RADIO MODULE

MRX-005

UHF AM RECEIVER MODULE

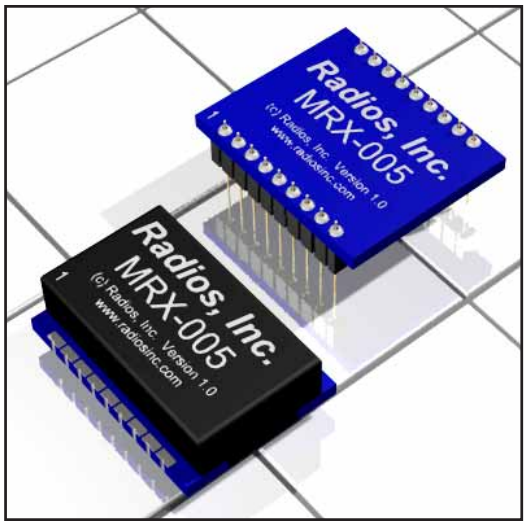
DATA SHEET

Radios, Inc.

October 29, 2007 Preliminary Data Sheet

MRX-005

UHF AM RECEIVER MODULE



The MRX-005 is an on-off keyed (OOK) high performance, ultra compact receiver operating at the 902-928 MHz band. This integrated modularized receiver is primarily intended for use in part 15.231 and 15.249 systems. Because all tuning is automatic and the module functions are completely integrated, this module is both a highly reliable and low cost solution for high volume wireless applications. An external antenna is the only component required, therefore the receiver can be easily integrated into other applications.

The MRX-005 offers a transit standby mode and a shutdown mode. These features make the MRX-005 perfect for power applications in both one-way and bi-directional wireless links. Post-detection data filtering is internal to the receiver, and normal filter bandwidth is fixed at 300kHz. The MRX-005 is a well-designed receiver suitable for a variety of RF applications.

Key Features

- Low cost
- Wide supply voltage range
- Commonly employed RKE frequencies
- Wide operating temperature range
- Easily integrated
- Low power consumption
- Compact surface-mount packages
- 5V operation
- Data rates up to 115kbps
- 1.2MHz receive bandwidth
- Small size
- Power down pin
- No production tuning

Typical Applications

- Remote controls
- Garage openers / Gate controls
- Keyless entry
- Lighting control
- Continuous / Periodic data transfer
- Domestic / Commercial security
- Fire / Security alarms
- General wire elimination

Contact Information	
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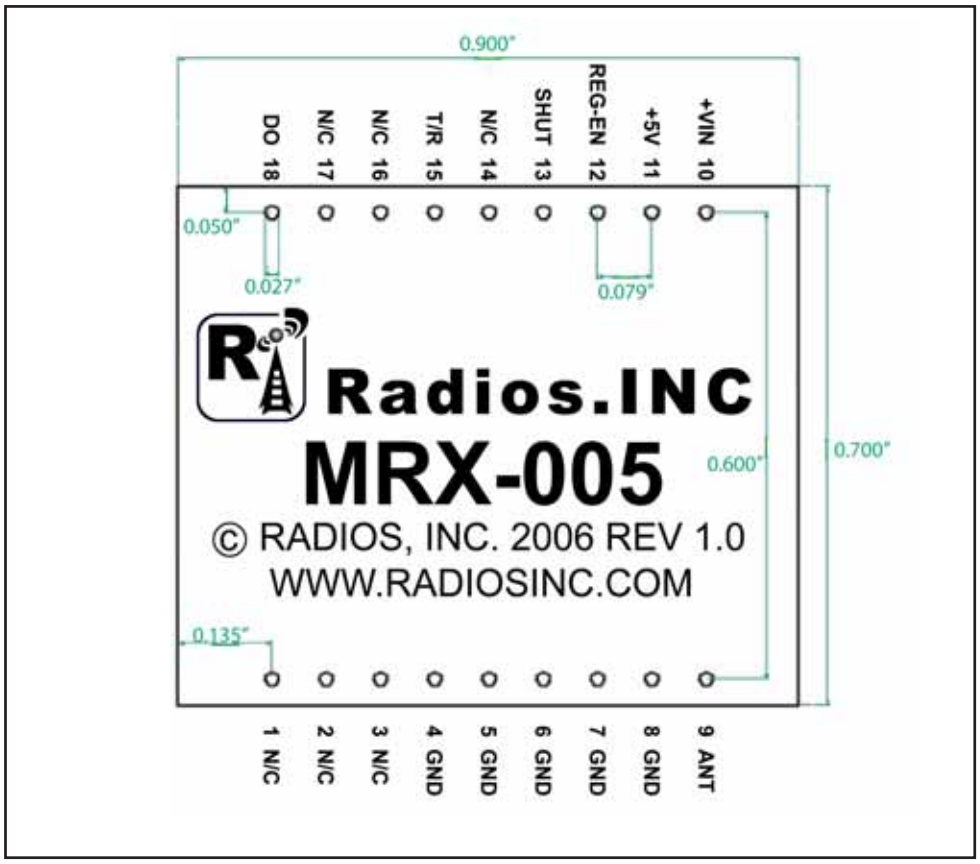
Mechanical and Pin Diagram
DIP Package

