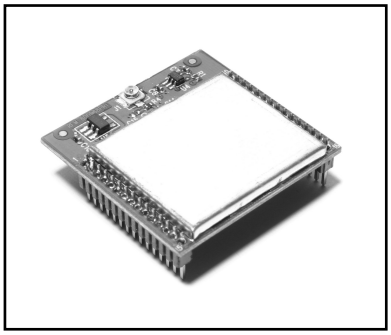
DEVELOPMENT KIT
(Info Click here)

WSN802G

802.11g Wireless Sensor Network Module

- ***Small Size, Light Weight, Low Cost***
- ***7.5 µA Sleep Current Supports Battery Operation***
- ***Timer and Event Triggered Auto-reporting Capability***
- ***Analog, Digital, Serial and SPI I/O for Sensor Applications***
- ***-40 to +85 °C Operating Temperature Range***
- ***FCC, Canadian IC 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, serial and SPI 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				Direct Sequence		
RF Chip Rate				11		Mcps
RF Data Rates				1, 2, 5.5, 11		Mbps
Modulation Type				BPSK at 1 Mbps, QPSK at 2 Mbps, CCK at 5.5 and 11 Mbps		
Number of RF Channels				11		
RF Channel Spacing				5		MHz
Receiver Sensitivity, 8% PER:						
1 Mbps RF Data Rate				-92		dBm
2 Mbps RF Data Rate				-90		dBm
5.5 Mbps RF Data Rate				-84		dBm
11 Mbps RF Data Rate				-81		dBm
RF Transmit Power				10		mW
RF Connector				U.FL Coaxial Connector		
Optimum Antenna Impedance				50		Ω

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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			kbps
Diagnostic 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			kbps
Serial Peripheral Interface (SPI) Data Rate, Master Mode					11	Mbps
Serial Peripheral Interface (SPI) Data Rate, Slave Mode					2	Mbps
Digital I/O:						
Logic Low Input Level			-0.3		0.7	V
Logic High Input Level			2.24		V_{CC}	V
Input Pull Up Resistor			50		1000	KΩ
Logic Low Output Level			0		0.4	V
Logic High Output Level			2.4		V_{CC}	V
Power Supply Voltage Range	V_{CC}		+3		+3.63	Vdc
Power Supply Voltage Ripple					10	mV_{P-P}
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.

