

Applications

- IEEE802.11b DSSS WLAN
- IEEE802.11g,n OFDM WLAN
- Embedded applications

Features

- ❑ Integrates SP3T Switch and LNA with by-pass mode
- ❑ 12 dB gain,
- ❑ 1.8 dB NF
- ❑ 0.5 dB Bluetooth path loss
- ❑ 1.07x1.05x 0.38mm, 250 um pitch, SnAg solder bump
- ❑ Lead free, Halogen free and RoHS compliant, MSL1

Product Description

The SE2600S is a single chip integrated front-end module (FEM) with a Bluetooth port to complement WLAN chipsets with integrated Power Amplifier. The FEM integrates SP3T Switch and Low Noise Amplifier with bypass mode in an ultra compact package. It is capable of switching between WLAN RX, WLAN TX and Bluetooth™

Ordering Information

Part No.	Package	Remark
SE2600S	11 pin CSP	Samples
SE2600S-R	11 pin CSP	Tape and Reel
SE2600S-EK1	N/A	Evaluation kit

Functional Block Diagram

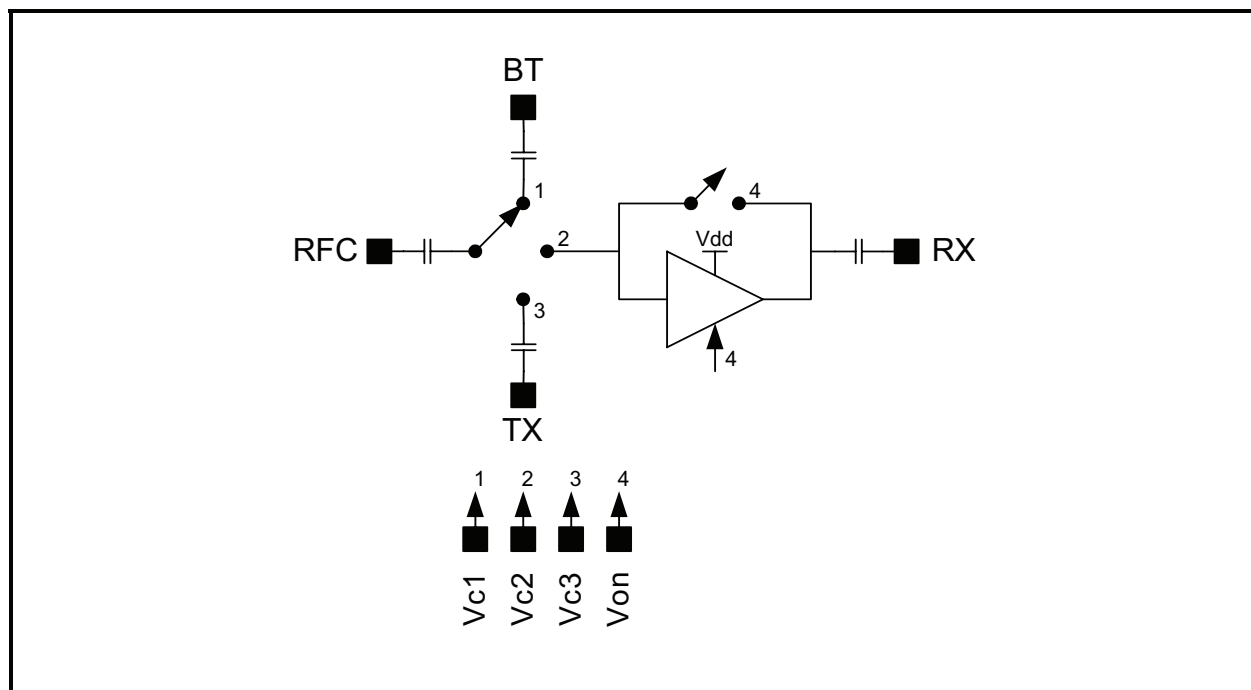
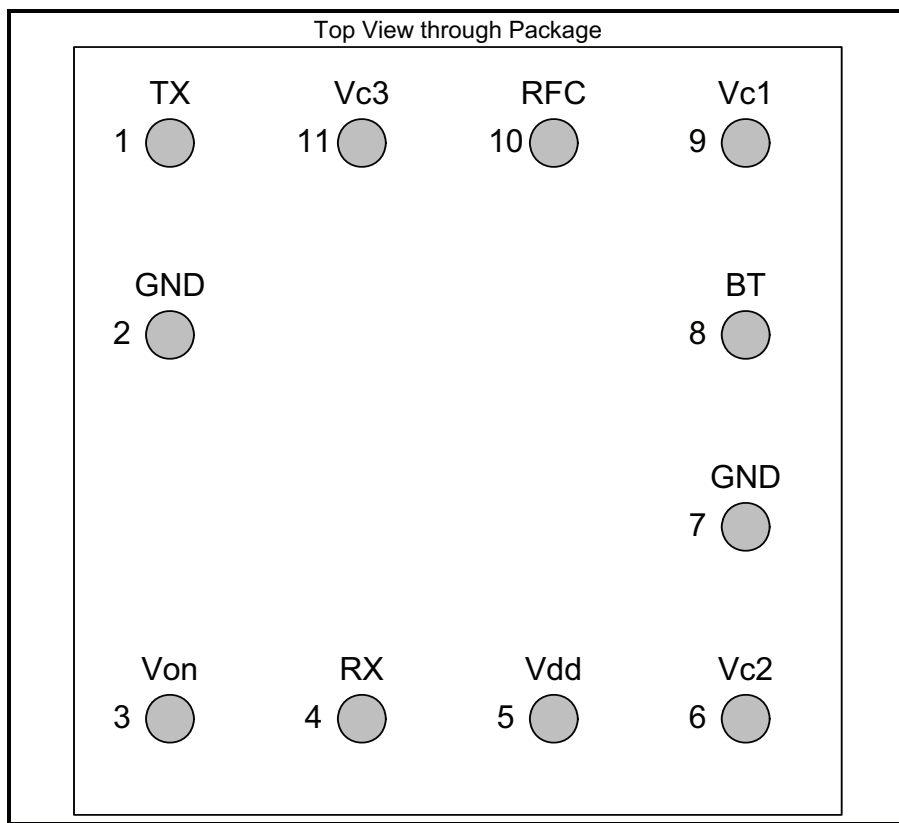


