

RADIO MODULE
MRX-701/02/11/12

FSK/FM/ASK RECEIVER MODULE

Supports the follow parts:

MRX-701
MRX-702
MRX-711
MRX-712

PRELIMINARY

DATA SHEET

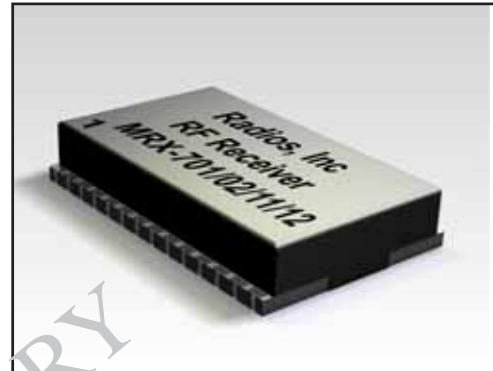
Radios, Inc.

April 25, 2006 Preliminary Data Sheet

MRX-701/02/11/12

FSK/FM/ASK RECEIVER MODULE

The MRX-701/02/11/12 FSK/FM/ASK superheterodyne receiver is designed for applications in the European 433 (MRX-701/02) and 868 (MRX-711/12) MHz industrial-scientific-medical (ISM) band, according to the EN 300 220 telecommunications standard. It can also be used for any other system with carrier frequencies within the ranges specified in the Electrical Characteristics on Page 4.



Key Features

- Single- and Double-conversion superhet architecture
- FSK for digital data and FM reception for analog signal transmission
- Low current consumption in active mode and very low standby current
- RSSI allows signal strength indication and ASK detection

Typical Applications

- Low-power telemetry
- Alarm and security systems
- Garage door openers
- Home automation
- Pagers

PRODUCT ORDER INFORMATION

Part Number	Description
MTX-701(D)(S)	TH71101 FSK/FM/ASK Module Receiver
MTX-702(D)(S)	TH71102 FSK/FM/ASK Module Receiver
MTX-711(D)(S)	TH71111 FSK/FM/ASK Module Receiver
MTX-712(D)(S)	TH71112 FSK/FM/ASK Module Receiver