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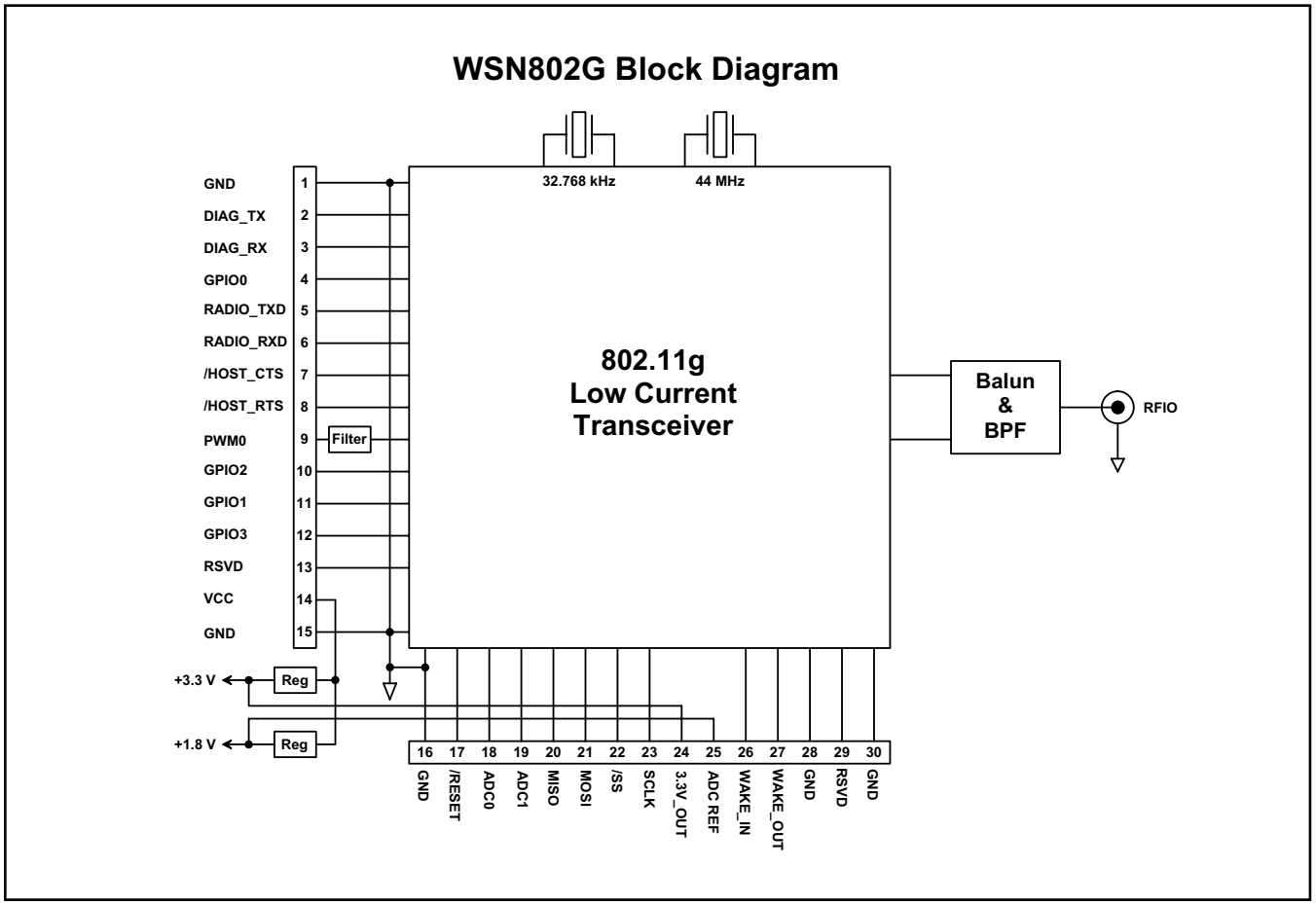

Figure 1

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 four standard 802.11g RF data rates - 1, 2, 5.5 and 11 Mbps.

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 kbps, with optional hardware flow control. The diagnostic port supports standard baud rates from 1.2 to 115.2 kbps. The WSN802G also includes an SPI port that supports data rates up to 2 Mbps in slave mode, and up to 11 Mbps in master mode.

The WSN802G includes two 10-bit ADC inputs, one 16-bit PWM (DAC) output, and four general purpose I/O (GPIO) ports to support sensor network applications.

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

Rev F 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 *WakeTimout* 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.

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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	GPIO0	I/O	Configurable digital I/O port 0. An internal weak pull up is provided when configured as an input.
5	RADIO_TXD	O	Serial data output from the radio.
6	RADIO_RXD	I	Serial data input to the radio.
7	/HOST_CTS	O	UART/SPI flow control output. The module sets this line low to indicate it is ready to accept data from the host on the RADIO_RXD or MOSI input. When the module sets this line high, the host must stop sending data.
8	/HOST_RTS	I	UART flow control input. The host sets this line low to allow data to flow from the module on the RADIO_TXD pin. When the host sets this line high, the module will stop sending data to the host.
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	GPIO2	I/O	Configurable digital I/O port 2. An internal weak pull up is provided when configured as an input.
11	GPIO1	I/O	Configurable digital I/O port 1. An internal weak pull up is provided when configured as an input.
12	GPIO3	I/O	Configurable digital I/O port 3. An internal weak pull up is provided when configured as an input.
13	RSVD	-	Reserved pin. Leave unconnected.
14	VCC	I	Power supply input, +3.0 to +3.63 Vdc.
15	GND	-	Connect to the host circuit board ground.
16	GND	-	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	MISO	I/O	SPI master in, slave out function. This pin is an input when the module is operating as a master, and is an output when the module is operating as a slave.
21	MOSI	I/O	SPI master out, slave in function. This pin is an output when the module is operating as a master, and is an input when the module is operating as a slave.
22	/SS	I/O	SPI active low slave select. This pin is an output when the module is operating as a master, and an input when it is operating as a slave.
23	SCLK	I/O	SPI clock signal. This pin is an output when operating as a master, and an input when operating as a slave.
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	-	Connect to the host circuit board ground plane.
29	RSVD	-	Reserved pin. Leave unconnected.
30	GND	-	Connect to the host circuit board ground plane.