Figure 1: Functional Block Diagram

Pad Diagram



Pad Description

Pad	Label	Function
1	TX	WLAN Transmit port
2	GND	Ground
3	Von	LNA control pin
4	RX	WLAN Receive port
5	Vdd	Positive power supply voltage
6	Vc2	RX switch control pin
7	GND	Ground
8	BT	Bluetooth port
9	Vc1	BT switch control pin
10	RFC	RF Common (antenna port)
11	Vc3	TX switch control pin

Absolute Maximum Ratings

These are stress ratings only. Exposure to stresses beyond these maximum ratings may cause permanent damage to, or affect the reliability of the device. Avoid operating the device outside the recommended operating conditions defined below. This device is ESD sensitive. Handling and assembly of this device should be at ESD protected workstations.

Symbol	Definition	Min.	Max.	Unit
V _{dd}	Supply Voltage on V _{dd}	0	3.6	V
V _{ON, cc}	DC input on control pins	-0.5	V _{dd} +0.5	V
P _{TXIN}	TX Input Power, ANT terminated in 50Ω match	-	27	dBm
T _A	Operating Temperature Range	-40	85	°C
T _{STG}	Storage Temperature Range	-40	150	°C
ESD _{HBM}	JEDEC JESD22-A114 all pins		1000	V

Recommended Operating Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
T _A	Ambient temperature	-40	25	85	°C
V _{dd}	Supply voltage, relative to GND = 0 V	2.7	3.3	3.6	V
V _{ON, cc}	Control voltage, relative to GND = 0 V	0	-	V _{dd}	V

DC Electrical Characteristics

Conditions: V_{dd} = 3.3 V, T_A = 25 °C, as measured on SiGe SE2600S EK1 evaluation board (de-embedded to device), all unused ports terminated with 50 ohms, unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _{dd}	LNA current	Gain mode	-	10	13	mA
I _{dd}	LNA current	Bypass mode			60	μA
I _{ON}	LNA control current		-		20	μA
I _{c1}	BT port control current		-		20	μA
I _{c3}	TX port control current		-		20	μA
V _{IH}	Logic input high		2.7		3.6	V
V _{IL}	Logic input low		0		0.3	V

