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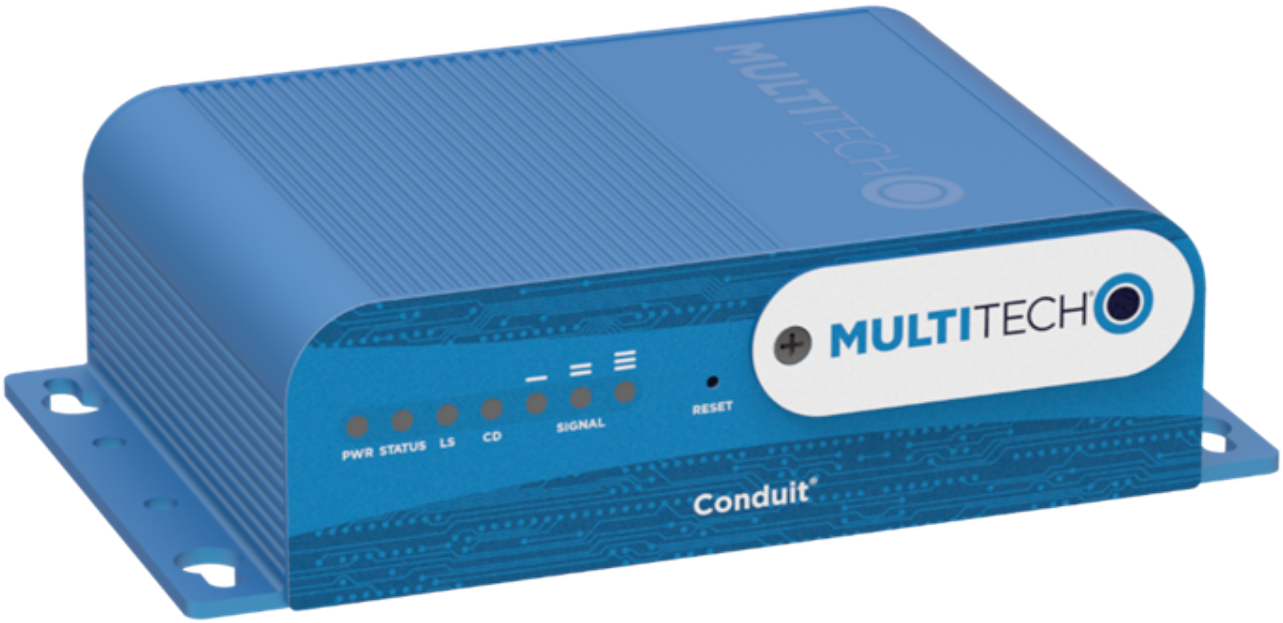

Conduit® Hardware Guide

Conduit® Hardware Guide

Model: MTCDT

Part Number: S000690 1.6

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Contacting MultiTech

Country	Sales		Support	
Europe, Middle East, Africa:	sales@multitech.co.uk	+(44) 118 959 7774	support@multitech.co.uk	+(44) 118 959 7774
U.S., Canada, all others:	sales@multitech.com	(800) 328-9717 or (763) 785-3500	support@multitech.com	(800) 972-2439 or (763) 717-5863

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World Headquarters

Multi-Tech Systems, Inc.

2205 Woodale Drive, Mounds View, MN 55112

Contents

Chapter 1 – Product Overview

Introduction

Conduit® is a programmable gateway that uses an open Linux development environment to enable machine-to-machine (M2M) connectivity using various wireless interfaces. It also provides an online application store for industrial things as a platform for developers to provision and manage their gateway and associated sensors and devices.

Product Kit Contents

Your Product Kit includes the following (varies with model):

Device	1 - MTCDT-Conduit
Power Supply	1 - 100-240V 9V-1.7A power supply with removable blades
	1 - NAM blade/plug
	1 - EURO blade/plug
	1 - UK blade/plug
Cables	1 - Micro USB Cable
	1 - Ethernet Cable RJ45 6-ft.
Antennas*	2 - LTE SMA (for Conduit LTE only)
Customer Notices	Quick Start*
	Registration Card
Feet	4 - Clear Adhesive Feet
Additional	1 - Promotional screwdriver

Note: *HEPTA or LTE antennas are not included with MTCDT-246 or 247A/L (No Radio versions).

Build Options

Product	Description	Region
MTCDT-246L-US-EU-GB	mLinux Programmable Gateway using GNSS w/US/EU/UK Accessory Kit	Global
MTCDT-246A-US-EU-GB	mPower Gateway using GNSS w/US/EU/UK Accessory Kit	Global
MTCDT-246A-915-US-EU-GB	mPower Programmable Gateway 8-channel, 915 MHz, using MTAC-LORA-H-915 mCard, GNSS, and US/EU/UK Accessory Kit	NA
MTCDT-246A-868-EU-GB	mPower Programmable Gateway 8-channel, 868 MHz, using MTAC-LORA-H-868 mCard, GNSS, and US/EU/UK Accessory Kit	EU/UK
MTCDT-246A-923-JP	mPower Programmable Gateway 8-channel, 923 MHz, using MTAC-LORA-H-923-JP mCard, GNSS, and Japan Accessory Kit	Japan
MTCDT-H5-246L-US-EU-GB	HSPA+ mLinux Programmable Gateway using GNSS w/US/EU/UK Acc Kit	Global
MTCDT-H5-246A-US-EU-GB	HSPA+ mPower Gateway using GNSS w/US/EU/UK Acc Kit	Global
MTCDT-LEU1-246L-US-EU-GB	Conduit LTE mLinux Programmable Gateway using GNSS w/US/EU/UK Acc Kit	Global
MTCDT-LEU1-246A-US-EU-GB	Conduit LTE mPower Programmable Gateway using GNSS w/US/EU/UK Acc Kit	Global
MTCDT-LAT1-246L-US	Conduit LTE mLinux Programmable Gateway using GNSS w/US/EU/UK Acc Kit	NA
MTCDT-LAT1-246A-US	Conduit LTE mPower Programmable Gateway using GNSS w/US/EU/UK Acc Kit	NA
MTCDT-LVW2-246L-US	Conduit LTE mLinux Programmable Gateway using GNSS w/US/EU/UK Acc Kit	NA
MTCDT-LVW2-246A-US	Conduit LTE mPower Programmable Gateway using GNSS w/US/EU/UK Acc Kit	NA
MTCDT-LDC3-246A-JP	Conduit 4G LTE Cat 1 mPower Programmable Gateway using GNSS w/Japan Acc Kit	Japan
MTCDT-LDC3-246L-JP	Conduit 4G LTE Cat 1 mLinux Programmable Gateway using GNSS w/Japan Acc Kit	Japan
MTCDT-LDC3-246A-923-JP	Conduit 4G LTE Cat 1 mPower Programmable Gateway using GNSS w/Japan Acc Kit (AS 923 Channel Plan)	Japan
MTCDT-LDC3-246L-923-JP	Conduit 4G LTE Cat 1 mLinux Programmable Gateway using GNSS w/Japan Acc Kit (AS 923 Channel Plan)	Japan
MTCDT-247L-US-EU-GB	mLinux Programmable Gateway using GNSS and WiFi/BT w/US/EU/UK Accessory Kit	Global

