

Data Sheet

The SST12LP08 is a versatile power amplifier based on the highly-reliable InGaP/ GaAs HBT technology. Easily configured for linear high-power applications with excellent power-added efficiency while operating over the 2.4- 2.5 GHz frequency band, it typically provides 30 dB gain with 34% power-added efficiency, while meeting 802.11b/g spectrum mask at 23.5 dBm. The SST12LP08 also features easy board-level usage along with high-speed power-up/down control through a single combined reference voltage pin and is offered in both 12-contact XQFN and 6-contact XSON packages.

Features

- · High Gain:
 - Typically 30 dB gain across 2.4~2.5 GHz over temperature 0°C to +85°C
- High linear output power:
 - ->28 dBm P1dB
 - Please refer to "Absolute Maximum Stress Ratings" on page 6
 - Meets 802.11g OFDM ACPR requirement up to 23.5 dBm
 - ~3% added EVM up to 20 dBm for
 - 54 Mbps 802.11g signal

 Meets 802.11b ACPR requirement up to 23.5 dBm
- High power-added efficiency/Low operating current for both 802.11g/b applications
 - $\sim 34\%/200 \text{ mA}$ @ P_{OUT} = 23.5 dBm for 802.11b/g
- Single-pin low I_{REF} power-up/down control
 - $-I_{REF}$ < 2 mA
- Low idle current
 - ~85 mA I_{CQ} for 12-contact XQFN~65 mA I_{CQ} for 6-contact XSON
- High-speed power-up/down
 - Turn on/off time (10%- 90%) <100 ns
 - Typical power-up/down delay with driver delay included <200 ns

- Low Shut-down Current (~2 μA)
- High temperature stability
 - -~1 dB gain/power variation between 0°C to +85°C
- Excellent On-chip power detection
- 20 dB dynamic range on-chip power detection
- Simple input/output matching
- Packages available
 - 12-contact XQFN 2mm x 2mm
 - 6-contact XSON 1.5mm x 1.5mm
- All non-Pb (lead-free) devices are RoHS compliant

Applications

- WLAN (IEEE 802.11b/g/n)
- Home RF
- Cordless phones
- 2.4 GHz ISM wireless equipment



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Product Description

The SST12LP08 is a versatile power amplifier based on the highly-reliable InGaP/GaAs HBT technology.

The SST12LP08 can be easily configured for high-power applications with good power-added efficiency while operating over the 2.4- 2.5 GHz frequency band. It typically provides 30 dB gain with 34% power-added efficiency (PAE) @ POUT = 23.5 dBm for 802.11b/g.

The SST12LP08 has excellent linearity, typically ~3% added EVM at 20 dBm output power which is essential for 54 Mbps 802.11g operation while meeting 802.11g spectrum mask at 23.5 dBm.

The SST12LP08 can also be easily configured for high-efficiency operation, typically ~3% added EVM at 18 dBm output power and 95 mA total power consumption for 54 Mbps 802.11g applications. High-efficiency operation is desirable in embedded applications, such as in hand-held units, where SST12LP08 can provide 30 dB gain and meet 802.11b/g spectrum mask at 22 dBm output power with 34% PAE.

The SST12LP08 also features easy board-level usage along with high-speed power-up/down control through a single combined reference voltage pin. Ultra-low reference current (total $I_{REF} \sim 2$ mA) makes the SST12LP08 controllable by an on/off switching signal directly from the baseband chip. These features coupled with low operating current make the SST12LP08 ideal for the final stage power amplification in battery-powered 802.11b/g/n WLAN transmitter applications.

The SST12LP08 has an excellent on-chip, single-ended power detector, which features wide-range (>15 dB) with dB-wise linearization. The excellent on-chip power detector provides a reliable solution to board-level power control.

The SST12LP08 is offered in both 12-contact XQFN and 6-contact XSON packages. See Figure 3 for pin assignments and Tables 1 and 2 for pin descriptions.