Control Logic Table

Mode#	Mode Description	Vc1	Vc2	Vc3	Von
0	All Off	0	0	0	0
1	Tx	0	0	1	0
2	BT	1	0	0	0
3	Rx – high gain	0	1	0	1
4	Rx - bypass	0	1	0	0

AC Electrical Characteristics

Transmit Characteristics (RFC-TX port)

Conditions: $V_{dd} = 3.3\text{ V}$, $T_A = 25\text{ }^{\circ}\text{C}$, as measured on SiGe Semiconductor's SE2600S EK1 evaluation board (de-embedded to device), all unused ports terminated with 50 ohms, unless otherwise noted. $V_{c1} = V_{c2} = V_{on} = 0$.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
F_{OUT}	Frequency Range	-	2400	-	2500	MHz
TX_{IL}	Insertion Loss		-	0.5	0.7	dB
S_{11}	Input Return Loss			-16	-14	dB
S_{22}	Output Return Loss			-16	-14	dB
$ISOL_{SW}$	Switch Isolation	$V_{c3} = 0$	23			dB
IP1dB	Input P1dB		31			dBm
T_{ON}, T_{OFF}	Turn-On/Off Time	90/10 % of final output power level			400	ns

Bluetooth Characteristics (RFC-BT port)

Conditions: $V_{dd} = 3.3\text{ V}$, $T_A = 25\text{ }^{\circ}\text{C}$, as measured on SiGe Semiconductor's SE2600S EK1 evaluation board (de-embedded to device), all unused ports terminated with 50 ohms, unless otherwise noted. $V_{c2} = V_{c3} = V_{on} = 0$.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
F_{OUT}	Frequency Range	-	2400	-	2500	MHz
BT_{IL}	Insertion Loss		-	0.5	0.7	dB
S_{11}	BT Port Return Loss			-16	-14	dB
S_{22}	BT Port Return Loss			-16	-14	dB
IP1dB	Input P1dB		31			dBm
$ISOL_{SW}$	Switch Isolation	$V_{c1} = 0$	25			dB
T_{ON}, T_{OFF}	Turn-On/Off Time	90/10 % of final output power level			400	ns

Receive Characteristics (RF- RX port)

Conditions: $V_{dd} = 3.3\text{ V}$, $T_A = 25\text{ }^{\circ}\text{C}$, as measured on SiGe Semiconductor's SE2600S EK1 evaluation board (de-embedded to device), all unused ports terminated with 50 ohms, unless otherwise noted. $V_{c1} = V_{c3} = 0$.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
F_{OUT}	Frequency Range	-	2400	-	2500	MHz
S_{21}	Receive Gain, LNA enabled.		11	12	13	dB
NF	Noise Figure		-	1.8	2.0	dB
S_{11}	Input Return Loss			-10	-8	dB
S_{22}	Output Return Loss			-10	-8	dB
IP1dB	Input P1dB		-6	-5		dBm
S_{21-BYP}	Receive Gain, LNA bypassed			-3	-4	dB
T_{ON}, T_{OFF}	Turn-On/Off Time	90/10 % of final output power level			400	ns

Package Handling Information

Branding Information

The device branding is shown in Figure 4.

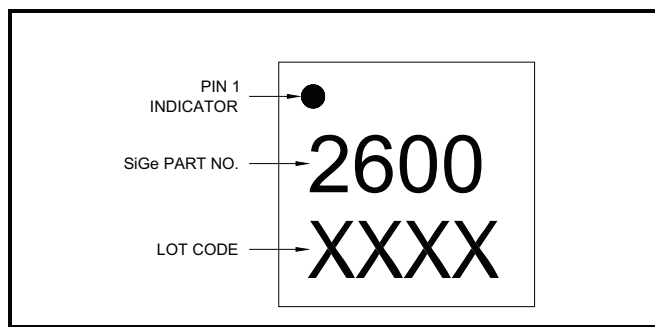


Figure 4: SE2600S Branding and Pin 1 Location

Package Diagram

The package diagram is shown in Figure 5.

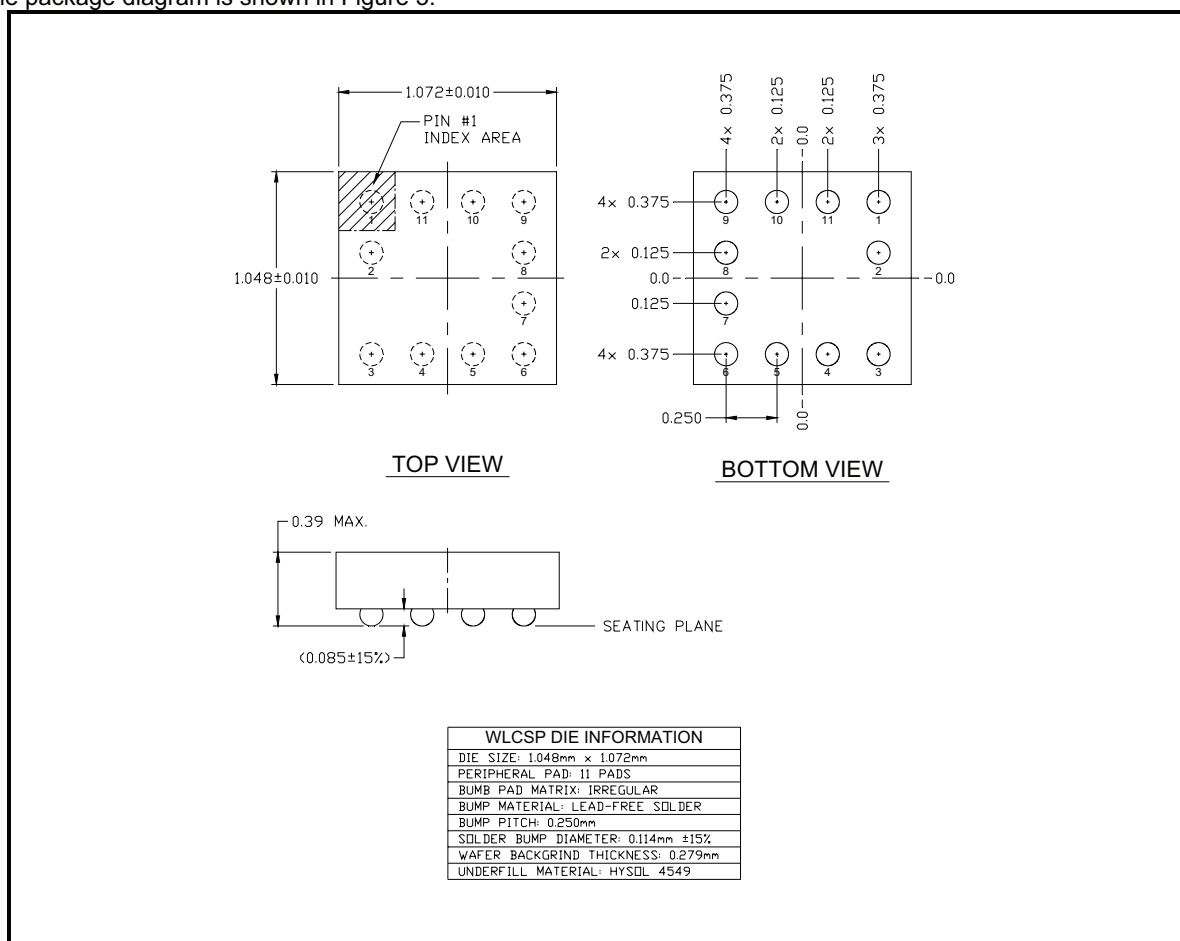


Figure 5: SE2600S Package Diagram

Recommended PCB Footprint

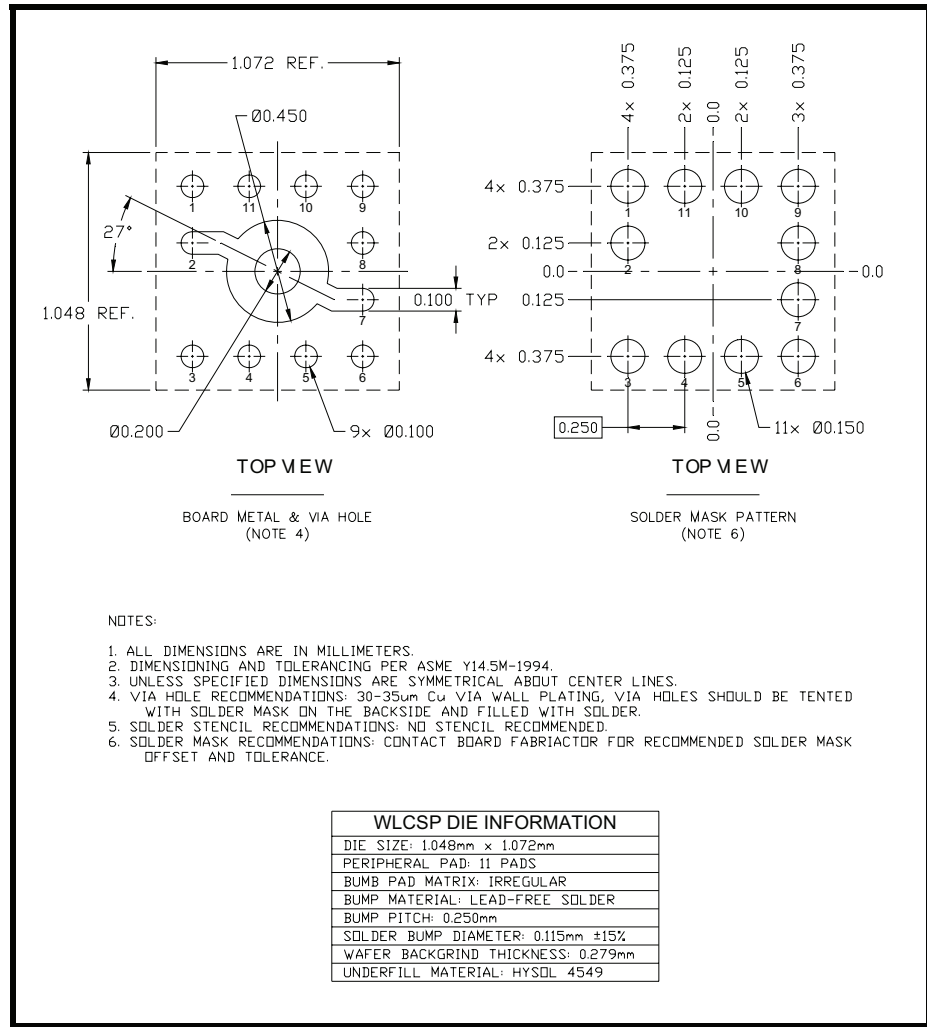


Figure 5: SE2600S PCB footprint recommendation

Recommended Reflow Temperature Profile

Profile Feature	SnPb Eutectic Assembly	Lead (Pb) Free Assembly
Average ramp-up rate (T_L to T_P)	3 °C/Second Max.	3 °C/Second Max.
Preheat		
Temperature min. (T_{smin})	100 °C	150 °C
Temperature max. (T_{smax})	150 °C	200 °C
Time (min. to max) (t_s)	60-120 s	60-180 s
Ramp Up		
T_{smax} to t_L	-	3 °C/s Max.
Time 25 °C to peak temperature	6 Minutes Max.	8 Minutes Max.
Reflow		
Temperature (t_L)	183 °C	217 °C
Time maintained above t_L	60-150 s	60-150 s
Peak temperature (t_p)	240 +/-5 °C	260 +/-5 °C
Time within 5 °C of actual peak temperature (t_p)	10-30 s	20-40 s
Ramp-Down		
Ramp-down rate	6 °C/s Max.	6 °C/s Max.

Reflow Profile (Reference JEDEC J-STD-020)

