

RADIO MODULE
MXR-NT924/25

FM TRANSCEIVER MODULE

Supports the follow parts:

MXR-NT924

MXR-NT925

PRELIMINARY

DATA SHEET

Radios, Inc.

April 27, 2006 Preliminary Data Sheet

MXR-NT924/25

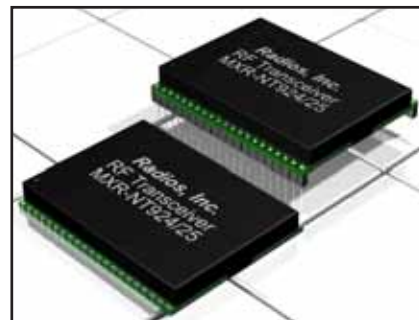
FM TRANSCEIVER MODULE

The MXR-NT924/25 is a complete FM/FSK transceiver which operates in the 2.4 GHz ISM band. Utilizing a unique direct-conversion, zero-intermediate frequency (zero-IF) receiver architecture, the MXR-NT924/25 provides a high performance RF design solution.

The receiver section of the MXR-NT924/25 provides all of the required receiver functions including local oscillator synthesis, down-conversion, filtering, automatic gain control (AGC), automatic frequency control (AFC), FM/FSK demodulation and RSSI functions. The transmitter section contains a directly modulated VCO and RF power amplifier (PA). Internal, dual, high-performance phase locked loop (PLL) synthesizers and VCOs allow full duplex or half-duplex operation over the entire RF tuning range.

MXR-NT924/25 provides a high level of integration, with high performance operation and low power consumption. The MXR-NT924/25 operates over an industrial temperature range of -20C to +65C and over the supply voltage range of 2.7 to 16 VDC.

A quadrature mixed, direct-conversion, zero intermediate frequency (Zero-IF) approach is used for the receiver section. After quadrature down-conversion to baseband and filtering, a quadrature mixer up-converts the complex signal to an intermediate frequency (IF) for demodulation. The transmitter section of the MXR-NT924/25 is comprised of a modulation input circuit, a PLL synthesizer / VCO, and a RF power amplifier (PA) capable of providing -5 dBm into a 50 ohm load.



Key Features

- 2400 - 2483.5 MHz Operation
- Direct-Conversion, Zero-IF Architecture
- Full and Half-Duplex
- FM or FSK Modulation
- Dual Integrated Fractional-N PLLs with VCOs
- RF Output -5 dBm
- Serial Programming Interface
- 2.7 - 16 VDC Operation
- Low Standby Current
- No Tune "Tankless" FM Detector

Typical Applications

- 2.4 GHz Wireless Hands-free
- 2.4 GHz Cordless Phones
- AMR/Telemetry/Data Radios
- TDD or FHSS Systems

PRODUCT ORDER INFORMATION

Part Number	Description
MXR-NT924(D)(S)	NT2924 2.4 GHz FM Module Transceiver
MXR-NT925(D)(S)	NT2925 2.4 GHz FM Module Transceiver