Data Sheet

Functional Blocks

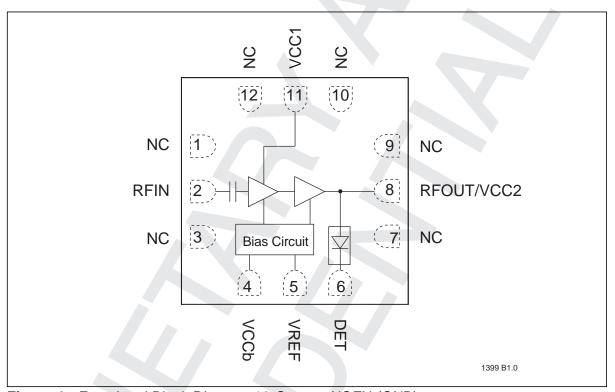


Figure 1: Functional Block Diagram 12-Contact XQFN (QXB)

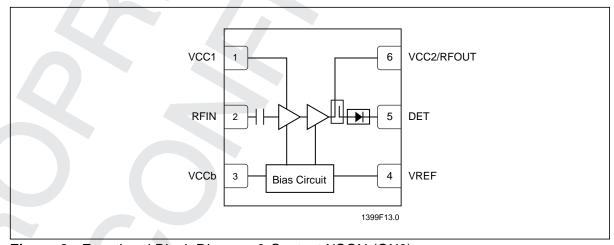


Figure 2: Functional Block Diagram 6-Contact XSON (QX6)



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Pin Assignments

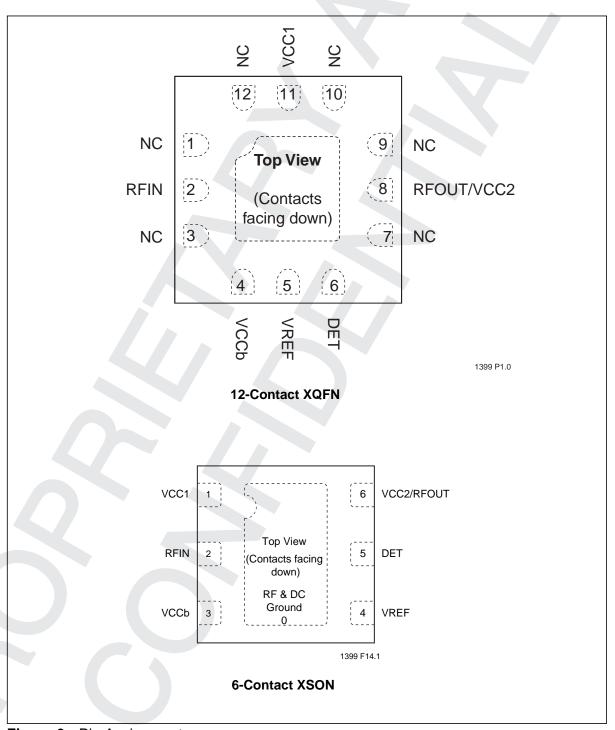


Figure 3: Pin Assignments



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Pin Descriptions

Table 1: Pin Description for 12-Contact XQFN (QXB)

Symbol	Pin No.	Pin Name	Type ¹	Function	
GND	0	Ground		Low-inductance GND pad	
NC	1	No Connection		Unconnected pin	
RFIN	2		1	RF input, DC decoupled	
NC	3	No Connection		Unconnected pin	
VCCb	4	Power Supply	PWR	Supply voltage for bias circuit	
VREF	5		PWR	1 st and 2 nd stage idle current control	
DET	6		0	On-chip power detector	
NC	7	No Connection		Unconnected pin	
VCC2/ RFOUT	8	Power Supply	PWR/O	Power Supply, 2 nd stage / RF output	
NC	9	No Connection		Unconnected pin	
NC	10	No Connection		Unconnected pin	
VCC1	11	Power Supply	PWR	Power supply, 1 st stage	
NC	12	No Connection		Unconnected pin	

^{1.} I=Input, O=Output

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Table 2: Pin Description, 6-contact XSON (QX6)

Symbol	Pin No.	Pin Name	Type ¹	Function
GND	0	Ground		Low inductance GND pad
V _{CC1}	1	Power Supply	PWR	Power supply, 1 st stage
RF _{IN}	2	7		RF input, DC decoupled
V _{CCb}	3	Power Supply	PWR	Supply voltage for bias circuit
VREF	4		PWR	1 st and 2 nd stage idle current control
Det	5		0	On-chip power detector
V _{CC2} / RFOUT	6	Power Supply	PWR/O	Power supply, 2 nd stage/ RF Output

1. I=Input, O=Output

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Electrical Specifications

The AC and DC specifications for the power amplifier interface signals. Refer to Table 4 for the DC voltage and current specifications. Refer to Figures 4 through 11 for the RF performance.

