



## Conduit<sup>®</sup> AP

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MTCAP2-L4E1-868-042x-POE and MTCAP2-868-042x-POE User Guide



## Conduit AP MTCAP2-L4E1-868-042x-POE and MTCAP2-868-042x-POE User Guide

Models: MTCAP2-L4E1-868-042A-POE, MTCAP2-L4E1-868-042L-POE, MTCAP2-868-042A-POE, MTCAP2-868-042L-POE

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Country	By Email	By Phone
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# Contents

<b>Chapter 1 – Product Overview .....</b>	<b>5</b>
Overview .....	5
Product Build Options .....	5
Package Contents .....	5
Documentation Overview .....	6
Developer Documentation .....	6
Power over Ethernet (PoE) .....	6
<b>Chapter 2 – Specifications and Hardware Information .....</b>	<b>7</b>
Dimensions .....	7
Specifications .....	8
Connectors and LEDs .....	9
Resetting the Device .....	10
Power Measurements .....	10
MTCAP2-868-042L .....	10
MTCAP2-L4E1-868 .....	11
Antenna .....	11
Antenna Compliance .....	11
Pulse Electronics Antenna .....	12
<b>Chapter 3 – Safety Information .....</b>	<b>13</b>
PoE Safety .....	13
Warnings and Cautions .....	13
Ethernet Ports .....	13
Ports Ethernet .....	13
Handling Precautions .....	13
General Safety .....	14
Radio Frequency (RF) Safety .....	14
Sécurité relative aux appareils à radiofréquence (RF) .....	14
Interference with Pacemakers and Other Medical Devices .....	15
Potential interference .....	15
Precautions for pacemaker wearers .....	15
Device Maintenance .....	15
UL Notice .....	16
Spécifications UL .....	16
User Responsibility .....	16
<b>Chapter 4 – Labels .....</b>	<b>17</b>
Example Device Labels .....	17
-868-042 Models .....	17

-L4E1-042 Models .....	18
<b>Chapter 5 – Setting Up Hardware.....</b>	<b>19</b>
Installing a SIM Card .....	19
Removing a SIM Card .....	19
Attaching the Antenna .....	19
Cabling the Device.....	19
<b>Chapter 6 – Getting Started .....</b>	<b>20</b>
mPower Models .....	20
mLinux Models.....	20
<b>Chapter 7 – Mounting the Device.....</b>	<b>21</b>
Mounting the Device.....	21
You will need.....	21
Determining Location.....	21
Mounting the Device .....	22
<b>Chapter 8 – Regulatory and Environmental Information .....</b>	<b>25</b>
EMC, Safety, and Radio Equipment Directive (RED) Compliance .....	25
Industry Canada .....	25
Waste Electrical and Electronic Equipment Statement .....	25
WEEE Directive.....	25
Instructions for Disposal of WEEE by Users in the European Union .....	25
Restriction of the Use of Hazardous Substances (RoHS) .....	27
REACH Statement .....	27
Registration of Substances.....	27
Information on HS/TS Substances According to Chinese Standards .....	28
Information on HS/TS Substances According to Chinese Standards (in Chinese) .....	29
<b>Index.....</b>	<b>30</b>

# Chapter 1 – Product Overview

## Overview

Conduit AP (MTCAP2) connects thousands of IoT assets to the cloud using the LoRaWAN<sup>®</sup> 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
MTCAP2-L4E1-868-042A-POE	LTE Cat 4 mPower Programmable Access Point with optional PoE power, external LoRa antenna, and Europe/UK Accessory Kit
MTCAP2-L4E1-868-042L-POE	LTE Cat 4 mLinux Programmable Access Point with optional PoE power, external LoRa antenna, and Europe/UK Accessory Kit
MTCAP2-868-042A-POE	mPower Programmable Access Point with optional PoE power, external LoRa antenna, and Europe/UK Accessory Kit
MTCAP2-868-042L-POE	mLinux Programmable Access Point with optional PoE power, external LoRa antenna, and Europe/UK Accessory Kit

## Package Contents

Your device ships with the following:

- 1 – MTCAP2
- 1 – Mounting Bracket
- 1 – RJ45 Ethernet cable
- 1 - LoRa antenna
- 1 – Quick Start

**Note:** You will also need either a 5 Volt, 2.5 Amp power supply or a PoE injector.

## 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 MTCAP2-L4E1-868-042x User Guide	This document. Hardware, regulatory, and getting started information.	S000746
mPower Software Guide	<i>For mPower models only.</i> 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.	82104750L
Telit LE910 AT Commands Reference Guide	For L4E1 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.

