



## User Manual For WebGate TotalPoint Module

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### DESCRIPTION

The MuNet TotalPoint Zigbee Module (ZB-0009) utilizes IEEE 802.15.4 and ZigBee wireless networking standards to create a robust mesh network specifically designed to support the advanced metering and load management applications for next generation AMI projects. When incorporated in the TotalPoint system, the module operates as full function ZigBee devices creating a two-way mesh network with automatic routing and self healing properties.

The Zigbee Module radio is a EM250 SoC from Ember Corp. The EM250 SoC consists of a 2.4GHz, IEEE 802.15.4 compliant transceiver with an integrated 16-bit XAP2b microprocessor. This transceiver utilizes O-QPSK modulation. In addition to the EM250, the design utilizes an external power amplifier resulting in a maximum transmit power of 100mW (20dBm). The antenna is a ceramic chip antenna permanently soldered to the PCB, with a measured peak gain of -0.63 dBi. The use of any other antenna is not allowed.

The module is capable of running any application code generated for the Ember EM250.

## TotalPoint Module Pin Details

Please refer to the Ember EM250 datasheet for details on the use of the EM250.

| Pin# | Signal name | Type     | Description   |
|------|-------------|----------|---|
| 1    | Ground      | GND      | Ground  |
| 2    | Ground      | GND      | Ground  |
| 3    | Ground      | GND      | Ground  |
| 4    | VCC         | PWR      | 3.3V Power Supply Input (135mA Max TX, 40mA Max RX)   |
| 5    | Ground      | GND      | Ground  |
| 6    | GPIO11      | DI/DO    | General Purpose Digital I/O, SC1 UART CTS, SC1 SPI master clock, or Capture Input A of Timer 2                |
| 7    | GPIO12      | DI/DO    | General Purpose Digital I/O, SC1 UART RTS, or Capture Input B of Timer 2                                      |
| 8    | GPIO0       | DI/DO    | General Purpose Digital I/O, SC2 SPI MOSI, or Capture Input A of Timer 1                                      |
| 9    | GPIO1       | DI/DO    | General Purpose Digital I/O, SC2 SPI MISO, SC2 I2C SDA, or Capture Input A of Timer 2                         |
| 10   | GPIO2       | DI/DO    | General Purpose Digital I/O, SC2 SPI master clock, SC2 I2C SCL, or Capture Input B of Timer 2                 |
| 11   | RSTB        | DI       | Reset, active low   |
| 12   | GPIO3       | DI/DO    | General Purpose Digital I/O, SC2 SPI slave select, or Capture Input B of Timer 1                              |
| 13   | GPIO4       | DI/DO/AI | General Purpose Digital I/O, ADC Input 0, or PT1 frame signal   |
| 14   | GPIO5       | DI/DO/AI | General Purpose Digital I/O, ADC Input 1, or PT1 data signal  |
| 15   | GPIO6       | DI/DO/AI | General Purpose Digital I/O, ADC Input 2, Timer 2 Clock Input, or Timer 1 Enable                              |
| 16   | GPIO7       | DI/DO    | General Purpose Digital I/O, Regulator Enable, active high  |
| 17   | GPIO8       | DI/DO/AO | General Purpose Digital I/O, ADC Reference Output, Timer 1 Clock Input, Timer 2 Enable, or Source A Interrupt |
| 18   | GPIO9       | DI/DO    | General Purpose Digital I/O, SC1 TXD, SC1 MO, SC1 I2C Data, or Capture Input A of Timer 1                     |
| 19   | GPIO10      | DI/DO    | General Purpose Digital I/O, SC1 RXD, SC1 MI, SC1 I2C Clock, or Capture Input B of Timer 1                    |
| 20   | SIF_CLK     | DI       | SIF Interface clock   |
| 21   | SIF_MISO    | DO       | SIF Interface master in/slave out   |
| 22   | SIF_MOSI    | DI       | SIF Interface master out/slave in   |
| 23   | SIF_LOADB   | DI/DO    | SIF Interface load strobe   |
| 24   | Ground      | GND      | Ground  |
| 25   | GPIO16      | DI/DO    | General Purpose Digital I/O, Output B of Timer 1, Capture Input B of Timer 2, or Source D Interrupt           |
| 26   | GPIO15      | DI/DO    | General Purpose Digital I/O, Output A of Timer 1, Capture Input A of Timer 2, or Source C Interrupt           |
| 27   | GPIO14      | DI/DO    | General Purpose Digital I/O, Output B of Timer 2, Capture Input B of Timer 1, or Source B Interrupt           |
| 28   | GPIO13      | DI/DO    | General Purpose Digital I/O, Output A of Timer 2, or Capture Input A of Timer 1                               |
| 29   | Ground      | GND      | Ground  |
| 30   | Ground      | GND      | Ground  |

## TotalPoint Module Physical Specifications

The overall Module board size is 1.34"x1.8". See Figure 1 for details.

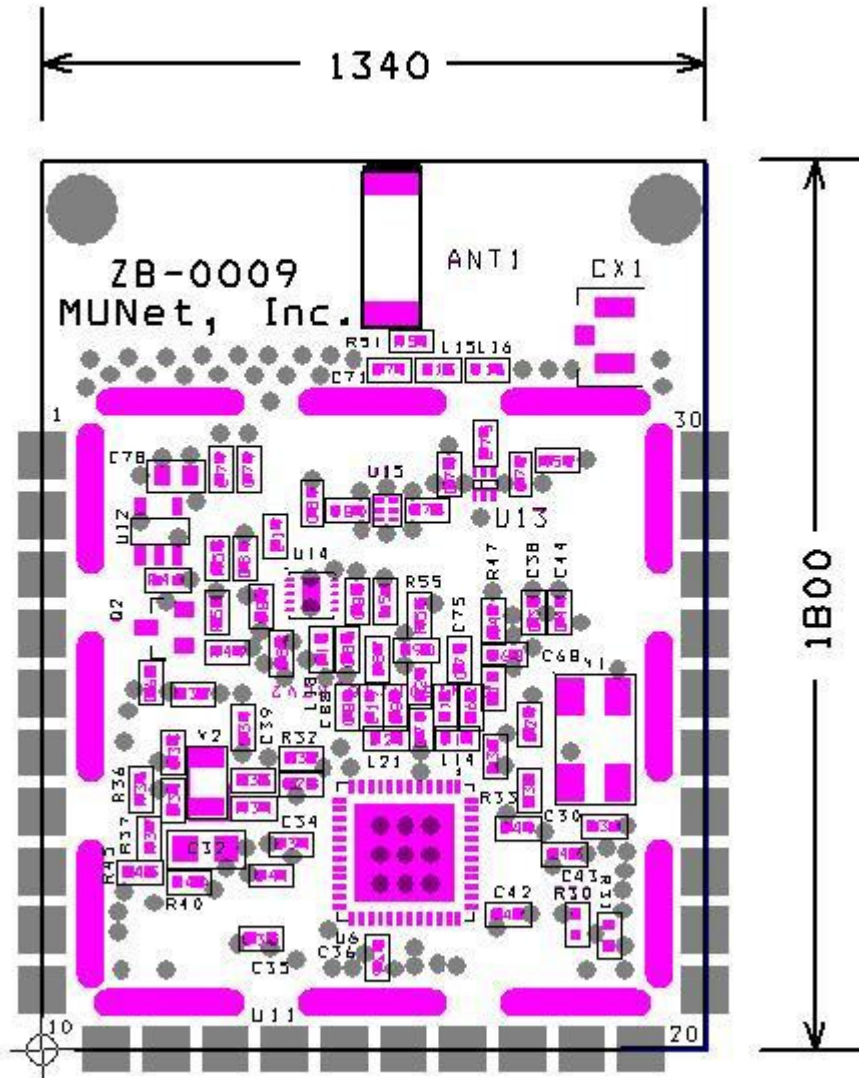
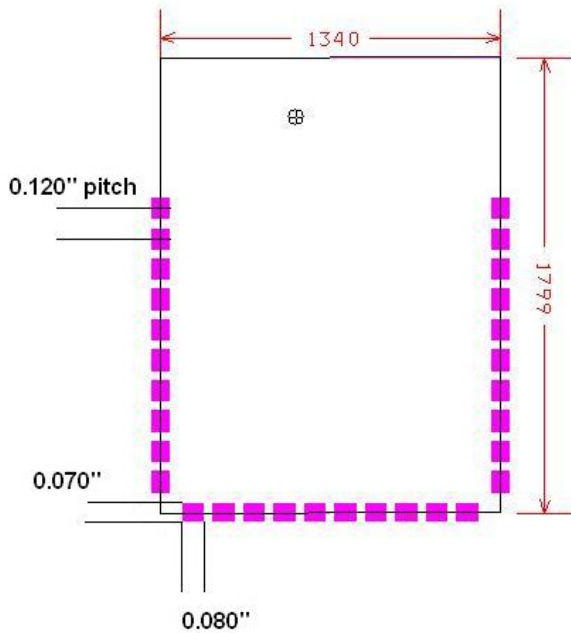


Figure 1 – TotalPoint Module Board Size

The recommended PCB footprint for the module is in Figure 2, a photo of the module for reference is Figure 3

## PCB PATTERN LAYOUT

Dimensions in inches.



**Figure 2 – PCB Footprint**

## MODULE PHOTO



**Figure 3 – TotalPoint Module  
(FCC Modular ID: U2R-TPM0101)**

## Installation

When using the module on a PCB the following design guidelines should be followed:

- Do not place any traces, vias, or copper on the top layer of the PCB directly under the module
- Keep traces and copper away from the antenna
- Do not place the antenna near metallic objects
- A Ground plane or traces on the bottom or inner layer of the PCB under the module is acceptable
- The ground pins of the module can be tied directly to the ground plane of the host PCB

muNet can provide assistance and review of PCB layout

## TotalPoint Serial-Bridge Gateway Mode

The muNet TotalPoint module can be configured for use in a serial-ZigBee mode for integration into gateway devices that provide access to an IP data backhaul. The host processor in the gateway device is expected to provide a serial “pass-through” connection to the TotalPoint module. This “pass-through” connection will allow the TotalPoint ZigBee network to be monitored/controlled including communication to other TotalPoint devices that join the gateway.

To utilize the Serial-Bridge mode, the minimum connections detailed in table 1 must be made:

| Module Pin #           | Connection  |
|------------------------|---|
| 1, 2, 3, 5, 24, 29, 30 | Ground  |
| 4                      | VCC 3.3VDC Nominal (3.0VDC Min-3.6VDC Max), Max Ripple 10mV P-P |
| 18                     | Module UART TX  |
| 19                     | Module UART RX  |

**Table 1 – Minimum Connections for Serial-Bridge Mode**

The UART operates at a baud rate of 19200, but other rates are possible.

## Programming Connector

The Ember EM250 contains a Serial Programming Interface known as a SIF, to allow loading of code and full packet capture of the ZigBee traffic. It is desirable that the SIF connections are brought out to a programming connector if possible, especially during the development phase. The SIF connections are detailed in Table 2.

| Module Pin # | Connection | SIF Connector Pin # |
|--------------|------------|---------------------|
| 4            | VCC_3.3    | 1                   |
| 21           | SIF_MISO   | 2                   |
| 1            | GND        | 3                   |
| 22           | SIF_MOSI   | 4                   |
| 1            | GND        | 5                   |
| 20           | SIF_CLK    | 6                   |
| 23           | nSIF_LOAD  | 7                   |
| 11           | nReset     | 8                   |
| 13           | PTI_EN     | 9                   |
| 14           | PIT_DATA   | 10                  |

**Table 2 – SIF Programming Connections**

The recommended connector is a Samtec (MFG P/N: FTSH-105-01-F-DV-K). The recommended pin out is indicated in Figure 4 below.

|           |   |    |          |
|-----------|---|----|----------|
| VBRD      | 1 | 2  | SIF_MISO |
| GND       | 3 | 4  | SIF_MOSI |
| GND       | 5 | 6  | SIF_CLK  |
| nSIF_LOAD | 7 | 8  | nRESET   |
| PTI_EN    | 9 | 10 | PTI_DATA |

**Figure 4 – Recommended SIF Connector**

It is not required that the pin out and connector recommended is used as a suitable adapter cable could be made to interface to the standard SIF cable interface.



## **FCC Information:**

Modifications to the antenna or attachment of any non-approved external antenna are not allowed to ensure FCC compliance.

Whenever this module is included in another product, the product must display a label indicating that the product:

**Contains MuNet Inc. Module**  
**Model: WG-TP-MOD**  
**FCC ID U2R-TPM0101**  
**IC: 6958A-TPM0101**

FCC Notifications:

FCC ID U2R-TPM0101

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received including interference that may cause undesired operation.

Changes or modifications not expressly approved by MU Net, Inc. could void the user's authority to operate this equipment.

To meet FCC and Industry Canada RF radiation exposure limits for general population (uncontrolled exposure) a minimum of 20 cm separation distance must be maintained between the module's antenna and users' and/or nearby persons' bodies at all times. Additionally, the module must not be co-located with any other antenna or transmitter.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## **Operating Conditions for compliance are:**

Tx BOOST MODE may not be set on any channel. The highest channel (Channel 26) cannot be used. In addition Channel 25 must have the output power of the EM250 limited to -1dBm. All other channels can operate at the full power output setting of +3dBm. Any custom firmware must adhere to these limits to ensure FCC compliance. Contact muNet with any questions.