

*RADIO MODULE*  
**MTX-112S-E**

**UHF ASK/FSK TRANSMITTER MODULE**

PRELIMINARY

**DATA SHEET**

***Radios, Inc.***

June 14, 2010 Preliminary Data Sheet

# MTX-112S-E

## UHF ASK/FSK TRANSMITTER MODULE

The MTX-112S-E is a high performance, easy to use ASK /FSK Transmitter module for remote wireless applications in the 300 to 450MHz frequency band. This transmitter module is a true “signal-in, packet-out” monolithic device.

MTX-112S-E is high performance in three areas: power delivery, operating voltage, and operating temperature. In terms of power, the MTX-112S-E is capable of delivering +10 dBm into a 50Ohm load. This power level enables the transmitter to operate near the maximum limit of transmission regulations. In terms of operating voltage, the MTX-112S-E operates from 3.3V to 16V.

The MTX-112S-E is easy to use. The MTX-112S-E operates with ASK/OOK (Amplitude Shift Keying/On-Off Keyed) UHF receiver types from wide-band super-regenerative radios to narrow-band, high performance super-heterodyne receivers. The MTX-112S-E’s maximum ASK data rate is 50kbps (Manchester Encoding). It operates with FSK receivers as well. The MTX-112S-E’s maximum FSK data rate is 10kbps.



### Key Features

- Complete UHF transmitter module
- Frequency range 300MHz to 450MHz
- Data rates up to 50kbps ASK, 10kbps FSK
- Output Power to 10dBm
- Low standby current <math><1\mu\text{A}</math>
- With microcontroller
- Encoder and encryption on board
- Momentary toggle or latching response
- Binary counter
- Sleep / Wakeup function
- Custom Firmware available

### Typical Applications

- Remote Keyless Entry Systems (RKE)
- Remote Control (STB, HVAC and Appliances)
- Garage Door Opener Transmitters
- Remote Sensor Data Links
- Infrared Transmitter Replacement



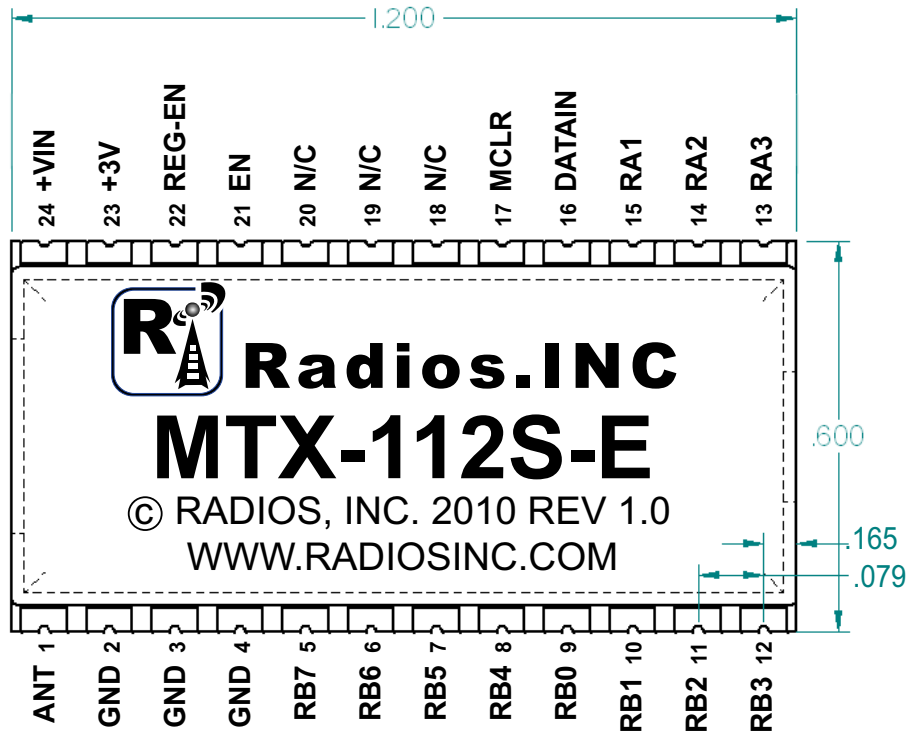
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www.radiosinc.com