Product	Description	Region
MTCDT-247A-US-EU-GB	mPower Programmable Gateway using GNSS and WiFi/BT w/US/EU/UK Accessory Kit	Global
MTCDT-H5-247L-US-EU-GB	HSPA+ mLinux Programmable Gateway using GNSS and WiFi/BT w/US/EU/UK Acc Kit	Global
MTCDT-H5-247A-US-EU-GB	HSPA+ mPower Programmable Gateway using GNSS and WiFi/BT w/US/EU/UK Acc Kit	Global
MTCDT-LEU1-247L-US-EU-GB	Conduit LTE mLinux Programmable Gateway using GNSS and WiFi/BT w/US/EU/UK Acc Kit	Global
MTCDT-LEU1-247A-US-EU-GB	Conduit LTE mPower Programmable Gateway using GNSS and WiFi/BT w/US/EU/UK Acc Kit	Global
MTCDT-LAT1-247L-US	Conduit LTE mLinux Programmable Gateway using GNSS and WiFi/BT w/US/EU/UK Acc Kit	NA
MTCDT-LAT1-247A-US	Conduit LTE mPower Programmable Gateway using GNSS and WiFi/BT w/US/EU/UK Acc Kit	NA
MTCDT-LVW2-247L-US	Conduit LTE mLinux Programmable Gateway using GNSS and WiFi/BT w/US/EU/UK Acc Kit	NA
MTCDT-LVW2-247A-US	Conduit LTE mPower Programmable Gateway using GNSS and WiFi/BT w/US/EU/UK Acc Kit	NA

Note:

- The complete product code may end in .Rx. For example, MTCDT-H5.Rx, where R is the revision and the x is the revision number.
- 210 models use pervious hardware and software (not upgraded to latest version).

Chapter 2 – Specifications

Conduit Specifications

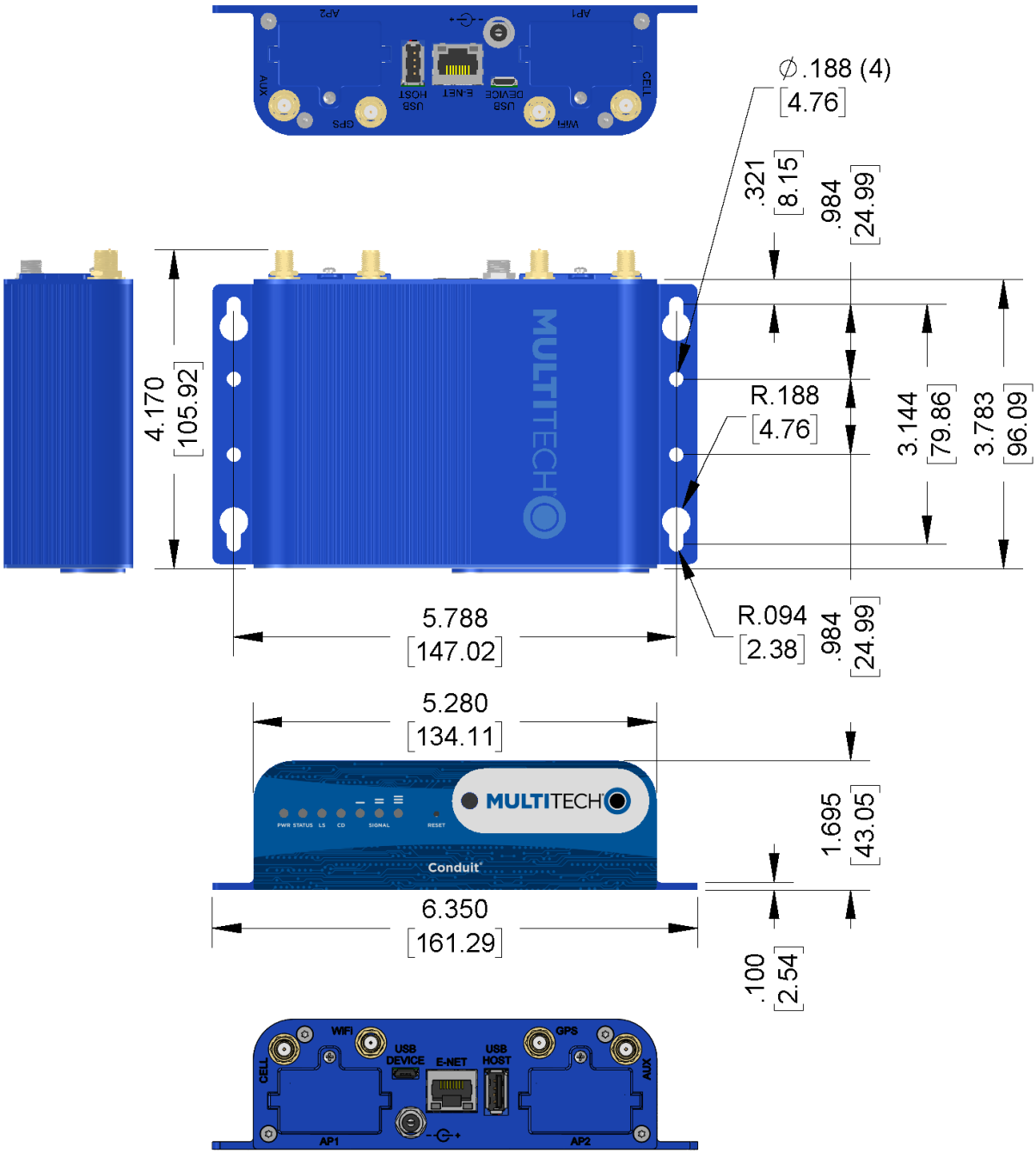
Category	Description
Physical Description	
Dimensions	See the Conduit Demensions Drawing
Weight	15.6 oz. (442.25 grams) with no accessory cards installed
Connectors	
Connectors	1 USB device micro Type B debug port (behind nameplate)
	1 RJ-45 Ethernet port
	1 USB micro port
	2 cellular antenna connectors
	1 Wi-Fi/Bluetooth connector
	1 GPS antenna connector
Power Requirements	
Input Voltage	9-32 Volts
Power Draw	See Conduit Power Draw
Environment	
Operating Environment	-30° to +70° C [1]
Storage Environment	-40° to +85° C
Relative Humidity	20 to 90% non-condensing
Certifications	
Radio & EMC Compliance	EN 55022:2010
	EN 301 489
	FCC Part 15 Class B
	IC Class B
Safety Compliance	UL/cUL 60950-1 2nd Ed.
	IEC 60950-1 2nd Ed. Am. 1 and Am. 2
Telecom Approvals	Based on radio installed

[1]UL Listed @ 40° C, limited by AC power supply. UL Recognized @ 65° C for Conduit LTE devices within IP67 enclosure or when used with the fused DC power cable, part number FPC-532-DC.