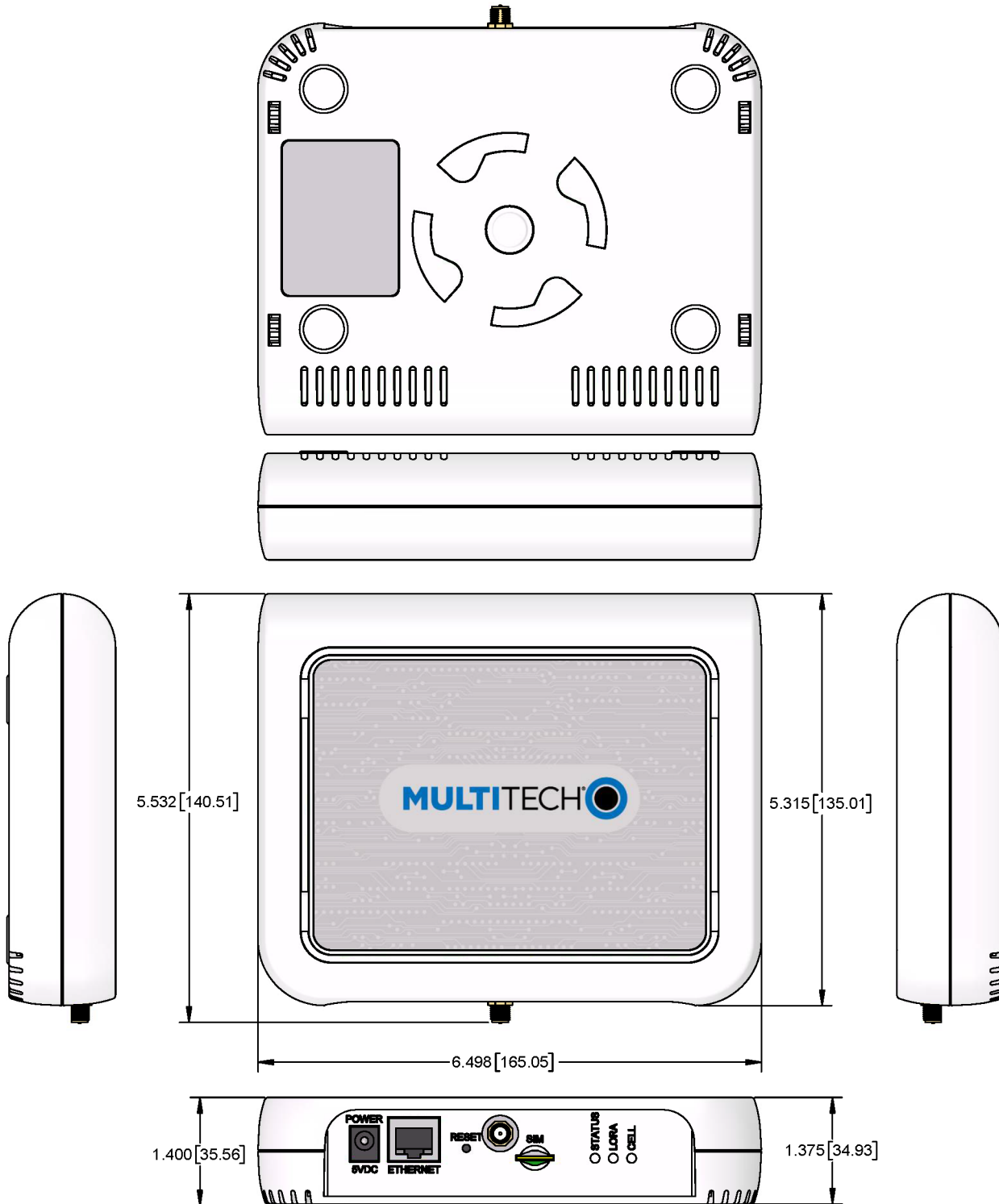
- For mLinux getting started and advanced information, go to <http://www.multitech.net/developer/software/mlinux/>
- For advanced mPower information, go to <http://www.multitech.net/developer/software/aep/>
- For LoRa information, <http://www.multitech.net/developer/software/lora/>

