
QuickCarrier™ USB MT100UCC



Developer's Guide

USB Card Carrier Developers Guide

MT100UCC-G2, MT100UCC-H5, MT100UCC-EV2

S000513E, Revision E

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Revision History

Revision	Date	Description
A	10/24/11	Initial release.
B	11/09/11	Updated power draw, added SP3 to Windows XP, updated drawings.
C	05/17/12	Updated HSDPA power draw.
D	01/07/2013	Removed references to H3 and H4. Added H5. Fixed typographical errors. Added pacemaker statement. Updated RoHS and other regulatory notices.
E	10/08/15	For H5 only, added Powering Down Your Device section to avoid corrupting device file system.

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Contacting Multi-Tech

Knowledge Base

The Knowledge Base provides immediate access to support information and resolutions for all Multi-Tech 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>

Technical Support

Business Hours: M-F, 9am to 5pm CT

Country

Europe, Middle East, Africa:

U.S., Canada, all others:

By Email

support@multitech.co.uk

support@multitech.com

By Phone

+(44) 118 959 7774

(800) 972-2439 or (763) 717-5863

World Headquarters

Multi-Tech Systems, Inc.

2205 Woodale Drive

Mounds View, Minnesota 55112

Phone: 763-785-3500 or 800-328-9717

Fax: 763-785-9874

Warranty

To read the warranty statement for your product, please visit: <http://www.multitech.com/warranty.go>

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Chapter 1 – QuickCarrier USB Hardware

The QuickCarrier USB is a complete, ready-to-integrate communications device that offers 2G and 3G cellular connectivity options. These quick-to-market devices combine a network approved cellular SocketModem® and a USB carrier card in one compact design. With its 4-pin USB interface the QuickCarrier USB embedded cellular modem cables to an existing device's internal USB port and can be secured using the four mounting holes located at the corners of the printed circuit board. Embedding M2M connectivity into your Windows® or Linux device has never been this quick or this easy.

QuickCarrier Features

- Easy migration to future standards
- GPRS Class 10, EV-DO Rev A or HSPA+ connectivity
- Packet data download speeds of up to 85.6K bps, 3.1M bps or 21M bps
- Short Message Services (SMS)
- Drivers for Windows and Linux
- Locking 4-pin USB interface
- UFL antenna connector
- SIM socket for G2 and H5 models
- AT command compatible
- Carrier approved radio
- Two-year warranty

Product Ordering Guide

Product	Description	Region
MT100UCC-G2	GPRS Class 10 Embedded USB Modem (US Defaults 850/1900MHz)	Global
MT100UCC-G2-ED	GPRS Class 10 Embedded USB Modem (Euro Defaults 900/1800MHz)	Global
MT100UCC-EV2-N2	EV-DO Rev A Embedded USB Modem (Sprint)	US
MT100UCC-EV2-N3	EV-DO Rev A Embedded USB Modem (Verizon)	US
MT100UCC-EV2-N16	EV-DO Rev A Embedded USB Modem (Aeris)	US
MT100UCC-H5	Penta-band HSPA+ Embedded USB Modem	Global
MT100UCC-AK	Accessory kit. Includes USB cables, antenna cable, and antenna	Not applicable

AT Commands

Multi-Tech provides the following AT Command Guides:

For Product	Reference Guides Title and Document Product Number
MT100UCC-G2 MT100UCC-G2-ED	GPRS AT Commands for Multi-Tech G2 Cellular Modems (S000463)
MT100UCC-EV2-N2 MT100UCC-EV2-N3 MT100UCC-EV2-N16	CDMA 1xEV-DO AT Commands Reference Guide (S000482)
MT100UCC-H5	H5 AT Commands Reference Guide (S000574)

All reference guides are available:

- By email request to oemsales@multitech.com.
- By using the *Embedded Products Developer's Guide Request Form* on [Multi-Tech's website](#).

Design Considerations

USB Power Considerations

- Use a high speed USB cable that is as short as possible. It is recommended that you use a 12 inch cable. Some computers with high speed USB connectors run additional cables to the mother board. The additional length can then cause enumeration issues.
- If possible, connect directly to the USB connector on the motherboard.
- Use USB 3.0 ports if available because these ports are typically rated for more current.
- The peak current measurements—which you can find in the power draw section for your model—show that transmit spikes can happen. Although the bulk caps on the MT100UCC handle these spikes in most cases, review your power design with the spikes in mind.

Noise Suppression Design Considerations

Adhere to engineering noise-suppression practices when designing a printed circuit board (PCB) containing the QuickCarrier USB modem. Noise suppression is essential to the proper operation and performance of the modem and surrounding equipment.

Any OEM board design that contains the QuickCarrier should consider both on-board and off-board generated noise that can affect digital signal processing. Both on-board and off-board generated noise that is coupled on-board can affect interface signal levels and quality. Noise in frequency ranges that affect modem performance is of particular concern.

On-board generated electromagnetic interference (EMI) noise that can be radiated or conducted off-board is equally important. This type of noise can affect the operation of surrounding equipment. Most local government agencies have stringent certification requirements that must be met for use in specific environments.

Proper PC board layout (component placement, signal routing, trace thickness and geometry, etc.) component selection (composition, value, and tolerance), interface connections, and shielding are required for the board design to achieve desired modem performance and to attain EMI certification.

Other aspects of proper noise-suppression engineering practices are beyond the scope of this developer's guide. The developer should consult noise suppression techniques described other sources, such as technical publications, electronics and electrical engineering text books, and component supplier application notes.

Mounting Hardware

Use #4 or M2/M3 hardware to mount the QuickCarrier modem to the board.

Electromagnetic Interference (EMI) Considerations

The following guidelines are offered specifically to help minimize EMI generation. Some of these guidelines are the same as, or similar to, the general guidelines but are mentioned again to reinforce their importance. In order to minimize the contribution of the QuickCarrier-based design to EMI, the designer must understand the major sources of EMI and how to reduce them to acceptable levels.

