

Technical Datasheet

for

RDM-A8FZ

RF Transceiver Module in 850 to 870 MHz



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Document Revision History

Version No.	Release Date	Description of Changes
1.0	February 26, 2011	Initial Release



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1. Overview

The RDM-A8FZ is a very low power, high performance, highly integrated FSK/GFSK/OOK/MSK/GMSK transceiver designed for operation in the frequency band 850MHz to 870MHz. Data rates from 1kbps to 300kbps are supported.

The transmit RF synthesizer contains a VCO and a low noise fractional-N PLL with an output channel frequency resolution of 400Hz. The VCO operates at 2x or 4x the fundamental frequency to reduce spurious emissions. The receiver and transmitter synthesizer bandwidths are automatically, and independently, configured to achieve optimum phase noise, modulation quality and settling time. The transmitter output power is programmable from -20 dBm to +13.5 dBm, with automatic PA ramping to meet transient spurious specifications. The part possesses both single-ended and differential PAs, which allow for Tx antenna diversity.

The receiver is exceptionally linear, achieving an IP3 specification of -12.2 dBm and -11.5 dBm at maximum gain and minimum gain, respectively. Thus, the part is extremely resilient to the presence of interferers in spectrally noisy environments. The receiver features a novel, high speed automatic frequency control (AFC) loop, allowing the PLL to find and correct any RF frequency errors in the recovered packet.

The RDM-A8FZ operates with a power supply range of 1.8 V to 3.6 V and has very low power consumption in both Tx and Rx modes enabling long lifetimes in battery operated systems while maintaining excellent RF performance. The device can enter a low power sleep mode in which the configuration settings are retained in BBRAM. The RDM-A8FZ features an ultra-low power, on-chip, communications processor. The communications processor, which is custom RISC, 8-bit processor, performs the radio control, packet handling and smart wake mode (SWM) functionality. The communications processor eases the processing burden of the companion microprocessor by integrating the lower layers of a typical communication protocol stack. The communications processor provides a simple command based radio control interface for the host microprocessor. A single byte command transitions the radio between states or performs a radio function.

The communications processor provides support for a generic payload format. The packet format is highly flexible and fully programmable thereby ensuring it is compatible with proprietary packet profiles. In transmit mode the communications processor can be configured to add preamble, sync word and CRC to the payload data stored in packet RAM. In receive mode the communications processor can detect and interrupt the MCU on reception of preamble, sync word, address and CRC and store the received payload to packet RAM. The RDM-A8FZ utilizes an efficient interrupt system comprising of MAC level Interrupts and PHY level interrupts that can be individually set. The payload data, plus the 16-bit CRC can be encoded or decoded using Manchester or 8b/10b encoding. Alternatively, data whitening and de-whitening can be applied.

