MULTITECH®

Conduit® AP

MTCAP-LAP3-915-001 User Guide

Conduit AP MTCAP-LAP3-915 User Guide

MTCAP-LAP3-915-001A, MTCAP-LAP3-915-001L

Part Number: S000771, Version 1.0

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Contacting MultiTech

Knowledge Base

The Knowledge Base provides immediate access to support information and resolutions for all MultiTech products. Visit http://www.multitech.com/kb.go.

Support Portal

To create an account and submit a support case directly to our technical support team, visit: https://support.multitech.com.

Support

Business Hours: M-F, 8am to 5pm CT

Country	By Email	By Phone
Europe, Middle East, Africa:	support@multitech.co.uk	+(44) 118 959 7774
U.S., Canada, all others:	support@multitech.com	(800) 972-2439 or (763) 717-5863

Warranty

To read the warranty statement for your product, visit https://www.multitech.com/legal/warranty. For other warranty options, visit www.multitech.com/es.go.

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Contents

Chapter 1 – Product Overview

Overview

Conduit AP (MTCAP) connects thousands of IoT assets to the cloud using the LoRaWAN® protocol. It expands LoRa network coverage to difficult to reach areas and is capable of packet forwarding user data between LoRa end points and a centrally located network server on the cloud, in a data center, or a public network.

Note: Check for an updated version of this document at https://www.multitech.com/brands/multiconnect-conduit-ap/.

Product Build Options

Product	Description
MTCAP-LAP3-915-001A	LTE Cat 1 mPower Programmable Access Point with internal LoRa antenna
MTCAP-LAP3-915-001L	LTE Cat 1 mLinux Programmable Access Point with internal LoRa antenna

Package Contents

Your device ships with the following:

1 – MTCAP

1 – 5 Volt, 2.5 Amp power supply

1 – RJ45 Ethernet cable

1 – Mounting bracket

1 – Quick Start

Important: Contact MultiTech Systems if a replacement power supply is needed. Using a different power supply may damage the device and voids the warranty.

Documentation Overview

The following documents are available at http://www.multitech.com/brands/multiconnect-conduit-ap. Select your model to find the documents specific for that device.

Document	Description	Part Number
Conduit AP MTCAP-LAP-915-001 User Guide	This document. Hardware, regulatory, and getting started information.	S000771
mPower Software Guide	*For mPower models only.*Includes steps for configuring and using devices using the mPower platform.	S000727
Conduit AP MTCAP and MTCAP2 Quick Start	Steps for getting started with hardware. Ships with the device and is available online.	82104800L
Telit LE910 AT Commands Reference Guide	For LAP3 devices, lists AT Commands and parameters used to communicate with your device.	80502ST10950A

