



# WSN802G

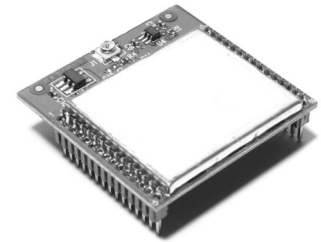
## 802.11g Wireless Sensor Network Module

- *Small Size, Light Weight, Low Cost*
- *7.5  $\mu$ A Sleep Current Supports Battery Operation*
- *Timer and Event Triggered Auto-reporting Capability*
- *Analog, Digital and Serial I/O for Sensor Applications*
- *-40 to +85 °C Operating Temperature Range*
- *FCC and ETSI Certified for Unlicensed Operation*

The WSN802G transceiver module is a low cost, robust solution for 802.11g sensor networks. The WSN802G's very low sleep current makes long life battery operation practical. The WSN802G module includes analog, digital and serial I/O, providing the flexibility and versatility needed to serve a wide range of sensor network applications. The WSN802G module is easy to integrate and is compatible with standard 802.11b/g access points.

### WSN802G Absolute Maximum Ratings

Rating	Value	Units
Input/Output Pins Except ADC Inputs	-0.5 to +3.63	V
ADC Input Pins	-0.5 to 1.98	V
Non-Operating Ambient Temperature Range	-40 to +85	°C



### WSN802G Electrical Characteristics

Characteristic	Sym	Notes	Minimum	Typical	Maximum	Units
Operating Frequency Range			2401		2474	MHz
Spread Spectrum Method			CCK Direct Sequence			
RF Chip Rate				11		Mc/s
RF Data Rates				1 or 2		Mb/s
Modulation Type			BPSK at 1 Mb/s, QPSK at 2 Mb/s			
Number of RF Channels				11		
RF Channel Spacing				5		MHz
Receiver Sensitivity, 8% PER:						
1 Mb/s RF Data Rate				-92		dBm
2 Mb/s RF Data Rate				-90		dBm
RF Transmit Power				10		mW
RF Connector			U.FL Coaxial Connector			
Optimum Antenna Impedance				50		$\Omega$

**WSN802G Electrical Characteristics**

Characteristic	Sym	Notes	Minimum	Typical	Maximum	Units
ADC Input Range			0		1.8	V
ADC Input Resolution				10		bits
ADC Input Impedance			1			MΩ
PWM Output Resolution					16	bits
Data Serial Port Baud Rates			1.2, 2.4, 4.8, 9.6 (default), 19.2, 28.8, 38.4, 57.6, 76.8, 115.2, 230.4, 460.8, 921.6			kb/s
Diagnostic Serial Port Baud Rate			9.6			kb/s
Digital I/O:						
Logic Low Input Level			-0.3		0.7	V
Logic High Input Level			2.24		V <sub>CC</sub>	V
Input Pull Up/Down Resistor			50		1000	KΩ
Logic Low Output Level			0		0.4	V
Logic High Output Level			2.4		V <sub>CC</sub>	V
Power Supply Voltage Range	V <sub>CC</sub>		+3		+3.63	Vdc
Power Supply Voltage Ripple					10	mV <sub>P-P</sub>
Receive Mode Current					150	mA
Transmit Mode Current					200	mA
Sleep Mode Current				7.5		μA
WSN802GC Mounting			Reflow Soldering			
WSN802GP Mounting			Socket			
Operating Temperature Range			-40		85	°C
Operating Relative Humidity Range, Non-condensing			10		90	%



