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**RJModem™**

**MT5656RJ**

**Developer's Guide**

## RJModem™ Developer's Guide

MT5656RJ

PN S000363E, Version E

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### Revisions

Revision Level	Date	Description
A	09/24/04	Initial release.
B	10/05/04	Add one drawing (bottom view) to the Dimensions page.
C	10/14/04	Change the RJModem drawing on page 11. Changed 5 V Serial Electrical to VDDMAX=5.5 V. In the same table, removed the Current Drive cell.
D	05/12/05	Add the EMI filtering diagram. Update the PCB footprint. Add panel-mounting kit and board-mounting diagrams.
E	06/30/05	Add one more panel-mounting diagram. Add information on Transmit Clock (TXCLK) and Receive Clock (RXCLK). Add reference to the separate AT Command document for RJModem. Add Waste Electrical and Electronic Equipment (WEEE) Notice.

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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. Other Patents Pending.

### 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

### Technical Support

Country	By Email	By Phone
France:	support@multitech.fr	(33) 1-64 61 09 81
India:	support@multitechindia.com	91 (124) 6340778
U.K.:	support@multitech.co.uk	(44) 118 959 7774
U.S. and Canada:	oemsales@multitech.com	(800) 972-2439
Rest of the World:	oemsales@multitech.com	(763) 717-5863
Internet Address: <a href="http://www.multitech.com">http://www.multitech.com</a>		

# Table of Contents

<b>Chapter 1 – RJModem Hardware .....</b>	<b>4</b>
Introduction .....	4
RJModem Features .....	4
Product Ordering Information .....	4
Developer Kit .....	4
AT Commands .....	4
Technical Specifications .....	5
Dimensions .....	7
<i>For Board Mounting</i> .....	7
<i>For Panel Mounting</i> .....	7
Attaching the Mounting Bracket .....	8
PCB Footprint .....	8
Pinout Dimensions .....	9
Pin Descriptions .....	9
<i>Transmit Clock (TXCLK) and Receive Clock (RXCLK)</i> .....	10
<i>&amp;Q – Sync/Async Mode</i> .....	10
<i>&amp;W – Store Current Configuration</i> .....	10
Electrical Characteristics .....	11
<i>3.3 V Serial RJModem</i> .....	11
<i>5 V Serial RJModem</i> .....	11
<i>Handling Precautions</i> .....	11
RJModem Developer Board .....	12
<i>5 V / 3.3 V Jumper – JP6</i> .....	12
<i>RJModem Schematics</i> .....	13
Design Considerations .....	17
<i>PC Board Layout Guidelines</i> .....	17
<i>Electromagnetic Interference (EMI) Considerations</i> .....	17
<i>EMI Filtering</i> .....	18
<b>Chapter 2 – Telecom Approvals and Regulatory Information .....</b>	<b>19</b>
Telecom Approvals .....	19
Regulatory Compliance Statements .....	20
<i>EMC, Safety, and R&amp;TTE Directive Compliance</i> .....	20
<i>International Modem Restrictions</i> .....	20
<i>Telecom Requirements for the United States</i> .....	20
<i>Industry Canada</i> .....	20
<i>New Zealand Telecom Warning Notice</i> .....	21
<i>South African Statement</i> .....	21
<i>Other</i> .....	21
<b>Chapter 3 – Multi-Tech Warranty and Repairs Policy .....</b>	<b>22</b>
Multi-Tech Warranty Statement .....	22
<i>Repair Procedures for U.S. and Canadian Customers</i> .....	22
<i>Repair Procedures for International Customers (Outside U.S.A. and Canada)</i> .....	23
<i>Repair Procedures for International Distributors</i> .....	23
<b>Chapter 4 – Waste Electrical and Electronic Equipment .....</b>	<b>24</b>
<b>Index .....</b>	<b>25</b>

# Chapter 1 – RJModem Hardware

## Introduction

The Multi-Tech RJModem creates communication-ready devices by integrating modem functionality into the most compact, integrated device. The first-of-its-kind RJ11 form factor includes the controller, data pump, and DAA providing device manufacturers with 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.32bis/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.22bis Fast Connect
- V.80 Synchronous Access
- 10 or 11-bit modes
- 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	
MTSMI-IDK	Developer Kit	Global	
MTRJ-RMK	Panel Mounting Kit for RJModem	Global	

Ordering Codes	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 (default is 5V)

## 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, connector for attaching the RJModem embedded modem, RS-232 cable and Developer Guide CD.

## AT Commands

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

## Technical Specifications

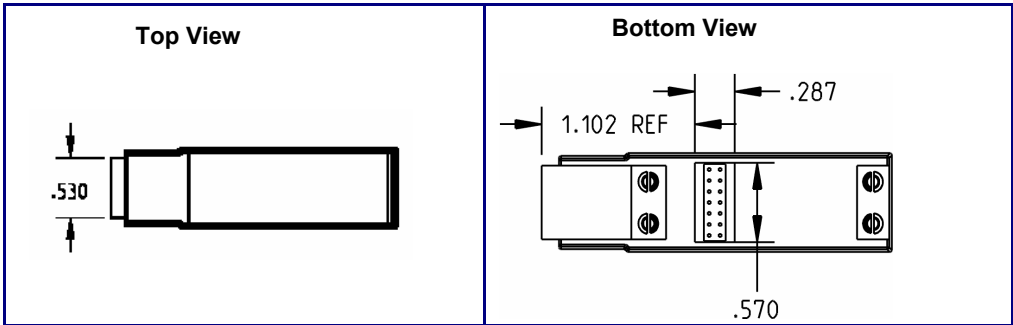
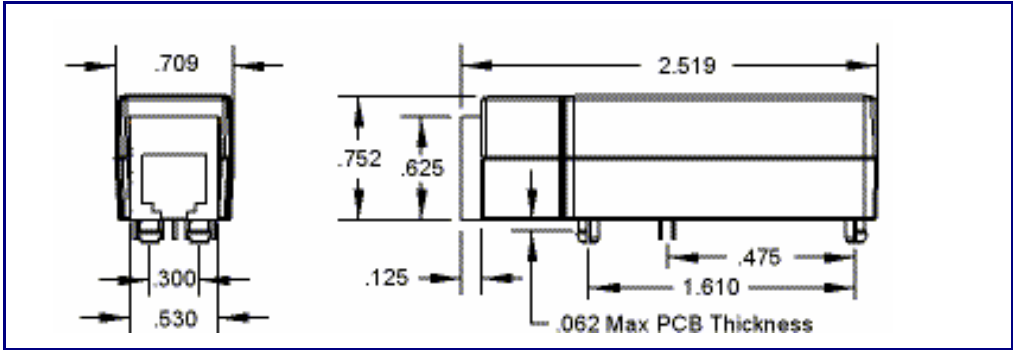
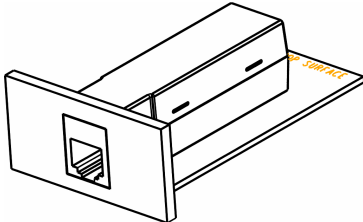
The RJModem meets the following specifications:

Category	Description
<b>Client-to-Server Data Rates</b>	Supports V.92 and V.90 data rates
<b>AGC Dynamic Range</b>	43 dB
<b>Cleaning</b>	No cleaning/washing due to the manufacturing process used to produce this product.
<b>Client-to-Client Data Rates</b>	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
<b>Command Buffer</b>	60 characters
<b>DAA Isolation</b>	Basic isolation at 1500 Vac
<b>Data Compatibility</b>	V.92/V.90/56K, V.34/33.6K, V.32bis/14.4K, V.22, V.23, V.21; Bell 212A and Bell103
<b>Data Compression</b>	V.44, V.42bis and MNP Class 5
<b>Data Format</b>	Serial, binary, asynchronous
<b>Diagnostics</b>	Local analog loop, local digital loop, remote digital loop
<b>Dimensions</b>	2.519 x .709 x 0.757 inches (6.4 x 1.8 x 1.92 cm)
<b>Error Correction</b>	Data Mode: V.42 (LAPM or MNP 2-4)
<b>Flow Control</b>	XON/XOFF (software), RTS/CTS (hardware)
<b>Frequency Stability</b>	±0.01%
<b>Interface</b>	Serial
<b>Modes of Operation</b>	Full duplex over dial-up lines; data mode, command mode, and online command mode, V.54 test mode
<b>Operating Voltage</b>	<b>5V DC Build Option ± 10%</b> Absolute Maximum Supply Voltage: 5.5 V DC <b>3.3V DC Build Option ± 10%</b> Absolute Maximum Supply Voltage: 3.6 V DC
<b>Operational Temperature Range</b>	<b>3.3 V and 5V Build Options</b> 0 to +50° C ambient under closed conditions; humidity range 20–90% (non-condensing)
<b>Power Consumption</b>	<b>5V Build Option</b> Typical: 66mA (.330W @ 5VDC) Maximum: 75mA (.394W @ 5.25VDC) <b>3.3 V Build Option</b> Typical: 95mA (0.314W @ 3.3VDC) Maximum: 105mA (.378W @ 3.6VDC)
<b>Receiver Sensitivity</b>	–43 dBm under worst-case conditions
<b>Serial Speeds</b>	Serial port data rates adjustable to 300, 1200, 2400, 4800, 9600, 19,200, 38,400, 57,600, 115,200
<b>Storage Temperature</b>	–40 to +85° C
<b>Transmit Level</b>	–11 dBm (varies by country setting)
<b>Voice Compatibility</b>	TAM (Telephone Answering Machine): S-101 AT+V commands (no CODEC for speakers/microphone interface)
<b>Physical Description</b>	.709" w x 2.519" h x .752 d (1.8 cm x 6.4 cm x 1.92 cm)
<b>Weight</b>	64 oz. (0.02 Kg)
<b>Warranty</b>	Two years

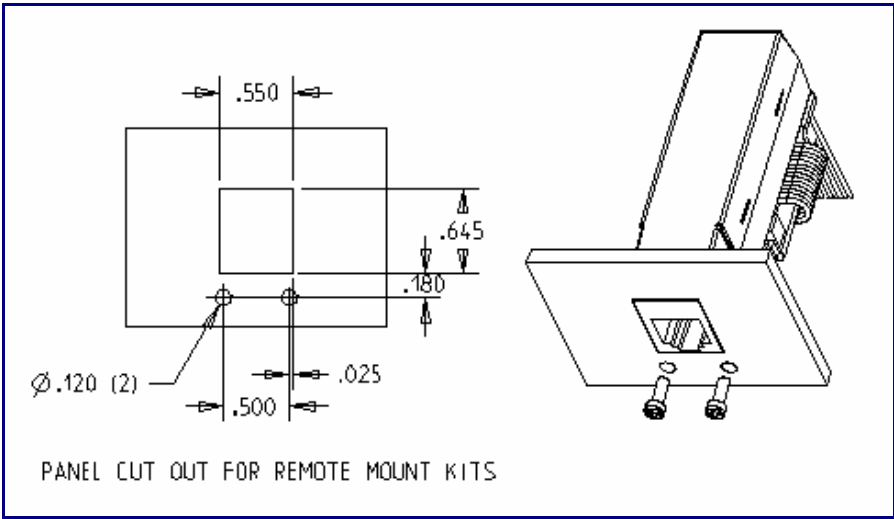
Category	Description
<b>Manufacturing Information</b>	Trade Name: RJModem Model Number: MT5656RJ Registration No: Printed on the product Ringer Equivalence: 0.01B Modular Jack (USOC): RJ11
<b>Approvals</b>	<b>Safety Certifications</b> UL60950-1 IEC60950-1 ACA TS001 / AS3260 CCC <b>EMC Approvals</b> FCC CFR47 Part 15 (Class B) ICES-003 Canada (Class B) EN 55022 (Class B) EN 55024
<b>Intelligent Features</b>	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 10 or 11-bit modes 3.3V or 5V power input options Board mount or remote panel mounting