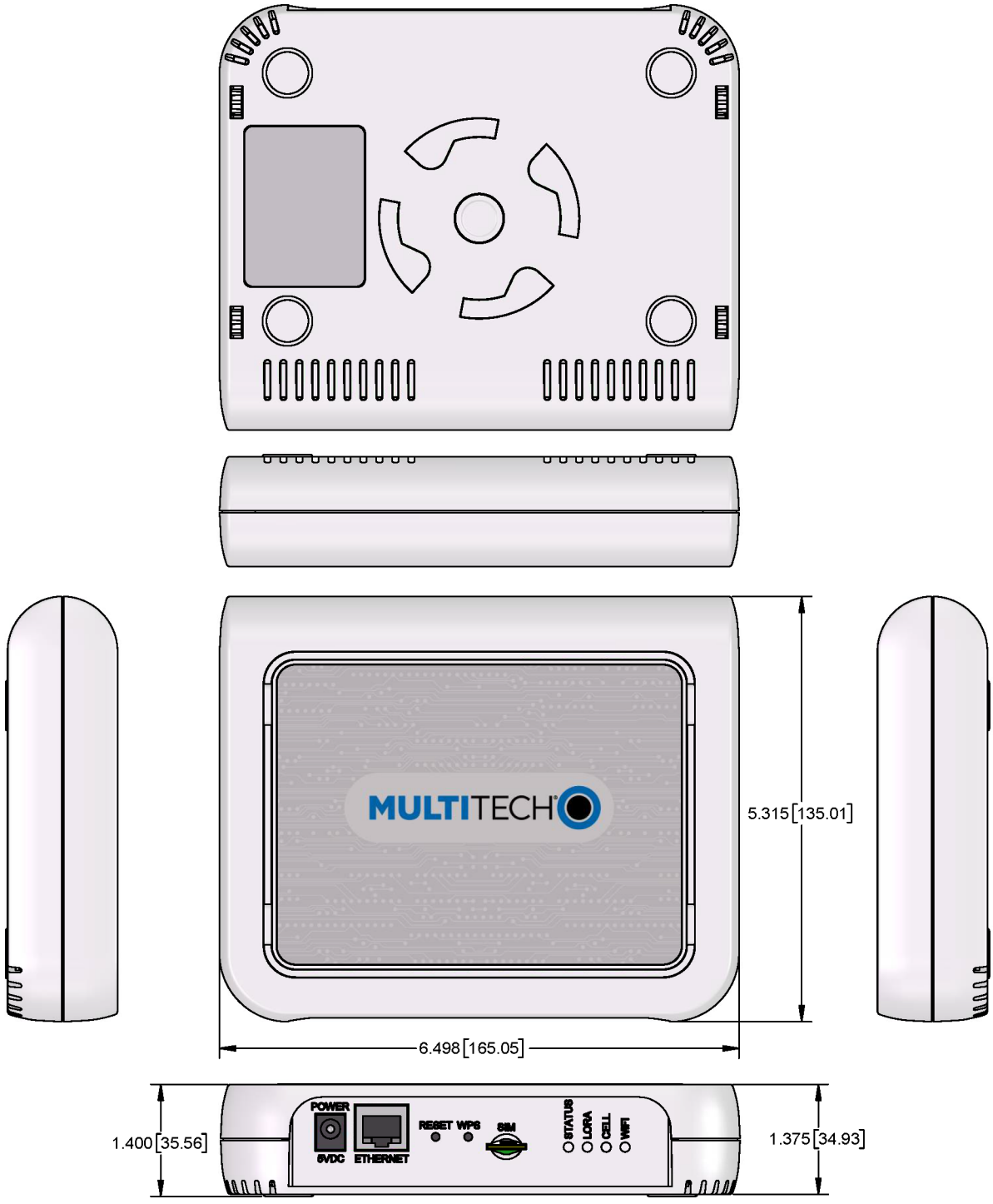
Developer Documentation

Our developer site includes information for the mLinux platform, advanced mPower information, and LoRa information.

- For mLinux getting started and advanced information, go to http://www.multitech.net/developer/software/mlinux/
- For advanced mPower information, go to http://www.multitech.net/developer/software/aep/
- For LoRa information, http://www.multitech.net/developer/software/lora/

Chapter 2 – Specifications and Hardware Information

Dimensions



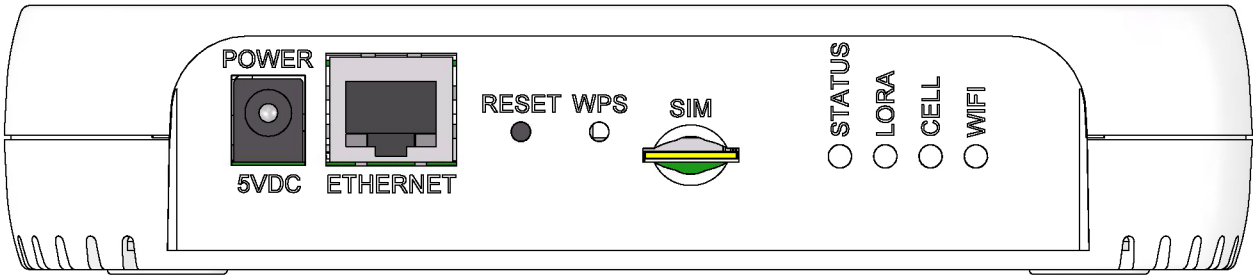
DIMENSIONS IN In [mm]

Specifications

Category	Description
General	
Standards	LoRaWAN 1.0.2 specifications
	LTE FDD Cat.1, 3GPP release 10 compliant
	3G fallback
RAM	256MB
Flash	256MB
Radio Frequency	
ISM Band	915 MHz ISM band for Australia
4G/LTE	2100 (B1) / 1800 (B3) / 850 (B5) / 800 (B8) / 700 (B28)
3G	2100 (B1) / 850 (B5) / 800 (B8)
Physical Description	
Weight	1.36 kg
Dimensions	Refer to Mechanical Drawings for Dimensions.
Chassis Type	PC-ABS
Environment	
Operating Temperature[1]	-0° C to +70° C
Storage Temperature	-40° C to +85° C
Humidity	20%-90% RH, non-condensing
Power Requirements	
Operating Voltage	5Vdc, 1.4A
Certifications and Compliance	
EMC and Radio Compliance	CISPR 32
	AS/NZS 4268:2017
Safety Compliance	RCM – Australia
	UL/CSA 60950-1
	IEC 60950-1 2nd Ed Am2
	UL/CSA 62368-1
	IEC 62368-1

[1] UL listed at 40° C, limited by AC power supply. Product has been tested to +70° C excluding power supply.