## Power over Ethernet (PoE)

Some MTCAP models support PoE. For information on using and troubleshooting PoE, refer to the PoE Application Note <https://www.multitech.com/documents/publications/application-notes/S000678.pdf>

## Chapter 2 – Specifications and Hardware Information

### Dimensions



DIMENSIONS IN In [mm]

## Specifications

Category	Description
<b>General</b>	
Standards	LoRaWAN 1.0.2 specifications
	LTE FDD Cat 4, 3GPP release compliant (-L4E1 models only)
	HSPA+ with GPRS fallback (-L4E1 models only)
RAM	256MB
Flash	256MB
<b>Radio Frequency</b>	
ISM Band	868 MHz ISM band for Europe
4G/LTE	4G: B1, B3, B7, B8, B20, B28A (-L4E1 models only)
3G	3G: B1, B3, B8 (-L4E1 models only)
2G	2G: B3, B8 (-L4E1 models only)
<b>Physical Description</b>	
Weight	0.4 kg
Dimensions	Refer to Mechanical Drawings for Dimensions.
Chassis Type	PC-ABS
<b>Environment</b>	
Operating Temperature <sup>1</sup>	-0° C to +70° C
Storage Temperature	-40° C to +85° C
Humidity	20%-90% RH, non-condensing
<b>Power Requirements</b>	
Operating Voltage	5Vdc, 1.4A
PoE Standard	IEEE 802.3at
PoE Input Power	38-57 Vdc
LoRa ERP <sup>2</sup>	13.3 dBm ERP for low power channels, maximum 14 dB.
	25.8 dB for high power channels, maximum 27 dB.
<b>Certifications and Compliance</b>	
EMC and Radio Compliance	CE Mark, RED (EU)
Safety Compliance	IEC 62368-1 2nd Ed

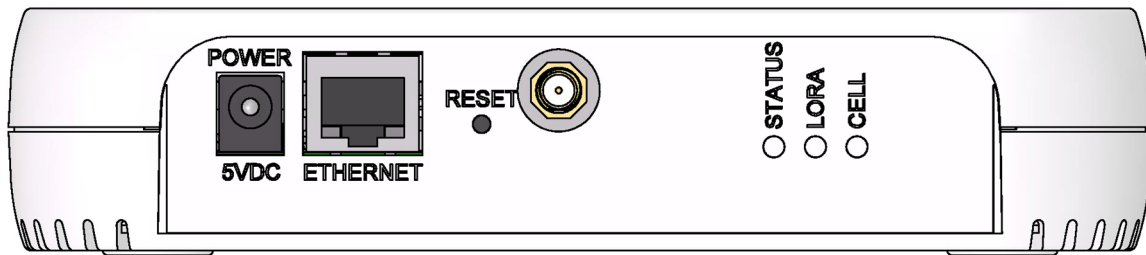
<sup>1</sup> UL listed at 40° C, limited by AC power supply. Product has been tested to +70° C excluding power supply.

<sup>2</sup>Determined using the internal LoRa antenna of 0.85 dB gain. If using an external LoRa antenna, adjust levels to ensure maximum values are not exceeded.

