

Wi.Freestar Data Sheet



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ORDERING INFORMATION

	PART NUMBER
module	WI.FS24-100ST
kit	RK-WI.FS24-100ST

For more ordering information please visit http://www.radiotronix.com/products/prodsel_db.asp and visit our products page.

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1.0 SCOPE

Provide hardware specifications for the Wi.Freestar RF module.

2.0 REVISION CONTROL

DATE	CHANGES	REVISION
8-16-05	ORIGINAL RELEASE	0.4
1-2-06		0.5
4-17-06	ADD RESITOR FOR SLEEP MODE CURRENT	0.7

3.0 APPLICABLE DOCUMENTS

NONE

4.0 WI.FREESTAR MODULE DESCRIPTION

The Wi.Freestar module is a 2.4 GHz 802.15.4 data transceiver module intended for Very Low Cost Wireless Applications. The module design is based on the MC13192/3 RF transceiver from Freescale which is based on the IEEE 802.15.4 standard and intended for use in Zigbee applications. It provides for enhanced range performance over standard 802.15.4/Zigbee implementations with the integrated 100mW power amplifier. It implements a proprietary communications protocol based on the 802.15.4 standard streamlined to lower cost and power consumption. The Wi.Freestar module design consists of the MC13192, the MC9S08GT16CFD uP, 100 mW PA, and integrated PCB trace antenna. The module is FCC and CE certified for fast and simple integration into end applications. The Wi.Freestar Module provides the lowest cost, best in class range in an extremely small form factor.

5.0 FEATURES

1. Networking
 - a. Point to Point
 - b. Point to Multipoint
2. Range: Up to 4000ft
3. Very Small Form Factor: 1.4" x 1.0" (36.2mm x 24.8mm)
4. Inverted-F PCB Trace Antenna
5. FCC, IC, and CE Certified
6. Direct Sequence Spread Spectrum
7. CSMA-CA
8. Flash Based / Upgradeable
9. 10 bit A/D (2 inputs)
10. General Purpose Digital I/O (8 pins)
11. Windows® Based Configuration and Test Tool

6.0 SPECIFICATIONS

1. Frequency: 2400 to 2483.5 MHz
2. Output power: 10mW – 100mW (software controlled)
3. Receiver Sensitivity: -92 dBm @ 1% PER
4. RF Data Rate: 250 kbps
5. Host Data Rate: 19.2 kbps
6. RF Channels: 16 (channel 16 is set at a reduced power level)
7. EMC Certifications
 - a. FCC Part 15.247 Module Certified (Portable)
 - b. EN 300 328 1 Certified / CE Approved
8. Voltage Operating Range: 2.4 to 3.6 V
9. Power Consumption
 - a. Transmit Mode
 - i. 10mW – 125mA
 - ii. 100mW – 150mA
 - b. Receive Mode: < 45mA
 - c. Standby Mode: < 5 uA
10. Host Interface: Serial TTL
11. Operating Temperature: -40 to +85°C
12. Storage Temperature: -55 to +125°C

7.0 ELECTRICAL CHARACTERISTICS

7.1 Maximum Ratings

Rating	Value	Unit
Power Supply Voltage	3.6	Vdc
RF Input Power	+10	dBm
Storage Temperature Range	-55 to 125	°C

Note: Exceeding the maximum ratings may cause damage to the module or devices

7.2 Recommended Operating Conditions

Characteristic	Min	Typ	Max	Unit
Power Supply Voltage (Vdd)	2.4	3.3	3.6	Vdc
Input Frequency	2405		2480	MHz
Ambient Temperature Range	-40	25	85	°C
Logic Input Low Voltage	0		30% Vdd	V
Logic Input High Voltage	70% Vdd		Vdd	V

7.3 DC Electrical Characteristics

(Vdd = 3.3 V, Temperature = 25°C unless otherwise noted)

Characteristic	Min	Typ	Max	Unit
Power Supply Current (Vdd)				
Sleep	1	2	5	μA
Transmit Mode (10 dBm nominal output power)		125		mA
Transmit Mode (20 dBm nominal output power)		150		mA
Receive Mode		42		mA
Output High Voltage (All digital outputs)	80% Vdd		Vdd	V
Output Low Voltage (All digital outputs)	0		20%Vdd	V