Connectors and LEDs



Note: Some features are available only on select models. The above image shows the model with all features. For models that don't have a cellular radio, the chassis will not have a SIM slot.

Item	Description
Connectors	
Power	5 Volt power jack.
Ethernet	RJ45 Ethernet jack.
Reset	Reset button. Reboots device or restores factory defaults. Refer to *Resetting the Device* for details.
WPS	Reserved for future use.
SIM	*Cellular models only.* Micro (3FF) SIM slot. Refer to *Installing SIM Card* for details.
LEDs	
STATUS	Blinks when operating system is fully loaded.
LORA	Lights when LoRa software is active.
CELL	*Cellular models only.* Lights when there is power to the radio. Blinks when the SIM is registered with the carrier.
WIFI	Reserved for future use.
Ethernet Link	Left LED on the Ethernet connector. Blinks when data is sent or received on the Ethernet link. Steady light when there is a valid Ethernet connection.
Ethernet Speed	Right LED on the Ethernet connector. Lit when the Ethernet is linked at 100 Mbps. If not lit, the Ethernet is linked at 10 Mbps.

Resetting the Device

You need:

- A pin, paperclip, or similar thin object that can fit into the reset hole

To reset the device:

1. Find the hole labeled RESET. The reset button is recessed into the case.
2. Use the pin to press and release the RESET button as follows:

   Reset options:
   - To reboot, press RESET for less than 3 seconds.
   - To reboot and restore user-defined defaults (if previously set), press RESET for 3 to 29 seconds.
   - To reboot, restore factory settings, and erase user-defined defaults, press RESET for 30 seconds or longer.

     The device restarts in commissioning mode. The system automatically removes all user accounts.

     Enter a new username and password to create your new administrative account. (Refer to **User Accounts** in the appropriate software guide for details on username and password requirements.)

Note: The device reboots when restoring settings.

Power Measurements

MTCAP-LAP3

Note:

- Multi-Tech Systems, Inc. recommends that you incorporate a 10% buffer into the power source when determining product load.
- **Maximum Power:** The continuous current during maximum data rate with the radio transmitter at maximum power.
- **Tx Pulse:** The average peak current during an LTE connection.
- **Inrush Charge:** The total inrush charge at power on.

Radio Protocol	Cellular Call Box Connection, No Data	Average Measured Current at Maximum Power	TX Pulse (AVG) Amplitude Current for GSM850 or Peak Current for LTE	Total Inrush Charge Measured in Millicoulomb	Total Inrush Duration
5.0 Volts					
WCDMA Band 1	189 mA	867 mA	1.00 A	1.0 mC	1.11 mS
LTE Band 1	191 mA	1.26 mA	1.33 A	1.0 mC	1.11 mS

Chapter 3 – Safety Information

Power Supply Caution

CAUTION: Do not replace the power supply with one designed for another product; doing so can damage the modem and void your warranty. Adapter shall be installed near the equipment and shall be easily accessible.
CAUTION: Pour garantir une protection continue contre les risques d'incendie, remplacez les fusibles uniquement par des fusibles du même type et du même calibre. L'adaptateur doit être installé à proximité de l'appareil et doit être facilement accessible.

Ethernet Ports

CAUTION: Ethernet ports and command ports are not designed to be connected to a public telecommunication network or used outside the building or campus.

Ports Ethernet

CAUTION: Les ports Ethernet et de commande ne sont pas conçus pour être raccordés à un réseau de télécommunications public ou utilisé à l'extérieur du bâtiment.

General Safety

The device is designed for and intended to be used in fixed and mobile applications. Fixed means the device is physically secured at one location and cannot be easily moved to another location. Mobile means the device is used in other than fixed locations.

CAUTION: Maintain a separation distance of at least 20 cm (8 inches) between the transmitter's antenna and the body of the user or nearby persons. The device is not designed for or intended to be used in portable applications within 20 cm (8 inches) of the user's body.
Attention: Maintenir une distance d'au moins 20 cm (8 po) entre l'antenne du récepteur et le corps de l'utilisateur ou à proximité de personnes. Le modem n'est pas conçu pour, ou destinés à être utilisés dans les applications portables, moins de 20 cm du corps de l'utilisateur.