2. Key Features

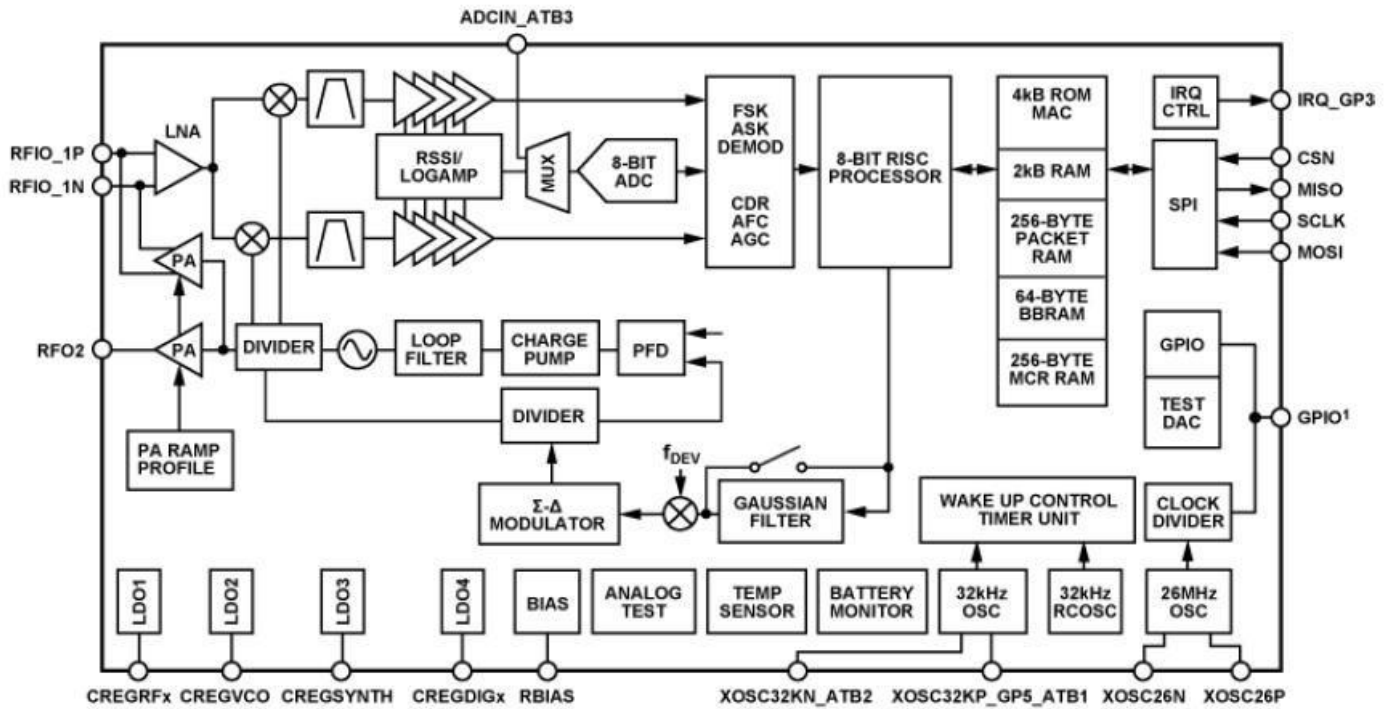
- Ultra low power, high performance transceiver module
- Frequency bands
 - 850 MHz to 870 MHz
- Data rates supported
 - 1 kbps to 300 kbps

- 1.8 V to 3.6 V power supply
- Single-ended and differential PAs
- Low IF receiver with programmable IF bandwidths
 - 100 kHz, 150 kHz, 200 kHz, 300 kHz
- Receiver sensitivity (BER)
 - -116 dBm at 1.0 kbps, 2FSK, GFSK
 - -107.5 dBm at 38.4 kbps, 2FSK, GFSK
 - -102.5 dBm at 150 kbps, GFSK, GMSK
 - -100 dBm at 300 kbps, GFSK, GMSK
 - -104 dBm at 19.2 kbps, OOK
- Very low power consumption
 - 12.8mA in PHY_RX mode (Max front-end gain)
 - 24.1mA in PHY_TX mode (10dBm output, single-ended PA)
 - 0.65 μ A in PHY_SLEEP Mode (RC oscillator active)
 - 0.3 μ A in PHY_SLEEP Mode (Deep Sleep Mode 1)
- RF output power of -20dBm to +13.5dBm (single-ended PA)
- RF output power of -20dBm to +10dBm (differential PA)
- Patented fast settling automatic frequency control (AFC)
- Digital received signal strength indication (RSSI)
- Integrated PLL loop filter and Tx/Rx switch
- Fast automatic VCO calibration
- Automatic synthesizer bandwidth optimization
- 240 byte Packet Buffer for TX/RX data
- Efficient SPI control interface with block read/write access
- Integrated battery alarm and temperature sensor
- Integrated RC and 32.768kHz crystal oscillator
- On-chip 8-bit ADC
- 5 x 5 mm, 32 pin, LFCSP package

