MultiTech® Systems

SocketModem® Cell HSPA
SocketModem iCell HSPA

MTSMC-H3 Device Guide

SocketModem Cell HSPA and SocketModem iCell HSPA MTSMC-H3 Device Guide

S000533, Version A

MTSMC-H3-U-P1, MTSMC-H3-IP-P1, MTSMC-H3-MI-IP-P1

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Revisions

Revision	Date	Description
A	12/05/12	Initial release. Information was in the Universal Socket Developer Guide.

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

Support

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Warranty

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

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Chapter 1 – Device Overview

Description

The SocketModem® Cell cellular modem is a complete, ready-to-integrate communications device that offers standards-based quad-band HSPA 7.2 performance. This quick-to-market communications device allows developers to add wireless communication to products with a minimum of development time and expense. The SocketModem Cell cellular modem is based on industry-standard open interfaces and use Multi-Tech's Universal Socket design.

Product Build Options

Product	Description	Region
MTSMC-H3-U-P1	Quad-Band HSPA 7.2 Modem – AT&T/Euro – 5V - USB	US Europe
MTSMC-H3-IP-P1	Quad-Band HSPA 7.2 Modem with Universal IP – AT&T/Euro – 5V-Serial	US Europe
MTSMC-H3-MI-IP-P1	Quad-Band HSPA 7.2 Modem with Universal IP – AT&T/Euro – 5V – Serial/USB/GPIO	US Europe
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. For more information, refer to Account Activation for Cellular Devices in the Universal Socket Developer's Guide.

HSPA (High-Speed Uplink and Downlink Packet Access)/UMTS (Universal Mobile Telecommunications System).

MI devices have multiple interfaces.

U devices have direct USB connectivity

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

The complete product code may end in .Rx. For example, MTSMC-H3.Rx, where R is revision and x is the revision number.