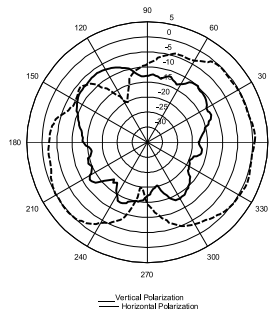
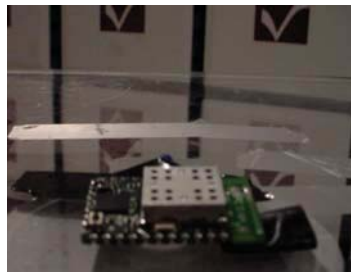
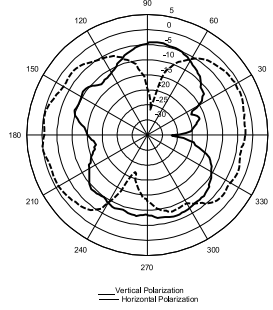
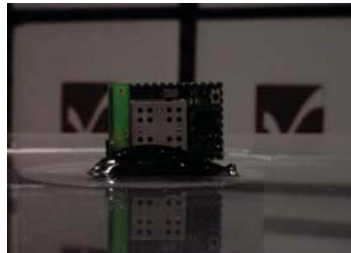
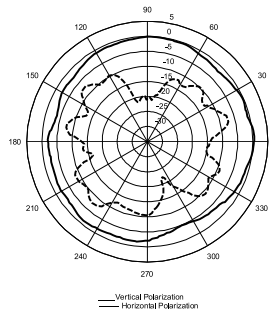
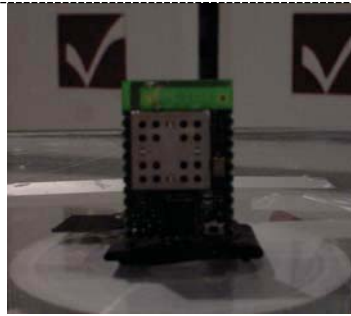
7.4 AC Electrical Characteristics

(Vdd = 3.3 V, Temperature = 25°C unless otherwise noted)

Characteristic	Min	Typ	Max	Unit
Sensitivity for 1% packet error rate (-40 to +85°C)		-92		dBm
Sensitivity for 1% packet error rate (25°C)		-92	-87	dBm
Saturation (maximum input level)		10		dBm
Nominal Output Power		20		dBm
Output Power Control Range (+20 to -10 dBm)		30		dB
Error Vector Magnitude (EVM)			35	%
Over the Air Data Rate		250		kbps
On-board antenna gain (peak)		0.8		dBi
On-board antenna gain (average)		-3.1		dBi

8.0 RADIATION PATTERNS

FreeStar Rev B 2440 MHz			
Device Orientation	polarization	Gain [dBi]	
		Max	Avg
(V)	vertical	0.60	-1.72
(V)	horizontal	-7.27	-12.37
(H)	vertical	-4.00	-10.91
(H)	horizontal	0.02	-5.90
(F)	vertical	-6.62	-13.52
(F)	horizontal	0.85	-4.67
Total Avg. Gain [dBi]		-3.15	