Installation in outdoor locations or ambient above 70° C has not been evaluated by UL. UL Certification does not apply or extend to use in outdoor applications.

Optional power must be UL Listed ITE power supply marked LPS or Class 2 rated 12 VDC, 5A. Certification does not apply or extend to Voltages outside certified range, and has not been evaluated by UL for operating voltages beyond tested range.

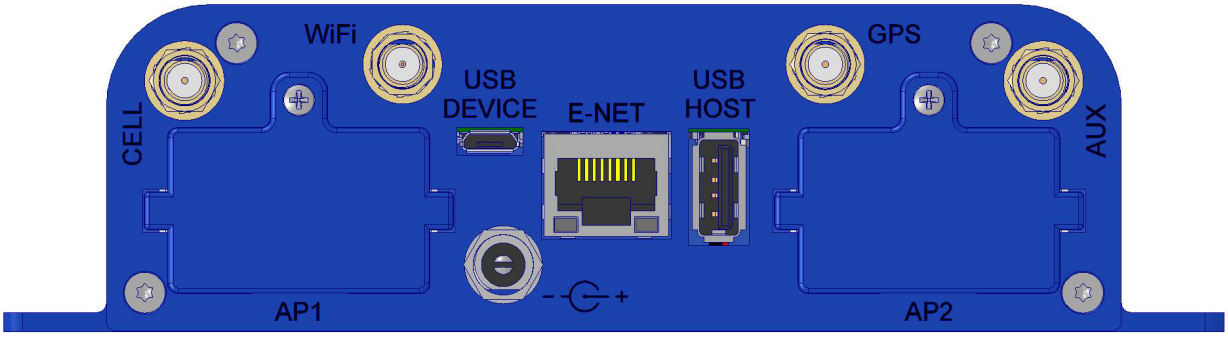
Dimensions



DIMENSIONS IN In [mm]

Backpanel Connectors

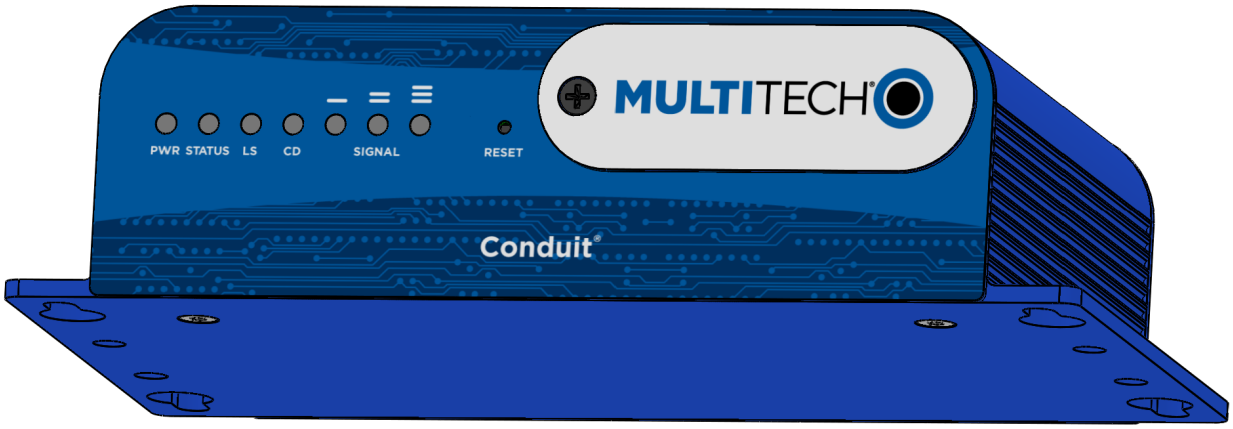
Label	Description
CELL, AUX	Cellular antenna inputs. ■ H5: CELL - Primary. ■ AUX - Diversity.
AP1, AP2	Slots for MultiTech accessory cards. You can install an accessory card in either slot. Both slots can be occupied at one time. An exception is an SDIO (Secure Digital Input/Output) card, which can be used only in the AP1 slot.
USB DEVICE	User-defined, high-speed 480 Mbps, standard USB 2.0 Micro B connector. Use this port to connect the Conduit to a computer or another device. By default, this port is a serial port terminal interface, but you can program it to act as another device such as a mass storage device or an Ethernet port.
E-NET	RJ-45 receptacle for standard Ethernet 10/100 Base-T.
	Caution: Ethernet ports and command ports are not designed to be connected to a public telecommunication network or used outside the building or campus.
USB HOST	High-speed, standard USB 2.0 Type A connector. 500mA maximum current draw. You can plug into the Host port a device such as a flash drive, camera, or printer if the Linux kernel has the appropriate driver.
Power 	9-32 Vdc power receptacle for provided power cord.



LED Descriptions

Conduit mLinux Model Front Panel

Conduit mPower Model Front Panel



Label	Name	Description
PWR	Power	Solid (constant) green if unit is on indicating that DC power is present.
STATUS	Power Status	Default condition: LED blinks when mLinux is fully loaded.
LS	Link Status	Varies with radio model.
A-B-C-D	--	These 4 LEDs are user-specified. Present on the Conduit mLinux model only.
CD	Carrier Detect	This LED is on when a cellular data connection is made. Present on the Conduit mPower model only.

Label	Name	Description
Signal	Signal Strength	These 3 LEDs display the strength of the cellular signal. Present on the Conduit mPower model only.

If a cellular radio is installed, the typical LS (Link Status) LED behavior is the following:

- OFF - No power to the cellular radio
- Continuously Lit - Not registered
- Slow Blink (-0.2Hz) - Registered or connected

On the back of the Conduit, the RJ-45 Ethernet LEDs (located at the bottom of the connector) are defined as follows:

- Orange LED (lower-left) indicated activity/link. Blinks when there is transmit and receive on the Ethernet link. It shows a steady light when there is a valid Ethernet connection.
- Green LED (lower-right) indicates link speed. Lit when Ethernet is linked at 100Mbps. If not lit, Ethernet is linked at 10 Mbps.

Chapter 3 – Power Draw

MTCDT-H5-246 with Modem and No Accessory Cards Power Draw

Radio Protocol	Idle Cellular Connection no data (Amps)	Average Tx Current at Max Power passing data (Amps)	Peak Tx Current (Amps)[1]	Total Inrush Charge (mC)[2]	Total Inrush Charge Duration (mS)
9.0 Volts					
GSM 850 MHz	0.182	0.342	1.12 (pulse avg.)	5.18	9.60
HSDPA	0.208	0.472	0.548	5.18	9.60
12.0 Volts					
GSM 850 MHz	0.148	0.268	0.826	4.59	8.58
HSDPA	0.151	0.391	0.460	4.59	8.58
24.0 volts					
GSM 850 MHz	0.099	0.161	0.455	3.68	17.55
HSDPA	0.101	0.214	0.288	3.68	17.55

[1]**Peak Tx Current**: The average peak current during a GSM850 transmission burst period or HSDPA connection. The transmission burst duration for GSM850 can vary, depending on what transmission scheme is being deployed (GPRS Class 8, Class 10, GSM, etc.).

