
RJModem™

MT5656RJ

Developer's Guide



RJModem™ Developer's Guide
MT5656RJ
PN S000363N

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Revisions

Revision	Date	Description
J	06/01/09	Updated Technical Support section on the copyright page. Added a link on the copyright to the Multi-Tech Web site for Multi-Tech Warranty information. Updated the EMC, Safety, and R&TTE Directive Compliance. Added RoHS statement, Chinese standards, and Brazilian bar code and approval. Added power consumption: sleep and idle modes. Added lead-free solderable (wave solder only) specifications.
K	03/12/10	Changed the operating temperature range. Updated the –RESET text. Added the Technical Support section describing the use of the Multi-Tech Online Support Portal.
L	10/12/10	Changed operating temperature and added UL note about temperature.
M	08/15/11	Applied template. Updated references to product CD for developer's kit.
N	09/19/12	Updated RoHS statement.

Trademarks

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Patents

This device covered by one or more of the following patents: 6,031,867; 6,012,113; 6,009,082; 5,905,794; 5,864,560; 5,815,567; 5,815,503; 5,812,534; 5,809,068; 5,790,532; 5,764,628; 5,764,627; 5,754,589; 5,724,356; 5,673,268; 5,673,257; 5,644,594; 5,628,030; 5,619,508; 5,617,423; 5,600,649; 5,592,586; 5,577,041; 5,574,725; 5,559,793; 5,546,448; 5,546,395; 5,535,204; 5,500,859; 5,471,470; 5,463,616; 5,453,986; 5,452,289; 5,450,425; 5,355,365; 5,309,562; 5,301,274; 7,082,106; 7,082,141; 7,092,406. Other Patents Pending.

Contacting Multi-Tech Support

Multi-Tech Online Support Portal <https://support.multitech.com>

To better serve our customers, manage support requests and shorten resolution times, we have created the online web portal allowing you to submit questions regarding Multi-Tech products directly to our technical support team. Get answers to your most complex questions, ranging from implementation, troubleshooting, product configuration, firmware upgrades and more.

To create an account and submit a Support Case on the Portal, visit <https://support.multitech.com>

Knowledge Base and Support Services: www.multitech.com/en_US/SUPPORT

The Knowledge Base provides immediate answers to your questions and gives you access to support resolutions for all Multi-Tech products. Visit our support area on the website for other support services.

Technical Support

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U.S., Canada, all others:	support@multitech.com	(800) 972-2439 or (763) 717-5863

Warranty

Warranty information can found at http://www.multitech.com/en_US/COMPANY/Policies/warranty/

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Chapter 1 – RJModem Hardware

The Multi-Tech RJModem creates communication-ready devices by integrating modem functions into the most compact, integrated device. The first-of-its-kind RJ11 form factor includes the controller, data pump, and DAA giving you the ability to integrate dial-up connectivity into any product design. With minimal engineering effort, the RJModem instantly adds global communication capabilities, enhancing the end user experience and increasing product value.

RJModem Features

- Complete data modem including the controller, data pump, DAA, and RJ-11 connector
- V.92/56K, V.34/33.6K, V.32vis/14.4K data rate options
- High speed models backward compatible with lower speeds
- Telecom approved in more than 50 countries (some pending)
- V.44 and V.42 bis data compression
- V.42 error correction
- Intelligent DAA technology detects line status
- AT command compatible
- U. S. Caller ID reporting
- Low power/sleep mode
- FastPOS (V.29) and V.22vis Fast Connect
- V.80 Synchronous Access
- 3.3V or 5V power input options
- Board mount or remote panel mounting
- Two-year warranty

Product Ordering Information

Product	Description	Region	Order this Product ✓
MT5656RJ-92	V.92 Serial Data Only 5V	Global	
MT5656RJ-34	V.34 Serial Data Only 5V	Global	
MT5656RJ-32	V.32bis Serial Data Only 5V	Global	
MT5656RJ-L-92	V.92bis Serial Data Only 3.3V	Global	
MT5656RJ-L-34	V.34 Serial Data Only 3.3V	Global	
MT5656RJ-L-32	V.32bis Serial Data Only 3.3V	Global	
MTRJ-DK	Developer Kit	Global	
MTRJ-RMK	Panel Mounting Kit for RJModem	Global	

Ordering Codes

Code	Description
92	V.92/56K Data Rate
34	V.34/33.6K Data Rate
32	V.32bis/14.4K Data Rate
L	3.3V Power Input

Note: Lead-free builds of the RJModem are available.

Developer Kit

A Developer Kit is available. This kit provides the ability to plug in the RJModem and use it for testing, programming, and evaluation. The kit includes one developer board with RS-232 DB-25 connector, universal power supply, RS-232 cable, RJ-11 cable, and MTRJ-RMK Panel Mounting Kit, and Developer Kit CD, which contains a Developer Guide.

Additional Documentation

The AT Commands for the RJModem are published in a separate document (document number S000364x) available on the Multi-Tech Web site.

In addition to the AT Commands guide, you can obtain a Developer Guide in these ways:

- Send an email request for a guide to [mailto: oemsales@multitech.com](mailto:oemsales@multitech.com)
- Look for an electronic version of the guide on the developer kit CD.
- Go to the Multi-Tech website and complete the Developer Guide Request Form.

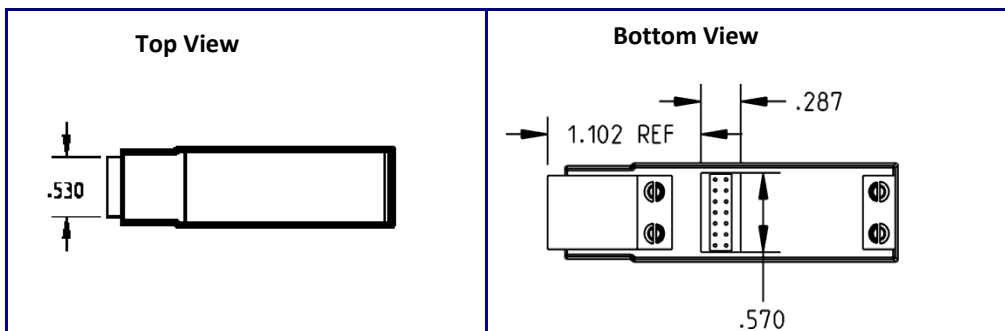
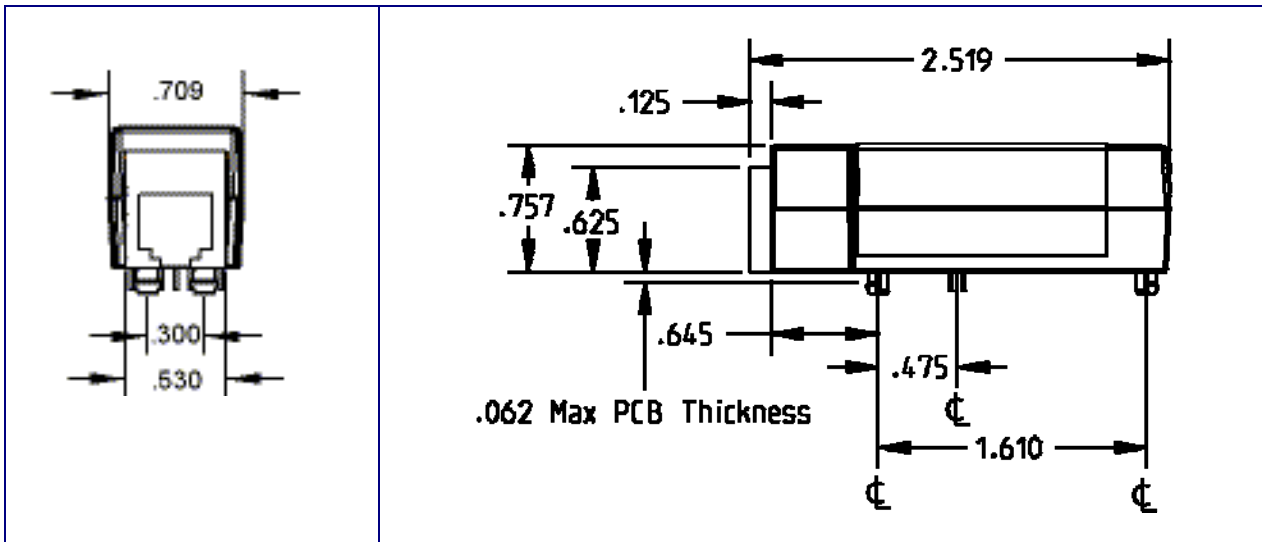
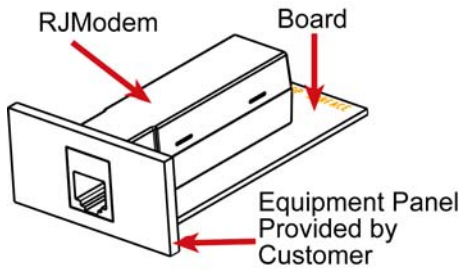
Technical Specifications