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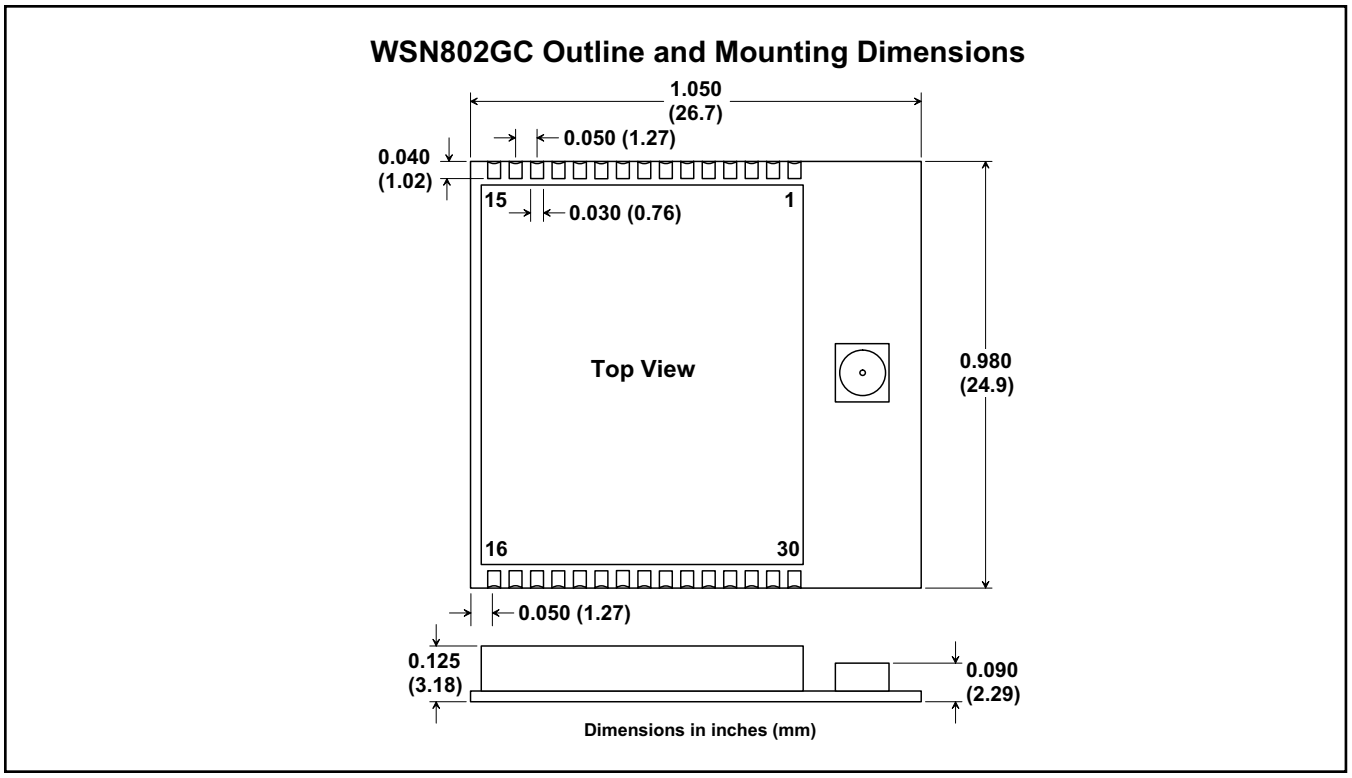

Figure 2

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.