# Dimensions

## For Board Mounting

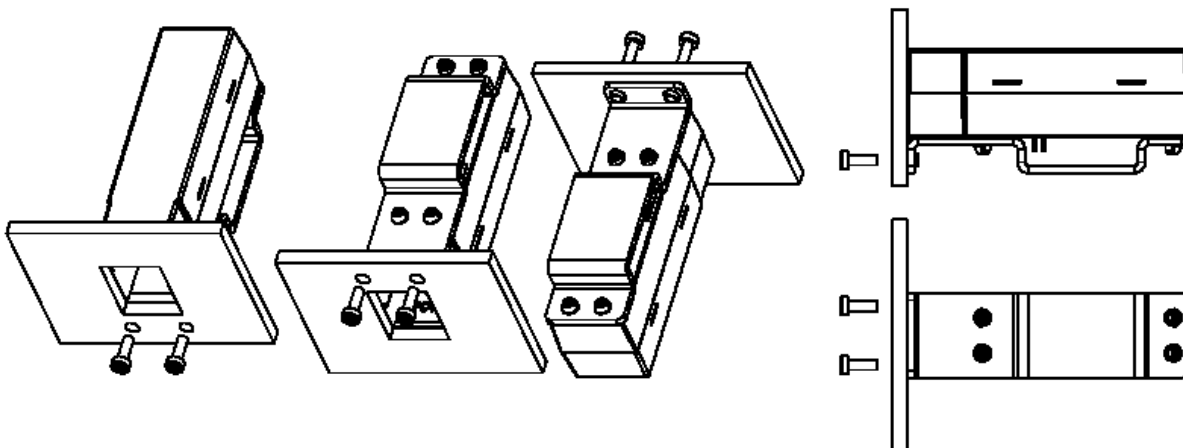


## For Panel Mounting

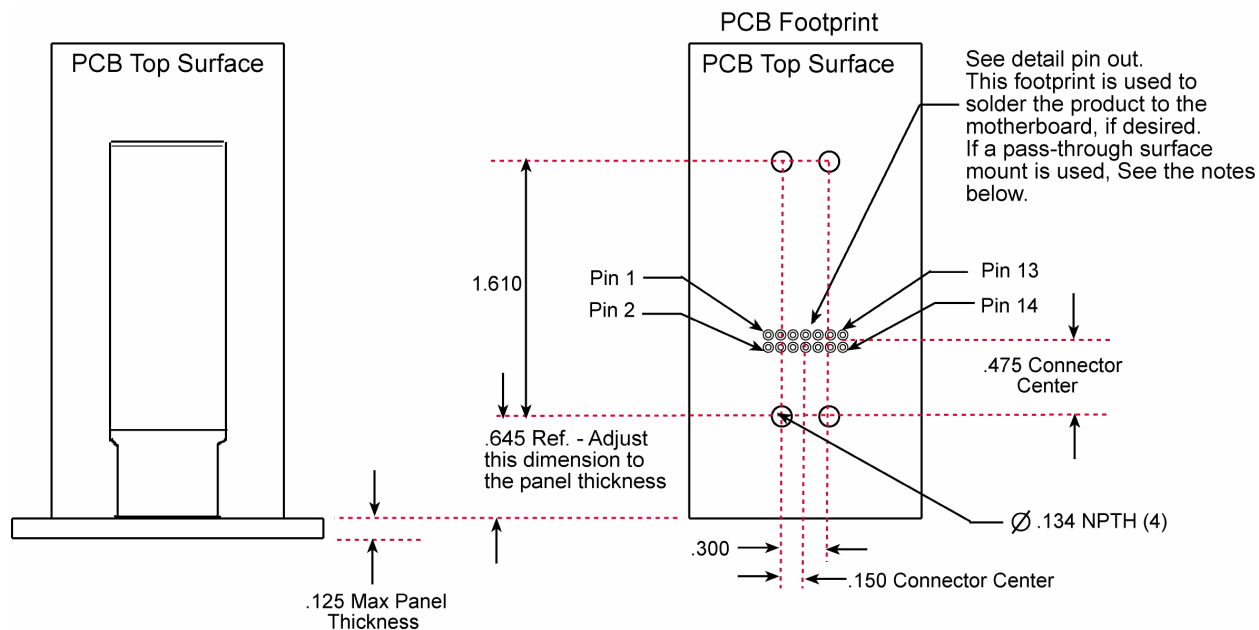


**Note:** Screws, bracket and ribbon cable are included in the panel-mounting kit.

## Attaching the Mounting Bracket



## PCB Footprint



**Notes:**

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

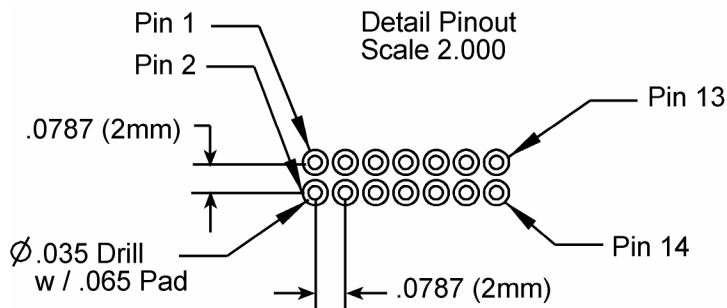
Follow the "Pass Through" footprint instructions on the part data sheets.

[www.samtec.com](http://www.samtec.com)

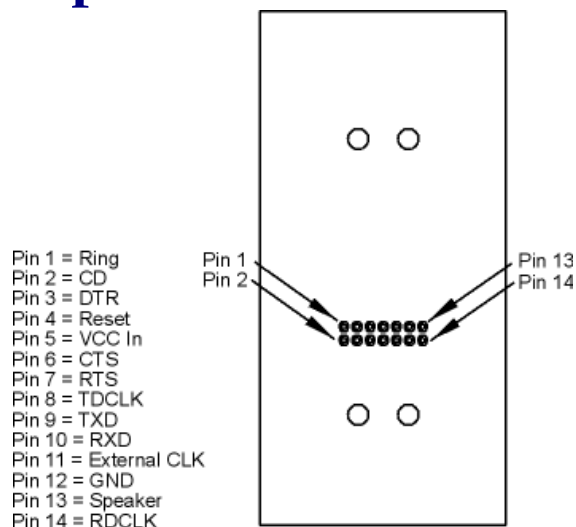
SAMTEC: SMM-107-02-S-D-(other option) or equivalent

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

## Pinout Dimensions



## Pin Descriptions



Pin	Signal Name	IN/OUT Type	Description
1	–RI	O	<b>RING (Active Low).</b> Incoming ring signal from phone. <b>Ring Indicate.</b> –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	<b>Data Carrier Detect (Active Low).</b> –DCD output is ON (low) when a data connection is established and the module is ready to send/receive data.
3	–DTR	I	<b>Data Terminal Ready (Active Low).</b> 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	<b>Device Reset (with pull-up).</b> 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. –RESET is tied to VCC through a time-constant circuit for "Power-on-Reset" functionality. The module is ready to accept commands after a fixed amount of time after power-on or reset.
5	VCC	PWR	<b>DC Input Power.</b> 3.3 V or 5 V DC power, depending upon the build.
6	–CTS	O	<b>Clear to Send (Active Low).</b> –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	<b>Request to Sent (Active Low).</b> –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.