Category	Description																														
Data Standards	V.92/V.90/56K, V.34/33.6K, V.32bis/14.4K, V.22, V.23, V.21; Bell 212A and Bell103																														
Data Format	Serial, binary, asynchronous																														
Serial Speeds	Serial port data rates adjustable to 300, 1200, 2400, 4800, 9600, 19,200, 38,400, 57,600, 115,200																														
Client-to-Server Data Rates	Supports V.92 and V.90 data rates																														
Client-to-Client Data Rates	33,600; 31,200; 28,800; 26,400; 24,000; 21,600; 19,200; 16,800; 14,400; 12,000; 9600; 7200; 4800; 2400; 1200; 0-300 bps																														
Error Correction	Data Mode: V.42 (LAPM or MNP 2–4)																														
Data Compression	V.44, V.42bis and MNP Class 5																														
Modes of Operation	Full duplex over dial-up lines; data mode, command mode, and online command mode, V.54 test mode																														
Dimensions	.709" w x 2.519" h x .752 d (1.8 cm x 6.4 cm x 1.92 cm)																														
Weight	64 oz. (0.02 Kg)																														
Operating Temperature*	3.3 V and 5V Build Options -40° to +85°C UL recognized @ 40°																														
Storage Temperature	-40° to +85°C																														
Humidity	Humidity range 20% to 90% (non-condensing)																														
Lead-Free Solder (Wave solder only) Temperature	RJModem can withstand lead-free wave solder temperatures up to 260° C (± 5°) for 6 seconds																														
Operating Voltage	5V DC Build Option ± 10% – Absolute Maximum Supply Voltage: 5.5VDC 3.3V DC Build Option ± 10% – Absolute Maximum Supply Voltage: 3.6VDC																														
Power Consumption	<table border="1"> <thead> <tr> <th></th> <th></th> <th>Sleep</th> <th>Typical</th> <th>Maximum</th> </tr> </thead> <tbody> <tr> <td>Input Voltage</td> <td>Current</td> <td>23mA</td> <td>97mA</td> <td>105mA</td> </tr> <tr> <td>3.3V</td> <td>Watts</td> <td>76mW</td> <td>315mW</td> <td>340mW</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>5.0V</td> <td>Current</td> <td>23mA</td> <td>97mA</td> <td>102mA</td> </tr> <tr> <td></td> <td>Watts</td> <td>115mW</td> <td>480mW</td> <td>510mW</td> </tr> </tbody> </table>			Sleep	Typical	Maximum	Input Voltage	Current	23mA	97mA	105mA	3.3V	Watts	76mW	315mW	340mW						5.0V	Current	23mA	97mA	102mA		Watts	115mW	480mW	510mW
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5.0V	Current	23mA	97mA	102mA																											
	Watts	115mW	480mW	510mW																											
Transmit Level	-11 dBm (varies by country setting)																														
Receiver Sensitivity	-43 dBm under worst-case conditions																														
Frequency Stability	±0.01%																														
DAA Isolation	1.5Kv r.m.s. or 2121 VDC at working voltage of 250VAC																														
Flow Control	XON/XOFF (software), RTS/CTS (hardware)																														
Command Buffer	60 characters																														
Telephony / TAM	TAM (Telephone Answering Machine): S-101 AT+V commands (no CODEC for speakers/microphone interface)																														
Certifications and Approvals	<table> <tbody> <tr> <td>Safety Certifications</td> <td>EMC Approvals</td> </tr> <tr> <td>UL 60950-1</td> <td>FCC Part 15 (Class B)</td> </tr> <tr> <td>IEC 60950-1</td> <td>Canada (Class B)</td> </tr> <tr> <td>AS/NZS 6950:2000</td> <td>EN 55022 (Class B)</td> </tr> <tr> <td>CCC</td> <td>EN 55024</td> </tr> </tbody> </table>	Safety Certifications	EMC Approvals	UL 60950-1	FCC Part 15 (Class B)	IEC 60950-1	Canada (Class B)	AS/NZS 6950:2000	EN 55022 (Class B)	CCC	EN 55024																				
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AS/NZS 6950:2000	EN 55022 (Class B)																														
CCC	EN 55024																														
Warranty	Two years																														

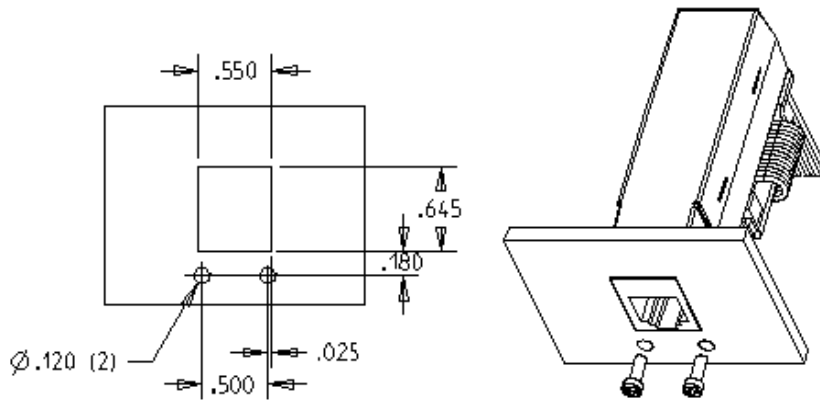
*UL recognized @ 40°C. UL Certification does not apply or extend to an ambient above 40°C and has not been evaluated by UL for ambient greater than 40°C.