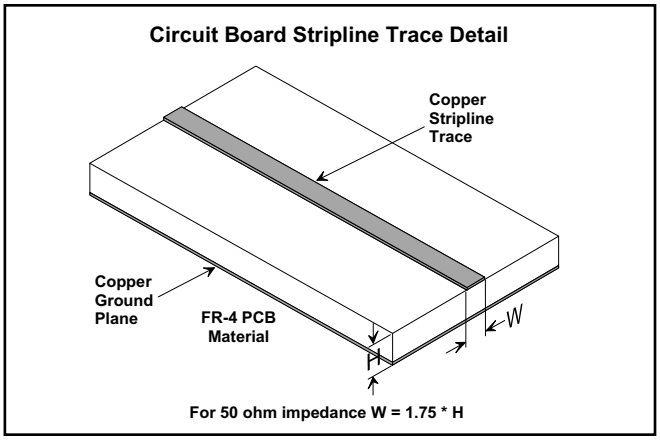

Figure 3

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

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WSN802GC Solder Pad Dimensions

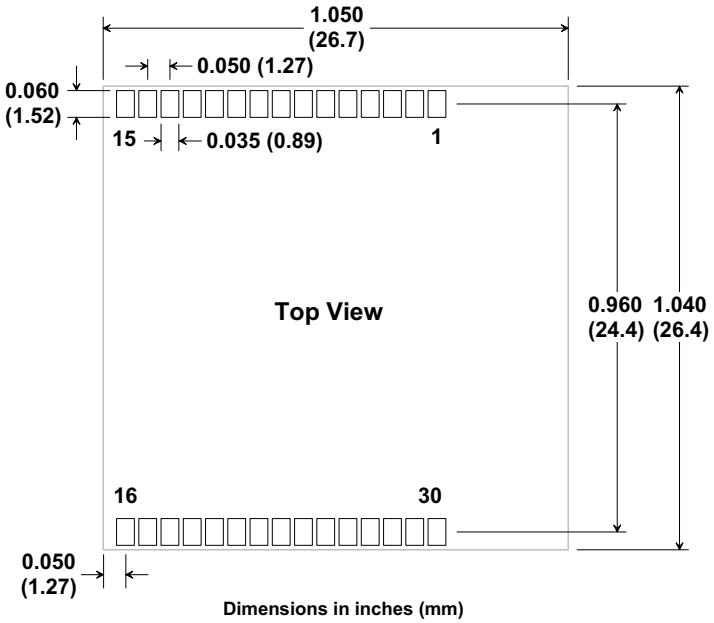

Figure 5

WSN802GP Outline and Mounting Dimensions

