POWERED BY Panasonic
Electronic Components

RF Modules

At-A-Glance Selection Guide

A Comprehensive Guide to Choosing the Right RF Module

Panasonic Electronic Components provides powerful, highly flexible, cost effective RF Modules for a wide variety of wireless Personal Area Network (PAN) applications. New extended range products and small footprints combined with network firmware flexibility make Panasonic an industry leader in the development of cutting edge RF Module technology with over 100 different module choices!

1-800-344-2112
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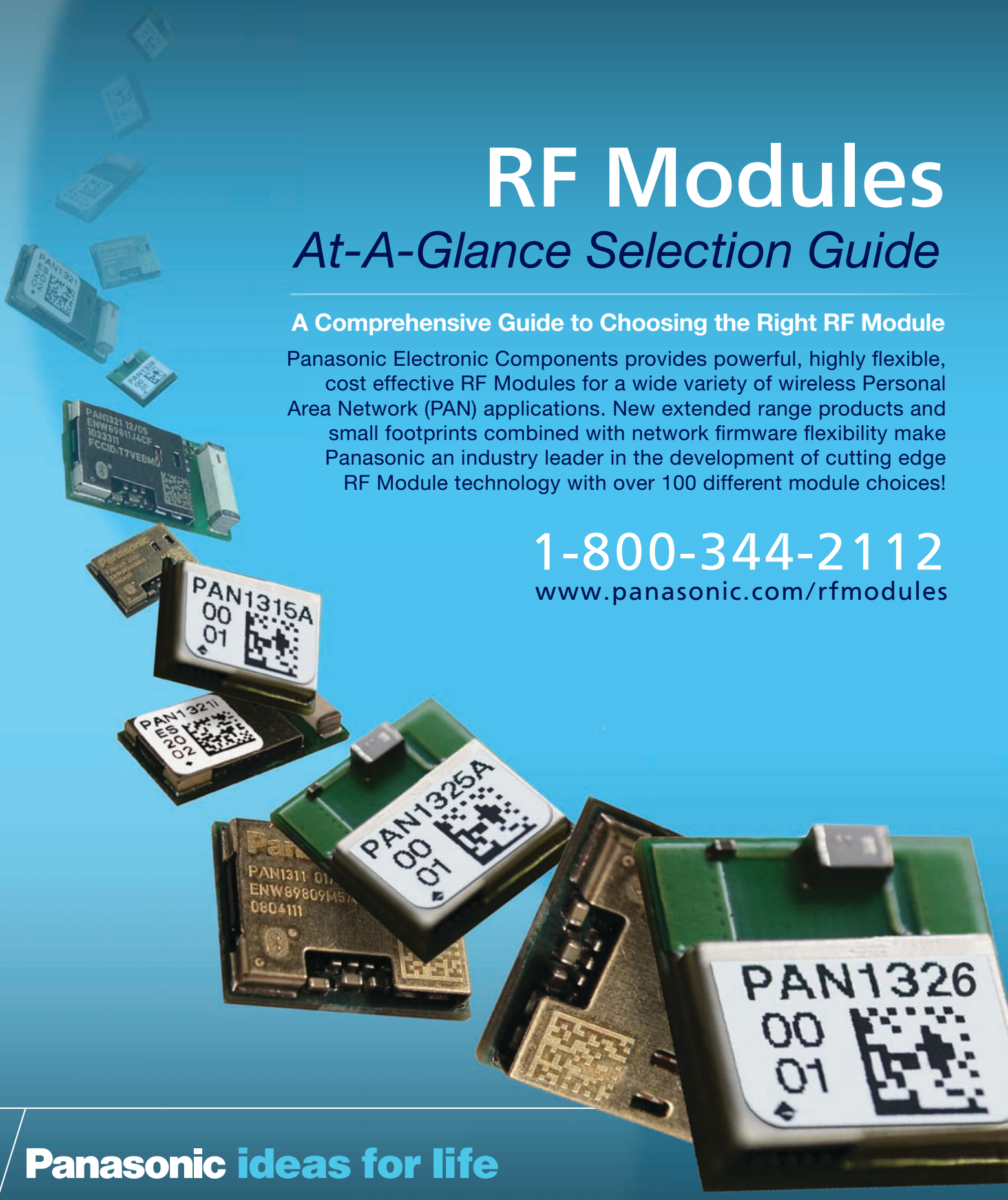


