EMB-WMB series
169/868 MHz

Wireless M-Bus Modules

Technical Specifications

EMB-WMB series represents the Wireless M-Bus Embit modules.
The **EMB-WMB** series offers solutions for both 169 MHz and 868 MHz bands. The modules combine high performance to small dimensions and low cost, providing to the system integrator a simple and easy way to add WMBus connectivity and multi-hop networking into existing products. The module can be configured as an embedded micro system or as a simple data modem for low power applications.
The RF implementation guarantees best-in-class performance in terms of coverage and power consumption. All the possible configurations work on a **single power supply rail (3.3 V)**. The power amplifier of the PA version can also be bypassed for saving power during transmission in those situations where +15 dBm are enough. The strict requirements of EN-13757 in terms of frequency accuracy and drift can be achieved by the 169 MHz module thanks to an accurate frequency reference.
Any **EMB-WMB** module can communicate with other devices through a wide range of serial interfaces: UART, I2C and SPI, several digital and analog I/O ports. One of the main targets of the **EMB-WMB** platforms is flexibility. Moreover, the extremely reduced power consumption (up to 2 µA in sleep mode with an RTC clock running) perfectly fits the long lasting battery life requirement of the metering market.
The **EMB-WMB** modules can be provided with the **Embit WMBus stack**, specifically developed for these platforms. It allows the customer to easily integrate the module in the desired system simplifying the interaction within WMBus networks.

MCU	MSP430F534x
Memory	64/96/128 KB Flash, 6/8/10 KB RAM
Frequency	169 MHz/868 MHz
Modulation	FSK, GFSK, MSK, ASK, OOK
Voltage supply	3.3 V (single supply)
Tx output power	up to +30 dBm (EMB-WMB169PA) up to +27 dBm (EMB-WMB169PAE) up to +15 dBm (EMB-WMB868)
Rx sensitivity	up to -122 dBm
Tx current EMB-WMB169PA	600 mA (at +27 dBm)
Tx current EMB-WMB169PAE	390 mA (at +27 dBm)
Tx current EMB-WMB868	57 mA (at +15 dBm)
Rx current	27 mA (full sensitivity) < 2 mA (long preamble)
Sleep current	< 2 µA
Data rate	up to 19.2 kbps at 169 MHz up to 200 kbps at 868 MHz
Interfaces	GPIO, UART, ADC, SPI, I2C, TIMER/PWM, JTAG
Antenna	U.FL connector, Wire antenna Pads on edge connector
Dimensions	29.5x22.5x3.5 mm Usual Embit Form Factor & pin to pin compatibility
Connector	SMD Edge connector
Temperature Range	-40 °C +85 °C
Ordering information:	EMB-WMB169PA/PC with GSG PADS only EMB-WMB169PA/UL with U.FL connector for external antenna

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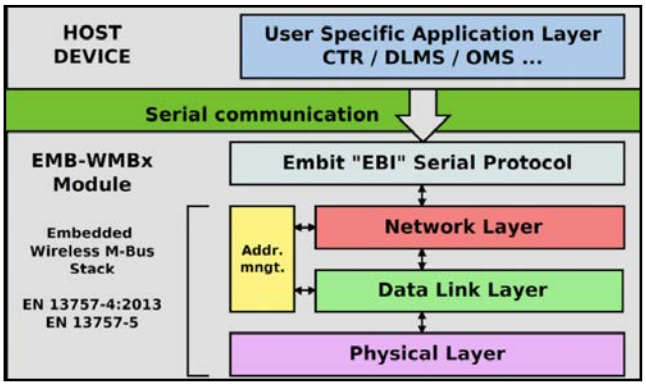
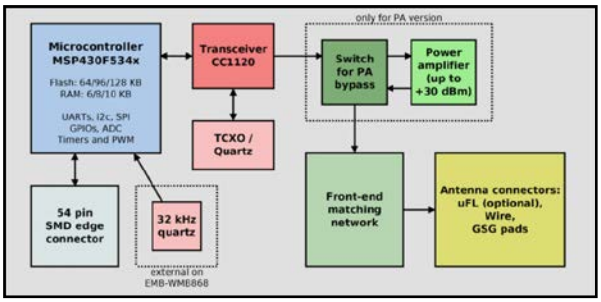
The **EMB-WMB** modules come in different flavours to best fit the customer's requirements. The cost and performances trade off can be tweaked with multiple approaches.
The module is based on an MSP430 microcontroller featuring multiple memory sizes.
The transceiver can be clocked by a crystal oscillator (for cheaper solutions) or by an extremely **accurate TCXO** (for those applications with more strict frequency accuracy constrains).
An optional power amplifier that further increases the RF output power up to **+30 dBm** is also available for the 169 MHz version.
Last but not least, different antenna connectors can be chosen (U.FL connector, wire antenna and ground-signal-ground pads).
The **EMB-WMB** modules can be adopted for developing any custom wireless protocol or can be used with the Wireless M-Bus stack designed by Embit which fully implements the lower layer of **Wireless M-bus** according to EN-13757 .The following modes are supported: **N (169 MHz), S, T, R2, C (868/869 MHz).**





The stack manages automatically all the timing requirements imposed by the standard with a particular focus on battery efficiency. The module also provides firmware update functionalities as well as CRC and address check/ insert for every packet. Multi-hop networks are also feasible.

The host can implement any desired layer on top of the stack, embedding the application on the module or exchange data through a UART port with simple commands leaving all the complexity of the wireless communication to the stack

EMB-WMB modules comparison

Module	Operating frequency	Clock	32kHz Quartz	Max. TX power
EMB-WMB169PA	169 MHz	TCXO	YES	+30 dBm
EMB-WMB169PAE	169 MHz	TCXO	YES	+27 dBm
EMB-WMB868	868 MHz	Quartz	NO	+15 dBm

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