Pin	Signal Name	IN/OUT Type	Description
8	TXCLK	O	<b>Transmit Data Sync Clock.</b> TX synchronous data clock for sync data mode. More information below.
9	-TXD	I	<b>Transmitted Data.</b> 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	<b>Received Data.</b> 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	<b>Logic Ground.</b>
13	SPKR		<b>Speaker.</b> 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	I	<b>Receive Data Sync Clock.</b> 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.

Synchronous mode can be set with the **&M** command and stored with the **&W** command. See the RJModem AT command guide available on the RJModem Developer Kit CD and the Multi-Tech Web site.

#### &Q – Sync/Async Mode

<b>Description:</b>	This command is an extension of the &M command and is used to control the connection modes permitted. It is used in conjunction with S36 and S48. <b>Note:</b> When &Q0 to &Q3 are issued to select the mode, the subsequent connect message will report the DCE speed regardless of the W command and S95 settings.
<b>Syntax:</b>	&Q<value>
<b>Defined Values:</b>	<p><b>&lt;value&gt;</b> Decimal number corresponding to the selected option.</p> <ul style="list-style-type: none"> <li><b>0</b> – Selects direct asynchronous operation. The value 000b is written to S27 bits 3, 1, and 0, respectively. See &amp;M0.</li> <li><b>1</b> – Selects synchronous connect mode with async off-line command mode. The value 001b is written to S27 bits 3, 1, and 0, respectively. See &amp;M1. (Serial interface operation only.)</li> <li><b>2</b> – 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 &amp;M2. (Serial interface operation only.)</li> <li><b>3</b> – 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 &amp;M3. (Serial interface operation only.)</li> <li><b>5</b> – 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.)</li> <li><b>6</b> – Selects asynchronous operation in normal mode (speed buffering). The value 110b is written to S27 bits 3, 1, and 0, respectively.</li> </ul>
<b>Result Codes:</b>	OK <value> = 0 to 3, 5, or 6 ERROR

#### &W – Store Current Configuration

<b>Description:</b>	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 will yield an ERROR message if the NVRAM is not installed or is not operational as detected by the NVRAM test. The current configuration is comprised of a list of storable parameters illustrated in the &V command. These settings are restored to the active configuration upon receiving a Zn command or at power up (see &Yn).
<b>Syntax:</b>	&W<value>
<b>Defined Values:</b>	<p><b>&lt;value&gt;</b> Decimal number corresponding to the selected profile.</p> <ul style="list-style-type: none"> <li><b>0</b> – Store the current configuration as profile 0.</li> <li><b>1</b> – Store the current configuration as profile 1.</li> </ul>
<b>Result Codes:</b>	OK <value> = 0 or 1. ERROR Otherwise.

## 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

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

### 5 V Serial RJModem

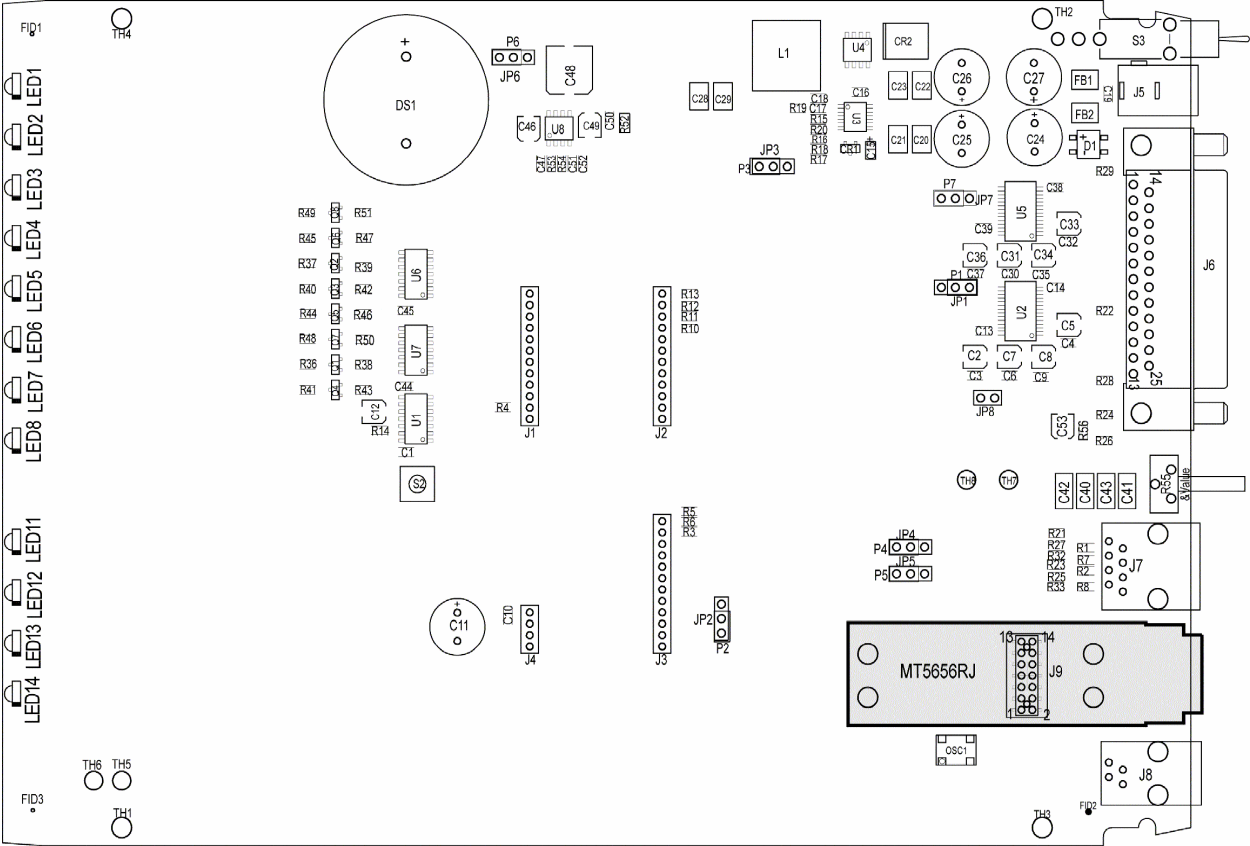
5 V DC Characteristics (TA = 0 °C to 50 °C; VDD = 5 V ± 0.25 V) VDDMAX = 5.5 V

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

### Handling Precautions

All electronic devices should be handled 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.