3. Application Areas

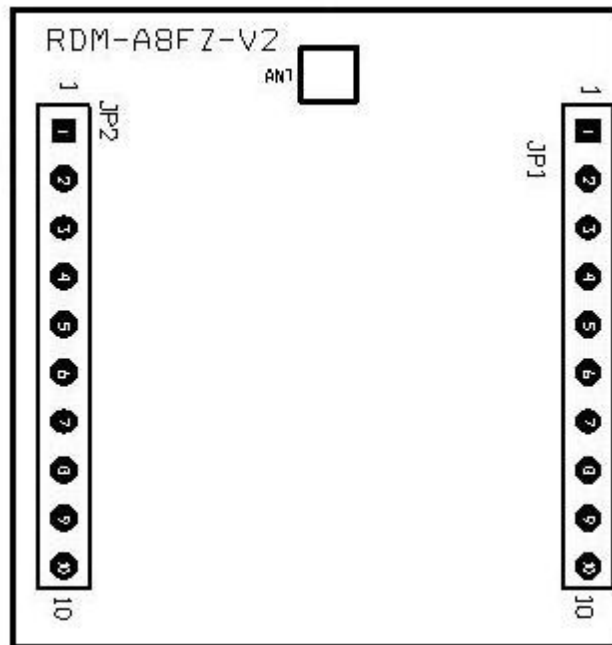
- Smart Metering
- IEEE 802.15.4g
- Wireless MBUS
- Home Automation
- Process and Building Control
- Wireless Sensor Networks (WSNs)
- Wireless Healthcare

4. Functional Block Diagram



¹GPIO REFERS TO PIN GP0 TO PIN GP5.

5. Pin Configuration and Function Description



Connector	Pin No.	Pin Name	Description
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No.			
JP1	1	ADCVREF	On chip ADC voltage reference output
	2	ATB4	External LNA enable signal output also can be used as analog test pin
	3	ADCIN_ATB3	External analog signal input pin also can be used as analog test pin
	4	GP5_ATB1	Analog test pin
	5	ATB2	Analog test pin
	6	GP4	SPORT mode signal pin
	7	GP2	SPORT mode signal pin
	8	GP1	SPORT mode signal pin
	9	GND	Power supply ground pin
	10	DIGITAL VCC	Supply pin for Digital section
JP2	1	GND	Power supply ground pin
	2	RF VCC	Supply pin for RF section
	3	DGUARD	Internal guard/screen pin for digital section
	4	CLK_EXT	26MHz clock output
	5	GP0	SPORT mode signal pin
	6	IRQ	Interrupt Request pin
	7	MISO(Master in, serial out)	SPI signal pin
	8	SCLK(Serial clock)	SPI signal pin
	9	MOSI(Master out, slave In)	SPI signal pin
	10	CS(Chip select)	SPI signal pin

6. Device Specifications

6.1. General Specifications

Parameter	Min	Typ	Max	Unit
Dimensions		26.31 x 25.02		mm
Weight		15		grams
Operating Temperature	-40		+85	°C
Humidity	20		85	%RH
Supply Voltage	1.8		3.6	V

6.2. Transmitter Specifications

Parameter	Min	Typ	Max	Unit
Frequency Range	850		870	MHz
Data Rate	1		300	Kbps
Single Ended PA Maximum Power		+13.5		dBm

Minimum Power	-20	dBm
Programmable Step Size	0.5	dBm
-20 dBm to +13 dBm		
Differential PA		
Maximum Power	+10	dBm
Minimum Power	-20	dBm
Programmable Step Size	0.5	dBm
-20dBm to +13.5 dBm		
Harmonics		
Single Ended PA		
Second Harmonic	-15.1	dBc
Third Harmonic	-29.3	dBc
Differential PA		
Second Harmonic	-23.2	dBc
Third Harmonic	-25.2	dBc
Receive Current Consumption	18	mA
Sleep Current Consumption	<1	μA

6.3. Receiver Specifications

Parameter	Min	Typ	Max	Unit
Sensitivity				
1.0 kbps		-116		dBm
10 kbps		-111		dBm
38.4 kbps		-107.5		dBm
50 kbps		-106.3		dBm
100 kbps		-103.7		dBm
150 kbps		-102.5		dBm
200 kbps		-101		dBm
300 kbps		-100		dBm
Adjacent Channel Rejection				
200kHz channel spacing		37		dB
AFC Accuracy		1		kHz
RSSI				
Range at Input		-97 to -26		dBm
Linearity		±2		dB