* Note: Pinouts of surface mount and through-hole packages are mirrored



DIP Package

Pin Description

Pin Num	Pin Name	Description	Pin Num	Pin Name	Description
Pin 1	N/C	No Connect	Pin 10	+VIN	Positive Supply Pin (5-16V)
Pin 2	N/C	No Connect	Pin 11	+5V	Regulated Output (5V)
Pin 3	N/C	No Connect	Pin 12	REG-EN	Regulator Enable (2-VCC)
Pin 4	Gnd	Ground	Pin 13	SHUT	Shutdown (0-5V)
Pin 5	Gnd	Ground	Pin 14	N/C	No Connect
Pin 6	Gnd	Ground	Pin 15	T/R	T/R Control Switch (0-5V)
Pin 7	Gnd	Ground	Pin 16	N/C	No Connect
Pin 8	Gnd	Ground	Pin 17	N/C	No Connect
Pin 9	Ant	RF Input (50 Ohms)	Pin 18	DO	Data Output (0-5V)

** Verify pin configurations are correct before connecting power or resulting damage may occur.

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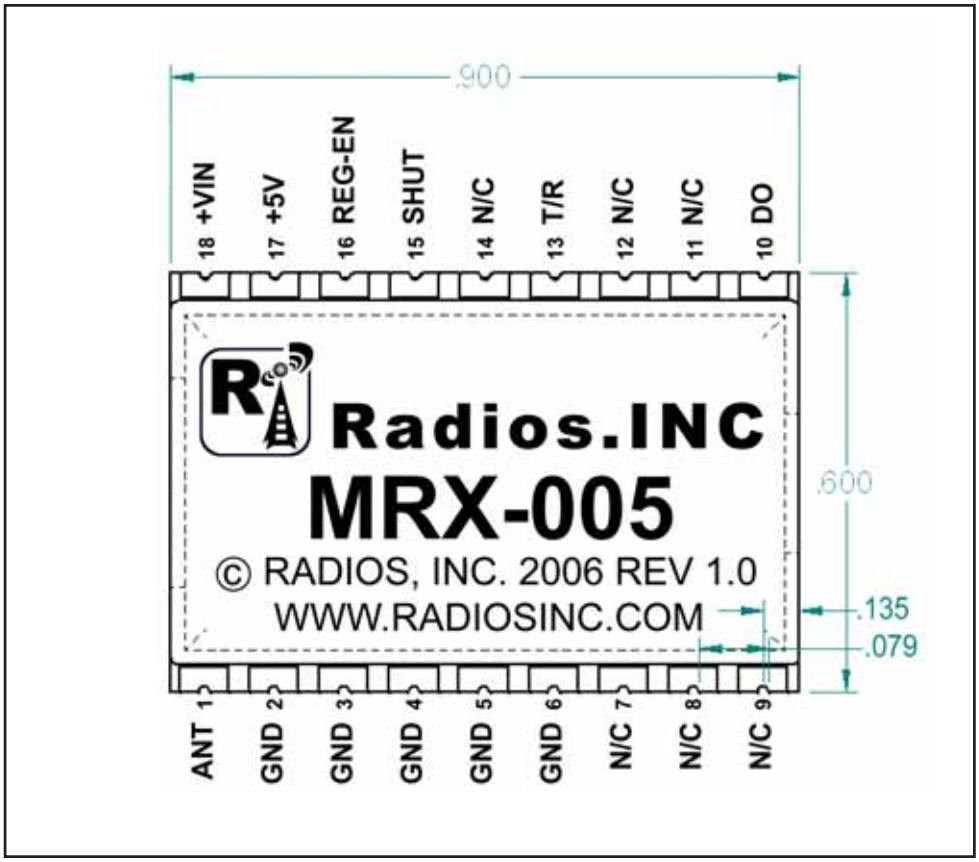
Mechanical and Pin Diagram
Surface Mount Package