[2]**Total Inrush Charge**: The total inrush charge at power on expressed in Millicoulombs (mC).

Note:

Multi-Tech Systems, Inc. recommends that you incorporate a 10% buffer into the power source when determining product load.

MTCDT-LEU1-246 with Modem and No Accessory Cards

Radio Protocol	Idle Cellular Connection no data (Amps)	Average Tx Current at Max Power Passing Data (Amps)[1]	Peak Tx Current (Amps)[2]	Total Inrush Charge (mC)[3]	Total Inrush Charge Duration (mS)
9.0 Volts					
EGSM 900 MHz	0.178	0.363	1.10	4.87	9.7
LTE	0.192	0.552	0.632	4.87	9.7
12.0 Volts					
EGSM 900 MHz	0.140	0.290	0.835	4.2	8.5
LTE	0.151	0.440	0.512	4.2	8.5
24.0 Volts					
EGSM 900 MHz	0.093	0.170	0.441	3.65	17.9

Radio Protocol	Idle Cellular Connection no data (Amps)	Average Tx Current at Max Power Passing Data (Amps)[1]	Peak Tx Current (Amps)[2]	Total Inrush Charge (mC)[3]	Total Inrush Charge Duration (mS)
LTE	0.102	0.249	0.316	3.65	17.9

[1]**Max Power**: The continuous current during maximum data rate with the radio transmitter at maximum power.

[2]**Peak Tx Current**: The average peak current during an EGSM900 transmission burst period or LTE connection. The transmission burst duration for EGSM900 can vary, depending on what transmission scheme is being deployed (GPRS Class 8, Class 10, GSM, etc.).

[3]**Total Inrush Charge**: The total inrush charge at power on expressed in Millicoulombs (mC).

Note:

Multi-Tech Systems, Inc. recommends that you incorporate a 10% buffer into the power source when determining product load.

MTCDT-LVW2-246 with Modem and No Accessory Cards

Radio Protocol	Idle Cellular Connectionno data (Amps)	Average Tx Current at Max Power Passing Data (Amps)[1]	Peak Tx Current (Amps)[2]	Total Inrush Charge (mC)[3]	Total Inrush Charge Duration (mS)
9.0 Volts					
LTE	0.175	0.482	0.556	4.87	9.7
12.0 Volts					
LTE	0.148	0.375	0.499	4.2	8.5
24.0 Volts					
LTE	0.100	0.214	0.303	3.65	17.9

[1]**Max Power**: The continuous current during maximum data rate with the radio transmitter at maximum power.

[2]**Peak Tx Current**: The average peak current during LTE connection.

[3]**Total Inrush Charge**: The total inrush charge at power on expressed in Millicoulombs (mC).

Note:

Multi-Tech Systems, Inc. recommends that you incorporate a 10% buffer into the power source when determining product load.

MTCDT-246A No Modem and No Accessory Cards

Voltage	No Connections (Amps)[1]	Ethernet Connected only (Amps)[2]	Maximum Current (Amps)[3]	Total Inrush Charge (mC)[4]	Total Inrush Charge Duration (mS)
9.0 Volts	0.147	0.155	0.222	3.92	9.7
12.0 Volts	0.124	0.128	0.175	3.26	8.54

Voltage	No Connections (Amps)[1]	Ethernet Connected only (Amps)[2]	Maximum Current (Amps)[3]	Total Inrush Charge (mC)[4]	Total Inrush Charge Duration (mS)
24.0 Volts	0.081	0.086	0.114	2.48	14.6

[1]**No Connections**: Typical measure performed with the unit powered up only–no connections to the device.

[2]**Ethernet Connected Only:** Typical power with Ethernet measured and the device attached to PC with Ethernet cable only.

[3]**Maximum Current:** Maximum current measured with Ethernet connected, SD Card, and USB Device actively running read/write script, USB Debug and Host active running find/command.

[4]**Total Inrush Charge**: The total inrush charge at power on expressed in Millicoulombs (mC).

Note:

Multi-Tech Systems, Inc. recommends that you incorporate a 10% buffer into the power source when determining product load.

MTCDT-210 with Modem and no Accessory Cards Power Draw

Radio Protocol	Idle Cellular Connectionno data (Amps)	Average Tx Current at Max Power passing data (Amps)	Peak Tx Current (Amps)[1]	Total Inrush Charge (mC)[2]	Total Inrush Charge Duration (mS)
9.0 Volts					
GSM 850 MHz	0.200	0.400	1.200 (pulse avg.)	5.21	8.27
HSDPA	0.198	0.525	0.616	5.21	8.27
12.0 Volts					
GSM 850 MHz	0.166	0.323	0.884	4.81	8.26
HSDPA	0.168	0.453	0.540	4.81	8.26
24.0 Volts					
GSM 850 MHz	0.099	0.175	0.490	3.99	20.0
HSDPA	0.101	0.245	0.320	3.99	20.0

[1]**Peak Tx Current**: The average peak current during a GSM 850 transmission burst period or HSDPA connection. The transmission burst duration for GSM 850 can very, depending on what transmission scheme is being deployed (GPRS Class 8, Class 10, GSM, etc.).

[2]**Total Inrush Charge**: The total inrush charge at power on expressed in Millicoulombs (mC).

Note: Multi-Tech Systems, Inc. recommends that you incorporate a 10% buffer into the power source when determining product load.

MTCDT-LEU1-210 with Modem and no Accessory Cards Power Draw

Radio Protocol	Idle cellular Connection no data (Amps)	Average Tx Current at Max Power Passing Data (Amps)[1]	Peak Tx Current (Amps)[2]	Total Inrush Charge (mC)[3]	Total Inrush Charge Duration (mS)
9.0 Volts					
EGSM 900 MHz	0.242	0.435	1.33	5.21	8.27
LTE	0.256	0.615	0.704	5.21	8.27
12.0					
EGSM 900 MHz	0.192	0.340	0.931	4.81	8.26
LTE	0.203	0.468	0.512	4.81	8.26
24.0 Volts					
EGSM 900 MHz	0.104	0.189	0.493	3.99	20.0
LTE	0.115	0.245	0.312	3.99	20.0

[1]**Max Power**: The continuous current during maximum data rate with the radio transmitter at maximum power.

[2]**Peak Tx Current**: The average peak current during an EGSM 900 transmission burst period or LTE connection. The transmission burst duration for EGSM 900 can very, depending on what transmission scheme is being deployed (GPRS Class 8, Class 10, GSM, etc.).

[3]**Total Inrush Charge**: The total inrush charge at power on expressed in Millicoulombs (mC).

