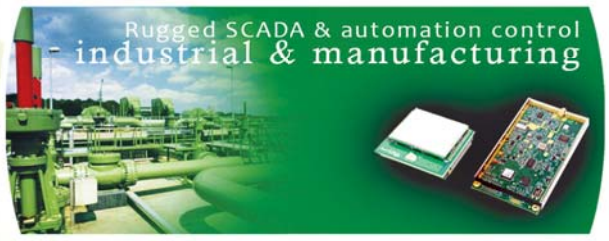
Catalog

Spring 2013

Wireless is... RFM®

Delivering M2M Around the World

www.RFM.com



Bluetooth 4.0

WiFi

ZigBee

802.15.4

WirelessHART

FHSS Modules
900 MHz & 2.4 GHz

RF ICs
300 MHz - 2.4 GHz

SAW-Based ICs
300 MHz - 1 GHz

SAW-Based
Frequency Control

SAW-Based
Resonators

SAW-Based
Filters

Should I "Make"?

Short-Range Radios

Wi-Fi / Bluetooth

WLS1271L 2.4GHz 802.11b/g/n Module

WLS1271L 2.4GHz 802.11b/g/n + Bluetooth BLE Combo Module

WLS1273L 2.4GHz & 5.8GHz 802.11a/b/g/n + Bluetooth BLE Combo Module

RF ICs

863-960 MHz RFIC (TRC103)

300-510 MHz RFIC (TRC105)

2.4 GHz RFIC (TRC104)

SAW-Based

300-1000 MHz SAW-Based TX

300-1000 MHz SAW-Based RX

300-1000 MHz SAW-Based TR

Select from an assortment of ultra-low-power RF integrated circuits (RFICs) and surface acoustical wave (SAW) short-range radios from RFM.

Should I "Buy"?

Certified RF Modules

2.4 GHz **802.11b/g Wi-Fi®**

2.4 GHz **WirelessHART®**

2.4 GHz **802.15.4** 1mW LP or 100mW ER

2.4 GHz **ZigBee®** 1mW LP or 100mW HP

900 MHz and 2.4 GHz

Multi-Fuction Proprietary FHSS

Choose from a broad selection of pre-certified RF Modules from a single supplier - RFM.

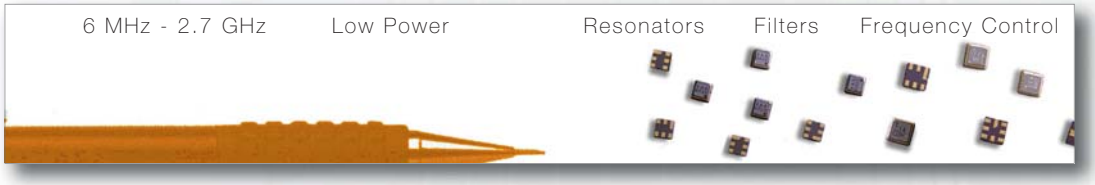
Short-Range Radios

Recognized for industry-leading low power consumption and sensitivity, RFM has offered innovative short-range radios in a very small form factor since the arly 1990's.

Certified RF Modules

RFM has offered certified RF modules since the early 1990's, helping OEMs without in-house RF engineering expertise and others that simply want to speed their products to market.

SAW-Based RF Components



SAW-BASED FREQUENCY CONTROL products include SAW-stabilized Optical Timing Clocks and Diff-Sine Wave Clocks and Oscillators in a wide range of operating frequencies.

LOW-POWER SAW RESONATORS are used as frequency control elements in transmitter and receiver LO circuits. They are essential to the miniature radio frequency transmitters.

NARROWBAND FRONT-END FILTERS. RFM SAW coupled resonator filters are used in receivers as narrowband front-end filters to reject strong out of band signals.

SAW RF/IF FILTERS include a variety of standard and custom bandpass filters for RF, IF and other applications. Their operating frequencies range from 40 MHz to 2.7 GHz.

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www.RFM.com

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RFM is a subsidiary of Murata Electronics North America, Inc.

RFM Wireless Inside

RFM serves a very broad range of vertical markets and

RFM Short-Range Radios are industry-leading in low power consumption and sensitivity

- Have been designed into hundreds of thousands of wireless medical devices such as pacemakers, ICDs (implantable cardiac defibrillators)
- Enable a broad range of diagnostics and therapapeutic systems including cardiac monitors, implantable devices to monitor and treat diabetes, and neuromodulation systems to manage chronic pain or lessen the effects of neurological diseases

RFM Certified RF Modules are ideal for next generation personal health / fitness products and services to meet connectivity and interoperability standards

- Makes possible for patients, caregivers and health care providers to more proactively address ongoing health care needs
- Also ideal for medical telemetry applications including vital signs monitoring

RFM Certified RF Modules enable OEMS to build power-efficient solutions that provide seamless network connectivity in a wide range of consumer and commercial building automation and control applications

- Lighting control, constant and variable volume air handlers, chilled water, hot water and condensed water systems, plus transformer and auxiliary power units for emergency power
- Many building automation and control systems also include access control, alarms and security as well as a myriad of complex room automation for audio and video equipment.

RFM Short-Range Radios are used in Advanced Metering Infrastructure (AMI) applications

RFM SAW-Based Resonators and Filters are used in a variety of automotive, transportation and tracking systems

- Automotive remote keyless entry (RKE) applications and tire pressure monitoring applications
- Satellite Digital Audio Radio (SDAR), Global Navigation Systems (GNS), and vehicle theft detection and tracking systems

RFM Short-Range Radios and Certified RF Modules are used in fleet management vehicule tracking and sensor monitoring applications of materials during transport (including railroad)

enables wireless connectivity in a wide variety of applications.

RFM is one of very few wireless technology providers offering RFM Modules and Short-Range Radios that can enable wireless connectivity for monitoring and controlling energy distribution of power, water and gas from the plant, through substations, down feeds, and all the way to the meter.

The RFM product portfolio includes industrial grade, field-proven products that meet the rigorous demands of electric power plants, remote windmill farms, solar power farms, nuclear power sites, natural gas, and public utilities require. These products are based on RFM proprietary frequency hopping spread spectrum (FHSS) technology that ensure long-range data througput even in the presence of electrical noise and multi-path fading.

RFM's Certified RF Modules line offers multiple options for state-of-the-art wireless communications systems to meet requirements of harsh industrial environments. The DNT FHSS and XDM WirelessHART modules enable cost-effective wireless sensor networking for sophisticated diagnostics, remote monitoring and control and plant optimization.

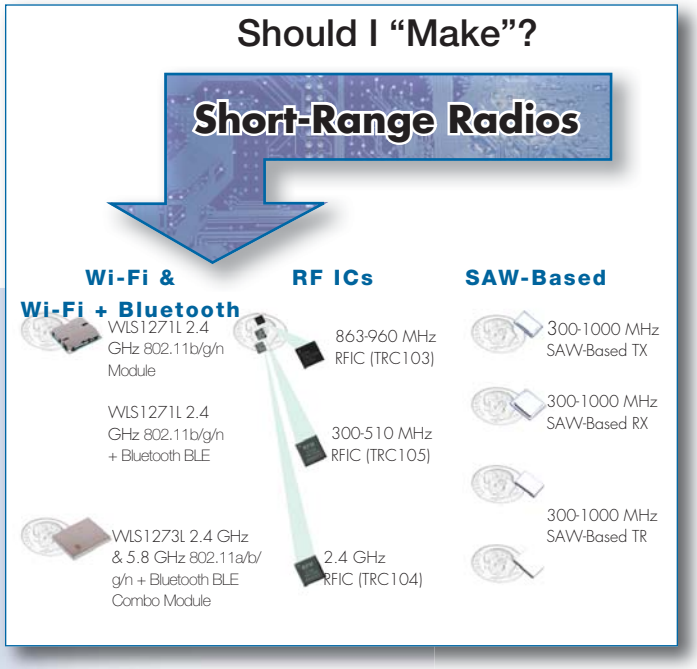
Process manufacturers can now add wireless monitoring to their field devices utilizing the XDM series WirelessHART modules. The DNT series FHSS modules provide a cost-effective solution for industrial wireless sensor networking, applications include:

- Environmental alarms and personnel management for greater safety and compliance
- Security applications to detect intrusions, control access, report smoke/fire or perform video surveillance within a facility
- Wireless connectivity for mobile workforce that accesses applications
- Asset tracking to optimize assets and ensure regulatory compliance for the usage, storage and transportion of hazardous chemicals

RFM SAW-Based resonators, filters, and frequency control products are utilized in communications applications around the workd because they come in a wide range of frequencies and bandwidths, and in a variety of package sizes. They are utilized in a host of communications applications:

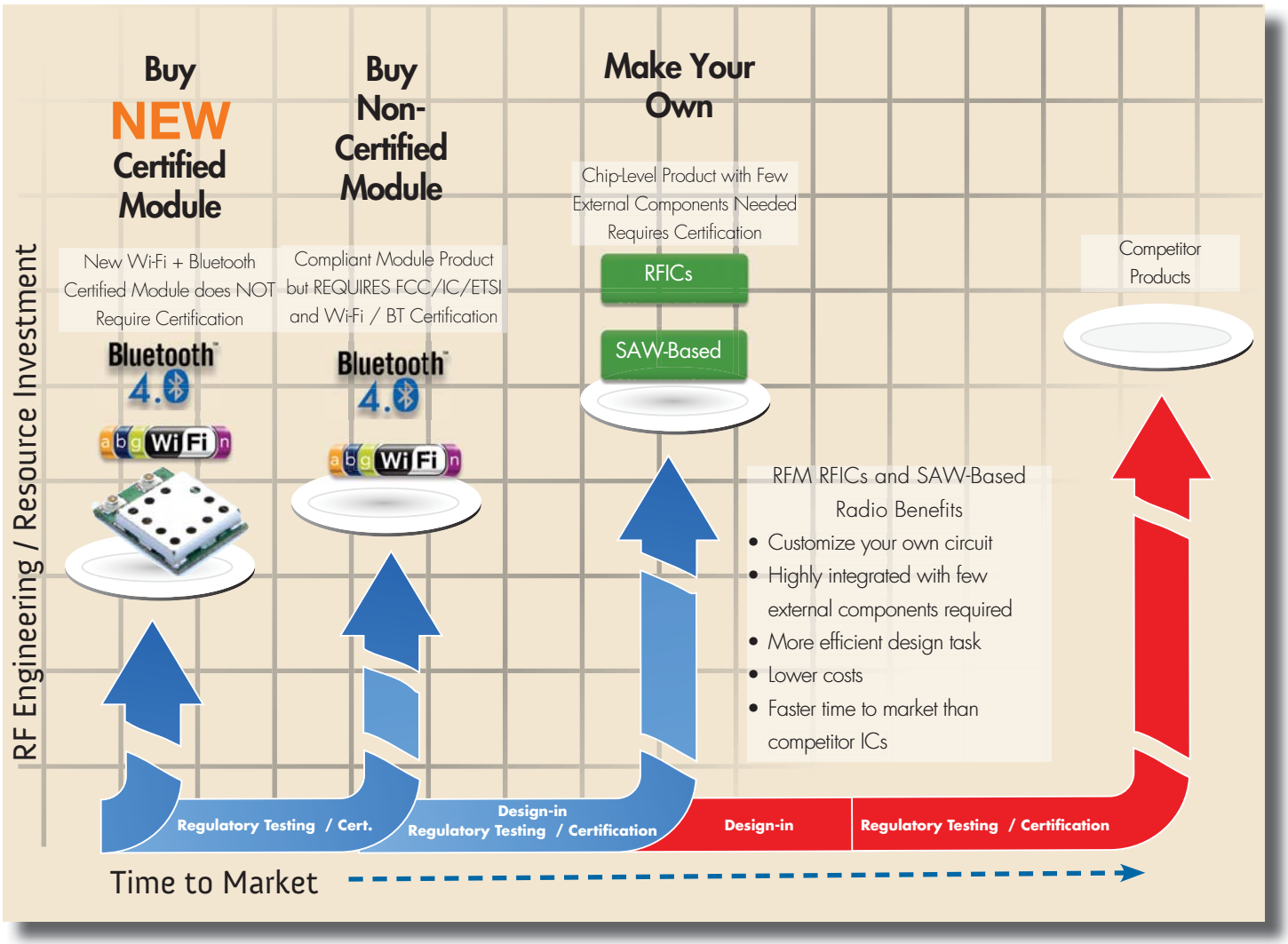
- Cellular Subscriber Terminals, Base Stations and Repeaters for GSM, TD-SCDMA, W-CDMA, CDMA, Wireless Local Loop, LTE, WiMax
- They are also used in CATV infrastructure, SONET, and WLAN

RoHS Compliant



If the answer is yes, then RFM short-range radios are ideal.

OEMs utilize RFM short-range radios when building their own RF circuitry. The RFM short-range radio portfolio includes standards-based Wi-Fi and Wi-Fi + Bluetooth combination radios, plus RFM proprietary RF ICs and SAW-based chip-level radios. These radios are attractive to original equipment manufacturers that design their own RF circuit. All RFM's integrated short-range radio products are optimized for RF performance and feature a high-level of integration all in a small form factor.



Short-Range Radios

RFM has been offering short-range radios since the early 1990's when the company first introduced its patented amplifier sequenced hybrid (ASH) radio architecture. ASH technology integrates quartz SAW filtering plus frequency control components into a single custom integrated circuit (IC).

RFM's ASH architecture delivers 50% power savings over superheterodyne architecture. As a consequence, OEMs are able to extend the operating life of their products - particularly in medical implant and external medical devices where long operating life is essential. They also are embedded in many automotive, ARM, and consumer products.

KEY FEATURES & BENEFITS OF RFM SHORT-RANGE RADIO 1-PORTFOLIO

Wide range of frequencies

Ultra-low-power consumption with very long battery life

Standards-based and Proprietary Technologies

IC Chipsets, Modules and Certified Modules

RoHS Compliant

Ultra-Low-Power, Ultra Small, Ultra Performance

Wi-Fi • Wi-Fi+Bluetooth • RF ICs • SAW-Based

Then in 2005, RFM introduced a line of RF ICs featuring an integrated PLL, IF and Baseband circuitry which significantly minimizes external component count and greatly simplifies and speeds up design ins. RFM has since expanded that line of RF ICs for applications in frequency ranges 300-510 MHz, 863-960 MHz, and 2.4 GHz; and in very small 5 x 5mm, 4 x 4mm, and even 3 x 3mm packages. As a result, the RFM line of RF ICs spans applications around the globe.

Recently in 2011, RFM broadened the company's portfolio of subsystem short-range radio products to include Wi-Fi and Wi-Fi + Bluetooth compliant modules. Due to customer demand, RFM added a certified version of the Wi-Fi and Wi-Fi + Bluetooth module in early 2013. FCC / IC certified modules speed up OEM design-ins, much of the demand for which is being driven by mass consumer adoption of smart devices and applications that interface with them, such as smart healthcare and home automation applications.

RFM SHORT-RANGE RADIO KEY FEATURES

- **Broad range of devices and technology** — RFM offers a variety of technology options at the subsystem chip-level that includes transceivers, receivers and transmitters. Additionally, RFM offers a complementary range of SAW-based components.
- **Integrated design** — Due to the company's leadership in RF technologies, RFM has developed a broad portfolio of short-range radios that deliver the largest link budget in the industry. System level functions in our SAW-based, RF IC and Wi-Fi + Bluetooth short-range radios off load functionality from the micro controller to reduce power and computation burden.
- **Broad data rates** — RFM SAW-based radios support data rates from 1 kb/s - 200 kb/s; RF ICs 1 kb/s to 1 Mb/s; and the Wi-Fi and Wi-Fi + Bluetooth combo modules comply with the associated Wi-Fi and Bluetooth standards.
- **Broad frequency range support** — Our devices also support all license-free ISM frequency bands (5.8 GHz, 2.4 GHz, 868 to 928 MHz, 433 MHz, and 315 MHz) so you can design products that target a wide range of proprietary wireless industrial and consumer applications.
- **High sensitivity** — Depending upon the series of short-range radios, RFM has brought the latest in its proprietary technology or innovation to ensure best-in-class or highest in radio sensitivity for superior radio performance among all its radios.
- **Low current consumption** — Whether in operation, idle, and sleep mode, RFM short-range radios are engineered with key features to deliver long battery lifetime.
- **Variety of output power** — Transceiver devices support a power output range from 0 dBm to 10 dBm.
- **Variety of modulations and technologies** — RFM short-range radios feature OOK / ASK, Single-channel, FSK, multi-channel, FHSS, and DSSS.
- **Smallest short-range radio packages** — RF IC transceivers come in packages as small as 4 mm x 4 mm; RF IC transmitters come in 3 mm x 3 mm.

WLS-Series

RFM Wi-Fi + Wi-Fi + BLUETOOTH COMBINATION MODULES (PAGES 7-10). Like all RFM integrated short-range radio products, the WLS Series of Wi-Fi and Wi-Fi + Bluetooth combination modules are optimized for RF performance and feature a high-level of integration all in a small form factor. The Wi-Fi and Wi-Fi + Bluetooth Combination Module Line now includes certified modules and non-certified modules.

NEW
CERTIFIED MODULE!

DR-WLS1273L-102
2.4 GHz & 5.8 GHz

802.11a Compliant
Ideal for Healthcare

Great for High Speed Data Applications at 5.8 MHz

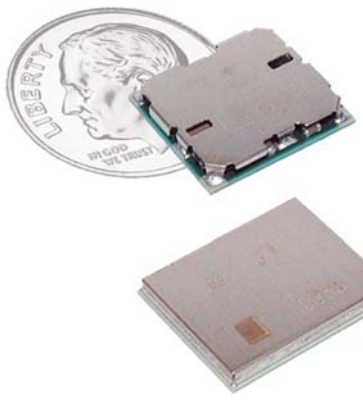
Bluetooth 4.0

a b g Wi Fi n

Wi-Fi / Bluetooth

2.4 GHz • 5.8 GHz

Wi-Fi Only • Wi-Fi + Bluetooth Combo • BLE



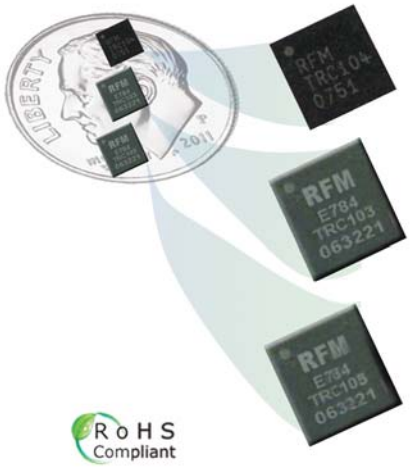
Wi Fi™ Bluetooth 4.0 RoHS Compliant

- Optimized for RF performance and feature a high-level of integration all in a small form factor.
- All three modules comply with IEEE 802.11b/g/n and the WLS1273L also complies with 802.11a/b/g/n.
- The WLS1271L and WLS1273L also comply with Bluetooth v4.0 EDR, Power Class 1.5+ BLE.
- The WLS-Series of products include Wi-Fi and Bluetooth technology in a single SoC, a high-efficiency RF front-end circuit plus a DC-DC converter. The modules are designed to fit into small designs and are slightly smaller than a dime.
- Minimal external circuitry is required to complete a radio design

Add an antenna, power source processor, and interface hardware and the **Radio Hardware Design is Complete**

RF ICs

300-510 MHz • 863-960 MHz • 2.4 GHz
FSK / OOK • GFSK • Data Rates 1 kb/s - 1 Mb/s



RF ICs (PAGES 11-12)

- Optimized for RF performance / feature a high-level of integration in a small form factor.
- Ssingle chip, multi-channel, low power RF transceivers, receivers, and transmitters.
- Idleal for low cost, high-volume, two-way short-range wireless applications in the 300 - 510 MHz, 863 - 960 MHz and 2.4 GHz frequency ranges.
- Incorporate a set of low-power states to reduce current consumption and extend battery life.
- Small size with low power consumption make them ideal for a wide variety of short-range radio applications.
- All critical RF and baseband functions are integrated in the radios, minimizing external component count and simplifying and speeding design-ins.

Add a microcontroller, RF SAW filter, crystal and a few passive components to create a **Complete, Robust Radio Function**

SAW-Based

300 MHz - 1 GHz
OOK / ASK • Data Rates 1 kb/s - 1 Mb/s

SAW-BASED (PAGES 13-14)

- Provide robust operation for wireless control or data communication in applications where low power consumption, small size and low implementation costs are critical.
- RFM's patented Amplifier-Sequenced Hybrid (ASH) radio architecture called Virtual Wire™ integrates RF ICs with quartz SAW filtering plus frequency control components built into a single custom integrated circuit.
- ASH architecture delivers ultra-low-power consumption and long range in a miniature-sized surface-mount package while also ensuring greater frequency stability, reliability and out-of-band rejection in a crowded frequency spectrum.
- ASH architecture also provides a low-cost radio by reducing external component count which also eases the RF engineering design task.
- The devices include provisions for both OOK and ASK modulation and can be configured to support a wide range of data rates and protocol requirements.

ASH RX & TR Architecture Delivers **50% Power Savings** Over Superheterodyne RX & TR Architecture

RoHS Compliant

Short-Range Radio Selector Tool

Due to the broad selection of options in the RFM portfolio of RF ICs and SAW-based short-range radios, the following two-page selector tool is provided for catalog user convenience. The selector tool helps catalog users to quickly identify the RF IC and/or SAW-based radio(s) that meet initial criteria. Go to www.RFM.com to locate the radio by part number and download the data sheet.

Turn the page for information on selecting Wi-Fi or Wi-Fi + Bluetooth combination modules.

Seven Key Questions (Match Question Number to Product Selection Table at Right)

1 Frequency:

In North or South America, if the application is for remote control choose 303 MHz or 433 MHz frequencies. If the application is for transmitting data choose 900 MHz.

In Europe, choose 433 MHz or 868 MHz for all applications.

In Asia and Pan Pacific, choose from any offered frequency. The RF power output is software programmable to meet the rules / regulations of a wide range of countries.

2 Data rate and range:

Choose the data rate and distance / line-of-sight range over which the remote control is to be activated or over which the data is to be transmitted.

3 RF Power and RX / TX Current:

Is long battery life or transmission distance primarily important? The lower the power / current the longer the battery life. The longer the transmission range the higher the power / current required to transmit over extended ranges.

Also, is the application to be powered by main or by battery? If battery, then obtaining the lowest power / current is critical.

4 Modulation and Technology:

Does the application require noise immunity or resistance to fading? Modulation enables transmission across a single channel (OOK/ASK) or multi-channel (FSK) to affect desired level of noise immunity. FSK and FHSS offers highest immunity to interference.

5 Features:

All SAW-based and RFIC short-range radios include a sleep mode feature to reduce power consumption.

Duty Cycle: Is programmable duty-cycle important (helps to regulate RF power output)? RFM 3rd generation SAW-based and RFIC short-range radios include a software programmable duty-cycle feature.

Clock Recovery: Is clock recovery needed within the RF device? RFM 3rd generation SAW-based and RFIC short-range radios have built-in clock recovery so that the microprocessor does not have to perform that function to minimize the processing overhead on the microprocessor. RFM 2nd generation short-range radios do not feature built-in clock recovery as they interface to encoders/decoders with built-in clock recovery.

Start Symbol: RFM's third generation SAW-based and RFIC short-range radios include a transmission start symbol option. The start symbol allows the receiver to automatically detect the start of a message, unloading this function from the host microprocessor. If automatic message detection by the radio is not mandatory, a second generation SAW-based radio can be used to achieve lowest receiver current.

6 Interface to microprocessor:

Does your microprocessor have limited I/O? If so choose a short-range radio with serial (SPI) interface. Choose a short-range radio with digital interface if your microprocessor requires digital I/O.

7 Package:

SAW-Based Short-range radios are encased in a rugged, self-shielding, metal ceramic, hybrid package. RFIC Short-range radios are encased in smaller plastic packages.

Customize. Don't see what you need? Contact the sales rep or distributor nearest you to discuss your specifications. For certain high volume applications, RFM customizes the company's proprietary RF IC and SAW-based short-range radios to meet custom specifications in a variety of markets, such as medical / healthcare, industrial, automotive, and consumer.

Short-Range Radio Selector Tool

	1 Frequency										2 Data Rate							3 Range			4 RF Power			5 TX Current					6 RX Current				7 Modulation & Technology						8 Features			9 Interface		10 Package					
	303.825 MHz	315 MHz	403.5 MHz	418 MHz	433.92 MHz	868.35 MHz	902.960 MHz	914 MHz	916.5 MHz	2.4 GHz	19.2 kb/s - FSK	32 kb/s - OOK	115.2 kb/s - OOK	200 kb/s - FSK	19.2 kb/s	115.2 kb/s	256 kb/s	Up to 1 Mb/s	100 m Line-of-Sight	200 m Line-of-Sight	600 m Line-of-Sight	0 dBm	4 dBm	10 dBm	Adjustable -10 dBm to + 10 dBm	6 mA	13 mA	15 mA	32 mA	1.8 mA	2.7 mA	3.3 mA	4.3 mA	18 mA	OOK / ASK	Single Channel	FSK	Multi-Channel	FHSS	DSSS	Duty Cycle	Clock Recovery	Start Symbol	Digital	SPI	3 mm X 3 mm	4 mm X 4 mm	5 mm X 5 mm	10 mm X 7 mm	11 mm X 7 mm	11 mm X 9.5 mm
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RX5003	✓															✓				✓									✓					✓								✓							✓
RX5005H					✓											✓				✓									✓					✓								✓							
RX5500					✓										✓					✓									✓					✓								✓							✓
RX5501		✓													✓					✓									✓					✓								✓							✓
RX6000								✓								✓				✓									✓					✓								✓					✓		
RX6001					✓											✓				✓									✓					✓								✓					✓		
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RX6501					✓										✓					✓									✓					✓								✓					✓		

RoHS Compliant

Wi-Fi & Wi-Fi + Bluetooth w/BLE Combo Modules

Wi-Fi and Bluetooth Compliant / Featuring BLE

Linux, Android and WinCE Drivers Available

for Selected TI and Freescale Processors

WHY CHOOSE WLS-SERIES?

Small size and low cost

High level of integration supports efficient design cycles for faster time-to-market

Best-in-Class Ti SoC provides reliability and customer assurance

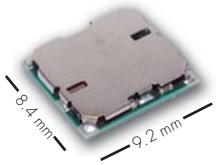
Minimal external circuitry required to complete a radio design / minimize BOM costs

RFM design support provided at lower volumes (10K-200K units) vs. other vendors, getting customers through certifications and to market faster

Reference Designs Available

Reference designs for the WLS-Series modules are made available to customers who purchase WLS-Series evaluation kits

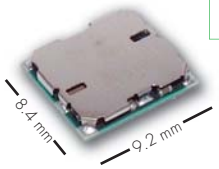
WLS1270
2.4 GHz



Wi-Fi Compliant Only

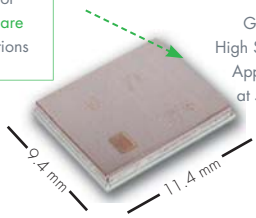
WLS1271L
2.4 GHz

802.11a Compliant Ideal for Healthcare Applications



WLS1273L
2.4 GHz & 5.8 GHz

Great for High Speed Data Applications at 5.8 MHz



Wi-Fi and Bluetooth Compliant + Bluetooth Low Energy

RFM WLS-Series Modules provide a solution that is design-optimized for high RF performance and to be size-efficient. These products are manufactured in an automated, high volume environment to provide a high-quality, low-cost solution. The WLS-Series modules represent best-in-class WLAN and Bluetooth coexistence technology on a single-chip and include high-efficiency RF front-end circuits plus a DC-DC converter. The module is designed to fit into small spaces, with minimal external circuitry required to complete a radio design, resulting in a cost-effective solution that reduces the product design cycle.

Wi-Fi and Bluetooth Compliant. To ease Wi-Fi and Bluetooth certifications, all three modules comply with IEEE 802.11b/g/n and WLS1273L complies with 11a/b/g/n, while the WLS1271L and WLS1273L modules comply with Bluetooth v 4.0 plus EDR, Power Class 1.5 + BLE.

FCC / ETSI Certifiable. The WLS-Series Modules are FCC and / or ETSI certifiable.

Standard Order Increments. WLS-Series products are shipped in tape and reel with standard order increment of 1,000 on 13" reels.

WLS-Series Wi-Fi / Bluetooth Combo Short-Range Radio Module					
RFM Part	Freq. (GHz)	IEEE 802.11	Bluetooth	Description	Case
WLS1270	2.412-2.485	b/g/n compliant	n/a	802.11b/g/n Radio Module	9.2 mm x 8.4 mm x 1.35 mm
WLS1271L	2.412-2.485	b/g/n compliant	4.0+EDR, Power Class 1.5+BLE	802.11b/g/n + Bluetooth Combo Radio Module	9.2 mm x 8.4 mm x 1.35 mm
WLS1273L	2.412 to 2.485 GHz 4.920 to 5.824 GHz	a/b/g/n compliant	4.0+EDR, Power Class 1.5+BLE	802.11a/b/g/n + Bluetooth Combo Radio Module	11.4 mm x 9.4 mm x 1.4 mm

IEEE 802.11 Specification Highlights			
IEEE 802.11	WLS1270	WLS1271L	WLS1273L
	b/g/n compliant	b/g/n compliant	a/b/g/n compliant
Operating Frequency Range	2.412 to 2.485 GHz		2.412 to 2.485 GHz 4.920 to 5.824 GHz
Power Output	Up to 16 dBm	Up to 18 dBm	
Supply Current (11/g)	Transmit 180 mA / Receive 100 mA		
Size	9.2 mm x 8.4 mm x 1.35 mm		11.4 mm x 9.4 mm x 1.4 mm
Microprocessor	Embedded ARM Microprocessor		
Operating Temp. Range	-40 °C to +85 °C		
Other	Supports SDIO host interface for WLAN		

Bluetooth Specification Highlights		
Bluetooth	WLS1271L	WLS1273L
	4.0 plus EDR, Power Class 1.5 +BLE	
Operating Frequency Range	2.4000 to 2.4835 GHz	
Power Output	Up to 8 dBm	
Supply Current	35 mA	
Data Rate	Up to 3 Mb/s	

Wi-Fi & Wi-Fi + Bluetooth w/BLE Combo Modules

Wi-Fi and Bluetooth Compliant / Featuring BLE

Fast-Track Your Designs with Evaluation Kits

RFM Part	DR-WLS1270-EV / DR-WLS1271L-EV	Evaluation Kit Contains:
DR-WLS1270-EV	 DR-WLS1273L-EV	• (1) Evaluation Board • CD with GUI • USB Cable • (1) Antenna in the WLS1270/71L Kits • (2) Antennas in the WLS1273L Kit
DR-WLS1271L-EV		
DR-WLS1273L-EV		BUY YOUR EVAL KIT NOW

Use Evaluation Kit to test:

- Wi-Fi RF performance
- Bluetooth RF performance
- SDIO interface
- Hi Speed USB interface
- Host Interface
- and more…

Small Quantities Available for Purchase

RFM Part	
WLS1270-S	Small quantities are available for design support. The "-S" P/Ns have been established to support small quantity procurement of WLS product for design activities. Contact your local RFM authorized sales representative or distributor for more information.
WLS1271L-S	
WLS1273L-S	

Driver Support. Thee majority of applications today are being developed in a combination with either Linux or Android operating systems due to their fast through-put capabilities in Wi-Fi / Bluetooth applications. RFM has available for designers Linux and Android drivers for OMAP processors, or driver source code is available that can be modified for other ARM Cortex A-Series processors.

Quick Time-to-Market

Platform	OS	Components
OMAP3 / OMAP4 / AM18x / AM37x	Linux 2.6	Mac Firmware / BT Scripts
	Android	
	WinCE 6	
i.Mx53 / i.Mx53QSB	Linux 2.6.35	Source / Drivers / Image
	Android Gingerbread	

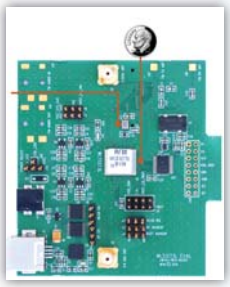
- The above Platforms and OS are the quickest time to market and require the least amount of Driver support.
- Only hardware design is needed for both Wi-Fi and Bluetooth.
- Other platforms or OS's require driver design or slight modification.

(OMAP™3 / OMAP™4 are trademarks of TI)

Reference Designs. RFM's reference designs for SDIO and host interface are available with RFM evaluation kits. These are valuable tools designers may use to speed up development cycles.

Sales & support. A worldwide network of RFM authorized sales representatives, distributors, and stocking representatives / distributors are available to serve customers. To locate a sales rep or distributor nearest you, please visit the company's website via the following URL http://www.rfm.com/contact_php/map.php

WLS1273L Wi-Fi + Bluetooth Combo Module Smaller than a Dime



WLS1273L Module Installed on DR-WLS1273L-EV Evaluation Board

TOP MARKETS

Medical / Healthcare / Pharmaceutical

Military / Homeland Security

Utilities Industries (Power, Gas and Water)

Consumer

Warehousing

Manufacturing Industries

TOP APPLICATIONS

Patient Monitoring Devices*

In-home Smart-Health Devices*

Healthcare Data Management / Tracking Apps*

Security Systems

Smart Energy - AMI / AMR

Consumer Products / White Goods

Set-Top Boxes

Gaming Devices

Smart Home Devices

Handheld Devices

Asset Tracking / RFIC

Industrial Control or Automation

***WLS1273L featuring 802.11a is particularly well-suited for Health / Wellness, Medical, and Sport / Fitness applications.**

Wi-Fi & Wi-Fi + Bluetooth w/BLE Combo Modules
Block Diagrams

Bluetooth v4.0 with low energy (BLE) technology paves the way for Bluetooth Smart™ devices

BLE enables new Bluetooth Smart devices that can operate for months or even years on tiny, coin-cell batteries.