Panasonic ideas for life

Bluetooth® Classic

Bluetooth Classic, formerly known as Bluetooth and Bluetooth EDR, is a networking standard designed to meet IEEE 802.15.1 and administered by the Bluetooth Special Interest Group (BT SIG). Conceived as a 2.4GHz wireless standard to replace wired headsets in 1999, Bluetooth has grown in both scope and capability. By far it is the most prolific wireless standard today adding over 1,000,000 nodes to the network every day, in cell phones, PC's, consumer and medical electronics applications and many more. Bluetooth Classic is best suited to high data rate – up to 3Mbits/sec – applications where the network size is under eight nodes. Larger networks can be formed with Scatternets. Connections are robust, even in noisy environments, by using 80 channels, each 1MHz wide, adaptive frequency hopping, and multiple modulation schemes. Range can be adjusted using hardware and software from under a meter to over two hundred meters. Panasonic offers four Series of Bluetooth devices with over 20 parts numbers to address nearly every application.

Bluetooth Dual Mode

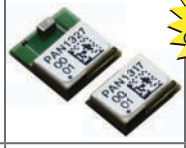
Panasonic Dual Mode RF Modules require only 85.5 mm^2, including antenna, of board area; 80% less than any multi-module or device design; all while reducing costs associated with incorporating two wireless technologies. These modules have been designed to be 100% pin compatible with other members of the PAN13xx family. This unique design feature enables designers to seamlessly transition between Bluetooth Classic, Low Energy and ANT™ enabled modules, addressing larger markets and providing migration paths to circumvent obsolescence.

Bluetooth ANT™

ANT™ is a wireless sensor network protocol operating in the 2.4 GHz spectrum. Designed for ultra-low power, ease of use, efficiency and scalability, ANT supports peer-to-peer, star, tree and fixed mesh topologies. It provides reliable data communications, flexible and adaptive network operation and cross-talk immunity. The ANT protocol stack is compact, requiring minimal microcontroller resources to reduce system costs, lighten the computational burden and improve efficiency. Low-level security is implemented to allow user-defined network security.

Bluetooth Low Energy

Bluetooth Low Energy is designed to reduce power consumption. It can be put into a sleep mode and only activates for event activities such as sending data to a gateway, PC or mobile phone. Furthermore, the maximum power consumption is less than 15 mA and the average power consumption is about 1 uA. The foundations of low energy consumption are short messages and establishing very fast connections (few ms). Using these techniques, energy consumption is reduced to a tenth of a Classic Bluetooth unit. Thus, a small coin cell – such as a CR2032 – is capable of powering a device for up to 10 years of operation.

Category	Classic				Dual Mode + Low Energy	Dual Mode + ANT™	Low Energy
Module Image			 Apple® Device Compatible!		 Bluetooth SMART READY		 Apple® Device Compatible! Bluetooth SMART
Series	PAN1315A/1325A	PAN1311/1321	PAN1321i	PAN1455/1555	PAN1316/1326	PAN1317/1327	PAN1720
Function	(no/with antenna) Ver 2.1 EDR - HCI	(no/with antenna) Ver 2.0 EDR - SPP	(with antenna) Ver 2.0 EDR - SPP	(no/with antenna) Ver 3.0 EDR - SPP, HID, HDP	(no/with antenna) Ver 4.0 EDR - HCI	(no/with antenna) Ver 2.1 EDR - HCI	(with antenna) Ver 4.0 EDR BLE
Size [mm]	9.0 x 6.5 x 1.7 9.0 x 9.5 x 1.7	11.6 x 8.7 x 1.8 15.6 x 8.7 x 2.8	15.6 x 8.7 x 2.8	18.8 x 13.5 x 2.5	9.0 x 6.5 x 1.7 9.0 x 9.5 x 1.7	9.0 x 6.5 x 1.7 9.0 x 9.5 x 1.7	15.6 x 8.7 x 1.8
IC	CC2560A	PMB8753/2	PMB8753/2	BC6 / STM32F103	CC2564	CC2567	CC2540 / (41)
Rx Sensitivity [dBm]	-93 @ BER 10^{-3}	-86 @ BER 10^{-3}	-86 @ BER 10^{-3}	-86 @ BER 10^{-3}	-93 @ BER 10^{-3}	-93 @ BER 10^{-3}	-94 @ BER 1%
Tx Power (max.)	+10.5 dBm	+4 dBm	+4 dBm	+4 dBm	+10.5 dBm	+10.5 dBm	+3 dBm
Operating Temp.	-20 to +70 °C	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C	-20 to +70 °C	-20 to +70 °C	-40 to +85 °C
Power Supply	1.8 to 4.8 V	2.7 to 3.6 V	2.7 to 3.6 V	2.7 to 3.6 V	1.8 to 4.8 V	1.8 to 4.8 V	2.0 to 3.6 V
Current Consum.	135 µA (sleep) 40 mA (Tx,EDR)	80 µA (sleep) 40 mA (Tx,EDR)	80 µA (sleep) 40 mA (Tx,EDR)	<100 µA (sleep) 47 mA (ACL; DH1)	135 µA (sleep) 40 mA (Tx,EDR)	135 µA (sleep) 40 mA (Tx,EDR)	>1µA (sleep) Tx23mA @ -6dBm
Frequency Range	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz
Number of GPIOs	2	>15	>15	18	2	2	19
Interfaces	GPIO, PCM, UART	GPIO, UART, JTAG	GPIO, UART, JTAG	GPIO, UART, I²C, SPI, ADC	GPIO, PCM, UART	GPIO, PCM, UART	GPIO, UART (USB)
Data Rate (max. air)	3 MBit/s	3 MBit/s 190 kBit/s		3 MBit/s ca. 500 kBit/s	3 MBit/s	3 MBit/s	1 MBit/s
Dev Kit	EVAL_PAN1323	EVAL_PAN1321i		EVAL_PAN1555	EVAL_PAN1323		EVAL_PAN1720
Dev Module	EVAL_PAN1323ETU	EVAL_PAN1321iETU			EVAL_PAN1323ETU		

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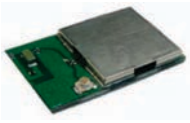
Mesh Networking

Based on the IEEE 802.15.4 standard, Mesh Networking was developed for the purpose of sending small amounts of data short distances, using very little power. The key feature of this technology is the ability to create a self healing mesh network where nodes “talk” to each other in a way that gets a message to a desired end point using the best path. When not in use, nodes will “sleep” using extremely little power.

Category	Mesh Networking		
Module Image			
Series	PAN4580	PAN4555	PAN4561 H/M/L
Function	AT Command Set & Mesh Software	AT Command Set & Mesh Software	AT Command Set & Mesh Software
Size [mm]	29.0 x 19.0 x 2.9	16.4 x 12.2 x 2.2	35.0 x 15.0 x 3.8
IC	ATmega128RFA1	MC1321x	MC1321x/CC259x
Rx Sensitivity [dBm]	-100 @ 250kBit/s	-92	+18.5/0/0
Tx Power (max.)	3.5 dBm	0 dBm	-102/-102/-92dBm
Operating Temp.	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C
Power Supply	1.8 to 3.6 V	2.0 to 3.4 V	2.0 to 3.4 V
Current Consumption	Tx: 18.5 mA @0dBm Rx: 16.5mA Sleep Mode: <1µA	<1µA (off mode) 30 mA (Tx, -4dBm)	<1 / 2 µA (off mode) 30 / 210 mA (Tx, -4 / +20 dBm)
Frequency Range	2.4 GHz	2.4 GHz	2.4 GHz
Number of GPIOs	33	19	33
Interfaces	GPIO, 2 UART, SPI, ADC, 2 wire serial	GPIO, UART, SPI	GPIO, UART, I²C, BDM
Data Rate (max. air)	2000 kBit/s	250 kBit/s	250 kBit/s
Dev Kit		EVAL_PAN4555	EVAL_PAN4561
Dev Module		EVAL_PAN4555ETU	EVAL_PAN4561ETU