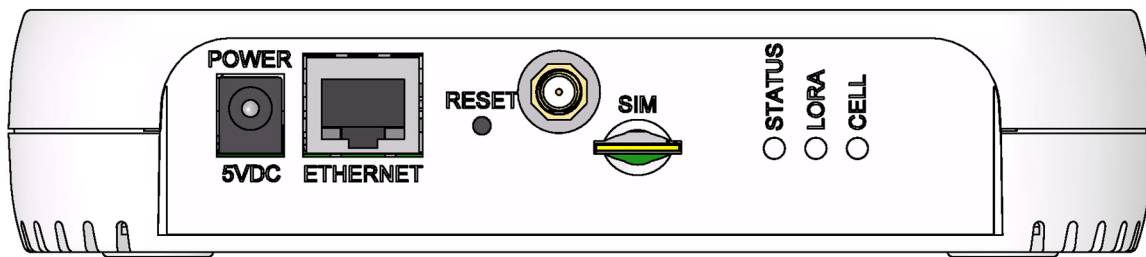


## Connectors and LEDs

LoRa only models



LoRa and cellular radio models



Item	Description
<b>Connectors</b>	
Power	5 Volt power jack.
Ethernet	RJ45 Ethernet jack.
Reset	Reset button. Reboots device or restores factory defaults. Refer to <a href="#">Resetting the Device</a> for details.
(No label)	Connector for external LoRa antenna.
SIM	<i>Cellular models only.</i> Micro (3FF) SIM slot. Refer to <i>Installing SIM Card</i> for details.
<b>LEDs</b>	
STATUS	Blinks when operating system is fully loaded.
LORA	Lights when LoRa software is active.
CELL	<i>Cellular models only.</i> Lights when there is power to the radio. Blinks when the SIM is registered with the carrier.
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.

For more information about commissioning mode, consult the mPower Software Guide or mlinux developer resources. Refer to [Documentation Overview](#) for details.

## Power Measurements

### MTCAP2-868-042L

**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 and at LoRa Max power setting
- **TX Pulse:** The average peak current during LoRa transmission.
- **Inrush Charge:** The total inrush charge at power on.

Voltage	Sleep Mode Current	Cellular Call Box Connection No Data, OR IDLE Measure, with no Radio	Average Measured Current at Maximum Power	TX Pulse Peak Current for no radio model	Total Inrush Charge	Total Inrush Charge Duration
5 VDC	N/A	137 mA	452 mA	584 mA	0.962 mC	1.69 mS
38 VDC POE	N/A	61 mA	126 mA	272 mA	0.127 mC	10.6 mS
56 VDC	N/A	40 mA	106 mA	224 mA	0.130 mC	10.3 mS

## MTCAP2-L4E1-868

### 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 a GSM850 transmission burst period or HSDPA/LTE connection. The transmission burst duration for GSM850 can vary, depending on what transmission scheme is being deployed (GPRS Class 8, Class 10, GSM, etc.).
- **Inrush Charge:** The total inrush charge at power on.

Voltage	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
<b>EGSM900</b>					
5 VDC only	159 mA	740 mA	2.06 A	1.40 mC	1.63 mS
38 VDC POE	72 mA	183 mA	324 mA	0.178 mC	10.7 mS
56 VDC POE	49 mA	141 mA	216 mA	0.167 mC	10.5 mS
<b>WCDMA Band 1</b>					
5 VDC only	162 mA	1.02 A	1.11 A	1.40 mC	1.63 mS
38 VDC POE	71 mA	285 mA	364 mA	0.178 mC	10.7 mS
56 VDC POE	48 mA	195 mA	268 mA	0.167 mC	10.5 mS
<b>LTE Band 1</b>					
5 VDC only	161 mA	1.31 A	1.42 A	1.40 mC	1.63 mS
38 VDC POE	71 mA	305 A	372 mA	1.78 mC	10.7 mS
56 VDC POE	48 mA	212 mA	280 mA	0.167 mC	10.5 mS

## Antenna

Your device ships with the following antenna. Any replacement antenna should fall within the same specifications.

### Antenna Compliance

This radio transmitter [IC: 125A-0061] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Le présent émetteur radio [IC: 125A-0061] a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

## Pulse Electronics Antenna

Manufacturer:	Pulse Electronics
Description:	868-928 MHz RP-SMA Antenna, 8"
Model Number:	W1063
MultiTech Part Number:	45009830L

### MultiTech ordering information:

Ordering Part Number	Quantity
AN868-915A-1HRA	1
AN868-915A-10HRA	10
AN868-915A-50HRA	50

## Antenna Specifications

Category	Description
Frequency Range	868-928 MHz
Impedance	50 Ohms
VSWR	$\leq 2.0$
Gain	3.0 dBi
Radiation	Omni
Polarization	Vertical

## Chapter 3 – Safety Information

### PoE Safety



#### Warnings and



#### Cautions

Warning and Caution symbols mean potential danger.