Dimensions for Board Mounting and Panel Mounting

Board Mounting Dimensions



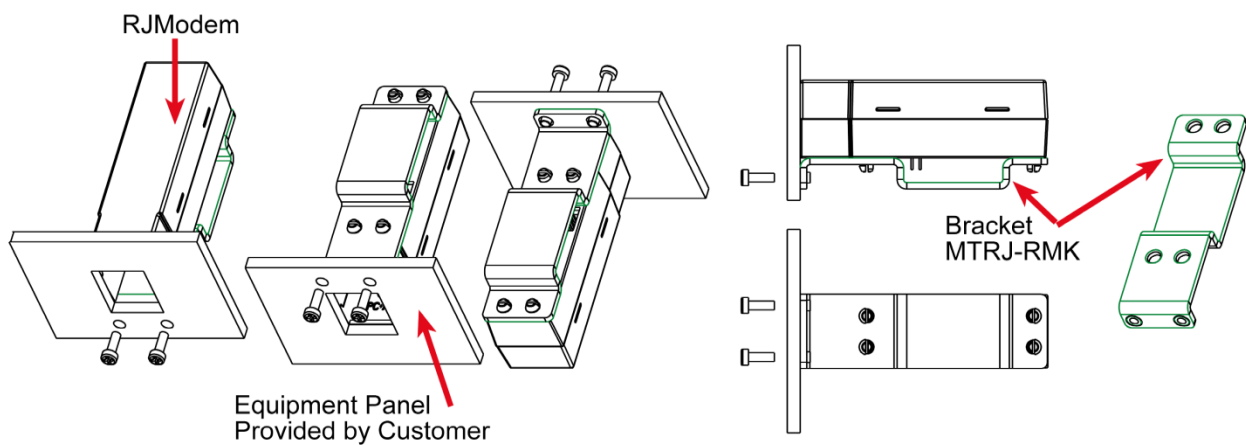
Panel Mounting



PANEL CUT OUT FOR REMOTE MOUNT KITS

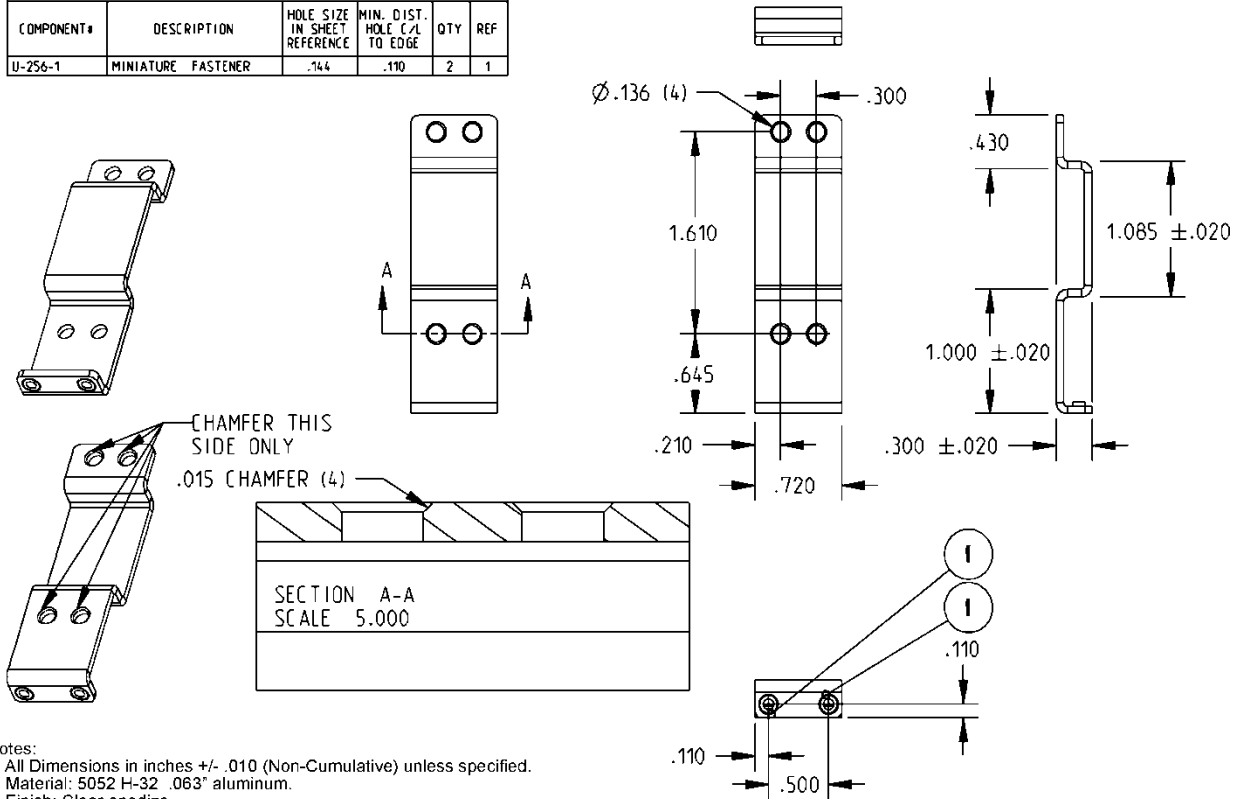
Note: Screws, bracket and ribbon cable are included in the panel-mounting kit.

Attaching the Mounting Bracket

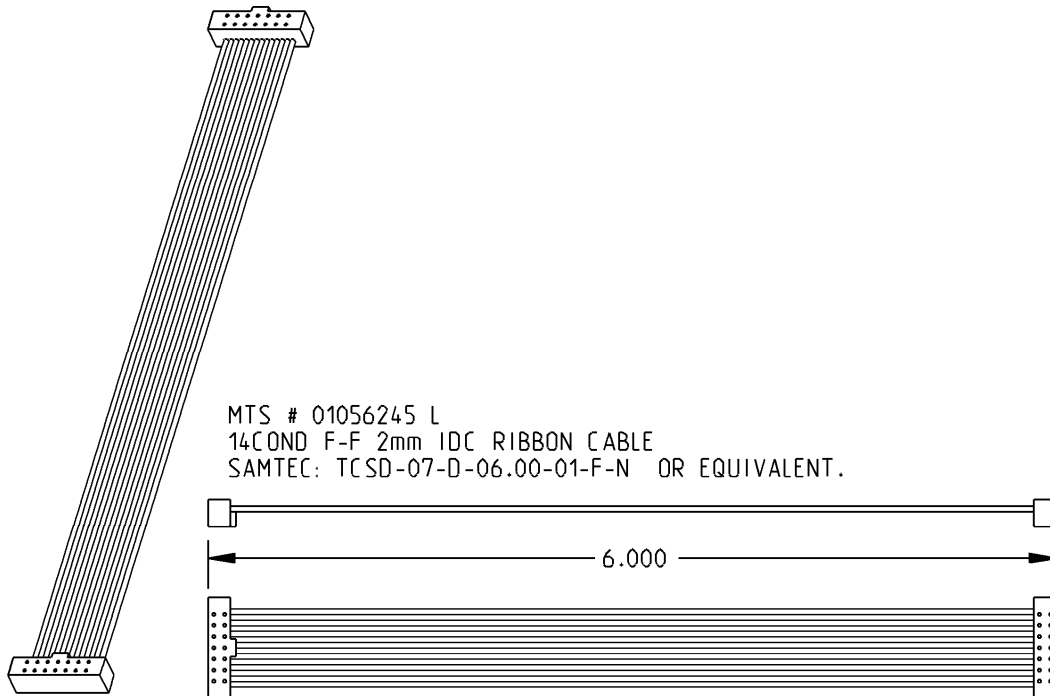


Dimensional Drawing of the Bracket

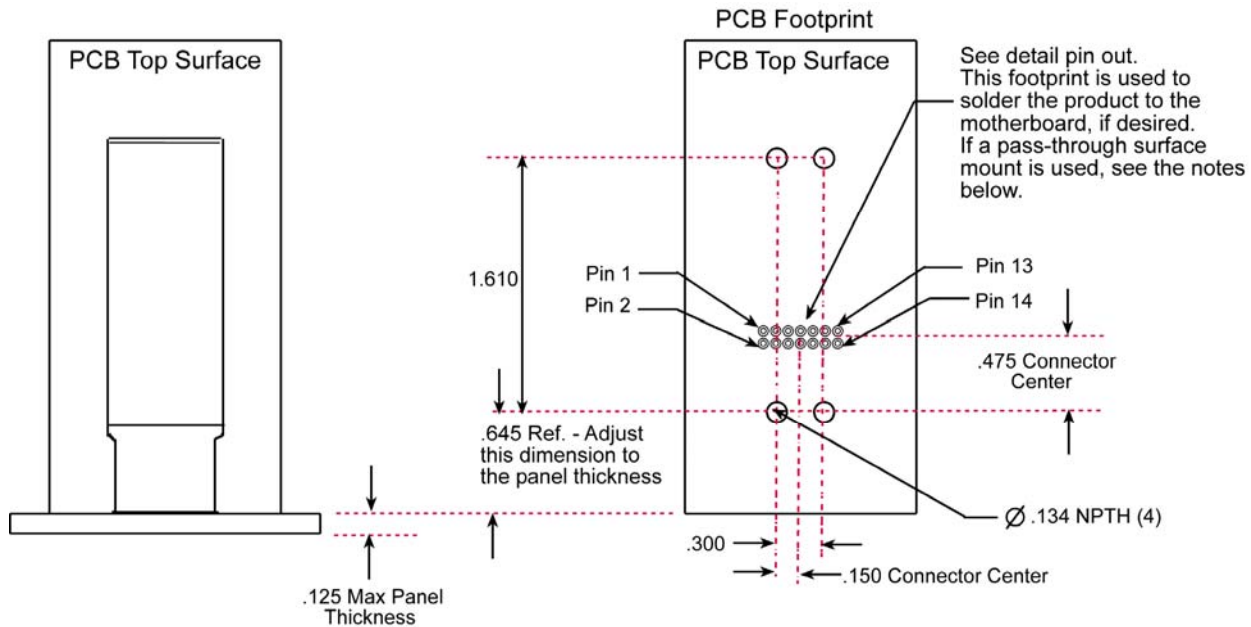
PRESSED IN HARDWARE					
COMPONENT#	DESCRIPTION	HOLE SIZE IN SHEET REFERENCE	MIN. DIST. HOLE C/L TO EDGE	QTY	REF
U-256-1	MINIATURE FASTENER	.144	.110	2	1



Cable Specifications



PCB Footprint



Notes:

Surface mount connectors are approved in place of soldering the unit to the motherboard.