Note: Multi-Tech Systems, Inc. recommends that you incorporate a 10% buffer into the power source when determining product load.

MTCDT- LAT1-210 with Modem and No Accessory Cards

Radio Protocol	Idle Cellular Connection no data (Amps)	Average Tx Current at Max Power Passing Data (Amps)[1]	Peak Tx Current (Amps)[2]	Total Inrush Charge (mC)[3]	Total Inrush Charge Duration (mS)
9.0 Volts					
GSM 850 MHz	0.200	0.436	1.20	6.4	8.50
LTE	0.201	0.525	0.588	6.4	8.50
12.0 Volts					
GSM 850 MHz	0.163	0.335	0.915	5.18	8.2
LTE	0.164	0.410	0.480	5.18	8.2
24.0 Volts					
GSM 850 MHz	0.094	0.186	0.440	4.12	11.8
LTE	0.095	0.225	0.300	4.12	11.8

[1]**Max Power**: The continuous current during maximum data rate with the radio transmitter at maximum power.

[2]**Peak Tx Current**: The average peak current during an GSM 850 transmission burst period or LTE connection. The transmission burst duration for GSM 8502 can very, depending on what transmission scheme is being deployed (GPRS Class 8, Class 10, GSM, stc.).

[3]**Total Inrush Charge**: The total inrush charge at power on expressed in Millicoulombs (mC).

Note: Multi-Tech Systems, Inc. recommends that you incorporate a 10% buffer into the power source when determining product load.

MTCDT-LVW2-210 with Modem and No Accessory Cards

Radio Protocol	Idle Cellular Connection no data (Amps)	Average Tx Current at Max Power Passing Data (Amps)[1]	Peak Tx Current (Amps)[2]	Total Inrush Charge (mC)[3]	Total Inrush Charge Duration (mS)
9.0 Volts					
LTE	0.205	0.550	0.620	6.28	8.28
12.0 Volts					
LTE	0.161	0.414	0.500	5.15	8.43

Radio Protocol	Idle Cellular Connection no data (Amps)	Average Tx Current at Max Power Passing Data (Amps)[1]	Peak Tx Current (Amps)[2]	Total Inrush Charge (mC)[3]	Total Inrush Charge Duration (mS)
24.0 Volts					
LTE	0.096	0.227	0.300	2.75	7.43

[1]**Max Power**: The continuous current during maximum data rate with the radio transmitter at maximum power.

[2]**Peak Tx Current**: The average peak current during LTE connection.

[3]**Total Inrush Charge**: The total inrush charge at power on expressed in Millicoulombs (mC).

Note: Multi-Tech Systems, Inc. recommends that you incorporate a 10% buffer into the power source when determining product load.

MTCDT-210 No Modem and No Accessory Cards

Voltage	No Connections (Amps)[1]	Ethernet Connected only (Amps)[2]	Maximum Current (Amps)[3]	Total Inrush Charge (mC)[4]	Total Inrush Charge Duration (mS)
9.0 Volts	0.151	0.168	0.265	2.37	1.05
12.0 Volts	0.130	0.139	0.204	3.4	8.24
24.0 Volts	0.080	0.086	0.114	2.8	22.7

[1]**No Connections**: Typical measure performed with the unit powered up only–no connections to the device.

[2]**Ethernet Connected Only**: Typical power with Ethernet measured and the device attached to PC with Ethernet cable only.

[3]**Maximum Current**: Maximum current measured with Ethernet connected, SD Card, and USB Device actively running read/write script, USB Debug and Host active running find/command.

[4]**Total Inrush Charge**: The total inrush charge at power on expressed in Millicoulombs (mC).

Note: Multi-Tech Systems, Inc. recommends that you incorporate a 10% buffer into the power source when determining product load

MTCDT-LEU1-247 with Bluetooth, Wi-Fi, and No Accessory Cards Power Draw

Radio Protocol	Idle Cellular Call Box Connection No Data	Average Measured Current at Max Power (Wi-Fi WAN Active Internet Upload/Download)[1]	TX Pulse (AVG) Amplitude Current for GSM850 or Peak Current for HSDPA/LTE[2]	Total Inrush Charge Measured[3]	Total Inrush Charge Duration During Powerup (Inrush Duration)
9.0 Volts					
EGSM 900 MHz	283 mA	635 mA	1.30 Amps	4.87 mC	9.7 mS
LTE	296 mA	850 mA	952 mA	4.87 mC	9.7 mS
12.0 Volts					
EGSM 900 MHz	220 mA	490 mA	928 mA	4.2 mC	8.5 mS
LTE	232 mA	675 mA	748 mA	4.2 mC	8.5 mS
24.0 Volts					
EGSM 900 MHz	124 mA	258 mA	385 mA	3.65 mC	17.9 mS
LTE	131 mA	343 mA	420 mA	3.65 mC	17.9 mS

[1]**Maximum Power**: The continuous current during maximum data rate with the radio transmitter at maximum power.

[2]**Peak Tx Current**: The average peak current during a GSM850 transmission burst period or HSDPA connection. The transmission duration for GSM850 can vary, depending on what transmission scheme is being deployed (GPRS Class 8, Class 10, GSM, etc.).

[3]**Total Inrush Charge**: The total inrush charge at power.

Note: Multi-Tech Systems, Inc. recommends that you incorporate a 10% buffer into the power source when determining product load.

Chapter 4 – Frequency Information

Frequency Bands for Conduit

Cellular Radio	Frequencies
LE910-Eug LEU1	2G 900/1800, 3G 850/900/2100, LTE/FDD 800/1800/2600
LE910-NAG LAT1	2G 850/1900, WCDMA 850/1900, LTE/FDD 700/850, AWS 1700/1900
LE910-SVG LVW2	700 AWS 1700
HE910-D H5	GSM 850/900, DCS 1800, PCS 1900, WCDMA 800/850/900, AWS 1700/1900/2100

Frequency and Power Information for WiFi/Bluetooth

Operating Frequency	RF Output Power
802.11b: 2400 MHz – 2483.5 MHz	19.1 dBm
802.11g: 2400 MHz – 2483.5 MHz	19.9 dBm
802.11n: 2400 MHz – 2483.5 MHz	19.9 dBm
802.11a: 5150 MHz – 5350 MHz, 5470 MHz – 5725 MHz	13.5 dBm
802.11n: 5150 MHz – 5350 MHz, 5470 MHz – 5725 MHz	13.6 dBm
BT/BLE: 2400 MHz – 2483.5 MHz	10.1 dBm

Frequency and Power Information for LoRa

Operating Frequency	RF Output Power
EN 300 220-2: 869.525 MHz (Europe)	27 dBm Max allowed ERP power - high channel
EN 300 220-2: 867.1 MHz – 868.8 MHz (Europe)	14 dBm Max allowed ERP power - low channels

Max Radio Frequency Power for Conduit

HE910 Telit Transmission Output Power

Band	Power Class
GSM 850/900	4 (2W)
DCS 1800/PCS 1900	1 (1W)