**Warning:** Only trained and qualified personnel should install, replace, or service this equipment.

- Disconnect PoE power (Ethernet PoE port) before servicing the device.
- Do not work on the system or connect or disconnect cables during periods of lightning activity.
- This device is not designed or approved to be used in any Hazardous Locations. Do not install or operate device if area is known to be an explosive environment.



#### CAUTION:

Power over Ethernet (PoE) Certification does not apply or extend to voltages outside of standard PoE range. Any PoE voltages beyond 0Vdc to 60Vdc have not been evaluated by UL or MULTITECH. Nominal PoE voltage is 38 Vdc to 57 VDC. The end user supplies the PoE cable.

- Recommended PoE: 802.3at-compliant Type 2 Class 4 Power-over-Ethernet (PoE) Powered Devices (PDs) and require PoE Power Supply Equipment (PSE) that is 802.3at-compliant with minimum 25.5W output power capability.

Ethernet port is not designed to be connected to a public Telecommunication (PSTN) or any other connection other than IEEE 802.3-2012 power over Ethernet devices.

Do not remove product labels.

### 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.

### 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.

## 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 23 cm (9 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 23 cm (9 inches) of the user's body.

**Attention:** Maintenir une distance d'au moins 23 cm (9 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 23 cm du corps de l'utilisateur.

## 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.
- Do not place the antenna outdoors.
- 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.
- Ne placez pas l'antenne en extérieur.
- 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, such as antennas, 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 Device Labels

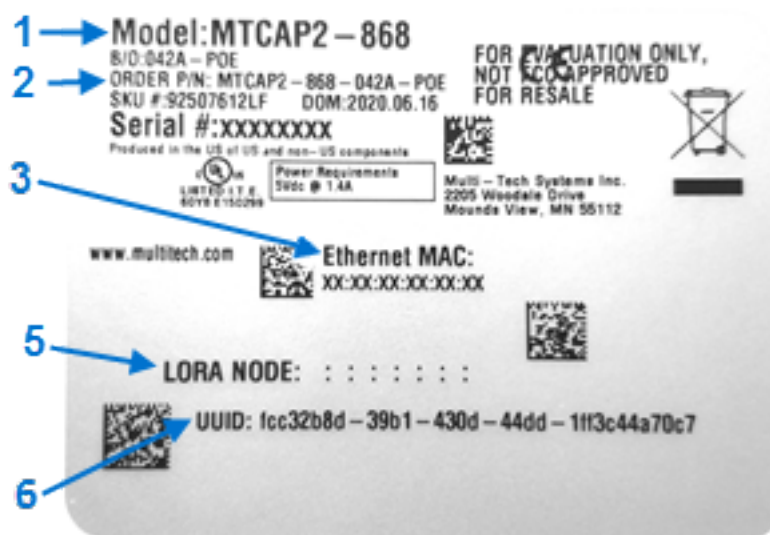
**Note:** Actual labels vary depending on the regulatory approval markings and content.

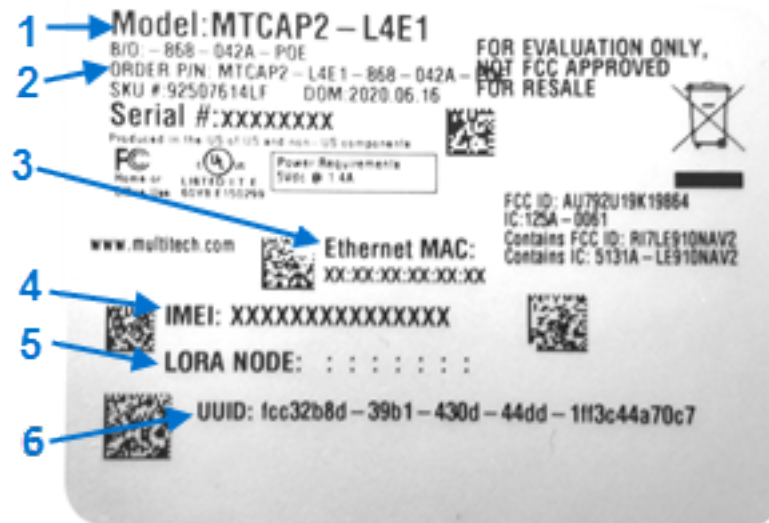
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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