# RJModem Developer Board



## 5 V / 3.3 V Jumper – JP6

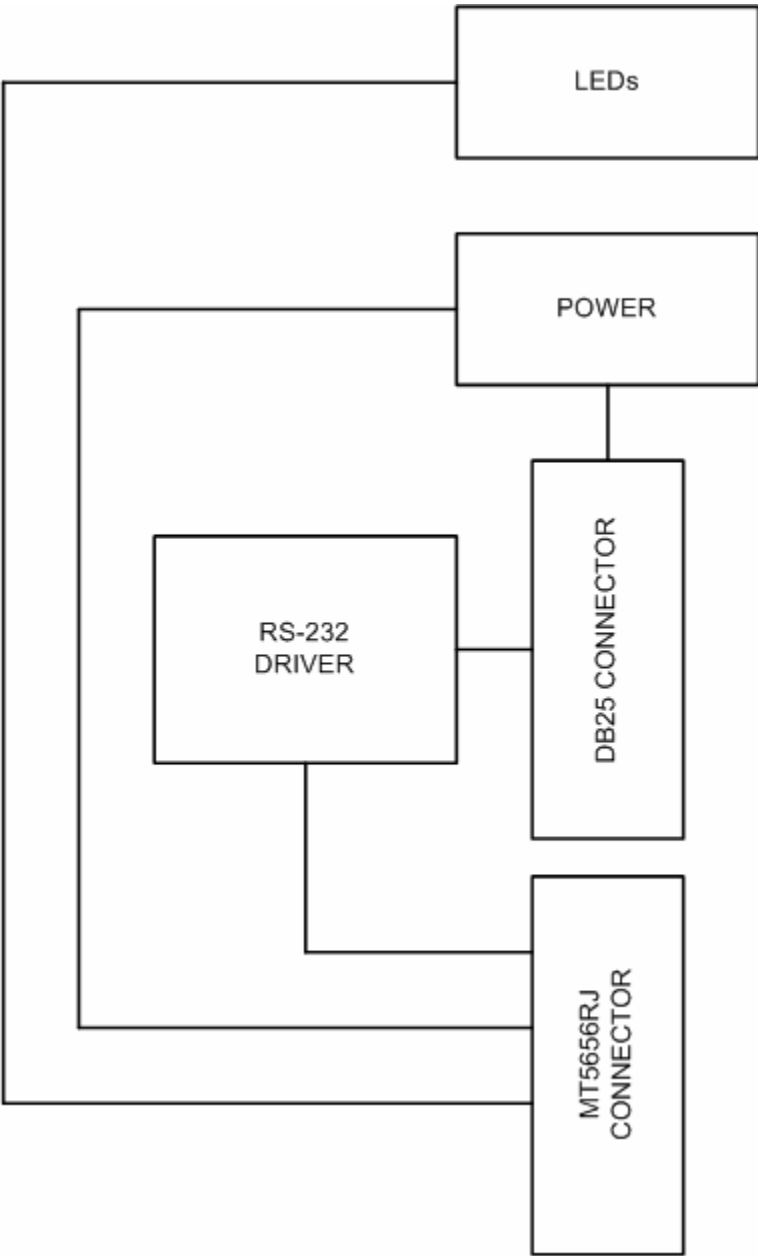
The operating voltage factory default setting is 3.3 V. The JP1 jumper must be set to 3.3-volt.

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

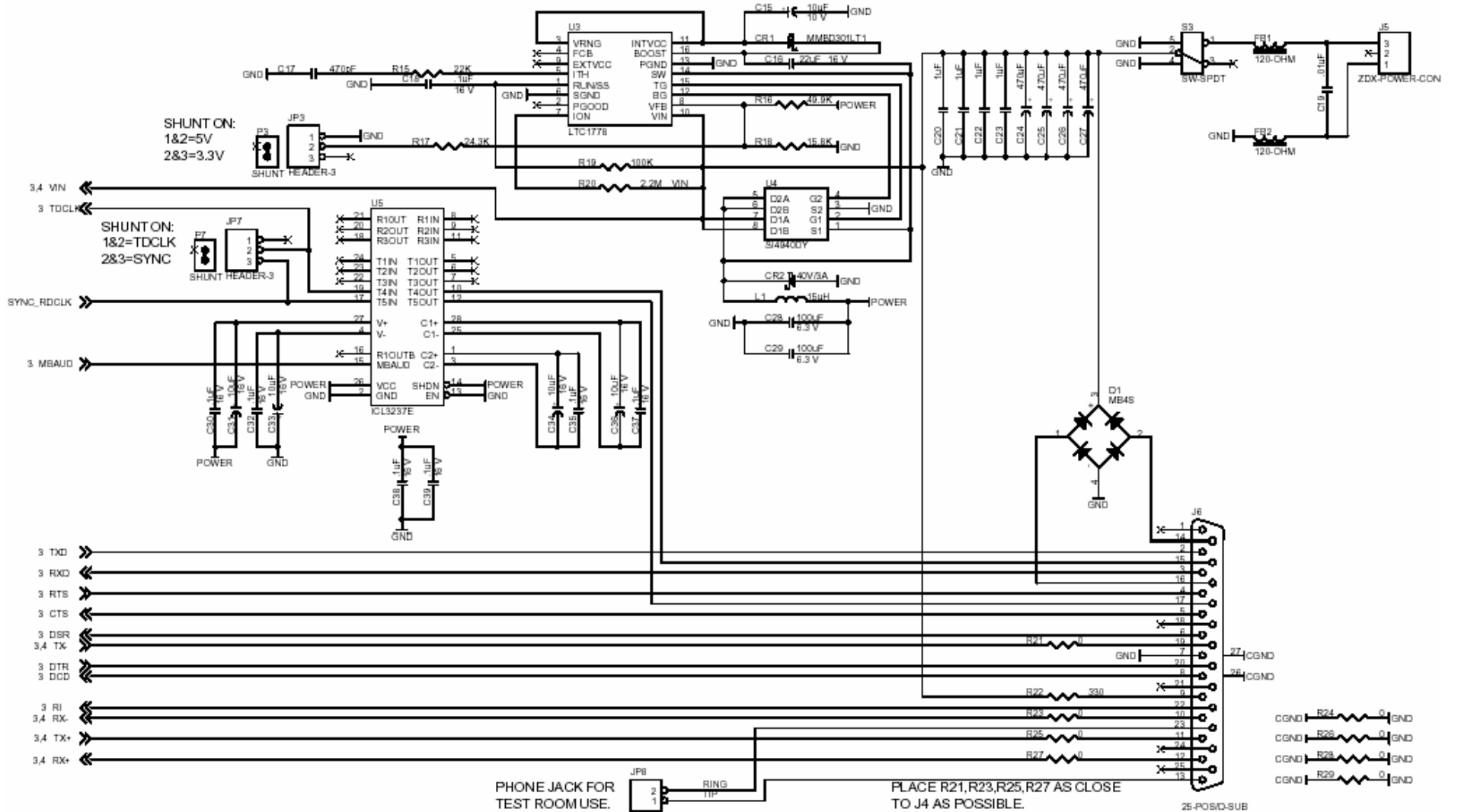
If this jumper is set incorrectly, damage to the RJModem and/or the Test/Demo card could result.

