# RADIO MODULE MRX-007

**UHF AM RECEIVER MODULE** 

PRELIMINARY

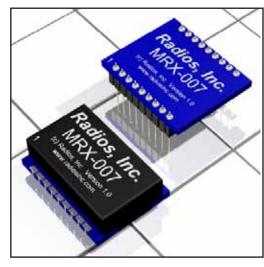
## DATA SHEET

Radios, Inc.

October 30, 2007 Preliminary Data Sheet

#### **UHFAM RECEIVER MODULE**

The MRX-007 is an on-off keyed (OOK) high performance, ultra compact, long range receiver for remote wireless applications. The receiver operates at 315, 390, 418, and 433 MHz, and is primarily intended for use in part 15.231 systems. Because all tuning is automatic and the receiver 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-007 is an enhanced version of the MRX-002 and the MRX-011. The receiver is a conventional superhetrodyne receiver with an internal local oscillator fixed at a single frequency. The MRX-007 has a Shutdown mode and reduced current consumption, both of which make the receiver ideal for low and ultra-low power applications such as RKE and RFID. Additionally, post-detection data filtering is internal to the receiver. The MRX-007 is a well-designed receiver suitable for a variety of RF applications, particularly OEM applications.

## **Key Features**

- Low cost
- Commonly employed NK frequencies
- Wide operating temperature range
- Supports On-Off Keying
- Low power consumption
- Compact surface-mount packages
- Data rates up to 2.1 kbps
- Small size
- Power down pin
- No production tuning
- Fast enable time

## **Typical Applications**

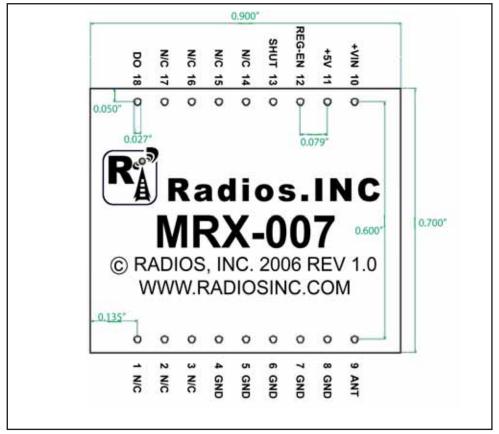
- Remote controls
- Garage openers / Gate controls
- Keyless entry
- Lighting control
- Periodic data transfer
- Remote access
- Guard patrol / Lone worker protection
- Domestic / Commercial security
- Fire / Security alarms
- General wire elimination

Contact Information				
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## **UHF AM RECEIVER MODULE**

# Mechanical and Pin Diagram DIP Package

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



## **DIP Package**

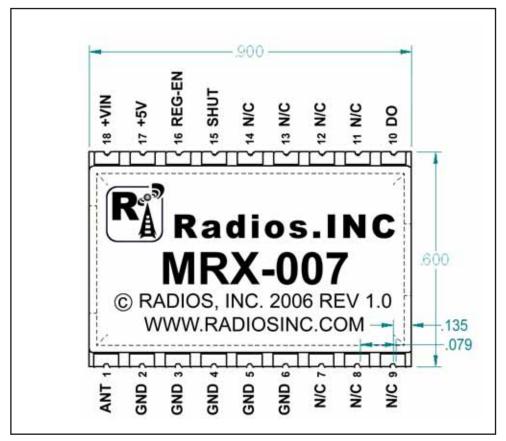
Pin Description							
<b>Pin Num</b>	Pin Name	Description	Pin Num	Pin Name	Description		
Pin 1	N/C	No Connect	Pin 10	+VIN	Positive Supply Pin (5-16V)		
Pin 2	N/C	No Connect	Pin 11	+5V	Regulated Output (5V)		
Pin 3	N/C	No Connect	Pin 12	REG-EN	Regulator Enable (2-VCC)		
Pin 4	Gnd	Ground	Pin 13	SHUT	Shutdown (0-5V)		
Pin 5	Gnd	Ground	Pin 14	NC	No Connect		
Pin 6	Gnd	Ground	Pin 15	N/C	No Connect		
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)		

<sup>\*\*</sup> Verify pin configurations are correct before connecting power or resulting damage may occur.

#### **UHF AM RECEIVER MODULE**

## Mechanical and Pin Diagram Surface Mount Package

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



## **Surface Mount Package**

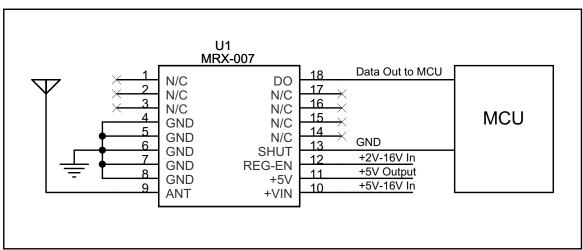
#### **Pin Description** Pin Num Pin Name Pin Num Pin Name **Description** Description RF Input (50 Ohms) DO Pin 1 Ant Pin 10 Data Output (0-5V) N/C Pin 2 Gnd Ground Pin 11 No Connect Pin 3 Gnd Ground Pin 12 NC No Connect NC Pin 4 Gnd Ground Pin 13 No Connect Pin 5 NC No Connect Gnd Ground Pin 14 Pin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

<sup>\*\*</sup> Verify pin configurations are correct before connecting power or resulting damage may occur.

## **UHF AM RECEIVER MODULE**

	Pin Detail						
Pin N	Pin Number						
DIP	Surface Mount	Name	Description				
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				
1,2,3,14,15,	7,8,9,11,12,13,14	N/C	No Connect				
16,17							
18	10	DO	Data output pin.				
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-007, 433.92MHz

## **UHF AM RECEIVER MODULE**

#### **Electrical Limits**

Sym	Parameters	Min	Тур	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 <sub>EN</sub>	Enable Input Voltage	0		16	V	
	Operating Ratings					
V <sub>EN</sub>	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	Тур	Max	Unit
Power Supply					
Operating Current	433.92 MHz		2		mA
Quiescent Current	REG-EN = 0.4V (shutdown)</td <td></td> <td>0.01</td> <td></td> <td>μA</td>		0.01		μA
Operating Voltage	Regulated	5		16	V
	Not Regulated	4.75		5.5	V
RF/IF Section					
Receiver Sensitivity	Note 1, 3		-96	-90	dBm
IF Bandwidth	Note 3	400	0.43		kHz
Receive Data Rate	1	0.1		4.8	kbps
RF Input Range		300		440	MHz
Maximum Receiver Input	Rs = $50\Omega$		-20		dBm
Spurious Reverse Isolation	ANT pin, Rs = 50Ω Note 2		1		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		10		μΑ
Output High Voltage	DO pin, lout = 1µA	0.9VCC			V
Output Low Voltage	DO pin, lout = 1µA			0.1VCC	V
Output Tr, Tf	DO pin, Cload=15pF			10	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

#### **UHF AM RECEIVER MODULE**

#### 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.

#### **UHF AM RECEIVER MODULE**

## **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 <a href="mailto:information@radiosinc.com">information@radiosinc.com</a>. 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

#### **UHF AM RECEIVER MODULE**

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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 30, 2007 PRELIMINARY

## **Product Ordering Information:**