BLE includes a low energy feature that is the basis for Bluetooth Smart devices

Ultra-low peak, average, and idle mode power consumption

Ability to run for years on standard, coin-cell batteries

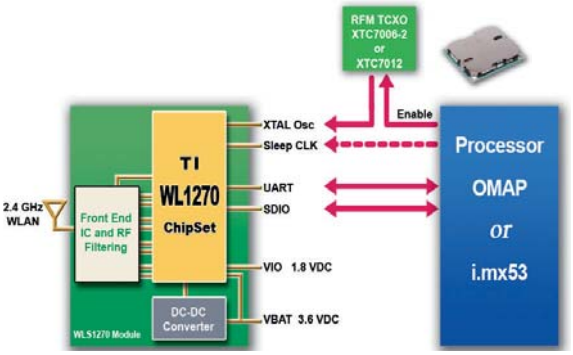
Low cost

Multi-vendor interoperability

Enhanced range

WLS1270 Features

- IEEE 802.11b/g and 11n compliant
- IEEE 802.11d,e,h,i,k,r,s compliant
- Chipset: Texas Instruments WL1270
- Size: 9.2 x 8.4 x 1.35 mm maximum
- Embedded ARM microprocessor
- Supports SDIO host interface for WLAN
- Lead free and RoHS compliant



WLS1270 WLAN Highlights

Data Rates:

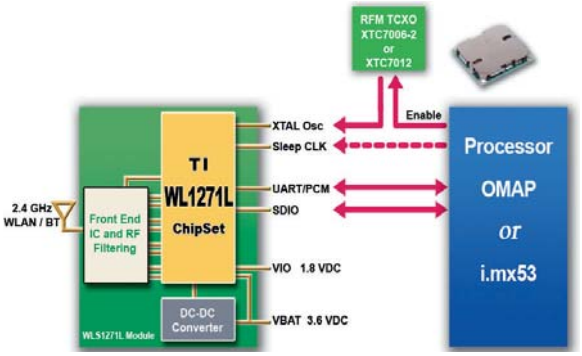
- 802.11n: 65, 58.5, 52, 39, 26, 19.5, 13, 6.5 Mb/s
- 802.11g: 54, 48, 36, 24, 18,12, 9, 6 Mb/s
- 802.11b: 11,5.5, 2, 1 Mb/s

Operating Frequency Range: 2.412 to 2.484 GHz

Output Power: up to 16 dBm
Supply Current: 11/g Transmit 180 mA / Receive 100 mA
Operating Temperature Range: -40 to 85 °C
Relative Humidity: 5 to 95%, non-condensing

WLS1271L Features

- IEEE 802.11b/g and 11n compliant
- IEEE 802.11d,e,h,i,k,r,s compliant
- Bluetooth v4.0 plus EDR, Power Class 1.5 +BLE
- The firmware running on the microprocessor includes the lower layers of the Bluetooth Protocol up to HCI available (Link Controller, Link Manager, HCI and HCI Transport Layer)
- Chipset: Texas Instruments WL1271L
- Size: 9.2 x 8.4 x 1.35 mm maximum
- Embedded ARM microprocessor
- Supports SDIO host interface for WLAN
- Lead free and RoHS compliant
- Supports H4 or H5 (UART) host interfaces and PCM audio interfaces for Bluetooth



WLS1271L WLAN Highlights

Data Rates:

- 802.11n: 65, 58.5, 52, 39, 26, 19.5, 13, 6.5 Mb/s
- 802.11g: 54, 48, 36, 24, 18,12, 9, 6 Mb/s
- 802.11b: 11,5.5, 2, 1 Mb/s

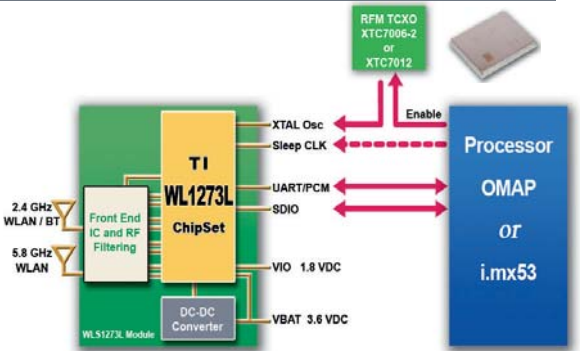
Operating Frequency Range: 2.412 to 2.484 GHz
Output Power: up to 18 dBm
Supply Current: 11/g Transmit 180 mA / Receive 100 mA
Operating Temperature Range: -40 to 85 °C
Relative Humidity: 5 to 95%, non-condensing

WLS1271L Bluetooth Highlights

Data Rates: up to 3 Mb/s
Operating Frequency Range: 2.4000 to 2.4835 GHz
Output Power: up to 8 dBm
Supply Current: 35 mA typical (DH1)

WLS1273L Features

- IEEE 802.11a/b/g and 11n compliant
- IEEE 802.11d,e,h,i,k,r,s compliant
- Bluetooth v4.0 plus EDR, Power Class 1.5 +BLE
- The firmware running on the microprocessor includes the lower layers of the Bluetooth Protocol up to HCI available (Link Controller, Link Manager, HCI and HCI Transport Layer)
- Chipset: Texas Instruments WL1273L
- Size: 11.2 x 9.4 x 1.35 mm maximum
- Embedded ARM microprocessor
- Supports SDIO host interface for WLAN
- Lead free and RoHS compliant
- Supports H4 or H5 (UART) host interfaces and PCM audio interfaces for Bluetooth



WLS1273L WLAN Highlights

Data Rates:

- 802.11a: 6, 9, 12, 24, 36, 48, 54 Mb/s
- 802.11n: 65, 58.5, 52, 39, 26, 19.5, 13, 6.5 Mb/s
- 802.11g: 54, 48, 36, 24, 18,12, 9, 6 Mb/s
- 802.11b: 11,5.5, 2, 1 Mb/s

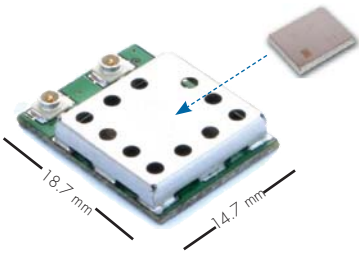
Operating Frequency Range: 2.412 to 2.484 GHz and 4.920 to 5.825 GHz
Output Power: up to 18 dBm
Supply Current: 11/g Transmit 180 mA / Receive 100 mA
Operating Temperature Range: -40 to 85 °C
Relative Humidity: 5 to 95%, non-condensing

WLS1273L Bluetooth Highlights

Data Rates: up to 3 Mb/s
Operating Frequency Range: 2.4000 to 2.4835 GHz
Output Power: up to 8 dBm
Supply Current: 35 mA typical (DH1)

New Certified Wi-Fi + Bluetooth Combo Module

FCC / IC Certified; Wi-Fi and Bluetooth Compliant



WLS1273L
2.4 GHz & 5.8 GHz

Great for
High Speed Data
Applications
at 5.8 MHz

New FCC / IC Certified Wi-Fi + Bluetooth Module with Bluetooth Low Energy.

RFM DR-WLS1273L-102 module provides 2.4 and 5.8 GHz WLANs plus Bluetooth functionality in a small form factor that is FCC/IC and ETSI compliant. The RFM WLS1273L module, which is based on the TI WL1273L SOC, is embedded within the DR-WLS1273L-102. This new certified version module features the optimized RF performance of the WLS1273L including a high-efficiency RF front end circuit, a stable 38.4 MHz internal reference clock, and U.FL coaxial RF connectors. An integrated DC-DC converter allows the module to operate from a single input voltage. The DR-WLS1273L-102 is designed to fit into small spaces and requires a minimum of external components to operate. Software drivers are available for Linux, Android, and WinCE operating systems. See page 7 for additional details.

- IEEE 802.11a/b/g + IEEE 802.11n WLAN MAC baseband processor
- IEEE 802.11n single stream data rates (MCSO-7) and SGI support
- Single-ended digital radio processor (DRP) RF implementation with internal LNA
- 4-bit SDIO WLAN host interface
- Cisco Client eXtension (CCX) supported
- Bluetooth Version 4.0 including 2 and 3 Mb/s enhanced data rates
- Lower Bluetooth layers up to HCI included
- Optimized for low current consumption in all operating modes
- Extremely low current sleep mode
- Integrated DC-to-DC converter provides single supply operation
- Miniature 51 pad CGA package, 18.7 x 14.7 x 3.8 mm

WLS-Series Wi-Fi / Bluetooth Combo Short-Range Radio Module					
RFM Part	Freq. (GHz)	IEEE 802.11	Bluetooth	Description	Case
DR-WLS1273L-102	2.412 to 2.485 GHz 4.920 to 5.824 GHz	a/b/g/n compliant	4.0+EDR, Power Class 1.5+BLE	802.11a/b/g/n + Bluetooth Combo Radio Module	18.7 mm x 14.7 mm x 3.8 mm

IEEE 802.11 Specification Highlights	
a/b/g/n Compliant	DR-WLS1273L-102
Operating Frequency Range	2.412 to 2.485 GHz 4.920 to 5.824 GHz
Power Output	Up to 18 dBm
Supply Current (11/g)	Transmit 180 mA / Receive 100 mA
Size	11.4 mm x 9.4 mm x 1.4 mm
Microprocessor	Embedded ARM Microprocessor
Operating Temp. Range	-40 °C to +85 °C
Other	Supports SDIO host interface for WLAN

Bluetooth Specification Highlights	
Bluetooth Compliant	DR-WLS1273L-102
4.0 plus EDR, Power Class 1.5 +BLE	
Operating Frequency Range	2.4000 to 2.4835 GHz
Power Output	Up to 8 dBm
Supply Current	35 mA
Data Rate	Up to 3 Mb/s

Developer Kit

See **PAGE 8** for Developer Kits. Utilize DR-WLS1273-DK.

Driver Support & Reference Designs

See **PAGE 8**.

802.11a Compliant ...

Ideal for Healthcare Applications

TOP MARKETS

- Medical / Healthcare / Pharmaceutical
- Military / Homeland Security
- Utilities Industries (Power, Gas and Water)
- Consumer
- Warehousing
- Manufacturing Industries

TOP APPLICATIONS

- Patient Monitoring Devices*
- In-home Smart-Health Devices*
- Healthcare Data Management / Tracking Apps*
- Security Systems
- Smart Energy - AMI / AMR
- Consumer Products / White Goods
- Set-Top Boxes
- Gaming Devices
- Smart Home Devices
- Handheld Devices
- Asset Tracking / RFIC
- Industrial Control or Automation

RoHS Compliant

RF ICs - Chip-Level Radios
Proprietary Transceivers and Transmitters

WHY CHOOSE TRC103 / TRC105?

300-960 MHz with Data Rates of 200 kb/s

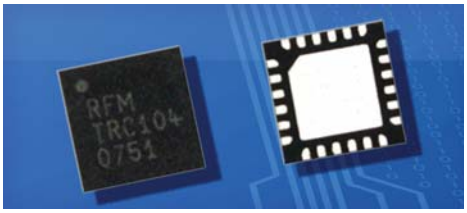
High Sensitivity of -112 mA

Current consumption in receive mode; receive current can be as low as 3.0 mA (TRC103) or 2.7 mA (TRC105)

Transmit at high data rate to reduce transmitter on time and save power

Utilizing the RSSI in receive mode, the transmit power can be adjusted to maintain the data link and minimize power consumption

5 mm X 5 mm Size



WHY CHOOSE TRC104?

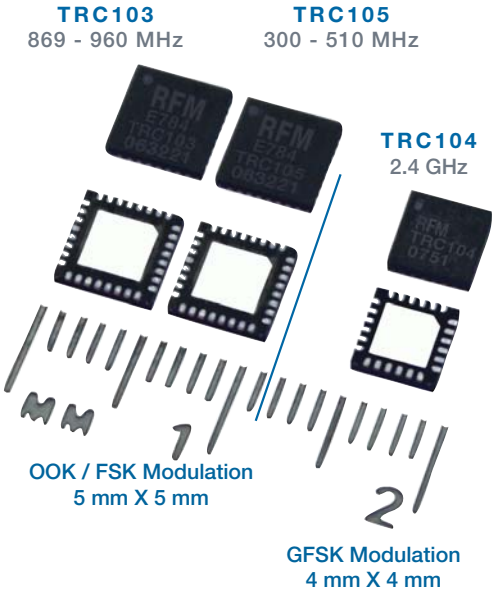
2.4 GHz with Data Rates Up to 1 Mb/s

Transmit power up to 1 mW with receive current at 18 mA

GFSK with FHSS Capability

4 mm X 4 mm Size

RFM RF ICs include PLL-based, single- or multi-channel transceivers and transmitters, evaluation boards and RF Design Assistant Software, servicing varied wireless applications in the marketplace and providing the following features:



- Integrated PLL, IF and Baseband Circuitry to minimize external component count and simplify / speed design-ins
- Support for single- and multiple-channel applications
- Wide frequency range
- Wide operating supply voltage
- Frequency Hopping Spread Spectrum capability
- Very few external components required
- Small size plastic packages

Transmitters					
RFM Part	Frequency	Data Rate	Output Power	Description	Case
TXC100	300 - 450 MHz	100 kb/s	10 dBm	ASK/FSK	3 mm x 3 mm

Transceivers					
RFM Part	Frequency	Data Rate	Output Power	Description	Case
TRC103	863 - 960 MHz	200 kb/s	13 dBm	Multi-channel OOK/ FSK	5 mm x 5 mm
TRC104	2.401 - 2.527 GHz	1 Mb/s	0 dBm	Multi-channel GFSK	4 mm x 4 mm
TRC105	300 - 510 MHz	200 kb/s	13 dBm	Multi-channel OOK/ FSK	5 mm x 5 mm

More Key Features

Duty Cycle. To help regulate RF power output and deliver ultra-lower-power performance, RFM RF ICs include software programmable duty-cycle.

Clock Recovery. The build-in clock recovery within RFM RF ICs minimizes processing overhead in the microprocessor. The microprocessor does not have to perform clock recovery function.

Start Symbol. The built-in transmission start symbol option is another function of the RFM RF ICs that minimizes processing overhead in the microprocessor. The start symbol allows the receiver to automatically detect the start of a message thus unloading this function from the host micro processor.

RF ICs - Chip-Level Radios
Proprietary Transceivers and Transmitters

Developer Kits
"Out-of-the-box" Operation Between Two Windows-based PCs

RFM Part	Frequency	Data Rate	Output Power	RFM Filter Part #
DR-TRC103-868-DK	863-870 MHz	200 kb/s	13 dBm	RF3501E
DR-TRC103-915-DK	902-928 MHz	200 kb/s	13 dBm	RF2040E or SF2093E
DR-TRC103-950-DK	950-960 MHz	200 kb/s	13 dBm	RF3601E
DR-TRC104-2400-DK	2.401-2.527 MHz	1 Mb/s	0 dBm	Not Needed
DR-TRC105-304-DK	303.325-307.3 MHz	200 kb/s	13 dBm	RF3602D
DR-TRC105-315-DK	310.0-319.5 MHz	200 kb/s	13 dBm	RF3603D
DR-TRC105-345-DK	342.0-348.0 MHz	200 kb/s	13 dBm	RF3607D
DR-TRC105-372-DK	365.0-381.0 MHz	200 kb/s	13 dBm	RF3608D
DR-TRC105-390-DK	382.0-398.0 MHz	200 kb/s	13 dBm	RF3604D
DR-TRC105-403-DK	402.0-407.3 MHz	200 kb/s	13 dBm	RF3605D
DR-TRC105-434-DK	416.395-436.395 MHz	200 kb/s	13 dBm	RF3606D
DR-TRC105-450-DK	447.0-451.0 MHz	200 kb/s	13 dBm	RF3609D

RFM Filters are delivered for the correct frequency in the associated developer kits.

Refer to this table when ordering production parts.

Each Developer Kit Contains:

- (2) DR Radio Boards
- (2) DR Interface Boards
- (2) Dipole Antennas
- (2) USB 2.0 A/B Cables
- (2) Universal Wall-plug Power Supplies
- (2) AA Battery Packs
- (4) AA Batteries
- CD Containing: RF IC Design Assistant Software, KIT Firmware Source Code, User Guide

DR-TRC104-2400-DK

DR-TRC103-DK
DR-TRC105-DK Series

BUY YOUR DEV KIT NOW

Evaluations Kits

RFM Part	Frequency	Data Rate	Output Power	RFM Filter Part #
DR-TRC103-868-EV	863-870 MHz	200 kb/s	13 dBm	RF3501E
DR-TRC103-915-EV	902-928 MHz	200 kb/s	13 dBm	RF2040E or SF2093E
DR-TRC103-950-EV	950-960 MHz	200 kb/s	13 dBm	RF3601E
DR-TRC104-2400-EV	2.401-2.527 MHz	1 Mb/s	0 dBm	Not Needed
DR-TRC105-304-EV	303.325-307.3 MHz	200 kb/s	13 dBm	RF3602D
DR-TRC105-315-EV	310.0-319.5 MHz	200 kb/s	13 dBm	RF3603D
DR-TRC105-345-EV	342.0-348.0 MHz	200 kb/s	13 dBm	RF3607D
DR-TRC105-372-EV	365.0-381.0 MHz	200 kb/s	13 dBm	RF3608D
DR-TRC105-390-EV	382.0-398.0 MHz	200 kb/s	13 dBm	RF3604D
DR-TRC105-403-EV	402.0-407.3 MHz	200 kb/s	13 dBm	RF3605D
DR-TRC105-434-EV	416.395-436.395 MHz	200 kb/s	13 dBm	RF3606D
DR-TRC105-450-EV	447.0-451.0 MHz	200 kb/s	13 dBm	RF3609D
DR-TXC100-315	315 MHz	100 kb/s	10 dBm	
DR-TXC100-433	433.92 MHz	200 kb/s	10 dBm	

Use for initial evaluation of RFM RF IC radio technology.

Prototype applications that will be using the RFM RF IC radios.

Each Evaluation Kit Contains:

- (2) DR Evaluation Radio Boards
- (2) Dipole Antennas
- (2) AA Battery Packs
- (4) AA Batteries
- User Guides

DR-TRC103 / DR-TRC105 Series Evaluation Kit

DR-TXC100 Evaluation Board

Evaluation Board in the DR-TRC104-2400-EV

TOP MARKETS

Utilities (power, gas , water)

Consumer Electronics and Residential

Commercial and Retail

Automotive

Medical / Healthcare

TOP APPLICATIONS

Automated Meter Reading

Building Automation

Security Systems / Controlled Entry

Two-Way RKE

Industrial Controls

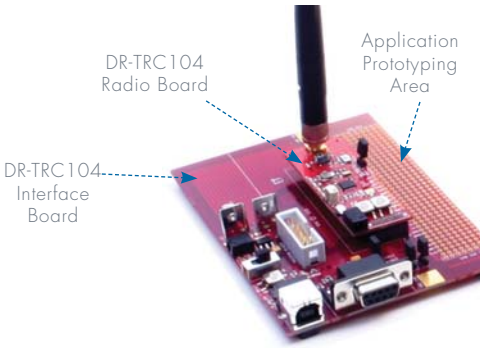
Asset Tracking / RFID

Sports & Recreation Equipment

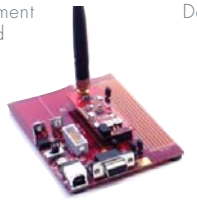
Low-Power Two-Way Telemetry Systems

Patient Monitoring / Medial Alert Pendants

RF IC Development Boards



DR-TRC103-DK
DR-TRC105-DK
Development
Board

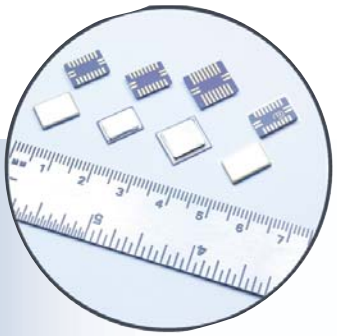


DR-TRC104-DK
Development
Board

RoHS Compliant

SAW-Based Short-Range Radios: Chip-Level Radios

Proprietary ASH Technology; Transceivers, Transmitters and Receivers



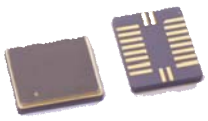
SM-20L Package
10.8 mm X 9.52 mm

SM-20L Case

SM-20H Package
10.2 mm X 7.06 mm

SM-20H Case

SM3-20H Package
10.7 mm X 6.8 mm



THIRD GENERATION

- Longer range: 600 meters line-of-sight
- Very low power with excellent receiver sensitivity
  - TX current of 32 mA
  - RX current of 4.3 mA
- Data rates: 115.2 kb/s
- Adjustable Transmit Power up to 10 mW
- Sleep Mode Current 200 nA
- SPI Interface
- Additional features include DSSS, Clock Recovery, and Start Symbol

SECOND GENERATION

- Short range: 200 meters line-of-sight
- Ultra low-power consumption with very long batter life
  - TX current of 6 mA
  - RX current of 1.8 mA
- Data rates: 115.2 kb/s to 1 Mb/s
- Adjustable Transmit Power up to 0 dBm
- Sleep Mode Current 700 nA
- Digital Interface

THIRD GENERATION

	RFM Part	Frequency	max Data Rate	Output Power	Case	Dev Kit Part #
TRANSCEIVERS	TR7000	916.4 MHz	115.2 kb/s	10 mW	10.7 mm X 6.8 mm	DR7000-DK
	TR7001	868.35 MHz	115.2 kb/s	10 mW	10.7 mm X 6.8 mm	DR7001-DK
	TR7002	914 MHz	115.2 kb/s	10 mW	10.7 mm X 6.8 mm	DR7002-DK
	TR7003	916.5 MHz	115.2 kb/s	10 mW	10.7 mm X 6.8 mm	DR7003-DK
	TR8000	433.92 MHz	115.2 kb/s	10 mW	10.7 mm X 6.8 mm	DR8000-DK
	TR8001	315 MHz	115.2 kb/s	10 mW	10.7 mm X 6.8 mm	DR8001-DK
	TR8100	418 MHz	115.2 kb/s	10 mW	10.7 mm X 6.8 mm	DR8100-DK

SECOND GENERATION

	RFM Part	Frequency	Max Data Rate	Output Power	Case	Dev Kit Part #
TRANSCEIVERS	TR1000	916.4 MHz	115.2 kb/s	1 mW	10.2 mm X 7.06 mm	DR2000-DK
	TR1001	868.35 MHz	115.2 kb/s	1 mW	10.2 mm X 7.06 mm	DR1201-DK
	TR1004	914 MHz	115.2 kb/s	1 mW	10.2 mm X 7.06 mm	
	TR1100	916.5 MHz	1 Mb/s	1 mW	10.2 mm X 7.06 mm	DR3300
	TR3000	433.92 MHz	115.2 kb/s	1 mW	10.8 mm X 9.52 mm	DR1300-DK
	TR3001	315 MHz	115.2 kb/s	1 mW	10.8 mm X 9.52 mm	DR3101
	TR3002	418 MHz	115.2 kb/s	1 mW	10.8 mm X 9.52 mm	
	TR3003	303.825 MHz	115.2 kb/s	1 mW	10.8 mm X 9.52 mm	
	TR3005	403.5 MHz	115.2 kb/s	1 mW	10.2 mm X 7.06 mm	
	TR3006HS	314 MHz	115.2 kb/s	1 mW	10.7 mm X 6.8 mm	
	TR3100	433.92 MHz	576 kb/s	1 mW	10.8 mm X 9.52 mm	
TRANSMITTERS	TX5000	433.92 MHz	115.2 kb/s	1 mW	10.8 mm X 9.52 mm	DR4100
	TX5001	315 MHz	115.2 kb/s	1 mW	10.8 mm X 9.52 mm	DR4101
	TX5002	418 MHz	115.2 kb/s	1 mW	10.8 mm X 9.52 mm	
	TX5003	303.825 MHz	115.2 kb/s	1 mW	10.8 mm X 9.52 mm	DR4103
	TX6000	916.5 MHz	115.2 kb/s	1 mW	10.2 mm X 7.06 mm	DR4000
	TX6001	868.35 MHz	115.2 kb/s	1 mW	10.2 mm X 7.06 mm	DR4001
	TX6004	914 MHz	115.2 kb/s	1 mW	10.2 mm X 7.06 mm	
RECEIVERS	RX5000	433.92 MHz	115.2 kb/s		10.8 mm X 9.52 mm	DR5100
	RX5000H	433.92 MHz	115.2 kb/s		10.2 mm X 7.06 mm	
	RX5001	315 MHz	115.2 kb/s		10.8 mm X 9.52 mm	DR5101
	RX5002	418 MHz	115.2 kb/s		10.8 mm X 9.52 mm	
	RX5003	303.825 MHz	115.2 kb/s		10.8 mm X 9.52 mm	DR5103
	RX5005H	433.42 MHz	115.2 kb/s		10.2 mm X 7.06 mm	
	RX5500	433.92 MHz	19.2 kb/s		10.8 mm X 9.52 mm	
	RX5501	315 MHz	19.2 kb/s		10.8 mm X 9.52 mm	
	RX5502H	434.52 MHz	115.2 kb/s		10.2 mm X 7.06 mm	
	RX6000	916.5 MHz	115.2 kb/s		10.2 mm X 7.06 mm	DR5000
	RX6001	868.35 MHz	115.2 kb/s		10.2 mm X 7.06 mm	DR5001
	RX6004	914 MHz	115.2 kb/s		10.2 mm X 7.06 mm	
	RX6501	868.35 MHz	19.2 kb/s		10.2 mm X 7.06 mm	

RF UART Integrated Circuits

RFM Part		
IC1000	Data / Clock Extraction	k04-057
IC1003	RF UART IC	vq65

WHY CHOOSE THIRD GEN?

Long range at 600 meter line-of-sight transmission

Sleep mode current 200 nA extends battery life

SPI interface

WHY CHOOSE SECOND GEN?

Lowest power consumption in industry / smaller battery and overall footprint (TX current of 6 mA and RX current of 1.8 mA)

Adjustable data rates from 115.2 kb/s to 1 Mb/s

SAW-Based Short-Range Radios: Chip-Level Radios

Proprietary ASH Technology; Transceivers, Transmitters and Receivers

The RFM SAW-based short-range radios feature RFM's proprietary amplifier sequenced hybrid (ASH) architecture; integrated RF ICs with quartz SAW filtering plus frequency control components built into a single custom integrated circuit.

The ASH architecture delivers ultra-low-power consumption and long range in a miniature sized surface-mount package while also ensuring greater frequency stability, reliability and out-of-band rejection in a crowded frequency spectrum.

SAW-Based Developer Kits
"Out-of-the-box" Operation Between Two Windows-based PCs

RFM Part	Frequency	Data Rate	Output Power
DR1200A-DK	916.5 MHz	2 kb/s	1 mW
DR1200-DK	916.5 MHz	22.5 kb/s	1 mW
DR1201A-DK	868.35 MHz	2 kb/s	1 mW
DR1201-DK	868.35 MHz	22.5 kb/s	1 mW
DR1300A-DK	433.92 MHz	2 kb/s	1 mW
DR1300-DK	433.92 MHz	22.5 kb/s	1 mW
DR2000-DK	916.5 MHz	115.2 kb/s	1 mW
DR7000-DK	433.82 MHz	115.2 kb/s	10 mW
DR7001-DK	315 MHz	115.2 kb/s	10 mW
DR7002-DK	418 MHz	115.2 kb/s	10 mW
DR7003-DK	303.825 MHz	115.2 kb/s	10 mW
DR8000-DK	916.5 MHz	115.2 kb/s	10 mW
DR8001-DK	868.35 MHz	115.2 kb/s	10 mW
DR8100-DK	916.5 MHz	115.2 kb/s	10 mW

Each Developer Kit Contains:

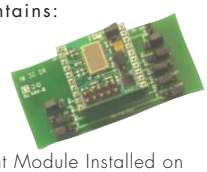
- (2) DR Development Boards
- (2) USB 2.0 Cables
- (2) 9 V Batteries
- (2) tuned, SMA Antennas
- Program CD with Documentation
- Configuration Software

SAW-Based Transceiver Evaluation Kits - Third Generation ASH Technology ONLY

RFM Part	Frequency	Data Rate	Output Power
DR7000-EV	433.92 MHz	115.2 kb/s	10 mW
DR7001-EV	315 MHz	115.2 kb/s	10 mW
DR7003-EV	303.825 MHz	115.2 kb/s	10 mW
DR8000-EV	916.5 MHz	115.2 kb/s	10 mW
DR8001-EV	868.35 MHz	115.2 kb/s	10 mW
DR8100-EV	916.5 MHz	115.2 kb/s	10 mW

Each Developer Kit Contains:

- (1) DR Module
- (1) Interface Board w/ Microprocessor



SAW Radio Development Module Installed on an Evaluation Board with Microprocessor

SAW-Based Radio Development Modules for Selected TR, TX, RX

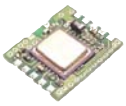
RFM Part	Frequency	Data Rate	Output Power
DR3000	916.5 MHz	2.4 kb/s	1 mW
DR3000-1	916.5 MHz	115.2 kb/s	1 mW
DR3001	868.35 MHz	2.4 kb/s	1 mW
DR3100	433.92 MHz	2.4 kb/s	1 mW
DR3100-1	433.92 MHz	115.2 kb/s	1 mW
DR3101	315 MHz	2.4 kb/s	1 mW
DR3300	916.5 MHz	1 Mb/s	1 mW
DR4000	916.5 MHz	115.2 kb/s	1 mW
DR4001	868.35 MHz	115.2 kb/s	1 mW
DR4100	433.92 MHz	115.2 kb/s	1 mW
DR4101	315 MHz	115.2 kb/s	1 mW
DR4103	303.825 MHz	115.2 kb/s	1 mW
DR5000	916.5 MHz	19.2 kb/s	1 mW
DR5001	868.35 MHz	19.2 kb/s	1 mW
DR5100	433.92 MHz	19.2 kb/s	1 mW
DR5101	315 MHz	19.2 kb/s	1 mW
DR5103	303.825 MHz	19.2 kb/s	1 mW
DR7000	433.92 MHz	115.2 kb/s	10 mW
DR7001	315 MHz	115.2 kb/s	10 mW
DR7003	303.825 MHz	115.2 kb/s	10 mW
DR8000	916.5 MHz	115.2 kb/s	10 mW
DR8001	868.35 MHz	115.2 kb/s	10 mW
DR8100	916.5 MHz	115.2 kb/s	10 mW

Each Developer Kit Contains:

- (1) DR Module
- (1) Interface Board w/Microprocessor

10.2 mm X 7.06 mm Surface Mount Package

10.8 mm X 9.52 mm Surface Mount Package



10.7 mm X 6.8 mm Surface Mount Package

TOP MARKETS

Medical / Healthcare (Implants)

Automotive

Utilities (Power, Gas and Water)

Consumer Electronics and Residential

Commercial and Retail

SAW-Based (ASH)

TOP APPLICATIONS

Pacemakers and Defibrillators

Insulin Pumps, Monitors

Patient Monitoring / Medial Alert Pendants

Security Systems / Controlled Entry

Wireless Thermostats / Metering

Window Controls (Blinds / Drapes)

Auto Theft Deterrent Systems

Two-Way RKE

Asset Tracking / RFID

Sports & Recreation Equipment

Low-Power Two-Way Telemetry Systems

ASH RX & TR Architecture Delivers

50% Power Savings

Over Superheterodyne

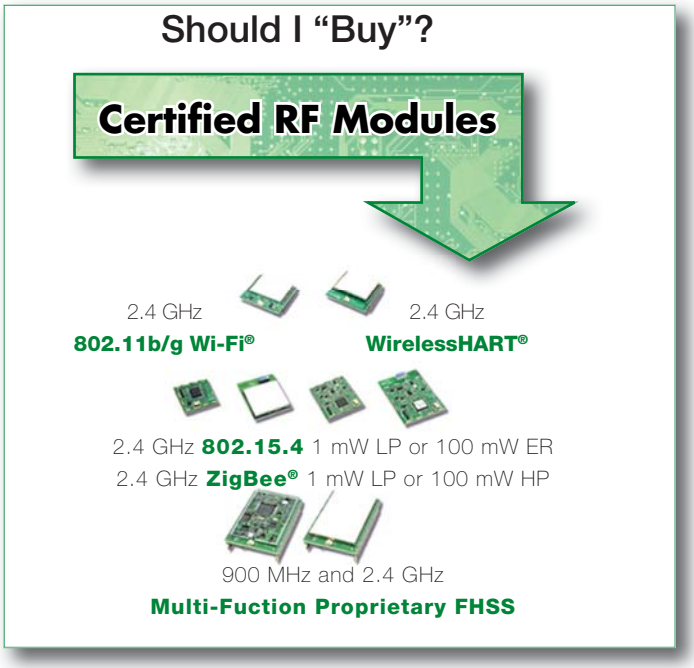
RX & TR Architecture

RFM SAW-based short-range radios feature excellent suppression of output harmonics and generate virtually no RF emissions ...

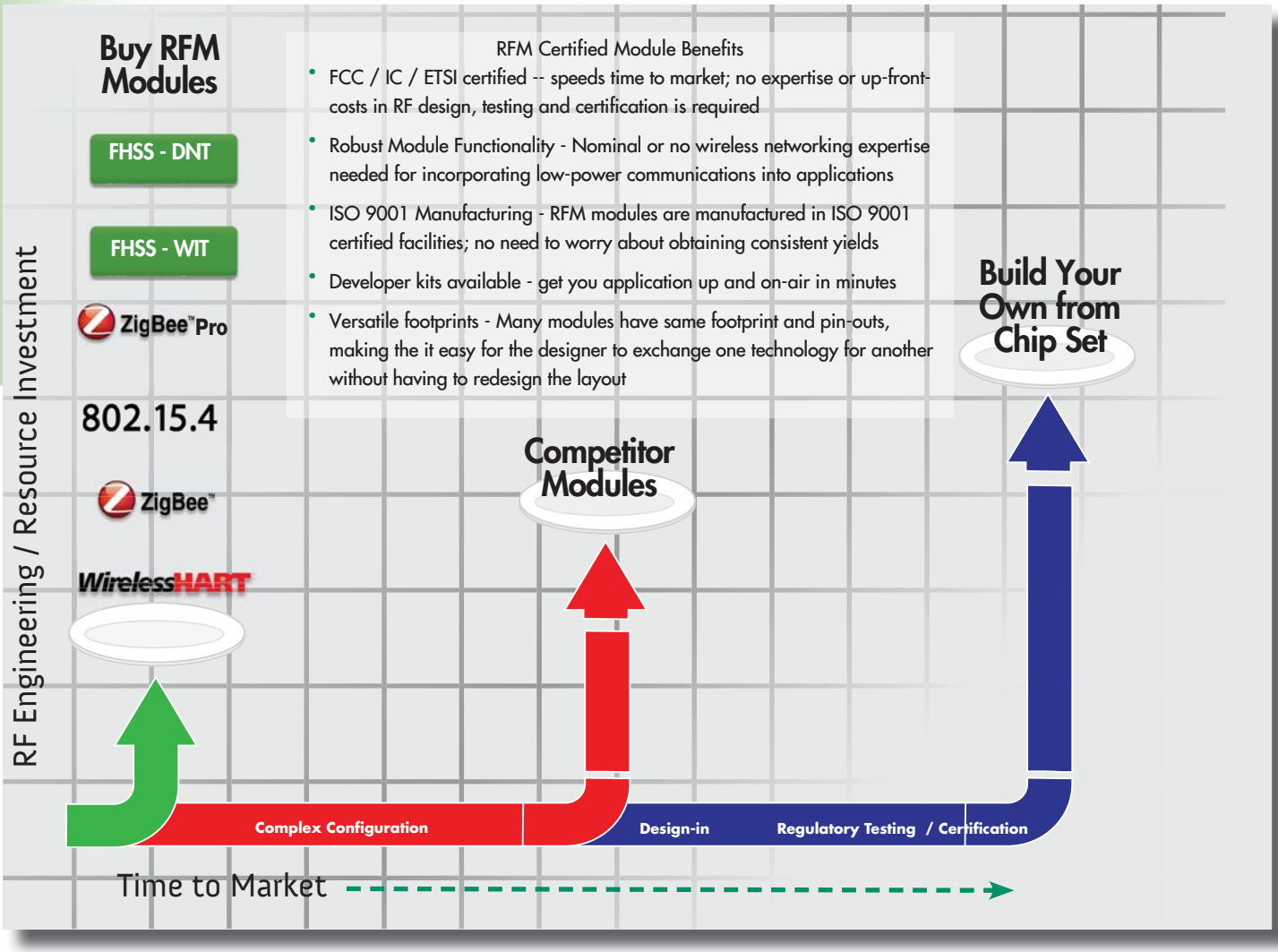
...thus making them easy to certify to short-range (unlicensed) radio regulations.