- Keep traces carrying high frequency signals as short as possible.
- Provide a good ground plane or grid. In some cases, a multilayer board may be required with full layers for ground and power distribution.
- Decouple power from ground with decoupling capacitors as close to the QuickCarrier power pins as possible.
- Eliminate ground loops, which are unexpected current return paths to the power source and ground.
- Locate high frequency circuits in a separate area to minimize capacitive coupling to other circuits.
- Locate cables and connectors so as to avoid coupling from high frequency circuits.
- Lay out the highest frequency signal traces next to the ground grid.
- If a multilayer board design is used, make no cuts in the ground or power planes and be sure the ground plane covers all traces.
- Minimize the number of through-hole connections on traces carrying high frequency signals.
- Avoid right angle turns on high frequency traces. Forty-five degree corners are good; however, radius turns are better.
- On 2-layer boards with no ground grid, provide a shadow ground trace on the opposite side of the board to traces carrying high frequency signals. This will be effective as a high frequency ground return if it is three times the width of the signal traces.
- Distribute high frequency signals continuously on a single trace rather than several traces radiating from one point.

Electrostatic Discharge Control

All electronic devices should be handled with certain precautions to avoid damage due to the accumulation of static charge.

See the ANSI/ESD Association Standard (ANSI/ESD S20.20-1999) – a document “for the Development of an Electrostatic Discharge Control for Protection of Electrical and Electronic Parts, Assemblies and Equipment.” This document covers ESD Control Program Administrative Requirements, ESD Training, ESD Control Program Plan Technical Requirements (grounding/bonding systems, personnel grooming, protected areas, packaging, marking, equipment, and handling), and Sensitivity Testing.

Multi-Tech Systems, Inc. strives to follow all of these recommendations. Input protection circuitry has been incorporated into the Multi-Tech devices to minimize the effect of this static buildup, proper precautions should be taken to avoid exposure to electrostatic discharge during handling.

Multi-Tech uses and recommends that others use anti-static boxes that create a faraday cage (packaging designed to exclude electromagnetic fields). Multi-Tech recommends that you use our packaging when returning a product and when you ship your products to your customers.

Cellular Information

Antenna System for Cellular Devices

The cellular performance is completely dependent on the implementation and antenna design. The integration of the antenna system into the product is a critical part of the design process; therefore, it is essential to consider it early so the performance is not compromised. If changes are made to the certified antenna system of the QuickCarrier, then recertification will be required by specific network carriers such as Sprint. The Antenna System is defined as the UFL connection point from the QuickCarrier to the specified cable specifications and specified antenna specifications.

Antenna Specifications

EV-DO, CDMA Antenna Requirements/Specifications

Category	Description
Frequency Range	824 – 894 MHz / 1850 – 1990 MHz
Impedance	50 Ohms
VSWR	VSWR shall not exceed 2.0:1 at any point across the bands of operation
Typical Radiated Gain (to meet PTCRB)	Requirements 0 / 2 dBi on azimuth plane
Maximum Radiated Gain allowed by FCC	10/8.9 dBi
Radiation	Omni-directional
Polarization	Vertical
TRP/TIS	The total radiated power (TRP) at the antenna shall be no less than +21/20 dBm for PCS/CELL channels respectively, and the total isotropic sensitivity (TIS) at the antenna shall be no less than -104/104 dBm for PCS/CELL channels respectively.

GSM Antenna Requirements/Specifications

Category	Description
Frequency Range	824 – 960 MHz / 1710 – 1990 MHz
Impedance	50 Ohms
VSWR	VSWR shall not exceed 2.0:1 at any point across the bands of operation
Typical Radiated Gain (to meet PTCRB)	Requirements 0 / 2 dBi on azimuth plane
Maximum Radiated Gain allowed by FCC	6.9/3.1 dBi
Radiation	Omni-directional
Polarization	Vertical
TRP/TIS	Including cable loss the total radiate power (TRP) at the antenna shall be no less than +22/24.5 dBm for 850/1900 MHz respectively, and the total isotropic sensitivity (TIS) at the antenna shall be no less than -99/101.5 dBm for 850/1900 MHz respectively.

HSPA / UMTS Antenna Requirements/Specifications

Category	Description
Frequency Range	824 – 960 MHz / 1710 – 1990 MHz / 1920 – 2170 MHz
Impedance	50 Ohms
VSWR	VSWR shall not exceed 2.0:1 at any point across the bands of operation
Typical Radiated Gain (to meet PTCRB)	Requirements 0 / 2 dBi on azimuth plane
Maximum Radiated Gain allowed by FCC	5.0/4.3 dBi
Radiation	Omni-directional
Polarization	Vertical
TRP/TIS	Including cable loss the total radiate power (TRP) at the antenna shall be no less than +22/24.5 dBm for 850/1900/ MHz respectively, and the total isotropic sensitivity (TIS) at the antenna shall be no less than -99/101.5 dBm for 850/1900 MHz respectively. Note: 2100MHz is not used by the North America carriers.

PTCRB Requirements for the Antenna

There cannot be any alteration to the authorized antenna system. The antenna system must maintain the same specifications. The antenna must be the same type, with similar in-band and out-of-band radiation patterns.

Coax Cables Specifications

Category	Description
Cable Type	Coaxial Cable
Attenuation	<1.0db
Connector Impedance	50 ohm
Maximum Cable Length	16" (40 cm)

You can order optional antenna cables from Multi-Tech Systems, Inc.

OEM Integration

FCC Grant Notes

The OEM should follow all the grant notes listed below. Otherwise, further testing and device approvals may be necessary.

The antenna gain, including cable loss, for the radio you are incorporating into your product design must not exceed the requirements at 850 MHz and 1900 MHz as specified by the FCC grant for mobile operations and fixed mounted operations as defined in 2.1091 and 1.1307 of the FCC rules for satisfying RF exposure compliance. Power output listed is conducted.