**CAUTION: Electrostatic Sensitive Device. Observe precautions when handling.**

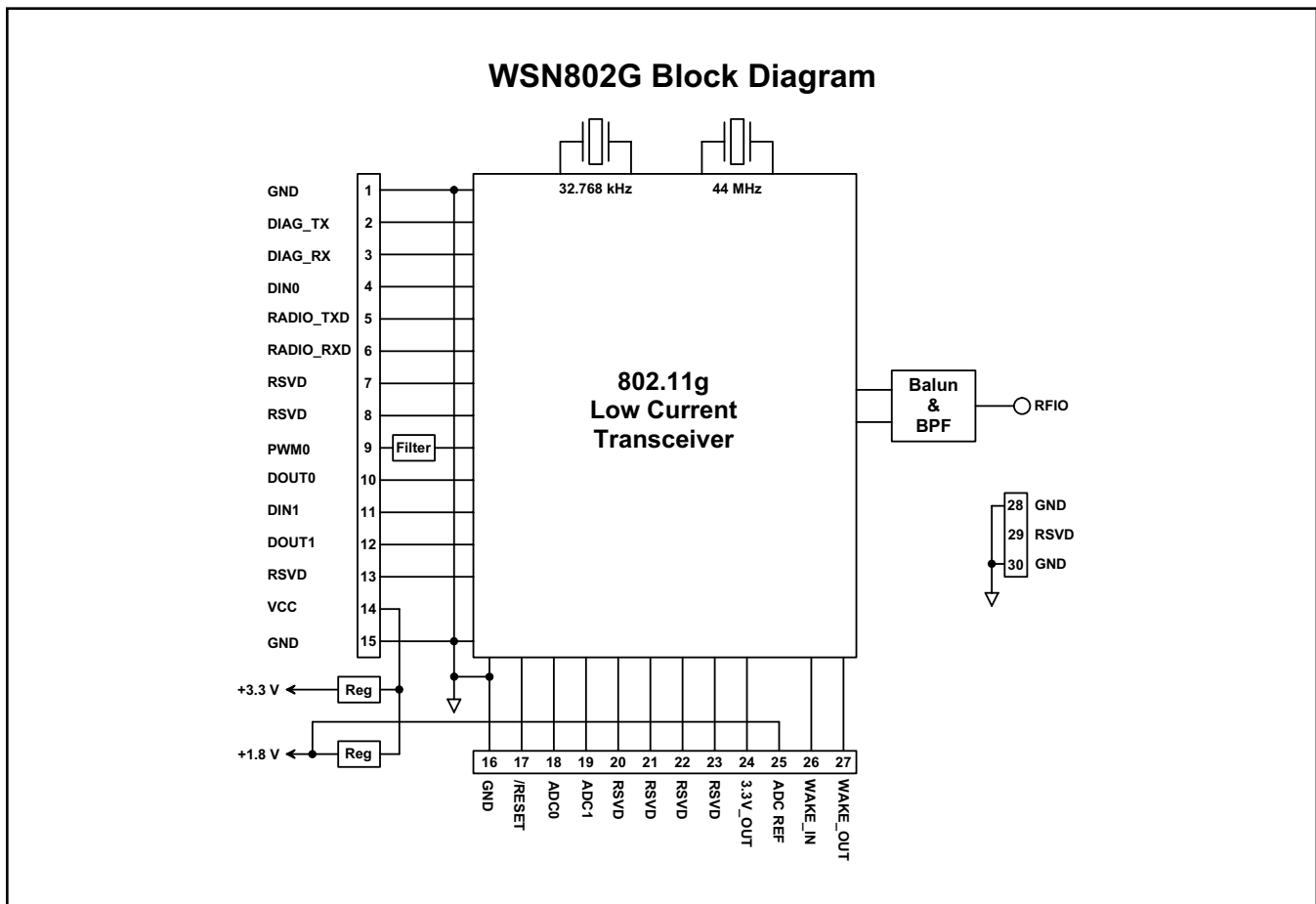


Figure 1

#### WSN802G Hardware

The WSN802G operates in the international 2.4 GHz ISM band over the frequency range of 2401-2474 MHz, with a nominal RF output power of 10 mW. The WSN-802G supports two standard 802.11g RF data rates, 1 and 2 Mb/s.

The WSN802G transceiver module provides a variety of hardware interfaces. There are two serial interfaces, one for data and a second for diagnostics. The data port supports standard serial baud rates from 1.2 to 921.6 kb/s, and the diagnostic port operates at a fixed baud rate of 9.6 kb/s. Hardware flow control is not currently implemented on either serial port.