Follow the "Pass Through" footprint instructions on the part data sheets.

The following are recommended by Multi-Tech:

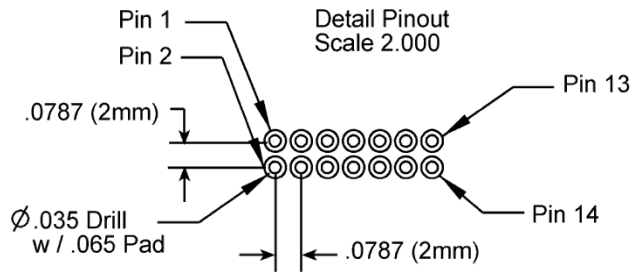
www.samtec.com

SAMTEC: SMM-107-02-S-D-(other option) or equivalent

SAMTEC: CLT-107-02-(plating option)-D-(other option) or equivalent

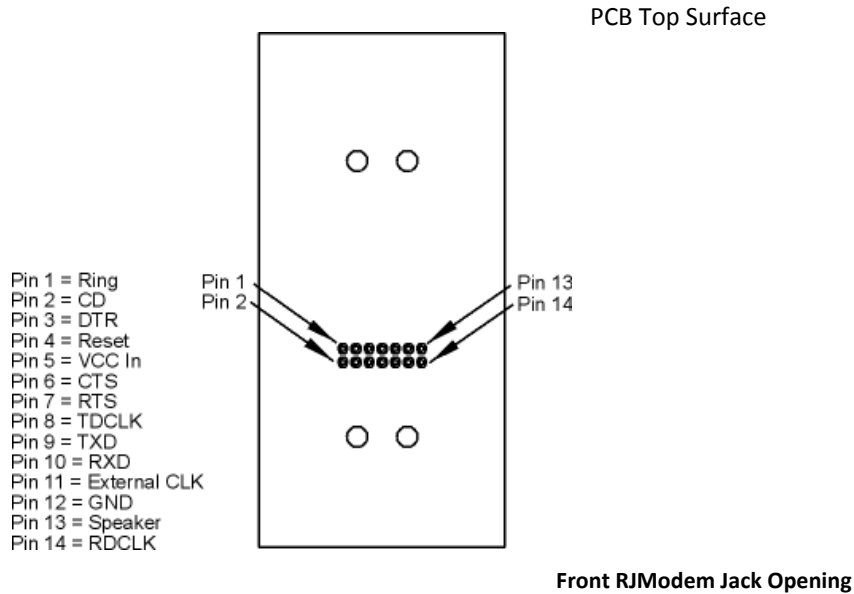
Pin Out Dimensions

PCB Footprint or Board Lay-out (Note: This is the PCB top view)



Pin Descriptions

Top View



Pin	Signal Name	IN/OUT Type	Description
1	–RI	O	RING (Active Low). Incoming ring signal from phone. Ring Indicate. –RI output ON (low) indicates the presence of an ON segment of a ring signal on the telephone line. The modem will not go off-hook when –RI is active; the modem waits for –RI to go inactive before going off-hook.
2	–DCD	O	Data Carrier Detect (Active Low). –DCD output is ON (low) when a data connection is established and the module is ready to send/receive data.
3	–DTR	I	Data Terminal Ready (Active Low). The –DTR input is turned ON (low) when the DTE is ready to communicate. –DTR ON prepares the modem to be connected, and, once connected, maintains the connection. –DTR OFF places the modem in the disconnect state under control of the &Dn and &Qn commands.
4	–RESET	I	Device Reset (with pull-up). The active low –RESET input resets the device logic and returns the configuration of the device to the original factory default values or "stored values" in the NVRAM. The pulse width for the reset signal should be $\geq 10\text{mS}$.
5	VCC	PWR	DC Input Power. 3.3 V or 5 V DC power, depending upon the build.
6	–CTS	O	Clear to Send (Active Low). –CTS is controlled by the module to indicate whether or not the module is ready to transmit data. –CTS ON indicates to the DTE that signals on TXD will be transmitted. –CTS OFF indicates to the DTE that it should not transfer data on TXD.
7	–RTS	I	Request to Sent (Active Low). –RTS signal is used for hardware flow control. –RTS input ON (low) indicates that the DTE is ready to send data to the modem. In the command state, the modem ignores –RTS.
8	TXCLK	O	Transmit Data Sync Clock. TX synchronous data clock for sync data mode. More information below.
9	–TXD	I	Transmitted Data. The DTE uses the –TXD line to send data to the module for transmission or to transmit commands to the module. The DTE should hold this circuit in the mark state when no data is being transmitted or during intervals between characters.
10	–RXD	O	Received Data. The module uses the RXD line to send data to the DTE and to send module responses to the DTE. In command mode, –RXD data presents the module responses to the DTE. Module responses take priority over incoming data when the two signals are in competition for –RXD. When no data is transmitted, the signal is held in mark condition.
11	CLK		Optional 28.224 or 27 mhz clk input (requires special build option)
12	GND	GND	Logic Ground.
13	SPKR		Speaker. Call Progress signaling on MT5656RJ is a square wave output that can be optionally connected to a low-cost single-ended speaker; e.g., a sounducer or an analog speaker circuit.
14	RXCLK	O	Receive Data Sync Clock. RX synchronous data clock for sync data mode. More information below.

Transmit Clock (TXCLK) and Receive Clock (RXCLK)

Transmit Clock (TXCLK) and Receive Clock (RXCLK) pins are used in synchronous (sync) mode serial communication. They are needed when using a synchronous terminal device to keep synchronization between the modem and the terminal device on the serial port. Transmit Clock (TXCLK) and Receive Clock (RXCLK) are not used in asynchronous mode.

However, most applications use asynchronous mode because synchronous ports are not as common as asynchronous ports on computer hardware. For asynchronous operation the host system does not need to connect to the TXCLK and the RXCLK pins on the RJModem; you can use a 9-pin interface.

Use the **&M** command to set Synchronous mode. To save the current (active) configuration (profile), use the **&W** command. See the RJModem AT command guide available on the Multi-Tech Web site.

Using &Q Command to Control the Connection Modes

This command is an extension of the &M command. Use it to control the connection modes. It is used with S36 and S48.

Note: If you issue &Q0 to &Q3 to select the mode, the subsequent connect message reports the DCE speed regardless of the W command and S95 settings.

Syntax

&Q<value>

Defined Values

<value> Decimal number corresponding to the selected option.

- 0 Selects direct asynchronous operation. The value 000b is written to S27 bits 3, 1, and 0, respectively. See &M0.
- 1 Selects synchronous connect mode with async off-line command mode. The value 001b is written to S27 bits 3, 1, and 0, respectively. See &M1. (Serial interface operation only.)
- 2 Selects synchronous connect mode with async off-line command mode and enables DTR dialing of directory 0. The value 010b is written to S27 bits 3, 1, and 0, respectively. See &M2. (Serial interface operation only.)
- 3 Selects synchronous connect mode with async off-line command mode and enables DTR to act as Talk/Data switch. The value 011b is written to S27 bits 3, 1, and 0, respectively. See &M3. (Serial interface operation only.)
- 5 The modem will try to negotiate an error-corrected link. The modem can be configured using S36 to determine whether a failure will result in the modem returning on-hook or will result in fallback to an asynchronous connection. The value 101b is written to S27 bits 3, 1, and 0, respectively. (Default.)
- 6 Selects asynchronous operation in normal mode (speed buffering). The value 110b is written to S27 bits 3, 1, and 0, respectively.