This device is a mobile device with respect to RF exposure compliance. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons, and must not be collocated or operate in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product guidelines. Installers and end-users must be provided with specific information required to satisfy RF exposure compliance for installations and final host devices. (See note under Grant Limitations.) Compliance of this device in all final host configurations is the responsibility of the Grantee.

Grant Limitations

This device has been granted modular approval for mobile applications. Portable applications may require further RF exposure (SAR) evaluations. Examples of mobile devices include wireless routers, desktop computers, utility meters, etc. Examples of portable applications include devices such as a laptop, USB dongle, mobile phone, tablet PC, and any device that can be worn on the body during use.

Your final product with this embedded device may need to pass FCC Part 15B.

This device has not been evaluated or approved for simultaneous transmission. Any simultaneous transmission conditions should be evaluated per the current FCC KDB 447498 requirements. Simultaneous transmission requirements for mobile devices are contained in Section 8.

KDB 447498 Section 8

Transmitters and modules certified for mobile or portable exposure conditions and categorically excluded by § 2.1091(c) can be incorporated in mobile host devices without further testing or certification when:

The closest separation among all simultaneous transmitting antennas is ≥ 20 cm;

or

The antenna separation distance and MPE compliance boundary requirements that enable all simultaneous transmitting antennas incorporated within the host to comply with MPE limits are specified in the application filing of at least one of the certified transmitters incorporated in the host device. In addition, when transmitters certified for portable use are incorporated in a mobile host device the antenna(s) must be ≥ 5 cm from all other simultaneous transmitting antennas.

All antennas in the final product must be at least 20 cm from users and nearby persons.

If the host device requires further authorization, consult an accredited FCC laboratory for guidance.

FCC Definitions

Portable: (§2.1093) — A portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

Mobile: (§2.1091) — A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter’s radiating structure(s) and the body of the user or nearby persons.

Host Labeling

The following statements are required to be on the host label:

- This device contains FCC ID: {Add the FCC ID of the specific device}
- This device contains equipment certified under IC ID: {Add the IC ID of the specific device}

For labeling examples, see Cellular Approvals and Labeling Requirements.

Account Activation for Cellular Devices

Some Multi-Tech cellular modems have been pre-configured to operate on a specific cellular network, such as Sprint and Verizon Wireless.

However, before you can begin to use the modem, you must set up a cellular data account with your cellular network provider. Please refer to Multi-Tech’s Cellular Activation Web site <http://www.multitech.com/activation.go> for information on activating your cellular modem.

ESN, IMEI Information

The cellular carrier will ask you for device identification information:

- **For EV-DO:** The modem’s ESN is printed in hexadecimal format on the label.
- **For GPRS/HSPA+:** The modem's 15-character IMEI (International Mobile Equipment Identity) number is printed on the modem's label.

Refer to the device labels on the next page for the location of the device identification.

IMPORTANT: Both the QuickCarrier USB and the modem include labels. When the cellular carrier asks you to provide the modem's model identification, give the Multi-Tech cellular model identification, not the host device model.

Cellular Approvals and Labeling Requirements

Approvals and Certification

The Multi-Tech SocketModem is an Industry and/or Carrier Approved modem. In most cases, when integrated and used with an antenna system that was part of the Multi-Tech modem certification, no additional approvals or certifications are required (however, EV-DO has a few exceptions) for the device you develop as long as the following are met:

- **PTCRB Requirements (GPRS and HSPA+ only)**
The antenna system **cannot** be altered.
- **Model Identification**
The Multi-Tech model identification allows the carrier to verify the modem as one of its approved models. This information is located on the modem's label.

Modem Label Example

Note: The label is shown larger than actual size.

Multi-Tech Model Identification → **Model:MTSMC – EV2 – U**

ORDER P/N: MTSMC – EV2 – U – LP – N3 5.5 UFL
 SKU #:92502389LF Serial#:xxxxxxxxK
 DOM: 2011.11.09
 FCC ID: AU792U10E06831

FC Home or Office Use E150299

ROHS 2002/95/EC COMPLIANT

ESN (EV2) or IMEI (H5/G2) → ESN(hex):

ESN(dec):

Produced in the US of US and non – US components
 Multi – Tech Systems, Inc. Mounds View, MN USA
 www.multitech.com

QuickCarrier USB Label

Note: The label is shown larger than actual size.

Multi-Tech Model Identification → **M/N:MT100UCC – EV2**

B/O: – N3
 SKU:92502391LF
 SERIAL #:XXXXXXXX

Multi-Tech Ordering Part Number → ORDER P/N: MT100UCC – EV2 – N3

ESN (EV2) or IMEI (H5/GP2) for the attached modem → ESN DEC:

ESN HEX:

www.multitech.com
 DOM:2011.11.09

XXXXXXXXXX

FC Home or Office Use E150299

Safety Notices and Warnings

Note to OEMs: The following safety statements may be used in your final product documentation.

RF Safety

Remote modems are cellular devices. It is important to follow any special regulations regarding the use of radio equipment due in particular to the possibility of Radio Frequency (RF) interference.

Caution: A separation distance of at least 20 cm must be maintained between the modem transmitter's antenna and the body of the user or nearby persons. The modem is not designed for or intended to be used in portable applications within 20 cm of the body of the user. Check your local standards regarding safe distances, etc.

- Operating a cellular modem 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 have their own restrictions governing the use of cellular devices. Please observe local restrictions of the environment where you intend to operate the cell modem.
- Under no circumstances should the antenna be placed outdoors.

Interference with Pacemakers and Other Medical Devices

Potential interference

Radiofrequency 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 the 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).

Vehicle Safety

- Do not use your cellular device while driving. Respect national regulations on the use of cellular telephones in vehicles. Road safety always comes first.

- If it is incorrectly installed in a vehicle, operating the cellular device could interfere with the correct functioning of vehicle electronics. Only qualified personnel should install the device. The installation process should verify that vehicle electronics are protected from interference.
- Using an alert device to operate a vehicle's lights or horn is not permitted on public roads.
- UL has evaluated this device for use in ordinary locations only. UL did not evaluate installation in a vehicle or other outdoor locations. UL Certification does not apply or extend to use in vehicles or outdoor applications or in ambient temperatures above 40° C.