The WSN802G includes two 10-bit ADC inputs, a 16-bit PWM (DAC) output, two digital inputs and two digital outputs to support sensor network applications.

The WSN802G is available in two mounting configurations. The WSN802GC is designed for solder reflow mounting, and the WSN802GP is designed for plug-in connector mounting.

#### WSN802G Firmware

The major firmware components in the WSN802G include the 802.11g stack and the application protocol. The WSN802G acts as a UDP client to a data and/or sensor application running on a network server.

The application protocol supports three operating modes: (1) sleeping sensor node with timer or interrupt auto-reporting, (2) sleeping serial data node with timer or interrupt wake-up and (3) always on sensor or serial data node with auto-reporting. Modes 1 and 2 take full advantage of the very low sleep current capability of the WSN802G. The module sleeps unless the WAKE\_IN input is asserted or the *AutoReport* timer fires. A *Wake-Timeout* timer is provided to hold the module awake for a configurable period. The *Wake Timeout* timer is held in reset as long as WAKE\_IN is asserted, serial data is being received, an RF packet is being sent or received, or if the module is uncommissioned.

The WSN802G asserts WAKE\_OUT whenever it is awake to notify its external host. The module also sends an I/O status report automatically each time WAKE\_IN is asserted, and/or each time the *AutoReport* timer fires.

**WSN802G I/O Pad Descriptions**

Pin	Name	I/O	Description
1	GND	-	Power supply and signal ground. Connect to the host circuit board ground.
2	DIAG_TX	O	Diagnostic serial port output.
3	DIAG_RX	I	Diagnostic serial port input.
4	DIN0	I	Digital input port 0.
5	RADIO_TXD	O	Serial data output from the radio.
6	RADIO_RXD	I	Serial data input to the radio.
7	RSVD	-	Reserved pin. Leave unconnected.
8	RSVD	-	Reserved pin. Leave unconnected.
9	PWM0	O	16-bit pulse-width modulated output 0 with internal low-pass filter. Filter is first-order, with a 159 Hz 3 dB bandwidth, 10K output resistance.
10	DOUT0	O	Digital output port 0.
11	DIN1	I	Digital input port 1.
12	DOUT1	O	Digital output port 1.
13	RSVD	-	Reserved pin. Leave unconnected.
14	VCC	I	Power supply input, +3.0 to +3.63 Vdc.
15	GND	-	Power supply and signal ground. Connect to the host circuit board ground.
16	GND	-	Power supply and signal ground. Connect to the host circuit board ground.
17	/RESET	I	Active low module hardware reset.
18	ADC0	I	10-bit ADC input 0. ADC full scale reading can be referenced to the module's +1.8 V regulated supply.
19	ADC1	I	10-bit ADC input 1. ADC full scale reading can be referenced to the module's +1.8 V regulated supply.
20	RSVD	-	Reserved pin. Leave unconnected.
21	RSVD	-	Reserved pin. Leave unconnected.
22	RSVD	-	Reserved pin. Leave unconnected.
23	RSVD	-	Reserved pin. Leave unconnected.
24	3.3V_OUT	O	Module's +3.3 V regulated supply, available to power external sensor circuits. Current drain on this output should be no greater than 50 mA.
25	ADC_REF	O	Module's +1.8 V regulated supply, used for ratiometric ADC readings. Current drain on this output should be no greater than 10 mA.
26	WAKE_IN	I	Active high interrupt input to wake the module from timer sleep. Can be used to wake module on event, etc.
27	WAKE_OUT	O	Active high output asserted when module wakes from timer sleep. Can be used to wake an external device.
28	GND	-	RF ground for the WSN802GC only. Connect to the host circuit board ground plane.
29	RSVD	-	Reserved pin. Leave unconnected.
30	GND	-	RF ground for the WSN802GC only. Connect to the host circuit board ground plane.