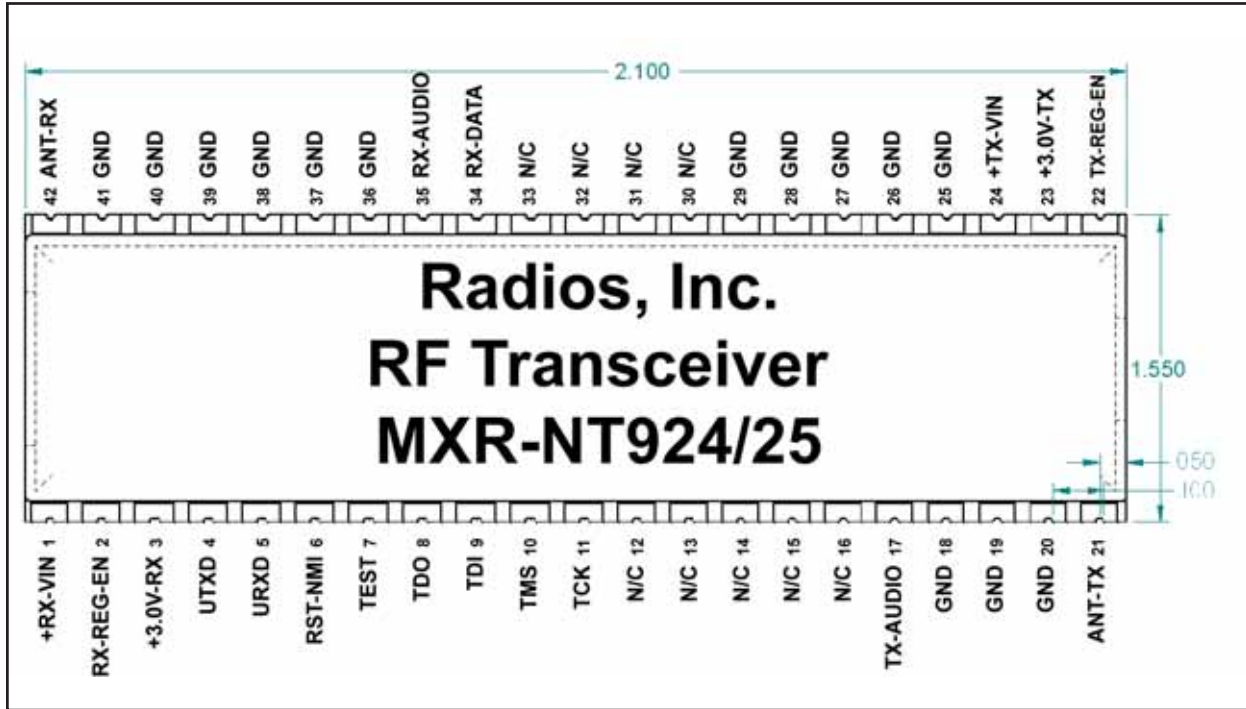
Contact Information

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

MXR-NT924/25

FM TRANSCEIVER MODULE

Mechanical and Pin Diagram



Pin Description

Pin Num	Pin Name	Description	Pin Num	Pin Name	Description
Pin 1	+RX-VIN	Positive Supply Pin - Receiver	Pin 22	TX-REG-EN	Regulator Enable - Transmitter
Pin 2	RX-REG-EN	Regulator Enable - Receiver	Pin 23	+3.0V-TX	Regulated Output - Transmitter
Pin 3	+3.0V-RX	Regulated Output - Receiver	Pin 24	+TX-VIN	Positive Supply Pin - Transmitter
Pin 4	UTXD	UART Transmit Data Out	Pin 25	Gnd	Ground
Pin 5	URXD	UART Receive Data In	Pin 26	Gnd	Ground
Pin 6	RST/NMI	Reset/Nonmaskable Interrupt Input	Pin 27	Gnd	Ground
Pin 7	TEST	Selects Test Mode	Pin 28	Gnd	Ground
Pin 8	TDO	Test Data Output	Pin 29	Gnd	Ground
Pin 9	TDI	Test Data Input	Pin 30	N/C	No Connect
Pin 10	TMS	Test Mode Select	Pin 31	N/C	No Connect
Pin 11	TCK	Test Clock	Pin 32	N/C	No Connect
Pin 12	N/C	No Connect	Pin 33	N/C	No Connect
Pin 13	N/C	No Connect	Pin 34	RX-DATA	Receive Data Output
Pin 14	N/C	No Connect	Pin 35	RX-AUDIO	Receive Audio Output
Pin 15	N/C	No Connect	Pin 36	Gnd	Ground
Pin 16	N/C	No Connect	Pin 37	Gnd	Ground
Pin 17	TX-AUDIO	Transmitter Audio and Data Input	Pin 38	Gnd	Ground
Pin 18	Gnd	Ground	Pin 39	Gnd	Ground
Pin 19	Gnd	Ground	Pin 40	Gnd	Ground
Pin 20	Gnd	Ground	Pin 41	Gnd	Ground
Pin 21	ANT-TX	RF Output	Pin 42	ANT-RX	RF Input

MXR-NT924/25

FM TRANSCEIVER MODULE

Electrical Limits

Sym	Parameters	Min	Typ	Max	Unit	Notes
Absolute Maximum Ratings						
VDD	Supply Voltage	2.7		16	V	
	Storage Temperature Range	-65		150	°C	
	Lead Temperature		260		°C	
V _{EN}	Enable Input Voltage	-20		+20	V	
Operating Ratings						
	Maximum Supply Ripple Voltage			TBD	mV	
V _{EN}	Enable Input Voltage	0		TBD	V	
TA	Ambient operating temperature	-20		65	°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
General Characteristics					
Frequency of Operation			2400		MHz
Reference Oscillator				12	MHz
Reference Frequency				150	kHz
Serial Interface Clock Frequency		0.1		20	MHz
Channel Bandwidth				150	kHz
Channel Spacing				300	kHz
Modulation Frequency				1	kHz
FM deviation				40	kHz
DC Characteristics					
Supply Current	Receive Only Transmit Only Total (RX + TX)			45 31 76	47 35 82 mA
Standby Current					5 µA
Quiescent Current	V _{EN} </= 0.4V (shutdown) V _{EN} </= 0.18V (shutdown)			0.01	1 5 µA
Receiver Characteristics					
Input Sensitivity	12dB SINAD, Note 4 10 ⁻³ BER, Note 5			-95 -83	dBm dBm
Input Impedance	Across RFI pins				33 ohms // 0.9 nH
Maximum RF Input	12dB SINAD, Note 4			TBD	dBm
Input IP ₃				TBD	dBm
Input 1dB Compression Point		TBD		TBD	dBm
Receiver Channel Bandwidth	Note 6			150	kHz
Adjacent Channel Rejection		55	60	65	dB
Audio Output Level	Note 4	150	175	200	mVrms
Demodulation Frequency Range	Note 4	0.2		50	kHz
Audio Output Impedance at Pin 48		2		10	Kohm
SINAD	at -70 dBm, Note 4	40	42		dB