RoHS Compliant

If the answer is yes, then RFM certified RF modules are ideal.



OEMs utilize RFM certified RF modules when their marketing requirements necessitate faster time-to-market, a reduced design engineering time-frame and / or reduced design costs. Often, OEMs also choose RFM certified RF modules because they do not possess or have access to expert RF engineering / and or wireless networking expertise for incorporating low-power communications into their applications, including lacking proper RF design, engineering, and testing facilities and equipment. And sometimes, they simply do not want to be concerned with the manufacturing of RF elements or managing ongoing RF yields in product manufacturing, preferring to leave that to RFM as the RF module supplier.



Signage | Transportation | Building Automation / Control | Agriculture | Industrial

Certified RF Modules

For more than twenty years, even the most intrepid design engineers have called upon RFM for ready-made, pre-certified RF modules when adding wireless connectivity in their applications. RFM has built an expert-level foundation in frequency hopping spread spectrum (FHSS), helping industrial and manufacturing companies cut the wires in SCADA and wireless industrial telemetry.

In recent years, as advancements in standards such as Bluetooth, Wi-Fi, ZigBee and WirelessHART have come about, RFM has been delivering best-in-class standards-based certified modules, helping OEMs connect and network more devices, equipment and processes than ever before.

KEY FEATURES & BENEFITS OF RFM CERTIFIED RF MODULES

ALL RFM OEM modules come with FCC / IC and ETSI module certification, as applicable

No FCC or ETSI-type acceptance testing is required

Each RFM transceiver module is treated just like other integrated circuits, with reflow soldering or connector pins for optional use

Small-size, there is no size penalty associated with the convenience of a module

Twenty+ years' experience in certified RF module business and manufacturing

Broad range of frequencies and technologies

Standards-Based modules: Wi-Fi, ZigBee Pro with Smart Energy Profile, 802.15.11 / ZigBee Standard, and WirelessHART

Broad range of frequency hopping spread spectrum (FHSS) options from simple low-cost yet ultra-reliable applications to SCADA and sophisticated industrial telemetry applications

Saves Time & Money, Small Size Easy-to-Configure & Design-In

Wi-Fi • ZigBee Pro • 802.15.4 • WirelessHART • 802.15.4

Easy Configuration & Integration

Few modules offer the ease of configuration and implementation like RFM certified modules. Examples include:

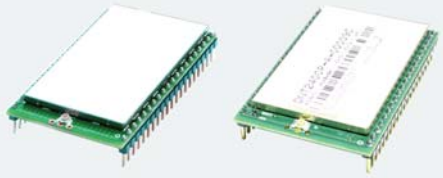
- RFM's new DNT-series of FHSS of modules with configurable data rates and RF power, among other easy-to-configure and -integrate features.
- The WSN-series of Wi-Fi sensor networking modules with Enterprise Security Level software.
- The WirelessHART module for process manufacturing with its network manager that is highly configurable so that an OEM may fine-tune the application.
- The RFM LPR-series of 802.15.4 arrives with a simple-to-use API, so there is no need for the design engineer to write custom code.

RFM FLAGSHIP MODULES - FREQUENCY HOPPING SPREAD SPECTRUM (FHSS) TECHNOLOGY. PAGES 17-25

Based on RFM's proprietary frequency hopping spread spectrum (FHSS) technology, RFM's FHSS modules are especially well-suited to commercial, industrial and factory environments. They ensure long-range data throughput even in the presence of electrical noise and multi-path fading. RFM offers two lines of unique, proprietary FHSS modules.

DNT Series

- **DNT Series 900 MHz and 2.4 GHz Low-Cost, Multi-Purpose FHSS Networking (PAGES 20-23).** Highly-reliable multi-purpose FHSS modules for sensor networking for RF data rates of 38 kb/s to 500 kb/s, offered at a very low-price.

For Very Cost Sensitive Applications		For Applications Needing Extended Range or High Level of Flexibility
	Analog, Digital I/O and Serial Data Sleep Mode and Auto Reporting Multipoint, Point-to-Point, Peer-to-Peer Networks AES-128 Encryption	
DNT90 / DNT24 900 MHz / 2.4 GHz		**DNT900 / DNT2400** 900 MHz / 2.4 GHz
DNT90 100 kb/s DNT24 250 kb/s	**Data Rates**	Configurable data rates from 38 kb/s to 500 kb/s
DNT90 5+ Miles LOS* DNT24- 5+ Miles LOS with gain antennas **Extend Range with** **Store-and-Forward Repeating**	**Long Range**	DNT900 40+ Miles DNT2400 5+ Miles **Efficiently Increase Coverage Area with** **Tree Routing**
DNT90 40 mW or 150 mW DNT24 10 mW or 100 mW	**Configurable RF Power**	DNT900 1 mW to 1 W DNT2400 1 mW to 100 mW

WIT Series

- **WIT Series 900 MHz and 2.4 GHz FHSS Networking (PAGES 24-25).** RFM's ultra-reliable FHSS modules for wireless telemetry applications for RF data rates of 172.8 kb/s to 1.23 Mb/s.

900 MHz*		2.4 GHz	
			
172.8 kb/s **WIT910** @ 1 W	460.8 kb/s **WIT2410** @ 10-100 mW **WIT2450** @ 40-250 mW	921.6 kb/s **WIT2492** @ 10-100 mW	1.23 Mb/s **WIT2411*** @ 10-100 mW

- See "FHSS BOXED RADIO TELEMETRY" overview on the next page for more information regarding the RFM line of FHSS Serial Modems, Serial-to-Ethernet Access Points, and Ethernet Bridges that are built upon the RFM WIT FHSS modules. They are either paired in applications based upon WIT technology or as stand-alone devices in applications needing FHSS reliability and robustness.

RF Modules Portfolio Overview — FCC / IC / ETSI Certified Transceivers

For Wireless Sensor Networking, Wireless Telemetry, and M2M Applications

Battery-Powered Wi-Fi® Sensor Networking

WSN802G

PAGES 26-27

- 2.4 GHz 802.11b/g/n Transceiver
- Makes use of existing Wi-Fi infrastructure
- Up to 11 Mb/s data rate
- Analog & digital I/O
- Timer & event triggered auto-reporting
- WPA2-PSK security
- No coprocessor required
- Full function module firmware

Ultra-Small ZigBee® Pro Module for Smart Energy and Home / Building Automation

ZPM3570

PAGES 28-29

- 2.4 GHz ZigBee Pro Transceiver
- Built around Ember®'s EM357 ZigBee RFIC
- Tiny footprint of less than .063 in^2
- Analog, Digital I/O and Serial data
- Transmitter power of 100 mW (+200 dBm)
- Receive sensitivity of -100 dBm
- Over-the-air module programming and configuration
- Smart Energy and Home Automation Profiles
- AES-128 Encryption
- UART and SPI port
- 1 MB flash memory to accommodate data logging requirements

Add WirelessHART® to Your Process Field Devices

XDM2510H

PAGES 34-35

- 2.4 GHz IEEE 802.15.4 Transceiver
- Features Dust Networks IA-510(H) technology
- Very low current consumption
- Greater than 99.99% communications reliability
- Battery-powered nodes up to 10 years
- Self-organizing / self-healing mesh
- Channel Hopping IEEE 802.15.4
- Sleeping battery-powered routers
- Companion Ethernet gateway / network manager

Certified Modules - At a Glance

LPR Series

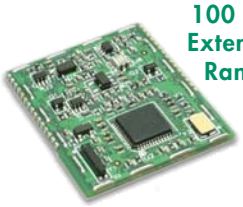
- **LPR2430 Series 2.4 GHz 802.15.4 Wireless Sensor Networking (PAGES 30-31).** Comprised of the low-power 1 mW RF power LPR2430 / LPR2430A and the extended range 100 mW RF power LPR2430ER / LPR2430ERA, the RFM LPR Series modules provide the flexibility and versatility to serve a variety of applications, from simple cable replacement to remote terminal data collection to sophisticated sensor networks. The LPR Series modules are easy to integrate and provide robust wireless communications in applications where meshing is not needed or desired.

1 mW Low Power

LPR2430 OR **ZMN2430**

LPR2430A OR **ZMN2430A** with Chip Antenna

100 mW Extended Range



LPR2430ER OR **ZMN2430HP**

LPR2430ERA OR **ZMN2430HPA** with Chip Antenna

ZMN Series

- **ZMN2430 Series 2.4 GHz 802.15.4 ZigBee® Wireless Sensor Networking (PAGE 32-33).** Comprised of the low-power 1 mW RF power ZMN2430 / ZMN2430A and the high power 100 mW ZMN2430HP / LPR2430HPA, the RFM ZMN2430 Series modules are based on the IEEE 802.15.4 wireless standard and the ZigBee protocol stack. The ZMN Series modules are easy to integrate and provide robust wireless mesh networking.

HN-, SNAP-, and SEM-Series FHSS Boxed Radios **(PAGES 37-39).** RFM offers 900 MHz and 2.4 GHz Proprietary FHSS boxed radios which are built upon RFM WIT series modules. Whether paired with RFM WIT Series RF modules or used standalone, RFM FHSS boxed radios are ideal for fixed wireless network applications for a wide range of indoor, outdoor, and harsh environments. They are available in 900 MHz and 2.4 GHz versions, support data rates of 172.8 kb/s to 1.23 Mb/s, are Class I Div 2 certified, and support Modbus, DNP3, and DF1 protocols. They come in a variety of enclosures, some including NEMA 4X and IP. 66 rated enclosures with an effective operating temperature range of -30 °C to +70 °C. Most are DIN-rail mountable.

SNAP Serial-to-Ethernet Access Points

(PAGE 37)

900 MHz*	**2.4 GHz**	**2.4 GHz***
Used with WIT910-based devices	Used with WIT2410-based devices	Used with WIT2411-based devices

SEM Ethernet Bridges

(PAGE 38)

900 MHz*	**2.4 GHz**	**2.4 GHz***
172.8 kb/s 1 W	460.8 kb/s 100 mW	1.23 Mb/s 100 mW

HN Serial Modems

(PAGE 39)

900 MHz*
172.8 kb/s
1 W

2.4 GHz
460.8 kb/s
40 mW / 100 mW / 250 mW

2.4 GHz
460.8 kb/s
100 mW

2.4 GHz
1.23 Mb/s
100 mW

RF Module Selection Tool

Consider the seven key questions below matching them to the product selection tables to identify the part number for the module that is most suitable for your application. Then locate the part number in the catalog and select the developer kit part number. Order your developer kit today!

	1 FREQUENCY			2 MAX RF DATA RATE									2 RANGE										3 RF POWER						4 STANDARD						5 NET-WORK			6 TECH-NOLOGY			7 INTER-FACE	
	434 MHz	900 MHz	2.4 GHz	4.8 kb/s	9.6 kb/s	100 kb/s	172.8 kb/s	250 kb/s	460.8 kb/s	500 kb/s	1.23 Mb/s	11 Mb/s	Indoor 30 m	Indoor 100 m	Indoor >100 m	Outdoor 30 m	Outdoor 100 m	Outdoor 250 m	Outdoor 500 m	Outdoor 1,000 m	Outdoor 10,000 m	Outdoor >10,000 m	1 mW	10 mW	100 mW	150 mW	250 mW	1 W	ZigBee Pro	ZigBee Standard	802.15.4	Proprietary	802.11	WirelessHART	Mesh/S&F	Multipoint	Peer-to-Peer	Narrowband	Frequency Hopping	Direct Sequence	UART Only	I/O and UART
DNT90		✓				✓							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓						✓			✓	✓	✓		✓			✓
DNT900		✓								★			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓			✓	✓	✓		✓			✓
DNT24			✓					✓					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓							✓			✓	✓	✓		✓			✓
DNT2400			✓							★			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓			✓	✓	✓		✓			✓
LPR2430			✓					✓					✓	✓		✓	✓						✓								✓					✓	✓			✓		✓
LPR2430A			✓					✓					✓	✓		✓	✓						✓								✓					✓	✓			✓		✓
LPR2430ER			✓					✓					✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓						✓					✓	✓			✓		✓
LPR2430ERA			✓					✓					✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓						✓					✓	✓			✓		✓
WIT910		✓				✓	✓						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓				✓				✓			✓		✓		
WIT2410			✓						✓				✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓							✓				✓			✓		✓		
WIT2411			✓								✓		✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓							✓				✓			✓		✓		
WIT2450			✓						✓				✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓					✓				✓			✓		✓		
WSN802G			✓									★	✓			✓	✓							✓									✓				✓				✓		✓
XDM2510H			✓					✓					✓	✓	✓	✓	✓	✓					✓	✓										✓	✓			✓			✓	
ZMN2430			✓					✓					✓	✓		✓	✓						✓							✓					✓					✓			✓
ZMN2430A			✓					✓					✓	✓		✓	✓						✓							✓					✓					✓			✓
ZMN2430HP			✓					✓					✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓					✓					✓					✓			✓
ZMN2430HPA			✓					✓					✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓					✓					✓					✓			✓
ZPM3570			✓					✓					✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓				✓			✓			✓					✓			✓

★Modules can be software configured for lower rates.

1 Frequency: If the product application will be offered in many countries 2.4 GHz modules provide a single solution for all markets. If the product will be marketed in:

- N. or S. America choose 900 MHz or 2.4 GHz
- Europe or China choose 434 MHz or 2.4 GHz
- Japan or Korea choose 2.4 GHz
- Australia or New Zealand choose 434 MHz, 900 MHz, or 2.4 GHz

2 Data rate and range: Does the application require low, medium, or high data through-put? Over what indoor or outdoor distance is data to be transmitted?

3 RF Power: Is long battery life or transmission distance the primary importance? The lower the RF power - the longer the battery life. The longer the transmission range – the higher the RF power required to transmit over extended ranges. Also, is the application to be powered by AC mains or by battery? If battery-powered, then obtaining the lowest RF power is important.

4 Standards: If standards-compatible products or standards-based wireless communications is important for the product application then choose ZigBee, 802.15.4, or 802.11b/g. If lowest power is most important choose mesh. If highest resistance to interference is most important then choose FHSS mesh or proprietary FHSS.

5 Network Topology: If the application requires a decentralized network topology where if a node fails it will dynamically find and re-route the data (like the Internet), then choose mesh. Further, if in a mesh network topology the application requires devices to be mobile, then choose RFM proprietary mesh. Choose point-to-point or point-to-multi-point network topology if a centralized network topology bearing very low attendant overhead costs is most important.

6 Technology: The product application primarily operates where:

- long-range and/or high data-rate transmission within adverse conditions (e.g., industrial), FHSS provides secure and highly reliable RF transmission that is resistant to interference
- high data-rate transmission, particularly for Ethernet LAN, 802.11b/g provides wireless communications for data rates of 11 Mb/s
- a balance between data rate and power consumption is important, 802.15.4 and ZigBee technology provide rapid synchronization, moderate interference robustness and a good data rate-to-power consumption ratio
- low power consumption is required to support battery operation in sensor networks or low traffic serial communications, the proprietary mesh modules are the best choice

7 Sensors / Serial Connections or UART / I/O Interface: Does the application need direct connection to sensors, or serial devices, or both?

RoHS Compliant

Low-Cost, Multi-Function FHSS MODULES

For Wireless Telemetry or Wireless Sensor Networking

DNT-Series . . . the best value in its class

WHY CHOOSE DNT24 / DNT90?

DNT24 100 mW RF power and DNT90 150 mW RF power – more than twice that of competing modules

Store-and -forward capabilities to extend range even further

Sleep mode, auto-reporting and I/O binding simplify application development

Over-the-air module programming and configuration for ease of integration

Certified Module - FHSS (DNT)

WHY CHOOSE DNT2400 / DNT900?

DNT2400 1 mW to 100 mW RF power and DNT900 1 mW to 1 W RF power – low cost with high power output

Tree-routing mesh with fail-over capabilities

Long-range. . . up to 40 miles in line-of-sight with data rates from 38.4 kb/s to 500 kb/s

Over-the-air module programming and configuration for ease of integration

DNT24 / DNT90

For cost-sensitive applications, the DNT24 / DNT90 modules deliver FHSS reliability without breaking the bank. But that doesn't mean that they are limited performance modules.

Sophisticated Features. Sophisticated networking features including heartbeats / join announcements, over-the-air module programming, over-the-air configuration and reading of analog and digital inputs, auto-reporting of module inputs, and a transparent data mode enable the DNT24 / DNT90 to out-perform FHSS modules costing more than twice the DNT24 / DNT90. And if that's not enough, the DNT24 / DNT90's store-and-forward repeating can extend the range even further without the need for dedicated routing.

For Very Cost Sensitive Applications

DNT90 / DNT24

900 MHz / 2.4 GHz

Data Rates

DNT90 100 kb/s

DNT24 250 kb/s

Long Range

DNT90 5+ Miles LOS*

DNT24- 5+ Miles LOS with gain antennas

Extend Range with

Store-and-Forward Repeating

Configurable RF Power

DNT90 40 mW or 150 mW

DNT24 10 mW or 100 mW

Analog, Digital I/O and Serial Data

Sleep Mode and Auto Reporting

Multipoint, Point-to-Point, Peer-to-Peer Networks

AES-128 Encryption

Highly Reliable and Secure FHSS Capabilities at Very Low Cost

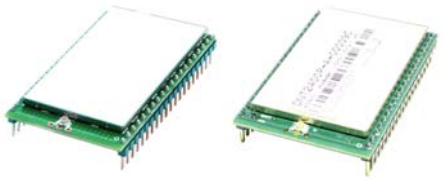
- 900 MHz (DNT90) and 2.4 GHz (DNT24) FHSS transceivers
- Point-to-point, point-to-multipoint, peer-to-peer, and store-and-forward repeating applications
- DNT90 RF transmit power of 40 mW or 150 mW (+22 dBm) and DNT24 configurable RF transmit power from 10 mW to 100 mW
- DNT90 receive sensitivity of -99 dBm and DNT24 receive sensitive of -100 dBm
- DNT90 RF data rate 100 kb/s and DNT24 RF data rate of 250 kb/s
- Provides reliable wireless communications of to 5 miles in line-of-sight installations
- AES-128 Encryption allows the most sensitive data to be securely sent wirelessly
- Auto-reporting of module inputs; Analog and Digital I/O for sensor applications
- DNT24P / DNT90P version for plug in installation, DNT24C / DNT90C version for solder reflow
- DNT90 FCC and Canadian IC certified (also provides a sub-band that meets Australian requirements); DNT24 IS FCC / IC / ETSI certified

DNT24A / DNT90A for Chip Antenna Version / U.FL without "A"

Low-Cost, Multi-Function FHSS MODULES

For Wireless Telemetry or Wireless Sensor Networking

For Applications Needing Extended Range or High Level of Flexibility



DNT900 / DNT2400

900 MHz / 2.4 GHz

Data Rates

Configurable data rates from 38 kb/s to 500 kb/s

Long Range

DNT900 40+ Miles

DNT2400 5+ Miles

Efficiently Increase Coverage Area with **Tree Routing**

Configurable RF Power

DNT900 1 mW to 1 W

DNT2400 1 mW to 100 mW

Analog, Digital I/O and Serial Data

Sleep Mode and Auto Reporting

Multipoint, Point-to-Point, Peer-to-Peer Networks

AES-128 Encryption

DNT2400 / DNT900

Like the DNT24 / DNT90, the DNT2400 / DNT900 modules are low-cost, multi-purpose, FHSS modules. However, they are also long-range, multi-function and highly configurable. The high level of configurability enables OEM designers to fit the radio to the application rather than having to fit the application to the radio. DNT2400 / DNT900 configuration options include:

- RF data rates
- RF transmit power
- Frequency hopping rate
- Bandwidth allocation
- Co-located network support
- Sleep nodes

For applications needing even more range, the DNT2400 / DNT900 efficiently extends range through the use of tree routing.

TOP MARKETS

Petrochemical Industries

Utilities Industries (Power, Gas and Water)

Agricultural and Commercial Ventures

AMR and Smart Grid Projects

Industrial Automation

TOP APPLICATIONS

Applications Requiring Direct Connections and Reporting of Sensor Data

SCADA for Monitoring and Control

Scoreboards and Electronic Sign

Industrial Remote Control

Energy Management

Commercial Telemetry

Wireless Robotics

Irrigation Control

Certified Module - FHSS (DNT)

Highly Reliable and Secure FHSS Capabilities at Very Low Cost

- 900 MHz (DNT900) and 2.4 GHz (DNT2400) FHSS transceivers
- Point-to-point, point-to-multipoint, and peer-to-peer applications
- DNT900 configurable RF transmit power of 1 mW to 1 W and DNT2400 configurable RF transmit power from 1 mW to 100 mW
- Configurable RF data rates from 38 kb/s and 500 kb/s
- Provides reliable wireless communications of 40+ mile range (DNT900) and 5+ mile range (DNT2400) with omni-directional antennas (antenna height dependent)
- AES-128 Encryption allows the most sensitive data to be securely sent wirelessly
- Serial port rate up to 460.8 kb/s for streaming applications
- Separate Serial port for diagnostics
- Analog and Digital I/O for sensor applications
- Software-configurable SPI port
- Sleep modes and auto-reporting of module inputs
- DNT900 FCC and Canadian IC certified; DNT2400 FCC / IC / ETSI certified
- U.FL RF connector only in the DNT900 / DNT2400 (no chip antenna version available)

Virtually Unlimited Number of Nodes in a Single Network

The DNT-Series use frequency hopping technology with a unique TDMA / CSMA hybrid multiple access scheme that delivers low latency, yet with a virtually unlimited number of nodes in a single network. The DNT-Series employs dynamic TDMA slot assignments that maximizes throughput and CSMA modes that maximizes network size.

RoHS Compliant

Low-Cost, Multi-Function FHSS MODULES

For Wireless Telemetry or Wireless Sensor Networking

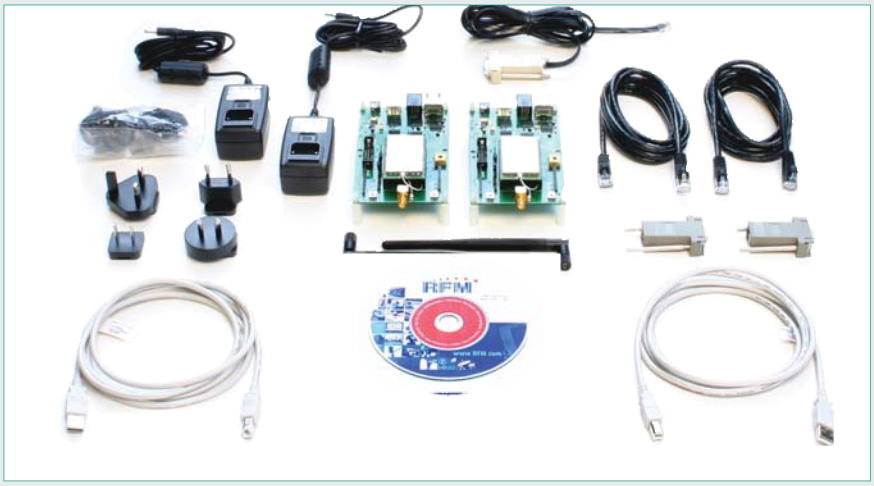
Low-Cost FHSS Modules						
RFM Part	Frequency Band	RF Data Rate	Transmit Power	RF Conn/ Antenna	Description	I/O
DNT90C	900 MHz	100 kb/s	150 mW	U.FL	Frequency hopping, point-to-multipoint, peer-to-peer, store-and-forward repeating, castellated	2 UART, SPI, 5 Analog, 6 Digital
DNT90CA	900 MHz	100 kb/s	150 mW	Chip Antenna	Frequency hopping, point-to-multipoint, peer-to-peer, store-and-forward repeating, castellated	2 UART, SPI, 5 Analog, 6 Digital
DNT90P	900 MHz	100 kb/s	150 mW	U.FL	Frequency hopping, point-to-multipoint, peer-to-peer, store-and-forward repeating, pinned	2 UART, SPI, 5 Analog, 6 Digital
DNT90PA	900 MHz	100 kb/s	150 mW	Chip Antenna	Frequency hopping, point-to-multipoint, peer-to-peer, store-and-forward repeating, pinned	2 UART, SPI, 5 Analog, 6 Digital
DNT900C	900 MHz	500 kb/s	1 mW to 1 W	U.FL	Frequency hopping, star, peer-to-peer, store-and-forward repeating, castellated	2 UART, SPI, 5 Analog, 6 Digital
DNT900P	900 MHz	500 kb/s	1 mW to 1 W	U.FL	Frequency hopping, star, peer-to-peer, store-and-forward repeating, pinned	2 UART, SPI, 5 Analog, 6 Digital
DNT24C	2.4 GHz	250 kb/s	10 to 100 mW	U.FL	Frequency hopping, point-to-multipoint, peer-to-peer, store-and-forward repeating, castellated	2 UART, SPI, 5 Analog, 6 Digital
DNT24CA	2.4 GHz	250 kb/s	10 to 100 mW	Chip Antenna	Frequency hopping, point-to-multipoint, peer-to-peer, store-and-forward repeating, castellated	2 UART, SPI, 5 Analog, 6 Digital
DNT24P	2.4 GHz	250 kb/s	10 to 100 mW	U.FL	Frequency hopping, point-to-multipoint, peer-to-peer, store-and-forward repeating, pinned	2 UART, SPI, 5 Analog, 6 Digital
DNT24PA	2.4 GHz	250 kb/s	10 to 100 mW	Chip Antenna	Frequency hopping, point-to-multipoint, peer-to-peer, store-and-forward repeating, pinned	2 UART, SPI, 5 Analog, 6 Digital
DNT2400C	2.4 GHz	500 kb/s	1 to 100 mW	U.FL	Frequency hopping, star, peer-to-peer, store-and-forward repeating, castellated	2 UART, SPI, 5 Analog, 6 Digital
DNT2400P	2.4 GHz	500 kb/s	1 to 100 mW	U.FL	Frequency hopping, star, peer-to-peer, store-and-forward repeating, pinned	2 UART, SPI, 5 Analog, 6 Digital

Very small footprint, the DNT SERIES modules are slightly larger than a quarter

Low-Cost, Multi-Function FHSS MODULES

For Wireless Telemetry or Wireless Sensor Networking

Fast-Track Your Design... Order Your Developer Kit Today!



DNT24DK / DNT90DK Dev Kit

- 2 DNT2400 or 2 DNT900 modules with pins
- 2 DNT2400 or 2 DNT900 development boards
- 2 USB and 2 Serial Cables
- 9V Batteries and Wall-mount Power Supplies
- Antennas and RF Cables
- Program CD with software and manuals
- Quick Start Guide

DNT2400DK / DNT900DK Dev Kit

- 2 DNT2400 or 2 DNT900 modules with pins
- 2 DNT2400 or 2 DNT900 development boards
- 2 USB and 2 Serial Cables
- 9V Batteries and Wall-mount Power Supplies
- Antennas and RF Cables
- Program CD with software and manuals
- Quick Start Guide

Developer Kits	
DNT90ADK	(2) DNT90PA modules with pins, (2) DNT90 development boards, (2) USB cables, (2) Serial cables, Antennas and RF cables, Program CD with software and manuals, Quick Start Guide
DNT90DK	(2) DNT90 modules with pins, (2) DNT90 development boards, (2) USB cables, (2) Serial cables, Antennas and RF cables, Program CD with software and manuals, Quick Start Guide
DNT24ADK	(2) DNT24PA radios installed in DNT24 interface boards, labeled Base and Remote (2) wall-plug power suppliers, 9 VDC, 120/240 VAC, plus 2 batteries, 9 VDC (2) RJ-45/DB-9F cable assemblies and two A/B USB cables; Documentation and software CD
DNT24DK	(2) DNT24P radios installed in DNT24 interface boards, labeled Base and Remote (2) patch antennas and two 2 dBi dipole antennas with MMCX/RSMA adaptor cables (2) wall-plug power suppliers, 9 VDC, 120/240 VAC, plus 2 batteries, 9 VDC (2) RJ-45/DB-9F cable assemblies and two A/B USB cables; Documentation and software CD
DNT900DK	(2) DNT900P radios, (2) DNT900 development boards, (2) 2 dBi dipole antennas, (2) 120/240 VAC 9 V wall-plug power suppliers, (2) 9 V batteries, (2) RJ-45/DB-9F cable assemblies, (1) RJ-11/DB-9F cable assembly, (2) A/B USB cables, DNT900DK documentation and software CD
DNT2400DK	(2) DNT2400P radios, (2) DNT2400 development boards, (2) 2 dBi dipole antennas, (2) 120/240 VAC 9 V wall-plug power suppliers, (2) 9 V batteries, (2) RJ-45/DB-9F cable assemblies, (1) RJ-11/DB-9F cable assembly, (2) A/B USB cables, DNT2400DK documentation and software CD

DNT900 pinned version module installed on DNT900 development board

Certified Module - FHSS (DNT)

ORDER YOUR DEV KIT TODAY

Everything you need to get a wireless link going in less than 10 minutes

Two development boards providing a simple means to interface to your device and showcasing DNT Series module features

Utility programs that demonstrate network operation and performance

Documentation, including source code to the utility programs to speed integration of the DNT Series module into your product

RoHS Compliant

Ultra-Reliable FHSS MODULES

Wireless Telemetry for Point-to-Point and Point-to-Multipoint Networks

Superior Reliability and Transmission Range

WIT-Series FHSS Wireless Telemetry Modules. Especially well-suited to commercial, industrial and factory settings, RFM's WIT modules ensure long-range data throughput even in the presence of electrical noise and multi-path fading. They can be configured in point-to-point and point-to-multipoint network topologies.

WIT modules operate in either a TDMA mode with dynamic, automatic bandwidth allocation which support up to 62 remotes or a CSMA mode that supports up to 1024 remotes. The TDMA mode is used where guaranteed bandwidth and latency are required. The CSMA mode is used where large numbers of remotes are needed. Latencies of the TDMA mode are as low as 5 ms.

WIT modules consume a sufficiently low amount of power to allow 8+ hours of battery operation. Error-less data reception is further assured by CRC error checking and ARQ (automatic repeat-request) schemes for auto-retransmission of bad packets.

WHY CHOOSE WIT SERIES?

Industry leader in FHSS technology for 20+ years

Breadth of FHSS product offering includes DNT and WIT series

Variety of low to high data rates and power levels for a broad range of industrial and commercial applications

Build-in data scrambling adds security while stringent QA processes assures reliable operation

Default parameter settings work for most applications while software control makes changing parameters easy

Certified Module - FHSS (WIT)

The WIT910M and WIT2410M4G are the same size and mounting dimensions, and can be used in place of one another in existing designs with little development effort (80.2 x 46.5 x 8.6 mm and weighing just 35 grams)

900 MHz*

172.8 kb/s

WIT910* @ 1 W

- Exceptional performance: 29 dBm of transmit power and a receive sensitivity of -103 dBm
- Small size 80.2 x 46.5 x 8.6 mm and weigh just 35 grams
- Low power: consuming only 100 mA at 3.3 volts
- License-free use in US, Canada, South America, Australia and New Zealand
- High-speed wireless data: Up to 345.6 kb/s for extended range applications such as SCADA
- Superior transmission range: 1000 feet indoors; 20+ miles outdoors with omni-directional antennas
- Store-and-forward repeating: forwards data meant for another mode while also acting as an end device

2.4 GHz

460.8 kb/s

WIT2410 @ 10-100 mW

WIT2450 @ 40-250 mW

921.6 kb/s

WIT2492 @ 10-100 mW

1.23 Mb/s

WIT2411* @ 10-100 mW

- Size: - WIT2410 80.2 x 46.5 x 8.6 mm (weighs 35 grams)
  - WIT2450 69.85 x 47.75 x 4.57 mm (weighs 28 grams)
  - WIT2492 80.2 x 46.5 x 8.6 mm (weighs 35 grams)
  - WIT2411 88.9 x 70.0 x 10.5 mm (weighs 48 grams)
- License-free use world-wide
- High-speed wireless data: Up to 1.23 Mb/s throughput serves virtually any data need
- Superior transmission range: 900 feet indoors; over 5 miles outdoors with gain antennas
- Store-and-forward repeating: WIT2450 offers store-and-forward repeating to extend range and enable transmission around barriers without expensive dedicated repeaters.

***WIT910- and WIT2411-series modules (1.23 Mb/s data rate) are not RoHS compliant.**

Ultra-Reliable FHSS MODULES

Wireless Telemetry for Point-to-Point and Point-to-Multipoint Networks

FHSS Modules						
RFM Part	Frequency Band	RF Data Rate	Transmit Power	RF Conn/ Antenna	Description	I/O
WIT910M*	900 MHz	172.8 kb/s	1 W	MMCX	Frequency hopping star, TDMA only, pins down	UART
WIT910M2*	900 MHz	172.8 kb/s	1 W	MMCX	Frequency hopping, star, CSMA & TDMA, pins down	UART
WIT910S*	900 MHz	172.8 kb/s	1 W	MMCX	Frequency hopping star, TDMA only, pins up	UART
WIT2410M4G	2.4 GHz	460.8 kb/s	10 mW to 100 mW	MMCX	Frequency hopping star, TDMA only, pins down	UART
WIT2410S4G	2.4 GHz	460.8 kb/s	10 mW to 100 mW	MMCX	Frequency hopping star, TDMA only, pins up	UART
WIT2411D*	2.4 GHz	1.23 Mb/s	10 mW to 100 mW	MMCX	Frequency hopping star, on-demand, pins down	UART
WIT2411F*	2.4 GHz	1.23 Mb/s	11 m W to 100 mW	MMCX	Frequency hopping star, on-demand, socket	UART
WIT2450FG	2.4 GHz	460.8 kb/s	40 mW to 250 mW	MMCX	Frequency hopping star, TDMA only, socket	UART
WIT2450M2	2.4 GHz	460.8 kb/s	40 mW to 250 mW	MMCX	Frequency hopping, star, CSMA & TDMA, socket	UART
WIT2492M	2.4 GHz	921.6 kb/s	10 mW to 100 mW	MMCX	Frequency hopping star, TDMA only, pins down	UART

Fast-Track Your Design - Order Your Developer Kit Today!

