

RADIO MODULE
MRX-220S-D

UHF AM RECEIVER MODULE

PRELIMINARY

DATA SHEET

Radios, Inc.

June 09, 2010 Preliminary Data Sheet

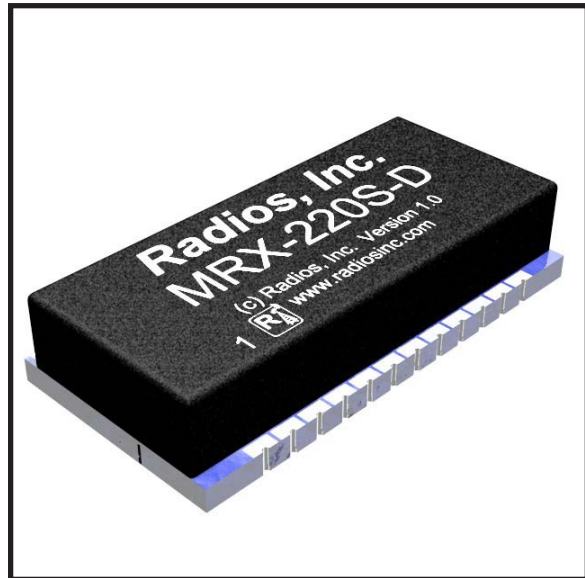
MRX-220S-D

UHF AM RECEIVER MODULE

The MRX-220S-D is a general purpose receiver module that operates at 433.92MHz with typical sensitivity of -110dBm.

The MRX-220S-D functions as a super-heterodyne receiver for OOK and ASK modulation up to 10kbps. The down-conversion mixer also provides image rejection. All post-detection data filtering is provided on the MRX-220S-D. Any one-of-four filter bandwidths may be selected externally by the user in binary steps, from 1.25kHz to 10kHz. The user need

only configure the device with a set of easily determined values, based upon data rate, code modulation format, and desired duty-cycle operation.



Key Features

- -110 dBm sensitivity, 1kbps and BER 10E-02
- Image Rejection Mixer
- Frequency from 380MHz to 450MHz
- Low power, 6.0mA @ 433.92MHz, continuous on data rates to 10kbps (Manchester Encoded)
- Analog RSSI Output
- No IF filter required
- Excellent selectivity and noise rejection
- Low external part count

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



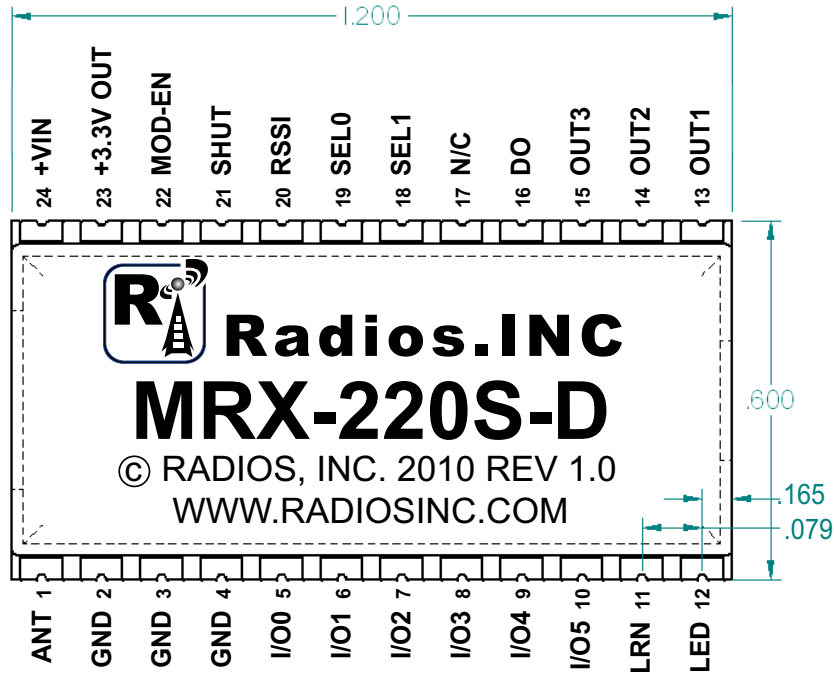
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Mechanical and Pin Diagram Surface Mount Package



Surface Mount Package

Pin Description

Pin Num	Pin Name	Description	Pin Num	Pin Name	Description
Pin 1	Ant	RF Input (50 Ohms)	Pin 13	OUT1	Output 1
Pin 2	Gnd	Ground	Pin 14	OUT2	Output 2
Pin 3	Gnd	Ground	Pin 15	OUT3	Output 3
Pin 4	Gnd	Ground	Pin 16	DO	Data Output (0-3.3V)
Pin 5	I/O0	Bidirectional I/O Pin	Pin 17	N/C	No Connect
Pin 6	I/O1	Bidirectional I/O Pin	Pin 18	SEL1	Bandwidth Dependant
Pin 7	I/O2	Bidirectional I/O Pin	Pin 19	SEL0	Bandwidth Dependant
Pin 8	I/O3	Bidirectional I/O Pin	Pin 20	RSSI	Receive Signal Strength Indicator
Pin 9	I/O4	Bidirectional I/O Pin	Pin 21	SHUT	Shutdown Input Control
Pin 10	I/O5	Bidirectional I/O Pin	Pin 22	REG-EN	Module Enable (2-VCC)
Pin 11	LRN	Normally HI/GND to Teach	Pin 23	+3.3V OUT	Regulated Output (3.3V)
Pin 12	LED	Toggles when Taught/LED	Pin 24	+VIN	Positive Supply Pin (3.3-16V)