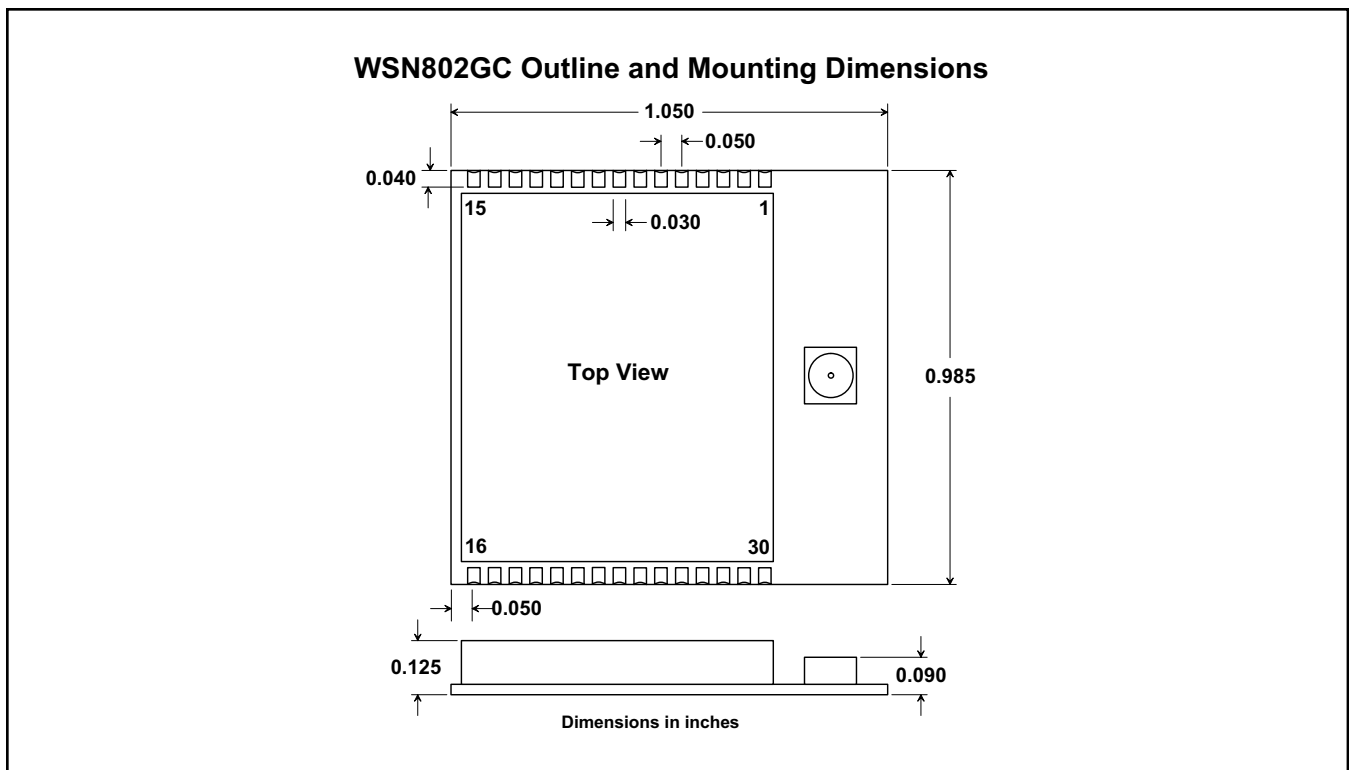


Figure 2

### WSN802G Antenna Connector

A U.FL miniature coaxial connector is provided on both WSN802G configurations for connection to the RFIO port. A short U.FL coaxial cable can be used to connect the RFIO port directly to an antenna. In this case the antenna should be mounted firmly to avoid stressing the U.FL coaxial cable due to antenna mounting flexure. Alternately, a U.FL coaxial jumper cable can be used to connect the WSN802G module to a U.FL connector on the host circuit board. The connection between the host circuit board U.FL connector and the antenna or antenna connector on the host circuit board should be implemented as a 50 ohm stripline. Referring to Figure 3, the width of this stripline depends on the thickness of the circuit board between the stripline and the groundplane. For FR-4 type circuit board materials (dielectric constant of 4.7), the width of the stripline is equal to 1.75 times the thickness of the circuit board. Note that other circuit board traces should be spaced away from the stripline to prevent signal coupling, as shown in Figure 4. The stripline trace should be kept short to minimize its insertion loss.