Cellular Device Maintenance

Your cellular device is the product of advanced engineering, design, and craftsmanship and should be treated with care. The suggestions below will help you to enjoy this product for many years.

- Do not attempt to disassemble the cellular device. There are no user serviceable parts inside.
- Do not expose the cellular device to water, rain, or spilled beverages. It is not waterproof.
- Do not place the cellular device alongside computer discs, credit or travel cards, or other magnetic media. The phone may affect the information contained on discs or cards.
- Using accessories not authorized by Multi-Tech or not compliant with Multi-Tech's accessory specifications may invalidate the warranty of the cellular device.
- In the unlikely event of a fault in the cellular device, contact Multi-Tech Tech Support.

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.

Your Responsibility

This cellular device is your responsibility. Please respect all local regulations. Become familiar with and use the security features to block unauthorized use and theft.

Regulatory Compliance Statements

EMC, Safety, and R&TTE Directive Compliance



Some models have received CE certification. If you need CD compliance, check with your sales representative.

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

- Council Directive 2004/108/EC of 15 December 2004 on the approximation of the laws of Member States relating to electromagnetic compatibility;
and
- Council Directive 2006/95/EC of 12 December 2006 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits;
and
- Council Directive 1999/5/EC of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

EMC Requirements for the United States

47 CFR – FCC Part 15 Regulation – Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

EMC Requirements for Industry Canada

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement Canadien sur le matériel brouilleur.

This device complies with Industry Canada RSS Appliance radio exempt from licensing. The operation is permitted for the following two conditions:

1. the device may not cause harmful interference, and
2. the user of the device must accept any interference suffered, even if the interference is likely to jeopardize the operation.

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.

South African Statement

This modem must be used in conjunction with an approved surge protection device.

Korea Class B Statement

Equipment (Residential Use)

이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하
모든 지역에서 사용할 수 있습니다.

Waste Electrical and Electronic Equipment Statement

Note to OEMs: This statement is included for your information. You can use it in your final product documentation.

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 Multi-Tech 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 2011/65/EU

Multi-Tech Systems confirms that its embedded products comply with the chemical concentration limitations set forth in the directive 2011/65/EU of the European Parliament (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment - RoHS)

These Multi-Tech products do not contain the following banned chemicals¹:

- Lead, [Pb] < 1000 PPM
- Mercury, [Hg] < 1000 PPM
- Hexavalent Chromium, [Cr+6] < 1000 PPM
- Cadmium, [Cd] < 100 PPM
- Polybrominated Biphenyl, [PBB] < 1000 PPM
- Polybrominated Diphenyl Ether, [PBDE] < 1000 PPM

Environmental considerations:

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

¹Lead 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.

Chapter 2 – QuickCarrier USB GPRS (MT100UCC-G2)

The QuickCarrier USB GPRS is an embedded USB cellular modem that offers standards-based quad-band GSM/GPRS Class 10 performance. These quick-to-market devices combine a network approved cellular SocketModem and a USB carrier card in one compact design. With its 4-pin USB interface the QuickCarrier USB embedded cellular modem cables to an existing device's internal USB port and can be secured using the four mounting holes located at the corners of the printed circuit board. Embedding M2M connectivity into your Windows or Linux device has never been this quick or this easy.

Network Activation

Note the following:

- These units ship without network activation.
- To connect to the cellular network, you will need a cellular account. See the Cellular Activation procedures.

Technical Specifications

The QuickCarrier USB MT100UCC-G2 and MT100UCC-G2-ED meet the following specifications:

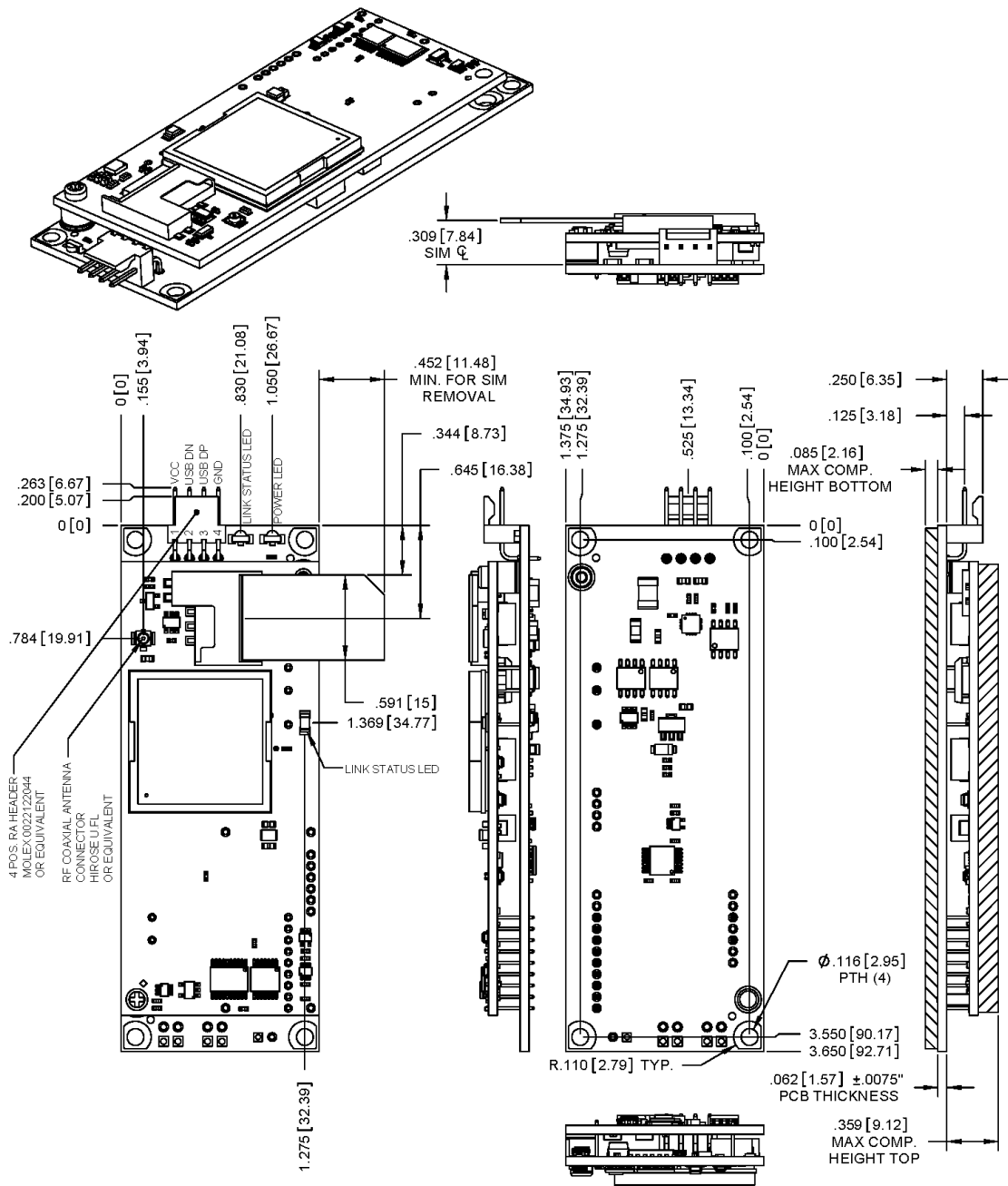
Category	Description
Standards	GPRS Class 10
Frequency Bands	Quad-band GSM 850/900/1800/1900 MHz
Data Format	10 bit Serial Asynchronous
Data Error Correction	MNP2
Data Compression	V.42bis
Driver Support	For Windows XP (SP3), Server 2003/2008, Vista, 7, and Linux. CDC-ACM compliant driver.
USB Interface	USB 2.0 Full Speed Compliant
Weight	1.536 oz. (43.5 g)
Dimensions	3.650" x 1.375" (92.71 mm x 34.925 mm)
Operating Temperature	-40° C to +85° C
Storage Temperature	-40 °C to +85°C
Humidity	20% to 90% RH, non-condensing
Operating Voltage	Supply Range: 4.75V to 5.25V 1.1A nominal current Device may be damaged if voltage exceeds 5.5V
Input Power	USB bus powered
Antenna Connector	Surface mount UFL
SIM Holder	Standard 1.8V and 3V SIM holder
Supported IP Protocols	DNS Resolve, FTP Client, LCP, PPP (dial-out), TCP socket, UDP socket, PAP and CHAP authentication

Category	Description
Compliance	<p>EMC Compliance FCC Part 15 Class B EN55022 EN55024</p> <p>Radio Compliance FCC Part 22 FCC Part 24 RSS 132 RSS 133 EN 301 511 EN 301 489-1 EN 301 489-7</p> <p>Safety Compliance UL 60950-1 2nd ED cUL 60950-1 2nd ED IEC 60950-1 2nd ED</p> <p>Network Compliant Socket Modem PTCRB AT&T</p>
Warranty	Two years

Note: The radio's performance may be affected at the temperature extremes. This is considered normal. The radio is designed to automatically fallback in class and reduces transmitter power to avoid damage to the radio. There is no single cause for this function. Rather, it is the result of an interaction of several factors, such as the ambient temperature, the operating mode and the transmit power.

You may need to reduce the temperature range if airflow is limited around the cellular radio. Test and verify the temperature range if the QuickCarrier USB is designed into an enclosed chassis.

Mechanical Drawing



DIMENSIONS IN In [mm]

MT100UCC-G2

Pin-Out Specifications

Pin(s)	Signal Name	Logic Level Voltage	I/O	Description
JP2-1	VCC	5.0	PWR	DC input power
JP2-2	USB DN	3.3	I/O	USB data
JP2-3	USB DP	3.3	I/O	USB data
JP2-4	GND	GND	GND	Ground

Power Draw

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

Input Voltage = 5.0 Volts	Sleep Mode	Typical	Maximum ¹	Peak ² TX	Peak Reset
GSM850					
Current (AMPS)	0.035	0.135	0.270	1.350	
Watts	0.177	0.672	1.33		
In-Rush Current (AMPS) (approx. 3ms duration)³					0.815

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

²**Peak:** The peak current during a GSM850 transmission burst period.

³**In-Rush Current:** The input current during power up or a reset.

Application Notes

LED Interface

The LED signal indicates the working status of the QuickCarrier.

Power LED

Signal	Description
OFF	No power to the unit
ON	The unit is functioning

Link Status LED

Signal	Description	
OFF	Download mode or switched OFF	
ON	Continuously lit	Switched ON (not registered on the network)
	Blinking	Switched ON (registered on the network)

RF Performances

RF performances are compliant with 3GPP TS 05.05 (R99)
All values indicated are conducted.

Receiver Features

Category	Description
GSM 850 Sensitivity	< -108 dBm
E-GSM 900 Sensitivity	< -108 dBm
DCS 1800 Sensitivity	< -107 dBm
PCS 1900 Sensitivity	< -107 dBm

Transmitter Features

Category	Description
Maximum output power (E-GSM 900 & GSM 850)	33 dBm ± 2 dB
Maximum output power (DCS 1800 & PCS 1900)	30 dBm ± 2 dB

Changing the Quad Band

If for any reason, such as moving the modem from one geographical area to another, you want to change the band, you can accomplish this by using the **+WMBS** AT Command.

Changing the GSM Band

Use a terminal application such as HyperTerminal for entering the AT Command.

1. Issue command **AT+WMBS=<Band><Param>**. Press **Enter**.
2. Enter one of the following **<Band>** options:
 - 4** = Dual-band mode 850/1900MHz
 - 5** = Dual-band mode 900/1800MHz
3. Enter one for the following **<Param>** options:
 - 0** = Modem must be reset in order to use the specified band(s). This is the default.
 - 1** = Modem restarts immediately using the specified band(s).