Result Codes

OK <value> = 0 to 3, 5, or 6

ERROR

Using &W Command to Save Configuration

This command saves the current (active) configuration (profile), including S-Parameters, in one of the two user profiles in NVRAM as denoted by the parameter value. This command produces an ERROR message if the NVRAM is not installed or is not operating, as detected by the NVRAM test.

The current configuration is comprised of a list of storable parameters as described in the &V command. These settings are restored to the active configuration upon receiving a Zn command or at power up (see &Yn).

Syntax

&W<value>

Defined Values

<value> Decimal number corresponding to the selected profile.

0 – Store the current configuration as profile 0.

1 – Store the current configuration as profile 1.

Result Codes

OK <value> = 0 or 1.

ERROR

Electrical Characteristics

3.3 V Serial RJModem

3.3 V DC Characteristics (TA = 0°C to 70°C; VDD = 3.3 V ± 0.3 V) VDDMAX = 3.6 V

Inputs –DTR (3), –TXD (9), –RTS (7), –RESET (3), XCLK (11), PWR (5), GND (12)	Input High Min 2.0 V	Input Low Max 0.8 V	
Outputs –DCD (2), –CTS (6), –RI (1), –RXD (10), RDCLK (14), TDCLK (8) 2 mA, Z INT = 120 Ω	Output High Min 2.4 V	Output Low Max 0.5 V	
Digital Input Capacitance			20pF

5 V Serial RJModem

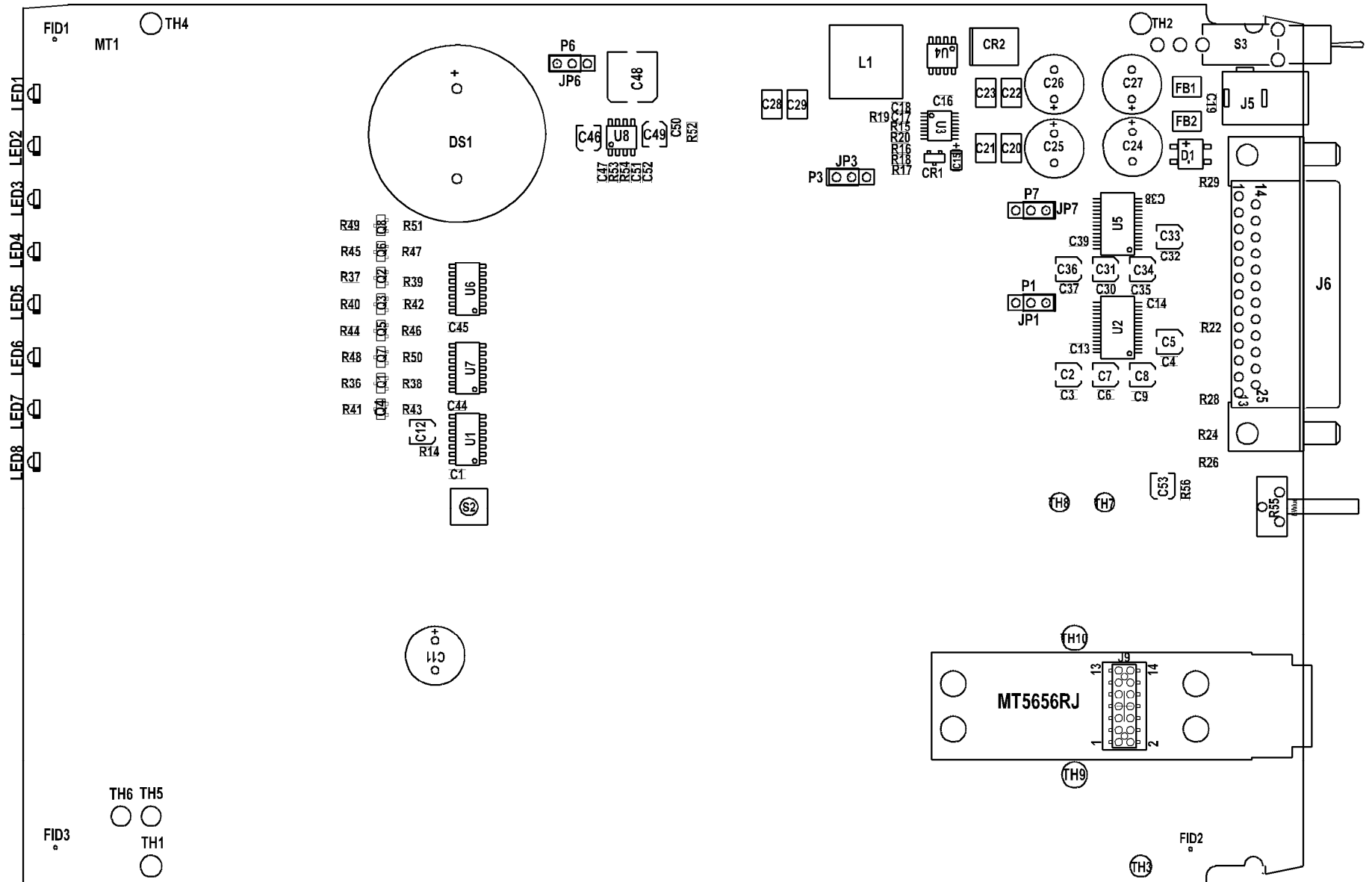
5 V DC Characteristics (TA = 0 °C to 50 °C; VDD = 5 V ± 0.25 V) VDDMAX = 5.5 V

Inputs –DTR (3), –TXD (9), –RTS (7), –RESET (3), XCLK (11), PWR (5), GND (12)	Input High Min 2 V	Input Low Max 0.8 V	
Outputs –DCD (2), –CTS (6), –RI (1), –RXD (10), RDCLK (14), TDCLK (8), SPKR (13) 2 mA, Z INT = 120 Ω	Output High Min 2.4 V	Output Low Max 0.5 V	
Digital Input Capacitance			20 PF

Handling Precautions

Handle all electronic devices with certain precautions to avoid damage due to the accumulation of static charge. Although input protection circuitry has been incorporated into the devices to minimize the effect of this static buildup, proper precautions should be taken to avoid exposure to electrostatic discharge during handling and mounting.

Developer Board



5 V / 3.3 V Jumper – JP6

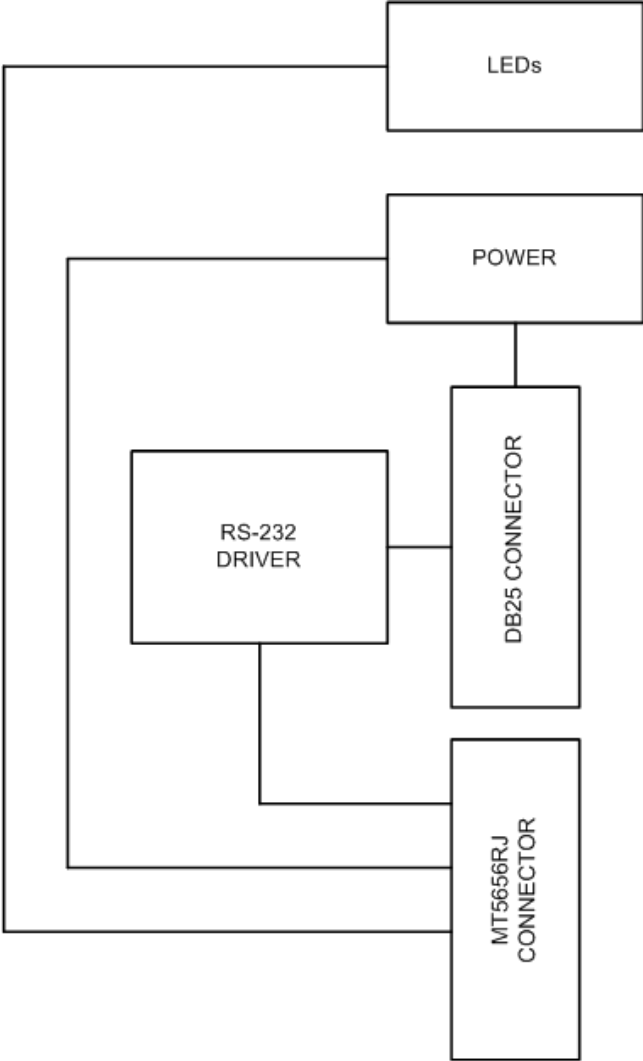
The operating voltage factory default setting is 3.3 V. The JP1 jumper must be set to 3.3-volt.

