



**Model SST-901  
Spread Spectrum Radio Modem  
User's Guide**

**PB008915 Rev A 2011.10.27**

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## 1. Notice to United States Users

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 undesirable operation. In normal operation the unit and approved antenna is positioned several feet from the user but under no circumstance should the antenna be positioned less than 20 cm from the operator.

The user is cautioned that changes or modifications not expressly approved by Telonics could void the user's authority to operate the equipment. This restriction includes the use of specified antennas which have been certified for use with the SST-901M. See approved antenna configuration section below.

The ST 901M module has been labeled with its own FCC ID number, and if the FCC ID is not visible when the module is installed inside another device, then the outside of the finished product into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording as following:

“Contains Transmitter Module FCC ID: JYL-SST901”  
-or-  
“Contains FCC ID: JYL-SST901”

### RF Exposure

The following statement must be included as a CAUTION statement in manuals and OEM products to alert users of FCC RF Exposure compliance:

“To satisfy FCC RF Exposure requirements for mobile and base station transmission devices, a separation distance of 20cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at closer than this distance is not recommended.

The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.”

## 2. Notice to Canadian Users

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

The SST-901 (IC: 4610A-SST901) has been approved by Industry Canada to operate with the antenna type listed below with the maximum permissible gain and antenna impedance indicated. Other antenna types, or antennas of the same type having a gain greater than the maximum gain indicated, are strictly prohibited for use with this device.

<u>Approved Antenna Type</u>	<u>Telonics P/N</u>	<u>Max Gain</u>	<u>Req'd Impedance</u>
Inverted 'L' Antenna (ILA) w/ gnd plane	CM008916-001	0.0dBi	50Ω

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

When incorporated into a host device, the following information must be included on the host label:

“Contains IC ID: 4610A-SST901”

### 3. Product Overview

The Telonics SST-901 is a frequency hopping spread spectrum transceiver that operates in the 902 – 928 MHz industrial, scientific, and medical (ISM) frequency band. The SST-901 is characterized as a “server”, a device that accepts requests from “client” devices such as the Telonics SST-901M.

The SST-901 design is modular and is intended to be used with a host controller that provides power, as well as a digital control and data communication interface. The SST-901 interfaces to its host via a 14-pin male connector and also provides a coaxial cable connection for the antenna.

A typical system environment includes one client SST-901M and one or more server systems consisting of an SST-901 and its host controller. The client SST-901M initiates a connection with the desired server, and once established, transfers data to and from that server using a file transfer protocol.

Communications between the SST-901M and SST-901 are performed using an on-air bit rate of 19200 bits per second. Interleaving and error control coding methods are employed to combat the effects of fading and interference. The combined costs of error control coding and data transfer overhead yield an effective transfer rate of approximately 9600 bits per second.

### 4. Hardware Connections

#### 4.1 RF Connection

RF connection to the antenna is via a 1.37mm x 6" (15cm) coaxial cable. The antenna end of the coaxial cable is soldered directly to the feedpoint of the ILA antenna, Telonics P/N CM008916-001. **The SST-901 module is not approved for any other antenna type.**

#### 4.2 Power and Interface Connection

The SST-901 module may be soldered directly to the host PWB. In applications where a connector is desired, the recommended mating connector for the 14 pin male header is **Samtec SLM-115-01-S-S** or equivalent. Pin functions are described in Table 4.2.

Table 4.2 Interface Connector Description

Pin	Signal	Direction*	Description
1	GND	Input	System ground.
2	N/C		No connection (not used).
3	VPA	Input	High current RF section power supply.
4	VMAIN	Input	Low current RF and digital logic power supply.
5	N/C		No connection (not used).
6	CTS\	Output	Clear To Send signal; asserted when low. This signal provides flow control from the host to the SST-901. When asserted, this signal indicates to the host that the SST-901 is able to accept a data byte. The CTS signal de-asserts at the next rising edge of SCLK, and re-asserts when the microcontroller in the SST-901 has retrieved the byte and is again ready to receive.
7	SDI	Input	Serial data input; non-inverted.
8	SCLK	Input	Serial clock input. SCLK must idle high. Data are clocked in on the rising edge and clocked out on the falling edge.
9	SDO	Output	Serial data output; non-inverted.
10	LE	Input	Listen enable signal; asserted when high. The host device pulses this signal (L-H-L) to command the SST-901 to power up its receiver and listen for a connect sequence from a client SST-901M.
11	ATTN	Output	Attention signal; asserted when high. When asserted, this indicates that a packet is available for the host device to retrieve. The packet may be a response to a request from the host device, or may be a packet received via

			the RF link. The SST-901 de-asserts ATTN when the host asserts CS.
12	RESET	Input	Reset signal, asserted when high. This signal must be pulsed (L-H-L) to reset the SST-901 microcontroller.
13	CS	Input	SST-901 serial interface chip select; asserted when high. CS must be asserted when transferring data using the SCLK, SDI, and SDO signals.
14	GND	Input	System ground.