Radios, Inc. ♦ 1408 Center Avenue ♦ Oostburg, WI 53070  
(920) 564-6622 ♦ Fax: (920) 564-6630 ♦ Email: sales@radiosinc.com

# MTX-112S-E

## UHF ASK/FSK TRANSMITTER MODULE

### 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 Output (50 Ohms)	Pin 13	RA3	Bidirectional I/O Pin
Pin 2	Gnd	Ground	Pin 14	RA2	Bidirectional I/O Pin
Pin 3	Gnd	Ground	Pin 15	RA1	Bidirectional I/O Pin
Pin 4	Gnd	Ground	Pin 16	DATAIN	Data Input (0-3.3V)
Pin 5	RB7	Bidirectional I/O Pin / ICSPDAT	Pin 17	MCLR	Master Clear
Pin 6	RB6	Bidirectional I/O Pin / ICSPCLK	Pin 18	N/C	No Connect
Pin 7	RB5	Bidirectional I/O Pin	Pin 19	N/C	No Connect
Pin 8	RB4	Bidirectional I/O Pin	Pin 20	N/C	No Connect
Pin 9	RB0	Bidirectional I/O Pin	Pin 21	EN	Enable Pin (0-3.3V)
Pin 10	RB1	Bidirectional I/O Pin	Pin 22	REG-EN	Regulator Enable (2-VCC)
Pin 11	RB2	Bidirectional I/O Pin	Pin 23	+3.3V	Regulated Output (3.3V)
Pin 12	RB3	Bidirectional I/O Pin	Pin 24	+VIN	Positive Supply Pin (3.3-16V)

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

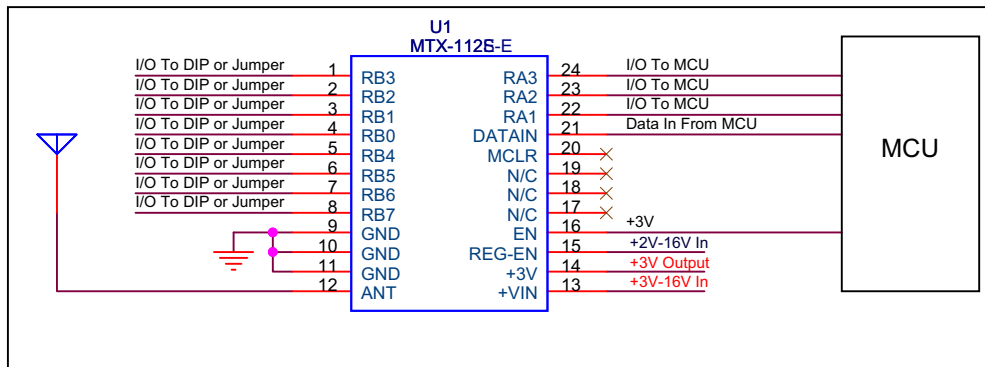
# MTX-112S-E

## UHF ASK/FSK TRANSMITTER MODULE

### Pin Detail

Pin Number	Pin Name	Description
1	Ant	This is the transmit RF output, internally ac-coupled. Connect this pin to the transmit antenna.
2,3,4	Gnd	Ground
5,6,7,8,9,10,11,12	RB0-7	Encoder input address pins.
13,14,15	RA1-3	Encoder input data pins. Active low. Pull low to enable transmission. Must be externally pulled to VCC.
16	DATAIN	Data input pin.
17	MCLR	Master Clear. For Programming Use Only.
21	EN	Input for transmitter enable pin is pulled to VCC for transmit operation. Internally pulled-up to VCC.
22	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.
23	+3V	In a regulated module, this is a 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 3-16V to power a regulated module. In a non-regulated module, this is a no connect.