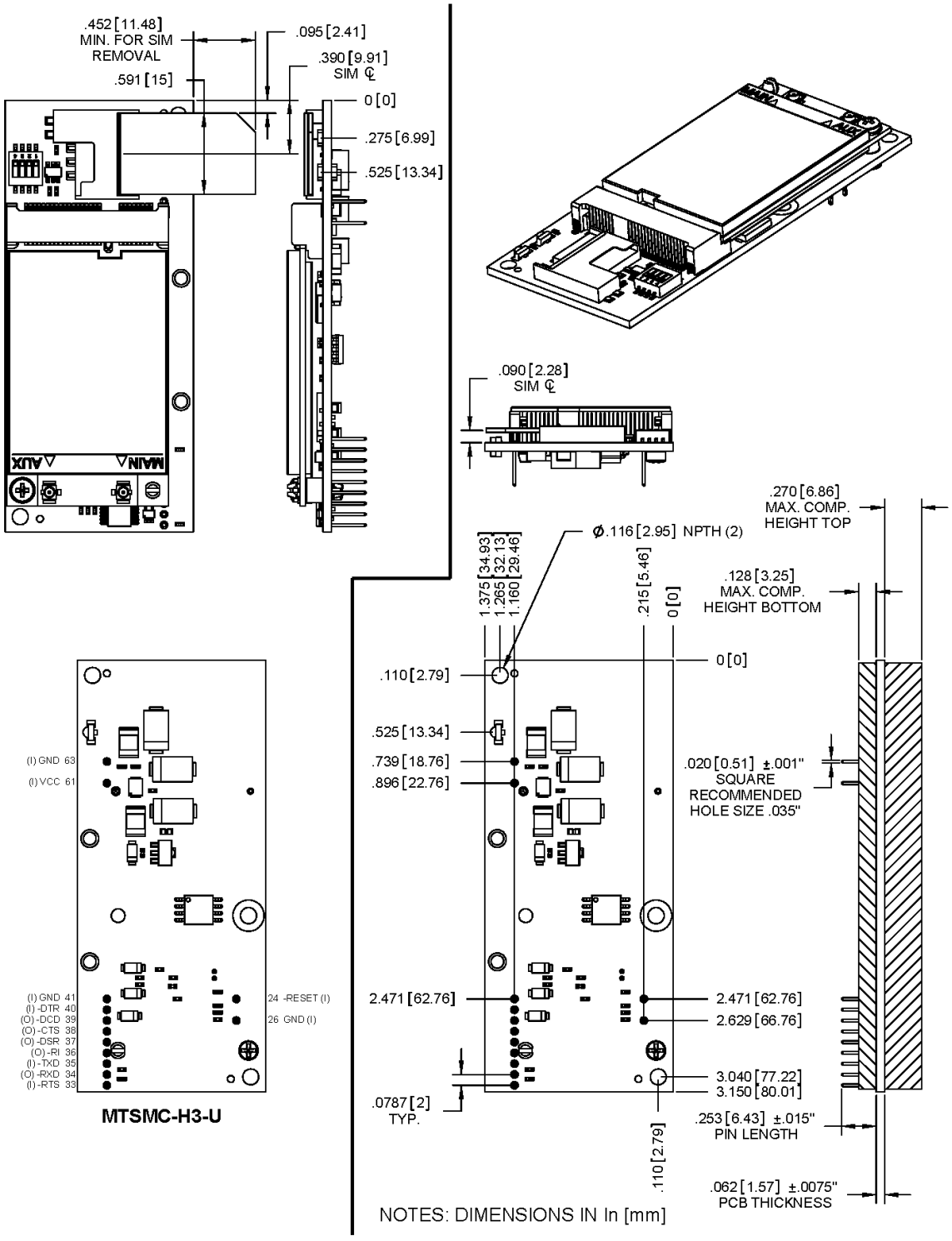
Documentation

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

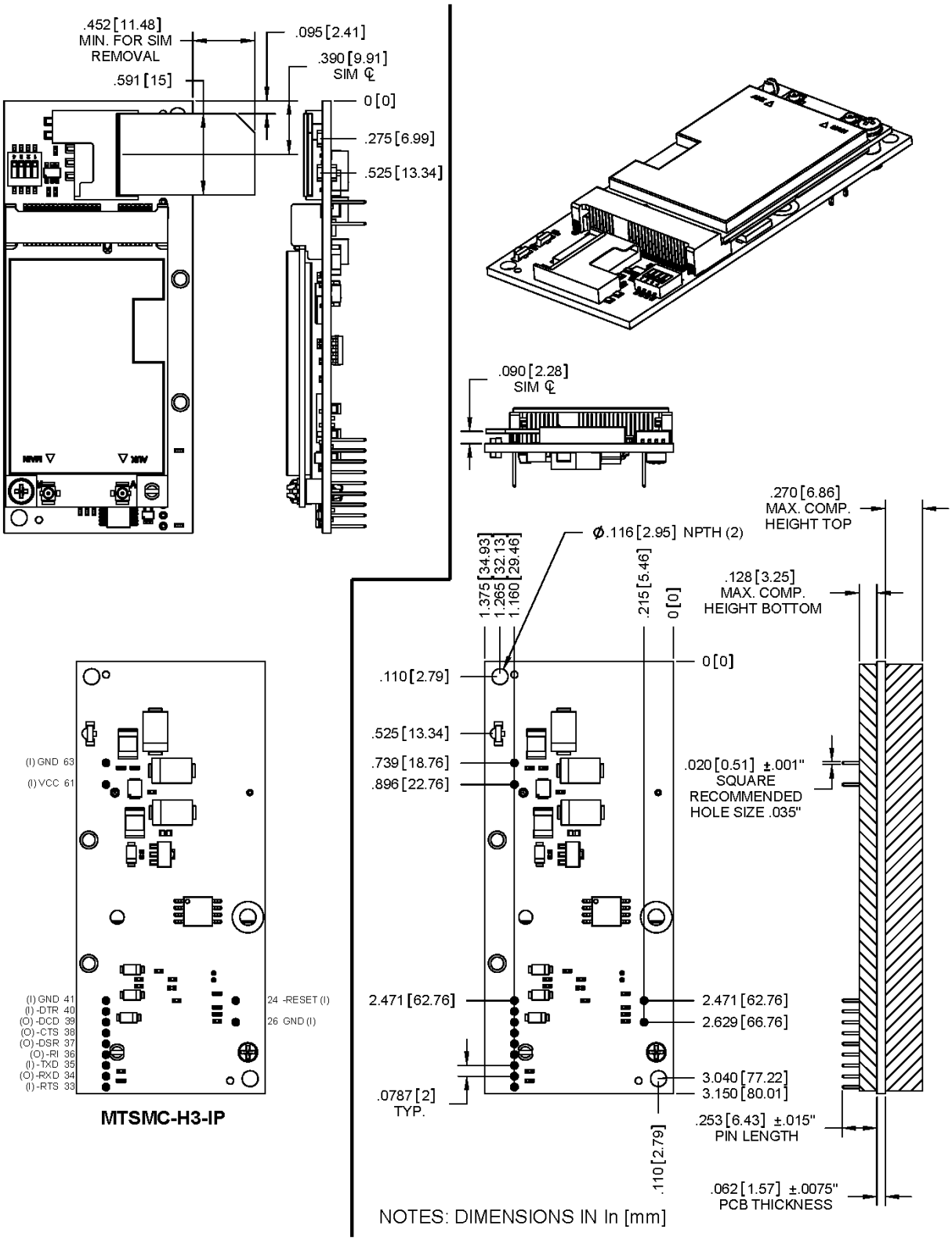
- **Device Guides** – This document. Provides model-specific specifications and developer information.
- **Universal Socket Developer Guide** – Provides an overview, safety and regulatory information, design considerations, schematics, and general device information.
- **AT Command Guide** – Use the following AT Command Guides with HSPA devices:
  - S000505 for H3 Modems
  - S000457 Universal IP Commands