For example, type **AT+WMBS=4,0** and press **Enter**.

For additional band settings and information, refer to *GPRS AT Commands for Multi-Tech G2 Cellular Modems* (S000463). To request this document, contact oemsales@multitech.com.

Chapter 3 – QuickCarrier USB HSPA (MT100UCC-H5)

The QuickCarrier USB HSPA is an embedded USB cellular modem uses HSPA technology to deliver some of the fastest cellular data speeds. These quick-to-market devices combine a network approved cellular SocketModem and a USB carrier card in one compact design. With its 4-pin USB interface the QuickCarrier USB embedded cellular modem cables to an existing device's internal USB port and can be secured using the four mounting holes located at the corners of the printed circuit board. Embedding M2M connectivity into your Windows or Linux device has never been this quick or this easy.

Technical Specifications

The QuickCarrier USB HSPA cellular modem meets the following specifications:

Category	Description
Standards	High Speed Packet Access (HSPA) Circuit-Switched (CS) domain data service based on UMTS and GSM
Frequency Bands	HSUPA / HSDPA / UMTS Triple-band: 2100/1900/850 MHz with Rx diversity GSM/GPRS/EDGE 850/900/1800/1900MHz
Data Speed	HSPA+ Models: HSPA+ data up to 21.0 Mbps downlink / 5.76 Mbps uplink Penta-band HSPA: 850/900/1700/1900/2100 MHz Quad-band GSM/GPRS/EDGE: 850/900/1800/1900 MHz
Driver Support	Windows and Linux
USB Interface	USB 2.0 Low/Full/High Speed Compliant
Weight	1.536 oz (43.5 g)
Dimensions	3.650" x 1.375" (92.71 mm x 34.925 mm)
Operating Temperature	-30° C to +85° C
Storage Temperature	-40° to +85° C
Humidity	20% to 90% non-condensing
Input Power	USB bus powered 5VDC user-supplied through 2-pin header (optional)
Operating Voltage	Supply Range: 4.55V to 5.5V 1.1A nominal current Device may be damaged if voltage exceeds 5.5V
SMS	Point-to-Point messaging Mobile-Terminated SMS Mobile-Originated SMS
Antenna Connector	2 x UFL, cellular and RX diversity
SIM Holder	Standard 1.8 / 3V SIM card holder

Category	Description
Compliance	<p>EMC Compliance FCC Part 15 Class B EN 55022 Class B EN 55024</p> <p>Radio Compliance FCC Part 22 FCC Part 24 RSS 132 RSS 133 EN 301 511 EN 301 489-1 EN 301 489-7 EN 301 489-24</p> <p>Safety Compliance UL 60950-1 cUL 60950-1 EN 60950-1 AS/NZ 60950-1</p> <p>Network Compliant Socket Modem PTCRB AT&T Others pending</p>
Warranty	2 years

Note: The radio's performance may be affected at the temperature extremes. This is considered normal. The radio is designed to automatically fallback in class and reduces transmitter power to avoid damage to the radio. There is no single cause for this function. Rather, it is the result of an interaction of several factors, such as the ambient temperature, the operating mode and the transmit power.

You may need to reduce the temperature range if airflow is limited around the cellular radio. Test and verify the temperature range if the QuickCarrier USB is designed into an enclosed chassis.

Pin-Out Specifications

Pin(s)	Signal Name	Logic Level Voltage	I/O	Description
JP2-1	VCC	5.0	PWR	DC input power
JP2-2	USB DN	3.3	I/O	USB data
JP2-3	USB DP	3.3	I/O	USB data
JP2-4	GND	GND	GND	Ground

Power Draw

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

Radio Protocol	AT command used to set radio function and power mode	Radio Idle, SIM installed and connected to tower (Amps)	Agilent Connection No Data (Amps)
5 Volts			
GSM850	AT+CFUN=1	51mA	52mA
HSDPA	AT+CFUN=1	51mA	51mA

Radio Protocol	IP Connection to Agilent with Data									Peak TX Amplitude Current (Amps) 577uS duration (GSM850)	Peak Reset Current (InRush) (Amps)	Peak Reset Current (InRush) Duration
	Low Power			Half Power			Max Power					
	Measured Current (Amps)	MS Transmit Burst or Power Control Level	(GSM) Xmit Pwr or (HSDPA) Ch. Pwr Meas. (avg)	Measured Current (Amps)	MS Xmit Level Burst or Pwr Cntrl Level	(GSM) Xmit Pwr or (HSDPA) Ch. Pwr Meas. (avg)	Measured Current (Amps)	MS Xmit Level Burst or Pwr Cntrl Level	(GSM) Xmit Pwr or (HSDPA) Ch. Pwr Meas. (avg)			
5 Volts												
GSM850	96mA	28	1.58	98mA	15	10.02	324mA	0	29.89	1.39A	520mA	32mS
HSDPA	222mA	Alternating bits		197mA	Active bits		486mA	All up bits		466mA	520mA	32mS

Notes:

Maximum: The continuous current during maximum data rate with the radio transmitter at maximum power.

Peak TX: The peak current during a GSM850 transmission burst period or HSDPA connection.

In-Rush Current: The input current during power up or a reset.

Powering Down Your Device

CAUTION: Failing to properly shutdown the device before removing power may corrupt your device's file system.

To properly power down your device, use the following sequence:

1. Issue the AT#SHDN command.
2. Wait 30 seconds.
3. Power off the device. Disconnect power from the device.

Application Notes

LED Interface

The LED signal indicates the working status of the QuickCarrier.

Power LED

Signal	Description
OFF	No power to the unit
ON	The unit is functioning

Link Status LED

Signal	Description	
OFF	No power to the unit	
ON	Continuously lit	Powered and connected, but not transmitting or receiving.
	Slow blink (-0.2Hz)	Powered and searching for a connection.
	Faster blink (-3Hz)	Transmitting or receiving.