MXR-NT924/25

FM TRANSCEIVER MODULE

Electrical Characteristics - CONT.

SINAD	at -70 dBm, Note 4	40	42		dB
Distortion	at -70 dBm, Note 4		0.7	2	%
Demodulation S/N	at -70 dBm, Note 4	38	40		dB
Transmitter Characteristics					
Transmitter Output Power		-7	-5	-3	dBm
Harmonic Level	2nd		TBD		dBc
	3rd		TBD		dBc
	4th		TBD		dBc
Modulation Input Level	Note 7		140		mVrms
Modulator Input Impedance		1		2	Kohm
Output Impedance	across RFO pins	71 ohms // 1.4 pF			
Modulation S/N	Note 8	34	36		dB
Intermodulation Prod.	2*RXL0-TXLO		-58		dBc
	Other			-60	dBc
Phase Noise	10kHz offset		TBD	TBD	
	10MHz offset		TBD		dBc/Hz
Response Time					
RX PLL Lock Time: Start Up	Note 9		4	7	ms
Adjacent Channel			2.5	4	ms
Audio Lag Time	from PLL locked to audio appears at audio out pin		1	2	ms
TX PLL Lock Time: Start Up	Note 9		10	15	ms
Adjacent Channel			3.5	5	ms
ENABLE Input					
Enable Input Logic-Low Voltage(V _{IL})	regulator shutdown			0.4	V
				0.18	V
Enable Input Logic-High Voltage(V _{IH})	regulator enabled	2.0			V
Enable Input Current	V _{IL} </= 0.4V		0.01	-1	μA
	V _{IL} </= 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. CCITT receive audio filter

Note 5. 38.4kbps 511 PRBS, Data mode

Note 6. Bandwidth can be adjusted between 19 KHz and 170 KHz by external components

Note 7. To obtain 40kHz FM deviation. Input level is TPLL setting dependant

Note 8. 300Hz HPF and 3kHz LPF

Note 9. Lock time adjustable by PLL loop filters

MXR-NT924/25

FM TRANSCEIVER MODULE

Product Warranty and Disclaimer Information:

Radios, Inc. is dedicated to providing its customers with the best possible products, and is continually working on improving the quality and function of its entire product line. Therefore, Radios, Inc. reserves the right to make changes to the design, specifications, or manufacturing of its products without notice. The information contained in this data sheet is believed to be complete, accurate, and reliable as of the time of publication. Because product specifications are based on representative lot samples, however, values can vary from lot to lot and are not guaranteed. Radios, Inc. does not assume any liability or responsibility arising from the application or use of any product described herein, and makes no guarantee, warranty, or representation regarding the suitability or legality of any product for use in a specific application. Radios, Inc. does not assume any liability for any infringement of patents or other rights of third parties which may result from the use of its products. No product sold by Radios, Inc. is intended for use in a life critical application, or an application where the safety of property is at risk. The user assumes full and complete responsibility for any use of Radios, Inc.'s products in an application where the safety of life or property is at stake.

A product can be returned directly to Radios, Inc. for evaluation. All returns must have a valid RMA number attached. RMA numbers can be obtained by calling customer service 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. This warranty does not apply to products which have been disassembled, modified, or subjected to conditions exceeding the application specifications. Under no conditions will Radios, Inc. be responsible for losses arising from the use or failure of a device in any 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.

MXR-NT924/25

FM TRANSCEIVER MODULE

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.

Copyright:

Radios Inc. reserves the right to all proprietary or commercial information contained in this data sheet. This data sheet is protected by copyright, and any unauthorized copying, reproduction, or dissemination is strictly prohibited without the prior written approval of Radios Inc.

Editorial Information:

	(Date)
Last Updated	April 27, 2006PRELIMINARY