Band	Power Class
EDGE, 850/900 MHz	E2 (0.5W)
EDGE, 1800/1900 MHz	Class E2 (0.4W)
WCDMA 850/900, AWS 1700, 1900/2100 MHz	Class 3 (0.25W)

LE910 Telit Transmission Output Power

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GSM 850/900	4 (2W)
DCS 1800/PCS 1900	1 (1W)
EDGE, 850/900 MHz	E2 (0.5W)
EDGE, 1800/1900 MHz	Class E2 (0.4W)
WCDMA FDD B1, B2, B4, B5, B8	Class 3 (0.25W)
LTE FDD B2, B3, B4, B5, B7, B13, B17, B20	Class 3 (0.2W)

Chapter 5 – Setting up and Configuring the Device

Install and Connect Conduit Hardware

To install and cable the device:

1. Install a Mini SIM card.
2. Install a Micro SD card (optional).
3. Install a battery (optional).
4. Connect the supplied antenna(s) to the appropriate connector(s) on the back of the device. Connectors may vary with model.
5. Use the Ethernet connector to connect the Conduit to the device used to administer the Conduit.
6. Install any mCard accessory cards into a slot at the back of the device. Refer to Installing an mCard Accessory Card for instructions.
7. Depending on the accessory card type, attach any antennas or cables for use with the card.
8. Connect the power cord to an outlet or power strip and to the power adapter.
9. Connect the power adapter to the barrel jack on the back panel of the device. The Power LED comes on immediately after power is applied. Wait for the Status LED to begin blinking.

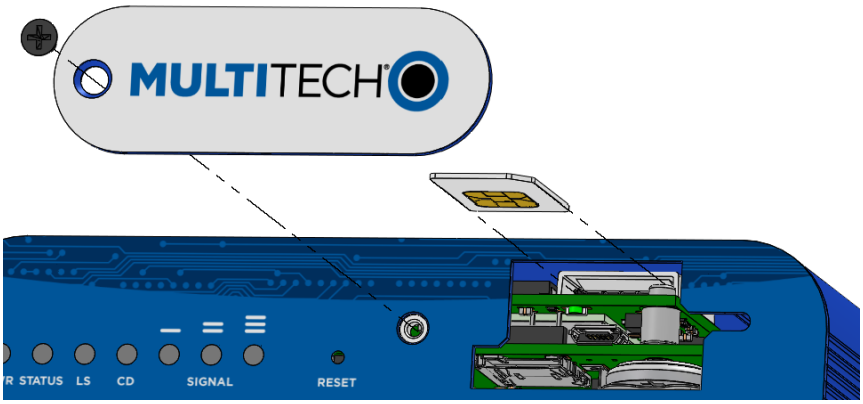
Installing a Mini SIM Card

You need:

- Phillips screwdriver
- Mini SIM card (2FF form factor)

To install or replace the SIM card:

1. Disconnect power to the Conduit, if it is connected.
2. At the front of the Conduit housing, remove the screw that secures the nameplate to the housing and remove the nameplate.
3. Locate the SIM card holder in the upper right corner of the opening. If a SIM card is installed and needs to be removed, slide it out of the SIM card holder.
4. Gently push the new SIM card into SIM card holder face up with the cut corner to the right and the SIM contacts facing toward the Conduit's interior.
5. If not installing a battery or micro SD card, reattach the MultiTech nameplate to the Conduit using the screw removed in Step 2.



Accessory Port (mCard) Interfaces

The accessory card interface on the Conduit base board has the following interface options:

Interface	Description
I2C	Used by all accessory cards. I2C is required for Electronic Identification (EID) support on the accessory card but can be used for other I2C devices. It should supports standard (100 kHz) and/or fast (400 kHz) clock speeds.
	The I2C interface reserves the full block of EEPROM address space for Electronic ID support, so we recommend that you not attach any other EEPROM devices to the interface. We recommend that you use a 24C04 part, because both address bits of the 24C04 are connected to the AP interface allowing you to identify four separate accessory port (AP) cards in a system.
Serial UART	Serial UART with HW flow control used by Serial interface based Accessory Cards
SDIO interface and/or SPI Interface	AP1 has option for SDIO or SPI interface, based on what Accessory Card is installed. AP2 supports only SPI based Accessory Cards.
GPIO	Additional control pins for certain Accessory Cards.
Interrupts	Software defined interrupts. Can also be used as additional control pins.
PPS	GPS generated Pulse-Per-Second signal used for software timing. Default is 1 pulse/sec.
USB 2.0	A standard USB 2.0 High Speed interface for USB based Accessory Cards.
5 VDC 1 Amp supply	Used by all accessory cards.
3.3 VDC 1 Amp supply	Used by all accessory cards.

For accessory card specifications, regulatory content, and installation information, refer to the appropriate product page: www.multitech.com/brands/multiconnect-mcard.

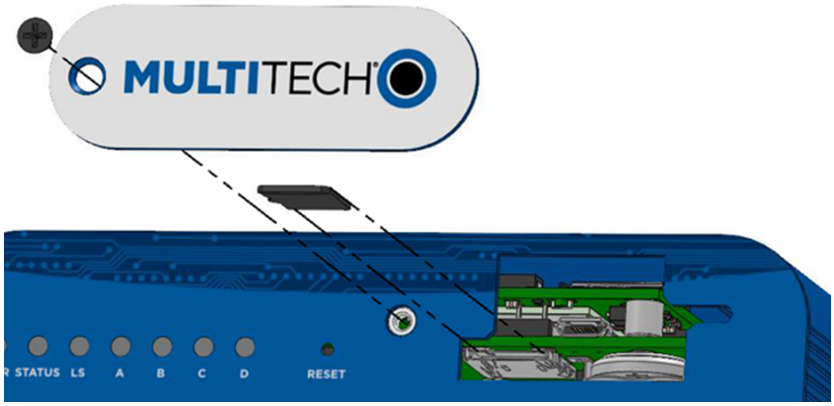
Installing a Micro SD Card

You need:

- Phillips screwdriver
- MicroSD memory card

To install or replace the SD card:

1. Disconnect power to the Conduit, if it is connected.
2. At the front of the Conduit, remove the screw that secures the MultiTech nameplate.
3. Locate the SD card at the left side of the opening on the underside of the PC board.
4. If an SD card is already installed, gently push on the card to release it from its setting and remove it from the housing with your fingers.
5. With the new SD card contacts facing up and toward the interior of the device, gently push the card into the slot to secure it.
6. Reattach the MultiTech nameplate to the housing using the screw removed in step 2.



Installing a Battery

The battery is located in the Conduit housing.

