

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.

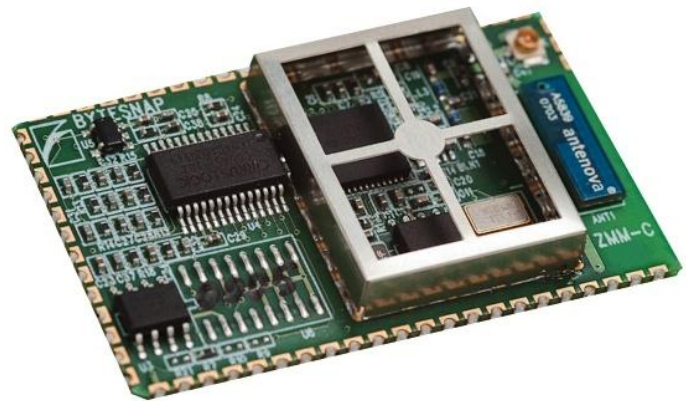
The module enables remote metering and control via a ZigBee mesh network and can form the heart of a meter that meets IEC EN62053-21 Class 1 or 62053-23 Class 2. The module is fully compliant with IEEE 802.15.4-2003.

## 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:  $\pm 0.1\%$  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  $\pm 2$ ppm from 0°C to +40°C
- Accuracy  $\pm 3.5$ ppm 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

- LVTTTL 3.3V I/O

## Antenna options

- Optional on-board antenna
- External antenna via U.FL connection

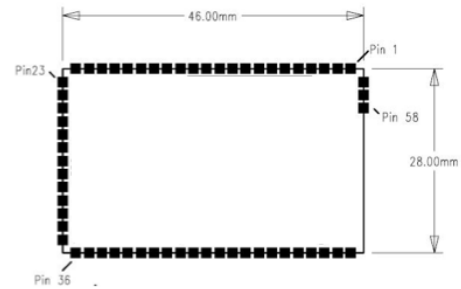
## Specifications

### 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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