* Note: Pinouts of surface mount and through-hole packages are mirrored



Surface Mount Package

Pin Description

Pin Num	Pin Name	Description	Pin Num	Pin Name	Description
Pin 1	Ant	RF Input (50 Ohms)	Pin 10	DO	Data Output (0-5V)
Pin 2	Gnd	Ground	Pin 11	N/C	No Connect
Pin 3	Gnd	Ground	Pin 12	N/C	No Connect
Pin 4	Gnd	Ground	Pin 13	T/R	T/R Control Switch (0-5V)
Pin 5	Gnd	Ground	Pin 14	N/C	No Connect
Pin 6	Gnd	Ground	Pin 15	SHUT	Shutdown (0-5V)
Pin 7	N/C	No Connect	Pin 16	REG-EN	Regulator Enable (2-VCC)
Pin 8	N/C	No Connect	Pin 17	+5V	Regulated Output (5V)
Pin 9	N/C	No Connect	Pin 18	+VIN	Positive Supply Pin (5-16V)

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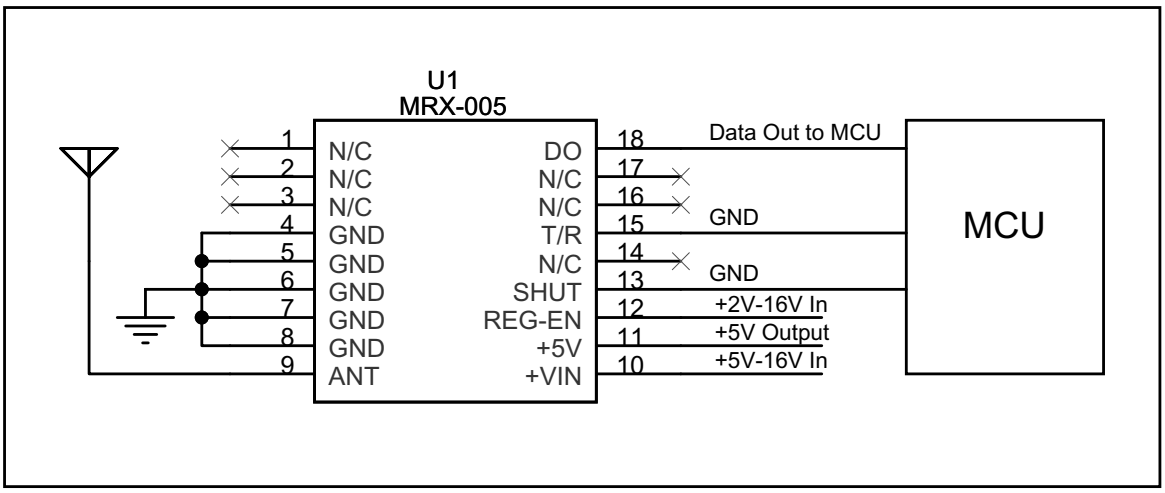
Pin Detail

