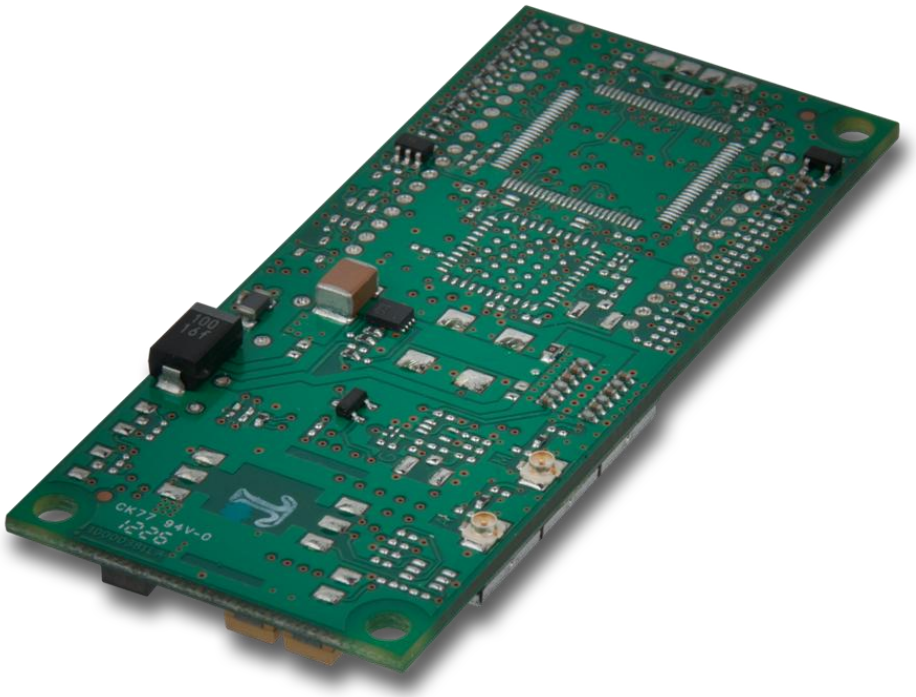
MultiTech® Systems



SocketModem® Cell CDMA
SocketModem® iCell CDMA

MTSMC-C2 Device Guide

SocketModem Cell CDMA Device Guide
SocketModem iCell CDMA Device Guide
S000542, Version A

MTSMC-C2-xx, MTSMC-C2-IP-xx, MTSMC-C2-GP-xx

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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

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Warranty

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

Contents

Chapter 1 – Device Overview

Description

The SocketModem cellular modem is a complete, ready-to-integrate communications device that offers 2G dual-band CDMA 1xRTT performance. These quick-to-market communications devices allow developers to add wireless communication to products with a minimum of development time and expense. The intelligence of the embedded Universal IP® stack allows for automatic/persistent connectivity for mission critical applications and enhanced M2M functionality. The SocketModem Cell and iCell cellular modems are based on industry-standard open interfaces and use Multi-Tech's Universal Socket design.

Product Build Options

Product	Description	Region
Builds using Sprint Services		
MTSMC-C2-N2	SocketModem Cell 800/1900 MHz CDMA 1xRTT – Sprint – Data only	USA
MTSMC-C2-GP-N2	SocketModem iCell 800/1900 MHz CDMA 1xRTT – Sprint – with GPS/Universal IP	USA
MTSMC-C2-IP-N2	SocketModem iCell 800/1900 MHz CDMA 1xRTT – Sprint – with Universal IP	USA
Builds using Verizon Wireless Services		
MTSMC-C2-N3	SocketModem Cell 800/1900 MHz CDMA 1xRTT – Verizon – Data Only	USA
MTSMC-C2-GP-N3	SocketModem iCell 800/1900 MHz CDMA 1xRTT – Verizon – with GPS/Universal IP	USA
MTSMC-C2-IP-N3	SocketModem iCell 800/1900 MHz CDMA 1xRTT – Verizon – with Universal IP	USA
Builds using Aeris Communication, Inc. Services		
MTSMC-C2-N16	SocketModem Cell 800/1900 MHz CDMA 1xRTT – Aeris – Data Only	USA
MTSMC-C2-GP-N16	SocketModem iCell 800/1900 MHz CDMA 1xRTT – Aeris – with GPS/Universal IP	USA
MTSMC-C2-IP-N16	SocketModem iCell 800/1900 MHz CDMA 1xRTT – Aeris – with Universal IP	USA
Developer Kit		
MTSMI-UDK	Universal Developer Kit	Global