For non-IP builds, to ensure that the Link Status LED works properly, issue the following AT Command sequence to the GPIO:

```
AT#GPIO=1,0,2
```

```
AT#SLED=2
```

RF Performances

The module's radio transceiver meets the requirements of 3GPP Release 5 & 6.
All values indicated are conducted.

Receiver Features

Category	Description
GSM 850 Sensitivity	< -106 dBm
E-GSM 900 Sensitivity	< -106 dBm
DCS 1800 Sensitivity	< -105 dBm
PCS 1900 Sensitivity	< -105 dBm
UMTS Band I 2100 Sensitivity	< -109 dBm
UMTS Band II 1900 Sensitivity	< -109 dBm
UMTS Band V 850 Sensitivity	< -110 dBm
UMTS Band VI 800 Sensitivity	< -110 dBm

Transmitter Features

Category	Description
Maximum output power (GSM 850 / GSM 900)	+32 dBm ± 1 dBm GSMK mode (class 4) +27 dBm ± 1 dBm 8PSK mode (class E2)
Maximum output power (DCS 1800 / PCS 1900)	+29 dBm ± 1 dBm GSMK mode (class 1) +26 dBm ± 1 dBm 8PSK mode (class E2)
Maximum output power (UMTS Band II 1900, V 850, &VI 800)	+23 dBm ± 1 dBm (class 3)

Category	Description
Maximum output power (UMTS Band I 2100)	+23 dBm \pm 1 dBm (class 3)

RF Connection and Antenna

The RF connector on the QuickCarrier is a UFL standard type. See Chapter 1 for [Antenna](#) details.

Frequency Bands Supported

UMTS Frequency Band Support

Band	Frequencies
Band I UMTS 2100	Tx: 1920 – 1980 MHz Rx: 2110 – 2170 MHz
Band II UMTS 1900	Tx: 1850 – 1910 MHz Rx: 1930 – 1990 MHz
Band V UMTS 850	Tx: 824 – 849 MHz Rx: 869 – 894 MHz

GSM Frequency Band Support

Band	Frequencies
GSM 850	Tx: 824 – 849 MHz Rx: 869 – 894 MHz
EGSM 900	Tx: 880– 915 MHz Rx: 925 – 960 MHz
GSM 1800	Tx: 1710 – 1785 MHz Rx: 1805 – 1880 MHz
GSM 1900	Tx: 1850 – 1910 MHz Rx: 1930 – 1990 MHz

Chapter 4 – QuickCarrier USB EV-DO (MT100UCC-EV2)

The QuickCarrier USB EV-DO embedded cellular modems are 3G modules supporting CDMA EV-DO Rev A and below. These devices combine a network approved cellular SocketModem and a USB carrier card in one compact design. QuickCarrier USB EV-DO modems are equipped with dual-band 800/1900 MHz bands with receive diversity support on both bands. With its 4-pin USB interface the QuickCarrier USB embedded cellular modem cables to an existing device's internal USB port and can be secured using the four mounting holes located at the corners of the printed circuit board. Embedding M2M connectivity into your Windows or Linux device has never been this quick or this easy.

Technical Specifications

The QuickCarrier USB EV-DO (MT100UCC-EV2-N2, MT100UCC-EV2-N3, and MT100UCC-EV2-N16) meets the following specifications:

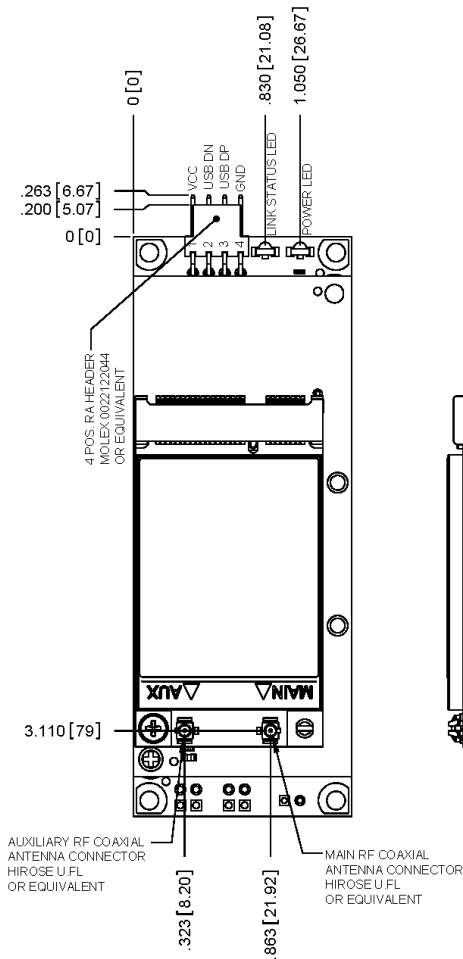
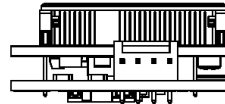
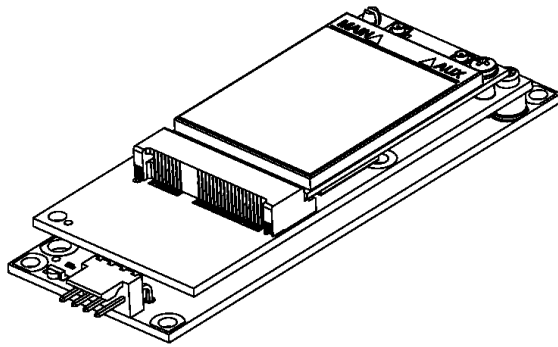
Category	Description
Standard	CDMA2000 1xRTT EV-DO Rev. A (backward compatible to EV-DO Rev. 0 and CDMA 1x networks)
Frequency Bands	Dual-band 800/1900 MHz bands with Receive Diversity support on both bands
Data Speed	EV-DO Peak downlink speeds up to 3.1 Mbps Peak uplink speeds up to 1.8 Mbps CDMA 1xRTT Up to 153 Kbps downlink and uplink Dual-band 900/1800MHz
USB Interface	USB 2.0 Full Speed Compliant
Driver Support	Windows XP (SP3), Server 2003/2008, Vista, 7, Linux
Weight	1.536 oz (43.5 g)
Dimensions	3.650" x 1.375" (92.71 mm x 34.925 mm)
Operating Temperature	-40° to +85° C
Storage Temperature	-40° to +85° C
Humidity	20% to 90% (non-condensing)
Operating Voltage	Supply Range: 4.75V to 5.25V 1.1A nominal current Device may be damaged if voltage exceeds 5.5V
Input Power	USB bus powered
Antenna Connector	All models have surface mount UFL antenna connectors. Standard and Rx diversity antennas are also supported.

Category	Description
SMS	Point-to-Point messaging Mobile-Terminated SMS Mobile-Originated SMS
Compliance	<p>EMC Compliance FCC Part 15 Class B</p> <p>Radio Compliance FCC Part 22 FCC Part 24</p> <p>Safety Compliance UL 60950-1 2nd ED cUL 60950-1 2nd ED IEC 60950-1 2nd ED</p> <p>Network Compliant Socket Modem Verizon Sprint Aeris</p>
Warranty	2 years

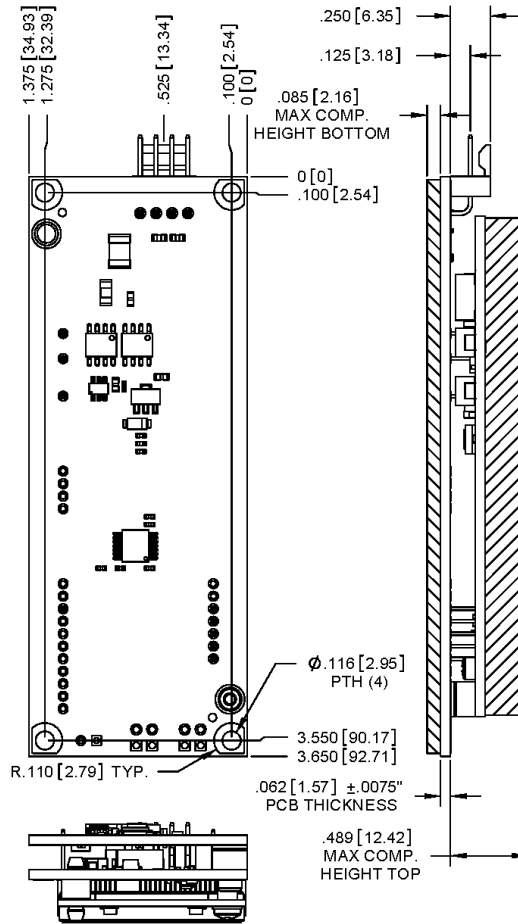
Note: The radio's performance may be affected at the temperature extremes. This is considered normal. The radio is designed to automatically fallback in class and reduces transmitter power to avoid damage to the radio. There is no single cause for this function. Rather, it is the result of an interaction of several factors, such as the ambient temperature, the operating mode and the transmit power.

You may need to reduce the temperature range if airflow is limited around the cellular radio. Test and verify the temperature range if the QuickCarrier USB is designed into an enclosed chassis.

Mechanical Drawing



DIMENSIONS IN IN [mm]



MT100UCC-EV2-Nx

Pin-Out Specifications

Pin(s)	Signal Name	Logic Level Voltage	I/O	Description
JP2-1	VCC	5.0	PWR	DC input power
JP2-2	USB DN	3.3	I/O	USB data
JP2-3	USB DP	3.3	I/O	USB data
JP2-4	GND	GND	GND	Ground

Power Draw

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

Input Voltage = 5.0 Volts	Sleep Mode	Typical	Maximum ¹	Peak Tx ²	In-Rush Current ³
US Cellular					
Current (AMPS)	0.052	0.205	0.755	0.830	
Watts	0.261	1.01	3.51		
US PCS					
Current (AMPS)	0.052	0.220	0.810	0.900	
Watts	0.261	1.08	3.73		
In-Rush Current (AMPS) at reset power on. (Approx. 3ms duration)					2.700

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

²**Peak:** The peak current during transmission.

³**In-Rush Current:** The input current during power up or a reset.

Application Notes

LED Interface

The LED signal indicates the working status of the QuickCarrier.

Power LED

Signal	Description
OFF	No power to the unit
ON	The unit is functioning

Link Status LED

Signal	Description	
OFF	No power to the unit.	
ON	Continuously lit	Powered and connected, but not transmitting or receiving
	Slow blink (~0.2 Hz)	Powered and searching for a connection
	Fast blink (~3 Hz)	Transmitting or receiving

RF Interfaces

Radio Characteristics

	CDMA/EV-DO 800	CDMA/EV-DO 1900
Frequency RX	869 to 894 MHz	1930 to 1990 MHz
Frequency TX	824 to 849 MHz	1850 to 1910 MHz
Impedance	50 ohms	
VSWR	<2	
Typical Radiated Gain	0 dBi in at least one direction	
Output Power	.25W in CDMA/EVDO	

RF Performances

All values indicated are conducted.

Receiver Features

Category	Description
CDMA 1xRTT US Cellular 800 (Verizon) sensitivity	< -108 dBm
CDMA 1xRTT US PCS 1900 (Sprint) sensitivity	< -107 dBm
EV-DO 1x Rev 0 US Cellular 800 (Verizon) sensitivity	< -111 dBm
EV-DO 1x Rev 0 US PCS 1900 (Sprint) sensitivity	< -109 dBm

Transmitter Features

Category	Description
Maximum output power (CDMA 1x RTT & EV-DO 1x Rev 0/Rev A)	+24 dBm \pm 1 dBm

RF Connection and Antenna

The RF connector on the QuickCarrier is a UFL standard type. See Chapter 1 for [Antenna](#) details.