### -868-042 Models



**-L4E1-042 Models**

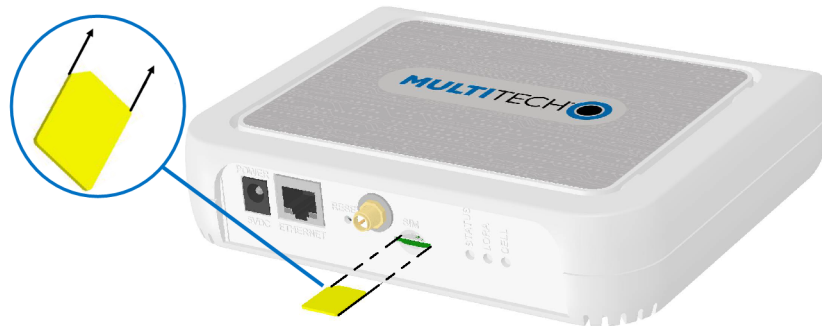
## Chapter 5 – Setting Up Hardware

### 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.

### Attaching the Antenna

To connect the antenna:

- Finger-tighten the antenna to the SMA antenna connector on your device.

### Cabling the Device

To cable the device:

**Note:** If using PoE to power your device, refer to [Power over Ethernet \(PoE\)](#) for additional information and skip Step 2.

1. Connect the Ethernet cable to the Ethernet port on the device.
2. Connect the power supply to the MTCAP'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

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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/>

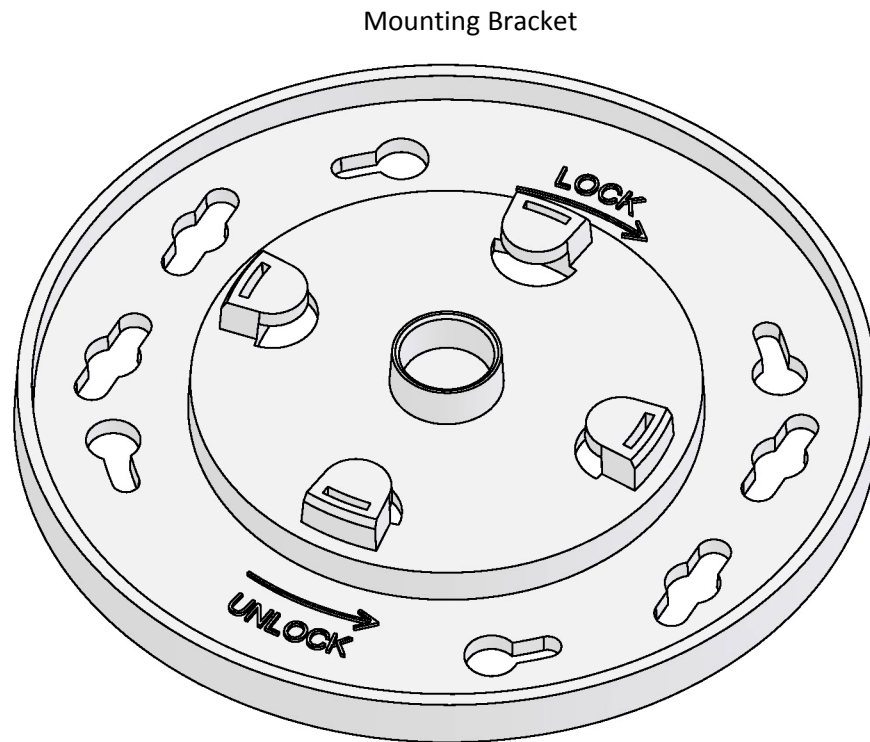
# Chapter 7 – Mounting the Device

## 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



### Determining Location

Follow these guidelines for best performance:

- For optimal performance, place the device at a level higher than the end devices.
- Angle the antenna so it is not parallel to the surface. It does not need to be perpendicular to the surface, but it should not be flat.