### Typical Application Schematic



MTX-112S-E, 433.92 MHz

# MTX-112S-E

## UHF ASK/FSK TRANSMITTER MODULE

### Electrical Limits

Sym	Parameters	Min	Typ	Max	Unit	Notes
<b>Absolute Maximum Ratings</b>						
VCC	Supply Voltage - Regulated	3.3		16	V	
	Supply Voltage - Not Regulated	1.8		3.6	V	
	Storage Temperature Range	0		70	°C	
	Lead Temperature		300		°C	
V <sub>EN</sub>	Enable Input Voltage	0		16	V	
<b>Operating Ratings</b>						
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	Typ	Max	Unit
<b>Power Supply</b>					
Standby supply current	EN=VSS		0.55	3.5	µA
MARK supply current	@315MHz, P <sub>out</sub> =+10dBm		12.7		mA
	@433.92MHz, P <sub>out</sub> =+10dBm		12.9		mA
SPACE supply current	@315MHz		2.3		mA
	@433.92MHz		2.3		mA
Operating Voltage	Regulated	3.3		16	V
	Not Regulated	1.8		3.6	V
<b>RF Output Section and Modulation Limits</b>					
Output power level	@315MHz		10		dBm
	@433MHz		10		dBm
Harmonics output for 315MHz	@650MHz, 2nd harm.		-39		dBc
	@945MHz, 3rd harm.		-53		dBc
Harmonics output for 433.92MHz	@867.84MHz, 2nd harm.		-55		dBc
	@1301.76MHz, 3rd harm.		-55		dBc
Extinction ratio for ASK			70		dBc
<b>FSK Modulation</b>					
Frequency Deviation			22		kHz
Data Rate				10	kbps
<b>ASK Modulation</b>					
Data Rate				50	kbps
Occupied Bandwidth	@315MHz, Note 4		<700		kHz
	@433.92Mhz, Note 4		<1000		kHz

# MTX-112S-E

## UHF ASK/FSK TRANSMITTER MODULE

### Electrical Characteristics - CONT.

VCO Section					
315MHz Single Side Band Phase Noise	@100kHz from Carrier		-76		dBc/Hz
	@1000kHz from Carrier		-79		dBc/Hz
433.92MHz Single Side Band Phase Noise	@100kHz from Carrier		-72		dBc/Hz
	@1000kHz from Carrier		-81		dBc/Hz
Digital/Control Section					
Output Blanking	STDBY transition from Low to High	0.8VDD			µs
Digital Input (EN, ASK and FSK)	High				V
	Low			0.2VDD	V
Digital Input Leakage Current (EN, DATAIN Pins)	High		0.05		µA
	Low		0.05		µA
Under Voltage Lock Out (UVLO)			1.6		V
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.** Exceeding the absolute maximum rating may damage the device.

**Note 2.** The device is not guaranteed to function outside its operating rating.

**Note 3.** Devices are ESD sensitive. Handling precautions recommended. Human body model, 1.5k in series with 100pF.

**Note 4.** RBW = 100kHz, OBW measured at -20dBc

## **MTX-112S-E**

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### **UHF ASK/FSK TRANSMITTER 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 [information@radiosinc.com](mailto: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

# **MTX-112S-E**

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## **UHF ASK/FSK TRANSMITTER MODULE**

### **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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# MTX-112S-E

## UHF ASK/FSK TRANSMITTER MODULE

### Editorial Information:

Last Updated (Date)  
June 14, 2010 PRELIMINARY

### Product Ordering Information:

MTX-112S-E - 433 4800 R -B

Packaging:

B - Bulk  
TB - Tube  
TR - Tape and Reel

Voltage Regulation:

R - Regulated  
- Not Regulated

Baud Rate:

600 = 600 bps  
= 1200 bps  
2400 = 2400 bps  
4800 = 4800 bps  
9600 = 9600 bps  
14400 = 14,400 bps  
28800 = 28,800 bps

Frequency:

(based on module's  
frequency range)

310 = 310 MHz  
315 = 315 MHz  
390 = 390 MHz  
418 = 418 MHz  
433 = 433.92 MHz  
XXX = Custom Frequency