WIT Developer Kits Contents

- 2 WIT Modules
- HN-591 serial modems with flow control indicators
- RS-232 interface
- Battery pack and power supply
- Dipole antenna
- Program CD with software and manual

SNAP Developer Kits Contain Everything in WIT Developer Kits PLUS:

- (1) SNAP910 10/100BaseT access point
- RF Cables and additional antennas

FHSS Developer Kits	
WIT910DK*	(2) HN-591 serial modems with flow control indicators, RS-232 interface, battery pack, power supply, dipole antenna, (2) WIT910M modules, RF cables, antennas and programming software
WIT910SDK*	SNAP910 Developer Kit: (2) HN-591 serial modems with flow control indicators, RS-232 interface, battery, dipole antenna, (1) SNAP910 10/100Base-T access point, (2) WIT910 modules, RF cables, antennas and programming software
WIT2410DK	(2) HN-510 serial modems with flow control indicators, RS-232 interface, battery pack, power supply, dipole antenna, (2) WIT2410M modules, RF cables, antennas and programming software
WIT2410SDK	SNAP2410 Developer Kit: (2) HN-510 serial modems with flow control indicators, RS-232 interface, battery, dipole antenna, (1) SNAP2410 10/100BaseT access point, (2) WIT2410 modules, RF cable, antennas and programming software
WIT2411DK*	(2) HN-211 serial modems with flow control indicators, RS-232 and USB interfaces, battery, dipole antenna, (2) WIT2411 modules, and programming software
WIT2411SDK*	SNAP2411 Developer Kit: (2) HN-211 serial modems with flow control indicators, RS-232 and USB interfaces, battery, dipole antenna, (1) SNAP2411 10/100BaseT access point, (2) WIT2411 modules, RF cables and dipole antennas and programming software
WIT2450DK	(2) HN-550 serial modems with flow control indicators, RS-232 interface, battery pack, power supply, dipole antenna, (2) WIT2450 modules, RF cables, antennas and programming software

TOP MARKETS

Utilities (power, gas , water)

Agricultural and Commercial Ventures

AMR and Smart Grid

Industrial Automation

Petrochemical Industries

TOP APPLICATIONS

Applications requiring direct connections and reporting of sensor data

SCADA for monitoring and control

Scoreboards and electronic signs

Industrial remote control

Energy management

Certified Module - FHSS (WIT)

ORDER YOUR DEV KIT TODAY

Complete with all components to put a system "on the air"

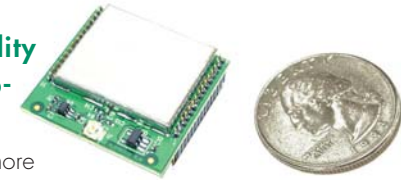
Includes two self-contained wireless modems built around the specific WIT modules, accelerates development and integration process:

- Developers get up and running quickly using standard RS-232 interfaces without having to build a 3.3V level serial interface
- Features LEDs to provide status information visually
- Convenient built-in rechargeable battery pack allows developer mobility during testing
- Other than the true RS-232 signals of the serial interface, the modems operate exactly as the modules

Wi-Fi® 802.11b/g/n MODULES

Wireless Sensor Networking in Point-to-Point and Point-to-Multipoint

Leverage existing Wi-Fi 802.11b/g/n infrastructure



Full Wireless Sensor Networking Functionality Including Analog and Digital I/O plus Auto-Reporting and Sleep. While many applications require wireless transmission of serial data, more and more applications need to collect sensor data from devices with analog and digital outputs. The WSN802G supports both types of applications.

With both a standard UART serial port supporting standard baud rates, a configurable Master /Slave SPI port, and a collection of 2 ADC inputs, 2 PWM outputs, 4 GPIOs, the WSN802G is well suited for any sensor application. When you add in the WSN802G's ability to auto-report sensor data and to sleep between reports, you get a low power 802.11b/g/n radio that is suitable for battery operation.

RFM Full-Function Model Firmware Provides a Ready-to-Use, Extremely Low-Power 802.11b/g/n Radio at a Remarkably Low Price

- <8 uA Sleep Current provides up to 5 years battery life on a single AA lithium battery
- <200 mA Active Power Current enables battery operation
- 10 mW RF Power
- 801.1x and WPA2-Enterprise security
- Ad Hoc mode operation
- UART and SPI serial interfaces
- RF data rates from 1 Mb/s to 11 Mb/s
- Small Size and Light Weight @ 1.0 X 1.05 in
- Typical transmission range (Indoor 50 meters / Outdoor 250 meters)
- Timer- and Event-Triggered auto-reporting capability
- Analog, Digital and Serial I/O for sensor and data applications
- -40 to +85 C operating temperature range
- Dynamic TDMA slot assignment that maximizes throughput and CSMA modes that maximizes network size
- Transparent ARQ protocol with data buffering ensures data integrity
- Simple serial interface handles both data and control at up to 460.8 kb/s
- WSN802G-P version for plug in installation, WSN802G-C version for solder reflow
- FCC, ETSI and IC Certified for Unlicensed Operation

Enterprise Series (E-Series). To be used in applications requiring enterprise security when interfacing to corporate Wi-Fi networks, the WSN802G E-series radio modules interface seamlessly to existing Wi-Fi 802.11b/g/n network infrastructure, enabling robust encryption, authentication and security protection. With Wi-Fi-to-serial transmission, any unformatted data is transparently sent via the serial interface over the Wi-Fi network to a fixed IP address / port and vice versa, without the need for any additional formatting.

The full TCP/IP stack on the module places less burden on the host applications and simplifies the design and development cycle. The WSN802G E-Series radio modules implements IEEE 802.1x features:

- Integration with RADIUS Authentication Server to allow administration, auditing and logging and allowing for centralized management of user credentials
- Uses an Extensible Authentication Protocol (EAP)
- Certificate Authentication - blocks hackers trying to infiltrate corporate networks
- Differing Encryption key in every packet offers robust security
- Includes Full TCP / IP stack on the module

WHY CHOOSE WSN-SERIES?

Low cost, very small size and light weight

Variable data rates from 1 Mb/s to 11 Mb/s allowing for flexible designs

Low sleep current provides operation for up to 5 years on a single AA battery

Auto-reporting eliminates need for applications to poll – simplifying design

Pinned and surface mount versions as well as chip antenna versions available

KEY FEATURES & BENEFITS

Wi-Fi 802.11b/g based module allowing easy integration to existing Wi-Fi access points

Multiple analog, digital, UART and SPI interfaces with auto-reporting and sleep mode

WPA2 and 802.11x secure encryption to protect sensitive data sent wirelessly

Ready-to-use out of the box – no programming or external processor needed

Unformatted Serial to Wi-Fi data transmission

FCC, Canadian IC and ETSI certified

Chip Antenna and U.FL Versions Available

Certified Module - 802.11 (WSN)

***WSN802G modules are not RoHS compliant.**

Wi-Fi® 802.11b/g/n MODULES

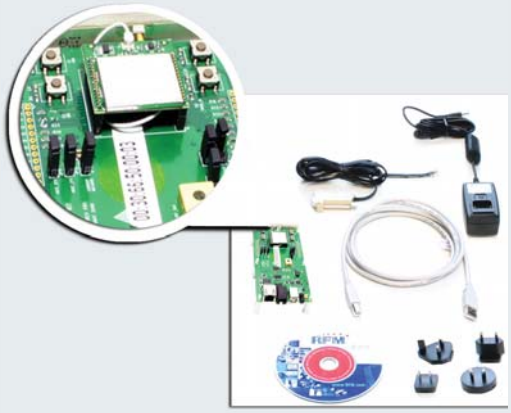
Wireless Sensor Networking in Point-to-Point and Point-to-Multipoint

Wi-Fi 802.11b/g/n Modules						
RFM Part	Frequency Band	Transmit Power	Data Rate	RF Conn/ Antenna	Description	I/O
WSN802GC	2.4 GHz	10 mW	1-11 Mb/s	U.FL	2.4 GHz Wi-Fi Transceiver, castellated	UART, SPI
WSN802GC-E	2.4 GHz	10 mW	1-11 Mb/s	U.FL	2.4 GHz Wi-Fi Transceiver, castellated Enterprise version	UART, SPI
WSN802GCA	2.4 GHz	10 mW	1-11 Mb/s	Chip Antenna	2.4 GHz Wi-Fi Transceiver, castellated	UART, SPI
WSN802GCA-E	2.4 GHz	10 mW	1-11 Mb/s	Chip Antenna	2.4 GHz Wi-Fi Transceiver, castellated Enterprise version	UART, SPI
WSN802GP	2.4 GHz	10 mW	1-11 Mb/s	U.FL	2.4 GHz Wi-Fi Transceiver, pinned	UART, SPI
WSN802GP-E	2.4 GHz	10 mW	1-11 Mb/s	U.FL	2.4 GHz Wi-Fi Transceiver, pinned Enterprise version	UART, SPI
WSN802GPA	2.4 GHz	10 mW	1-11 Mb/s	Chip Antenna	2.4 GHz Wi-Fi Transceiver, pinned	UART, SPI
WSN802GPA-E	2.4 GHz	10 mW	1-11 Mb/s	Chip Antenna	2.4 GHz Wi-Fi Transceiver, pinned Enterprise version	UART, SPI

Fast-Track Your Design - Order Your Developer Kit Today!

WSN802GDK Developer Kit

- 1 WSN802G module
- 1 WSN802G development board
- Serial and USB cables
- 9V battery and wall-mount power supply
- Antenna
- Program CD with software and manuals
- Quickstart Guide



WSN802GDK-A Kit

- Contents of the WSN802GDK Kit
- Plus one (1) Wireless Router

Wi-Fi 802.11b/g/n Developer Kits	
WSN802GDK	(1) WSN802GP module, (1) WSN802GP development board, Serial and USB Cables, 9V Battery and Wall-mount Power Supply, Antenna, Program CD with software and manuals, Quick Start Guide
WSN802GDK-A	(1) WSN802GP module, (1) WSN802GP development board, Serial and USB Cables, 9V Battery and Wall-mount Power Supply, Antenna, Program CD with software and manuals, Quick Start Guide AND wireless router
WSN802GADK	(1) WSN802GPA module, (1) WSN802GPA development board, Serial and USB Cables, 9V Battery and Wall-mount Power Supply, Antenna, Program CD with software and manuals, Quick Start Guide
WSN802GADK-A	(1) WSN802GPA module, (1) WSN802GPA development board, Serial and USB Cables, 9V Battery and Wall-mount Power Supply, Antenna, Program CD with software and manuals, Quick Start Guide AND wireless router

TOP MARKETS

Utilities (power, gas , water)

Agricultural and Commercial Ventures

AMR and Smart Grid

Industrial Automation

Petrochemical Industries

TOP APPLICATIONS

Applications requiring direct connections and reporting of sensor data

SCADA for monitoring and control

Scoreboards and electronic signs

Industrial remote control

Energy management

Certified Module - 802.11 (WSN)

ORDER YOUR DEV KIT TODAY

Everything you need to get a ZigBee PRO network going in less than 10 minutes

Two development boards providing a simple means to interface to your device and showcasing the features of the ZPM3570

Utility programs that demonstrate network operation and performance

Documentation to speed integration of the ZPM3570 into your product

RoHS Compliant

ZigBee™

ZigBee Smart Energy & Home Automation Profiles

WHY CHOOSE ZIGBEE PRO?

Low cost, small size and light weight with complete ZigBee PRO solution

1MB of flash memory eliminating the need for external memory

Flexibility with several analog and digital inputs / outputs for sensor applications

On-chip antenna for increased cost savings

KEY FEATURES & BENEFITS

ZigBee PRO based module built around Ember's EM357 ZigBee SoC Supports the Smart Energy and Home Automation public profiles for Energy Management

On board 1MB of flash memory for data logging eliminating the need for external memory

Multiple analog, digital, UART and SPI interfaces for wide range of applications

128-Bit AES secure encryption to protect sensitive data sent wirelessly

FCC, Canadian IC and ETSI certified

Certified Module - ZigBee Pro (ZPM)

ZigBee® Pro MODULES

Peer-to-Peer, Point-to-Point, and Point-to-Multipoint Networks

ZigBee Smart Applications. The ZPM3570 ZigBee PRO is a pre-certified 2.4 GHz multi-purpose wireless transceiver designed for a wide range of applications that require low power consumption and high transmit power. The ZPM3570 ZigBee PRO provides a high data rate of 250 kb/s with transmit power of 100 mW to provide exceptional performance in a wide variety of industrial, commercial and home automation applications. ZigBee is developing significant traction is in the Smart Grid and Energy Management arenas.

The RFM ZMN3570 supports these applications with the presence of the ZigBee Smart Energy and Home Automation profiles within the module. An intuitive API simplifies connecting the ZPM3570 to an application processor to quickly implement products, providing vendor interoperable Smart Energy and Home Automation operation.

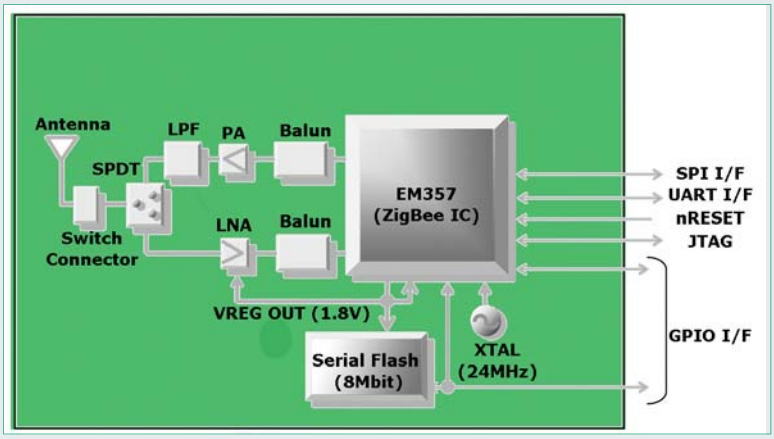
OEMs wishing to implement their own application in addition to the ZigBee stack can take advantage of the 32-bit M3 Coretex ARM processor in the module. This can eliminate the need for any separate application coprocessor.

Ultra Reliable Networking

- 2.4 GHz DSSS 802.15.4 Transceiver
- Point-to-Point, Point-to-Multipoint, Peer-to-peer, and Mesh
- Transmitter Power of 100 mW (+20 dBm)
- Receive Sensitivity of -103 dBm
- Over-the-air module programming and configuration
- Smart Energy and Home Automation Profiles
- 128-Bit AES Encryption
- UART and SPI ports; Analog and Digital I/O for Sensor Applications
- 1MB flash memory to accommodate data logging requirements
- FCC, Canadian IC, and ETSI Certified for Unlicensed Operation

The ZPM3570 is Built Around Ember's EM357 ZigBee RFIC

- Coupled with a power amplifier and low noise amplifier to increase the RF transmit power and receive sensitivity.
- The 100 mW coupled with the -103 dBm receive sensitivity provides exceptional range.
- The on-module antenna keeps device costs low by eliminating the cost of a separate antenna.



ZigBee® Pro MODULES

Peer-to-Peer, Point-to-Point, and Point-to-Multipoint Networks

ZigBee Pro Modules						
RFM Part	Frequency Band	Transmit Power	Data Rate	RF Conn/ Antenna	Description	I/O
ZPM3570-C	2.4 GHz	100 mW	250 kb/s	Chip Antenna	2.4 GHz Wi-Fi Transceiver, castellated	UART, SPI
ZPM3570-E	2.4 GHz	100 mW	250 kb/s	Chip Antenna	2.4 GHz Wi-Fi Transceiver, castellated	UART, SPI

Fast-Track Your Design - Order Your Developer Kit Today!

ZPM3570DK Kit Contents

- (2) ZPM3570 development boards
- (2) USB and 2 Serial Cables
- 9V Batteries and Wall-mount Power Supplies
- Antennas and RF Cables
- Program CD with software and manuals
- Quick Start Guide

ZigBee Pro Developer Kits	
ZPM3570DK	(2) ZPM3570 development boards, (2) USB and (2) Serial cables, 9 V batteries and wall-mount power supplies, Antennas and RF cables, Program CD with software and manuals, Quick Start Guide

TOP MARKETS

Home and Building Automation

Manufacturing Industries

Healthcare

TOP APPLICATIONS

Automatic Meter Reading and Smart Grid

Smart Energy Management and Control

Automatic Lighting and Temperature Control

Certified Module - ZigBee Pro (ZPM)

ORDER YOUR DEV KIT TODAY

Everything you need to get a ZigBee PRO network going in less than 10 minutes

Two development boards providing a simple means to interface to your device and showcasing the features of the ZPM3570

Utility programs that demonstrate network operation and performance

Documentation to speed integration of the ZPM3570 into your product

RoHS Compliant

802.15.4

Easy to configure with simple-to-use API - no need to write your own code

WHY CHOOSE RFM?

Unique one-hop relay to improve transmission reliability

Sleep current 1/3 of competing modules - extends battery life to years

Automatic heartbeats provide network health of sleeping devices

Auto-reporting and I/O binding simplify application development

FEATURES & BENEFITS

Superior combination of low cost and long range – provides substantial cost savings

Multiple analog, digital, UART and SPI interfaces with auto-reporting and sleep mode

AES – 128 secure encryption to protect sensitive data sent wirelessly

API designed for easy embedded integration – speeding up design times

FCC, IC and ETSI certified

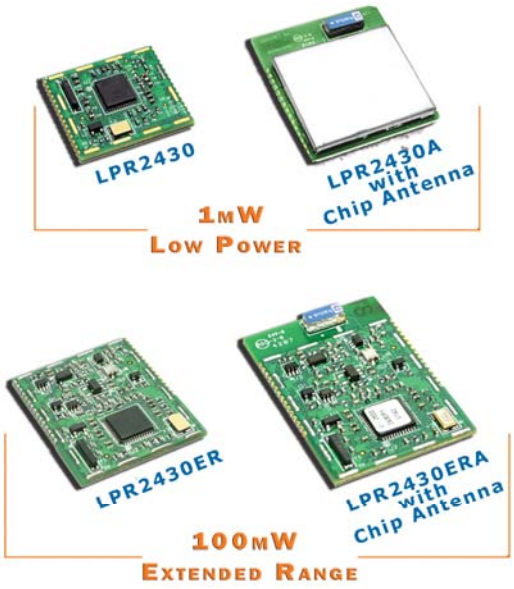
VERSATILE FORM FACTOR

LPR2430 series has the same form factor WSN802G, XDM2510H, and ZPM2430 series modules.

Certified Module - 802.15.4 (LPR)

802.15.4 MODULES (see page 36 for 802.15.4 Modems)

Peer-to-Peer, Point-to-Point, and Point-to-Multipoint Networks



Full Wireless Sensor Networking Without the Overhead of Mesh

The LPR2430 is a low cost pre-certified 2.4 GHz module based on 802.15.4 standard and is used in applications where meshing is not required. The simple-to-use API enables designers to configure the module easily without having to write their own code.

The LPR2430 includes analog, digital, UART and SPI I/O ports, providing the flexibility and versatility needed to serve a wide range of sensor network applications. Pinned and surface mount versions as well as chip antenna versions.

The LPR2430 Series is an obvious choice for battery-powered peer-to-peer, point-to-point and point-to-multipoint applications and is available in 1 mW and 100 mW versions.

Feature Rich Functionality

- Peer-to-peer and star topology networking — Use as simple cable replacement or a sophisticated network
- RFM Networking Layer — Eases integration and network configuration
- Low cost — Extends wireless to virtually any sensor
- Low power consumption — Ideal for battery operation
- I/O Binding — Automates I/O replication
- One-Hop Relay — Enables one node to send data to a base radio through another node
- AES-128 Encryption — Allows the most sensitive data to be securely sent wirelessly
- Sleep modes and auto reporting — Simplifies sensor Monitoring
- FCC, ETSI and IC Certified for Unlicensed Operation

I/O and Auto Report Capability

- Analog, Digital and Serial I/O including Analog & Digital I/O binding.
- Standard UART interface for serial communications plus 6 GPIO, 3 ADCs, and 2 DACs (PWMs)
- With the I/O Binding feature, one node has the ability to output on 2 GPIO lines the input value of 2 GPIO lines from another node
- Auto-reporting features allow many sensor nodes to be built without a dedicated microcontroller - the micro-controller on the module does all the work
- Auto-reporting mode provides module I/O updates based on timer or interrupts - without the need for the application to poll or otherwise request data
- Interrupts are generated by edge-triggered events or by exceeding user-defined limits on ADC values - and any interrupt can be used to wake a sleeping mode and have the module send its I/O data

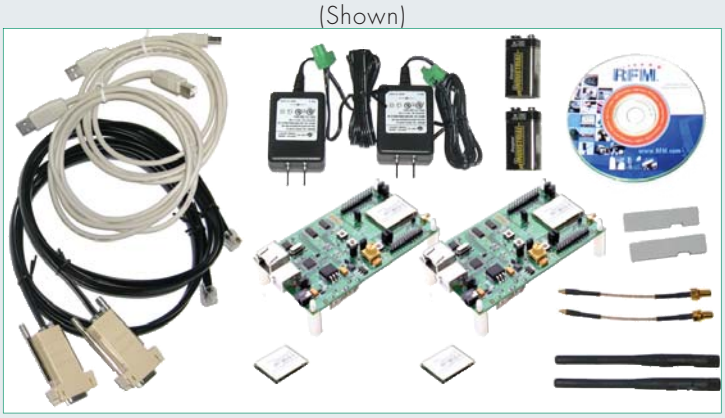
802.15.4 MODULES (see page 36 for 802.15.4 Modems)

Peer-to-Peer, Point-to-Point, and Point-to-Multipoint Networks

802.15.4 Modules						
RFM Part	Frequency Band	Transmit Power	Data Rate	RF Conn/ Antenna	Description	I/O
LPR2430	2.4 GHz	250 kb/s	1 mW	Module Pin	Low-Power 802.15.4 Transceiver, Module Pin RF Conn/Antenna	UART, SPI, 6 GPIO, 3 ADC & 2 DAC outputs
LPR2430A	2.4 GHz	250 kb/s	1 mW	Chip Antenna	Low-Power 802.15.4 Transceiver, Chip Antenna	UART, SPI, 6 GPIO, 3 ADC & 2 DAC outputs
LPR2430ER	2.4 GHz	250 kb/s	10 mW to 100 mW	Module Pin	Extended Range 802.15.4 Transceiver, Module Pin RF Conn/Antenna	UART, SPI, 6 GPIO, 3 ADC & 2 DAC outputs
LPR24030ERA	2.4 GHz	250 kb/s	10 mW to 100 mW	Chip Antenna	Extended Range 802.15.4 Transceiver, Chip Antenna	UART, SPI, 6 GPIO, 3 ADC & 2 DAC outputs

Fast-Track Your Design - Order Your Developer Kit Today!

LPR2430ERDK
(Shown)



LPR2430DK Contents

- 4 LPR2430A modules (2 installed on developer boards labeled Base and Remote)
- 2 patch antennas
- 2 dipole antennas with MMCX to SMA-R adapter cables
- 2 9V wall-plug power suppliers (120/240 VAC plus 2 9V batteries)
- 2 RS-232 cables
- 2 USB Serial cables
- Documentation and Software C

LPR2430ADK Kit does not contain the 2 patch antennas, 2 dipole antennas with MMCX to SMA-R adapter cables

802.15.4 Developer Kits	
LPR2430DK	(4) LPR2430 modules (2 installed on developer boards labeled Base and Remote), (2) patch antennas, (2) dipole antennas with MMCX to SMA-R adapter cables, (2) 9V wall-plug power suppliers (120/240 VAC plus 2 9 V batteries), (2) RS-232 cables, (2) USB Serial cables, Documentation and Software CD
LPR2430DK	(4) LPR2430A modules (2 installed on developer boards labeled Base and Remote), (2) 9V wall-plug power suppliers (120/240 VAC plus 2 9 V batteries), (2) RS-232 cables, (2) USB Serial cables, Documentation and Software CD
LPR2430ERDK	(4) LPR2430ER modules (2 installed on developer boards labeled Base and Remote), (2) patch antennas, (2) dipole antennas with MMCX to SMA-R adapter cables, (2) 9V wall-plug power suppliers (120/240 VAC plus 2 9V batteries), (2) RS-232 cables, (2) USB Serial cables, Documentation and Software CD
LPR2430ERADK	(4) LPR2430ERA modules (2 installed on developer boards labeled Base and Remote), (2) 9V wall-plug power suppliers (120/240 VAC plus 2 9 V batteries), (2) RS-232 cables, (2) USB Serial cables, Documentation and Software CD

TOP MARKETS

Home and Building Automation

Manufacturing Industries

Healthcare

Industrial Automation

TOP APPLICATIONS

Automatic Meter Reading and Smart Grid

Smart Energy Management and Control

Automatic Lighting and Temperature Control

Electronic Signs and Remote Control

Industrial Remote Control

Certified Module - 802.15.4 (LPR)

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Two development boards providing a simple means to interface to your device and showcasing LPR2430 features

Utility programs that demonstrate network operation and performance

Documentation, including source code to the utility programs to speed integration of the LPR2430 into your products

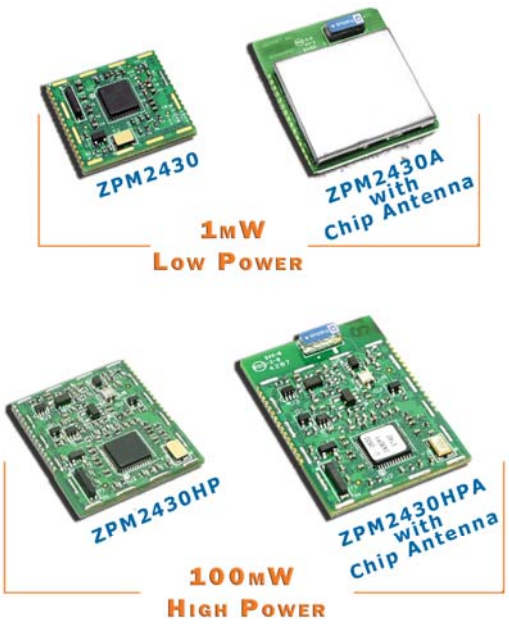
RoHS Compliant

ZigBee™

ZigBee® MODULES

Wireless Mesh Networking

Easy to configure with simple-to-use API - no need to write your own code



ZigBee Mesh Networking

The ZMN-Series ZigBee modules are ideal for low-cost, low-power, low data rate wireless applications including sensor monitoring, building and home automation, and any other applications requiring low-power consumption.

These 2.4 GHz OEM modules come in 1 mW (ZMN2430) transmit power versions for short-range applications and in 100 mW (ZMN2430HP) versions for applications needing extended range.

RFM ZigBee modules can be installed like integrated circuits. Even though they are complete OEM modules, they are reflow soldered to the host PCBs. With its small footprint, there is no size penalty associated with the convenience of a module. RFM has employed its experience in helping hundreds of OEMs integrate RFM modules to create a full set of development and configuration tools.

Feature Rich Functionality

- Point-to-point, point-to-multipoint and MESH wireless systems
- Small Size @ 1.0 X 1.05 inches
- IEEE 802.15.4 Compliant / ZigBee Protocol Stack
- 1 mW RF Power (also available - high power versions with 10 to 100 mW RF Power)
- Sleep Current less than 3 ?A
- Data rate 250 kb/s
- ZMN2430A-C has Chip Antenna (also available - versions with Module Pin RF Conn/Antenna)
- ZMN2430A-C is loaded with coordinator ("C") firmware configuration (also available - versions loaded with router "R" or end node "E" firmware configuration)
- -40 to +85 C Operating Temperature Range
- FCC, Canadian IC and ETSI Certified for Unlicensed Operation

I/O and Auto Report Capability

- Analog, Digital and Serial I/O including Analog & Digital I/O binding
- Standard UART interface for serial communications plus 6 GPIO, 3 ADCs, and 2 DACs (PWMs)
- Auto-reporting features allow many sensor nodes to be built without a dedicated microcontroller - the micro-controller on the module does all the work
- Auto-reporting mode provides module I/O updates based on timer or interrupts - without the need for the application to poll or otherwise request data
- Interrupts are generated by edge-triggered events - and any interrupt can be used to wake a sleeping mode and have the module send its I/O data

WHY CHOOSE RFM?

Unique one-hop relay to improve transmission reliability

Automatic heartbeats provide network health of sleeping devices

Auto-reporting and I/O binding simplify application development

KEY FEATURES & BENEFITS

Superior combination of low cost and long range – provides substantial cost savings

Multiple analog, digital, UART and SPI interfaces with auto-reporting and sleep mode

AES – 128 secure encryption to protect sensitive data sent wirelessly

API designed for easy embedded integration – speeding up design times

FCC, IC and ETSI certified

VERSATILE FORM FACTOR

ZMN2430 series has the same form factor WSN802G, XDM2510H, and LPR2430 series modules.

Certified Module - ZigBee (ZMN)

ZigBee® MODULES
Wireless Mesh Networking

ZigBee Modules						
RFM Part	Frequency Band	Data Rate	Transmit Power	RF Conn/ Antenna	Description	I/O
ZMN2430-C	2.4 GHz	250 kb/s	1 mW	Module Pin	Low-Power ZigBee Coordinator, Castellated	UART, 5 Analog, 6 Digital
ZMN2430-E	2.4 GHz	250 kb/s	1 mW	Module Pin	Low-Power ZigBee End Device, Castellated	UART, 5 Analog, 6 Digital
ZMN2430-R	2.4 GHz	250 kb/s	1 mW	Module Pin	Low-Power ZigBee Router, Castellated	UART, 5 Analog, 6 Digital
ZMN2430A-C	2.4 GHz	250 kb/s	1 mW	Chip Antenna	Low-Power ZigBee Coordinator, Castellated	UART, 5 Analog, 6 Digital
ZMN2430A-E	2.4 GHz	250 kb/s	1 mW	Chip Antenna	Low-Power ZigBee End Device, Castellated	UART, 5 Analog, 6 Digital
ZMN2430A-R	2.4 GHz	250 kb/s	1 mW	Chip Antenna	Low-Power ZigBee Router, Castellated	UART, 5 Analog, 6 Digital
ZMN2430HP-C	2.4 GHz	250 kb/s	1 mW to 100 mW	Module Pin	High-Power ZigBee Coordinator, Castellated	UART, 5 Analog, 6 Digital
ZMN2430HP-E	2.4 GHz	250 kb/s	1 mW to 100 mW	Module Pin	High-Power ZigBee End Device, Castellated	UART, 5 Analog, 6 Digital
ZMN2430HP-R	2.4 GHz	250 kb/s	1 mW to 100 mW	Module Pin	High-Power ZigBee Router, Castellated	UART, 5 Analog, 6 Digital
ZMN2430HPA-C	2.4 GHz	250 kb/s	1 mW to 100 mW	Chip Antenna	High-Power ZigBee Coordinator, Castellated	UART, 5 Analog, 6 Digital
ZMN2430HPA-E	2.4 GHz	250 kb/s	1 mW to 100 mW	Chip Antenna	High-Power ZigBee End Device, Castellated	UART, 5 Analog, 6 Digital
ZMN2430HPA-R	2.4 GHz	250 kb/s	1 mW to 100 mW	Chip Antenna	High-Power ZigBee Router, Castellated	UART, 5 Analog, 6 Digital

TOP MARKETS

Home and Building Automation

Manufacturing Industries

Healthcare

TOP APPLICATIONS

Automatic Meter Reading and Smart Grid

Smart Energy Management and Control

Automatic Lighting and Temperature Control

Electronic Signs and Remote Control

Industrial Remote Control

Fast-Track Your Design - Order Your Developer Kit Today!

ZMN2430ADK Contents

- 2 ZMN2430A modules (2 installed on developer boards labeled Base and Remote)
- 2 patch antennas
- 2 dipole antennas with MMCX to SMA-R adapter cables
- 2 9 V wall-plug power suppliers (120/240 VAC plus 2 9 V batteries)
- 2 RS-232 cables
- 2 USB Serial cables
- Documentation and Software CD

ZMN2430HPADK
(Shown)

ZigBee Developer Kits	
ZMN2430ADK	(2) ZMN2430A evaluation boards (high-power serial interface boards built around the 1 mW ZigBee ZMN2430A module), (2) AC power adapters and cords, (2) patch antennas, (2) USB cables, (2) Serial cables, (2) RF cables, (2) omni antennas, (2) 9V batteries, Software CD
ZMN2430HPADK	(2) ZMN2430HPA evaluation boards (high-power serial interface boards built around the 100 mW ZigBee ZMN2430HPA module), (2) AC power adapters and cords, (2) patch antennas, (2) USB cables, (2) Serial cables, (2) RF cables, (2) omni antennas, (2) 9V batteries, Software CD
ZMN24HPDK-B	(1) serial / sensor evaluation board configured as a Router, (1) ZN-241Z serial radio modem built around the ZigBee ZMN2405HP module configured as a Coordinator, (1) patch antenna, (1) USB cable, (2) Serial cables, (1) RF cable, (2) omni antennas, (1) 9V battery, Software CD

Certified Module - ZigBee (ZMN)

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Everything you need to get a wireless link up and running in minutes

Two development boards providing a simple means to interface to your device and showcasing ZPM2430 features

Utility programs that demonstrate network operation and performance

Documentation, including source code to the utility programs to speed integration of the ZMN2430 into your products

RoHS Compliant

WirelessHART

Add Wireless Connectivity to Process Automation Field Devices

WHY CHOOSE RFM?

Low cost and small size packed with features, pinned and surface mount

80% lower power consumption over competing modules

Ultra-efficient power usage giving over a decade of battery life on two AA batteries

All nodes can be battery powered including Routing nodes

KEY FEATURES & BENEFITS

WirelessHART compatible based on DUST Networks' technology

Provides high data reliability with built-in network redundancy

Battery powered with low power mesh networking technology gives ultra-long battery life

Tested with industry gateways like Emerson and others

FCC, Canadian IC and ETSI certified

Certified Module - WirelessHART

WirelessHART® MODULES

Wireless Networking in Process Automation

The XDM2510H is a pre-certified WirelessHART compatible module based on DUST Networks' SmartMesh IA-510(H)™ technology. The module employs mesh networking, frequency hopping and efficient power management.

The XDM2510H module provides excellent reliability and long battery life. The multi-functional interfaces gives it the flexibility to be used in a wide variety of industrial applications, from process control and data acquisition to energy management.

The XDM2510H requires no embedded programming, greatly reducing the development time and cost of a designing a network application.

The XDM2510H WirelessHART technology blends the reliability of self-organizing and self-healing mesh networking with synchronized power duty cycling to achieve very long battery life operation. The XDM2510H network is time-synchronized so that all nodes can be battery-powered and achieve over a decade of battery life. The XDM2510H offers substantially lower current consumption than competing WirelessHART modules.

The XDM2510H is certified for unlicensed operation in the USA, Canada and Europe.

Ultra Low Power Consumption

- Innovative radio design consumes 80% less power in receive mode than competing solutions
- Ultra-efficient power usage delivers over a decade of network operation on two AA batteries
- Automatic network-wide coordination for efficient power usage

Ultra Reliable Networking

- WirelessHART delivers greater than 99.9% typical network reliability
- Frequency hopping provides interference rejection and minimizes multipath fading
- Mesh networking provides built-in redundancy
- Every XDM2510H module acts as both an endpoint and a router, increasing network reliability
- Automatic self-organizing mesh networking capability built in

Ultra Easy Integration

- Provides all the module functionality with no embedded programming or complex configuration required
- Interfaces is well designed and multi-functional
- High-level Data Link Control (HDLC) serial interface includes bi-directional flow control
- Industrial temperature range -40 to +85 °C
- XDM2510H-P version for plug in installation, XDM2510H-C version for solder reflow

WirelessHART® MODULES

Wireless Networking in Process Automation

WirelessHART Modules						
RFM Part	Frequency Band	Data Rate	Transmit Power	RF Conn/ Antenna	Description	I/O
XDM2510HC	2.4 GHz	250 kb/s	10 mW	U.FL	2.4 GHz WirelessHART module castellated version	UART
XDM2510HP	2.4 GHz	250 kb/s	10 mW	U.FL	2.4 GHz WirelessHART module pinned version	UART

Fast-Track Your Design - Order Your Developer Kit Today!