Handling Precautions

To avoid damage due to the accumulation of static charge, use proper precautions when handling any cellular device. Although input protection circuitry has been incorporated into the devices to minimize the effect of static build-up, use proper precautions to avoid exposure to electronic discharge during handling and mounting the device.

Radio Frequency (RF) Safety

Due to the possibility of radio frequency (RF) interference, it is important that you follow any special regulations regarding the use of radio equipment. Follow the safety advice given below.

- Operating your device close to other electronic equipment may cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers' recommendations.
- Different industries and businesses restrict the use of cellular devices. Respect restrictions on the use of radio equipment in fuel depots, chemical plants, or where blasting operations are in process. Follow restrictions for any environment where you operate the device.

- Switch OFF your wireless device when in an aircraft. Using portable electronic devices in an aircraft may endanger aircraft operation, disrupt the cellular network, and is illegal. Failing to observe this restriction may lead to suspension or denial of cellular services to the offender, legal action, or both.
- Switch OFF your wireless device when around gasoline or diesel-fuel pumps and before filling your vehicle with fuel.
- Switch OFF your wireless device in hospitals and any other place where medical equipment may be in use.

Sécurité relative aux appareils à radiofréquence (RF)

À cause du risque d'interférences de radiofréquence (RF), il est important de respecter toutes les réglementations spéciales relatives aux équipements radio. Suivez les conseils de sécurité ci-dessous.

- Utiliser l'appareil à proximité d'autres équipements électroniques peut causer des interférences si les équipements ne sont pas bien protégés. Respectez tous les panneaux d'avertissement et les recommandations du fabricant.
- Certains secteurs industriels et certaines entreprises limitent l'utilisation des appareils cellulaires. Respectez ces restrictions relatives aux équipements radio dans les dépôts de carburant, dans les usines de produits chimiques, ou dans les zones où des dynamitages sont en cours. Suivez les restrictions relatives à chaque type d'environnement où vous utiliserez l'appareil.
- Éteignez votre appareil sans fil dans les avions. L'utilisation d'appareils électroniques portables en avion est illégale: elle peut fortement perturber le fonctionnement de l'appareil et désactiver le réseau cellulaires. S'il ne respecte pas cette consigne, le responsable peut voir son accès aux services cellulaires suspendu ou interdit, peut être poursuivi en justice, ou les deux.
- Éteignez votre appareil sans fil à proximité des pompes à essence ou de diesel avant de remplir le réservoir de votre véhicule de carburant.
- Éteignez votre appareil sans fil dans les hôpitaux ou dans toutes les zones où des appareils médicaux sont susceptibles d'être utilisés.

Interference with Pacemakers and Other Medical Devices

Potential interference

Radio frequency energy (RF) from cellular devices can interact with some electronic devices. This is electromagnetic interference (EMI). The FDA helped develop a detailed test method to measure EMI of implanted cardiac pacemakers and defibrillators from cellular devices. This test method is part of the Association for the Advancement of Medical Instrumentation (AAMI) standard. This standard allows manufacturers to ensure that cardiac pacemakers and defibrillators are safe from cellular device EMI.

The FDA continues to monitor cellular devices for interactions with other medical devices. If harmful interference occurs, the FDA will assess the interference and work to resolve the problem.

Precautions for pacemaker wearers

If EMI occurs, it could affect a pacemaker in one of three ways:

- Stop the pacemaker from delivering the stimulating pulses that regulate the heart's rhythm.
- Cause the pacemaker to deliver the pulses irregularly.
- Cause the pacemaker to ignore the heart's own rhythm and deliver pulses at a fixed rate.

Based on current research, cellular devices do not pose a significant health problem for most pacemaker wearers. However, people with pacemakers may want to take simple precautions to be sure that their device doesn't cause a problem.

- Keep the device on the opposite side of the body from the pacemaker to add extra distance between the pacemaker and the device.
- Avoid placing a turned-on device next to the pacemaker (for example, don’t carry the device in a shirt or jacket pocket directly over the pacemaker).

Device Maintenance

Do not attempt to disassemble the device. There are no user serviceable parts inside.