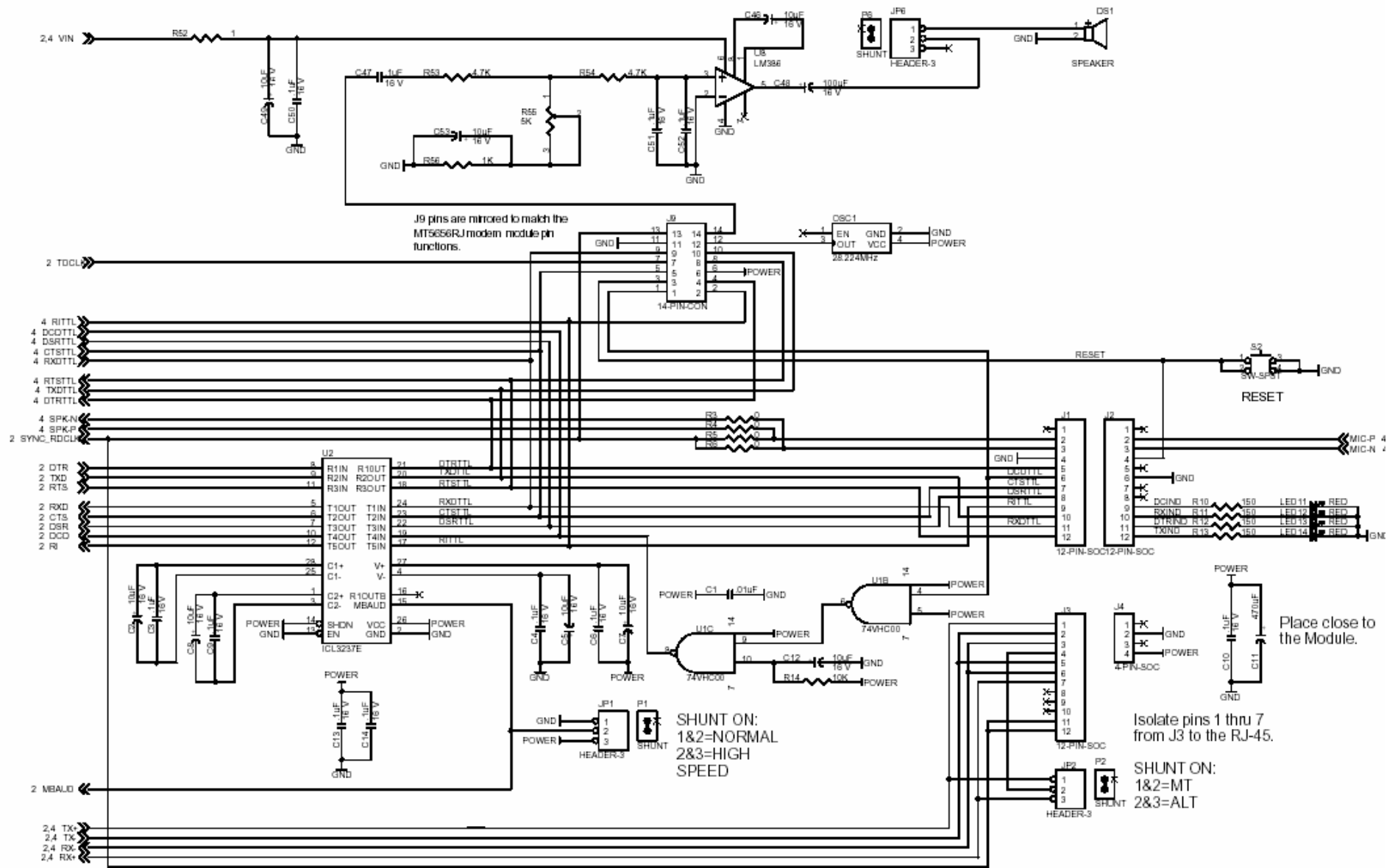
**Caution** – Use only the provided Multi-Tech Systems, Inc. transformer with the Test/Demo board. Use of any other power source will void the warranty and will likely damage the Test/Demo board and the RJModem. The transformer connector is keyed to prevent improper connection to the Test/Demo board.