Warning – Be sure that the 5 V/3.3 V jumper is set to match the requirements of your RJModem.

If this jumper is set incorrectly, damage to the RJModem and/or the Test/Demo card can result.

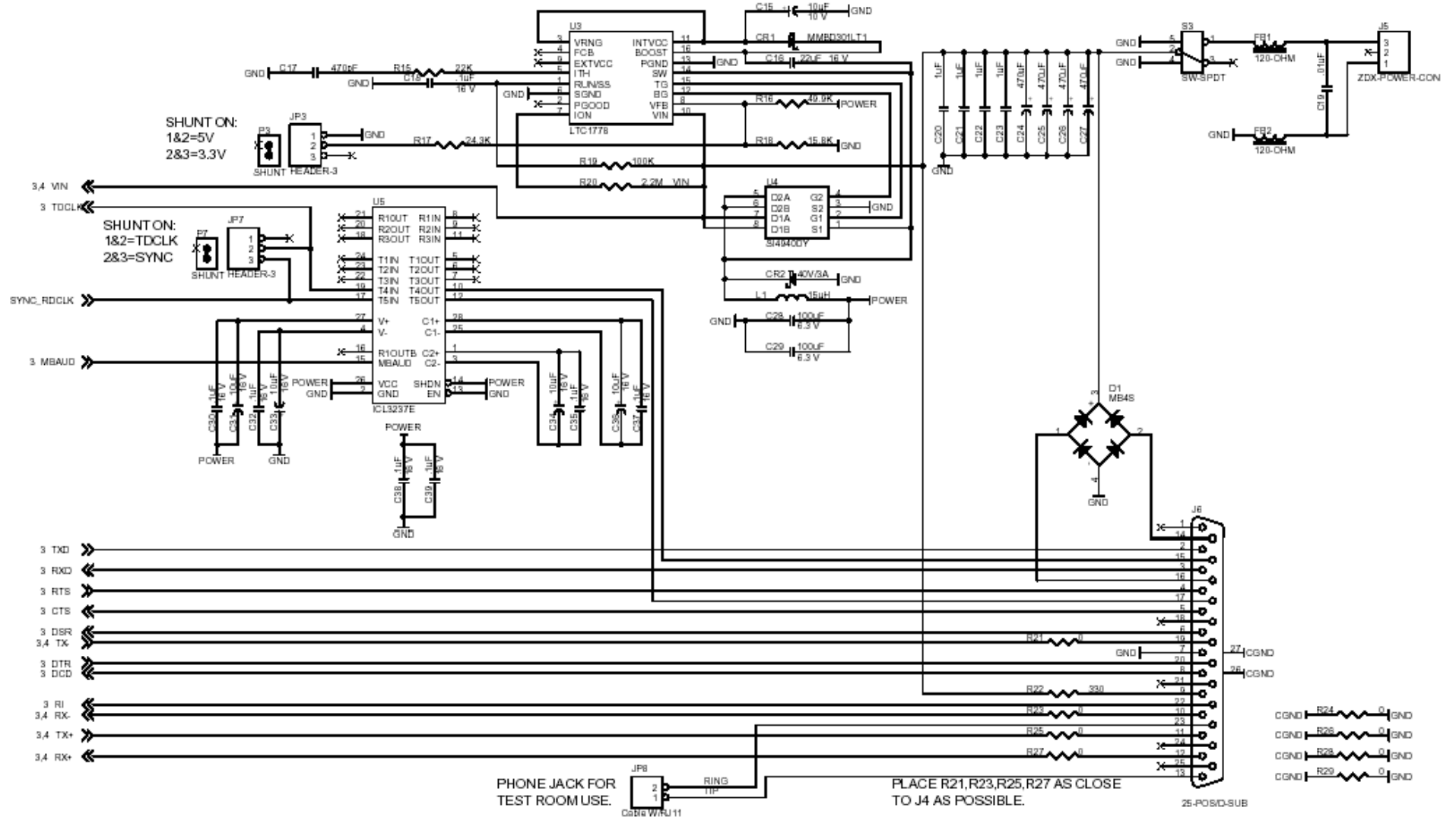
Caution – Use only the provided Multi-Tech Systems, Inc. transformer with the Test/Demo board. Use of any other power source voids the warranty and can damage the Test/Demo board and the RJModem. The transformer connector is keyed to prevent improper connection to the Test/Demo board.