Notes:

These units ship without network activation. To connect them to the cellular network, you need a cellular account. Refer to Multi-Tech's Cellular Activation site http://www.multitech.com/activation.go for step-by-step instructions on activating your cellular modem.

GP devices have a dedicated GPS receiver.

All builds can be ordered individually or in 50-packs.

The complete product code may end in .Rx. For example, MTSMC-C2-N2.Rx, where R is revision and x is the revision number.

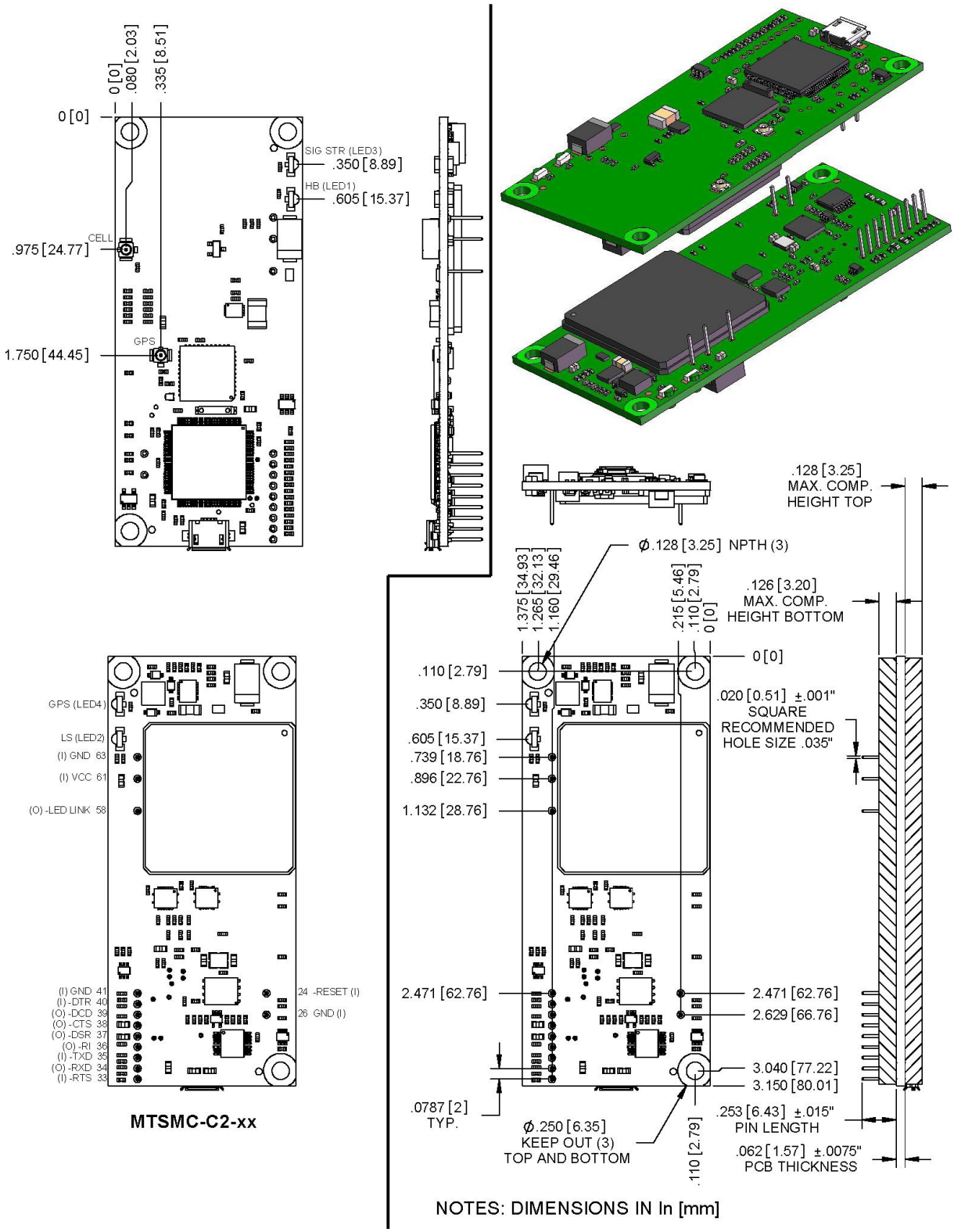
Documentation

The following documentation is available by email to oemsales@multitech.com or by using the Developer Guide Request Form on the multitech.com website.

- **Device Guides** – This document. Provides model-specific specifications and developer information.
- **Universal Socket Developer Guide** – Provides an overview, safety and regulatory information, design considerations, schematics, and general device information. (S000342)
- **USB Driver Installation Guide** – Provides steps for installing EV-DO/CDMA USB drivers. (S000569)
- **AT Command Guide** – Use the following AT Command Guides with CDMA devices:
  - S000546 for EV3 and C2 Modems
  - S000457 Universal IP Commands

Chapter 2 – Mechanical Drawings

MTSMC-C2 Builds



Chapter 3 – Specifications

Technical Specifications

Category	Description
General	
Standards	2G CDMA 1xRTT
Frequency Bands	Dual-band 800/1900 MHz CDMA
Speed	
Serial/Data Speed	Peak downlink speeds up to 153 Kbps Peak uplink speeds up to 153 Kbps
Interface, Ports	
Serial Modem Interface	Up to 921.6 Kbps
Physical Description	
Weight	1 oz. (28g)
Dimensions	3.15" x 1.375" (80.010 mm x 34.93 mm)