XDM2510HDK Kit

- (4) XDM2510H modules
- (4) XDM2510H development boards
- (1) XG2510HE gateway
- (1) Ethernet and (5) Serial cables
- 9V batteries and wall-mount power supplies
- Antennas and RF cables
- Program CD with software and manuals
- Quick Start Guide

WirelessHART Developer Kit	
XDM2510HDK	(4) XDM2510HP modules, (4) XDM2510HP development boards, (1) XG2510HE gateway, (1) Ethernet and (5) Serial cables, 9V batteries and wall-mount power supplies, Antennas and RF cables, Program CD with software and manuals, Quick Start Guide

Highly Configurable to Fine-Tune Your Application. The XG2510HE companion gateway and network manager combines standard Ethernet gateway functions with sophisticated networking, data, and security management capabilities for a network of XDM2510H modules. The network manager portion runs advanced algorithms to continuously optimize network performance and communications reliability to accommodate changing RF and environmental conditions. It also continuously monitors network performance and makes on-the-fly adjustments to ensure ultra-high data communications reliability. Adjustments include black-listing poor performing channels on a node-by-node basis and then white-listing them when conditions improve.

The XG2510HE features several APIs including an XML over an Ethernet connection, an XML API over the RF-232 serial port using PPP, and a serial API through the RF-232 interface. All three APIs provide a plethora of information regarding the WirelessHART network performance as well as a wide assortment of configuration commands that allow the WirelessHART network performance to be fine-tuned for your application.

SmartMesh-XD Network Manager / Gateway	
The XG2510HE gateway and network manager is multi-functional, combining Ethernet gateway functions with sophisticated networking, data, and security management capabilities for a network of XDM2510H modules. It includes a standard WirelessHART compliant, 2.4 GHz radio with a power amplifier, processor and memory, embedded networking software, and interfaces to host systems. The XG2510HE is only sold in tandem with XDM2510H networking products.	
XG2510HE	10/100Base-T Ethernet/Serial Network Manager/Gateway for WirelessHART based devices

TOP MARKETS

Manufacturing Industries

Oil and Gas Industries

Healthcare

Verticals Where Mesh Networking is a Must

Verticals Where WirelessHART is a Must

TOP APPLICATIONS

Industrial Automation

Process Control

Energy Management

Certified Module - WirelessHART

Optimum Network Performance with the XG2510HE Companion Gateway

RoHS Compliant

802.15.4 Data Modems

Wireless Replacement for RS-232 or Platform for Multi-Drop RS-485

ZN-241G

2.4 GHz
250 kb/s

The ZN-241G is a low-cost, 802.15.4 wireless data modem that can provide an auto-configured, wireless replacement for RS-232 cable in office environments, and can also serve as a platform for multi-drop RS-485 networks in industrial settings. Housed in a ruggedized metal enclosure, the ZN-241G replaces hard wiring in commercial environments that make wired connections challenging or impractical or that require frequent reconfiguration.

For point-to-point communications, ZN-241Gs configure the link automatically; all that's required is plugging the devices into two serial interfaces and turning on power. Point-to-multipoint links are set up by via an included utility that simplifies the configuration of network IDs and channels, and a repeater function allows a remote node to relay data through another remote node when the direct path is blocked.

The ZN-241G offers RS-232, USB, and RS-485 interface options, and operates license-free worldwide at 2.4 GHz with over-the-air data rates of up to 250 kb/s.

- Auto-Configuring
- 100 mW Transmit Power
- 2.4 GHz
- Seamless fit into existing wired networks
- Multiple Interfaces
- Automatic Relay Benefits:
- Low Cost/High Power
- Low Cost/High Power
- Easy to install and use
- Deployable in a wide range of uses
- Excellent range and coverage indoors and out
- License-free deployment around the world
- Reliable communications even when a direct path is blocked

802.15.4 Wireless Serial Data Modem

The RFM 802.15.4 wireless data modem can provide an auto-configured, wireless replacement for RS-232 cable in office environments, and can also serve as a platform for multi-drop RS-485 networks in industrial settings.

RFM Part	Frequency Band	Data Rate	Transmit Power	RF Conn/ Antenna	Description
ZN-241G	2.4 GHz	250 kb/s	10 mW to 100 mW	Reverse SMA	Standalone RS-232 Serial 802.15.4 Modem with DB9 Connector, Antenna, Power Supply, and Serial Cable
ZN-241GOEM	2.4 GHz	250 kb/s	10 mW to 100 mW	Reverse SMA	10 Pack of the ZN-241G without Antenna, Power Supply, or Serial Cable
ZN-241GI	2.4 GHz	250 kb/s	10 mW to 100 mW	Reverse SMA	Standalone Half-duplex RS-485/RS-232 Serial 802.15.4 Modem with Screw Terminal Connector, Antenna, and Power Supply
ZN-241GIOEM	2.4 GHz	250 kb/s	10 mW to 100 mW	Reverse SMA	10 Pack of the ZN-241GI without Antenna or Power Supply
ZN-241GSK	2.4 GHz	250 kb/s	10 mW to 100 mW	Reverse SMA	Starter kit including 2 ZN-241Gs, 2 2 dBi Antennas, 2 Power Supplies, 2 Serial Cables and Windows-based Configuration Utility
ZN-241GU	2.4 GHz	250 kb/s	10 mW to 100 mW	Reverse SMA	Standalone USB Serial 802.15.4 Modem, Antenna, Power Supply, and USB Cable (Can be powered from USB port)
ZN-241GUOEM	2.4 GHz	250 kb/s	10 mW to 100 mW	Reverse SMA	10 Pack of the ZN-241GU without Antenna, Power Supply, or USB Cable

Frequency Hopping (FHSS) Serial-to-Ethernet Access Points

Ethernet Connectivity for Serial Devices

SNAP910

900 MHz*
Used with WIT910-based devices

SNAP2410

2.4 GHz
Used with WIT2410-based devices

SNAP2411

2.4 GHz*
Used with WIT2411-based devices

SNAP Wireless Serial-to-Ethernet Access Points (900 MHz – 2.4 GHz). As the base station for WIT series 900 MHz and 2.4 GHz OEM modules (WIT910, WIT2410, and WIT2411) and HN series modems, SNAP access points provide seamless Serial-to-Ethernet connectivity with remote wireless nodes transmitting unformatted data to a server-based application running on the SNAP Ethernet network. SNAP devices remove the need for the remote devices to handle the TCP/IP protocol. Certified by the FCC and CE marked on 2.4 GHz products, the SNAP family offers license-free use.

- RFM FHSS technology — Patented FHSS technology provides reliable communications in high noise floor environments, superior jamming and interference immunity. CRC checking and automatic repeat request (ARQ) deliver error-free data.
- Serial to Ethernet connectivity — Allows transparent communication with remote devices and network-based applications. Allows limited intelligence and legacy serial devices to appear as nodes on an Ethernet network.
- Customizable operation — All parameters are configurable under software control. Even transmit power can be selected through a straightforward command set.
- Suited to tough environments — All SNAPs are available in "D" DIN rail mount versions and "X" remote radio versions for harsh and outdoor use.

SNAP Wireless Access Points for Ethernet Network					
RFM Part	Frequency Band	Data Rate	Transmit Power	RF Conn / Antenna	Description
SNAP910*	900 MHz	172.8 kb/s	1 W	Reverse TNC	Serial-to-Ethernet Access Point for WIT910 and Series 91-based devices, Internal Radio
SNAP910D*	900 MHz	172.8 kb/s	1 W	Reverse TNC	DIN-Rail Mount Serial-to-Ethernet Access Point for WIT910 and Series 91-based devices, Internal Radio
SNAP910DX*	900 MHz	172.8 kb/s	1 W	Reverse TNC	DIN-Rail Mount Serial-to-Ethernet Access Point for WIT910 and Series 91-based devices, Remote Radio with up to 500 foot cable
SNAP910X*	900 MHz	172.8 kb/s	1 W	Reverse TNC	Serial-to-Ethernet Access Point for WIT910 and Series 91-based devices, Remote Radio with up to 500 foot cable
SNAP2410	2.4 GHz	460.8 kb/s	100 mW	Reverse TNC	Serial-to-Ethernet Access Point for WIT2410 and Series 10-based devices, Internal Radio
SNAP2410D	2.4 GHz	460.8 kb/s	100 mW	Reverse TNC	DIN-Rail Mount, Serial-to-Ethernet Access Point for WIT2410 and Series 10-based devices, Internal Radio
SNAP2410DX	2.4 GHz	460.8 kb/s	100 mW	Reverse TNC	DIN-Rail Mount Serial-to-Ethernet Access Point for WIT2410 and Series 10-based devices, Remote Radio with up to 500 foot cable
SNAP2410X	2.4 GHz	460.8 kb/s	100 mW	Reverse TNC	Serial-to-Ethernet Access Point for WIT2410 and Series 10-based devices, Remote Radio with up to 500 foot cable
SNAP2411*	2.4 GHz	1.23 Mb/s	100 mW	Reverse TNC	Serial-to-Ethernet Access Point for WIT2411 and Series 11-based devices, Internal Radio
SNAP2411D*	2.4 GHz	1.23 Mb/s	100 mW	Reverse TNC	DIN-Rail Mount, Serial-to-Ethernet Access Point for WIT2411 and Series 11-based devices, Internal Radio
SNAP2411DX*	2.4 GHz	1.23 Mb/s	100 mW	Reverse TNC	DIN-Rail Mount Serial-to-Ethernet Access Point for WIT2411 and Series 11-based devices, Remote Radio with up to 500 foot cable
SNAP2411X*	2.4 GHz	1.23 Mb/s	100 mW	Reverse TNC	Serial-to-Ethernet Access Point for WIT2411 and Series 11-based devices, Remote Radio with up to 500 foot cable

* Boxed products based on WIT910- and WIT2411-series modules (1.23 Mb/s data rate) are not RoHS compliant.

RoHS Compliant

Frequency Hopping (FHSS) Ethernet Bridges

Ethernet Connectivity for Point-to-Point and Point-to-Multipoint Networks

900 MHz*	2.4 GHz	2.4 GHz
172.8 kb/s	460.8 kb/s	1.23* Mb/s
1 W	100 mW	100 mW

SEM Wireless Spread Spectrum Ethernet Bridges (900 MHz – 2.4 GHz). RFM SEM series wireless Ethernet bridges provide high-speed wireless connectivity between distant Ethernet nodes where cable runs are impractical. All SEMs feature the company's patented FHSS technology for robust RF performance. Typical SEM uses include Ethernet bridging, SCADA networking, PLC networking, and other industrial automation or data collection applications. SEMs can function as a high speed bridge between two 10/100 Base-T Ethernet networks; they can also provide wireless connectivity between an Ethernet network and multiple remote Ethernet network segments. Highly complex networks and extended coverage can be achieved by combining point-to-point or point-to-multipoint configurations with RFM repeaters.

The RFM SEM Ethernet Bridges are Class I, Div. 2 certified in both the 900 MHz and 2.4 GHz bands. SEM bridges include a standard 10/100 Base-T Ethernet port, antenna, and power connectors. Five LEDs indicate power status and data activity. Class I Div 1 versions are available by special order.

The SEM "D" model Ethernet radio is a DIN rail mount version, and the SEM "X" models use a remote, weatherproof, wireless Ethernet radio housed in a NEMA 4X / I.P. 66 enclosure.

900 MHz SEM Ethernet Bridges*. RFM SEM wireless 900 MHz Ethernet bridge is a high speed/long range wireless networking product that provides 172.8 kb/s over-the-air data rate and over 20 miles demonstrated communications range with 3 dB omni-directional antenna. Uses for a SEM wireless 900 MHz Ethernet bridge include SCADA networks, PLC networking, and other industrial automation or data collection applications.

2.4 GHz SEM Ethernet Bridges. The SEM2410 and SEM2411 link Ethernet nodes in an industrial communication hierarchy up to 5 miles apart (with gain antennas). The over-the-air data rate for the SEM2410 is 460 Kb/s and 1.23 Mb/s for the SEM2411. RFM patented FHSS assures reliable performance even in high-multi-path and noisy RF environments.

Ethernet Radio Security. RFM SEM wireless Ethernet bridges provide multiple levels of security. First, their communications use RFM proprietary frequency hopping spread spectrum (FHSS) protocol, which is understood only by other SEM Ethernet radio devices configured to use the same hopping pattern (out of 64 possibilities). To ensure that the SEM master communicates only with its intended SEM slaves, the SEM master can be configured to define the precise number of slaves (up to 62) that can register on the network, and can also be configured to authenticate an ID and password from each SEM slave prior to granting registration. Finally, SEM Ethernet radios include password protection for both console port and Telnet sessions, and can be configured to allow the opening of Telnet sessions only from specified IP addresses.

SEM: Spread Spectrum Wireless Ethernet Bridge					
RFM Part	Frequency Band	RF Data Rate	Transmit Power	RF Conn/ Antenna	Description
SEM910*	900 MHz	172.8 kb/s	1 W	Reverse TNC	10/100Base-T Ethernet Bridge, Internal Radio
SEM910D*	900 MHz	172.8 kb/s	1 W	Reverse TNC	10/100Base-T DIN-Rail mount Ethernet bridge, Internal Radio
SEM910DX*	900 MHz	172.8 kb/s	1 W	Reverse TNC	10/100Base-T DIN-Rail mount Ethernet bridge, Remote Radio with up to 500 foot cable
SEM910X*	900 MHz	172.8 kb/s	1 W	Reverse TNC	10/100Base-T Ethernet bridge, Remote Radio with up to 500 foot cable
SEM2410	2.4 GHz	460.8 kb/s	100 mW	Reverse TNC	10/100Base-T Ethernet Bridge, Internal Radio
SEM2410D	2.4 GHz	460.8 kb/s	100 mW	Reverse TNC	10/100Base-T DIN-Rail mount Ethernet bridge, Internal Radio
SEM2410DX	2.4 GHz	460.8 kb/s	100 mW	Reverse TNC	10/100Base-T DIN-Rail mount Ethernet bridge, Remote Radio with up to 500 foot cable
SEM2410X	2.4 GHz	460.8 kb/s	100 mW	Reverse TNC	10/100Base-T Ethernet bridge, Remote Radio with up to 500 foot cable
SEM2411*	2.4 GHz	1.23 Mb/s	100 mW	Reverse TNC	10/100Base-T Ethernet Bridge, Internal Radio
SEM2411D*	2.4 GHz	1.23 Mb/s	100 mW	Reverse TNC	10/100Base-T DIN-Rail mount Ethernet bridge, Internal Radio
SEM2411DX*	2.4 GHz	1.23 Mb/s	100 mW	Reverse TNC	10/100Base-T DIN-Rail mount Ethernet bridge, Remote Radio with up to 500 foot cable
SEM2411LC*	2.4 GHz	1.23 Mb/s	100 mW	Internal 12 dBi Patch	10/100Base-T Ethernet Bridge Client, Remote Radio with 50 foot cable
SEM2411X*	2.4 GHz	1.23 Mb/s	100 mW	Reverse TNC	10/100Base-T Ethernet bridge, Remote Radio with up to 500 foot cable

*Boxed products based on WIT910- and WIT2411-series modules (1.23 Mb/s data rate) are not RoHS compliant.

Frequency Hopping (FHSS) Serial Modems

Wireless Telemetry for Point-to-Point and Point-to-Multipoint Networks

HN Wireless Modems (900 MHz – 2.4 GHz). Built on the RFM WIT-Series RF modules, the versatile RFM HN-Series wireless modems employ the RFM proprietary FHSS and are well-suited for any industrial or commercial application needing complete, reliable, long-range, serial modems. Whether paired with RFM WIT-Series RF modules or used standalone, HN wireless modems are ideal for fixed wireless network applications in a range of indoor, outdoor, and harsh environments. They are available in 900 MHz and 2.4 GHz versions, support data rates of 172.8 kb/s to 1.23 Mb/s, are Class I Div 2 certified, and support Modbus, DNP3, and DF1 protocols. HN wireless modems come in a variety of enclosures including NEMA 4X and IP 66 rated enclosures with an effective operating temperature range of -30 °C to +70 °C.

900 MHz*
172.8 kb/s
1 W

2.4 GHz
460.8 kb/s
100 mW

2.4 GHz
460.8 kb/s
40 mW / 100 mW / 250 mW

2.4 GHz
1.23* Mb/s
100 mW

900 MHz Modems. The HN-591 desktop wireless modems are right at home in the relative comfort of a plant foreman's office, while the HN-291 modems deliver indoor / outdoor SCADA flexibility.

2.4 GHz Modem. The HN-510 and HN-550 are suitable for desktop use while the HN-1510 is a rugged indoor unit suitable for factory floor environments. The HN-21x, HN-1010, HN-2010, and HN-3010 are rugged enclosures designed for outdoor and wash-down environments.

Each HN-D Series is a DIN rail mount, low-cost modem with a remote mounted radio in a NEMA 4X/ IP 66 enclosure with either an internal 6 dB patch antenna or a reverse TNC antenna connector. A standard RS-232 interface connects to the device to be networked. The 2.4 GHz HN-series radios have over-the-air data rates of 460.8 kb/s or 1.23 Mb/s.

Combining HN-series Wireless Modems with SNAP Serial to Ethernet Access Point. Add SNAP Wireless Serial to Ethernet Access Points as a base station for both WIT OEM modules and HN modems, which allow non-Ethernet serial devices to operate as nodes on an Ethernet network.

900 MHz Long Range HN-91 Series Standalone Wireless Modems

RFM Part	Frequency Band	Data Rate	Transmit Power	RF Conn/ Antenna	Interface
HN-291*	900 MHz	172.8 kb/s	1 W	Internal 3 dBi Patch	RS-232 DB9, 50 foot cable
HN-291X*	900 MHz	172.8 kb/s	1 W	Reverse TNC	RS-232 DB9, 50 foot cable
HN-294*	900 MHz	172.8 kb/s	1 W	Internal 3 dBi Patch	RS-232 DB9, 4 foot cable
HN-294X*	900 MHz	172.8 kb/s	1 W	Reverse TNC	RS-232 DB9, 4 foot cable
HN-591*	900 MHz	172.6 kb/s	1 W	Reverse SMA	RS-232 DB9

2.4 GHz Low Cost HN-50 Series Standalone Wireless Modems

RFM Part	Frequency Band	Data Rate	Transmit Power	RF Conn/ Antenna	Interface
HN-250	2.4 GHz	460.8 kb/s	40 mW to 250 mW	Internal 6 dBi Patch	RS-232 DB9, 50 foot cable
HN-250X	2.4 GHz	460.8 kb/s	40 mW to 250 mW	Reverse TNC	RS-232 DB9, 50 foot cable
HN-250-100	2.4 GHz	460.8 kb/s	40 mW to 250 mW	Internal 6 dBi Patch	RS-232 DB9, 100 foot cable
HN-250U	2.4 GHz	460.8 kb/s	40 mW to 250 mW	Internal 6 dBi Patch	USB, 50 foot cable
HN-250UX	2.4 GHz	460.8 kb/s	40 mW to 250 mW	Reverse TNC	USB, 50 foot cable
HN-250U-100	2.4 GHz	460.8 kb/s	40 mW to 250 mW	Internal 6 dBi Patch	USB, 100 foot cable
HN-254	2.4 GHz	460.8 kb/s	40 mW to 250 mW	Internal 6 dBi Patch	RS-232 DB9, 4 foot cable
HN-254X	2.4 GHz	460.8 kb/s	40 mW to 250 mW	Reverse TNC	RS-232 DB9, 4 foot cable
HN-254U	2.4 GHz	460.8 kb/s	40 mW to 250 mW	Internal 6 dBi Patch	USB, 4 foot cable
HN-254UX	2.4 GHz	460.8 kb/s	40 mW to 250 mW	Reverse TNC	USB, 4 foot cable
HN-550	2.4 GHz	460.8 kb/s	40 mW to 250 mW	Reverse SMA	RS-232 DB9 Desktop Version

2.4 GHz HN-10/HN-11 Series Standalone Wireless Modems

RFM Part	Frequency Band	Data Rate	Transmit Power	RF Conn/ Antenna	Interface
HN-210	2.4 GHz	460.8 kb/s	100 mW	Internal 6 dBi Patch	RS-232 DB9, 50 foot cable
HN-210D	2.4 GHz	460.8 kb/s	100 mW	Internal 6 dBi Patch	DIN-Rail mount, RS-232, DB9, 50 foot cable
HN-210DX	2.4 GHz	460.8 kb/s	100 mW	Reverse TNC	DIN-Rail mount, RS-232, DB9, 50 foot cable
HN-210X	2.4 GHz	460.8 kb/s	100 mW	Reverse TNC	RS-232 DB9, 50 foot cable
HN-211R	2.4 GHz	1.23 Mb/s	100 mW	Internal 6 dBi Patch	RS-232 DB9, 50 foot cable
HN-211RX	2.4 GHz	1.23 Mb/s	100 mW	Reverse TNC	RS-232 DB9, 50 foot cable
HN-211U	2.4 GHz	1.23 Mb/s	100 mW	Internal 6 dBi Patch	RS-232 DB9, 50 foot cable
HN-211UX	2.4 GHz	1.23 Mb/s	100 mW	Reverse TNC	RS-232 DB9, 50 foot cable
HN-214	2.4 GHz	460.8 kb/s	100 mW	Internal 6 dBi Patch	RS-232 DB9, 4 foot cable
HN-214D	2.4 GHz	460.8 kb/s	100 mW	Internal 6 dBi Patch	DIN-Rail mount RS-232 DB9, 4 foot cable
HN-214DX	2.4 GHz	460.8 kb/s	100 mW	Reverse TNC	DIN-Rail mount, RS-232 DB9, 4 foot cable
HN-214X	2.4 GHz	460.8 kb/s	100 mW	Reverse TNC	RS-232 DB9, 4 foot cable
HN-214U	2.4 GHz	460.8 kb/s	100 mW	Internal 6 dBi Patch	USB, 4 foot cable
HN-214UX	2.4 GHz	460.8 kb/s	100 mW	Reverse TNC	USB, 4 foot cable
HN-510	2.4 GHz	460.8 kb/s	100 mW	Reverse SMA	RS-232 DB9 Desktop Version
HN-511	2.4 GHz	1.23 Mb/s	100 mW	Reverse SMA	RS-232 DB9 Desktop Version
HN-1010	2.4 GHz	460.8 kb/s	100 mW	TNC	RS-232 Connexall
HN-1510	2.4 GHz	460.8 kb/s	100 mW	TNC	RS-232 DB9
HN-2010	2.4 GHz	460.8 kb/s	100 mW	2 TNC	N/A
HN-3010	2.4 GHz	460.8 kb/s	100 mW	Internal 6 dBi Patch	RS-232 Connexall

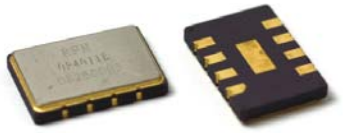
*Boxed products based on WIT910- and WIT2411-series modules (1.23 Mb/s data rate) are not RoHS compliant.

RoHS Compliant

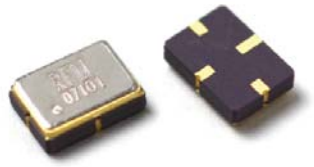
RFM is in its fourth decade as a global leader in SAW-based components.

SAW-Based RF Components

SAW FREQUENCY CONTROL (PAGES 43-44). RFM SAW-Based Frequency Control products include a broad array of SAW-stabilized Optical Timing Clocks and Diff-Sine Wave Clocks and Oscillators in a wide range of operating frequencies between 200 MHz and 1.8 GHz. These frequency sources exhibit very low phase noise and jitter. They have tolerances of 100 ppm basic stability, or the ability to phase lock to high-stability system clocks.



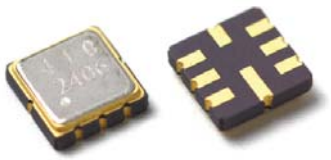
All RFM Frequency Control products are RoHS compliant.



All RFM SAW Resonators are RoHS compliant.

SAW RESONATORS (PAGES 45-46). Low-power SAW resonators are used as frequency control elements in transmitter and receiver LO circuits. These components are essential to the miniature radio frequency transmitters and receivers that enable a variety of wireless consumer, automotive, industrial, medical and commercial applications. RFM manufactures reliable, high performance, low-cost components in a variety of small surface-mount packages as well as the traditional TO39 "metal can" package.

SAW NARROWBAND FRONT-END FILTERS (PAGES 47-48). The use of narrowband SAW filters has become a necessity in a variety of wireless links. RFM SAW coupled resonators filter components are used as narrowband front-end filters for receivers to reject strong out of band signals. RFM has an extensive offering of low-cost, rugged, narrowband SAW front-end filters in a broad range of frequencies and a variety of small packages. These low-cost front-end filters exhibit excellent rejection characteristics, low insertion loss and superior temperature stability.



All RFM SAW Narrowband Front-End Filters are RoHS compliant.

All RFM SAW RF/IF Filters are RoHS compliant.

SAW RF/IF FILTERS (PAGES 49-56). RFM filter products includes a variety of standard and custom bandpass filters for radio frequency (RF), intermediate frequency (IF) and other applications. The operating frequencies of these filters range from 40 MHz to 2.7 GHz. These filters are available in a variety of leaded and surface-mount packages. RFM also custom designs and manufactures SAW delay lines and notch filters.

Small Size | Low Cost | Low-Power Consumption

SAW Components

40 MHz - 2.7 GHz

RFM delivers high performance surface acoustic wave (SAW) radio frequency (RF) components that are integral to enabling wireless connections and communications. They are embedded into a wide range of products.

With over 500 standard SAW components, RFM offers a robust SAW product portfolio that include RF and IF Filters, Resonators, and Frequency Control products (SAW-stabilized Optical Timing Clocks and Diff-Sine Wave Clocks, and SAW Oscillators).

KEY FEATURES & BENEFITS

Wide Range of Frequencies

Many Standard Off-the-Shelf RF SAWs

Broad Range of Standard Packages

Custom Design Capabilities to Meet Unique Requirements

Chip & Wire: Metal, C(5x5mm), D(3.8x3.8mm), E(3x3mm), G(2.5x2.0mm)

Flip Chip: G(2.5x2.0), H(2.0x1.6mm)

K(1.4x1.1mm) Au/Sn Seal Metal Cap for Automotive

K(1.4x1.1 mm) Molding, Low Cost

High Performance

Broad Range, Variety of Packages

Frequency Control • Resonators • Filters

RFM is also been known for support of custom SAW solutions. This is due in part to the company's large SAW technology portfolio that enables quick design turns.

This makes RFM the RF engineer's one-stop SAW technology shop.

RFM SAW products serves the global marketplace, with products embedded into millions of communications networking and devices, global positioning systems (GPS), automotive devices, healthcare devices and a broad range of industrial equipment.

RFM serves the world's largest household brand-name companies, leading-edge start-ups firms, and companies of all sizes in-between. However, RFM SAW products are manufacturered and priced ideally for applications at high volumes.

Founded in 1979 to deliver SAW technology, and acquired by Murata Electronics North America in 2012, RFM continues to be well-positioned to serve the growing demand for innovative SAW components around the world.

RoHS Compliant

SAW Frequency Control

APPLICATIONS

Digital communications systems

High performance analog and digital radios

Air Traffic Control (ATC) and Traffic Collision Avoidance Systems (TCAS)

Point-to-point microwave communications systems

RFM retains a long history of providing stable, SAW-based frequency control products for high-performance computer timing, communications, and test instrumentation.

In addition, RFM manufactures optical timing products based on RFM "Diff Sine" technology to meet the increasing demand for high data rates in communication systems. These products have been specifically developed for applications such as dense wave division multiplexing (DWDM) equipment where timing integrity and elimination of system noise in circuits are critical.

The OP4005B and OP4005B-1 are both 622.08 MHz differential clocks with near perfect symmetry and extremely low jitter even with noise on the power planes. The OP4006B is a 666.5 MHz Clock for forward error correction timing. RFM's "Diff Sine" architecture is the basis of each of these high performance optical products.

The OPB series along with the SCB series Clocks are also used for timing on ultra-high-speed A-to-D converter applications and other digital radio applications.

WHY CHOOSE RFM SAW FREQUENCY CONTROL

Best Performance

Lowest Phase Noise and Jitter

Tolerances as Low as ± 50 ppm Basic Stability

Ability to Phase Lock to High-Stability System Clocks

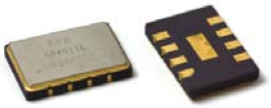
Wide Range of Operating Frequencies 200 MHz to 1.1 GHz

Small Packages

Small size is crucial when engineering tiny devices for wireless applicaitons. RFM frequency control components are available in a variety of non-leaded surface mount (SMP) ceramic packages or a Dual-in-lin package (DIP).

Standard Order Quantities

Components	Package	Shipped Via	QTY
Frequency Control - Oscillators	DIP	Antistatic Box	30
	SMP	Tape and Reel - 7"	500
Frequency Control - Dif Sine Wave Clocks	SMP	Tape and Reel - 7"	500
Frequency Control - VCSO Optical Timing Clocks	SMP	Tape and Reel - 7"	500



SMC-8 Case
14 mm x 9 mm

DIP16-8 Case
25.02 mm x 12.83 mm x 6.35 mm

SAW Frequency Control

Listed in Order by Frequency

Voltage-Controlled Oscillators				
Part No.	Frequency	Tolerance / Specification		Case (mm)
HO4050B-1	**622.08 MHz**	±200 kHz (-55 °C to 100 °C)		13.5x9.4
HO1080-3	**1030 MHz**	±200 kHz (-55 °C to 105 °C)		25x12.8
HO1081-3	**1090 MHz**	±250 kHz (-55 °C to 105 °C)		25x12.8

Diff Sine Wave Clock				
Part No.	Frequency	Tolerance / Specification		Case (mm)
SC3044B	**251 MHz**	Tol = 300 ppm	Vcc=3.3	13.5x9.4
SC3041B	**300 MHz**	Tol = 200 ppm	Vcc=3.3	13.5x9.4
SC3037B	**350 MHz**	Tol = 200 ppm	Vcc=3.3	13.5x9.4
SC3017B	**400 MHz**	Tol = 200 ppm	Vcc=3.3	13.5x9.4
SC3040B	**400 MHz**	Tol = 200 ppm	Vcc=3.3	13.5x9.4
SC3048B	**444 MHz**	Tol = 200 ppm	Vcc=3.3	13.5x9.4
SC3019B	**500 MHz**	Tol = 200 ppm	Vcc=3.3	13.5x9.4
SC3038B	**532 MHz**	Tol = 200 ppm	Vcc=3.3	13.5x9.4
SC3015B	**550 MHz**	Tol = 200 ppm	Vcc=3.3	13.5x9.4
SC3011B-1	**600 MHz**	Tol = 250 ppm	Vcc=3.3	13.5x9.4
SC3045B	**621.6 MHz**	Tol = 250 ppm	Vcc=3.3	13.5x9.4
SC3042B	**624 MHz**	Tol = 200 ppm	Vcc=3.3	13.5x9.4
SC3056B	**667 MHz**	Tol = 250 ppm	Vcc=3.3	13.5x9.4
SC3049B	**700 MHz**	Tol = 250 ppm	Vcc=3.3	13.5x9.4
SC3053B	**750 MHz**	Tol = 250 ppm	Vcc=3.3	13.5x9.4
SC3035B-1	**800 MHz**	Tol = 250 ppm	Vcc=3.3	13.5x9.4
SC3035B-2	**800 MHz**	Tol = 250 ppm	Vcc=3.3	13.5x9.4
SC3046B-5	**933.12 MHz**	Tol = 70 ppm	Vcc=3.3	13.5x9.4

VCSO Timing Clock for Optical Networking				
Part No.	Frequency	Tolerance / Specification		Case (mm)
OP4005B	**622.08 MHz**	±100 ppm	0.1ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4005B1	**622.08 MHz**	±100 ppm	0.1ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4004B	**625 MHz**	±100 ppm	2ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4014B	**627.329 MHz**	±100 ppm	<1 ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4012B	**644.53125 MHz**	±100 ppm	2 ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4010B	**663.552 MHz**	±100 ppm	2 ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4006B	**666.51 MHz**	±100 ppm	2 ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4006B1	**666.51 MHz**	±100 ppm	1ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4007B	**669.128 MHz**	±100 ppm	2 ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4008B	**669.327 MHz**	±100 ppm	2 ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4009B	**672.163 MHz**	±100 ppm	2 ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4013B	**693.48342 MHz**	±100 ppm	2 ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4018B	**718.864 MHz**	±50 ppm	0.5 ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4018B1	**718.864 MHz**	±50 ppm	0.5 ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4011B	**719.734 MHz**	±100 ppm	2 ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4017B	**777.6 MHz**	±100 ppm	1 ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4017B1	**777.6 MHz**	±100 ppm	2 ps RMS Jitter, Low Phase Noise	13.5x9.4
OP4015B	**780.881 MHz**	±100 ppm	0.2 ps RMS Jitter, Low Phase Noise	13.5x9.4

RoHS Compliant

SAW Resonators

RFM provides a large selection of SAW resonators in a broad range of frequencies from 300 MHz to over 1 GHz. These products are designed to be the frequency control elements in transmitters. Tighter center frequency tolerances are becoming popular especially in Europe. RFM can provide tolerances down to ±50 kHz. These quartz-stabilized devices ensure maximum temperature performance in a variety of applications.

Port Type. The SAW Resonator product family includes one (Single Port) and two port (Dual Port) types.

Single-Port. The RO series is a line of true single-port devices with a lumped element model that is similar to that of a bulk crystal device. Single-port resonators are typically used in modified Colpitts oscillator configurations where the resonator is connected between the base of a transistor and ground.

Dual-Port. The RP series is a line of dual-port resonators packaged in a low-profile TO39 (9.3 mm diameter) case. Dual-port resonators provide reliable, fundamental-mode, quartz frequency stabilization of fixed-frequency oscillators.

Small Packages

Small size is crucial when engineering tiny devices for wireless applicaitons. RFM Resonators are available in a variety of non-leaded SMP ceramic packages or a TO39-3 leaded package.