When maintaining your device:

- Do not misuse the device. Follow instructions on proper operation and only use as intended. Misuse could make the device inoperable, damage the device and/or other equipment, or harm users.
- Do not apply excessive pressure or place unnecessary weight on the device. This could result in damage to the device or harm to users.
- Do not use this device in explosive or hazardous environments unless the model is specifically approved for such use. The device may cause sparks. Sparks in explosive areas could cause explosion or fire and may result in property damage, severe injury, and/or death.
- Do not expose your device to any extreme environment where the temperature or humidity is high. Such exposure could result in damage to the device or fire. Refer to the device specifications regarding recommended operating temperature and humidity.
- Do not expose the device to water, rain, or spilled beverages. It is not waterproof. Exposure to liquids could result in damage to the device.
- Do not place the device alongside computer discs, credit or travel cards, or other magnetic media. The information contained on discs or cards may be affected by the device.
- Using accessories that MultiTech has not authorized or that are not compliant with MultiTech's accessory specifications may invalidate the warranty.

If the device is not working properly, contact MultiTech Technical Support.

UL Notice

UL Listed at 40° C, limited by power supply. UL Certification does not apply or extend to an ambient above 40° C and has not been evaluated by UL for ambient greater than 40° C. “UL has evaluated this device for use in ordinary locations only. Installation in a vehicle or other outdoor locations has not been evaluated by UL. UL Certification does not apply or extend to use in vehicles or outdoor applications or in ambient above 40° C.”

Spécifications UL

Listé UL à 40° C, limité par l'alimentation. La certification UL ne s'applique pas ou ne s'étend pas à des températures dépassant 40° C, et le produit n'a pas été évalué par UL pour une température ambiante dépassant 40° C. « UL a évalué cet appareil pour une utilisation en zone ordinaire uniquement. Le produit n'a pas été évalué par UL pour une installation dans un véhicule ou en extérieur. La certification UL ne s'applique pas ou ne s'étend pas aux applications dans un véhicule, en extérieur ou en présence d'une température ambiante supérieure à 40° C ».

User Responsibility

Respect all local regulations for operating your wireless device. Use the security features to block unauthorized use and theft.

Chapter 4 – Labels

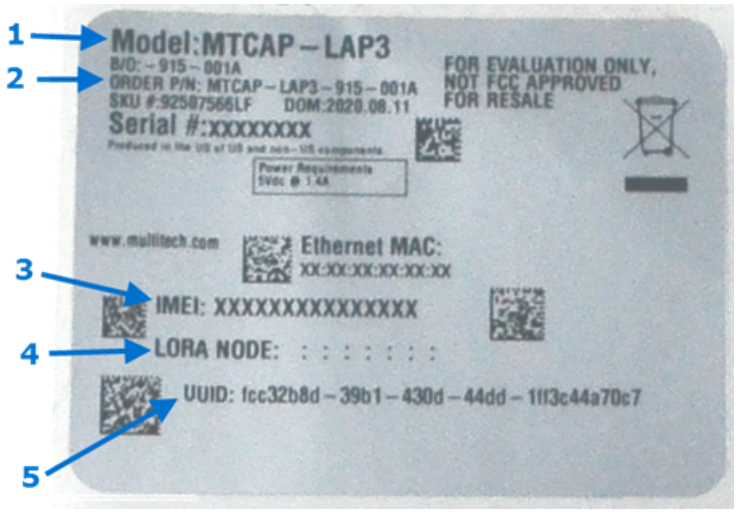
Example Labels

Note: Actual labels vary depending on the regulatory approval markings and content.

The label shown is not the actual size.

1 - MultiTech Model Identification.
2 - MultiTech Ordering Part Number.
3 - IMEI Number
4 - Device Node Number
5 - UUID

Example Device Label



Example Package Label

Chapter 5 – Setting Up Hardware

Installing a SIM Card

Models with cellular capability have a micro SIM slot, you'll need a micro (3FF) SIM card from your network provider.

To install the SIM card:

- With the contact side facing down, align the notched edge as shown on the following image and slide the SIM card completely into the SIM holder.

Removing a SIM Card

To remove the SIM card, push the SIM card in. The device ejects the SIM card.

Cabling the Device

To cable the device:

1. Connect the Ethernet cable to the Ethernet port on the device and to your computer.
2. Connect the power supply to the device's power jack and plug it into an electrical outlet. When the operating system is fully loaded, the STATUS LED blinks.