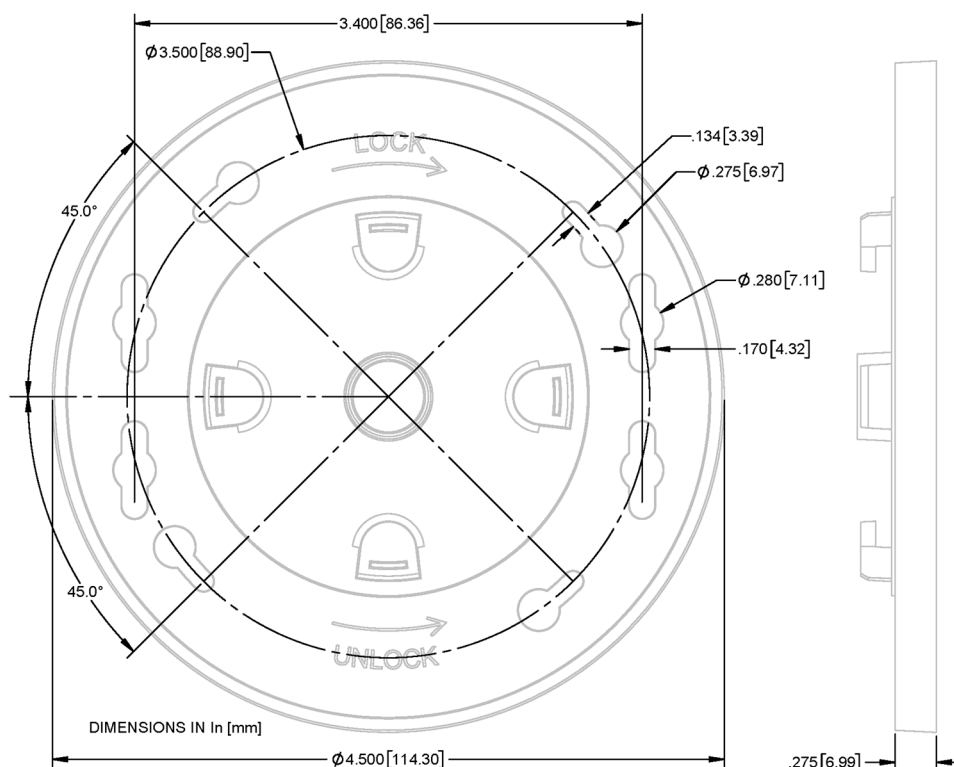
- Select a location central to all devices to be connected to this device.
- Avoid obstructions.

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

- We recommend conducting a site survey to test the signal strength in different locations before you mount the device.