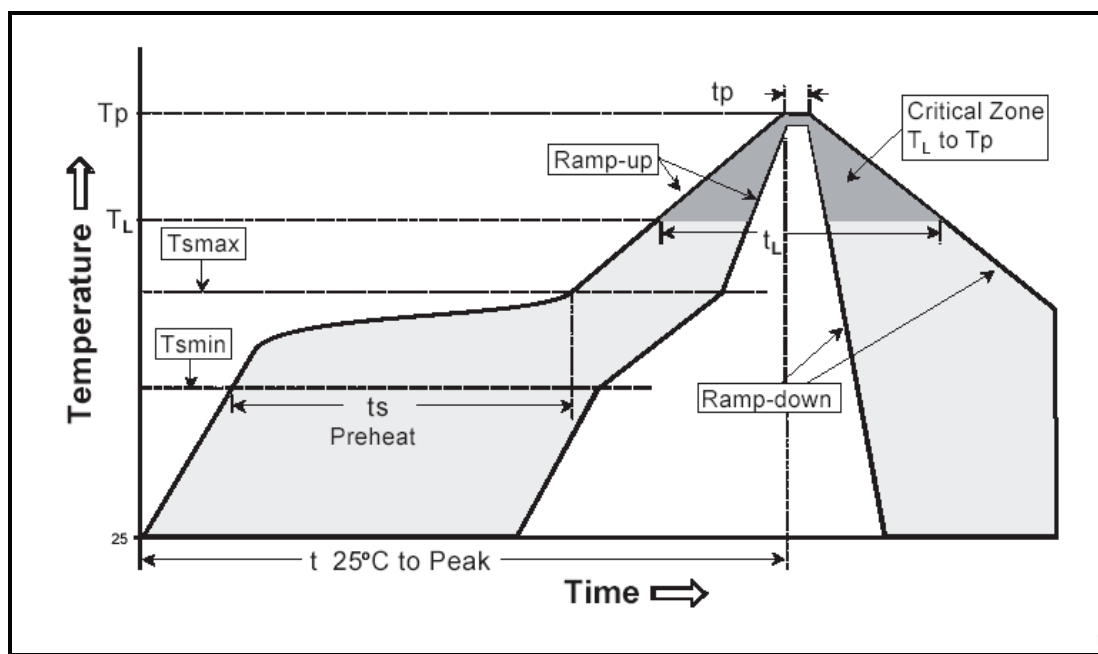


Figure 6: SE2600S Reflow profile

Under fill Requirements

The assembly of a CSP onto an electrical substrate requires special handling, and will normally need an under fill liquid epoxy mold compound. When fully cured, the under fill material forms a rigid, low stress seal that dissipates stress on solder joints and extends thermal cycling performance. SiGe Semiconductor recommends the use of Loctite Hysol 4549 as an under fill material, and this should be cured for 30 minutes at +165° C.

Attaching the CSP without an under fill will make the circuit more susceptible to mechanical damage. This damage can even occur if components in close proximity to the CSP are soldered or unsoldered on the substrate, without evenly preheating the entire board and die, prior to soldering or unsoldering. This can ultimately result in mechanical damage to the solder joint between the board and the die, which may impact electrical connectivity.

Contact SiGe Semiconductor for more information.

Pad Coordinates

The SE2600S pad coordinates are shown below.

The origin of the coordinates (i.e. X = 0, Y = 0) is located at the center of the SE2600S package. Sense is Top View through package (PCB footprint).

Please refer to the Pad Diagram at the front of this datasheet when interpreting the coordinates in the table below.