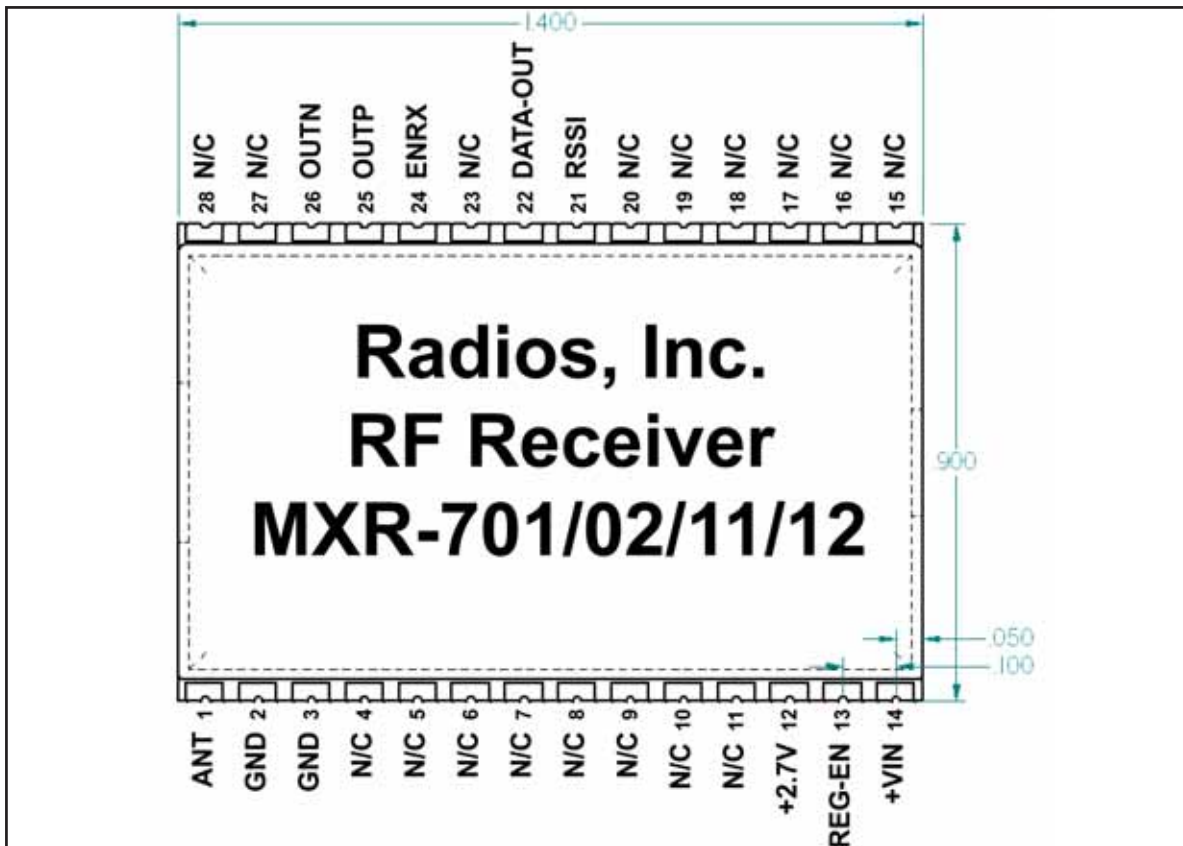
Contact Information

Radios, Inc. P.O. Box 1304 North Wales, PA 19454	Phone: 215-362-1899 Fax: 215-362-2214 Email: sales@radiosinc.com
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Mechanical and Pin Diagram



Pin Description

Pin Num	Pin Name	Description	Pin Num	Pin Name	Description
Pin 1	Ant	RF Input	Pin 15	N/C	No Connect
Pin 2	Gnd	Ground	Pin 16	N/C	No Connect
Pin 3	Gnd	Ground	Pin 17	N/C	No Connect
Pin 4	N/C	No Connect	Pin 18	N/C	No Connect
Pin 5	N/C	No Connect	Pin 19	N/C	No Connect
Pin 6	N/C	No Connect	Pin 20	N/C	No Connect
Pin 7	N/C	No Connect	Pin 21	RSSI	RSSI Output
Pin 8	N/C	No Connect	Pin 22	DATA-OUT	OA Output
Pin 9	N/C	No Connect	Pin 23	N/C	No Connect
Pin 10	N/C	No Connect	Pin 24	ENRX	Mode Control Input
Pin 11	N/C	No Connect	Pin 25	OUTP	FM/FSK Positive Output
Pin 12	+2.7V	Regulated Output	Pin 26	OUTN	FM/FSK Negative Output
Pin 13	REG-EN	Regulator Enable	Pin 27	N/C	No Connect
Pin 14	+VIN	Positive Supply Pin	Pin 28	N/C	No Connect