Chapter 2 – Mechanical Drawings

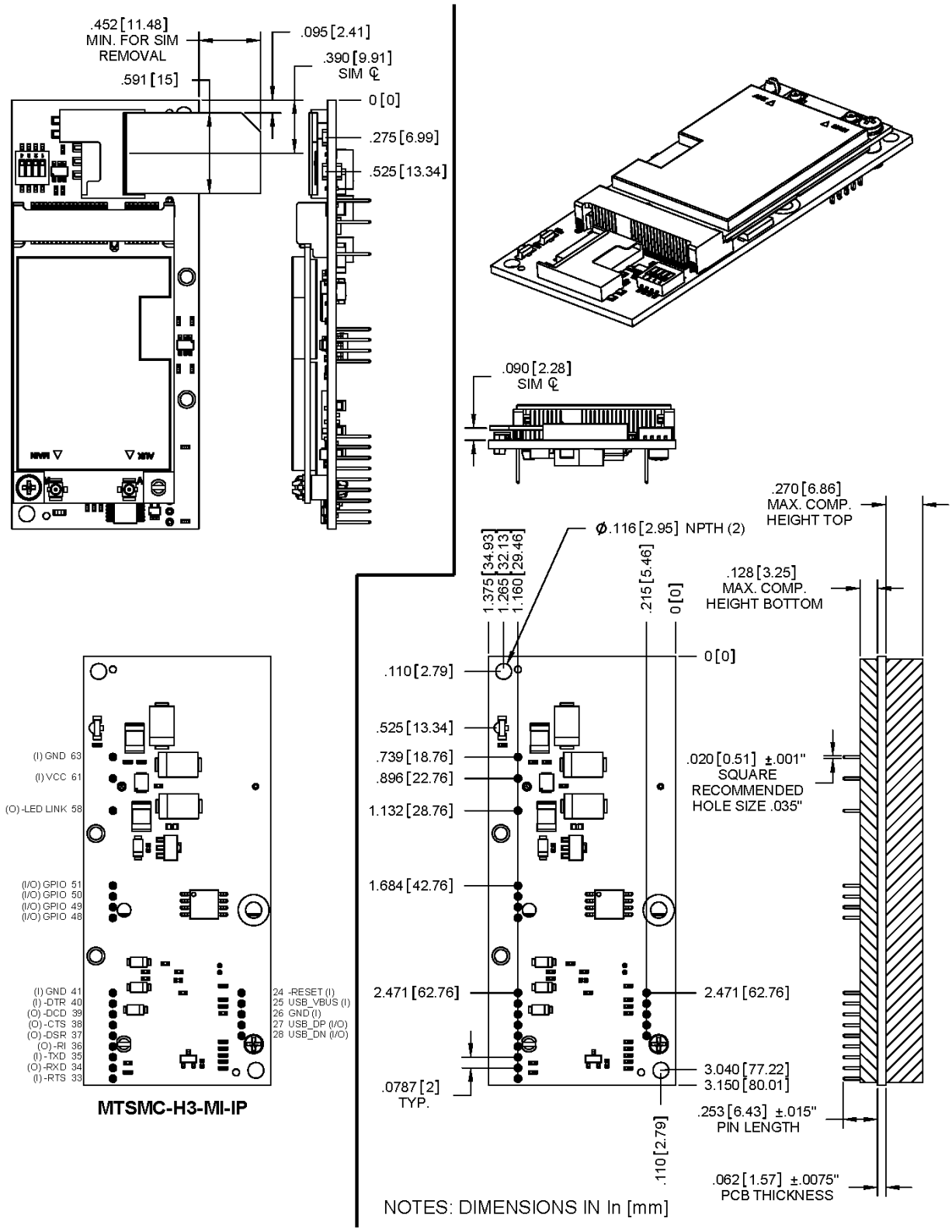
MTSMC-H3-U Build



MTSMC-H3-IP Builds



MTSMC-H3-MI-IP Builds



Chapter 3 – Specifications

Technical Specifications

Category	Description
General	
Standards	High Speed Packet Access (HSPA) GPRS CS1-CS4 (GPRS is General Packet Radio Service) EDGE MCSI-MCS9 (EDGE is Enhanced Data Rates for Global Evolution) Circuit-Switched (CS) domain data service based on UMTS and GSM (UMTS is Universal Mobile Telecommunications System and GSM is Global System for Mobile Communications) SMS is based on CS/Packet-Switched (PS) domain of GSM and WCDMA USB Interface is CDC-ACM compliant (Models with native USB support are not CDC-ACM compliant)
Frequency Bands	GSM/GPRS/EDGE Quad-band: 850/900/1800/1900 MHz HSUPA /HSDPA /UMTS Quad-Band: 2100/1900/900/850 MHz
Speed, Format, Compression	
Data Speed	HSDPA data service of up to 7.2 Mbps: Category 8 HSUPA data service of up to 5.76 Mbps: Category 6 UMTS PS domain data service of up to 384 Kbps EDGE packet data service of up to 236.8 Kbps GPRS packet data service of up to 85.6 Kbps
Interface, Ports	
USB Interface	USB 2.0 full speed (12Mbit/s) on MI builds only
Serial Modem Interface	Up to 921.6 Kbps
Ports	4 GPIO ports – MI builds only
Physical Description	
Weight	1 oz. (28g)
Dimensions	3.15" x 1.375" (80.010 mm x 34.925 mm)
Connectors	
Antenna Connector	Surface mount UFL one cellular, one GPS Standard and Rx diversity antennas also are supported
SIM Holder	Standard 1.8V and 3V
Environment	
Operating Temperature	-10°C to +55°C
Storage Temperature	-40°C to +85°C
Humidity	20% to 90% non-condensing
Power Requirements	
Operating Voltage	5VDC ± 10%
SMS	
SMS	Point-to-Point messaging Mobile-Terminated SMS Mobile-Originated SMS

Category	Description
Certifications, Compliance, Warranty	
EMC Compliance	FCC Part 15 Class B EN55022 Class B EN55024
Radio Compliance	FCC Part 22 FCC Part 24 EN 301 511 EN 301 489-1 EN 301 489-7 EN 301 489-24
Safety Compliance	UL 60950-1; 2nd Edition IEC 60950-1: 2005 2nd Edition with EN 60950-1: 2006+A11:2009
Network Compliance	PTCRB AT&T
Warranty	Two years

Notes:

Radio performance may be affected by temperature extremes. This is normal. The radio is designed to automatically fallback in class and reduces transmitter power to avoid damage to the radio. When this occurs depends on the interaction of several factors, such as ambient temperature, operating mode, and transmit power.