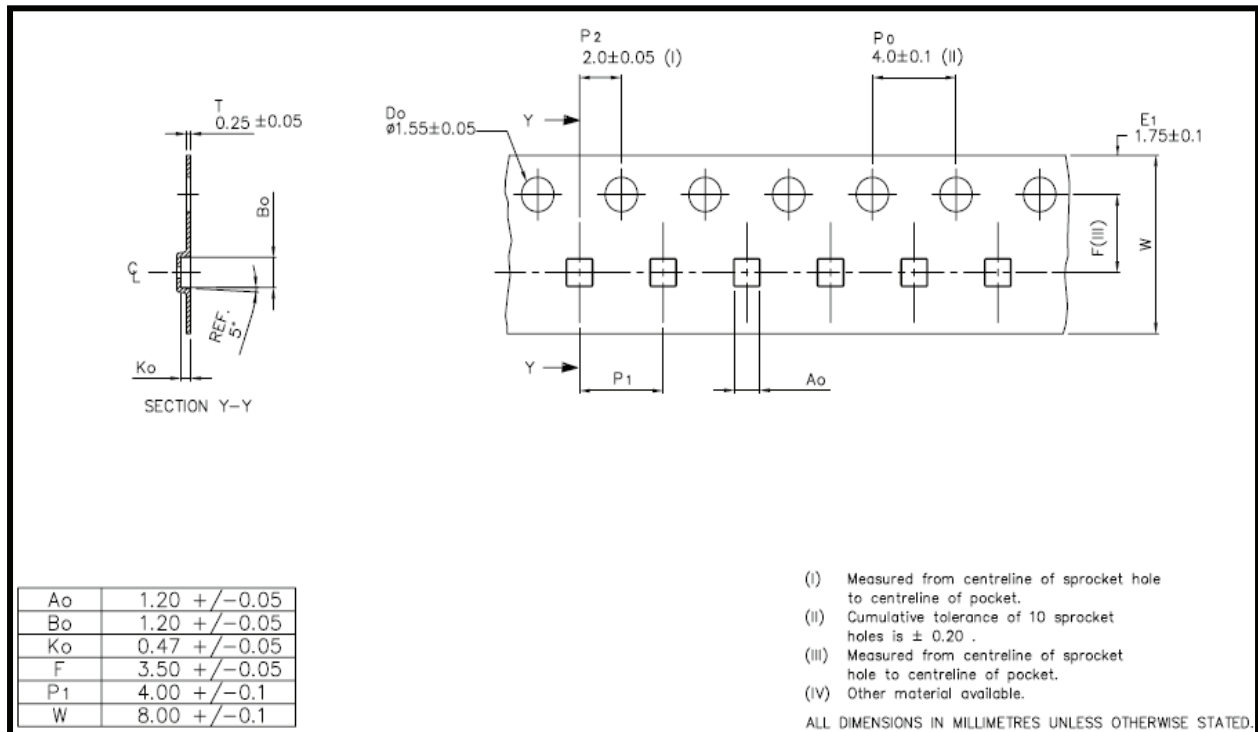
SE2600S Bump Pad Coordinates

Bump number	Bump Label	Bump coordinates	
		X [μm]	Y [μm]
1	TX	-375	375
2	GND	-375	125
3	Von	-375	-375
4	RX	-125	-375
5	Vdd	125	-375
6	Vc2	375	-375
7	GND	375	-125
8	BT	375	125
9	Vc1	375	375
10	RFC	125	375
11	Vc3	-125	375

Tape and Reel Information

Parameter	Value
Devices Per Reel	5000
Reel Diameter	7 inches
Tape Width	8 millimeters

Figure 7: SE2600S-R Tape and Reel Information.



Document Change History

Revision	Date	Notes
1.0	03/17/2009	Created
1.1	03/30/2009	Updated package size
1.2	07/31/2009	Updated package, specifications. Added PCB footprint recommendation
1.3	08/25/2009	Added Tape and Reel specification and updated Functional Block Diagram
1.4	10/09/2009	Updated Package Outline and PCB footprint recommendations
1.5	Jan-12-2010	Updated ESD rating
1.6	May-07-2010	Added Switching speeds
1.7	December-01-2010	Updated ESD and added MSL level
1.8	January-23-2011	Updated BT IP1dB and VIH

PAGE LEFT INTENTIONALLY BLANK

<http://www.sige.com>

Email: **sales@sige.com**

Customer Service Locations:

North America:
1050 Morrison Drive, Suite 100
Ottawa ON K2H 8K7 Canada

Phone: +1 613 820 9244
Fax: +1 613 820 4933

Hong Kong
Phone: +852 3428 7222
Fax: +852 3579 5450

San Diego
Phone: +1 858 668 3541 (ext. 226)
Fax: +1 858 668 3546

United Kingdom
Phone: +44 1279 464217
Fax: +44 1279 464201

Product Preview

The datasheet contains information from the product concept specification. SiGe Semiconductor, Inc. reserves the right to change information at any time without notification.

Preliminary Information

The datasheet contains information from the design target specification. SiGe Semiconductor, Inc. reserves the right to change information at any time without notification.

Production testing may not include testing of all parameters.

Information furnished is believed to be accurate and reliable and is provided on an "as is" basis. SiGe Semiconductor, Inc. assumes no responsibility or liability for the direct or indirect consequences of use of such information nor for any infringement of patents or other rights of third parties, which may result from its use. No license or indemnity is granted by implication or otherwise under any patent or other intellectual property rights of SiGe Semiconductor, Inc. or third parties. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. SiGe Semiconductor, Inc. products are NOT authorized for use in implantation or life support applications or systems without express written approval from SiGe Semiconductor, Inc.

Copyright 2011 SiGe Semiconductor, Inc.
All Rights Reserved