Connectors	
Antenna Connector	Surface mount UFL one cellular, one GPS (GP models only)
Environment	
Operating Temperature	-40° C to +85° C
Storage Temperature	-40 °C to +85°C
Humidity	20% to 90% non-condensing
Power Requirements	
Operating Voltage	3.3 - 5VDC ± 10%
IP, M2M, SMS	
Supported IP Protocols	DNS resolve, FTP client, ping, POP3 client, PPP (dialout), SMTP client, TCP RAW client & server
M2M Applications	iCell models: Automatic connect/reconnect, device monitor, modem emulation, ping & TCP keep alive, wake-up on caller ID, wake-up on ring, GPS tracking (GP modelsonly)
SMS	Point-to-Point messaging Mobile-Terminated SMS Mobile-Originated SMS
Certifications, Compliance	
EMC Compliance	FCC Part 15
Radio Compliance	FCC Part 22 FCC Part 24 RSS 132 RSS 133
Safety Compliance	UL 60950-1 cUL 60950-1 EN 60950-1
Network Compliance	Verizon Sprint (pending) Aeris (pending)

Note: Radio performance may be affected by temperature extremes. This is normal.

Mounting Hardware

The board has three mounting holes at corners. Use #4 or M3 hardware for mounting the SocketModem to the board. Refer to the Mechanical Drawings for more information.

Recommended Parts

Manufacturer	Part	Part Number
PEM PennEngineering	Surface Mount Standoff	SMTSO-M3-4ET
RAF Electronic Hardware	3/16” Hex Female Standoff	2051T-440-S-12 Zinc
RAF Electronic Hardware	4.5mm Hex Female Standoff	1251-3005-S-12 Zinc

Device Reset

The SocketModem is ready to accept commands after a fixed amount of time (“X” Time) after power-on or reset.

Model	Time Constant	"X" Time	Minimum Reset Pulse1
MTSMC-C2	250 ms	10 seconds	200 us

[1]The SocketModem may respond to a shorter reset pulse.