Mounting Hardware

#4 or M2/M3 hardware should be used for mounting the SocketModem to the board. Refer to the Mechanical Drawings for more information.

Important:

There are traces and vias around the tooling holes, so use nylon hardware if you are using the tooling holes to mount the SocketModems on the board.

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 Pulse[1]
MTSMC-H3	250 ms	10 seconds	200us

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

DC Electrical Characteristics

Units: Volts 5V DC Characteristics (VDD = 5V ± 0.5V)

Parameter	Minimum	Maximum	
Digital Inputs –DTR (40), –TXD (35), –RTS (33), –RESET	Input High 2.0V	Input Low 0.8V	
Digital Outputs –DCD (39), –CTS (38), –DSR (37), –RI (36), –RXD (34)	Output High 3.8V	Output Low 0.55V	**Current Drive** 4mA
Digital Input Capacitance			10 pF

Absolute Maximum Rating

VCC Voltage (Survival) -0.3V to +6.0

Electrical Specifications

Pin	Signal Name	VIL		VIH		VOL		VOH	
		Min	Max	Min	Max	Min	Max	Min	Max
J24	-RESET		0.8	2.0		--	--	--	--
J25	USB VBUS	-0.3	0.8	2.0	8.7	--	--	--	--
J26	GND	--	--	--	--	--	--	--	--
J27	USB DP		0.8	2			0.3	2.8	
J28	USB DM		0.8	2			0.3	2.8	
J33	-RTS	-0.3	0.8	2.0	5.5	--	--	--	--
J34	-RXD	--	--	--	--		0.26	3.98	
J35	-TXD	-0.3	0.8	2.0	5.5	--	--	--	--
J36	-RI	--	--	--	--		0.55	3.8	
J37	-DSR	--	--	--	--		0.26	3.98	
J38	-CTS	--	--	--	--		0.26	3.98	
J39	-DCD	--	--	--	--		0.26	3.98	
J40	-DTR	-0.3	0.8	2.0	5.5	--	--	--	--
J41	GND	--	--	--	--	--	--	--	--
J48	GPIO0	-0.3	0.8	2.0	5.5		0.4	2.9	
J49	GPIO1	-0.3	0.8	2.0	5.5		0.4	2.9	
J50	GPIO2	-0.3	0.8	2.0	5.5		0.4	2.9	
J51	GPIO3	-0.3	0.8	2.0	5.5		0.4	2.9	
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)
J25	USB VBUS	3.3 – 5.0	I	USB power supply input
J26	GND	GND	GND	Ground
J27	USB DP	3.3	I/O	USB data
J28	USB DM	3.3	I/O	USB data
J33	-RTS	3.3 – 5.0	I	Request to send (active low)
J34	-RXD	(3.3) / 5.0	O	Received data (active low)
J35	-TXD	3.3 – 5.0	I	Transmitted data (active low)
J36	-RI	(3.3) / 5.0	O	Ring indicator (active low)
J37	-DSR	(3.3) / 5.0	O	Data set ready (active low)
J38	-CTS	(3.3) / 5.0	O	Clear to send (active low)
J39	-DCD	(3.3) / 5.0	O	Data carrier detect (active low)
J40	-DTR	3.3 – 5.0	I	Data terminal ready (active low)
J41	GND	GND	GND	Ground
J48	GPIO0	3.3	I/O	User configurable general purpose I/O
J49	GPIO1	3.3	I/O	User configurable general purpose I/O
J50	GPIO2	3.3	I/O	User configurable general purpose I/O
J51	GPIO3	3.3	I/O	User configurable general purpose I/O
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 SIM card inserted, 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 EDGE/GPRS/CDMA contexts activated. Indicates EDGE/GPRS/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	Depending on call type:	
	Voice Call:	Connected to remote party.
	Data Call:	Connected to remote party or parameter exchange while call is set up or disconnected.