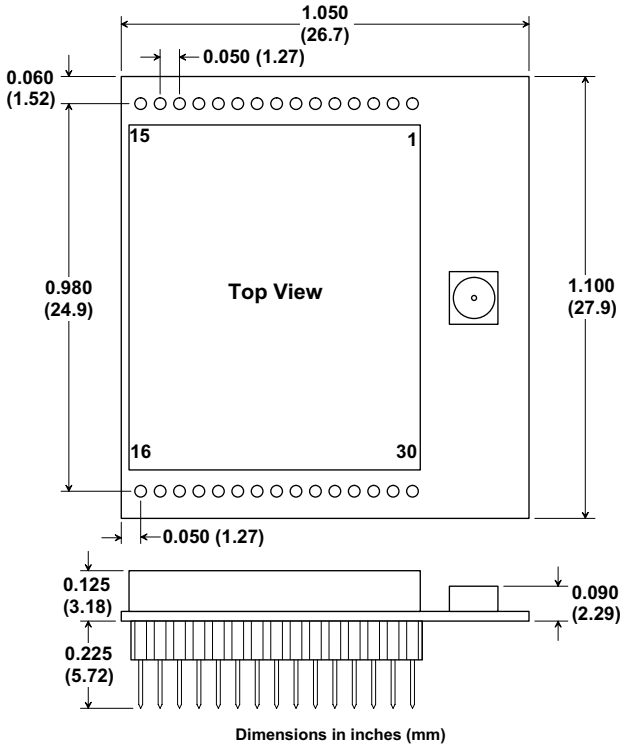

Figure 6

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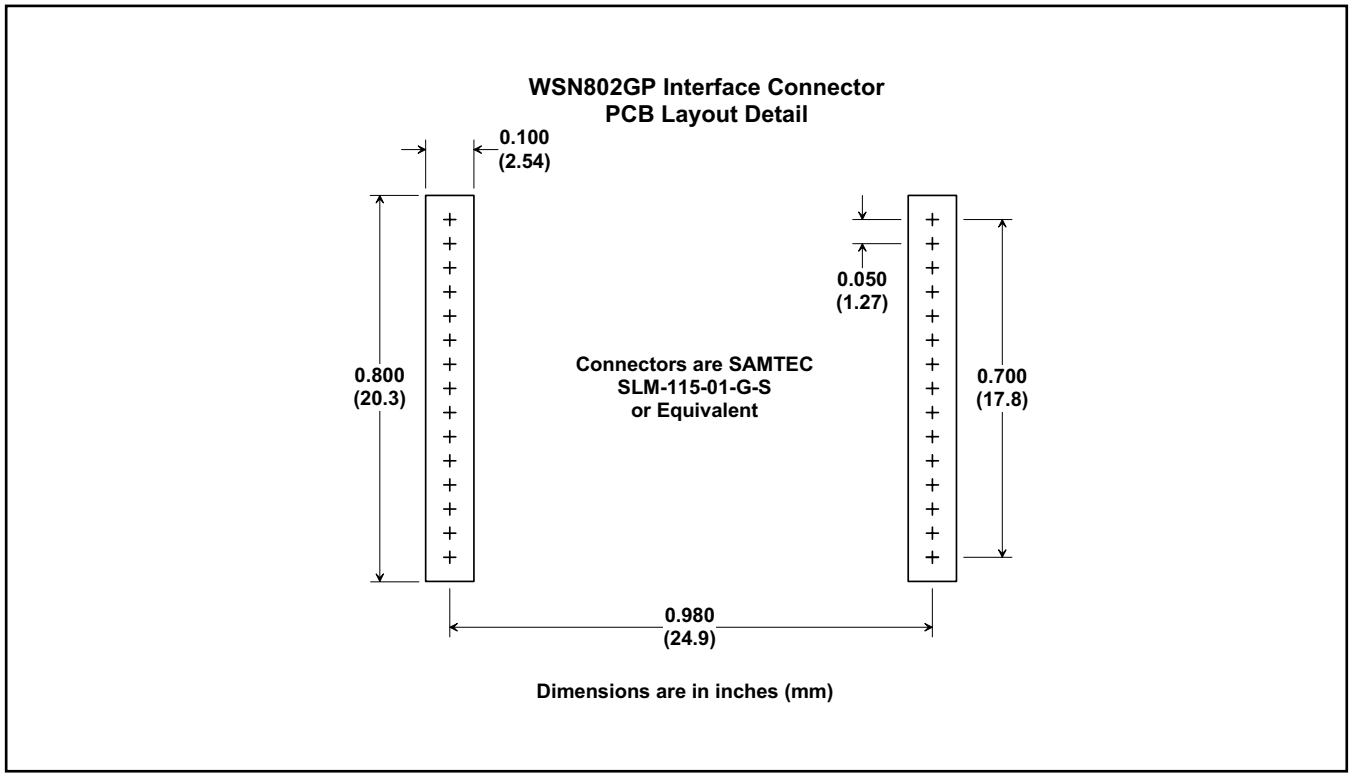

Figure 7

Note: Specifications subject to change without notice.

Part # M-0802-1000, Rev C

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