Chapter 6 – Getting Started

After powering up your device, refer to the following sources for help configuring and using your device.

mPower Models

If your device uses the mPower platform, getting started information is in *mPower Software Guide* (S000727), available through your model's page at https://www.multitech.com/brands/multiconnect-conduit-ap

mLinux Models

If your device uses the mLinux platform, getting started information is at http://www.multitech.net/developer/software/mlinux/getting-started-with-conduit-mlinux/

Chapter 7 – Mounting the Device

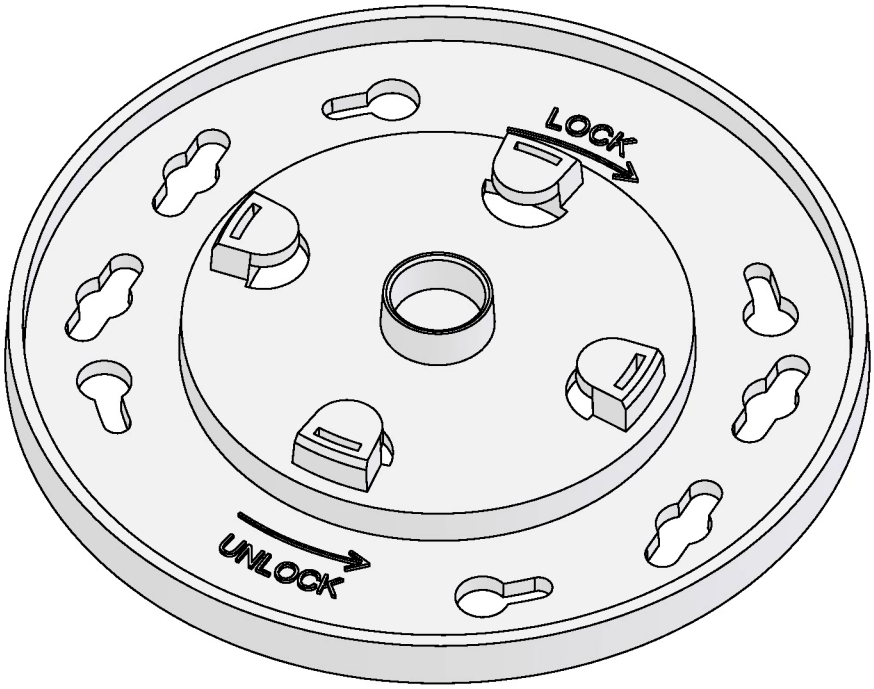
Mounting the Device

The device ships with a mounting bracket.

You will need

- Device
- Mounting bracket
- Four #6 screws, with anchors (not provided)
- Screwdriver
- Drill

Mounting Bracket



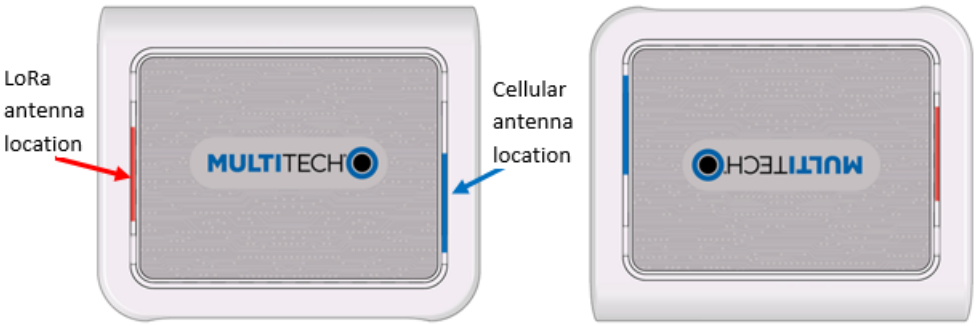
Determining Location

Follow these guidelines for best performance:

- The LoRa antenna is omnidirectional, but for best results, mount the device so the LoRa antenna is in a vertical position as shown in the following image.
- Place the device as high as possible, such as near the top of a wall.
- Select a location central to all devices to be connected to this device.
- Avoid obstructions.

