHz Down
Band 28	703-748 MHz Up, 758-803 Mhz Down

1. The two battery cells in the IoA are non-rechargeable and non-replaceable. Under no circumstances shall the end-user attempt to de-solder or cut the battery cells from the circuit board assembly; chemical leakage causing fire or insulation damage may result. Do not dispose the IoA product into fire or hot oven, or mechanically crush or cut the IoA product; explosion may result. Do not store the IoA product beyond 85° C; explosion and/or leakage of flammable liquid or gas may result.
2. Depending on reporting frequency.
3. 0.6" (14.5 mm) at the thinnest part and 1" (26 mm) on the thicker end.



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English

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