RS-232 Signal DC Electrical Characteristics

Units: Volts

Applies to the following pins:

Pin	Signal Name	Pin	Signal Name
J33	-RTS	J37	-DSR
J34	-RXD	J38	-CTS
J35	-TXD	J39	-DCD
J36	-RI	J40	-DTR

Parameter	Minimum	Maximum
3.3 Volt Powered		
Input Low Level	0	0.55
Input High Level	1.5	3.3
Output Low Level	0	0.55
Output High Level	2.35	3.3
5 Volt Powered		
Input Low Level	0	0.8
Input High Level	2.3	5
Output Low Level	0	0.55
Output High Level	3.7	5

Absolute Maximum Rating

VCC Voltage (Survival) -0.3V to +5.5V

Electrical Characteristics Other Pins

Pin	Signal Name	VIL		VIH		VOL		VOH	
		Min	Max	Min	Max	Min	Max	Min	Max
J24	-RESET		0.8	2.0		--	--	--	--
J26	GND	--	--	--	--	--	--	--	--
J41	GND	--	--	--	--	--	--	--	--
J58	-LED LINK	--	--	--	--	0	0.45	2.85	3.3
J61	VCC	--	--	--	--	--	--	--	--
J63	GND	--	--	--	--	--	--	--	--

Pinout Specifications

Pin	Signal Name	Logic Level Voltage[1]	I/O	Description
J24	–RESET	3.3 – 5.0	I	Device reset (active low)
J26	GND	GND	GND	Ground
J33	–RTS	5.0	I	Request to send (active low)
J34	–RXD	5.0	O	Received data (active low)
J35	–TXD	5.0	I	Transmitted data (active low)
J36	–RI	5.0	O	Ring indicator (active low)
J37	–DSR	5.0	O	Data set ready (active low)
J38	–CTS	5.0	O	Clear to send (active low)
J39	–DCD	5.0	O	Data carrier detect (active low)
J40	–DTR	5.0	I	Data terminal ready (active low)
J41	GND	GND	GND	Ground
J58	–LED LINK	3.3	O	Link status (active low, can sink up to 150mA)
J61	VCC	5.0	PWR	DC input power
J63	GND	GND	GND	Ground

[1] A hyphen (-) indicates a range of acceptable logic levels.

Pin 58

Note: Pin 58 may or may not be available on some SocketModems.

Pin 58 LED Mode	Operating Status
OFF	Subscriber Carrier Mode is OFF or running in SLEEP or ALARM mode.
600 ms ON/600ms OFF	No PIN entered, network search in progress, ongoing user authentication, or network login in progress.
75 ms ON/75 ms OFF/75 ms ON 3 s OFF Flashing or Blinking	One or more CDMA contexts activated. Indicates CDMA data transfer: When a transfer is in progress, the LED goes on within 1 second after data packets were exchanged. Flash duration is approximately 0.5 s.
ON	Connected to remote party or parameter exchange while call is set up or disconnected.

Pin Availability by Build

Pin and Function	Serial only	2G-IP
J24 - Reset	x	x
J26 - GND	x	x
J33 - RTS	x	x
J34 - RXD	x	x
J35 - TXD	x	x
J36 - RI	x	x
J37 - DSR	x	x
J38 - CTS	x	x
J39 - DCD	x	x
J40 - DTR	x	x
J41 - GND	x	x
J58 - LED LINK		x
J61 - VCC	x	x
J63 - GND	x	x

Power Measurements

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

Note: Protocol is 1xRTT US Cellular 800 and 1xRTT US PCS 1900.

MTSMC-C2

Radio Protocol	Sleep Mode Current (Amps)	Cellular Call Box Connection No Data (Amps)	Average Measured Current (Amps) at Maximum Power	Peak TX Amplitude Current (Amps)	Total Inrush Charge measured in Millicoulombs
3.3 Volts					
US Cellular	0.034	0.055	0.687	0.744	1.08
PCS	0.034	0.055	0.865	0.92	1.08
5 Volts					
US Cellular	0.032	0.044	0.445	0.5	1.52
PCS	0.032	0.045	0.552	0.604	1.52

MTSMC-C2-IP

Radio Protocol	Cellular Call Box Connection No Data (Amps)	Average Measured Current (Amps) at Maximum Power	Peak TX Amplitude Current (Amps)	Total Inrush Charge measured in Millicoulombs
3.3 Volts				
US Cellular	0.142	0.736	0.795	3.37
PCS	0.141	1.244	1.319	3.37
5 Volts				
US Cellular	0.099	0.457	0.512	1.73
PCS	0.1	0.689	0.747	1.73