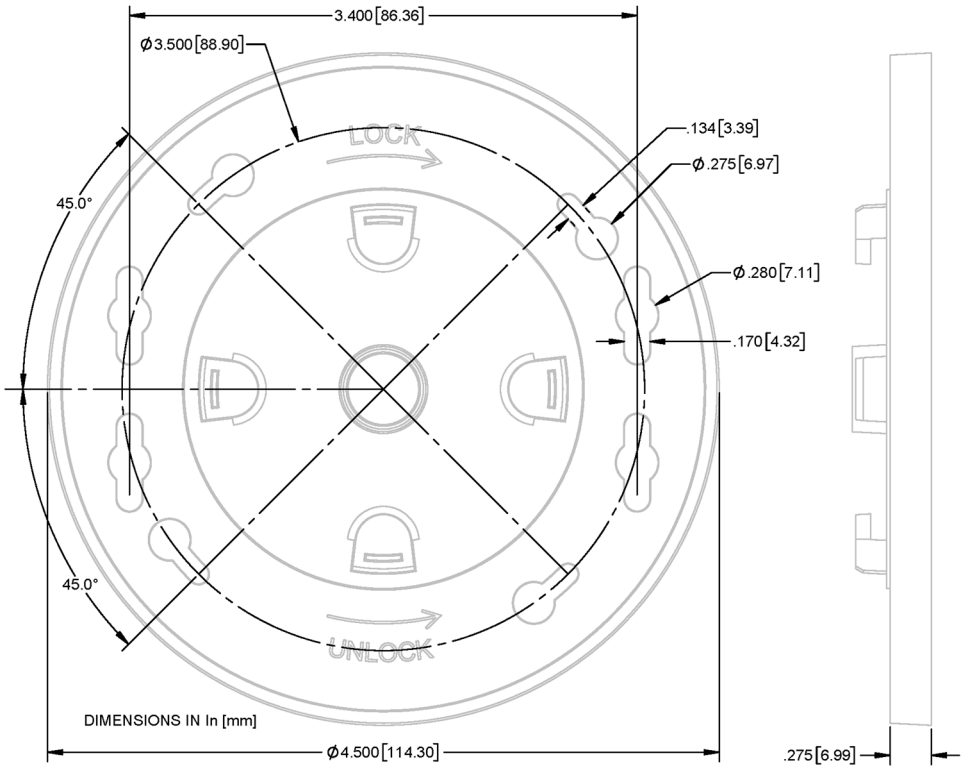
Important: Thick walls and reflective surfaces, such as metal, weaken the signal between the device and other devices.

- Note the LoRa antenna location in the following image. The LoRa signal will be strongest radiating from that side of the device. The LoRa antenna is 31.2 mm long.
- We recommend conducting a site survey to test the signal strength in different locations before you mount the device.



Mounting the Device

1. Determine where you want to mount the device.
2. Mark where you want the screws to go.



3. Drill holes for the screws and insert anchors.
4. Place the mounting bracket and secure it with screws.
5. Attach the device to the bracket and rotate to lock into place.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Chapter 8 – Regulatory and Environmental Information

Regulatory Compliance Mark (RCM) for Australia

This product complies with the requirements of the Regulatory Compliance Mark (RCM) for Electrical Regulatory Authorities Council (ERAC), Electrical Equipment Safety System (EESS), and the Australian Communications and Media Authority (ACMA) for Electromagnetic Compatibility (EMC).

Software Version

The MTCAP-LAP3 was approved with mLinux version 5.1.8.

Waste Electrical and Electronic Equipment Statement

Note: This statement may be used in documentation for your final product applications.

WEEE Directive

The WEEE Directive places an obligation on EU-based manufacturers, distributors, retailers, and importers to take-back electronics products at the end of their useful life. A sister directive, ROHS (Restriction of Hazardous Substances) complements the WEEE Directive by banning the presence of specific hazardous substances in the products at the design phase. The WEEE Directive covers all MultiTech products imported into the EU as of August 13, 2005. EU-based manufacturers, distributors, retailers and importers are obliged to finance the costs of recovery from municipal collection points, reuse, and recycling of specified percentages per the WEEE requirements.

Instructions for Disposal of WEEE by Users in the European Union

The symbol shown below is on the product or on its packaging, which indicates that this product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.

July, 2005

REACH Statement

Registration of Substances

Multi-Tech Systems, Inc. confirms that none of its products or packaging contain any of the Substances of Very High Concern (SVHC) on the REACH Candidate List, in a concentration above the 0.1% by weight allowable limit

The latest **197** substances restricted per the REACH Regulation were **last updated January 2019**. Refer to the following for the most current candidate list of substances: http://echa.europa.eu/candidate-list-table.

Restriction of the Use of Hazardous Substances (RoHS)

Multi-Tech Systems, Inc.

Certificate of Compliance

2015/863

Multi-Tech Systems, Inc. confirms that its embedded products comply with the chemical concentration limitations set forth in the directive 2015/863 of the European Parliament (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment - RoHS 3).