9.0 TYPICAL PERFORMANCE/CURVES

Typical TX Power and TX Current vs Supply Voltage over Temperature

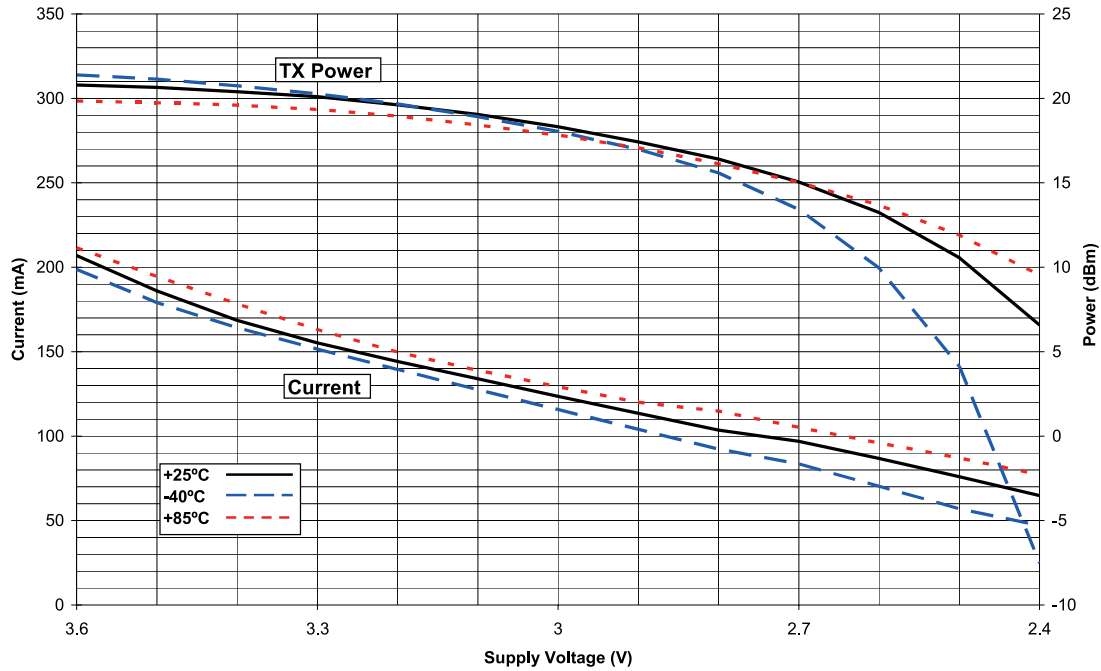
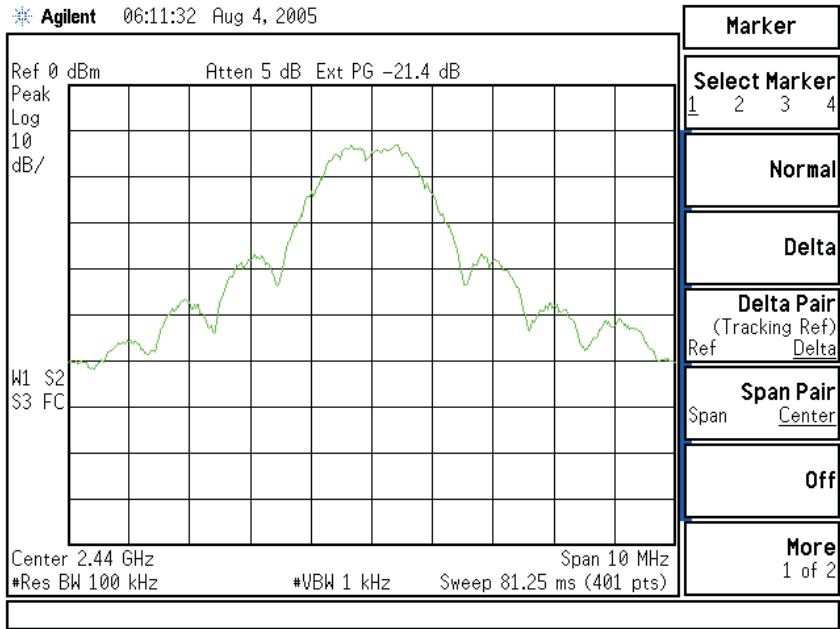
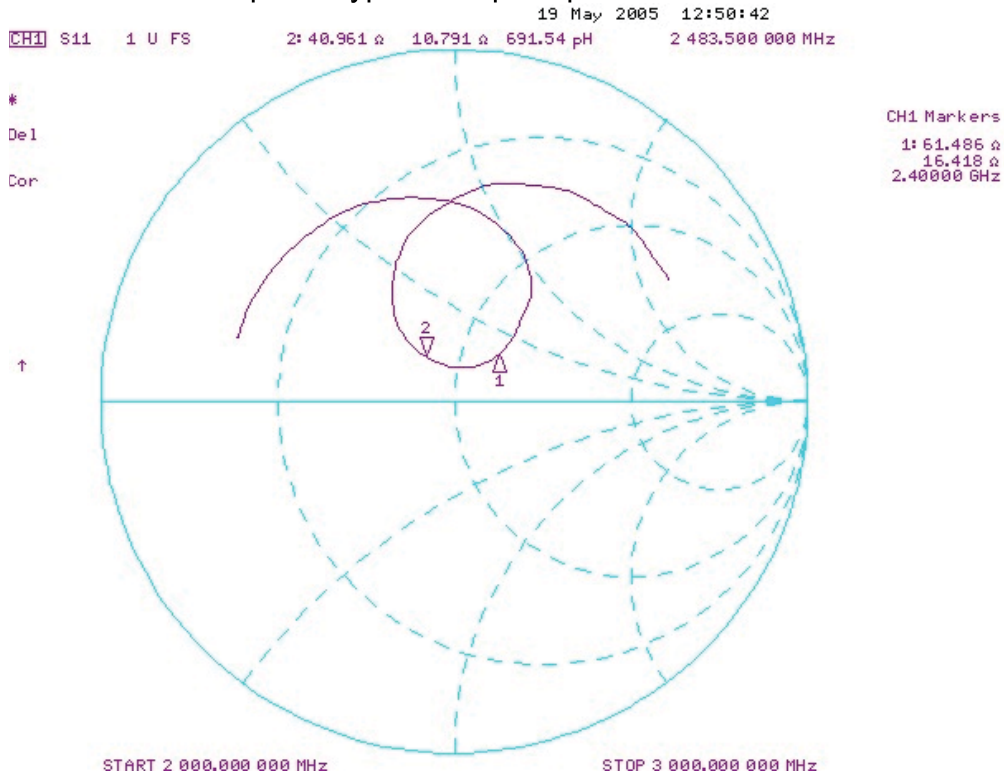