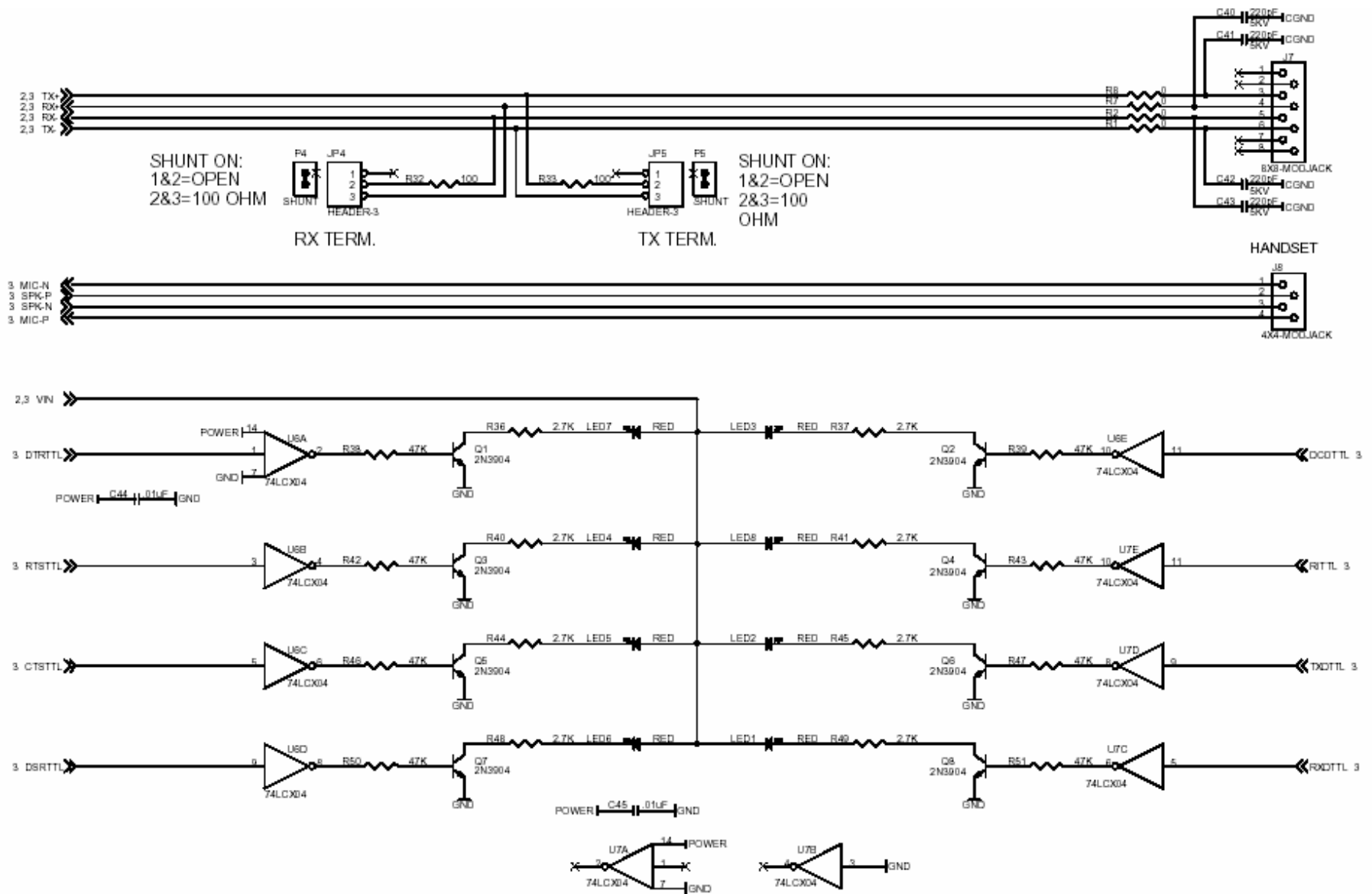
**RJModem Schematics**



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







# Design Considerations

Good engineering practices must be adhered to 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.

Two aspects of noise in an OEM board design containing the RJ Modem must be considered: 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, 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.

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.

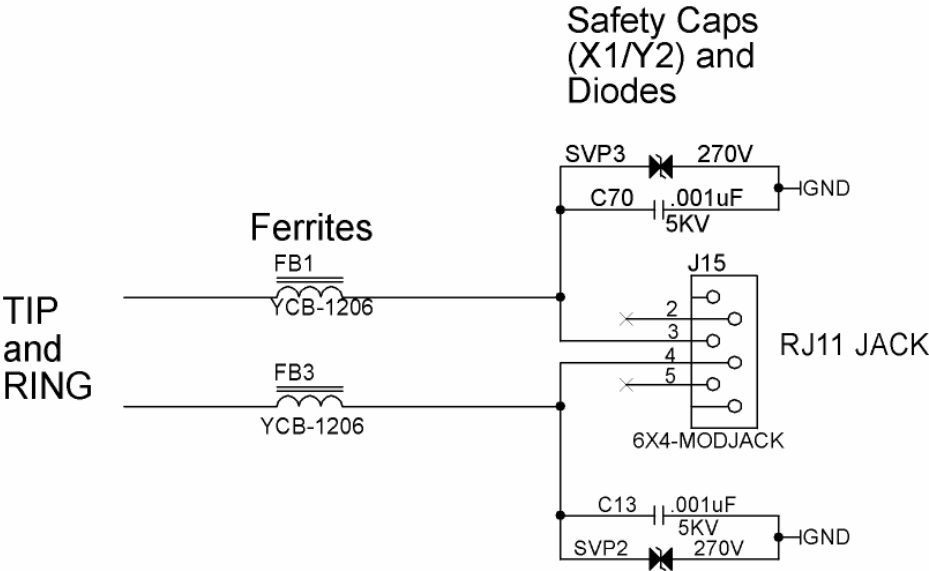
## Electromagnetic Interference (EMI) Considerations

The following guidelines are offered to specifically 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 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 will be approved for connection to the public switched telephone network in more than 50 countries or regions worldwide. Multi-Tech's RJModem is being approved as host independent, which means our certification efforts can be transferred directly to your end product. Multi-Tech supports our approvals by supplying our customers with supporting documentation and offering a compliance label with country or region approval logos and approval numbers to be attached to an end product.

The following is a list of countries or regions that Multi-Tech completes testing and obtains\* certification test reports or certificates at or near the initial release of the product. After the initial release, the product may be tested and certified for other countries or regions. Contact Multi-Tech at [oesales@multitech.com](mailto:oesales@multitech.com) to obtain a current list of approvals for the RJModem.

Countries or Regions			
Argentina	France	Latvia	Russia
Australia	Germany	Liechtenstein	Singapore
Austria	Greece	Lithuania	Slovak Republic
Belgium	Hong Kong, S.A.R. of China	Luxembourg	Slovenia
Brazil	Hungary	Malaysia	South Africa
Canada	Iceland	Malta	Spain
Chile	India	Mexico	Sweden
China	Indonesia	Netherlands	Switzerland
Cyprus	Ireland	New Zealand	Taiwan
Czech Republic	Israel	Norway	Thailand
Denmark	Italy	Philippines	Turkey
Estonia	Japan	Poland	United Kingdom
Finland	Korea	Portugal	United States

The above list is our target set of countries or regions in which the global RJModem will be approved.

Many of the approvals are completed at the time the product is released to market; whereas, others may take additional months to complete the approval.

\* Some countries or regions have special import requirements that require us to facilitate additional paperwork application in partner with our customers. Contact Technical Support or Multi-Tech at [oesales@multitech.com](mailto:oesales@multitech.com) for more information.

# 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 89/336/EEC of 3 May 1989 on the approximation of the laws of Member States relating to electromagnetic compatibility;  
and  
Council Directive 73/23/EEC of 19 February 1973 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 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.

## **Telecom Requirements for the United States**

### **FCC Part 15 Regulation**

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.
- Plug the equipment into an outlet on a circuit that is different from the one used by the receiver.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC 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.

## **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.

## ***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.

## ***South African Statement***

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

## ***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 – Multi-Tech Warranty and Repairs Policy

### Multi-Tech Warranty Statement

Multi-Tech Systems, Inc., (hereafter “MTS”) warrants that its products will be free from defects in material or workmanship for a period of two years from date of purchase, or if proof of purchase is not provided two years from date of shipment.