Pin Number		Pin	Description
DIP	Surface Mount	Name	
9	1	Ant	This is the receive RF input, internally ac-coupled. Connect this pin to the receive antenna.
4,5,6,7,8	2,3,4,5,6	Gnd	Ground
1,2,3,14,16,17	7,8,9,11,12,14	N/C	No Connect
18	10	DO	Data output pin.
15	13	T/R	Transmit/Receive control switch. Pull low to enable receiver function. Pull high to put receiver in standby mode and disable receive function. This pin is internally pulled low.
13	15	SHUT	Shutdown-mode logic-level control input. Pull low to enable the receiver. Internally pulled-up to VCC.
12	16	REG-EN	In a regulated module, this pin powers on the module with a 2-16V supply input. Pulling this pin low disables module. In a non-regulated module, this is a no connect.
11	17	+5V	In a regulated module, this is a 5V output from the onboard regulator when REG-EN is high (2-16V). In a non-regulated module, this is the 4.75V to 5.5V power supply input.
10	18	+VIN	In a regulated module, this is the power supply pin of the module. Input 5-16V to power a regulated module. In a non-regulated module, this is a no connect.

Typical Application Schematic



MRX-005, 915MHz

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UHF AM RECEIVER MODULE

Electrical Limits

Sym	Parameters	Min	Typ	Max	Unit	Notes
	Absolute Maximum Ratings					
VCC	Supply Voltage - Regulated	5		16	V	
	Supply Voltage - Not Regulated	4.75		5.5	V	
	Storage Temperature Range	0		70	°C	
V_{EN}	Enable Input Voltage	0		16	V	
	Operating Ratings					
V_{EN}	Enable Input Voltage	0		VCC	V	
TA	Ambient operating temperature	0		70	°C	

Electrical Characteristics

This device is ESD sensitive. Do not operate or store near strong electrostatic fields. Use appropriate ESD precautions. All voltages are with respect to Ground.

Parameters	Test Conditions	Min	Typ	Max	Unit
Power Supply					
Operating Current			8		mA
Quiescent Current	REG-EN </= 0.4V (shutdown)		0.01		µA
Operating Voltage	Regulated	5		16	V
	Not Regulated	4.75		5.5	V
RF/IF Section					
Receiver Sensitivity	Note 1, 3	-81	-84		dBm
IF Bandwidth	Note 3		1.20		MHz
Receive Data Rate		0.1		115	kbps
RF Input Range		800		1000	MHz
Maximum Receiver Input	Rs = 50Ω		-10		dBm
Spurious Reverse Isolation	ANT pin, Rs = 50Ω Note 2		30		µVrms
AGC Attack / Decay ratio	T(Attack) / T(Decay)		0.1		
Oscillator Turn-on Time			TBD		s
Digital Section					
Output Current	DO pin, Push-Pull		90		µA
Output High Voltage	DO pin, Iout = 1µA	0.9VCC			V
Output Low Voltage	DO pin, Iout = 1µA			0.1VCC	V
Output Tr, Tf	DO pin, Cload=15pF			TBD	µsec
Regulator Enable Input					
Input Low Voltage	Regulator OFF			0.6	V
Input High Voltage	Regulator ON	2.0			V
Enable Input Current	REG-EN = 0.6V; Regulator OFF		0.01		µA

Electrical Characteristics - CONT.

Note 1: Sensitivity is defined as the average signal level measured at the input necessary to achieve 10e-2 Bit Error Rate (BER). The input signal is defined as a return-to-zero (RZ) waveform with 50% average duty cycle at a data rate of 2400bps. The RF input is assumed to be matched into 50 ohms.

Note 2: Spurious reverse isolation represents the spurious components which appear on the RF input (ANT) pin measured into 50 ohms with an input RF matching network.