TABLE 1. Typical Output power versus MC13192 power setting (Vdd 3.3V, 25°C)

Power Setting	Output Power
≥ 30	20 dBm
28	19.6 dBm
26	18.3 dBm
24	18 dBm
22	17.6 dBm
20	17 dBm
18	11.4 dBm
16	10.8 dBm
14	10.1 dBm
12	9.5 dBm
10	1.9 dBm
8	1.4 dBm
6	0.9 dBm
4	0.3 dBm
2	-9.7 dBm



Graph 1. Typical Output Spectrum of transmitter



Graph 2. Receive Port Input Impedance at Antenna

10.0 EXAMPLE INTERFACE DIAGRAMS

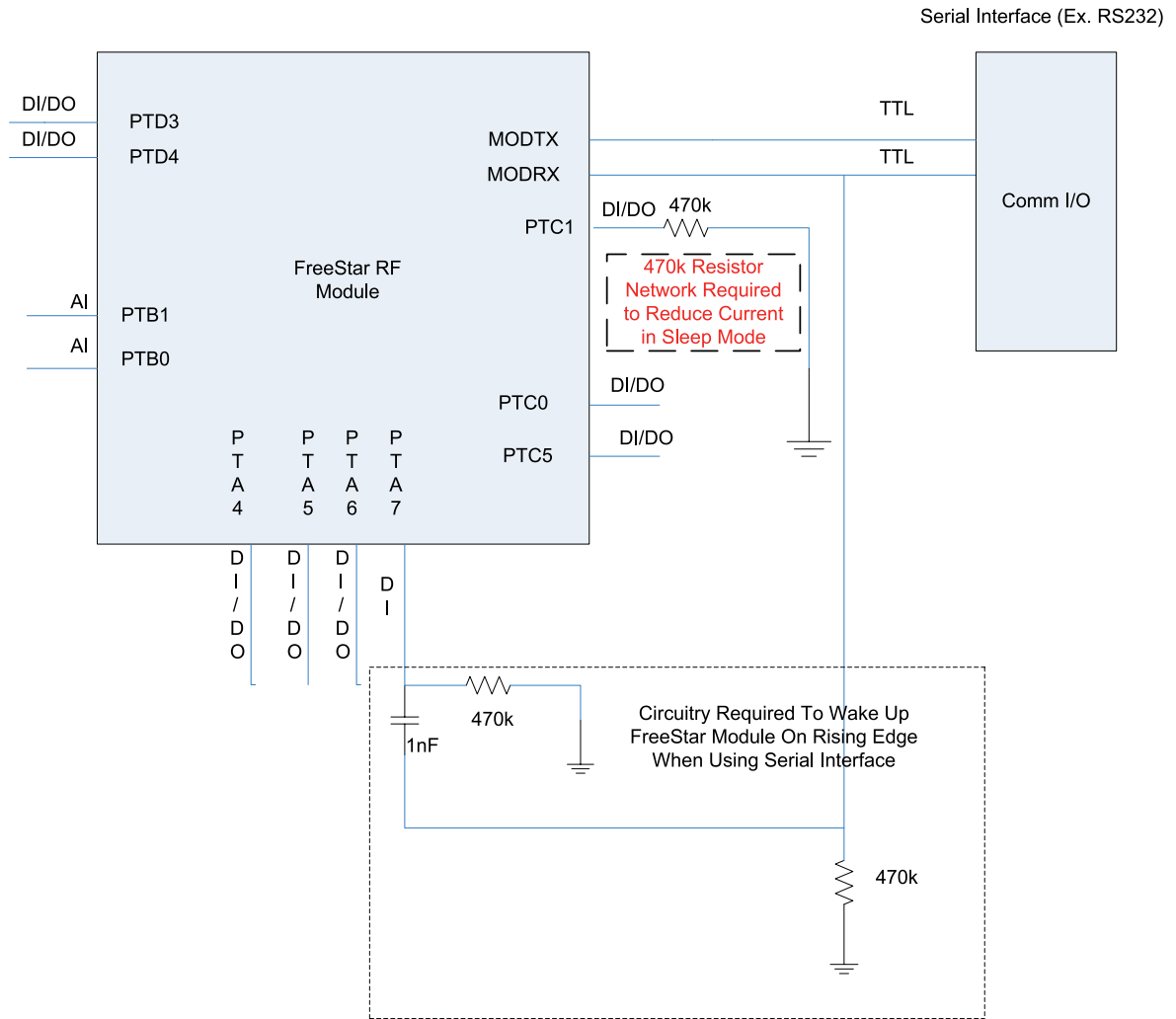


Figure 1. Sample Connection Diagram when Using Serial Interface

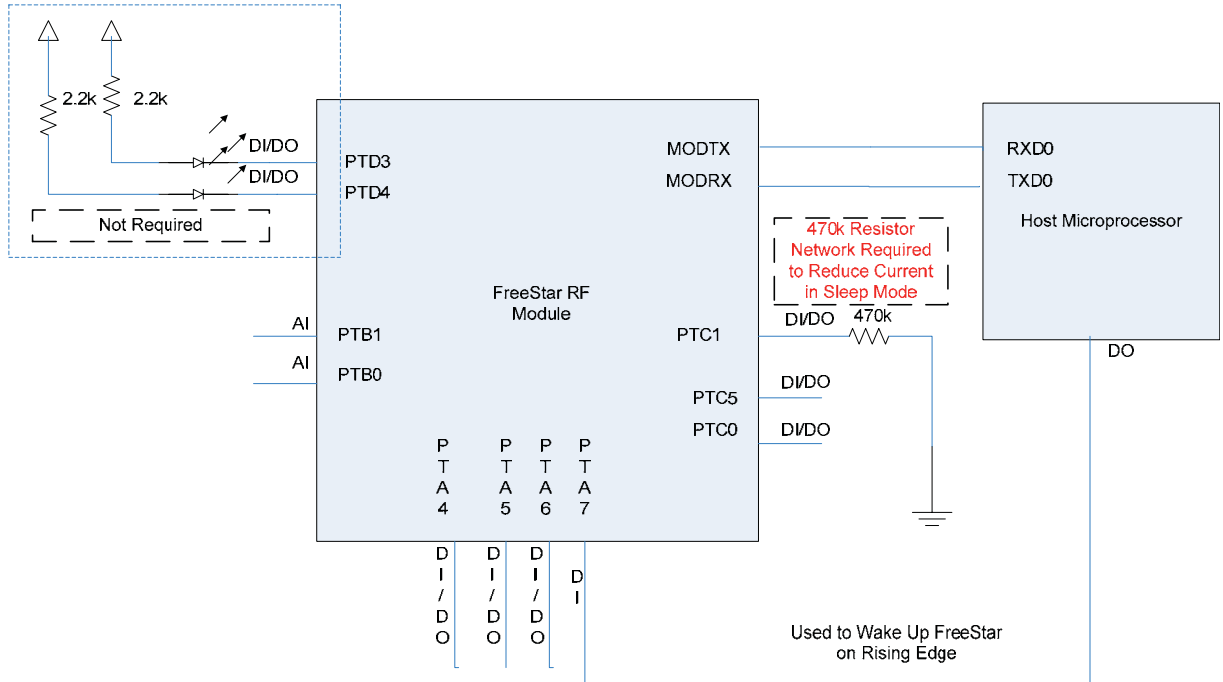


Figure 2. Sample Connection Diagram when Using Host Processor Interface

11.0 MECHANICAL DRAWINGS