Standard Order Quantities

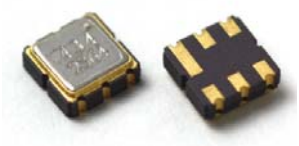
Components	Package	Shipped Via	QTY
Resonators - Single Port	TO39-3	Antistatic Tube	50
	SMP	Tape and Reel - 7"	500
	SMP	Tape and Reel - 13	3,000
	SMP	Tape and Reel - 13	4,000
Resonators - Dual-Port	TO39-3	Antistatic Tube	50

9.3 mm diameter
TO39

3.0 mm x 3.0 mm
6-Pin

5.0 mm x 5.0 mm
8-Pin

5.0 mm x 3.5mm
4-Pin



3.8 mm x 3.8 mm
6-Pin

APPLICATIONS

Automotive keyless entry

Tire pressure monitoring

Wireless point-of-sale terminals

Data link equipment

Peripherals

Remote bar code data entry

Bar code readers

Identification tags

Home automation

Door and gate openers

Personal and home security

Automated meter reading

Consumer sports

WHY CHOOSE RFM SAW RESONATORS

Wide Range of Frequencies 300 MHz to 1.1 GHz

Tolerances Down to ±50 kHz

Broad Range of Standard Off-the-Shelf SAW Resonators Available

Custom Designs Possible

Variety of Standard Packages

Chip & Wire: TO39, A (6.6x3.9mm, 5x3.5mm), C(5x5mm), D(3.8x3.8mm), E(3x3mm), G(2.5x2.0mm)

Flip Chip: G (2.5x2.0), H(2.0x1.6mm)

One of RFM Co-founders Also Co-invented SAW Resonators

SAW Resonators

Listed in Order by Frequency

Single-Port Resonators in Order by Frequency			
Part No.	**Frequency**	**Lid Symbol**	**Case (mm)**
RO3122A	**293.125 MHz**	835	5.0x3.5
RO2100	**295.05 MHz**	RO2100	9.3 mm diameter case
RO3116	**303.325 MHz**	RO3116	9.3 mm diameter case
RO3116A	**303.325 MHz**	819	5.0x3.5
RO3104	**303.825 MHz**	RO3104	9.3 mm diameter case
RO3104A	**303.825 MHz**	662	5.0x3.5
RO3104C	**303.825 MHz**	688	5.0x5.0
RO3104D	**303.825 MHz**	689	3.8x3.8
RO3104E	**303.825 MHz**	690	3.0x3.0
RO2043	**303.875 MHz**	RO2043	9.3 mm diameter case
RO3150A	**304 MHz**	838	5.0x3.5
RO3125A	**304.3 MHz**	787	5.0x3.5
RO3125A-2	**304.3 MHz**	815	5.0x3.5
RO3123A	**307.3 MHz**	831	5.0x3.5
RO3053A-1	**310 MHz**	810	5.0x3.5
RO3132A	**312 MHz**	794	5.0x3.5
RO3030A-1	**314.2 MHz**	830	5.0x3.5
RO2131D	**314.35 MHz**	440	3.8x3.8
RO3131A	**314.35 MHz**	849	5.0x3.5
RO3113	**314.5 MHz**	RO3113	9.3 mm diameter case
RO3113A	**314.5 MHz**	801	5.0x3.5
RO3073	**315 MHz**	RO3073	9.3 mm diameter case
RO3073A	**315 MHz**	656	5.0x3.5
RO3073A-1	**315 MHz**	742	5.0x3.5
RO3073A-11	**315 MHz**	907	5.0x3.5
RO3073A-6	**315 MHz**	789	5.0x3.5
RO3073C	**315 MHz**	706	5.0x5.0
RO3073D	**315 MHz**	705	3.8x3.8
RO3073E	**315 MHz**	704	3.0x3.0
RO3073E-1	**315 MHz**	802	3.0x3.0
RO3073E-11	**315 MHz**	909	3.0x3.0
RO3073A-5	**315.05 MHz**	788	5.0x3.5
RO3119A	**317.5 MHz**	834	5.0x3.5
RO2044	**318 MHz**	RO2044	9.3 mm diameter case
RO3118	**318 MHz**	RO3118	9.3 mm diameter case
RO3118A	**318 MHz**	661	5.0x3.5
RO3118A-1	**318 MHz**	763	5.0x3.5
RO3118D	**318 MHz**	716	3.8x3.8
RO3118E	**318 MHz**	687	3.0x3.0
RO3075	**345 MHz**	RO3075	9.3 mm diameter case
RO3075A	**345 MHz**	664	5.0x3.5
RO3075E	**345 MHz**	694	3.0x3.0
RO3302A	**361.3 MHz**	867	5.0x3.5
RO3143A	**372 MHz**	820	5.0x3.5
RO3134A	**372.5 MHz**	836	5.0x3.5
RO3193A	**379.3 MHz**	832	5.0x3.5
RO3188A	**390 MHz**	797	5.0x3.5
RO3120A	**403.55 MHz**	824	5.0x3.5
RO3120C	**403.55 MHz**	811	5.0x5.0
RO3300E	**403.55 MHz**	719	3.0x3.0
RO3138A	**407.3 MHz**	837	5.0x3.5
RO3115	**417.5 MHz**	RO3115	9.3 mm diameter case
RO3115A	**417.5 MHz**	833	5.0x3.5
RO3103	**418 MHz**	RO3103	9.3 mm diameter case
RO3103A	**418 MHz**	659	5.0x3.5
RO3103D	**418 MHz**	717	3.8x3.8
RO3103E	**418 MHz**	676	3.0x3.0
RO3102	**423.22 MHz**	RO3102	9.3 mm diameter case
RO3102A	**423.22 MHz**	823	5.0x3.5
RO3102A-1	**423.22 MHz**	784	5.0x3.5
RO3112	**433.42 MHz**	RO3112	9.3 mm diameter case
RO3112A	**433.42 MHz**	658	5.0x3.5
RO3112C	**433.42 MHz**	657	5.0x5.0
RO3112D	**433.42 MHz**	683	3.8x3.8
RO3112E	**433.42 MHz**	684	3.0x3.0
RO3101	**433.92 MHz**	RO3101	9.3 mm diameter case
RO3101A	**433.92 MHz**	655	5.0x3.5
RO3101A-1	**433.92 MHz**	745	5.0x3.5
RO3101A-11	**433.92 MHz**	904	5.0x3.5
RO3101A-21	**433.92 MHz**	807	5.0x3.5

Single-Port Resonators in Order by Frequency			
Part No.	**Frequency**	**Lid Symbol**	**Case (mm)**
RO3101C	**433.92 MHz**	703	5.0x5.0
RO3101C-11	**433.92 MHz**	901	5.0x5.0
RO3101D	**433.92 MHz**	702	3.8x3.8
RO3101E	**433.92 MHz**	701	3.0x3.0
RO3101E-1	**433.92 MHz**	750	3.0x3.0
RO3101E-11	**433.92 MHz**	894	3.0x3.0
RO3023	**433.97 MHz**	RO3023	9.3 mm diameter case
RO3164	**868.35 MHz**	RO3164	9.3 mm diameter case
RO3164A	**868.35 MHz**	660	5.0x3.5
RO3164A-1	**868.35 MHz**	780	5.0x3.5
RO3164A-2	**868.35 MHz**	868	5.0x3.5
RO3164D	**868.35 MHz**	685	3.8x3.8
RO3164D-1	**868.35 MHz**	771	3.8x3.8
RO3164D-2	**868.35 MHz**	772	3.8x3.8
RO3164E	**868.35 MHz**	686	3.0x3.0
RO3164E-1	**868.35 MHz**	773	3.0x3.0
RO3164E-2	**868.35 MHz**	774	3.0x3.0
RO3156A	**868.95 MHz**	714	5.0x3.5
RO3156A-1	**868.95 MHz**	923	5.0x3.5
RO3156A-2	**868.95 MHz**	828	5.0x3.5
RO3156D	**868.95 MHz**	715	3.8x3.8
RO3156D-1	**868.95 MHz**	924	3.8x3.8
RO3156D-2	**868.95 MHz**	925	3.8x3.8
RO3156E	**868.95 MHz**	707	3.0x3.0
RO3156E-1	**868.95 MHz**	708	3.0x3.0
RO3156E-2	**868.95 MHz**	926	3.0x3.0
RO3144	**916.50 MHz**	RO3144	9.3 mm diameter case
RO3144A	**916.50 MHz**	663	5.0x3.5
RO3144A-1	**916.50 MHz**	897	5.0x3.5
RO3144A-2	**916.50 MHz**	813	5.0x3.5
RO3144C	**916.50 MHz**	691	5.0x5.0
RO3144D	**916.50 MHz**	692	3.8x3.8
RO3144D-1	**916.50 MHz**	767	3.8x3.8
RO3144D-2	**916.50 MHz**	768	3.8x3.8
RO3144E	**916.50 MHz**	693	3.0x3.0
RO3144E-1	**916.50 MHz**	769	3.0x3.0
RO3144E-2	**916.50 MHz**	770	3.0x3.0

Dual-Port Resonators			
Part No.	**Frequency**	**Lid Symbol**	**Case (mm)**
RP1053-2	**310 MHz**	**1053**	**9.3 mm diameter**
RP1236-1	**312 MHz**	**P1236**	**9.3 mm diameter**
RP1298	**423.22 MHz**	**P1298**	**9.3 mm diameter**
RP1308	**433.92 MHz**	**P1308**	**9.3 mm diameter**
RP1105	**640 MHz**	**P1105**	**9.3 mm diameter**
RP1104	**824.25 MHz**	**P1104**	**9.3 mm diameter**

RoHS Compliant

SAW Narrowband Front-End Filters

APPLICATIONS

Automotive keyless entry

Tire pressure monitoring

Wireless point-of-sale terminals

Data link equipment

Peripherals

Remote bar code data entry

Bar code readers

Identification tags

Home automation

Door and gate openers

Personal and home security

Automated meter reading

Consumer sports

WHY CHOOSE RFM SAW NARROWBAND FRONT-END FILTERS

Wide Range of Frequencies 300 MHz to 1 GHz

High Performance

Excellent Rejection Characteristics, Low Insertion Loss, and Superior Temperature Stability (Quartz Stability)

STW Quartz R/D for High Narrowband RF Filters

Chip & Wire: Metal, C(5x5mm), D(3.8x3.8mm), E(3x3mm), G(2.5x2.0mm)

Flip Chip: G (2.5x2.0), H(2.0x1.6mm)

Many standard off-the-shelf RF SAWs

The use of narrowband SAW filters has become a necessity in a variety of wireless links. RFM SAW coupled resonators filter components are used as narrowband front-end filters for receivers to reject strong out of band signals.

RFM provides a large selection of low-loss narrowband front-end filters for all major frequencies used in low-power unlicensed communications equipment from 300 MHz to 1 GHz. Coupled resonator filter technology is used in the RF series of components. These devices are used as narrowband front-end filters to reject strong out-of-band signals.

Typical bandwidths are 600-900 kHz with typical ultimate out-of-band rejection of 50 dB. Special rejection is provided at key points such as -10.7 MHz for local oscillator rejection and -21.4 MHz for the image spurious response in typical superhet receivers.

Optimum implementation of this filter technology is accomplished when the filter is matched on both input and output ports. This matching is typically a simple inductor-capacitor network. In addition to matching, careful attention to circuit board layout is also important to achieve optimum filter performance.

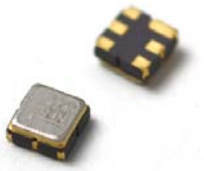
Small Packages

Small size is crucial when engineering tiny devices for wireless applicaitons. RFM SAW Narrowband Front-End Filters are available in a variety of non-leaded SMP ceramic packages and a TO39-3 leaded package.

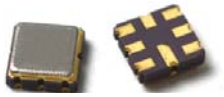
Standard Order Quantities

Components	Package	Shipped Via	QTY
Filters - Narrow-band Front-end Filters	TO39-3	Antistatic Tube	50
	SMP	Tape and Reel - 7"	500
	SMP	Tape and Reel - 13	3,000

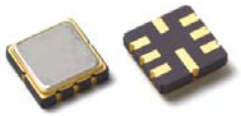
9.3 mm diameter TO39



3.0 mm x 3.0 mm 6-Pin SMT Package



3.8 mm x 3.8 mm 8-Pin SMT Package



5.0 mm x 5.0 mm 8-pin SMT Package

SAW Narrowband Front-End Filters

Listed in Order by Frequency

SAW Narrowband Front-End Filters by Frequency

Part No.	Frequency	Bandwidth	Lid Symbol	Case (mm)
RF1199	**297.4 MHz**	800 kHz	RF1199	9.3 mm diameter
RF3210	**303.825 MHz**	600 kHz	RF3210	9.3 mm diameter
RF3210D	**303.825 MHz**	650 kHz	675	3.8x3.8
RF3602D	**305.3 MHz**	12500 kHz	885	3.8x3.8
RF1211C	**315 MHz**	900 kHz	410	5.0x5.0
RF1211D	**315 MHz**	600 kHz	476	3.8x3.8
RF1402D	**315 MHz**	1000 kHz	496	3.8x3.8
RF1417D	**315 MHz**	600 kHz	550	3.8x3.8
RF3417	**315 MHz**	700 kHz	RF3417	9.3 mm diameter
RF3417D	**315 MHz**	600 kHz	550	3.8x3.8
RF3417E	**315 MHz**	600 kHz	696	3.0x3.0
RF3603D	**316.4 MHz**	13000 kHz	886	3.8x3.8
RF1238	**318 MHz**	700 kHz	RF1238	9.3 mm diameter
RF1284	**319.5 MHz**	600 kHz	RF1284	9.3 mm diameter
RF1432C	**319.5 MHz**	600 kHz	621	5.0x5.0
RF1353C	**345 MHz**	430 kHz	446	5.0x5.0
RF1353D	**345 MHz**	430 kHz	444	3.8x3.8
RF3604D	**345 MHz**	16000 kHz	887	3.8x3.8
RF3700D	**372 MHz**	400 kHz	916	3.8x3.8
RF3605D	**372.25 MHz**	16000 kHz	888	3.8x3.8
RF1414D	**372.5 MHz**	425 kHz	528	3.8x3.8
RF3414E	**372.5 MHz**	450 kHz	720	3.0x3.0
RF3355C	**390 MHz**	440 kHz	736	5.0x5.0
RF3606D	**390 MHz**	16000 kHz	889	3.8x3.8
RF1419D	**403.5 MHz**	7500 kHz	560	3.8x3.8
RF3607D	**403.5 MHz**	18000 kHz	890	3.8x3.8
RF1171	**418 MHz**	600 kHz	RF1171	9.3 mm diameter
RF3171	**418 MHz**	600 kHz	RF3171	9.3 mm diameter
RF3171D	**418 MHz**	600 kHz	775	3.8x3.8
RF3608D	**426.4 MHz**	19500 kHz	891	3.8x3.8
RF1391C	**433.42 MHz**	600 kHz	415	5.0x5.0
RF3391D	**433.42 MHz**	500 kHz	739	3.8x3.8
RF1172C	**433.92 MHz**	700 kHz	409	5.0x5.0
RF1172D	**433.92 MHz**	600 kHz	477	3.8x3.8
RF1400D	**433.92 MHz**	1150 kHz	490	3.8x3.8
RF1401D	**433.92 MHz**	1000 kHz	495	3.8x3.8
RF1404C	**433.92 MHz**	600 kHz	499	5.0x5.0
RF3404	**433.92 MHz**	600 kHz	RF3404	9.3 mm diameter
RF3404D	**433.92 MHz**	600 kHz	539	3.8x3.8
RF3404E	**433.92 MHz**	600 kHz	697	3.0x3.0
RF3446E	**433.92 MHz**	960 kHz	776	3.0x3.0
RF3701E	**433.92 MHz**	650 kHz	940	3.0x3.0
RF1396C	**434.42 MHz**	700 kHz	427	5.0x5.0
RF1408D	**447.7 MHz**	840 kHz	511	3.8x3.8
RF3609D	**449 MHz**	18000 kHz	892	3.8x3.8
RF1295C	**451.35 MHz**	1000 kHz	482	5.0x5.0
RF3501E	**866.1 MHz**	31000 kHz	805	3.0x3.0
RF3336	**868.35 MHz**	600 kHz	RF3336	9.3 mm diameter
RF3336C	**868.35 MHz**	600 kHz	673	5.0x5.0
RF3336D	**868.35 MHz**	600 kHz	699	3.8x3.8
RF3336E	**868.35 MHz**	600 kHz	700	3.0x3.0
RF1407D	**868.6 MHz**	1800 kHz	505	3.8x3.8
RF3600E	**868.6 MHz**	1400 kHz	816	3.0x3.0
RF3319D	**868.95 MHz**	650 kHz	668	3.8x3.8
RF3319E	**868.95 MHz**	800 kHz	668	3.0x3.0
RF1411D	**869.2625 MHz**	1250 kHz	512	3.8x3.8
RF2040E	**915 MHz**	28000 kHz	804	3.0x3.0
RF3181	**916.5 MHz**	750 kHz	RF3181	9.3 mm diameter
RF3181D	**916.5 MHz**	750 kHz	671	3.8x3.8
RF3181E	**916.5 MHz**	750 kHz	689	3.0x3.0
RF3601E	**960 MHz**	40000 kHz	818	3.0x3.0

SAW Narrowband Front-End Filters by Bandwidth

Part No.	Frequency	Bandwidth	Lid Symbol	Case (mm)
RF3700D	372	**400 kHz**	916	3.8x3.8
RF1414D	372.5	**425 kHz**	528	3.8x3.8
RF1353C	345	**430 kHz**	446	5.0x5.0
RF1353D	345	**430 kHz**	444	3.8x3.8
RF3355C	390	**440 kHz**	736	5.0x5.0
RF3414E	372.5	**450 kHz**	720	3.0x3.0
RF3391D	433.42	**500 kHz**	739	3.8x3.8
RF3210	303.825	**600 kHz**	RF3210	9.3 mm diameter
RF1211D	315	**600 kHz**	476	3.8x3.8
RF1417D	315	**600 kHz**	550	3.8x3.8
RF3417D	315	**600 kHz**	550	3.8x3.8
RF3417E	315	**600 kHz**	696	3.0x3.0
RF1284	319.5	**600 kHz**	RF1284	9.3 mm diameter
RF1432C	319.5	**600 kHz**	621	5.0x5.0
RF1171	418	**600 kHz**	RF1171	9.3 mm diameter
RF3171	418	**600 kHz**	RF3171	9.3 mm diameter
RF3171D	418	**600 kHz**	775	3.8x3.8
RF1391C	433.42	**600 kHz**	415	5.0x5.0
RF1172D	433.92	**600 kHz**	477	3.8x3.8
RF1404C	433.92	**600 kHz**	499	5.0x5.0
RF3404	433.92	**600 kHz**	RF3404	9.3 mm diameter
RF3404D	433.92	**600 kHz**	539	3.8x3.8
RF3404E	433.92	**600 kHz**	697	3.0x3.0
RF3336	868.35	**600 kHz**	RF3336	9.3 mm diameter
RF3336C	868.35	**600 kHz**	673	5.0x5.0
RF3336D	868.35	**600 kHz**	699	3.8x3.8
RF3336E	868.35	**600 kHz**	700	3.0x3.0
RF3210D	303.825	**650 kHz**	675	3.8x3.8
RF3701E	433.92	**650 kHz**	940	3.0x3.0
RF3319D	868.95	**650 kHz**	668	3.8x3.8
RF3417	315	**700 kHz**	RF3417	9.3 mm diameter
RF1238	318	**700 kHz**	RF1238	9.3 mm diameter
RF1172C	433.92	**700 kHz**	409	5.0x5.0
RF1396C	434.42	**700 kHz**	427	5.0x5.0
RF3181	916.5	**750 kHz**	RF3181	9.3 mm diameter
RF3181D	916.5	**750 kHz**	671	3.8x3.8
RF3181E	916.5	**750 kHz**	689	3.0x3.0
RF1199	297.4	**800 kHz**	RF1199	9.3 mm diameter
RF3319E	868.95	**800 kHz**	668	3.0x3.0
RF1408D	447.7	**840 kHz**	511	3.8x3.8
RF1211C	315	**900 kHz**	410	5.0x5.0
RF3446E	433.92	**960 kHz**	776	3.0x3.0
RF1402D	315	**1000 kHz**	496	3.8x3.8
RF1401D	433.92	**1000 kHz**	495	3.8x3.8
RF1295C	451.35	**1000 kHz**	482	5.0x5.0
RF1400D	433.92	**1150 kHz**	490	3.8x3.8
RF1411D	869.2625	**1250 kHz**	512	3.8x3.8
RF3600E	868.6	**1400 kHz**	816	3.0x3.0
RF1407D	868.6	**1800 kHz**	505	3.8x3.8
RF1419D	403.5	**7500 kHz**	560	3.8x3.8
RF3602D	305.3	**12500 kHz**	885	3.8x3.8
RF3603D	316.4	**13000 kHz**	886	3.8x3.8
RF3604D	345	**16000 kHz**	887	3.8x3.8
RF3605D	372.25	**16000 kHz**	888	3.8x3.8
RF3606D	390	**16000 kHz**	889	3.8x3.8
RF3607D	403.5	**18000 kHz**	890	3.8x3.8
RF3609D	449	**18000 kHz**	892	3.8x3.8
RF3608D	426.4	**19500 kHz**	891	3.8x3.8
RF2040E	915	**28000 kHz**	804	3.0x3.0
RF3501E	866.1	**31000 kHz**	805	3.0x3.0
RF3601E	960	**40000 kHz**	818	3.0x3.0

RoHS Compliant

SAW RF / IF Filters

RFM designs and manufactures a variety of standard and custom bandpass filters for radio frequency (RF) and intermediate frequency (IF) for a wide range of wireless telecommunication and data communication applications. RFM RF / IF filters are available in a broad range of frequencies from 40 MHz to 2.7 GHz, and feature a wide range of bandwidths, low insertion loss, low amplitude and group delay ripple, small size and high out-of-band rejection. RFM also custom designs and manufactures SAW delay lines and notch filters.

Custom Designed Filters. RFM also provides custom filters for high volume applications: Satellite Digital Audio Radio (SDAR) receivers (Sirius™ and XM™), cellular base stations, and repeaters (EDGE, WCDMA, CDMA-2000, TD-SCDMA, GSM900, DCS1800, PCS1900, CDMA, TDMA and AMPs, DECT, LTE, WiMax), Global Positioning System (GPS), microwave radio, wireless local loop (WLL), wireless local area networks (WLAN), and multimedia and fiber-optic transmission equipment.

Small Packages

Small size is crucial when engineering tiny devices for wireless applicaitons. RFM SAW RF / IF Filters are available in a variety of non-leaded SMP ceramic packages and a TO39-3 leaded package.

Standard Order Quantities

Components	Package	Shipped Via	QTY
Filters - RF / IF Filters	TO39-3	Antistatic Tube	50
	SMP	Tape and Reel - 7"	500
	SMP	Tape and Reel - 13	2,000

APPLICATIONS

Wireless point-of-sale terminals

Data link equipment

Peripherals

Remote bar code data entry

Bar code readers

Satellite digital audio radio (SDAR)

Global positioning systems (GPS)

Wireless local area network (WLAN)

CATV Infrastructure

Synchronous optical network (SONET)

Automated meter reading

Cellular base stations, and repeaters for GSM, TD-SCDMA, LTE, WiMax, W-CDMA, CDMA, Wireless Local Loop

WHY CHOOSE RFM SAW RF / IF FILTERS

Wide Range of Frequencies 40 MHz to 2.7 GHz

Very Narrowband, High Selectivity IF SAWs (PX)

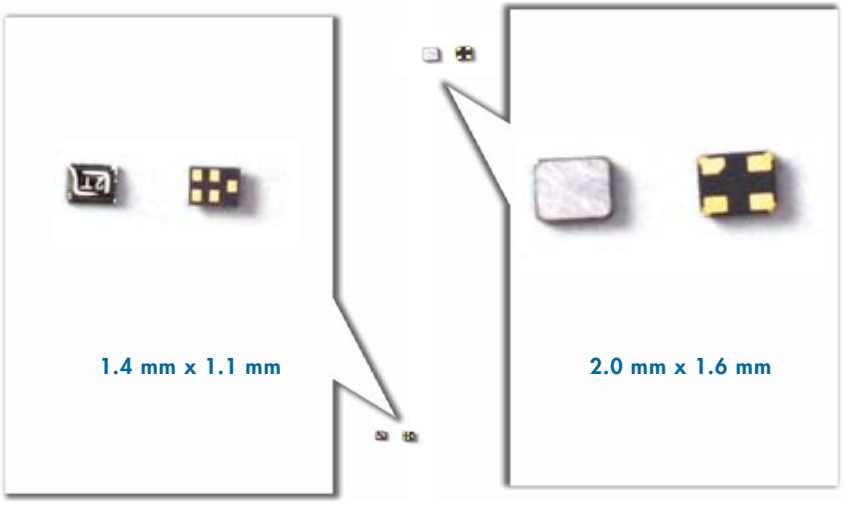
SPUDT, RSPUDT, Slanted (Tapered) SPUDT., with different performance advantages (SF)

Very High Selectivity IF SAWs (SF)

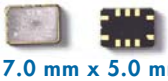
Langasite R/D for Special IF SAWs

Delay Lines and IF Diplexers

Many Package Styles, Mainly SMT Packages




19.0 mm x 6.5 mm


7.0 mm x 5.0 mm

SAW Filters

SAW RF / IF Filters: Top Applications

Listed in Order by Frequency

Band F (A)	
Part No.	Frequency
SF2204E	1900 MHz
SF2204E-1	1900 MHz

BTS RF	
SF2200E	707 MHz
SF2199E	787 MHz
SF2198E	806 MHz
SF2197E	847 MHz

Cable	
SF1145B	427.25 MHz
SF1146B	499.25 MHz

Cable/DOCSIS	
SF2017D	1220 MHz
SF2017E	1220 MHz
SF2081D	1220 MHz
SF2081E	1220 MHz

CATV	
SF1080A	499.25 MHz

CDMA	
SF2141B	210.38 MHz

CDMA 450	
SF1214D	413.76 MHz
SF1215D	423.76 MHz
SF1212D	452.5 MHz
SF1218D	453.5 MHz
SF1201D	455 MHz
SF1213D	462.5 MHz
SF1202D	465 MHz
SF1216D	481.25 MHz
SF1217D	491.25 MHz

CDMA2000 BTS	
SF2147D	157 MHz
SF1111A	160 MHz

Cellular	
SF1183G	881.5 MHz

DCS	
SF2036E	1880 MHz

DECT	
SF1056A	110.592 MHz
SF1056B	110.592 MHz

Digital Television	
SF2159E	974 MHz
SF2163E	1076.06 MHz
SF2162E	1178.12 MHz
SF2166E	1280.18 MHz
SF2167E	1382.24 MHz
SF2164E	1484.3 MHz
SF2165E	1586.36 MHz
SF2168E	1688.42 MHz
SF2169E	1790.48 MHz

DOCSIS Compatible	
SF2032E	1220 MHz

Glonass	
SF2254E	872 MHz
SF2253E	2655 MHz

GPS	
SF1120B	298.74 MHz
SF2008D	930.5 MHz
SF1186B-2	1575.42 MHz
SF1186B-3	1575.42 MHz
SF1186B-4	1575.42 MHz
SF1186E-1	1575.42 MHz
SF1186E-2	1575.42 MHz
SF1186G	1575.42 MHz
SF1186G-2	1575.42 MHz
SF1186H-2	1575.42 MHz
SF1186H-3	1575.42 MHz
SF1186K-2	1575.42 MHz
SF1186K-3	1575.42 MHz
SF1186K-5	1575.42 MHz
SF1220G	2326 MHz
SF1219E	2338.75 MHz

GSM Receiver	
SF1081A	71 MHz
SF1081A-1	71 MHz
SF2027B	199 MHz

GSM/DCS	
SF1088A	170.6 MHz
SF1092A	199 MHz
SF1115A	199 MHz
SF1091A	211 MHz

IF Receiver	
SF1142B	315 MHz

IS-54 TDMA	
PX1002	86.85 MHz
PX1004	82.2 MHz
PX1004-1	82.2 MHz

ISM Band	
SF2196E	315 MHz
SF2248E	315 MHz
SF2247E	422 MHz
SF2136E	422.92 MHz
SF2176E	433.92 MHz
SF2137D	869 MHz
SF2137E	869 MHz
SF2137E-1	869 MHz
SF2049E	915 MHz
SF2049E-1	915 MHz
SF2053E	915 MHz
SF2093E	915 MHz
SF2098G	915 MHz
SF2201E	916.45 MHz
SF2150E	950 MHz
SF2124E	2441.8 MHz

MediaFlo	
SF2171E	719 MHz
SF2171H	719 MHz

Orbcom RX	
SF2059B-1	137.5 MHz

Orbcom TX	
SF2120C	149 MHz

PCS	
SF2001E	1960 MHz

PHS	
SF2062A	229.25 MHz
SF2055A	240 MHz

IF Filter	
SF2185A	70 MHz
SF2185A-1	70 MHz
SF2227A	70 MHz
SF2228A	70 MHz
SF2229A	70 MHz
SF2230A	70 MHz
SF2257A	70 MHz
SF2085A	96 MHz
SF2135A	96 MHz
SF2181D	140 MHz
SF2182D	140 MHz
SF2189A	140 MHz
SF1194A	167 MHz
SF1179B	184.14 MHz
SF2139D	184.14 MHz
SF2223D	184.32 MHz
SF2244A	225 MHz
SF2243A	233 MHz
SF2086C	240MHz
SF1197B	248.6 MHz
SF2079D	251 MHz
SF2079D-1	251 MHz
SF2079C	251.045 MHz
SF2079E	251.045 MHz
SF2087C	267.5 MHz
SF2172C	280 MHz
SF2088C	297.5 MHz
SF2089C	325 MHz
SF2033A	350 MHz
SF2090C	355 MHz
SF2091C	385 MHz
SF2242B	40 MHz
SF2146D	415 Mhz
SF2179C	495 MHz
SF2180D	700 MHz
SF2194E	1220 MHz

Sat Receiver	
SF2190B	138 MHz

SAW Duplexer	
SF1222D	800/842
SF1223D	800/842
SF1207C	836.5/881.5
SF1207D	836.5/881.5
SF1221F	1950/2140

TD-SCDMA	
SF2149A	46.08 MHz
SF2131B	92.16 MHz
SF1200B	96 MHz
SF2069A-1	96 MHz
SF2069A-2	96 MHz
SF2148B	138.24 MHz
SF2111A	140 MHz
SF2155B	153.6 MHz
SF2212K	1902 MHz
SF1208H	2017.5 MHz
SF2202E	2017.5 MHz
SF2213K	2107.5 MHz

RF Filter	
SF2170D	165 MHz
SF2219A	193 MHz
SF2220C	193 MHz
SF2221A	193 MHz
SF2151B	211.2 MHz
SF2222C	228 MHz
SF2183E	400 MHz
SF2218D	425 MHz
SF2210D	427.8 MHz
SF1188C	465 MHz
SF2192D	495 MHz
SF2237C	515 MHz
SF2156B	611 MHz
SF2065C	734 MHz
SF2207E	800 MHz
SF2092E	810 MHz
SF2214E	815 MHz
SF2203E	834 MHz
SF1182B	836.5 MHz
SF2195E	842.5 MHz
SF2142G	867.5 MHz
SF2205E	879 MHz
SF2145B	895 MHz
SF2134E	897.5 MHz
SF2098H	915 MHz
SF2002E	942.5 MHz
SF1184B-1	947.5 MHz
SF2184E	953 MHz
SF2255E	1056 MHz
SF2256E	1076.06 Mhz
SF2211E	1200 MHz
SF2208E	1227 MHz
SF2193E	1228 MHz
SF2186E	1268.52 MHz
SF2177E	1472 MHz
SF2177E-1	1472 MHz
SF2235E	1542.5 MHz
SF2235G	1542.5 MHz
SF2252E	1590 MHz
SF2217K	1591.5 MHz
SF2251E	1600 MHz
SF2249E	1602 MHz
SF2216K	1603 MHz
SF2250E	1615 MHz
SF2191E	1621 MHz
SF2236E	1642.5 MHz
SF2236G	1642.5 MHz
SF2133E	1745.5 MHz
SF1192B	1842.5 MHz
SF2233E	1882.5 MHz
SF2224E	1950 MHz
SF2215E	1960 MHz
SF2234E	1980 MHz
SF2209H	2017.5 MHz
SF2226E	2132.5 MHz
SF2225E	2140 MHz
SF2160E	2330 MHz
SF2173E	2350 MHz
SF2158E	2535 MHz
SF2238E	2560 MHz
SF2239E	2580 MHz
SF2240E	2595 MHz
SF2241E	2595 MHz
SF2161E	2650 MHz
SF2206E	2655 MHz
SF2258E	2655 MHz

SCDMA	
SF2188C	340 MHz
SF2188D	340 MHz

SDARS	
SF2039B	72.54 MHz
SF2039B-2	72.54 MHz
SF2039B-3	72.54 MHz
SF2143A	72.54/80.46 MHz
SF2143B	72.54/80.46 MHz
SF1131B	75 MHz
SF1140B	75 MHz
SF1140B-2	75 MHz
SF1141B	75 MHz
SF1141B-2	75 MHz
SF1141B-4	75 MHz
SF2037B	76.5 MHz
SF2037B-2	76.5 MHz
SF2037B-3	76.5 MHz
SF2037C	76.5 MHz
SF2038B	76.5 MHz
SF2038B-2	76.5 MHz
SF2038B-3	76.5 MHz
SF2038C	76.5 MHz
SF2040B	80.46 MHz
SF2040B-2	80.46 MHz
SF2040B-3	80.46 MHz
SF2060B	80.46 MHz
SF2060B-1	80.46 MHz
SF2026B	114.815 MHz
SF2138B	144 MHz
SF2025B	259.861 MHz
SF2025D	259.861 MHz
SF1143B	315 MHz
SF1143B-1	315 MHz
SF1143B-2	315 MHz
SF1143B-4	315 MHz
SF2024B	467.751 MHz
SF2024D	467.751 MHz
SF2024D-1	467.751 MHz
SF2024E-1	467.751 MHz
SF2024E-2	467.751 MHz

Wibro	
SF2063A	156 MHz
SF2109D	305 MHz

Wimax	
SF2064A	156 MHz
SF2157A	156 MHz
SF2178A	168 MHz
SF2110D	305 MHz
SF2125D	305 MHz
SF2072C	360 MHz
SF2094B	380 MHz
SF2042B	456 MHz
SF2042C	456 MHz
SF2073B	456 MHz
SF2097B	456 MHz
SF2046B	456.44 MHz
SF2076B	464 MHz
SF2126E	725 MHz