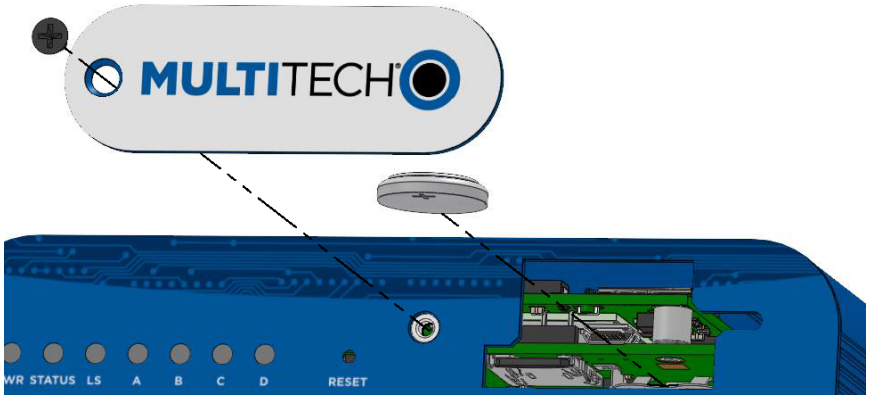
You need:

- Phillips screwdriver
- If replacing a battery, non-metal tweezers or similar object
- CR1632 standard coin lithium battery

To install or replace the battery:

1. If connected, disconnect power to the Conduit.
2. At the front of the Conduit housing, remove the screw that secures the MultiTech nameplate to the housing.

3. The battery holder is located at the right side of the opening on the underside of the PC board. To remove an existing battery, use non-metal tweezers as necessary.
4. Orient the new battery so that the positive (+) pole is facing down. Use your fingers or non-metal tweezers to insert the battery into the holder.
5. Reattach the MultiTech nameplate to the housing using the screw removed in Step 2.



CAUTION: Risk of explosion if this battery is replaced by an incorrect type. Dispose of batteries according to instructions.

Note:

ATTENTION: Risque d'explosion si vous remplacez la batterie par un modèle incompatible. Jetez les piles usagées selon les instructions.

Connecting to the Debug Interface

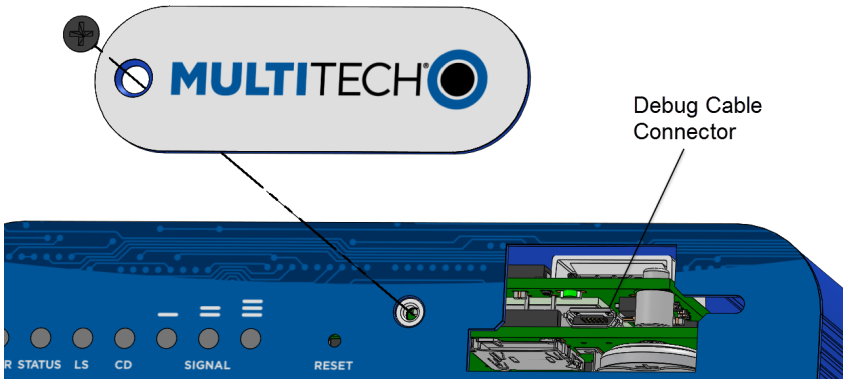
There are two different options for the debug connector: 1) USB Micro B connector or 2) 3-pin connector. Check which debug interface is in your device by using steps 1-3. Once you have the appropriate cable available, proceed with steps 4-7.

NOTE: If you have a 3-pin connector, you must build a cable specifically for your debug interface. See details on how to build the 3-pin cable following these instructions.

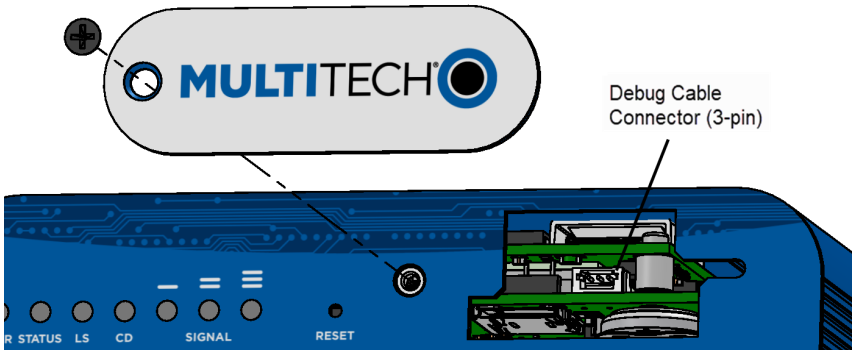
You need:

- Phillips screwdriver
- Standard USB Micro B cable

1. Disconnect power to the Conduit, if it is connected.
2. At the front of the Conduit housing, remove the screw that secures the MultiTech nameplate to the housing.
3. Locate and identify the USB debug cable connector in the center of the opening. Make sure have the appropriate cable available (if you have the 3-pin connector, see cable details below).
4. Connect the appropriate cable to the debug connector.
    a. If you have the USB Micro B connector, connect the USB Micro B cable to the debug connector.



b. If you have the 3-pin connector, connect the 3-pin cable to the debug connector.



5. Connect the Type A end of the USB cable to the host.
6. From the host, use an application such as TeraTerm with a baud rate of 115,200. If the USB driver does not automatically install, do the following:
   a. Unplug the USB cable.
   b. Go to the following web site to download and install the appropriate USB driver: https://www.maxlinear.com/support/design-tools/software-drivers
   c. Plug the USB cable back into the housing.
7. From the host, access the Conduit's USB COM port.

Accessory 3-pin Cable for Debug Interface

The 3-pin Debug Interface cable can be ordered as an accessory from the factory, P/N: 95218134LF, model: CA-MTCDT-DEBUG. Otherwise, you have the option to build it yourself. See details in the following section.

Building the 3-pin Cable

As an alternative to the accessory cable for the 3-pin debug connector, you can build a custom cable to use the debug interface. The resulting cable should have a USB-A connector for the host end and the 3-pin connector on the device end. See tables under the cable and connector information for specific parts and manufacturers that you can use.

You need:

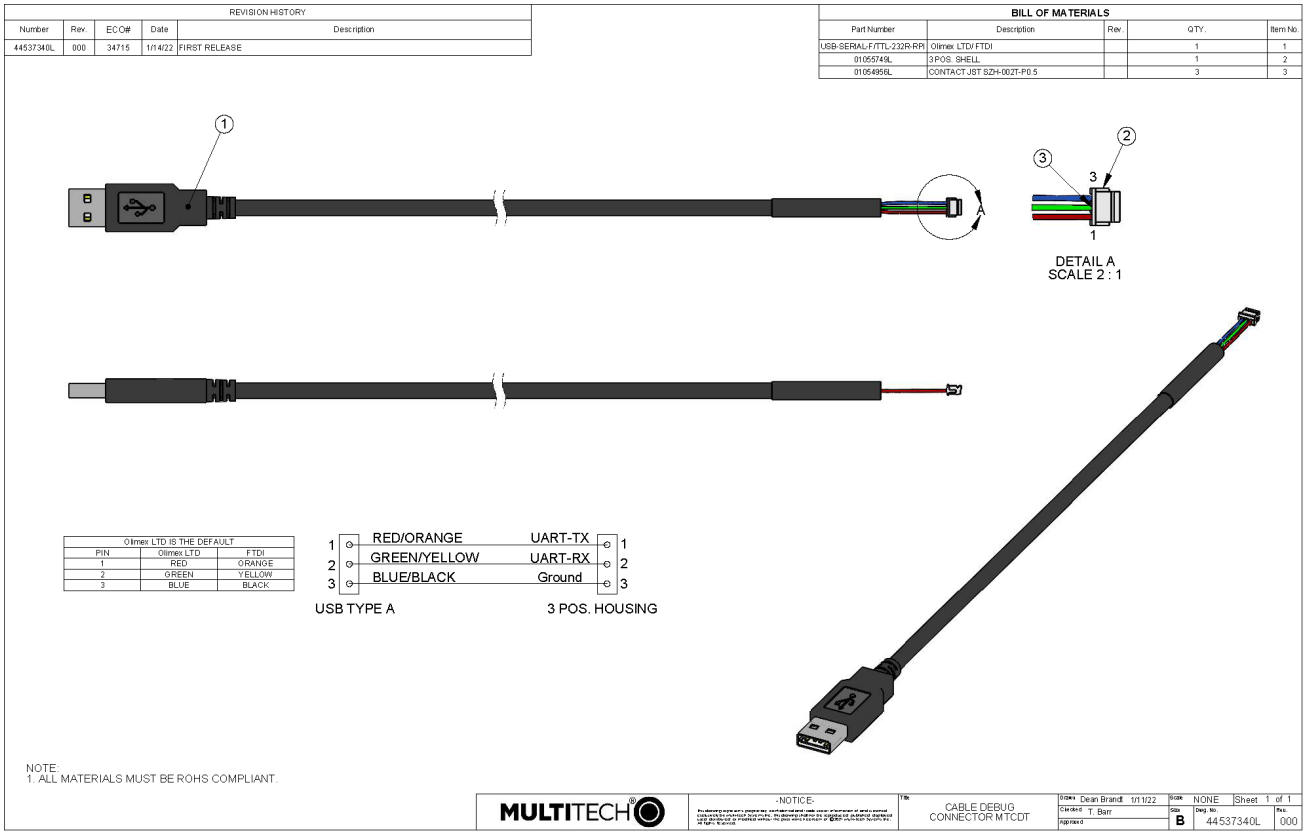
- USB to 3.3V Serial UART cable
- JST-ZHR-3 connector (3-pin connector with crimp-style contacts)
- Custom crimping tool (for use with JST connector only)

1. Purchase a USB to 3.3V Serial UART cable with a USB-A connector for the host end and three leads on the device end. See cable information for details.
2. Purchase a 3-pin connector using crimp-style contacts for the device end of the cable. See connector information for details.
3. Cut the original connectors off the three leads of the device end of the cable.
4. Strip the insulation and crimp the terminals on the wire with a custom crimping tool.
5. Plug the terminals into the connector shell. **Note:** The terminals are very small.

Cable Information

Description	Manufacturer	P/N or Product Number
Olinuxino Serial Console Cable (USB to 3.3V Serial UART cable)	Olimex LTD	USB-SERIAL-F
Debug Cable for Raspberry Pi (USB to 3.3V Serial UART cable)	FTDI	TTL-232R-RPi

Cable Drawing

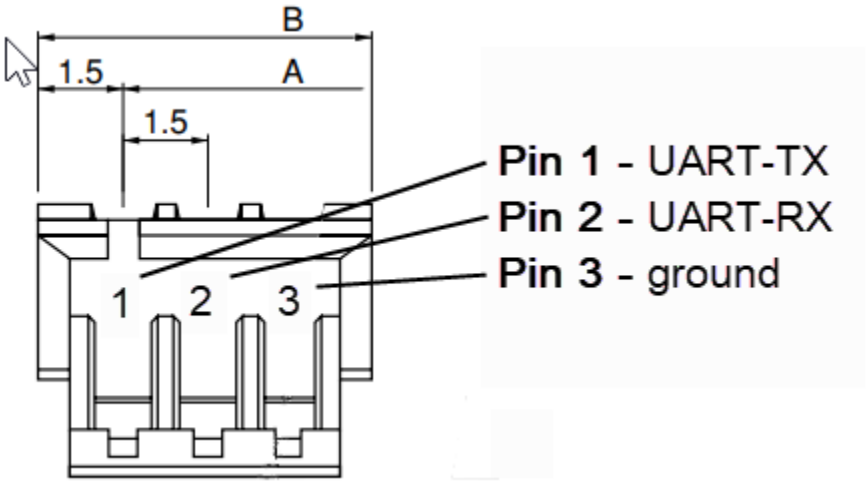


Olimex cable

FTDI Cable

Connector Information

Description	Manufacturer	P/N or Product Number	Contacts
3-pin connector with crimp-style contacts (female socket)	JST	JST-ZHR-3	SZH-002T-P0.5



Restoring User Defined Settings

You need:

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

To restore user defined settings for an **mPower device**:

1. Locate the hole in the panel labeled RESET. The reset button is recessed into the housing.
2. Use the pin to press in the button for between 3 to 29 seconds, then release the reset button.
   - If you do not press in the button long enough, the device will reset, but the user defined settings will not be restored.
   - If you hold it too long (30 seconds or longer), factory default settings will be restored.

Note: The RESET button is in the same location on all Conduit models.

Resetting the Device

You need:

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

The following is the default condition for the RESET button on the Conduit. You can program a change to the behavior of the button if needed.

To reset the device:

1. Find the hole in the front panel labeled RESET. The reset button is recessed into the case.
2. **For mPower models**: Use the pin to press the RESET button for less than 3 seconds, then release. The device reboots.

For mLinux models: Press and hold the RESET button for less than 5 seconds, then release. Holding it beyond 5 seconds resets an mLinux device to factory defaults.

3. The status LED will keep blinking normally for a couple of seconds until the unit resets. Then the status light will stay solid while the device reboots. Once finished, the status will resume blinking normally.

Powering Up the Device

CAUTION: Use only the power cord provided with the device. Using any other power cord voids the warranty and can damage the device.

To power up the device:

1. Install the desired MultiTech accessory card or cards into the slots at the back of the device. Refer to the appropriate installation documentation for the accessory card.

   Note: Some models already have MTAC cards installed.

2. Connect the power cord to an outlet or power strip and to the power adapter.
3. Connect the power adapter to the barrel jack on the back panel of the device.
4. Verify power.
   - The Power LED comes on immediately after power is applied.
   - The device takes a short time to boot up when you apply power.
5. Connect the device to the controlling device through the Ethernet connector or the USB connector on the back panel.

Chapter 6 – Regulatory Information

Conduit Regulatory Information

For regulatory infomration please see http://www.multitech.net/developer/products/multiconnect-conduit-platform/conduit/conduit-regulatory-information/