These MultiTech products do not contain the following banned chemicals[1]:

- Lead, [Pb] < 1000 PPM
- Mercury, [Hg] < 100 PPM
- Cadmium, [Cd] < 100 PPM
- Hexavalent Chromium, [Cr+6] < 1000 PPM
- Polybrominated Biphenyl, [PBB] < 1000 PPM
- Polybrominated Diphenyl Ethers, [PBDE] < 1000 PPM
- Bis(2-Ethylhexyl) phthalate (DEHP): < 1000 ppm
- Benzyl butyl phthalate (BBP): < 1000 ppm
- Dibutyl phthalate (DBP): < 1000 ppm
- Diisobutyl phthalate (DIBP): < 1000 ppm

Environmental considerations:

- Moisture Sensitivity Level (MSL) =1
- Maximum Soldering temperature = 260C (in SMT reflow oven)

[1]Lead usage in some components is exempted by the following RoHS annex, therefore higher lead concentration would be found in some modules (>1000 PPM);

- Resistors containing lead in a glass or ceramic matrix compound.

Information on HS/TS Substances According to Chinese Standards

In accordance with China's Administrative Measures on the Control of Pollution Caused by Electronic Information Products (EIP) # 39, also known as China RoHS, the following information is provided regarding the names and concentration levels of Toxic Substances (TS) or Hazardous Substances (HS) which may be contained in Multi-Tech Systems Inc. products relative to the EIP standards set by China's Ministry of Information Industry (MII).

Hazardous/Toxic Substance/Elements

Name of the Component	Lead (PB)	Mercury (Hg)	Cadmium (CD)	Hexavalent Chromium (CR6+)	Polybrominated Biphenyl (PBB)	Polybrominated Diphenyl Ether (PBDE)
Printed Circuit Boards	O	O	O	O	O	O
Resistors	X	O	O	O	O	O
Capacitors	X	O	O	O	O	O
Ferrite Beads	O	O	O	O	O	O
Relays/Opticals	O	O	O	O	O	O
ICs	O	O	O	O	O	O
Diodes/ Transistors	O	O	O	O	O	O
Oscillators and Crystals	X	O	O	O	O	O
Regulator	O	O	O	O	O	O
Voltage Sensor	O	O	O	O	O	O
Transformer	O	O	O	O	O	O
Speaker	O	O	O	O	O	O
Connectors	O	O	O	O	O	O
LEDs	O	O	O	O	O	O
Screws, Nuts, and other Hardware	X	O	O	O	O	O
AC-DC Power Supplies	O	O	O	O	O	O
Software /Documentation CDs	O	O	O	O	O	O
Booklets and Paperwork	O	O	O	O	O	O
Chassis	O	O	O	O	O	O

X Represents that the concentration of such hazardous/toxic substance in all the units of homogeneous material of such component is higher than the SJ/Txxx-2006 Requirements for Concentration Limits.
O Represents that no such substances are used or that the concentration is within the aforementioned limits.

Information on HS/TS Substances According to Chinese Standards (in Chinese)

依照中国标准的有毒有害物质信息

根据中华人民共和国信息产业部 (MII) 制定的电子信息产品 (EIP) 标准－中华人民共和国《电子信息产品污染控制管理办法》（第 39 号），也称作中国 RoHS, 下表列出了 Multi-Tech Systems, Inc. 产品中可能含有的有毒物质 (TS) 或有害物质 (HS) 的名称及含量水平方面的信息。

有害/有毒物质/元素

成分名称	铅 (PB)	汞 (Hg)	镉 (CD)	六价铬 (CR6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板	O	O	O	O	O	O
电阻器	X	O	O	O	O	O
电容器	X	O	O	O	O	O
铁氧体磁环	O	O	O	O	O	O
继电器/光学部件	O	O	O	O	O	O
ICs	O	O	O	O	O	O
二极管/晶体管	O	O	O	O	O	O
振荡器和晶振	X	O	O	O	O	O
调节器	O	O	O	O	O	O
电压传感器	O	O	O	O	O	O
变压器	O	O	O	O	O	O
扬声器	O	O	O	O	O	O
连接器	O	O	O	O	O	O
LEDs	O	O	O	O	O	O
螺丝、螺母以及其它五金件	X	O	O	O	O	O
交流-直流电源	O	O	O	O	O	O
软件/文档 CD	O	O	O	O	O	O
手册和纸页	O	O	O	O	O	O
底盘	O	O	O	O	O	O

X 表示所有使用类似材料的设备中有害/有毒物质的含量水平高于 SJ/Txxx-2006 限量要求。
O 表示不含该物质或者该物质的含量水平在上述限量要求之内。

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