WLAN	
SF1189B	280 MHz
SF1189B-1	280 MHz
SF1059A	350 MHz
SF1174B	374 MHz
SF1174D	374 MHz

RoHS Compliant

SAW RF / IF Filters

Listed in Order by Part Number

SAW RF / IF Filters Listed by Part Number					
Type	Part No.	Freq. (MHz)	BW(MHz)	Application	Case (mm)
IF Filter	**PX1002**	86.85	0.024	IS-54 TDMA	13.3x6.5
IF Filter	**PX1004**	82.2	0.03	IS-54 TDMA	13.3x6.5
IF Filter	**PX1004-1**	82.2	0.03	IS-54 TDMA	13.3x6.5
IF Filter	**SF1056A**	110.592	1.152	DECT	13.3x6.5
IF Filter	**SF1056B**	110.592	1.44	DECT	7.0x5.0
IF Filter	**SF1059A**	350	0.8	WLAN	9.1x7.1
IF Filter	**SF1080A**	499.25	1.5	CATV	9.1x7.1
IF Filter	**SF1081A**	71	0.2	GSM Receiver	22.1x8.0
IF Filter	**SF1081A-1**	71	0.2	GSM Receiver	22.1x8.0
IF Filter	**SF1088A**	170.6	0.18	GSM/DCS	19x6.5
IF Filter	**SF1091A**	211	0.9	GSM/DCS	13.3x6.5
IF Filter	**SF1092A**	199	0.2	GSM/DCS	19x6.5
IF Filter	**SF1111A**	160	1.5	CDMA2000 BTS	24.6x9
IF Filter	**SF1115A**	199	0.2	GSM/DCS	9.1x7.1
IF Filter	**SF1120B**	298.74	2.2	GPS	7.0x5.0
IF Filter	**SF1131B**	266	2.2	SDARS	7.0x5.0
IF Filter	**SF1140B**	75	4.2	SDARS	7.0x5.0
IF Filter	**SF1140B-2**	75	4.2	SDARS	7.0x5.0
IF Filter	**SF1141B**	75	12.7	SDARS	7.0x5.0
IF Filter	**SF1141B-2**	75	12.7	SDARS	7.0x5.0
IF Filter	**SF1141B-4**	75	12.7	SDARS	7.0x5.0
IF Filter	**SF1142B**	315	4.2	IF Receiver	7.0x5.0
IF Filter	**SF1143B**	315	12.7	SDARS	7.0x5.0
IF Filter	**SF1143B-1**	315	12.7	SDARS	7.0x5.0
IF Filter	**SF1143B-2**	315	12.7	SDARS	7.0x5.0
IF Filter	**SF1143B-4**	315	12.7	SDARS	7.0x5.0
IF Filter	**SF1145B**	427.25	30	Cable	7.0x5.0
IF Filter	**SF1146B**	499.25	30	Cable	7.0x5.0
IF Filter	**SF1174B**	374	17	WLAN	5.0x5.0
IF Filter	**SF1174D**	374	17	WLAN	3.8x3.8
IF Filter	**SF1177A**	57.6	21.2	WCDMA/TD-SCDMA	13.3x6.5
IF Filter	**SF1179B**	184.14	11	IF Filter	7.0x5.0
RF Filter	**SF1182B**	836.5	25	RF Filter	3.0x3.0
RF Filter	**SF1183G**	881.5	25	Cellular	2.5x2.0
RF Filter	**SF1184B-1**	947.5	25	RF Filter	3.0x3.0
RF Filter	**SF1186B-2**	1575.42	2	GPS	3.0x3.0
RF Filter	**SF1186B-3**	1575.42	10	GPS	3.0x3.0
RF Filter	**SF1186B-4**	1575.42	2	GPS	3.0x3.0
RF Filter	**SF1186E-1**	1575.42	2	GPS	3.0x3.0
RF Filter	**SF1186E-2**	1575.42	2	GPS	3.0x3.0
RF Filter	**SF1186G**	1575.42	2	GPS	2.5x2.0
RF Filter	**SF1186G-2**	1575.42	2	GPS	2.5x2.0
RF Filter	**SF1186H-2**	1575.42	2	GPS	2.0x1.6
RF Filter	**SF1186H-3**	1575.42	2	GPS	2.0x1.6
RF Filter	**SF1186K-2**	1575.42	2	GPS	1.4x1.1
RF Filter	**SF1186K-3**	1575.42	2	GPS	1.4x1.1
RF Filter	**SF1186K-5**	1575.42	2	GPS	1.4x1.1
RF Filter	**SF1188C**	465	4	RF Filter	5.0x5.0
IF Filter	**SF1189B**	280	18.5	WLAN	5.0x5.0
IF Filter	**SF1189B-1**	280	17.97	WLAN	5.0x5.0
RF Filter	**SF1192B**	1842.5	75	RF Filter	3.0x3.0
IF Filter	**SF1194A**	167	0.4	IF Filter	19x6.5
IF Filter	**SF1197B**	248.6	5	IF Filter	7.0x5.0
IF Filter	**SF1200B**	96	20	TD-SCDMA	7.0x5.0
RF Filter	**SF1201D**	455	5	CDMA 450	3.8x3.8
RF Filter	**SF1202D**	465	5	CDMA 450	3.8x3.8
IF Filter	**SF1207C**	836.5/881.5	25	SAW Duplexer	5.0x5.0
IF Filter	**SF1207D**	836.5/881.5	25	SAW Duplexer	3.8x3.8
RF Filter	**SF1208H**	2017.5	15	TD-SCDMA	2.0x1.6
RF Filter	**SF1212D**	452.5	5	CDMA 450	3.8x3.8
RF Filter	**SF1213D**	462.5	5	CDMA 450	3.8x3.8
RF Filter	**SF1214D**	413.76	5	CDMA 450	3.8x3.8
RF Filter	**SF1215D**	423.76	5	CDMA 450	3.8x3.8
RF Filter	**SF1216D**	481.25	5	CDMA 450	3.8x3.8
RF Filter	**SF1217D**	491.25	5	CDMA 450	3.8x3.8
RF Filter	**SF1218D**	453.5	7	CDMA 450	3.8x3.8
RF Filter	**SF1219K**	2338.75	12.5	GPS	1.4x1.1
RF Filter	**SF1220G**	2326	14	GPS	2.5x2.0
RF Filter	**SF1221F**	1950/2140	60	SAW Duplexer	3.2x2.5
RF Filter	**SF1222D**	800/842	20	SAW Duplexer	3.8x3.8

SAW RF / IF Filters Listed by Part Number					
Type	Part No.	Freq. (MHz)	BW(MHz)	Application	Case (mm)
RF Filter	**SF1223D**	800/842	20	SAW Duplexer	3.8x3.8
RF Filter	**SF2001E**	1960	60	PCS	3.0x3.0
RF Filter	**SF2002E**	942.5	35	RF Filter	3.0x3.0
IF Filter	**SF2006C**	190	4.8	WCDMA	5.0x5.0
RF Filter	**SF2008D**	930.5	4	GPS	3.8x3.8
IF Filter	**SF2017D**	1220	8	Cable/DOCSIS	3.8x3.8
IF Filter	**SF2017E**	1220	8	Cable/DOCSIS	3.0x3.0
IF Filter	**SF2024B**	467.751	14.2	SDARS	7.0x5.0
IF Filter	**SF2024D**	467.751	14.2	SDARS	3.8x3.8
IF Filter	**SF2024D-1**	467.751	14.2	SDARS	3.8x3.8
IF Filter	**SF2024E-1**	467.751	12.5	SDARS	3.0x3.0
IF Filter	**SF2024E-2**	467.751	12.5	SDARS	3.0x3.0
IF Filter	**SF2025B**	259.861	13.8	SDARS	7.0x5.0
IF Filter	**SF2025D**	259.861	14.5	SDARS	3.8x3.8
IF Filter	**SF2026B**	114.815	6.3	SDARS	7.0x5.0
IF Filter	**SF2027B**	199	0.2	GSM Receiver	13.3x6.5
RF Filter	**SF2032E**	1220	28	DOCSIS Compatible	3.0x3.0
IF Filter	**SF2033A**	350	2	IF Filter	13.3x6.5
RF Filter	**SF2036E**	1880	60	DCS	3.0x3.0
IF Filter	**SF2037B**	76.5	3.8	SDARS	7.0x5.0
IF Filter	**SF2037B-2**	76.5	3.8	SDARS	7.0x5.0
IF Filter	**SF2037B-3**	76.5	3.8	SDARS	7.0x5.0
IF Filter	**SF2037C**	76.5	3.1	SDARS	5.0x5.0
IF Filter	**SF2038B**	76.5	12.5	SDARS	7.0x5.0
IF Filter	**SF2038B-2**	76.5	12.5	SDARS	7.0x5.0
IF Filter	**SF2038B-3**	76.5	12.5	SDARS	7.0x5.0
IF Filter	**SF2038C**	76.5	12.5	SDARS	5.0x5.0
IF Filter	**SF2039B**	72.54	3.7	SDARS	7.0x5.0
IF Filter	**SF2039B-2**	72.54	3.7	SDARS	7.0x5.0
IF Filter	**SF2039B-3**	72.54	3.7	SDARS	7.0x5.0
IF Filter	**SF2040B**	80.46	3.7	SDARS	7.0x5.0
IF Filter	**SF2040B-2**	80.46	3.7	SDARS	7.0x5.0
IF Filter	**SF2040B-3**	80.46	3.7	SDARS	7.0x5.0
IF Filter	**SF2042B**	456	15	Wimax	7.0x5.0
IF Filter	**SF2042C**	456	15	Wimax	5.0x5.0
IF Filter	**SF2045A**	140	10	WCDMA	13.3x6.5
IF Filter	**SF2046B**	456.44	5.22	Wimax	7.0x5.0
RF Filter	**SF2049E**	915	26	ISM Band	3.0x3.0
RF Filter	**SF2049E-1**	915	26	ISM Band	3.0x3.0
RF Filter	**SF2053E**	915	12.5	ISM Band	3.0x3.0
RF Filter	**SF2055A**	240	0.3	PHS	11.5x4.0
RF Filter	**SF2059B-1**	137.5	1	Orbcom RX	7.0x5.0
IF Filter	**SF2060B**	115	12.5	SDARS	7.0x5.0
IF Filter	**SF2060B-1**	115	12.5	SDARS	7.0x5.0
IF Filter	**SF2062A**	229.25	0.3	PHS	11.5x4.0
IF Filter	**SF2063A**	156	9	Wibro	13.3x6.5
IF Filter	**SF2064A**	156	10	Wimax	13.3x6.5
RF Filter	**SF2065C**	734	6	RF Filter	5.0x5.0
IF Filter	**SF2069A-1**	96	4.8	TD-SCDMA	19x6.5
IF Filter	**SF2069A-2**	96	4.8	TD-SCDMA	13.3x6.5
IF Filter	**SF2072C**	360	30	Wimax	5.0x5.0
IF Filter	**SF2073B**	456	10	Wimax	7.0x5.0
IF Filter	**SF2076B**	464	3.7	Wimax	7.0x5.0
IF Filter	**SF2079C**	251.045	12.5	IF Filter	5.0x5.0
IF Filter	**SF2079D**	251	12.5	IF Filter	3.8x3.8
IF Filter	**SF2079D-1**	251	12.5	IF Filter	3.8x3.8
IF Filter	**SF2079E**	251.045	14	IF Filter	3.0x3.0
IF Filter	**SF2081D**	1220	50	Cable/DOCSIS	3.8x3.8
IF Filter	**SF2081E**	1220	50	Cable/DOCSIS	3.0x3.0
IF Filter	**SF2085A**	96	30	IF Filter	13.3x6.5
IF Filter	**SF2086C**	240	30	IF Filter	5.0x5.0
IF Filter	**SF2087C**	267.5	30	IF Filter	5.0x5.0
IF Filter	**SF2088C**	297.5	30	IF Filter	5.0x5.0
IF Filter	**SF2089C**	325	30	IF Filter	5.0x5.0
IF Filter	**SF2090C**	355	30	IF Filter	5.0x5.0
IF Filter	**SF2091C**	385	30	IF Filter	5.0x5.0
RF Filter	**SF2092E**	810	17	RF Filter	3.0x3.0
RF Filter	**SF2093E**	915	26	ISM Band	3.0x3.0
IF Filter	**SF2094B**	380	4	Wimax	7.0x5.0
IF Filter	**SF2097B**	456	2.55	Wimax	7.0x5.0

SAW RF / IF Filters

Listed in Order by Part Number (continued)

SAW RF / IF Filters Listed by Part Number					
Type	Part No.	Freq. (MHz)	BW(MHz)	Application	Case (mm)
RF Filter	**SF2098G**	915	26	ISM Band	2.5x2.0
RF Filter	**SF2098H**	915	26	RF Filter	2.0x1.6
IF Filter	**SF2109D**	305	8.4	Wibro	3.8x3.8
IF Filter	**SF2110D**	305	10	Wimax	3.8x3.8
IF Filter	**SF2111A**	140	15	TD-SCDMA	13.3x6.5
RF Filter	**SF2120C**	149	2	Orbcom TX	5.0x5.0
RF Filter	**SF2124E**	2441.8	83.5	ISM Band	3.0x3.0
IF Filter	**SF2125D**	305	5	Wimax	3.8x3.8
RF Filter	**SF2126E**	725	50	Wimax	3.0x3.0
IF Filter	**SF2131B**	92.16	20	TD-SCDMA	7.0x5.0
RF Filter	**SF2133E**	1745.5	75	RF Filter	3.0x3.0
RF Filter	**SF2134E**	897.5	35	RF Filter	3.0x3.0
IF Filter	**SF2135A**	96	18	IF Filter	13.3x6.5
RF Filter	**SF2136E**	433.92	17.4	ISM Band	3.0x3.0
RF Filter	**SF2137D**	869	2	ISM Band	3.8x3.8
RF Filter	**SF2137E**	869	2	ISM Band	3.0x3.0
RF Filter	**SF2137E-1**	869	2	ISM Band	3.0x3.0
IF Filter	**SF2138B**	144	12.5	SDARS	7.0x5.0
IF Filter	**SF2139D**	177	20	IF Filter	3.8x3.8
IF Filter	**SF2140A**	140	20	WCDMA	13.3x6.5
IF Filter	**SF2140A-1**	140	18.4	WCDMA	13.3x6.5
IF Filter	**SF2141B**	210.38	1.2	CDMA	7.0x5.0
RF Filter	**SF2142G**	867.5	15	RF Filter	2.5x2.0
IF Filter	**SF2143A**	72.54/80.46	3.7	SDARS	11.4x5.3
IF Filter	**SF2143B**	72.54/80.46	4.4	SDARS	7.0x5.0
IF Filter	**SF2145B**	895	18	RF Filter	7.0x5.0
IF Filter	**SF2146D**	415	25	IF Filter	3.8x3.8
IF Filter	**SF2147D**	157	20	CDMA2000 BTS	3.8x3.8
IF Filter	**SF2148B**	138.24	20	TD-SCDMA	7.0x5.0
IF Filter	**SF2149A**	46.08	5	TD-SCDMA	13.3x6.5
RF Filter	**SF2150E**	915	10	ISM Band	3.0x3.0
IF Filter	**SF2151B**	211.2	20	RF Filter	7.0x5.0
IF Filter	**SF2155B**	153.6	20	TD-SCDMA	7.0x5.0
RF Filter	**SF2156B**	611	7	RF Filter	7.0x5.0
IF Filter	**SF2157A**	156	20	Wimax	13.3x6.5
RF Filter	**SF2158E**	2535	70	RF Filter	3.0x3.0
RF & IF	**SF2159E**	974	40	Digital Television	3.0x3.0
RF Filter	**SF2160E**	2330	60	RF Filter	3.0x3.0
RF Filter	**SF2161E**	2650	70	RF Filter	3.0x3.0
RF & IF	**SF2162E**	1178.12	40	Digital Television	3.0x3.0
RF & IF	**SF2163E**	1076.06	40	Digital Television	3.0x3.0
RF & IF	**SF2164E**	1484.3	40	Digital Television	3.0x3.0
RF & IF	**SF2165E**	1586.36	40	Digital Television	3.0x3.0
RF & IF	**SF2166E**	1280.18	40	Digital Television	3.0x3.0
RF & IF	**SF2167E**	1382.24	40	Digital Television	3.0x3.0
RF & IF	**SF2168E**	1688.42	40	Digital Television	3.0x3.0
RF & IF	**SF2169E**	1790.48	40	Digital Television	3.0x3.0
IF Filter	**SF2170D**	165	20	RF Filter	3.8x3.8
RF Filter	**SF2171E**	719	5	MediaFlo	3.0x3.0
RF Filter	**SF2171H**	719	5	MediaFlo	2.0x1.6
IF Filter	**SF2172C**	280	15	IF Filter	5.0x5.0
RF Filter	**SF2173E**	2350	100	RF Filter	3.0x3.0
RF Filter	**SF2176E**	433.92	1.6	ISM Band	3.0x3.0
RF Filter	**SF2177E**	1472	40	RF Filter	3.0x3.0
RF Filter	**SF2177E-1**	1472	4	RF Filter	3.0x3.0
IF Filter	**SF2178A**	168	20	Wimax	13.3x6.5
IF Filter	**SF2179C**	495	4.25	IF Filter	5.0x5.0
IF Filter	**SF2180D**	700	3.8	IF Filter	3.8x3.8
IF Filter	**SF2181D**	140	20	IF Filter	3.8x3.8
IF Filter	**SF2182D**	140	40	IF Filter	3.8x3.8
RF Filter	**SF2183E**	400	0.25	RF Filter	3.0x3.0
RF Filter	**SF2184E**	953	3	RF Filter	3.0x3.0
IF Filter	**SF2185A**	70	9	IF Filter	13.3x6.5
IF Filter	**SF2185A-1**	70	9.1	IF Filter	13.3x6.5
RF Filter	**SF2186E**	1268.52	20.46	RF Filter	3.0x3.0
RF Filter	**SF2188C**	340	6	SCDMA	5.0x5.0
RF Filter	**SF2188D**	340	8	SCDMA	3.8x3.8
IF Filter	**SF2189A**	140	30	IF Filter	13.3x6.5

SAW RF / IF Filters Listed by Part Number					
Type	Part No.	Freq. (MHz)	BW(MHz)	Application	Case (mm)
RF Filter	**SF2190B**	138	60	Sat Receiver	7.0x5.0
RF Filter	**SF2191E**	1621	10	RF Filter	3.0x3.0
IF Filter	**SF2192D**	495	0.65	RF Filter	3.8x3.8
RF Filter	**SF2193E**	1228	20	RF Filter	3.0x3.0
IF Filter	**SF2194E**	1220	0.5	IF Filter	3.0x3.0
RF Filter	**SF2195E**	842.5	5	RF Filter	3.0x3.0
RF Filter	**SF2196E**	315	0.6	ISM Band	3.0x3.0
RF Filter	**SF2197E**	847	30	BTS RF	3.0x3.0
RF Filter	**SF2198E**	806	30	BTS RF	3.0x3.0
RF Filter	**SF2199E**	787	22	BTS RF	3.0x3.0
RF Filter	**SF2200E**	707	18	BTS RF	3.0x3.0
RF Filter	**SF2201E**	916.45	4	ISM Band	3.0x3.0
RF Filter	**SF2202E**	2017.5	15	TD-SCDMA	3.0x3.0
RF Filter	**SF2203E**	834	30	RF Filter	3.0x3.0
RF Filter	**SF2204E**	1900	40	Band F (A)	3.0x3.0
RF Filter	**SF2204E-1**	1900	40	Band F (A)	3.0x3.0
RF Filter	**SF2205E**	879	30	RF Filter	3.0x3.0
RF Filter	**SF2206E**	2655	70	RF Filter	3.0x3.0
RF Filter	**SF2207E**	800	20	RF Filter	3.0x3.0
RF Filter	**SF2208E**	1227	20	RF Filter	3.0x3.0
RF Filter	**SF2209H**	2017.5	15	RF Filter	2.0x1.6
RF Filter	**SF2210D**	427.8	5	RF Filter	3.8x3.8
RF Filter	**SF2211E**	1200	40	RF Filter	3.0x3.0
RF Filter	**SF2212K**	1902	34.9	TD-SCDMA	1.4x1.1
RF Filter	**SF2213K**	2107.5	15	TD-SCDMA	1.4x1.1
RF Filter	**SF2214E**	815	20	RF Filter	3.0x3.0
RF Filter	**SF2215E**	1960	65	RF Filter	3.0x3.0
RF Filter	**SF2216K**	1603	12	RF Filter	1.4x1.1
RF Filter	**SF2217K**	1591.5	35	RF Filter	1.4x1.1
RF Filter	**SF2218D**	425	15	RF Filter	3.8x3.8
IF Filter	**SF2219A**	193.6	0.39	RF Filter	11.5x4.0
IF Filter	**SF2220C**	193.6	0.11	RF Filter	5.0x5.0
IF Filter	**SF2221A**	193.6	1	RF Filter	11.5x4.0
RF Filter	**SF2222C**	228	6.2	RF Filter	5.0x5.0
IF Filter	**SF2223D**	184.32	30	IF Filter	3.8x3.8
RF Filter	**SF2224E**	1950	60	RF Filter	3.0x3.0
RF Filter	**SF2225E**	2140	60	RF Filter	3.0x3.0
RF Filter	**SF2226E**	2132.5	45	RF Filter	3.0x3.0
IF Filter	**SF2227A**	70	6	IF Filter	13.3x6.5
IF Filter	**SF2228A**	70	4	IF Filter	13.3x6.5
IF Filter	**SF2229A**	70	1.1	IF Filter	13.3x6.5
IF Filter	**SF2230A**	70	20.8	IF Filter	13.3x6.5
RF Filter	**SF2233E**	1882.5	65	RF Filter	3.0x3.0
RF Filter	**SF2234E**	1980	30	RF Filter	3.0x3.0
RF Filter	**SF2235E**	1542.5	35	RF Filter	3.0x3.0
RF Filter	**SF2235G**	1542.5	35	RF Filter	2.5x2.0
RF Filter	**SF2236E**	1642.5	35	RF Filter	3.0x3.0
RF Filter	**SF2236G**	1642.5	35	RF Filter	2.5x2.0
RF Filter	**SF2237C**	515	27	RF Filter	5.0x5.0
RF Filter	**SF2238E**	2560	30	RF Filter	3.0x3.0
RF Filter	**SF2239E**	2580	100	RF Filter	3.0x3.0
RF Filter	**SF2240E**	2595	40	RF Filter	3.0x3.0
RF Filter	**SF2241E**	2595	50	RF Filter	3.0x3.0
IF Filter	**SF2242B**	40	5	IF Filter	7.0x5.0
IF Filter	**SF2243A**	233	4	IF Filter	13.3x6.5
IF Filter	**SF2244A**	225	4	IF Filter	13.3x6.5
RF Filter	**SF2247E**	422	4	ISM Band	3.0x3.0
RF Filter	**SF2248E**	315	5	ISM Band	3.0x3.0
RF Filter	**SF2249E**	1602	61	RF Filter	3.0x3.0
RF Filter	**SF2250E**	1615	20	RF Filter	3.0x3.0
RF Filter	**SF2251E**	1600	40	RF Filter	3.0x3.0
RF Filter	**SF2252E**	1590	55	RF Filter	3.0x3.0
RF Filter	**SF2253E**	2655	70	Glonass	3.0x3.0
RF Filter	**SF2254E**	872	15	Glonass	3.0x3.0
RF Filter	**SF2255E**	1056	30	RF Filter	3.0x3.0
RF Filter	**SF2256E**	1076.06	40	RF Filter	3.0x3.0
IF Filter	**SF2257A**	70	0.8	IF Filter	13.3x6.5
RF Filter	**SF2258E**	2655	66	RF Filter	3.0x3.0

RoHS Compliant

SAW RF / IF Filters

Listed in Order by Frequency

SAW RF / IF Filters Listed by Frequency					
Type	Part No.	Freq. (MHz)	BW(MHz)	Application	Case (mm)
IF Filter	SF2242B	**40**	5	IF Filter	7.0x5.0
IF Filter	SF2149A	**46.08**	5	TD-SCDMA	13.3x6.5
IF Filter	SF1177A	**57.6**	21.2	WCDMA/TD-SCDMA	13.3x6.5
IF Filter	SF2185A	**70**	9	IF Filter	13.3x6.5
IF Filter	SF2185A-1	**70**	9.1	IF Filter	13.3x6.5
IF Filter	SF2227A	**70**	6	IF Filter	13.3x6.5
IF Filter	SF2228A	**70**	4	IF Filter	13.3x6.5
IF Filter	SF2229A	**70**	1.1	IF Filter	13.3x6.5
IF Filter	SF2230A	**70**	20.8	IF Filter	13.3x6.5
IF Filter	SF2257A	**70**	0.8	IF Filter	13.3x6.5
IF Filter	SF1081A	**71**	0.2	GSM Receiver	22.1x8.0
IF Filter	SF1081A-1	**71**	0.2	GSM Receiver	22.1x8.0
IF Filter	SF2039B	**72.54**	3.7	SDARS	7.0x5.0
IF Filter	SF2039B-2	**72.54**	3.7	SDARS	7.0x5.0
IF Filter	SF2039B-3	**72.54**	3.7	SDARS	7.0x5.0
IF Filter	SF2143A	**72.54/80.46**	3.7	SDARS	11.4x5.3
IF Filter	SF2143B	**72.54/80.46**	4.4	SDARS	7.0x5.0
IF Filter	SF1140B	**75**	4.2	SDARS	7.0x5.0
IF Filter	SF1140B-2	**75**	4.2	SDARS	7.0x5.0
IF Filter	SF1141B	**75**	12.7	SDARS	7.0x5.0
IF Filter	SF1141B-2	**75**	12.7	SDARS	7.0x5.0
IF Filter	SF1141B-4	**75**	12.7	SDARS	7.0x5.0
IF Filter	SF2037B	**76.5**	3.8	SDARS	7.0x5.0
IF Filter	SF2037B-2	**76.5**	3.8	SDARS	7.0x5.0
IF Filter	SF2037B-3	**76.5**	3.8	SDARS	7.0x5.0
IF Filter	SF2037C	**76.5**	3.1	SDARS	5.0x5.0
IF Filter	SF2038B	**76.5**	12.5	SDARS	7.0x5.0
IF Filter	SF2038B-2	**76.5**	12.5	SDARS	7.0x5.0
IF Filter	SF2038B-3	**76.5**	12.5	SDARS	7.0x5.0
IF Filter	SF2038C	**76.5**	12.5	SDARS	5.0x5.0
IF Filter	SF2040B	**80.46**	3.7	SDARS	7.0x5.0
IF Filter	SF2040B-2	**80.46**	3.7	SDARS	7.0x5.0
IF Filter	SF2040B-3	**80.46**	3.7	SDARS	7.0x5.0
IF Filter	PX1004	**82.2**	0.03	IS-54 TDMA	13.3x6.5
IF Filter	PX1004-1	**82.2**	0.03	IS-54 TDMA	13.3x6.5
IF Filter	PX1002	**86.85**	0.024	IS-54 TDMA	13.3x6.5
IF Filter	SF2131B	**92.16**	20	TD-SCDMA	7.0x5.0
IF Filter	SF1200B	**96**	20	TD-SCDMA	7.0x5.0
IF Filter	SF2069A-1	**96**	4.8	TD-SCDMA	19x6.5
IF Filter	SF2069A-2	**96**	4.8	TD-SCDMA	13.3x6.5
IF Filter	SF2085A	**96**	30	IF Filter	13.3x6.5
IF Filter	SF2135A	**96**	18	IF Filter	13.3x6.5
IF Filter	SF1056A	**110.592**	1.152	DECT	13.3x6.5
IF Filter	SF1056B	**110.592**	1.44	DECT	7.0x5.0
IF Filter	SF2026B	**114.815**	6.3	SDARS	7.0x5.0
IF Filter	SF2060B	**115**	12.5	SDARS	7.0x5.0
IF Filter	SF2060B-1	**115**	12.5	SDARS	7.0x5.0
RF Filter	SF2059B-1	**137.5**	1	Orbcom RX	7.0x5.0
RF Filter	SF2190B	**138**	60	Sat Receiver	7.0x5.0
IF Filter	SF2148B	**138.24**	20	TD-SCDMA	7.0x5.0
IF Filter	SF2045A	**140**	10	WCDMA	13.3x6.5
IF Filter	SF2111A	**140**	15	TD-SCDMA	13.3x6.5
IF Filter	SF2140A	**140**	20	WCDMA	13.3x6.5
IF Filter	SF2140A-1	**140**	18.4	WCDMA	13.3x6.5
IF Filter	SF2181D	**140**	20	IF Filter	3.8x3.8
IF Filter	SF2182D	**140**	40	IF Filter	3.8x3.8
IF Filter	SF2189A	**140**	30	IF Filter	13.3x6.5
IF Filter	SF2138B	**144**	12.5	SDARS	7.0x5.0
RF Filter	SF2120C	**149**	2	Orbcom TX	5.0x5.0
IF Filter	SF2155B	**153.6**	20	TD-SCDMA	7.0x5.0
IF Filter	SF2063A	**156**	9	Wibro	13.3x6.5
IF Filter	SF2064A	**156**	10	Wimax	13.3x6.5
IF Filter	SF2157A	**156**	20	Wimax	13.3x6.5
IF Filter	SF2147D	**157**	20	CDMA2000 BTS	3.8x3.8
IF Filter	SF1111A	**160**	1.5	CDMA2000 BTS	24.6x9
IF Filter	SF2170D	**165**	20	RF Filter	3.8x3.8
IF Filter	SF1194A	**167**	0.4	IF Filter	19x6.5
IF Filter	SF2178A	**168**	20	Wimax	13.3x6.5
IF Filter	SF1088A	**170.6**	0.18	GSM/DCS	19x6.5
IF Filter	SF2139D	**177**	20	IF Filter	3.8x3.8

SAW RF / IF Filters Listed by Frequency					
Type	Part No.	Freq. (MHz)	BW (MHz)	Application	Case (mm)
IF Filter	SF1179B	**184.14**	11	IF Filter	7.0x5.0
IF Filter	SF2223D	**184.32**	30	IF Filter	3.8x3.8
IF Filter	SF2006C	**190**	4.8	WCDMA	5.0x5.0
IF Filter	SF2219A	**193.6**	0.39	RF Filter	11.5x4.0
IF Filter	SF2220C	**193.6**	0.11	RF Filter	5.0x5.0
IF Filter	SF2221A	**193.6**	1	RF Filter	11.5x4.0
IF Filter	SF1092A	**199**	0.2	GSM/DCS	19x6.5
IF Filter	SF1115A	**199**	0.2	GSM/DCS	9.1x7.1
IF Filter	SF2027B	**199**	0.2	GSM Receiver	13.3x6.5
IF Filter	SF2141B	**210.38**	1.2	CDMA	7.0x5.0
IF Filter	SF1091A	**211**	0.9	GSM/DCS	13.3x6.5
IF Filter	SF2151B	**211.2**	20	RF Filter	7.0x5.0
IF Filter	SF2244A	**225**	4	IF Filter	13.3x6.5
RF Filter	SF2222C	**228**	6.2	RF Filter	5.0x5.0
IF Filter	SF2062A	**229.25**	0.3	PHS	11.5x4.0
IF Filter	SF2243A	**233**	4	IF Filter	13.3x6.5
RF Filter	SF2055A	**240**	0.3	PHS	11.5x4.0
IF Filter	SF2086C	**240**	30	IF Filter	5.0x5.0
IF Filter	SF1197B	**248.6**	5	IF Filter	7.0x5.0
IF Filter	SF2079D	**251**	12.5	IF Filter	3.8x3.8
IF Filter	SF2079D-1	**251**	12.5	IF Filter	3.8x3.8
IF Filter	SF2079C	**251.045**	12.5	IF Filter	5.0x5.0
IF Filter	SF2079E	**251.045**	14	IF Filter	3.0x3.0
IF Filter	SF2025B	**259.861**	13.8	SDARS	7.0x5.0
IF Filter	SF2025D	**259.861**	14.5	SDARS	3.8x3.8
IF Filter	SF1131B	**266**	2.2	SDARS	7.0x5.0
IF Filter	SF2087C	**267.5**	30	IF Filter	5.0x5.0
IF Filter	SF1189B	**280**	18.5	WLAN	5.0x5.0
IF Filter	SF1189B-1	**280**	17.97	WLAN	5.0x5.0
IF Filter	SF2172C	**280**	15	IF Filter	5.0x5.0
IF Filter	SF2088C	**297.5**	30	IF Filter	5.0x5.0
IF Filter	SF1120B	**298.74**	2.2	GPS	7.0x5.0
IF Filter	SF2109D	**305**	8.4	Wibro	3.8x3.8
IF Filter	SF2110D	**305**	10	Wimax	3.8x3.8
IF Filter	SF2125D	**305**	5	Wimax	3.8x3.8
IF Filter	SF1142B	**315**	4.2	IF Receiver	7.0x5.0
IF Filter	SF1143B	**315**	12.7	SDARS	7.0x5.0
IF Filter	SF1143B-1	**315**	12.7	SDARS	7.0x5.0
IF Filter	SF1143B-2	**315**	12.7	SDARS	7.0x5.0
IF Filter	SF1143B-4	**315**	12.7	SDARS	7.0x5.0
RF Filter	SF2196E	**315**	0.6	ISM Band	3.0x3.0
RF Filter	SF2248E	**315**	5	ISM Band	3.0x3.0
IF Filter	SF2089C	**325**	30	IF Filter	5.0x5.0
RF Filter	SF2188C	**340**	6	SCDMA	5.0x5.0
RF Filter	SF2188D	**340**	8	SCDMA	3.8x3.8
IF Filter	SF1059A	**350**	0.8	WLAN	9.1x7.1
IF Filter	SF2033A	**350**	2	IF Filter	13.3x6.5
IF Filter	SF2090C	**355**	30	IF Filter	5.0x5.0
IF Filter	SF2072C	**360**	30	Wimax	5.0x5.0
IF Filter	SF1174B	**374**	17	WLAN	5.0x5.0
IF Filter	SF1174D	**374**	17	WLAN	3.8x3.8
IF Filter	SF2094B	**380**	4	Wimax	7.0x5.0
IF Filter	SF2091C	**385**	30	IF Filter	5.0x5.0
RF Filter	SF2183E	**400**	0.25	RF Filter	3.0x3.0
RF Filter	SF1214D	**413.76**	5	CDMA 450	3.8x3.8
IF Filter	SF2146D	**415**	25	IF Filter	3.8x3.8
RF Filter	SF2247E	**422**	4	ISM Band	3.0x3.0
RF Filter	SF1215D	**423.76**	5	CDMA 450	3.8x3.8
RF Filter	SF2218D	**425**	15	RF Filter	3.8x3.8
IF Filter	SF1145B	**427.25**	30	Cable	7.0x5.0
RF Filter	SF2210D	**427.8**	5	RF Filter	3.8x3.8
RF Filter	SF2136E	**433.92**	17.4	ISM Band	3.0x3.0
RF Filter	SF2176E	**433.92**	1.6	ISM Band	3.0x3.0
RF Filter	SF1212D	**452.5**	5	CDMA 450	3.8x3.8
RF Filter	SF1218D	**453.5**	7	CDMA 450	3.8x3.8
RF Filter	SF1201D	**455**	5	CDMA 450	3.8x3.8
IF Filter	SF2042B	**456**	15	Wimax	7.0x5.0
IF Filter	SF2042C	**456**	15	Wimax	5.0x5.0
IF Filter	SF2073B	**456**	10	Wimax	7.0x5.0
IF Filter	SF2097B	**456**	2.55	Wimax	7.0x5.0

SAW RF / IF Filters

Listed in Order by Frequency (continued)

