The ZMM-01 is a new class of low power 2.4GHz ZigBee modules, designed to form the heart of smart metering and control systems. It combines the industry-leading Ember EM357 ZigBee SoC, Cirrus Logic CS5467 AFE together with a highly accurate real-time clock, making the ZMM-01 the first commercially available ZigBee-enabled module that combines both metering and control capabilities with full support of the ZigBee Smart Energy protocol.
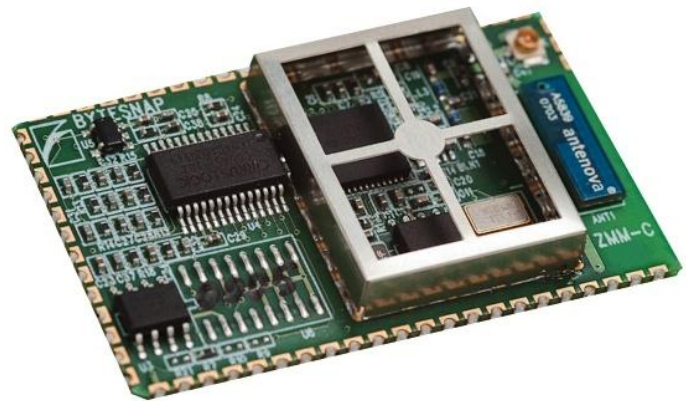
The module enables remote metering and control via a ZigBee mesh network and can form the heart of a meter that meets IEC EN62053-21 Class 1 or 62053-23 Class 2. The module is fully compliant with IEEE 802.15.4-2003.

Key features

- Device control via ZigBee Smart Energy protocol
- CS5467 watt-hour meter on a chip
- 32-bit ARM Cortex™-M3 processor
- External UART/I2C/SPI serial communications
- Real time clock, accuracy up to 3ppm
- Low power consumption
- Hardware CertiCom AES-128 encryption
- Ember InSight port for non-intrusive packet trace
- Surface mountable or pluggable format

AFE features

- Cirrus Logic Analogue Front End (AFE) CS5467
- 2 current inputs and 2 voltage inputs
- Energy Linearity: ±0.1% of Reading over 1000:1 dynamic range
- On-chip functions:
  - Voltage and Current Measurement
  - Active, Reactive, and Apparent Power/Energy
  - RMS Voltage and Current Calculations
  - Current Fault and Voltage Sag Detection
  - System level calibration
  - Phase Compensation
  - Temperature Sensor
  - Energy Pulse Outputs
  - Meets Accuracy Spec for IEC, ANSI, JIS, EN62053-21 (class 1) and EN50470-2 (class 2)
  - Low Power Consumption
  - Voltage Tamper Correction
  - Power Supply Monitor Function
- Internal RMS voltage reference can be used if voltage measurement is disabled by tampering

Typical applications

- Electric Vehicle (EV) charging points
- Smart energy metering
- Street light management and monitoring systems
- Air-conditioning system monitoring and management systems
- Data centre power monitoring and management

The ZMM-01 is certified for the Zigbee Smart Energy profile and, using the supplied development kit (ZDM-01), can be integrated with customer devices – providing customers with a cost-effective way of building ZigBee-enabled management systems.

Real time clock

Standard, low-cost option:

- Accuracy: 20ppm from 0°C to +40°C

High accuracy option:

- Accuracy ±2ppm from 0°C to +40°C
- Accuracy ±3.5ppm from -40°C to +85°C

In both cases, the RTC can be corrected using mains cycle counting (can be enabled/disabled in software).

Radio features

- Complies with ETSI EN 300 328 V1.7.1 (2006-10)
- Based on Ember EM357 single chip ZigBee unit
- Supports the full ZigBee 2.45GHz range i.e. channels 11-26

- Robust Wi-Fi and Bluetooth coexistence

- 250kbit/s over the air data rate

- +3dBm output power (+8dBm in boost mode)

- High sensitivity of -99dBm (-101dBm in boost mode) typically @ 1% packet error rate RX

- Rx current: 26mA, TX current: 31mA at 3dBm

- 2.4 GHz IEEE 802.15.4-2003 transceiver & lower MAC

Microcontroller features

- Industry-leading 32-bit ARM® Cortex™-M3 processor 192 kB flash, optional read protection

- 12 kB RAM memory

- 24 configurable GPIOs with Schmitt trigger inputs

- Highly efficient Thumb-2 instruction set

- Flexible Nested Vectored Interrupt Controller

- Low power consumption, advanced management

- Low-frequency internal RC oscillator for low-power sleep timing

- High-frequency internal RC oscillator for fast (110 µsec) processor start-up from sleep

- Flexible ADC, UART/SPI/TWI serial communications, and general purpose timers

- Normal mode link budget up to 103 dB; configurable up to 110 dB

Analogue characteristics

Accuracy	Input range	Typ.
Active power	0.1%-100%	±0.1%
Reactive power	0.1%-100%	±0.1%
Power factor	1.0%-100%	±0.1%
	0.1%-1.0%	±0.27%
Current RMS	1.0%-100%	±0.1%
	0.1%-1.0%	±0.17%
Voltage RMS	5%-100%	±0.1%

Digital I/O specifications

- LVTTL 3.3V I/O

Antenna options

- Optional on-board antenna

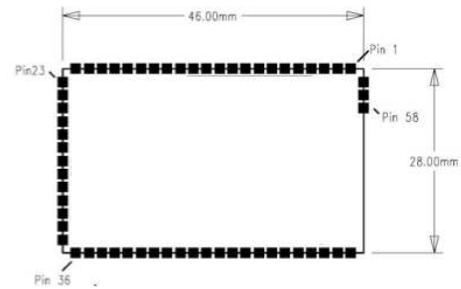- External antenna via U.FL connection

Specifications

Mechanical

- Dimensions: 46mm x 28mm

- Surface mount pads on 2mm pitch

Environmental & Safety

- Operating Temp.:   -40° to +85° Celsius

- Meets IEC/EN 61010-2 Second edition 2001

ZMM-01 Module dimensions

Development kit

ZDM-01 Development kit

- Full development kit available (ZDM-01) for module evaluation and code development. Customer circuits can be tested using the development kit's breadboarding section. The kit also provides four switch inputs and an LCD.

- The development kit has an on-board PIC 18F26K20 microcontroller, which simulates a connected mains load with the ability to vary voltage and current amplitudes as well as phase angle. This allows evaluation of the module and testing, without working on live equipment

Ordering and further information

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All information is correct at time of issue. ByteSnap Design reserves the right to make modifications and/or improvements without prior notification.

PB01 V2.0