**MTS MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.**

This warranty does not apply to any products which have been damaged by lightning storms, water, or power surges or which have been neglected, altered, abused, used for a purpose other than the one for which they were manufactured, repaired by Customer or any party without MTS's written authorization, or used in any manner inconsistent with MTS's instructions.

MTS's entire obligation under this warranty shall be limited (at MTS's option) to repair or replacement of any products which prove to be defective within the warranty period or, at MTS's option, issuance of a refund of the purchase price. Defective products must be returned by Customer to MTS's factory — transportation prepaid.

**MTS WILL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES, AND UNDER NO CIRCUMSTANCES WILL ITS LIABILITY EXCEED THE PRICE FOR DEFECTIVE PRODUCTS.**

### *Repair Procedures for U.S. and Canadian Customers*

In the event that service is required, products may be shipped, freight prepaid, to our Mounds View, Minnesota factory:

Multi-Tech Systems, Inc.  
2205 Woodale Drive  
Mounds View, MN 55112  
Attn: Repairs, Serial # \_\_\_\_\_

A Returned Materials Authorization (RMA) is not required. Return shipping charges (surface) will be paid by MTS to destinations in U.S. and Canada.

Please include, inside the shipping box, a description of the problem, a return shipping address (must have street address, not P.O. Box), your telephone number, and if the product is out of warranty, a check or purchase order for repair charges.

For out of warranty repair charges, go to [www.multitech.com/DOCUMENTS/Company/warranty/](http://www.multitech.com/DOCUMENTS/Company/warranty/)

Extended two-year overnight replacement service agreements are available for selected products. Please call MTS customer service at (888) 288-5470 or visit our web site at [www.multitech.com/PARTNERS/Programs/orc/](http://www.multitech.com/PARTNERS/Programs/orc/) for details on rates and coverage's.

Please direct your questions regarding technical matters, product configuration, verification that the product is defective, etc., to our Technical Support department at (800) 972-2439 or email [support@multitech.com](mailto:support@multitech.com). Please direct your questions regarding repair expediting, receiving, shipping, billing, etc., to our Repair Accounting department at (800) 328-9717 or (763) 717-5631, or email [mtsrepair@multitech.com](mailto:mtsrepair@multitech.com).

Repairs for damages caused by lightning storms, water, power surges, incorrect installation, physical abuse, or user-caused damages are billed on a time-plus-materials basis.

## ***Repair Procedures for International Customers (Outside U.S.A. and Canada)***

Your original point of purchase Reseller may offer the quickest and most economical repair option for your Multi-Tech product. You may also contact any Multi-Tech sales office for information about the nearest distributor or other repair service for your Multi-Tech product. The Multi-Tech sales office directory is available at [www.multitech.com/PARTNERS/Channels/offices/](http://www.multitech.com/PARTNERS/Channels/offices/)

In the event that factory service is required, products may be shipped, freight prepaid to our Mounds View, Minnesota factory. Recommended international shipment methods are via Federal Express, UPS or DHL courier services, or by airmail parcel post; shipments made by any other method will be refused. A Returned Materials Authorization (RMA) is required for products shipped from outside the U.S.A. and Canada. Please contact us for return authorization and shipping instructions on any International shipments to the U.S.A. Please include, inside the shipping box, a description of the problem, a return shipping address (must have street address, not P.O. Box), your telephone number, and if the product is out of warranty, a check drawn on a U.S. bank or your company's purchase order for repair charges. Repaired units shall be shipped freight collect, unless other arrangements are made in advance.

Please direct your questions regarding technical matters, product configuration, verification that the product is defective, etc., to our Technical Support department nearest you or email [support@multitech.com](mailto:support@multitech.com). When calling the U.S., please direct your questions regarding repair expediting, receiving, shipping, billing, etc., to our Repair Accounting department at +(763) 717-5631 in the U.S.A., or email [mtsrepair@multitech.com](mailto:mtsrepair@multitech.com).

Repairs for damages caused by lightning storms, water, power surges, incorrect installation, physical abuse, or user-caused damages are billed on a time-plus-materials basis.

## ***Repair Procedures for International Distributors***

International distributors should contact their MTS International sales representative for information about the repairs for their Multi-Tech product.

Please direct your questions regarding technical matters, product configuration, verification that the product is defective, etc., to our International Technical Support department at +(763)717-5863. When calling the U.S., please direct your questions regarding repair expediting, receiving, shipping, billing, etc., to our Repair Accounting department at +(763) 717-5631 in the U.S.A. or email [mtsrepair@multitech.com](mailto:mtsrepair@multitech.com).

Repairs for damages caused by lightning storms, water, power surges, incorrect installation, physical abuse, or user-caused damages are billed on a time-plus-materials basis.

# Chapter 4 – Waste Electrical and Electronic Equipment

## Waste Electrical and Electronic Equipment (WEEE)

The WEEE directive places an obligation on manufacturers, distributors and retailers 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 being sold into the EU as of August 13, 2005. Manufacturers, distributors and retailers 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 the user's 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 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 the seller from whom you purchased the product.



# Index

<b>&amp;</b>	
&Q – Sync/Async Mode .....	10
&W – Store Current Configuration .....	10
<b>5</b>	
5 V/3.3 V Jumper .....	12
<b>A</b>	
Asynchronous mode .....	10
AT Commands .....	4
<b>D</b>	
Design Considerations .....	17
Developer Kit .....	4
Dimensions .....	7
<b>E</b>	
Electrical Characteristics .....	11
Electromagnetic Interference Considerations .....	17
EMC, Safety, and R&TTE Directive Compliance .....	20
EMI filtering schematic .....	18
<b>F</b>	
FCC Regulations .....	20
<b>H</b>	
Handling Precautions .....	11
<b>I</b>	
International Modem Restrictions .....	20
<b>N</b>	
New Zealand Telecom Warning Notice .....	21
<b>O</b>	
Operational Temperature .....	5
Ordering Information .....	4
<b>P</b>	
Panel Mounting .....	7, 8
PCB Footprint .....	8
Pinouts .....	9
Power consumption .....	5
<b>R</b>	
Receive Clock (RXCLK) .....	10
Repair .....	22
<b>S</b>	
Schematics .....	13, 14, 15, 16
South African Statement, Regulations .....	21
Synchronous mode .....	10
<b>T</b>	
Technical Specifications .....	5
Telecom Approvals .....	19
Transmit Clock (TXCLK) .....	10
<b>V</b>	
Voice	
Telephone Answering Machine .....	5
<b>W</b>	
Warranty .....	22
Waste Electrical and Electronic Equipment (WEEE) .....	24
WEEE Notice .....	24