SAW RF / IF Filters Listed by Frequency					
Type	Part No.	Freq. (MHz)	BW (MHz)	Application	Case (mm)
IF Filter	SF2046B	**456.44**	5.22	Wimax	7.0x5.0
RF Filter	SF1213D	**462.5**	5	CDMA 450	3.8x3.8
IF Filter	SF2076B	**464**	3.7	Wimax	7.0x5.0
RF Filter	SF1188C	**465**	4	RF Filter	5.0x5.0
RF Filter	SF1202D	**465**	5	CDMA 450	3.8x3.8
IF Filter	SF2024B	**467.751**	14.2	SDARS	7.0x5.0
IF Filter	SF2024D	**467.751**	14.2	SDARS	3.8x3.8
IF Filter	SF2024D-1	**467.751**	14.2	SDARS	3.8x3.8
IF Filter	SF2024E-1	**467.751**	12.5	SDARS	3.0x3.0
IF Filter	SF2024E-2	**467.751**	12.5	SDARS	3.0x3.0
RF Filter	SF1216D	**481.25**	5	CDMA 450	3.8x3.8
RF Filter	SF1217D	**491.25**	5	CDMA 450	3.8x3.8
IF Filter	SF2179C	**495**	4.25	IF Filter	5.0x5.0
IF Filter	SF2192D	**495**	0.65	RF Filter	3.8x3.8
IF Filter	SF1080A	**499.25**	1.5	CATV	9.1x7.1
IF Filter	SF1146B	**499.25**	30	Cable	7.0x5.0
RF Filter	SF2237C	**515**	27	RF Filter	5.0x5.0
RF Filter	SF2156B	**611**	7	RF Filter	7.0x5.0
IF Filter	SF2180D	**700**	3.8	IF Filter	3.8x3.8
RF Filter	SF2200E	**707**	18	BTS RF	3.0x3.0
RF Filter	SF2171E	**719**	5	MediaFlo	3.0x3.0
RF Filter	SF2171H	**719**	5	MediaFlo	2.0x1.6
RF Filter	SF2126E	**725**	50	Wimax	3.0x3.0
RF Filter	SF2065C	**734**	6	RF Filter	5.0x5.0
RF Filter	SF2199E	**787**	22	BTS RF	3.0x3.0
RF Filter	SF2207E	**800**	20	RF Filter	3.0x3.0
RF Filter	SF1222D	**800/842**	20	SAW Duplexer	3.8x3.8
RF Filter	SF1223D	**800/842**	20	SAW Duplexer	3.8x3.8
RF Filter	SF2198E	**806**	30	BTS RF	3.0x3.0
RF Filter	SF2092E	**810**	17	RF Filter	3.0x3.0
RF Filter	SF2214E	**815**	20	RF Filter	3.0x3.0
RF Filter	SF2203E	**834**	30	RF Filter	3.0x3.0
RF Filter	SF1182B	**836.5**	25	RF Filter	3.0x3.0
IF Filter	SF1207C	**836.5/881.5**	25	SAW Duplexer	5.0x5.0
IF Filter	SF1207D	**836.5/881.5**	25	SAW Duplexer	3.8x3.8
RF Filter	SF2195E	**842.5**	5	RF Filter	3.0x3.0
RF Filter	SF2197E	**847**	30	BTS RF	3.0x3.0
RF Filter	SF2142G	**867.5**	15	RF Filter	2.5x2.0
RF Filter	SF2137D	**869**	2	ISM Band	3.8x3.8
RF Filter	SF2137E	**869**	2	ISM Band	3.0x3.0
RF Filter	SF2137E-1	**869**	2	ISM Band	3.0x3.0
RF Filter	SF2254E	**872**	15	Glonass	3.0x3.0
RF Filter	SF2205E	**879**	30	RF Filter	3.0x3.0
RF Filter	SF1183G	**881.5**	25	Cellular	2.5x2.0
IF Filter	SF2145B	**895**	18	RF Filter	7.0x5.0
RF Filter	SF2134E	**897.5**	35	RF Filter	3.0x3.0
RF Filter	SF2049E	**915**	26	ISM Band	3.0x3.0
RF Filter	SF2049E-1	**915**	26	ISM Band	3.0x3.0
RF Filter	SF2053E	**915**	12.5	ISM Band	3.0x3.0
RF Filter	SF2093E	**915**	26	ISM Band	3.0x3.0
RF Filter	SF2098G	**915**	26	ISM Band	2.5x2.0
RF Filter	SF2098H	**915**	26	RF Filter	2.0x1.6
RF Filter	SF2150E	**915**	10	ISM Band	3.0x3.0
RF Filter	SF2201E	**916.45**	4	ISM Band	3.0x3.0
RF Filter	SF2008D	**930.5**	4	GPS	3.8x3.8
RF Filter	SF2002E	**942.5**	35	RF Filter	3.0x3.0
RF Filter	SF1184B-1	**947.5**	25	RF Filter	3.0x3.0
RF Filter	SF2184E	**953**	3	RF Filter	3.0x3.0
RF & IF	SF2159E	**974**	40	Digital Television	3.0x3.0
RF Filter	SF2255E	**1056**	30	RF Filter	3.0x3.0
RF & IF	SF2163E	**1076.06**	40	Digital Television	3.0x3.0
RF Filter	SF2256E	**1076.06**	40	RF Filter	3.0x3.0
RF & IF	SF2162E	**1178.12**	40	Digital Television	3.0x3.0
RF Filter	SF2211E	**1200**	40	RF Filter	3.0x3.0
IF Filter	SF2017D	**1220**	8	Cable/DOCSIS	3.8x3.8
IF Filter	SF2017E	**1220**	8	Cable/DOCSIS	3.0x3.0
RF Filter	SF2032E	**1220**	28	DOCSIS Compatible	3.0x3.0
IF Filter	SF2081D	**1220**	50	Cable/DOCSIS	3.8x3.8

SAW RF / IF Filters Listed by Frequency					
Type	Part No.	Freq. (MHz)	BW (MHz)	Application	Case (mm)
IF Filter	SF2081E	**1220**	50	Cable/DOCSIS	3.0x3.0
IF Filter	SF2194E	**1220**	0.5	IF Filter	3.0x3.0
RF Filter	SF2208E	**1227**	20	RF Filter	3.0x3.0
RF Filter	SF2193E	**1228**	20	RF Filter	3.0x3.0
RF Filter	SF2186E	**1268.52**	20.46	RF Filter	3.0x3.0
RF & IF	SF2166E	**1280.18**	40	Digital Television	3.0x3.0
RF & IF	SF2167E	**1382.24**	40	Digital Television	3.0x3.0
RF Filter	SF2177E	**1472**	40	RF Filter	3.0x3.0
RF Filter	SF2177E-1	**1472**	4	RF Filter	3.0x3.0
RF & IF	SF2164E	**1484.3**	40	Digital Television	3.0x3.0
RF Filter	SF2235E	**1542.5**	35	RF Filter	3.0x3.0
RF Filter	SF2235G	**1542.5**	35	RF Filter	2.5x2.0
RF Filter	SF1186B-2	**1575.42**	2	GPS	3.0x3.0
RF Filter	SF1186B-3	**1575.42**	10	GPS	3.0x3.0
RF Filter	SF1186B-4	**1575.42**	2	GPS	3.0x3.0
RF Filter	SF1186E-1	**1575.42**	2	GPS	3.0x3.0
RF Filter	SF1186E-2	**1575.42**	2	GPS	3.0x3.0
RF Filter	SF1186G	**1575.42**	2	GPS	2.5x2.0
RF Filter	SF1186G-2	**1575.42**	2	GPS	2.5x2.0
RF Filter	SF1186H-2	**1575.42**	2	GPS	2.0x1.6
RF Filter	SF1186H-3	**1575.42**	2	GPS	2.0x1.6
RF Filter	SF1186K-2	**1575.42**	2	GPS	1.4x1.1
RF Filter	SF1186K-3	**1575.42**	2	GPS	1.4x1.1
RF Filter	SF1186K-5	**1575.42**	2	GPS	1.4x1.1
RF & IF	SF2165E	**1586.36**	40	Digital Television	3.0x3.0
RF Filter	SF2252E	**1590**	55	RF Filter	3.0x3.0
RF Filter	SF2217K	**1591.5**	35	RF Filter	1.4x1.1
RF Filter	SF2251E	**1600**	40	RF Filter	3.0x3.0
RF Filter	SF2249E	**1602**	61	RF Filter	3.0x3.0
RF Filter	SF2216K	**1603**	12	RF Filter	1.4x1.1
RF Filter	SF2250E	**1615**	20	RF Filter	3.0x3.0
RF Filter	SF2191E	**1621**	10	RF Filter	3.0x3.0
RF Filter	SF2236E	**1642.5**	35	RF Filter	3.0x3.0
RF Filter	SF2236G	**1642.5**	35	RF Filter	2.5x2.0
RF & IF	SF2168E	**1688.42**	40	Digital Television	3.0x3.0
RF Filter	SF2133E	**1745.5**	75	RF Filter	3.0x3.0
RF & IF	SF2169E	**1790.48**	40	Digital Television	3.0x3.0
RF Filter	SF1192B	**1842.5**	75	RF Filter	3.0x3.0
RF Filter	SF2036E	**1880**	60	DCS	3.0x3.0
RF Filter	SF2233E	**1882.5**	65	RF Filter	3.0x3.0
RF Filter	SF2204E	**1900**	40	Band F (A)	3.0x3.0
RF Filter	SF2204E-1	**1900**	40	Band F (A)	3.0x3.0
RF Filter	SF2212K	**1902**	34.9	TD-SCDMA	1.4x1.1
RF Filter	SF2224E	**1950**	60	RF Filter	3.0x3.0
RF Filter	SF1221F	**1950/2140**	60	SAW Duplexer	3.2x2.5
RF Filter	SF2001E	**1960**	60	PCS	3.0x3.0
RF Filter	SF2215E	**1960**	65	RF Filter	3.0x3.0
RF Filter	SF2234E	**1980**	30	RF Filter	3.0x3.0
RF Filter	SF1208H	**2017.5**	15	TD-SCDMA	2.0x1.6
RF Filter	SF2202E	**2017.5**	15	TD-SCDMA	3.0x3.0
RF Filter	SF2209H	**2017.5**	15	RF Filter	2.0x1.6
RF Filter	SF2213K	**2107.5**	15	TD-SCDMA	1.4x1.1
RF Filter	SF2226E	**2132.5**	45	RF Filter	3.0x3.0
RF Filter	SF2225E	**2140**	60	RF Filter	3.0x3.0
RF Filter	SF1220G	**2326**	14	GPS	2.5x2.0
RF Filter	SF2160E	**2330**	60	RF Filter	3.0x3.0
RF Filter	SF1219K	**2338.75**	12.5	GPS	1.4x1.1
RF Filter	SF2173E	**2350**	100	RF Filter	3.0x3.0
RF Filter	SF2124E	**2441.8**	83.5	ISM Band	3.0x3.0
RF Filter	SF2158E	**2535**	70	RF Filter	3.0x3.0
RF Filter	SF2238E	**2560**	30	RF Filter	3.0x3.0
RF Filter	SF2239E	**2580**	100	RF Filter	3.0x3.0
RF Filter	SF2240E	**2595**	40	RF Filter	3.0x3.0
RF Filter	SF2241E	**2595**	50	RF Filter	3.0x3.0
RF Filter	SF2161E	**2650**	70	RF Filter	3.0x3.0
RF Filter	SF2206E	**2655**	70	RF Filter	3.0x3.0
RF Filter	SF2253E	**2655**	70	Glonass	3.0x3.0
RF Filter	SF2258E	**2655**	66	RF Filter	3.0x3.0

RoHS Compliant

SAW RF / IF Filters

Listed in Order by Bandwidth

SAW RF / IF Filters Listed by Bandwidth					
Type	Part No.	Freq. (MHz)	BW (MHz)	Application	Case (mm)
IF Filter	PX1002	86.85	**0.024**	IS-54 TDMA	13.3x6.5
IF Filter	PX1004	82.2	**0.03**	IS-54 TDMA	13.3x6.5
IF Filter	PX1004-1	82.2	**0.03**	IS-54 TDMA	13.3x6.5
IF Filter	SF2220C	193.6	**0.11**	RF Filter	5.0x5.0
IF Filter	SF1088A	170.6	**0.18**	GSM/DCS	19x6.5
IF Filter	SF1081A	71	**0.2**	GSM Receiver	22.1x8.0
IF Filter	SF1081A-1	71	**0.2**	GSM Receiver	22.1x8.0
IF Filter	SF1092A	199	**0.2**	GSM/DCS	19x6.5
IF Filter	SF1115A	199	**0.2**	GSM/DCS	9.1x7.1
IF Filter	SF2027B	199	**0.2**	GSM Receiver	13.3x6.5
RF Filter	SF2183E	400	**0.25**	RF Filter	3.0x3.0
RF Filter	SF2055A	240	**0.3**	PHS	11.5x4.0
IF Filter	SF2062A	229.25	**0.3**	PHS	11.5x4.0
IF Filter	SF2219A	193.6	**0.39**	RF Filter	11.5x4.0
IF Filter	SF1194A	167	**0.4**	IF Filter	19x6.5
IF Filter	SF2194E	1220	**0.5**	IF Filter	3.0x3.0
RF Filter	SF2196E	315	**0.6**	ISM Band	3.0x3.0
IF Filter	SF2192D	495	**0.65**	RF Filter	3.8x3.8
IF Filter	SF1059A	350	**0.8**	WLAN	9.1x7.1
IF Filter	SF2257A	70	**0.8**	IF Filter	13.3x6.5
IF Filter	SF1091A	211	**0.9**	GSM/DCS	13.3x6.5
RF Filter	SF2059B-1	137.5	**1**	Orbcom RX	7.0x5.0
IF Filter	SF2221A	193.6	**1**	RF Filter	11.5x4.0
IF Filter	SF2229A	70	**1.1**	IF Filter	13.3x6.5
IF Filter	SF1056A	110.592	**1.152**	DECT	13.3x6.5
IF Filter	SF2141B	210.38	**1.2**	CDMA	7.0x5.0
IF Filter	SF1056B	110.592	**1.44**	DECT	7.0x5.0
IF Filter	SF1080A	499.25	**1.5**	CATV	9.1x7.1
IF Filter	SF1111A	160	**1.5**	CDMA2000 BTS	24.6x9
RF Filter	SF2176E	433.92	**1.6**	ISM Band	3.0x3.0
RF Filter	SF1186B-2	1575.42	**2**	GPS	3.0x3.0
RF Filter	SF1186B-4	1575.42	**2**	GPS	3.0x3.0
RF Filter	SF1186E-1	1575.42	**2**	GPS	3.0x3.0
RF Filter	SF1186E-2	1575.42	**2**	GPS	3.0x3.0
RF Filter	SF1186G	1575.42	**2**	GPS	2.5x2.0
RF Filter	SF1186G-2	1575.42	**2**	GPS	2.5x2.0
RF Filter	SF1186H-2	1575.42	**2**	GPS	2.0x1.6
RF Filter	SF1186H-3	1575.42	**2**	GPS	2.0x1.6
RF Filter	SF1186K-2	1575.42	**2**	GPS	1.4x1.1
RF Filter	SF1186K-3	1575.42	**2**	GPS	1.4x1.1
RF Filter	SF1186K-5	1575.42	**2**	GPS	1.4x1.1
IF Filter	SF2033A	350	**2**	IF Filter	13.3x6.5
RF Filter	SF2120C	149	**2**	Orbcom TX	5.0x5.0
RF Filter	SF2137D	869	**2**	ISM Band	3.8x3.8
RF Filter	SF2137E	869	**2**	ISM Band	3.0x3.0
RF Filter	SF2137E-1	869	**2**	ISM Band	3.0x3.0
IF Filter	SF1120B	298.74	**2.2**	GPS	7.0x5.0
IF Filter	SF1131B	266	**2.2**	SDARS	7.0x5.0
IF Filter	SF2097B	456	**2.55**	Wimax	7.0x5.0
RF Filter	SF2184E	953	**3**	RF Filter	3.0x3.0
IF Filter	SF2037C	76.5	**3.1**	SDARS	5.0x5.0
IF Filter	SF2039B	72.54	**3.7**	SDARS	7.0x5.0
IF Filter	SF2039B-2	72.54	**3.7**	SDARS	7.0x5.0
IF Filter	SF2039B-3	72.54	**3.7**	SDARS	7.0x5.0
IF Filter	SF2040B	80.46	**3.7**	SDARS	7.0x5.0
IF Filter	SF2040B-2	80.46	**3.7**	SDARS	7.0x5.0
IF Filter	SF2040B-3	80.46	**3.7**	SDARS	7.0x5.0
IF Filter	SF2076B	464	**3.7**	Wimax	7.0x5.0
IF Filter	SF2143A	72.54/80.46	**3.7**	SDARS	11.4x5.3
IF Filter	SF2037B	76.5	**3.8**	SDARS	7.0x5.0
IF Filter	SF2037B-2	76.5	**3.8**	SDARS	7.0x5.0
IF Filter	SF2037B-3	76.5	**3.8**	SDARS	7.0x5.0
IF Filter	SF2180D	700	**3.8**	IF Filter	3.8x3.8
RF Filter	SF1188C	465	**4**	RF Filter	5.0x5.0
RF Filter	SF2008D	930.5	**4**	GPS	3.8x3.8
IF Filter	SF2094B	380	**4**	Wimax	7.0x5.0
RF Filter	SF2177E-1	1472	**4**	RF Filter	3.0x3.0
RF Filter	SF2201E	916.45	**4**	ISM Band	3.0x3.0
IF Filter	SF2228A	70	**4**	IF Filter	13.3x6.5
IF Filter	SF2243A	233	**4**	IF Filter	13.3x6.5

SAW RF / IF Filters Listed by Bandwidth					
Type	Part No.	Freq. (MHz)	BW (MHz)	Application	Case (mm)
IF Filter	SF2244A	225	**4**	IF Filter	13.3x6.5
RF Filter	SF2247E	422	**4**	ISM Band	3.0x3.0
IF Filter	SF1140B	75	**4.2**	SDARS	7.0x5.0
IF Filter	SF1140B-2	75	**4.2**	SDARS	7.0x5.0
IF Filter	SF1142B	315	**4.2**	IF Receiver	7.0x5.0
IF Filter	SF2179C	495	**4.25**	IF Filter	5.0x5.0
IF Filter	SF2143B	72.54/80.46	**4.4**	SDARS	7.0x5.0
IF Filter	SF2006C	190	**4.8**	WCDMA	5.0x5.0
IF Filter	SF2069A-1	96	**4.8**	TD-SCDMA	19x6.5
IF Filter	SF2069A-2	96	**4.8**	TD-SCDMA	13.3x6.5
IF Filter	SF1197B	248.6	**5**	IF Filter	7.0x5.0
RF Filter	SF1201D	455	**5**	CDMA 450	3.8x3.8
RF Filter	SF1202D	465	**5**	CDMA 450	3.8x3.8
RF Filter	SF1212D	452.5	**5**	CDMA 450	3.8x3.8
RF Filter	SF1213D	462.5	**5**	CDMA 450	3.8x3.8
RF Filter	SF1214D	413.76	**5**	CDMA 450	3.8x3.8
RF Filter	SF1215D	423.76	**5**	CDMA 450	3.8x3.8
RF Filter	SF1216D	481.25	**5**	CDMA 450	3.8x3.8
RF Filter	SF1217D	491.25	**5**	CDMA 450	3.8x3.8
IF Filter	SF2125D	305	**5**	Wimax	3.8x3.8
IF Filter	SF2149A	46.08	**5**	TD-SCDMA	13.3x6.5
RF Filter	SF2171E	719	**5**	MediaFlo	3.0x3.0
RF Filter	SF2171H	719	**5**	MediaFlo	2.0x1.6
RF Filter	SF2195E	842.5	**5**	RF Filter	3.0x3.0
RF Filter	SF2210D	427.8	**5**	RF Filter	3.8x3.8
IF Filter	SF2242B	40	**5**	IF Filter	7.0x5.0
RF Filter	SF2248E	315	**5**	ISM Band	3.0x3.0
IF Filter	SF2046B	456.44	**5.22**	Wimax	7.0x5.0
RF Filter	SF2065C	734	**6**	RF Filter	5.0x5.0
RF Filter	SF2188C	340	**6**	SCDMA	5.0x5.0
IF Filter	SF2227A	70	**6**	IF Filter	13.3x6.5
RF Filter	SF2222C	228	**6.2**	RF Filter	5.0x5.0
IF Filter	SF2026B	114.815	**6.3**	SDARS	7.0x5.0
RF Filter	SF1218D	453.5	**7**	CDMA 450	3.8x3.8
RF Filter	SF2156B	611	**7**	RF Filter	7.0x5.0
IF Filter	SF2017D	1220	**8**	Cable/DOCSIS	3.8x3.8
IF Filter	SF2017E	1220	**8**	Cable/DOCSIS	3.0x3.0
RF Filter	SF2188D	340	**8**	SCDMA	3.8x3.8
IF Filter	SF2109D	305	**8.4**	Wibro	3.8x3.8
IF Filter	SF2063A	156	**9**	Wibro	13.3x6.5
IF Filter	SF2185A	70	**9**	IF Filter	13.3x6.5
IF Filter	SF2185A-1	70	**9.1**	IF Filter	13.3x6.5
RF Filter	SF1186B-3	1575.42	**10**	GPS	3.0x3.0
IF Filter	SF2045A	140	**10**	WCDMA	13.3x6.5
IF Filter	SF2064A	156	**10**	Wimax	13.3x6.5
IF Filter	SF2073B	456	**10**	Wimax	7.0x5.0
IF Filter	SF2110D	305	**10**	Wimax	3.8x3.8
RF Filter	SF2150E	915	**10**	ISM Band	3.0x3.0
RF Filter	SF2191E	1621	**10**	RF Filter	3.0x3.0
IF Filter	SF1179B	184.14	**11**	IF Filter	7.0x5.0
RF Filter	SF2216K	1603	**12**	RF Filter	1.4x1.1
RF Filter	SF1219K	2338.75	**12.5**	GPS	1.4x1.1
IF Filter	SF2024E-1	467.751	**12.5**	SDARS	3.0x3.0
IF Filter	SF2024E-2	467.751	**12.5**	SDARS	3.0x3.0
IF Filter	SF2038B	76.5	**12.5**	SDARS	7.0x5.0
IF Filter	SF2038B-2	76.5	**12.5**	SDARS	7.0x5.0
IF Filter	SF2038B-3	76.5	**12.5**	SDARS	7.0x5.0
IF Filter	SF2038C	76.5	**12.5**	SDARS	5.0x5.0
RF Filter	SF2053E	915	**12.5**	ISM Band	3.0x3.0
IF Filter	SF2060B	115	**12.5**	SDARS	7.0x5.0
IF Filter	SF2060B-1	115	**12.5**	SDARS	7.0x5.0
IF Filter	SF2079C	251.045	**12.5**	IF Filter	5.0x5.0
IF Filter	SF2079D	251	**12.5**	IF Filter	3.8x3.8
IF Filter	SF2079D-1	251	**12.5**	IF Filter	3.8x3.8
IF Filter	SF2138B	144	**12.5**	SDARS	7.0x5.0
IF Filter	SF1141B	75	**12.7**	SDARS	7.0x5.0
IF Filter	SF1141B-2	75	**12.7**	SDARS	7.0x5.0
IF Filter	SF1141B-4	75	**12.7**	SDARS	7.0x5.0
IF Filter	SF1143B	315	**12.7**	SDARS	7.0x5.0
IF Filter	SF1143B-1	315	**12.7**	SDARS	7.0x5.0

SAW RF / IF Filters

Listed in Order by Bandwidth (continued)

SAW RF / IF Filters Listed by Bandwidth					
Type	Part No.	Freq. (MHz)	BW (MHz)	Application	Case (mm)
IF Filter	SF1143B-2	315	**12.7**	SDARS	7.0x5.0
IF Filter	SF1143B-4	315	**12.7**	SDARS	7.0x5.0
IF Filter	SF2025B	259.861	**13.8**	SDARS	7.0x5.0
RF Filter	SF1220G	2326	**14**	GPS	2.5x2.0
IF Filter	SF2079E	251.045	**14**	IF Filter	3.0x3.0
IF Filter	SF2024B	467.751	**14.2**	SDARS	7.0x5.0
IF Filter	SF2024D	467.751	**14.2**	SDARS	3.8x3.8
IF Filter	SF2024D-1	467.751	**14.2**	SDARS	3.8x3.8
IF Filter	SF2025D	259.861	**14.5**	SDARS	3.8x3.8
RF Filter	SF1208H	2017.5	**15**	TD-SCDMA	2.0x1.6
IF Filter	SF2042B	456	**15**	Wimax	7.0x5.0
IF Filter	SF2042C	456	**15**	Wimax	5.0x5.0
IF Filter	SF2111A	140	**15**	TD-SCDMA	13.3x6.5
RF Filter	SF2142G	867.5	**15**	RF Filter	2.5x2.0
IF Filter	SF2172C	280	**15**	IF Filter	5.0x5.0
RF Filter	SF2202E	2017.5	**15**	TD-SCDMA	3.0x3.0
RF Filter	SF2209H	2017.5	**15**	RF Filter	2.0x1.6
RF Filter	SF2213K	2107.5	**15**	TD-SCDMA	1.4x1.1
RF Filter	SF2218D	425	**15**	RF Filter	3.8x3.8
RF Filter	SF2254E	872	**15**	Glonass	3.0x3.0
IF Filter	SF1174B	374	**17**	WLAN	5.0x5.0
IF Filter	SF1174D	374	**17**	WLAN	3.8x3.8
RF Filter	SF2092E	810	**17**	RF Filter	3.0x3.0
RF Filter	SF2136E	433.92	**17.4**	ISM Band	3.0x3.0
IF Filter	SF1189B-1	280	**17.97**	WLAN	5.0x5.0
IF Filter	SF2135A	96	**18**	IF Filter	13.3x6.5
IF Filter	SF2145B	895	**18**	RF Filter	7.0x5.0
RF Filter	SF2200E	707	**18**	BTS RF	3.0x3.0
IF Filter	SF2140A-1	140	**18.4**	WCDMA	13.3x6.5
IF Filter	SF1189B	280	**18.5**	WLAN	5.0x5.0
IF Filter	SF1200B	96	**20**	TD-SCDMA	7.0x5.0
RF Filter	SF1222D	800/842	**20**	SAW Duplexer	3.8x3.8
RF Filter	SF1223D	800/842	**20**	SAW Duplexer	3.8x3.8
IF Filter	SF2131B	92.16	**20**	TD-SCDMA	7.0x5.0
IF Filter	SF2139D	177	**20**	IF Filter	3.8x3.8
IF Filter	SF2140A	140	**20**	WCDMA	13.3x6.5
IF Filter	SF2147D	157	**20**	CDMA2000 BTS	3.8x3.8
IF Filter	SF2148B	138.24	**20**	TD-SCDMA	7.0x5.0
IF Filter	SF2151B	211.2	**20**	RF Filter	7.0x5.0
IF Filter	SF2155B	153.6	**20**	TD-SCDMA	7.0x5.0
IF Filter	SF2157A	156	**20**	Wimax	13.3x6.5
IF Filter	SF2170D	165	**20**	RF Filter	3.8x3.8
IF Filter	SF2178A	168	**20**	Wimax	13.3x6.5
IF Filter	SF2181D	140	**20**	IF Filter	3.8x3.8
RF Filter	SF2193E	1228	**20**	RF Filter	3.0x3.0
RF Filter	SF2207E	800	**20**	RF Filter	3.0x3.0
RF Filter	SF2208E	1227	**20**	RF Filter	3.0x3.0
RF Filter	SF2214E	815	**20**	RF Filter	3.0x3.0
RF Filter	SF2250E	1615	**20**	RF Filter	3.0x3.0
RF Filter	SF2186E	1268.52	**20.46**	RF Filter	3.0x3.0
IF Filter	SF2230A	70	**20.8**	IF Filter	13.3x6.5
IF Filter	SF1177A	57.6	**21.2**	WCDMA/TD-SCDMA	13.3x6.5
RF Filter	SF2199E	787	**22**	BTS RF	3.0x3.0
RF Filter	SF1182B	836.5	**25**	RF Filter	3.0x3.0
RF Filter	SF1183G	881.5	**25**	Cellular	2.5x2.0
RF Filter	SF1184B-1	947.5	**25**	RF Filter	3.0x3.0
IF Filter	SF1207C	836.5/881.5	**25**	SAW Duplexer	5.0x5.0
IF Filter	SF1207D	836.5/881.5	**25**	SAW Duplexer	3.8x3.8
IF Filter	SF2146D	415	**25**	IF Filter	3.8x3.8
RF Filter	SF2049E	915	**26**	ISM Band	3.0x3.0
RF Filter	SF2049E-1	915	**26**	ISM Band	3.0x3.0
RF Filter	SF2093E	915	**26**	ISM Band	3.0x3.0
RF Filter	SF2098G	915	**26**	ISM Band	2.5x2.0
RF Filter	SF2098H	915	**26**	RF Filter	2.0x1.6
RF Filter	SF2237C	515	**27**	RF Filter	5.0x5.0
RF Filter	SF2032E	1220	**28**	DOCSIS Compatible	3.0x3.0
IF Filter	SF1145B	427.25	**30**	Cable	7.0x5.0
IF Filter	SF1146B	499.25	**30**	Cable	7.0x5.0

SAW RF / IF Filters Listed by Bandwidth					
Type	Part No.	Freq. (MHz)	BW (MHz)	Application	Case (mm)
IF Filter	SF2072C	360	**30**	Wimax	5.0x5.0
IF Filter	SF2085A	96	**30**	IF Filter	13.3x6.5
IF Filter	SF2086C	240	**30**	IF Filter	5.0x5.0
IF Filter	SF2087C	267.5	**30**	IF Filter	5.0x5.0
IF Filter	SF2088C	297.5	**30**	IF Filter	5.0x5.0
IF Filter	SF2089C	325	**30**	IF Filter	5.0x5.0
IF Filter	SF2090C	355	**30**	IF Filter	5.0x5.0
IF Filter	SF2091C	385	**30**	IF Filter	5.0x5.0
IF Filter	SF2189A	140	**30**	IF Filter	13.3x6.5
RF Filter	SF2197E	847	**30**	BTS RF	3.0x3.0
RF Filter	SF2198E	806	**30**	BTS RF	3.0x3.0
RF Filter	SF2203E	834	**30**	RF Filter	3.0x3.0
RF Filter	SF2205E	879	**30**	RF Filter	3.0x3.0
IF Filter	SF2223D	184.32	**30**	IF Filter	3.8x3.8
RF Filter	SF2234E	1980	**30**	RF Filter	3.0x3.0
RF Filter	SF2238E	2560	**30**	RF Filter	3.0x3.0
RF Filter	SF2255E	1056	**30**	RF Filter	3.0x3.0
RF Filter	SF2212K	1902	**34.9**	TD-SCDMA	1.4x1.1
RF Filter	SF2002E	942.5	**35**	RF Filter	3.0x3.0
RF Filter	SF2134E	897.5	**35**	RF Filter	3.0x3.0
RF Filter	SF2217K	1591.5	**35**	RF Filter	1.4x1.1
RF Filter	SF2235E	1542.5	**35**	RF Filter	3.0x3.0
RF Filter	SF2235G	1542.5	**35**	RF Filter	2.5x2.0
RF Filter	SF2236E	1642.5	**35**	RF Filter	3.0x3.0
RF Filter	SF2236G	1642.5	**35**	RF Filter	2.5x2.0
RF & IF	SF2159E	974	**40**	Digital Television	3.0x3.0
RF & IF	SF2162E	1178.12	**40**	Digital Television	3.0x3.0
RF & IF	SF2163E	1076.06	**40**	Digital Television	3.0x3.0
RF & IF	SF2164E	1484.3	**40**	Digital Television	3.0x3.0
RF & IF	SF2165E	1586.36	**40**	Digital Television	3.0x3.0
RF & IF	SF2166E	1280.18	**40**	Digital Television	3.0x3.0
RF & IF	SF2167E	1382.24	**40**	Digital Television	3.0x3.0
RF & IF	SF2168E	1688.42	**40**	Digital Television	3.0x3.0
RF & IF	SF2169E	1790.48	**40**	Digital Television	3.0x3.0
RF Filter	SF2177E	1472	**40**	RF Filter	3.0x3.0
IF Filter	SF2182D	140	**40**	IF Filter	3.8x3.8
RF Filter	SF2204E	1900	**40**	Band F (A)	3.0x3.0
RF Filter	SF2204E-1	1900	**40**	Band F (A)	3.0x3.0
RF Filter	SF2211E	1200	**40**	RF Filter	3.0x3.0
RF Filter	SF2240E	2595	**40**	RF Filter	3.0x3.0
RF Filter	SF2251E	1600	**40**	RF Filter	3.0x3.0
RF Filter	SF2256E	1076.06	**40**	RF Filter	3.0x3.0
RF Filter	SF2226E	2132.5	**45**	RF Filter	3.0x3.0
IF Filter	SF2081D	1220	**50**	Cable/DOCSIS	3.8x3.8
IF Filter	SF2081E	1220	**50**	Cable/DOCSIS	3.0x3.0
RF Filter	SF2126E	725	**50**	Wimax	3.0x3.0
RF Filter	SF2241E	2595	**50**	RF Filter	3.0x3.0
RF Filter	SF2252E	1590	**55**	RF Filter	3.0x3.0
RF Filter	SF1221F	1950/2140	**60**	SAW Duplexer	3.2x2.5
RF Filter	SF2001E	1960	**60**	PCS	3.0x3.0
RF Filter	SF2036E	1880	**60**	DCS	3.0x3.0
RF Filter	SF2160E	2330	**60**	RF Filter	3.0x3.0
RF Filter	SF2190B	138	**60**	Sat Receiver	7.0x5.0
RF Filter	SF2224E	1950	**60**	RF Filter	3.0x3.0
RF Filter	SF2225E	2140	**60**	RF Filter	3.0x3.0
RF Filter	SF2249E	1602	**61**	RF Filter	3.0x3.0
RF Filter	SF2215E	1960	**65**	RF Filter	3.0x3.0
RF Filter	SF2233E	1882.5	**65**	RF Filter	3.0x3.0
RF Filter	SF2258E	2655	**66**	RF Filter	3.0x3.0
RF Filter	SF2158E	2535	**70**	RF Filter	3.0x3.0
RF Filter	SF2161E	2650	**70**	RF Filter	3.0x3.0
RF Filter	SF2206E	2655	**70**	RF Filter	3.0x3.0
RF Filter	SF2253E	2655	**70**	Glonass	3.0x3.0
RF Filter	SF1192B	1842.5	**75**	RF Filter	3.0x3.0
RF Filter	SF2133E	1745.5	**75**	RF Filter	3.0x3.0
RF Filter	SF2124E	2441.8	**83.5**	ISM Band	3.0x3.0
RF Filter	SF2173E	2350	**100**	RF Filter	3.0x3.0
RF Filter	SF2239E	2580	**100**	RF Filter	3.0x3.0

RFM Components Come in the Following Package Styles

Packages Shown Below are Near Actual Size

1.4 mm x 1.1 mm

2.0 mm x 1.6 mm

2.5 mm x 2.0 mm

3.2 mm x 2.5 mm

3.0 mm x 3.0 mm

3.8 mm x 3.8 mm

5.0 mm x 3.2 mm

7.0 mm x 5.0 mm

7.0 mm x 5.0 mm

7.0 mm x 5.0 mm

9.0 mm x 7.0 mm

9.3 mm diameter

11.5 mm x 4.0 mm

13.3 mm x 6.5 mm

19.0 mm x 6.5 mm

14 mm x 9 mm

22.0 mm x 8.0 mm

24.6 mm x 9.0 mm

25.02 mm x 12.83 mm x 6.35 mm

Standard Order Quantities

Components	Package	Shipped Via	QTY
Frequency Control - Oscillators	DIP	Antistatic Box	30
	SMP	Tape and Reel - 7"	500
Frequency Control - Dif Sine Wave Clocks	SMP	Tape and Reel - 7"	500
Frequency Control - VCSO Optical Timing Clocks	SMP	Tape and Reel - 7"	500
Resonators - Single Port	TO39-3	Antistatic Tube	50
	SMP	Tape and Reel - 7"	500
	SMP	Tape and Reel - 13	3,000
	SMP	Tape and Reel - 13	4,000
Resonators - Dual-Port	TO39-3	Antistatic Tube	50
Filters - Narrow-band Front-end Filters	TO39-3	Antistatic Tube	50
	SMP	Tape and Reel - 7"	500
	SMP	Tape and Reel - 13	3,000
Filters - RF /IF Filters	TO39-3	Antistatic Tube	50
	SMP	Tape and Reel - 7"	500
	SMP	Tape and Reel - 13	2,000

Small Packages

Small size is crucial when engineering tiny devices for wireless applicaitons. RFM comonents are available in a variety of non-leaded surface mount (SMP) ceramic packages, a TO39-3 leaded package, or a Dual-in-lin packages (DIP).

Wireless is...RFM®

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