ISM

Industrial, Scientific and Medical (ISM radio band). Key benefits are reduced cost, proprietary network, low power and various speeds of data transmission. Many ISM Modules work outside of the crowded 2.4 Ghz spectrum to provide high RF performance and data integrity.

Contact us today!

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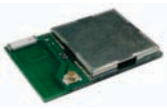
Visit www.panasonic.com/rfmodules for RF Module Website Resources:

- Design Guides
- Reference Guides
- Schematics
- PCB Layouts
- Development Software
- Specifications
- Applications Notes
- Video FAQ’s

Category	ISM (Market for Industrial-Scientific-Medical Solutions)		
Module Image			
Series	PAN2580	PAN235x	PAN2365
Function	wireless M-Bus & Mesh Software	<1GHz Transceiver Module	2.4GHz Transceiver Module
Size [mm]	29.0 x 19.0 x 2.9	8.0 x 8.2 x 1.9	8.0 x 8.2 x 1.9
IC	SiLabs SI100x	CC1101	CC2500
Rx Sensitivity [dBm]	-118 @ 2.0kBit/s	-104 @ 2.4kBit/s	-104 @ 2.4kBit/s
Tx Power (max.)	+13 / +18 dBm	+10 dBm	0 dBm
Operating Temp.	-40 to +85 °C	-40 to +85 °C	-40 to +85 °C
Power Supply	1.8 (2.7) to 3.6 V	1.8 to 3.6 V	1.8 to 3.6 V
Current Consumption	Tx: 30/85 mA Rx: 18.5mA Sleep Mode: <1µA	<1µA (sleep) 17mA (Tx, 0dBm)	<1µA (sleep) 21mA (Tx, 0dBm)
Frequency Range	863 to 928 MHz	300 to 1000 MHz	2.4 GHz
Number of GPIOs	18	2 Output	2 Output
Interfaces	GPIO, UART, SPI, I²C, ADC	GPO, SPI	GPO, SPI
Data Rate (max. air)	500 kBit/s	500 kBit/s	500 kBit/s

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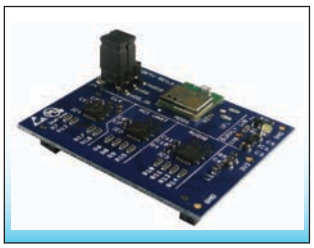
NEW! PAN1323ETU *BLUETOOTH*® Development Module



One development module, three standards: Bluetooth Classic, Bluetooth Low Energy and ANT™.This unique triple mode ETU – that's ETU for "Easy-To-Use" – module plugs directly into Panasonic Development Kits, Texas Instruments MSP430 and Stellaris experimenter boards with the added benefit of header connectors that simplify prototype wiring and field trials.

PAN1323ETU Triple Mode Compatibility

Series	Antenna	Bluetooth	LE	ANT	Compatibility
PAN1323ETU	X	X	X	X	-
PAN1315A		X			100%
PAN1315		X			
PAN1316		X	X		
PAN1317		X		X	
PAN1325A	X	X			100%
PAN1325	X	X			
PAN1326	X	X	X		
PAN1327	X	X		X	

To learn more, please visit:
http://www.panasonic.com/industrial/electronic-components/rf-modules/bluetooth/pan1323etu.aspx

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