Serial Model Pinout

For MTSMC-H3-IP
Pins available with current PCB: 24, 26, 33-41, 61, 63

USB Data Pinout

For MTSMC-H3-U, MTSMC-H3-MI-GP
Pins available with current PCB: 24-28, 33-41, 48-51, 58, 61, 63

Design Consideration

The current PCB does not accommodate the following pins: 22-23, 42-43, and GPS data pins 15-17. These pins will be present on a future hardware design. Take these pins into account in your product design, even if you have no plans for using them.

Power Measurements

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
MTSMC-H3-IP					
GSM850					
Current (AMPS)	0.140	0.290	0.690	2.50	0.140
Watts	0.693	1.43	3.36		0.693
HSPA					
Current (AMPS)	0.140	0.470	0.735	0.975	
Watts	0.693	2.31	3.60		
In-Rush Current (AMPS) (approx. 3ms duration)					2.80
MTSMC-H3-MI-IP					
GSM850					
Current (AMPS)	0.140	0.240	0.700	2.25	
Watts	0.694	1.19	3.44		
HSPA					
Current (AMPS)	0.140	0.480	0.725	0.950	
Watts	0.694	2.37	3.56		
In-Rush Current (AMPS) (approx. 3ms duration)					3.00
MTSMC-H3-U					
GSM850					
Current (AMPS)	0.110	0.210	0.675	2.650	
Watts	0.543	1.03	3.23		
HSPA					
Current (AMPS)	0.110	0.447	0.700		
Watts	0.543	2.19	3.37		
In-Rush Current (AMPS) (approx. 3ms duration)					1.90

[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.

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.

FCC Grant Parts 22 and 24

FCC Identifier	AU792U09J14828
Equipment Class	PCS Licensed Transmitter
Notes	SocketModem iCell
Approval	Single Modular

FCC Rule Parts	Frequency Range (MHz)	Output Watts	Frequency Tolerance	Emission Designators
22H	824.2 - 848.8	1.626	0.04 PM	300KGXW
22H	824.2 - 848.8	0.57	0.04 PM	300KG7W
22H	826.4 - 846.4	0.259	0.04 PM	4M20F9W
24E	1850.2 - 1909.8	0.891	0.02 PM	300KGXW
24E	1850.2 - 1909.8	0.394	0.02 PM	300KG7W
24E	1852.4 - 1907.6	0.18	0.02 PM	4M20F9W

Output power listed is conducted for GSM and average conducted for WCDMA.

This device is to be used in mobile or fixed applications only. Antenna gain including cable loss must not exceed 7.82 dBi in the 850 MHz Cellular band and 3.5 dBi in the PCS 1900 MHz band, for the purpose of satisfying the requirements of 2.1043, 2.1091, 22H and 24E.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operated in conjunction with any antenna or transmitter. The final product operating with this transmitter must include operating instructions and antenna installation instructions, for end-users and installers to satisfy RF exposure compliance requirements.

Compliance of this device in all final product configurations is the responsibility of the Grantee. Installation of this device into specific final products may require the submission of a Class II permissive change application containing data pertinent to RF Exposure, spurious emissions, ERP/EIRP, and host/module authentication, or new application if appropriate.

This device contains GSM functions that are not operational in the U.S. Territories. This filing is only applicable for U.S. operations.

Industry Canada

Certification Number/No. de Certification	125A-0037
Type of Radio Equipment/Type de Matériel	Modular Approval Cellular Mobile GSM (824-849 MHz) New Technologies (824-849 MHz) PCS Mobile (1850-1910 MHz)
Model/Modele	MTSMC-H3-U, MTSMC-H3-IP, MTSMC-H3-MI-IP
Antenna/Antenne	External Quad band stub antenna
Specification/Cahier des Charges	RSS-102 Issue 4, RSS-132 Issue 2, RSS 133 Issue 5