\* With respect to SST-901.

#### 4.2.1 Electrical characteristics for host interface signals

The following table describes the electrical characteristics for interface signals: ATTN, CS, CTS\, LE, SCLK, SDI, SDO, and RESET.

Table 4.2.1 Electrical characteristics for host interface signals

Parameter	Symbol	Min	Typ	Max	Unit
Input high voltage	VIH	2.4		3.0	V
Input low voltage	VIL	0.0		0.6	V
Output high voltage	VOH	2.5		3.0	V
Output low voltage	VOL			0.5	V
Low level output current	IOL			5.0	mA
High level output current	IOH			-5.0	mA

#### 4.2.2 Electrical characteristics for power supply inputs

The following table describes the electrical characteristics for the VMAIN and VPA power supply inputs.

Table 4.2.2 Electrical characteristics for power supply inputs

Parameter	Symbol	Min	Typ	Max	Unit
Low current RF / digital logic power supply voltage	VMAIN	3.3	3.6	5.0	V
High current RF section power supply voltage	VPA	2.7	3.6	4.0	V
Low current RF / digital logic power supply current (operating)	IMAIN		30	50	mA
High current RF section power supply current	IPA		600	900	mA
Low current RF / digital logic power supply standby current	IMAINSB		5	10	uA

#### 4.2.3 Timing Characteristics for host interface signals

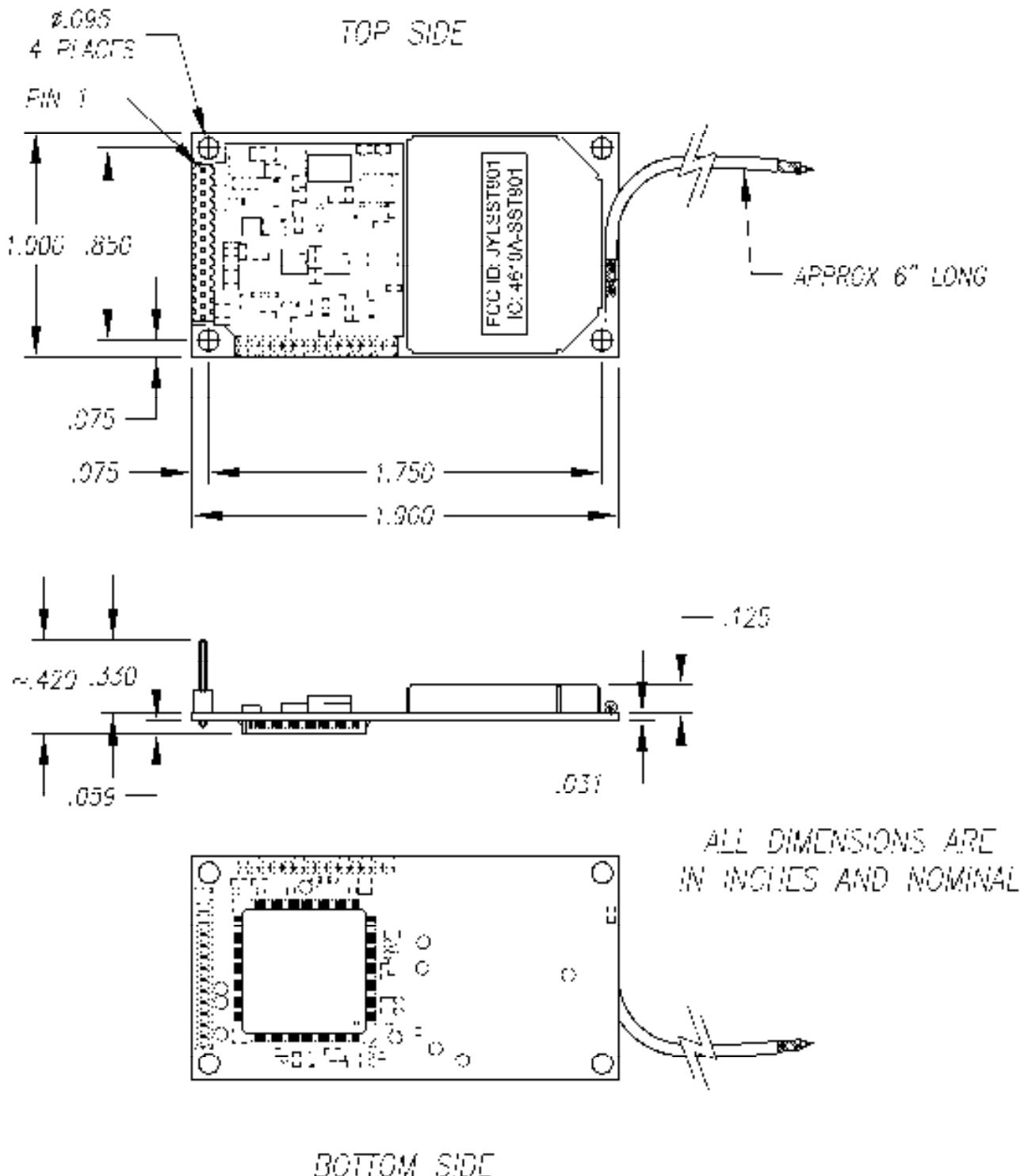
The following table describes the timing characteristics for interface signals LE, SCLK, SDI, SDO, and RESET.