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Electrical Limits

Sym	Parameters	Min	Typ	Max	Unit	Notes
Absolute Maximum Ratings						
VDD	Supply Voltage	-20		20	V	
	Storage Temperature Range	-40		125	°C	
	Lead Temperature		260		°C	
V _{EN}	Enable Input Voltage	-20		+20	V	
Operating Ratings						
	Supply Voltage	2.5		16	V	
V _{EN}	Enable Input Voltage	0		TBD	V	
TA	Ambient operating temperature	-40		85	°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
Operating Conditions					
Input Low Voltage	ENRX, DATA pins			0.3VCC	V
Input High Voltage	ENRX, DATA pins	0.7VCC			V
Input Frequency Range	MRX-701	289.3		460.7	MHz
	MRX-702	251.8		516.95	MHz
	MRX-711	789.3		940.7	MHz
	MRX-712	739.3		998.8	MHz
IF Range	MRX-701/11	0.4		22	MHz
First IF Range	MRX-702/12	10		80	MHz
Second IF Range	MRX-702/12	0.4		22	MHz
XOSC Frequency	MRX-701/02, set by the crystal	18.75		28.125	MHz
	MRX-711/12, set by the crystal	25		29.063	MHz
VCO Frequency	MRX-701/02	300		450	MHz
	MRX-711/12	800		930	MHz
Frequency Deviation	at FSK or FM	±2.5		±80	kHz
FSK Data Rate	NRZ			40	kbit/s
ASK Data Rate	NRZ			80	kbit/s
FM Bandwidth				15	kHz
Operating Currents					
Standby Current	ENRX=0		50	100	nA
Supply Current at Low Gain	MRX-701/02, ENRX=1	4.5	6.5	10.0	mA
	MRX-711/12, ENRX=1	4	7.5	12.0	mA
Supply Current at High Gain	MRX-701/02, ENRX=1	4.5	8.2	12.0	mA
	MRX-711/12, ENRX=1	5.0	9.2	14.0	mA
Digital Pin Characteristics					
Input Low Voltage CMOS	ENRX pin	-0.3		0.3VCC	V
Input High Voltage CMOS	ENRX pin		0.7VCC	VCC+0.3	V
Pull Down Current ENRX pin	ENRX=1	0.1	2	10	µA
Low Level Input Current ENRX pin	ENRX=0			0.05	µA

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Electrical Characteristics - CONT.

Analog Pin Characteristics					
High Level Input Voltage	ENRX=1			0.7	V
Low Gain Input Voltage	ENRX=1	1.5			V
Opamp Characteristics					
Opamp Input Offset Voltage		-35		35	mV
Opamp Input Offset Current		-50		50	nA
Opamp Input Bias Current		-150		150	nA
RSSI Characteristics					
RSSI Voltage at Low Input Level	ENRX=1	0.5	1	1.5	V
RSSI Voltage at High Input Level	ENRX=1	1.2	1.9	2.5	V
Receive Characteristics					
Input Sensitivity - FSK (narrow band)	MRX-701/02, Note 4			-111	dBm
	MRX-711/12, Note 4			-109	dBm
Input Sensitivity - FSK (wide band)	MRX-701/02, Note 4			-104	dBm
	MRX-711/12, Note 4			-102	dBm
Input Sensitivity - ASK (narrow band)	MRX-701/02, Note 4			-109	dBm
	MRX-711/12, Note 4			-108	dBm
Input Sensitivity - ASK (wide band)	MRX-701/02, Note 4			-106	dBm
	MRX-711/12, Note 4			-104	dBm
Maximum Input Signal - FSK/FM	BER $\leq 3 \cdot 10^{-3}$			0	dBm
Maximum Input Signal - ASK	BER $\leq 3 \cdot 10^{-3}$			-10	dBm
Spurious Emission				-70	dBm
Image Rejection	MRX-701/11			55	dB
	MRX-702/12			65	dB
Blocking Immunity	Note 5			57	dB
Start-up Parameters					
Start-up Time - FSK/FM	ENRX from 0 to 1, valid data at output			0.9	ms
Start-up Time - ASK	depends on ASK detector time			TBD	
	constant, valid data at output				ms
PLL Parameters					
VCO Gain	MRX-701/02			250	MHz/V
	MRX-711/12			350	MHz/V
Charge Pump Current				60	μ A

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Electrical Characteristics - CONT.

ENABLE Input					
Enable Input Logic-Low Voltage(V_{IL})	regulator shutdown			0.4 0.18	V V
Enable Input Logic-High Voltage(V_{IH})	regulator enabled	2.0			V
Enable Input Current	$V_{IL} \leq 0.4V$		0.01	-1	μA
	$V_{IL} \leq 0.18V$			-2	μA
	$V_{IH} = 2.0V$	2	5	20	μA
	$V_{IH} = 2.0V$			25	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. Inclusive 3 dB loss of front-end SAW filter

Note 5. Desired signal with FSK/FM or ASK modulation, CW blocking signal

PRELIMINARY

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Technical Support:

Radios Inc. is committed to providing its customers with excellent technical support and the resources necessary to assist its customers with their product development. 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 may call Radios Inc. at 215-362-1899.

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Editorial Information:

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