From Frequency/ De Fréquences	To Frequency/ Á Fréquences	Emission Designation/ Designation D'émission	RF Power / Puissance Nominale HF
824.2 MHz	848.8 MHz	247KGXW	1.626 W
824.2 MHz	848.8 MHz	245KG7W	0.570 W
826.4 MHz	846.6 MHz	4M18F9W	0.259 W
1850.2 MHz	1909.8 MHz	247KGXW	0.891 W
1850.2 MHz	1909.8 MHz	247KG7W	0.394 W
1852.4 MHz	1907.6 MHz	4M20F9W	0.180 W

Certification of equipment means only that the equipment has met the requirements of the above noted specification. License applications, where applicable to use certified equipment, are acted on accordingly by the issuing office and will depend on the existing radio environment, service and location of operation. This certificate is issued on condition that the holder complies and will continue to comply with the requirements of the radio standards specifications and procedures issued by Industry Canada.

La certification du matériel signifie seulement que le matériel a satisfait aux exigences de la norme indiquée ci-dessus. Les demandes de licences nécessaires pour l'utilisation du materiel certifié sont traitées en conséquence par le bureau de délivrance et dépendent des conditions radio ambiantes, du service et de l'emplacement d'exploitation. Le présent certificat est délivré à condition que le titulaire satisfasse et continue de satisfaire aux exigences et aux procédures d'Industrie Canada.

Chapter 5 – Application Notes

LED Interface

The LED signal indicates the SocketModem working status.

LED 1 – Heartbeat – IP 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	No power to the unit.	
ON	Continuously lit	Radio is enabled.

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
GSM 850 Sensitivity	< -108 dBm
GSM 1900 Sensitivity	< -106 dBm
EDGE 850 Sensitivity	< -102 dBm
EDGE 1900 Sensitivity	< -101 dBm
UMTS Band II 1900 Sensitivity	< -105 dBm
UMTS Band V 850 Sensitivity	< -106 dBm

Transmitter Features

Category	Description
Maximum output power (GSM 850/900)	+33 dBm (Class 4)
Maximum output power (GSM 1800/1900)	+30 dBm (Class 1)
Maximum output power (EDGE 850/900)	+27 dBm (Class E2)
Maximum output power (EDGE 1800/1900)	+26 dBm (Class E2)
Maximum output power (UMTS 850/900/1900/2100)	+24 dBm (Class 3)

RF Connection and Antenna

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

Frequency Bands

WCDMA Frequency Band Support

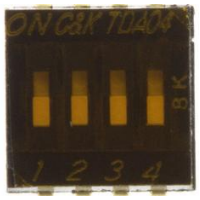
Band	Frequencies
Band I WCDMA 2100	Tx: 1920 – 1980 MHz Rx: 2110 – 2170 MHz
Band II WCDMA 1900	Tx: 1850 – 1910 MHz Rx: 1930 – 1990 MHz
Band V WCDMA 850	Tx: 824 – 849 MHz Rx: 869 – 894 MHz

GSM Frequency Band Support

Band	Frequencies
GSM 850	Tx: 824 – 849 MHz Rx: 869 – 894 MHz
EGSM 900	Tx: 800 – 915 MHz Rx: 925 – 960 MHz
GSM 1800	Tx: 1700 – 1785 MHz Rx: 1805 – 1880 MHz
GSM 1900	Tx: 1850 – 1910 MHz Rx: 1930 – 1990 MHz

Baud Rate Switches on the SocketModem Cell HSPA

Note: For the serial interface.



ON

				921600
•	•	•	•	
1	2	3	4	

ON

•				460800
	•	•	•	
1	2	3	4	

ON

	•			230400
•		•	•	
1	2	3	4	

ON

•	•			115200
		•	•	
1	2	3	4	

ON

		•		57600
•	•		•	
1	2	3	4	

ON

•		•		38400
	•		•	
1	2	3	4	

ON

	•	•		19200
•			•	
1	2	3	4	

ON

•	•	•		9600
			•	
1	2	3	4	

ON

			•	+IPR/USB enable
•	•	•		
1	2	3	4	

ON

•	•	•	•	+IPR
1	2	3	4	

Default