Block Diagram

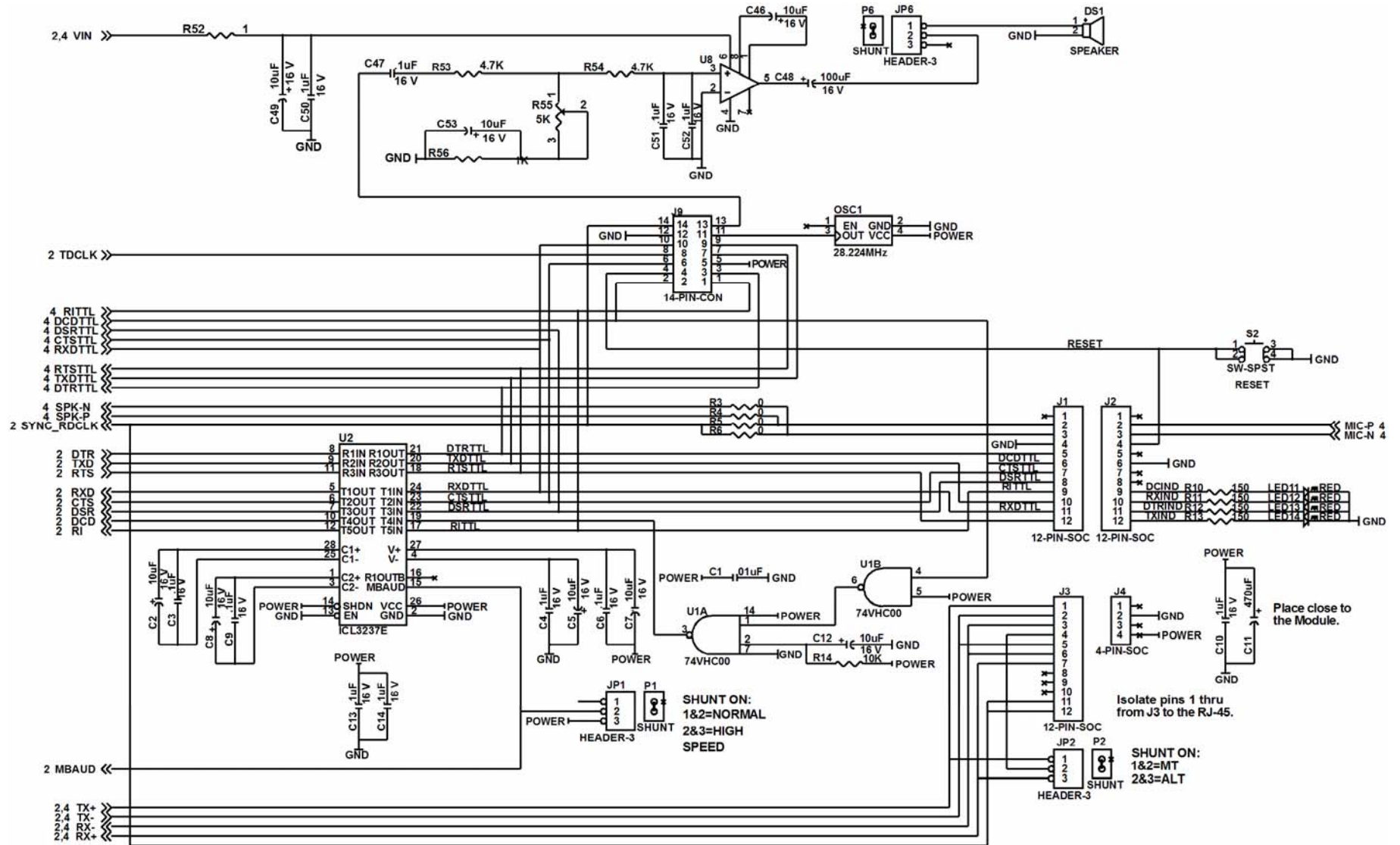


Developer Board Schematics

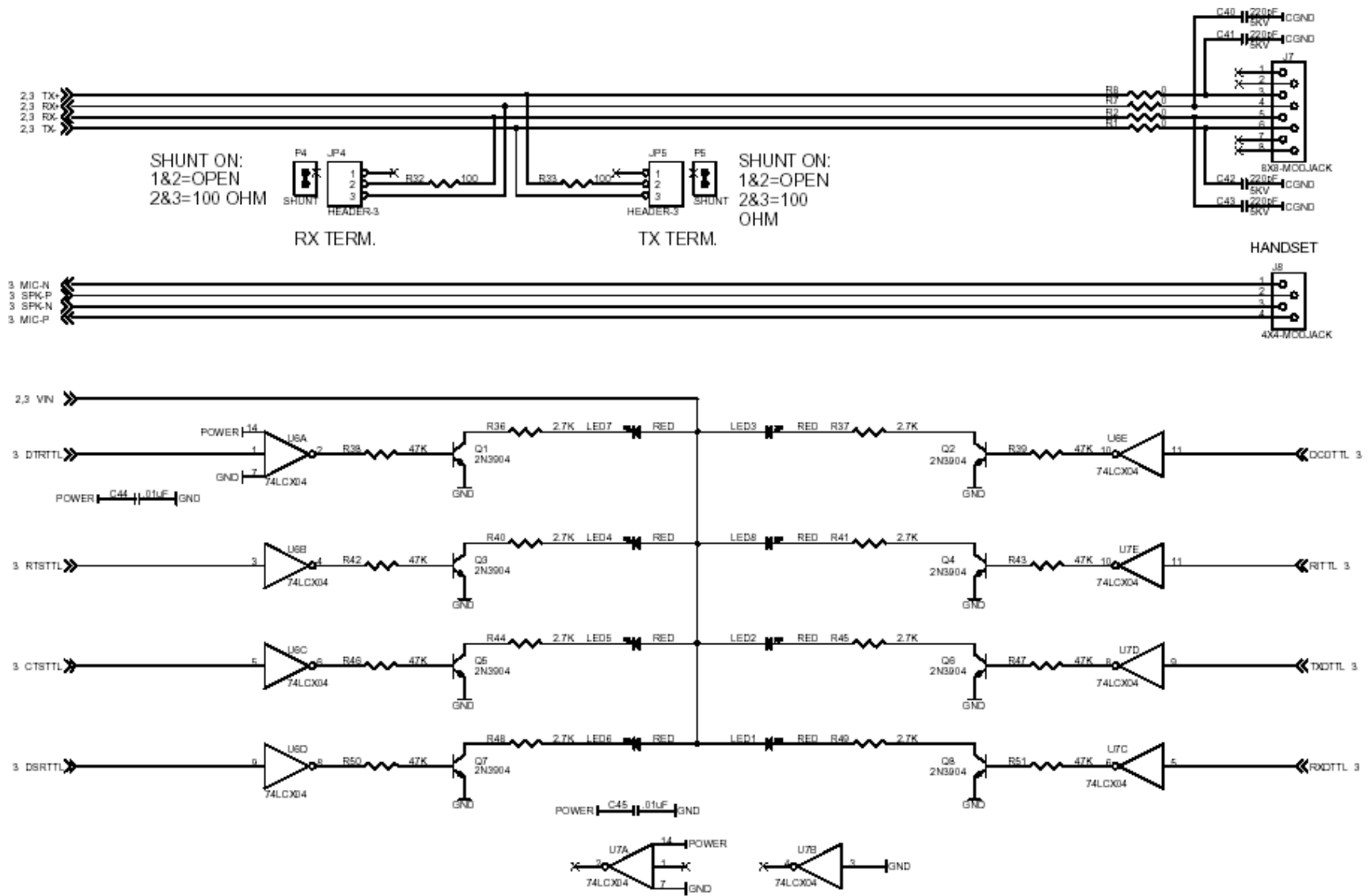
To view the text and numbers, increase the viewing percentage to 150% or print the page.



To view the text and numbers, increase the viewing percentage to 150% or print the page.



To view the text and numbers, increase the viewing percentage to 150% or print the page.



Design Considerations

Adhere to good engineering practices when designing a printed circuit board (PCB) containing the RJModem. Suppression of noise is essential to the proper operation and performance of the modem itself and for surrounding equipment.

Consider two aspects of noise in an OEM board design containing the RJ Modem: on-board/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. Of particular concern is noise in frequency ranges affecting modem performance.

On-board generated electromagnetic interference (EMI) noise that can be radiated or conducted off-board is a separate, but equally important, concern. 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, and so on) 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.

The aspects of proper engineering practices are beyond the scope of this designer guide. The designer should consult noise suppression techniques described in technical publications and journals, electronics and electrical engineering text books, and component supplier application notes.

PC Board Layout Guidelines

In a 4-layer design, provide adequate ground plane covering the entire board. In 4-layer designs, power and ground are typically on the inner layers. All power and ground traces should be 0.05 inches wide.

The recommended hole size for the RJ Modem pins is 0.036 in. +/-0.003 in. (check with CAD on this) in diameter.

All creepages and clearances for the RJModem have been designed to meet requirements of safety standards EN60950. The requirements are based on a working voltage of 250V.

Electromagnetic Interference (EMI) Considerations

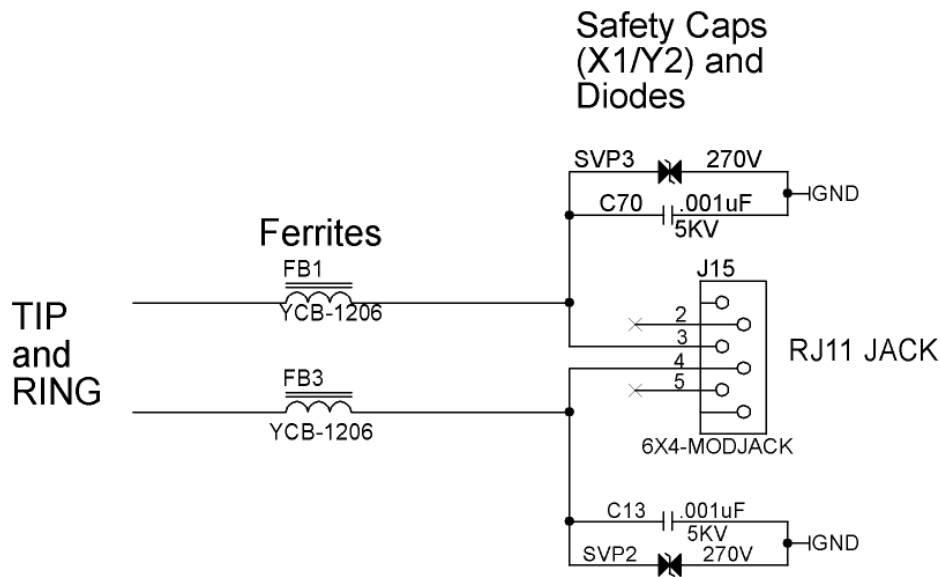
The following guidelines can help minimize EMI generation. Some of these guidelines are the same as, or similar to, the general guidelines but are mentioned again to reinforce their importance. To minimize the contribution of EMI by the RJModem to the design, the designer must understand the major sources of EMI and how to reduce them to acceptable levels.

1. Keep traces carrying high frequency signals as short as possible.
2. Provide a good ground plane or grid. In some cases, a multilayer board may be required with full layers for ground and power distribution.
3. Decouple power from ground with decoupling capacitors as close to the RJModem module power pins as possible.
4. Eliminate ground loops, which are unexpected current return paths to the power source and ground.
5. Decouple the power cord at the power cord interface with decoupling capacitors. Methods to decouple power lines are similar to decoupling telephone lines.
6. Locate high frequency circuits in a separate area to minimize capacitive coupling to other circuits.
7. Locate cables and connectors so as to avoid coupling from high frequency circuits.
8. Lay out the highest frequency signal traces next to the ground grid.
9. 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.

10. Minimize the number of through-hole connections on traces carrying high frequency signals.
11. Avoid right angle turns on high frequency traces. Forty-five degree corners are good; however, radius turns are better.
12. 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.
13. Distribute high frequency signals continuously on a single trace rather than several traces radiating from one point.

EMI Filtering

The RJModem includes EMI filtering as illustrated in the following schematic:



Chapter 2 – Telecom Approvals and Regulatory Information

Telecom Approvals

Multi-Tech's analog dial-up global RJModem is designed and approved for connection to the public switched telephone network in more than 50 countries or regions worldwide. Multi-Tech's RJModem is approved as host independent, which means our certification efforts can be transferred directly to your end product.

Contact Multi-Tech at oemsales@multitech.com to obtain a current list of approvals for the RJModem.

Regulatory Compliance Statements



EMC, Safety, and R&TTE Directive Compliance

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.

International Modem Restrictions

Some dialing and answering defaults and restrictions may vary for international modems. Changing settings may cause a modem to become non-compliant with national telecom requirements in specific countries. Also note that some software packages may have features or lack restrictions that may cause the modem to become non-compliant.

South African Statement

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

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.

Brazil Approval

This product has been homologated by ANATEL. This product meets the applied technical requirements in accordance with the procedures regulated by ANATEL. Reference of homologation of this product can be viewed in ANATEL web page: <http://www.anatel.gov.br>



Telecom Requirements for the United States

47 CFR – FCC Part 15

This equipment has been tested and found to comply with the limits for a **Class B** digital device, pursuant to 47 CFR – FCC Part 15 regulations. The stated limits in this regulation are designed to provide reasonable protection against harmful interference in a residential environment. 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.
- Plug 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.

This device complies with 47 CFR – FCC Part 15 rules. Operation of this device is subject to the following conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference that may cause undesired operation.

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.

New Zealand Telecom Warning Notice

1. The grant of a Telepermit for any item of terminal equipment indicates only that Telecom has accepted that the item complies with minimum conditions for connection to its network. It indicates no endorsement of the product by Telecom, nor does it provide any sort of warranty. Above all, it provides no assurance that any item will work correctly in all respects with another item of Telepermitted equipment of a different make or model, nor does it imply that any product is compatible with all of Telecom's network services

This equipment is not capable under all operating conditions of correct operation at the higher speed which it is designated. 33.6 kbps and 56 kbps connections are likely to be restricted to lower bit rates when connected to some PSTN implementations. Telecom will accept no responsibility should difficulties arise in such circumstances.

2. Immediately disconnect this equipment should it become physically damaged, and arrange for its disposal or repair.
3. This modem shall not be used in any manner which could constitute a nuisance to other Telecom customers.
4. This device is equipped with pulse dialing, while the Telecom standard is DTMF tone dialing. There is no guarantee that Telecom lines will always continue to support pulse dialing.

Use of pulse dialing, when this equipment is connected to the same line as other equipment, may give rise to 'bell tinkle' or noise and may also cause a false answer condition. Should such problems occur, the user should NOT contact the Telecom Faults Service.

The preferred method of dialing is to use DTMF tones, as this is faster than pulse (decadic) dialing and is readily available on almost all New Zealand telephone exchanges.

5. Warning Notice: No '111' or other calls can be made from this device during a mains power failure.
6. This equipment may not provide for the effective hand-over of a call to another device connected to the same line.
7. Some parameters required for compliance with Telecom's Telepermit requirements are dependent on the equipment (PC) associated with this device. The associated equipment shall be set to operate within the following limits for compliance with Telecom's Specifications:

For repeat calls to the same number:

- There shall be no more than 10 call attempts to the same number within any 30 minute period for any single manual call initiation, and
- The equipment shall go on-hook for a period of not less than 30 seconds between the end of one attempt and the beginning of the next attempt.

For automatic calls to different numbers:

- The equipment shall be set to ensure that automatic calls to different numbers are spaced such that there is no less than 5 seconds between the end of one call attempt and the beginning of another.

8. For correct operation, total of the RN's of all devices connected to a single line at any time should not exceed 5.

Other

The above country-specific examples do not cover all countries with specific regulations; they are included to show you how each country may differ. If you have trouble determining your own country's requirements, check with Multi-Tech's Technical Support for assistance.

Chapter 3 – Waste Electrical and Electronic Equipment (WEEE) Statement, RoHS, Chinese Standards

Waste Electrical and Electronic Equipment (WEEE) Statement

July, 2005

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.

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.

Information on HS/TS Substances According to Chinese Standards

In accordance with China's Administrative Measures on the Control of Pollution Caused by Electronic Information Products (EIP) # 39, also known as China RoHS, the following information is provided regarding the names and concentration levels of Toxic Substances (TS) or Hazardous Substances (HS) which may be contained in Multi-Tech Systems Inc. products relative to the EIP standards set by China's Ministry of Information Industry (MII).

Name of the Component	Hazardous/Toxic Substance/Elements					
	Lead (PB)	Mercury (Hg)	Cadmium (CD)	Hexavalent Chromium (CR6+)	Polybrominated Biphenyl (PBB)	Polybrominated Diphenyl Ether (PBDE)
Printed Circuit Boards	O	O	O	O	O	O
Resistors	X	O	O	O	O	O
Capacitors	X	O	O	O	O	O
Ferrite Beads	O	O	O	O	O	O
Relays/Opticals	O	O	O	O+	O	O
ICs	O	O	O	O	O	O
Diodes/ Transistors	O	O	O	O	O	O
Oscillators and Crystals	X	O	O	O	O	O
Regulator	O	O	O	O	O	O
Voltage Sensor	O	O	O	O	O	O
Transformer	O	O	O	O	O	O
Speaker	O	O	O	O	O	O
Connectors	O	O	O	O	O	O
LEDs	O	O	O	O	O	O
Screws, Nuts, and other Hardware	X	O	O	O	O	O
AC-DC Power Supplies	O	O	O	O	O	O
Software / Documentation CDs	O	O	O	O	O	O
Booklets and Paperwork	O	O	O	O	O	O
Chassis	O	O	O	O	O	O

X Represents that the concentration of such hazardous/toxic substance in all the units of homogeneous material of such component is higher than the SJ/Txxx-2006 Requirements for Concentration Limits.

O Represents that no such substances are used or that the concentration is within the aforementioned limits.

Information on HS/TS Substances According to Chinese Standards (in Chinese)

依照中国标准的有毒有害物质信息

根据中华人民共和国信息产业部 (MII) 制定的电子信息产品 (EIP)

标准 - 中华人民共和国《电子信息产品污染控制管理办法》(第 39 号), 也称作中国

RoHS, 下表列出了 Multi-Tech Systems, Inc. 产品中可能含有的有毒物质 (TS) 或有害物质 (HS) 的名称及含量水平方面的信息。

成分名称	有害/有毒物质/元素					
	铅 (PB)	汞 (Hg)	镉 (CD)	六价铬 (CR6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板	0	0	0	0	0	0
电阻器	X	0	0	0	0	0
电容器	X	0	0	0	0	0
铁氧体磁环	0	0	0	0	0	0
继电器/光学部件	0	0	0	0	0	0
IC	0	0	0	0	0	0
二极管/晶体管	0	0	0	0	0	0
振荡器和晶振	X	0	0	0	0	0
调节器	0	0	0	0	0	0
电压传感器	0	0	0	0	0	0
变压器	0	0	0	0	0	0
扬声器	0	0	0	0	0	0
连接器	0	0	0	0	0	0
LED	0	0	0	0	0	0
螺丝、螺母以及其它五金件	X	0	0	0	0	0
交流-直流电源	0	0	0	0	0	0
软件/文档 CD	0	0	0	0	0	0
手册和纸页	0	0	0	0	0	0
底盘	0	0	0	0	0	0

X 表示所有使用类似材料的设备中有害/有毒物质的含量水平高于 SJ/Txxx-2006 限量要求。

0 表示不含该物质或者该物质的含量水平在上述限量要求之内。

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