6.4. Antenna Specifications

Parameter	Min	Typ	Max	Unit
Frequency Range	850		870	MHz
Bandwidth		25		MHz
Wavelength		1/4 wave		

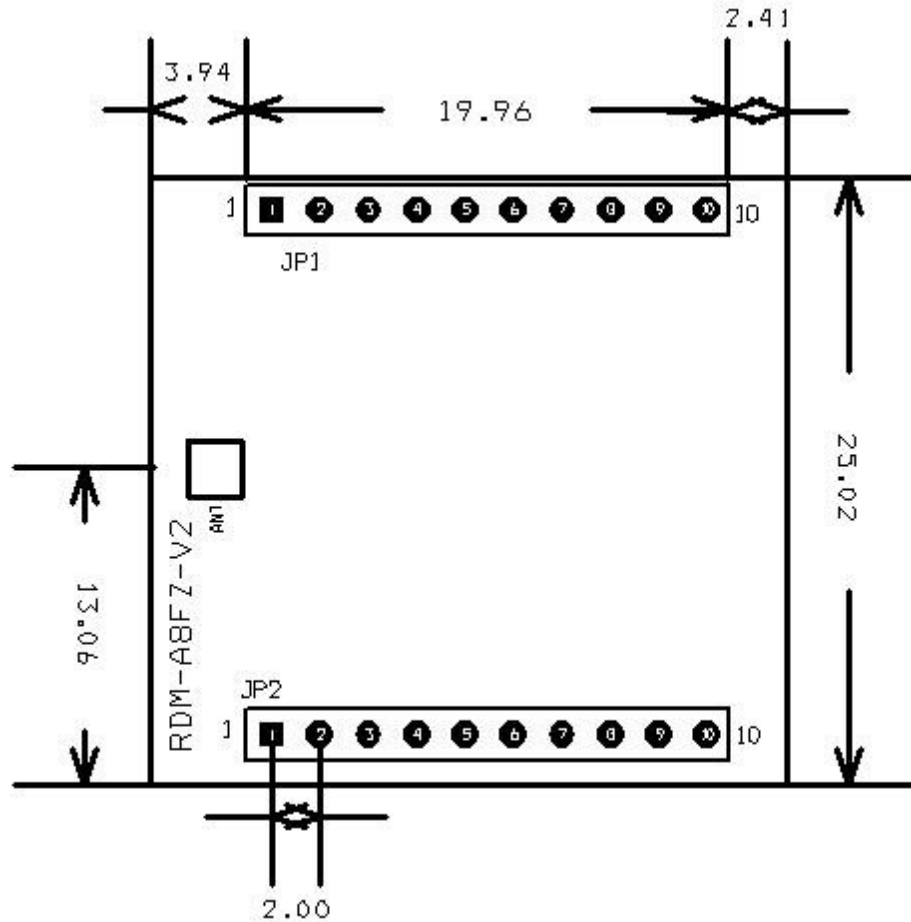
VSWR	≤ 2	
Impedance	50	ohm

ESD CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000V readily accumulate on the human body and test equipment and can discharge without detection. Although this product features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.