Note 3: Sensitivity, a commonly specified Receiver parameter, provides an indication of the Receiver's input referred noise, generally input thermal noise. However, it is possible for a more sensitive receiver to exhibit range performance no better than that of a less sensitive receiver, if the "ether" noise is appreciably higher than the thermal noise. "Ether" noise refers to other interfering "noise" sources, such as FM radio stations, pagers, etc.

A better indicator of receiver range performance is usually given by its Selectivity, often stated as Intermediate Frequency (IF) or Radio Frequency (RF) bandwidth, depending on receiver topology. Selectivity is a measure of he rejection by the receiver of "ether" noise. More selective receivers will almost invariably provide better range. Only when the receiver selectivity is so high that most of the noise on the receiver input is actually thermal will the receiver demonstrate sensitivity-limited performance.

Note 4: Exceeding the absolute maximum ratings may damage the device.

Note 5: The device is not guaranteed to function outside its operating ratings.

Technical Support:

Radios, Inc. is committed to providing its customers with excellent technical support and the resources necessary to assist them with their product development. All technical support is provided free of charge. Customers have several options to obtain assistance. First, any questions or concerns can be e-mailed to Radios, Inc. at information@radiosinc.com. We monitor our e-mail daily, and will respond to all questions promptly. Additionally, to speak directly to a technical support representative, customers can call Radios, Inc. at 920-564-6622.

Compliance:

Embedded wireless modules are intended for use as component devices which require peripheral elements to operate. Radios, Inc.'s modules are intended to be used in products requiring compliance. They are, however, not pre-approved by the FCC or any other agency worldwide unless so stated. The user or customer understands that regulatory compliance may be required prior to the sale or operation of the module or development system, and agrees to abide by all laws governing the module's or development system's use in the country of operation.

The approval process of embedded wireless modules in the United States is relatively uncomplicated. The Federal Communications Commission (FCC) is the governing body in the US that specifies its requirements in the Code of Federal Regulations (CFR), Title 47. Title 47 consists of several volumes and it is necessary to first identify the correct section that applies to your application. These rules require that a device which intentionally creates RF emissions be FCC compliant; i.e., pre-tested for compliance and assigned an identification number. Radios, Inc. offers pre-screening at one of our affiliate test sites. Final certification is then accomplished by an independent test laboratory. After passing compliance testing, you will be issued a unique ID number which must be placed on each product manufactured.

Any questions dealing with interpretations of the rules relating to testing or compliance should be addressed to:

FCC
Equipment Authorization Division
Customer Service Branch, MN 1300F2
7435 Oakland Mills Road
Columbia, MD 21046

Returns:

Products may be returned directly to Radios, Inc. for evaluation. Returns, without exception, must have a valid RMA number attached. RMA numbers can be obtained by calling a customer service representative at Radios, Inc. If a product is found to be defective and is returned within 90 days of purchase, Radios, Inc. may repair or replace, at its option, said defective product. The warranty does not apply to any products which have been disassembled, modified or subjected to conditions exceeding the application specifications. Under no circumstances will Radios, Inc. be responsible for losses, financial or other, arising from the use or failure of a device in an application or for losses arising from failure to meet delivery requirements, other than the repair, replacement, or refund limited to the original product purchase price. No other warranties, express, implied, or statutory, including warranty of fitness for a particular purpose, apply.

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Editorial Information:

	(Date)
Last Updated	October 29, 2007 PRELIMINARY

Product Ordering Information:

MRX-005 - 915 D 600 SQ R A - B

Packaging:	B - Bulk TB - Tube TR - Tape and Reel
Antenna:	A - Antenna - No Antenna
Voltage Regulation:	R - Regulated - Not Regulated
Squelched:	SQ - Squelched - Not Squelched
Baud Rate:	600 = 600 bps = 1200 bps 2400 = 2400 bps 4800 = 4800 bps 9600 = 9600 bps 14400 = 14,400 bps 28800 = 28,800 bps 57600 = 57,600 bps
Package:	D - Through-hole S - Surface Mount SC - Surface Mount with Cap
Frequency: (based on module's frequency range)	915 = 915 MHz XXX = Custom Frequency