MTSMC-C2-GP

Radio Protocol	Cellular Call Box Connection No Data (Amps)	Average Measured Current (Amps) at Maximum Power	Peak TX Amplitude Current (Amps)	Total Inrush Charge measured in Millicoulombs
3.3 Volts				
US Cellular	0.257	0.903	0.976	3.37
PCS	0.255	1.358	1.44	3.37
5 Volts				
US Cellular	0.175	0.564	0.632	1.73
PCS	0.173	0.767	0.832	1.73

Notes:

- **Maximum:** The continuous current during maximum data rate with the radio transmitter at maximum power.
- **Peak TX:** The peak current during a CDMA transmission burst period.
- **In-Rush Charge:** The total input charge during power up.

Chapter 4 – FCC and Industry Canada Information

The following is device specific FCC and Industry Canada information. For additional approval and regulatory information, see the Universal Socket Developer Guide (S000342).

FCC Grant Parts 22 and 24

FCC Identifier	RI7CE910-DUAL
Equipment Class	PCS Licensed Transmitter
Notes	Dual Band CDMA
Modular Type:	Single Modular

FCC Rule Parts	Frequency Range (MHz)	Output Watts	Frequency Tolerance	Emission Designators
22H	824.7 - 848.31	0.292	2.5 PM	1M28F9W
24E	1851.25 – 1908.75	0.278	2.5 PM	1M28F9W

Power listed is conducted. The maximum antenna gain including cable loss for compliance with radiated power limits. RF exposure requirements and the categorical exclusion requirements of 2.1091 is 5.12dBi for part 22H and 6.12dBi for part 24E. 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 transmit simultaneously with any other antenna or transmitter. This device is allowed only for OEM integration into host products. Consumer or end-user installation is not allowed. End-users and OEM integrators must be provided with specific information required to satisfy RF exposure compliance.

Industry Canada

Certification Number/No. de Certification	5131A-CE910DUAL
Type of Radio Equipment/Type de Matériel	Cellular Mobile New Technologies (824-849 MHz); Modular Approval PCS Mobile (1850-1910 MHz)
Model/Modele	CE910-DUAL

Specification/ Cahier des Charges	Issue/ Édition	From Frequency/ De Fréquences	To Frequency/ Á Fréquences	Emission Designation/ Designation D'émission	Minimum Power	Maximum Power
RSS132	2.0	824.7 M	848.31 M	1M28F9W	292 mW	292 mW
RSS133	5.0	1.851 G	1.909 G	1M28F9W	278 mW	278 mW

Chapter 5– Application Notes

LED Interface

The LED signal indicates the SocketModem working status.

LED 1 – Heartbeat –IP and –GP Builds Only

LED 1 Signal	Heartbeat LED
OFF	No power to the unit.
Blinking	Power on.

LED 2 – Link Status – All Builds

LED 2 Signal	Link Status LED	
OFF	Device off.	
ON	Continuously lit	During initial connection to tower or when connected and passing data.
	Slow blink (-0.2Hz)	Registered to tower and idle.
	Faster blink (-3Hz)	Powered not registered/Searching for registration.

Note:

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

LED 3 – Signal Strength –IP and –GP Builds Only

LED 3 Signal	Signal Strength LED
OFF	No signal
Blinking	The faster the LED blinks, the stronger the signal. The blink rate range is -0.5Hz to -10Hz.

LED 4 – GPS Status – GP Builds

LED 4 Signal	GPS Status LED	
OFF	No power to the unit.	
ON	Continuously lit	Satellite not acquired.
	Blinking	Satellite acquired.

RF Performances

RF performances are compliant with the ETSI recommendation 05.05 and 11.10. The module's radio transceiver meets the requirements of 3GPP Release 5 & 6. 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

Transmitter Features

Category	Description
Maximum output power	+24 dBm ± 1 dBm

RF Connection and Antenna

The RF connector on the SocketModem is a UFL standard type. See the Universal Socket Developer Guide for antenna details.