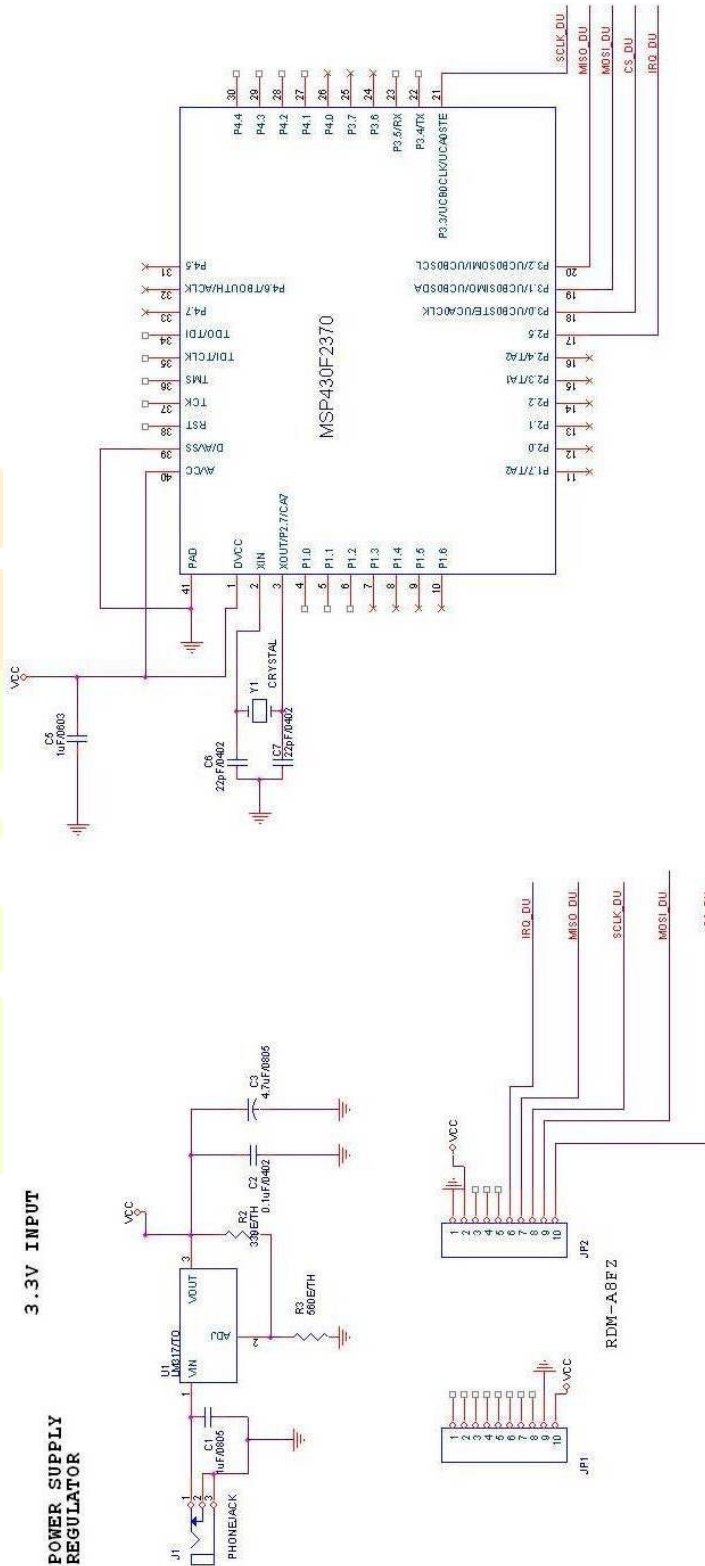


7. Mechanical Drawings



8. Example Circuit

The example circuit shown below explains how to connect the RDM-A8FZ module to a microcontroller (MSP430). This sample schematic can be used to develop an experimental board for testing the module.



9. Custom Applications

For cost-sensitive and custom applications, such as wireless sensors and AMR, Reindeer Technologies can embed the application software directly into a microcontroller built into the module. For more information on this service, please contact Reindeer Technologies.

10. Reference

For detailed information about programming the RDM-A4FZ module, please consult the current ADF7020-1 datasheet which can be found at <http://www.analog.com>.

11. Ordering Information

Ordering Part Number	Description
RDM-A8FZ	RF Transceiver Module (850 to 870 MHz)

12. Contact Us

12.1 Technical Support

Reindeer Technologies Pvt. Ltd. has built a solid technical support infrastructure so that you can get answers to your questions when you need them. Our technical support engineers are available Mon-Fri between 9:00 am and 6:30 pm Indian standard time.

The best way to reach a technical support engineer is to send an email to support@reindeersystems.com. E-mail support requests are given priority because we can handle them more efficiently than phone support requests.

12.2 Sales Support

Our sales department can be reached via e-mail at sales@reindeersystems.com or by phone at +91-44-45022335. Our sales department is available Mon-Fri between 9:00 am and 6:30 pm.



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