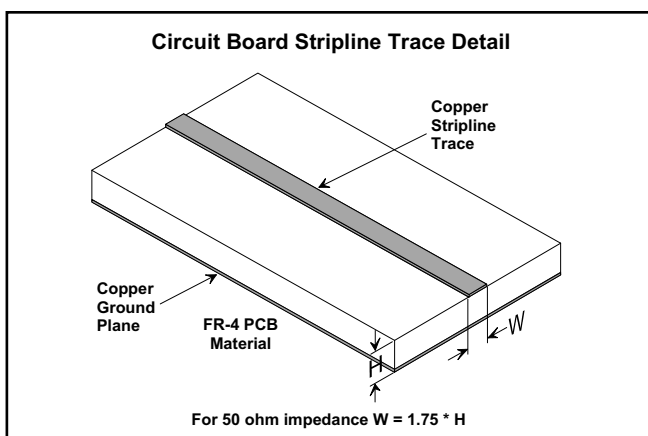


Figure 3

Trace Separation from 50 ohm Microstrip	Length of Trace Run Parallel to Microstrip
100 mil	125 mil
150 mil	200 mil
200 mil	290 mil
250 mil	450 mil
300 mil	650 mil

Figure 4

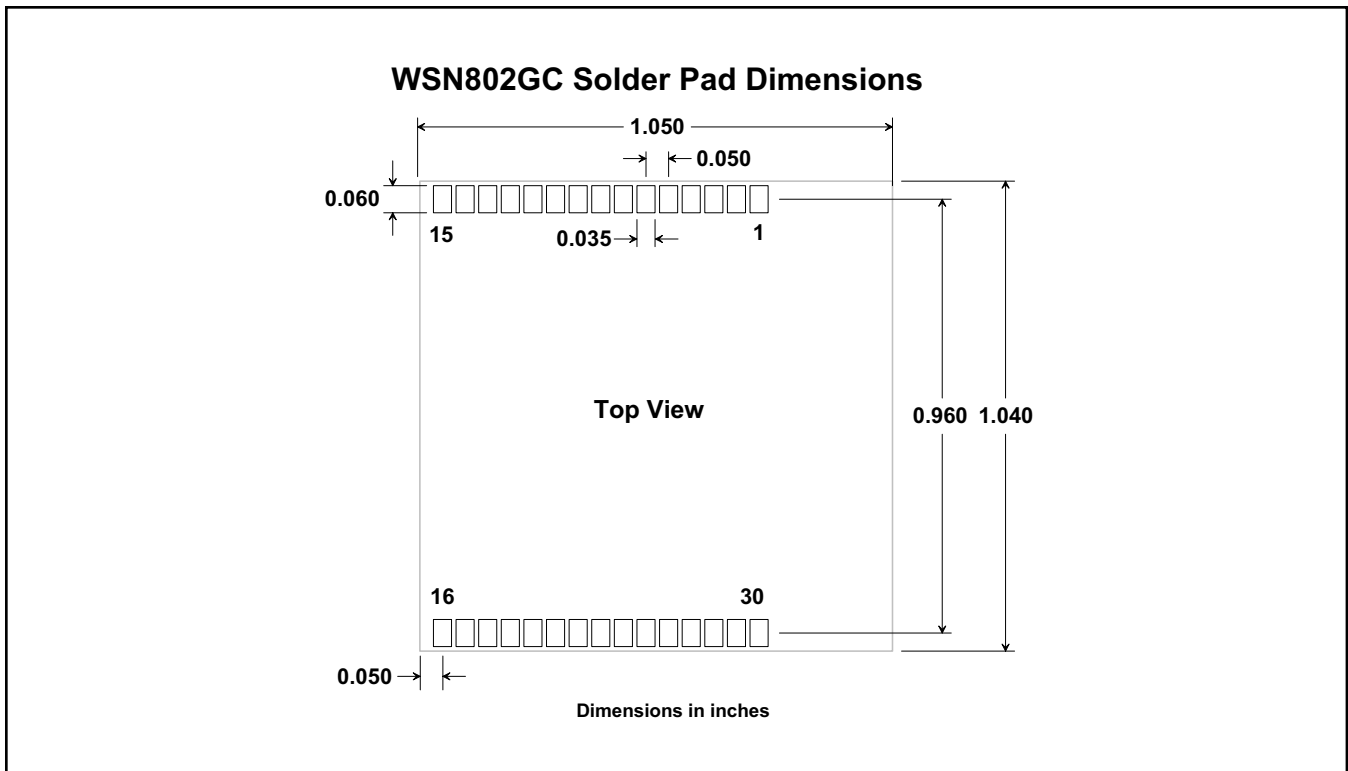


Figure 5

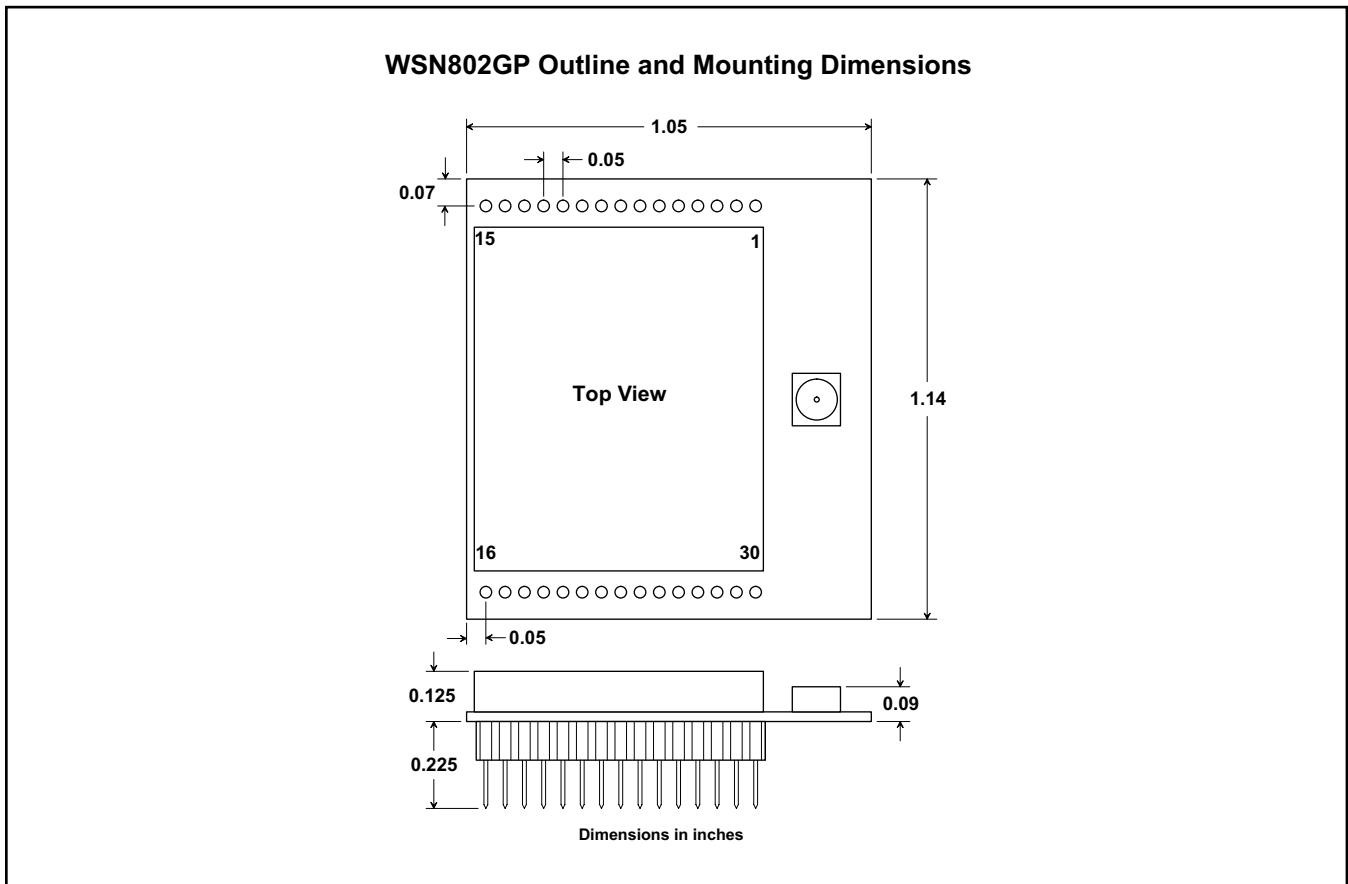