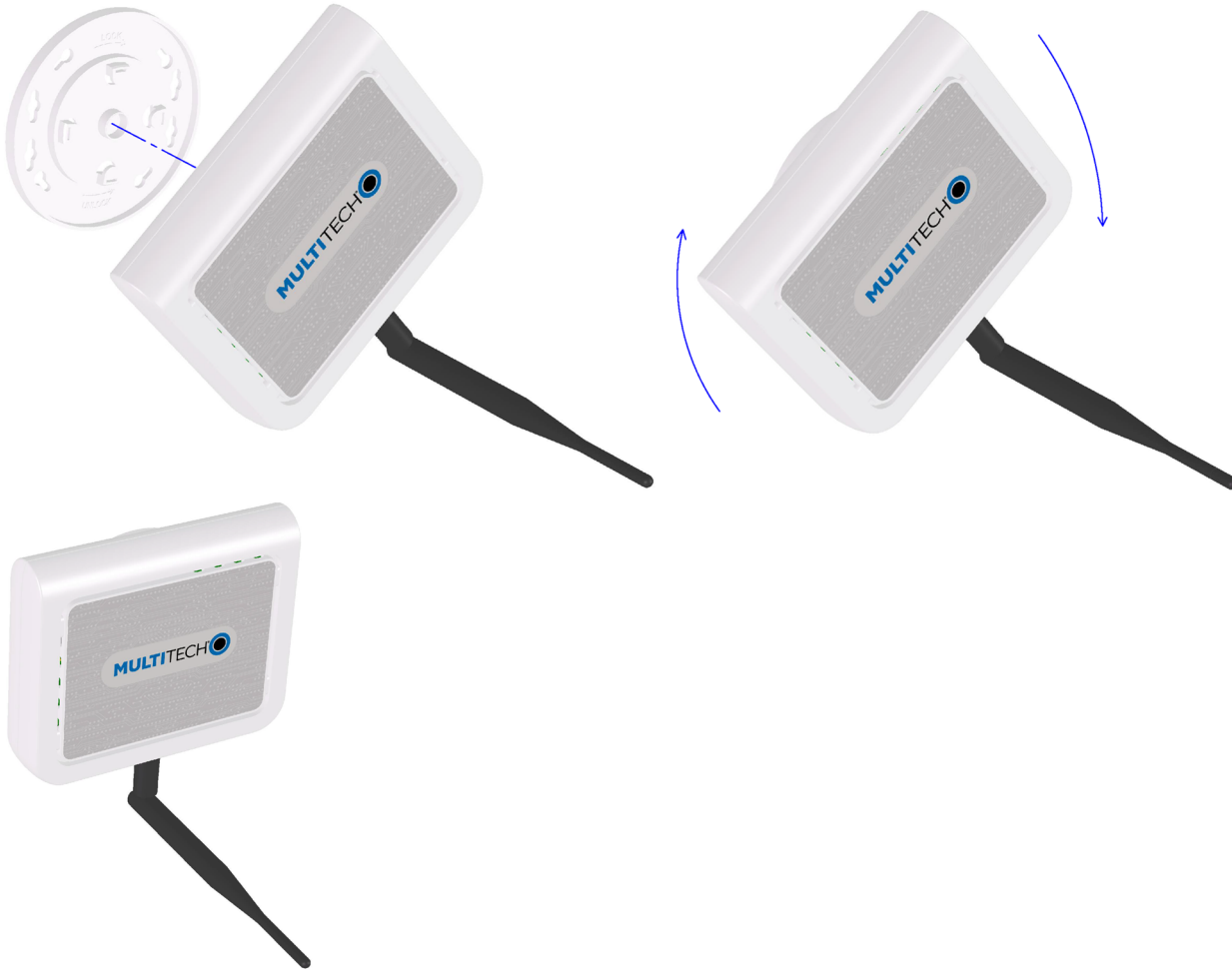
## Mounting the Device

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.







## Chapter 8 – Regulatory and Environmental Information

### EMC, Safety, and Radio Equipment Directive (RED) Compliance



The CE mark is affixed to this product to confirm compliance with the following European Community Directives:

Council Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment;  
and  
Council Directive 2014/53/EU on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

MultiTech declares that this device is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU. The declaration of conformity may be requested at <https://www.multitech.com/landing-pages/events/campaigns/promotions/products/certifications/red-certifications>.

### Industry Canada

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.

### 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



## 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<sup>1</sup>:

- 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)

<sup>1</sup>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.

## 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>.

## 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。

antenna .....	12
attach .....	19

build options .....5

CELL LED .....	9
certifications.....	8
Chinese hazardous substances	
Chinese version.....	29
English version .....	28
configuring .....	20
connectors.....	9

device	
maintenance .....	15
dimensions .....	7
documentation.....	6

Ethernet .....	9 19
Ethernet ports.....	13

getting started.....20

hazardous substances .....27

## interférence des radiofréquences.....14

labels .....17

LEDs .....	9
LORA LED .....	9

maintenance .....	15
mLinux.....	20
modem	
safety .....	14
mounting device .....	21
mPower software.....	20

package contents .....	5
Ports Ethernet .....	13
power jack.....	9
power measurements .....	10 11
power supply.....	19

radio frequency interference .....	14
receive sensitivity.....	8
remove	
SIM card .....	19
reset button .....	9
reset device.....	10
RoHS.....	27

safety.....	13
modem.....	14
RF interference .....	14
SIM card	
remove.....	19
SIM installation .....	19
specifications.....	8
static.....	13
STATUS LED .....	9
sécurité.....	13
interférences RF.....	14

**T**

transmission .....8

**U**

user responsibility .....16