Table 4.2.3 Timing Characteristics for host interface signals

Parameter	Symbol	Min	Typ	Max	Unit
SCLK input cycle time	tCK	200			ns
SCLK input high pulse width	tCKH	100			ns
SCLK input low pulse width	tCKL	100			ns
SDO output delay time	tOD			80	ns
SDO hold time	tOH	0			ns
SDI setup time	tISU	70			ns
SDI hold time	tIH	90			ns
Reset pulse width	tRPW	50			us
Reset recovery time	tRRT			50	ms
LE pulse width	tLEPW	1			ms

## 5. Physical Specifications

### 5.1 Module Dimensions



## 6. SST-901 SPECIFICATIONS

### GENERAL

FCC ID	JYLSST901
Industry Canada ID	4610A-SST901
Frequency Range	902.102 - 927.908 MHz.
Spread Spectrum Type	Frequency Hopping FSK
Applicable FCC Rules	Part 15 (15.247)
Number of RF Frequency Sets	4 sets, non overlapping Set 1: 902.102 - 907.100 MHz Set 2: 908.120 - 913.220 MHz Set 3: 915.260 - 920.360 MHz Set 4: 922.808 - 927.908 MHz
Nominal Channel Frequency Spacing	102 kHz
Data Interface	Logic-Level Clocked Serial

### POWER REQUIREMENTS

RF/Digital Supply	3.6V nominal (3.3 - 5.0 Vdc)
Power Amplifier Supply	3.6V nominal (2.7 – 4.0 Vdc)
Transmit Current	600 mA typ @ 3.6V
Receive Current	50 mA typ @ 3.6V
Stand-by Current	10µA typ

### TRANSMITTER

Power Output	500 mW (+27dBm) nominal
Frequency Stability	± 0.5 ppm @ 25°C ± 1.0ppm -30 < T < +60 °C
Modulation Data Rate	19.2 kbps
Modulation Type	FSK
Modulation Bandwidth (99%)	40 kHz typ
Load Impedance	50 Ω

### RECEIVER

Noise Figure	<3.0 dB
Sensitivity for 10 <sup>-4</sup> BER @ 19.2 kbps	<-110 dBm typ

### MECHANICAL / ENVIRONMENTAL

RF Connection	1.37mm coaxial cable, 6" long, no connector
Power and Interface Connector	14pin x 0.05" SIP connector
Recommended Mating Connector	Samtec SLM-115-01-S-S or equivalent
Dimensions, excluding connector	OR direct solder to host PWB 1.90" l x 1.00" w x 0.18" h (48.3 x 25.4 x 4.6 mm)
Operating Temperature Range	-40 to +70 °C
Humidity	Operating: ≤ 60%, non-condensing Storage: ≤ 75%, non-condensing