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

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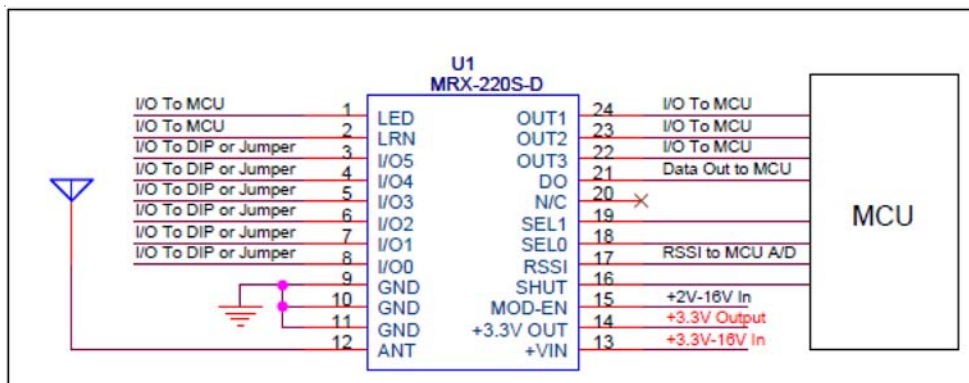
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Pin Detail		
Pin Number	Pin Name	Description
1	ANT	This is the receive RF input, internally ac-coupled. Connect this pin to the receive antenna.
2,3,4	GND	Ground
5,6,7,8,9,10	I/O 0-5	Decoder input address pins.
11,12,13,14,15	OUT 1-3	Decoder output data pins. LRN and LED can be conf as I/O
16	DO	Data output pin.
17	N/C	No Connect
18	SEL1	Programs desired Demodulator Filter Bandwidth. This pin is internally pulled-up to VCC. See Table 1.
19	SEL0	Programs desired Demodulator Filter Bandwidth. This pin is internally pulled-up to VCC. See Table 1.
20	RSSI	Receive Signal Strength Indicator Output
21	SHUT	Shutdown-mode logic-level control input. Pull low to enable the unit. Int pulled-low to GND.
22	MOD-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.
23	+3.3V OUT	In a regulated module, this is a 3.3V output from the onboard regulator when REG-EN is high (2-16V). In a non-regulated module, this is the 3.0V to 3.6V power supply input.
24	+VIN	In a regulated module, this is the power supply pin of the module. Input 3.3-16V to power a regulated module. In a non-regulated module, this is a no connect.

Table 1		
Programmable Bandwidth Configurations		
SEL0	SEL1	Bandwidth (bps)
0	0	1625
1	0	3250
0	1	6500
1	1	13000

**Note: 1=VCC, 0=GND*

Typical Application Schematic



MRX-220S-D, 433.92MHz Fixed, KEELOQ, 3250 bps Bandwidth

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Electrical Limits

Sym	Parameters	Min	Typ	Max	Unit	Notes
Absolute Maximum Ratings						
VCC	Supply Voltage - Regulated	3.3		16	V	
	Supply Voltage - Not Regulated	3.0		3.6	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	See Note 3

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 Supply Current	Continuous operation, 433.92MHz		7		mA
Shut Down Current			1		µA
Operating Voltage	Regulated	3.3		16	V
	Not Regulated	3.0		3.6	V
RF/IF Section					
Image Rejection			20		dB
1st IF Center Frequency	433.92MHz		1.20		MHz
Receiver Sensitivity@1kbps	433.92MHz, BER=10e-2		-110		dBm
IF Bandwidth	433.92MHz		330		kHz
Antenna Input Impedance	433.92MHz		19 - j174		Ohms
Receive Modulation Duty Cycle	Note 5	20		80	%
AGC Attack / Decay Ratio	T(Attack) / T(Decay)		0.1		
AGC Pin Leakage Current	T _A =25°C		+/- 2		nA
	T _A =+105°C		+/- 800		nA
AGC Dynamic Range	RF _{IN} @ -40dBm		1.15		V
	RF _{IN} @ -100dBm		1.70		V
Demodulator					
CTH Source Impedance	F _{REFOSC} = 13.52127MHz		120		kOhms
CTH Leakage Current	T _A =25°C		+/- 2		nA
	T _A =+105°C		+/- 800		nA
Demodulator Filter Bandwidth	434MHz, programmable	1625		13000	Hz
Digital/Control Functions					
Data Pin Output Current	source @ 0.8VDD		260		µA
	sink @ 0.2VDD		600		µA
Output Rise and Fall Times	CI = 15pF, pin Data, 10-90%		2		µsec

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Electrical Characteristics - CONT.

RSSI					
RSSI DC Output Voltage Range			0.4-2.0		V
RSSI Response Slope	-110dBm to -40dBm		25		mV/dB
RSSI Output Current			400		μA
RSSI Output Impedance			200		Ohms
RSSI Response Time	50% data duty cycle, input power to antenna=-20dBm		0.3		sec
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

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 1kbps.

Note 2: When data burst does not contain preamble, duty cycle is defined as total duty cycle, including any "quiet" time between data bursts. When data bursts contain preamble sufficient to charge the slice level on capacitor C_{TH} , then duty cycle is the effective duty cycle of the burst alone. [For example, 100msec burst with 50% duty cycle, and 100msec "quiet" time between bursts. If burst includes preamble, duty cycle is $T_{ON}/(T_{ON}+T_{OFF})=50\%$; without preamble, duty cycle is $T_{ON}/(T_{ON}+T_{OFF}+T_{QUIET})=50msec/(200msec)=25\%$. T_{ON} is the (Average number of 1's/burst) * bit time, and $T_{OFF} = T_{BURST} - T_{ON}$.]

Note 3: The temperature range is crystal dependent. Therefore the min/max temperature ranges may vary based on crystal used.

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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

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Product Ordering Information:

