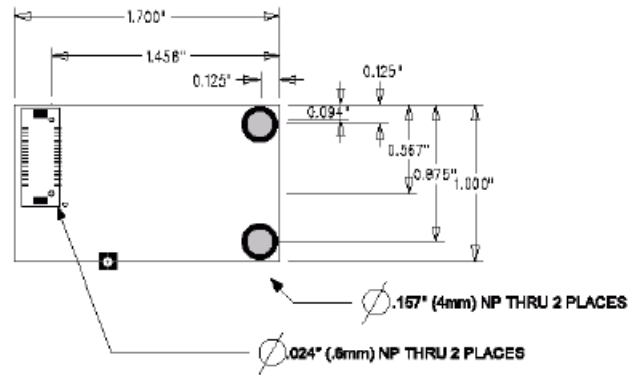


## Interface Decal Dimensions



## Components

### Microcontroller (U2)

The 8-bit flash-based ATmega 128L/ATmega64L microcontroller contains software for the configuration and control of the RM2420, AMC and network functions, and the user-defined application software. The microcontroller utilizes a 32.768KHz crystal for MAC timing and power management, as well as external crystal operating at 8Hz. A variety of peripherals are routed to headers on the Developer Kit carrier board for application development. For detail information on the microcontroller, see [www.atmel.com](http://www.atmel.com).

When configuring the Ember Studio Debug Reader, enter the following baud rate into the Debug Preference Window: 100,000. This rate is set by the microcontroller operating frequency.

### Radio (U5)

The radio is an RM2420, a true single-chip 2.4GHz IEEE 802.15.4 – compliant and Zigbee-ready radio frequency transceiver designed for low-power and low-voltage wireless applications. It includes a digital direct sequence spread-spectrum (DSSS) baseband modem with an effective data rate of 250kbps.

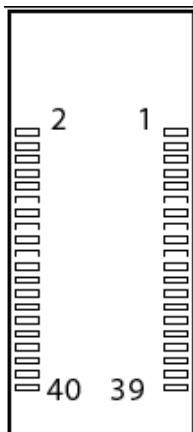
## Channel Frequencies

These channels are equivalent to IEEE 802.15.4 channels 11 to 26.

### RM2420 Channel Frequencies (GHz)

| Channel | Frequency | Channel | Frequency | Channel | Frequency |
|---------|-----------|---------|-----------|---------|-----------|
| 0       | 2.405     | 6       | 2.435     | 12      | 2.465     |
| 1       | 2.410     | 7       | 2.440     | 13      | 2.470     |
| 2       | 2.415     | 8       | 2.445     | 14      | 2.475     |
| 3       | 2.420     | 9       | 2.450     | 15      | 2.480     |
| 4       | 2.425     | 10      | 2.455     | —       | —         |
| 5       | 2.430     | 11      | 2.460     | —       | —         |

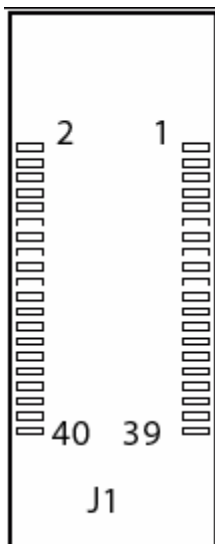
## Pin Layout



| Pin | ATmega 128/64 Pin Name | Description                                                  |
|-----|------------------------|--------------------------------------------------------------|
| 1   | GND                    | Digital GND                                                  |
| 2   | GND                    | Digital GND                                                  |
| 3   | PD3 (TXD1/INT3)        | EmberNet stack defaults to Alternate Function TX UART (TXD1) |
| 4   | nRESET                 | External reset, active low                                   |
| 5   | PD2 (RXD1/INT2)        | EmberNet stack defaults to Alternate Function RX UART        |

|    |                |                                                                                                                              |
|----|----------------|------------------------------------------------------------------------------------------------------------------------------|
|    |                | (Rxd1)                                                                                                                       |
| 6  | PG1 (nRD)      | General purpose I/O                                                                                                          |
| 7  | +3.3V out      | External power pin used to run custom external sensors and/or devices; 20mA max                                              |
| 8  | +3.3V in       | Input power from carrier boards                                                                                              |
| 9  | GND            | Digital GND                                                                                                                  |
| 10 | GND            | Digital GND                                                                                                                  |
| 11 | PD1 (SDA/INT1) | General purpose I/O; EmberNet defaults signal as an output connected to EM2 (button 1) on carrier board (with J11 installed) |
| 12 | PG0 (nWR)      | General purpose I/O                                                                                                          |
| 13 | PD0 (SDI/INT0) | General purpose I/O; EmberNet defaults signal as an output connected to EM1 (button 0) on carrier board (with J10 installed) |
| 14 | PC2            | Dedicated connection to red LED (D55 on carrier board) for debugging purposes                                                |
| 15 | PB7 (OC2/OC1C) | General purpose I/O                                                                                                          |
| 16 | PC3            | Dedicated connection to yellow LED (DS4 on carrier board) for debugging purposes                                             |
| 17 | PB6            | General purpose I/O                                                                                                          |
| 18 | PC5            | Dedicated connection to orange LED (DS2 on carrier board) for debugging purposes                                             |
| 19 | NC             | Dedicated for use with carrier board emulator/debug module                                                                   |

| Pin | ATmega 128/64 Pin Name | Description                                                                                   |
|-----|------------------------|-----------------------------------------------------------------------------------------------|
| 20  | PC6                    | Dedicated connection to green LED (DS3 on carrier board) for debugging purposes               |
| 21  | PB3                    | Master In/Slave Out SPI (used to configure the EM2420)                                        |
| 22  | PG2                    | General purpose I/O                                                                           |
| 23  | PB2 (MOSI)             | Master Out/Slave In SPI (used to configure the RM2420)                                        |
| 24  | AVCC                   | Analog voltage reference pin                                                                  |
| 25  | PB1 (SCK)              | SPI clock (used to configure the RM2420)                                                      |
| 26  | AGND                   | Analog ground pin (same as digital GND)                                                       |
| 27  | PC1                    | Dedicated signal for Temperature Enable (active high) for temperature sensor on carrier board |
| 28  | AREF                   | ADC voltage reference pin                                                                     |
| 29  | NC                     | —                                                                                             |
| 30  | PF1 (ADC1)             | EmberNet stack uses alternate function ACD1 to monitor external battery pack voltage          |
| 31  | NC                     | —                                                                                             |
| 32  | PF2 (ADC2)             | EmberNet stack uses alternate function ACD2 for temperature calibration                       |
| 33  | PE3 (OC3A/AIN1)        | General purpose I/O                                                                           |



Viewed from  
bottom

|    |                 |                                                                                                  |
|----|-----------------|--------------------------------------------------------------------------------------------------|
| 34 | PF4 (ADC4/TCK)  | General purpose I/O; if JTAG is enabled, the EmberNet stack uses alternate function TCK for JTAG |
| 35 | PE2 (XCK0/AIN0) | General Purpose I/O                                                                              |
| 36 | PF5 (ADC5/TMS)  | General purpose I/O; if JTAG is enabled, the EmberNet stack uses alternate function TMS for JTAG |
| 37 | PE1 (TXD0/PDO)  | EmberNet stack defaults to alternate function TX UART (TXD0)                                     |
| 38 | PF6 (ADC6/TDO)  | General purpose I/O; if JTAG is enabled, the EmberNet stack uses alternate function TDO for JTAG |
| 39 | PE0 (RXD0/PDI)  | EmberNet stack defaults to alternate function RX UART (RXD0)                                     |
| 40 | PF7 (ADC7/TDI)  | General purpose I/O; if JTAG is enabled, the EmberNet stack uses alternate function TDI for JTAG |