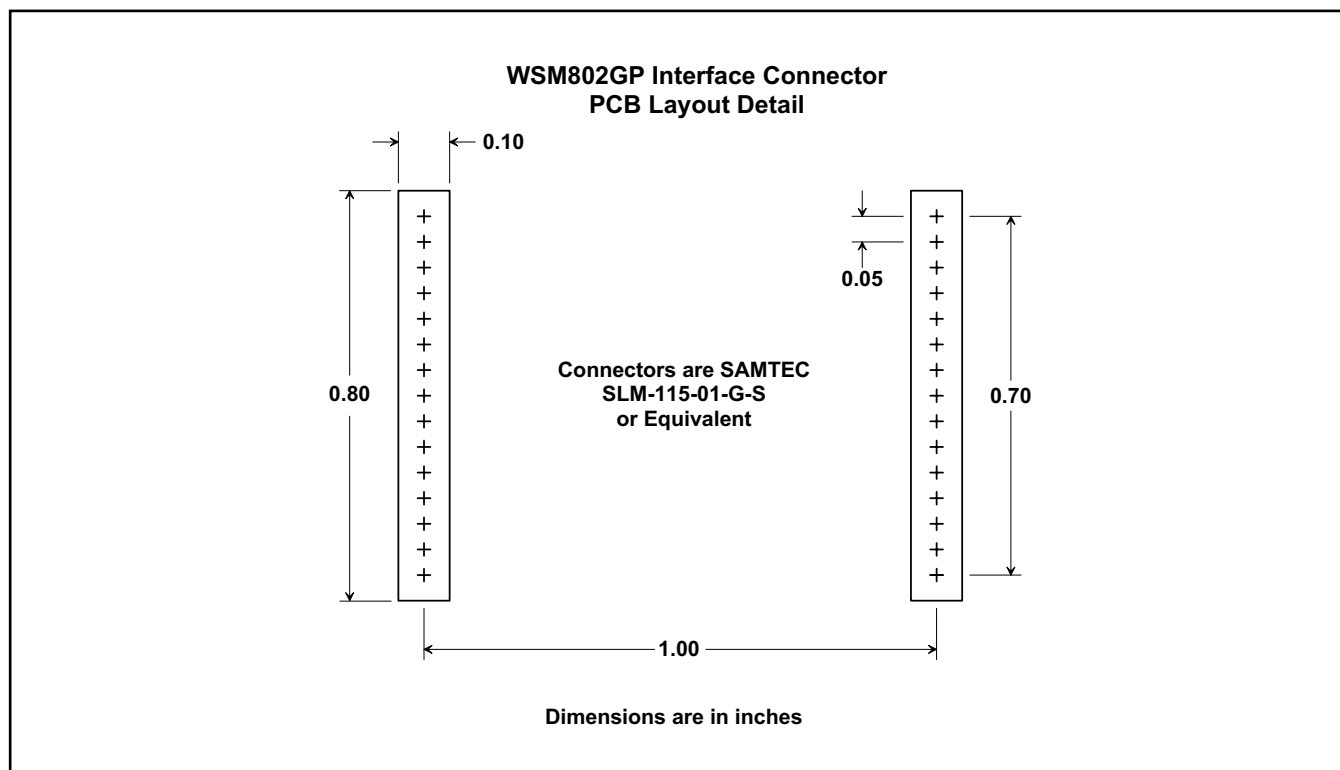


Figure 6



**Figure 7**

*Note: Specifications subject to change without notice.*

Part # M-0802-1000, Rev A