Absolute Maximum Stress Ratings (Applied conditions greater than those listed under "Absolute Maximum Stress Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these conditions or conditions greater than those defined in the operational sections of this data sheet is not implied. Exposure to absolute maximum stress rating conditions may affect device reliability.)

Input power to pin 2 (P _{IN})	+5 dBm
Average output power (P _{OUT}) ¹	+26 dBm
Supply Voltage at pins 4, 8, and 11 (V _{CC}) for 12-contact XQFN	0.3V to +5.0V
Supply Voltage at pins 1, 3, and 6 (V _{CC}) for 6-contact XSON	0.3V to +5.0V
Reference voltage to pin 5 (V _{REF}) or 12-contact XQFN	0.3V to +3.3V
Reference voltage to pin 4 (V _{REF}) for 6-contact XSON	0.3V to +3.3V
DC supply current (I _{CC}) ²	400 mA
Operating Temperature (T _A)	40°C to +85°C
Storage Temperature (T _{STG})	40°C to +120°C
Maximum Junction Temperature (T _J)	+150°C
Surface Mount Solder Reflow Temperature	
1. Never managing with CW source. Duland single tang source with #500/ duty avale is r	accommanded Evacading the may

^{1.} Never measure with CW source. Pulsed single-tone source with <50% duty cycle is recommended. Exceeding the maximum rating of average output power could cause permanent damage to the device.

Table 3: Operating Range

Range	Ambient Temp	V _{CC}
Industrial	-40°C to +85°C	3.3V

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^{2.} Measured with 100% duty cycle 54 Mbps 802.11g OFDM Signal



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Table 4: DC Electrical Characteristics at 25°C

Symbol	Parameter	Min.	Тур	Max.	Unit	Test Conditions
V	Supply Voltage at pins 4, 8, 11 for 12-contact XQFN	2.75	3.3	4.2	V	Figure 12
V _{CC}	Supply Voltage at pins 1, 3, 6 for 6-contact XSON	2.75	3.3	4.2	٧	Figures 13 and 14
	Idle current for 802.11g to meet EVM ~3% @ 20 dBm for 12-contact XQFN		85		mA	Figure 12
I _{CQ}	Idle current for 802.11g to meet EVM ~3% @ 20 dBm for 6-contact XSON		65		mA	Figure 13
	Idle current for 802.11g to meet EVM ~3% @ 18 dBm for 6-contact XSON		48		mA	Figure 14
I _{CC} (802.11g)	Current consumption for 802.11g to meet EVM ~3% @ 20 dBm for 12-contact XQFN	A	148		mA	Figure 12
	Current consumption for 802.11g to meet EVM ~3% @ 20 dBm for 6-contact XSON		140		mA	Figure 13
	Current Consumption for 802.11g to meet EVM ~3% @ 18 dBm for 6-contact XSON		95		mA	Figure 14
	Current consumption for 802.11b/g, 23.5 dBm for 12-contact XQFN		200		mA	Figure 12
I _{CC} (802.11b/g)	Current consumption for 802.11b/g, 23.5 dBm for 6-contact XSON		200		mA	Figure 13
	Current Consumption for 802.11b/g, 22 dBm for 6-contact XSON		140		mA	Figure 14
	Reference Voltage for 12-contact XQFN with 75 Ω resistor	2.75	2.85	2.95	V	Figure 12
V_{REG}	Reference Voltage for 6-contact XSON with 180Ω resistor	2.75	2.85	2.95	V	Figure 13
	Reference Voltage for 6-contact XSON with 390Ω resistor	2.75	2.85	2.95	V	Figure 14

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Table 5: AC Electrical Characteristics for Configuration at 25°C

Symbol	Parameter	Min.	Тур	Max.	Unit
F _{L-U}	Frequency range	2412		2484	MHz
G	Small signal gain	29	30		dB
G _{VAR1}	Gain variation over band (2412–2484 MHz)			±0.5	dB
G _{VAR2}	Gain ripple over channel (20 MHz)		0.2		dB
ACPR	Meet 11b spectrum mask	23			dBm
	Meet 11g OFDM 54 Mbps spectrum mask	23			dBm
Added EVM	@ 20 dBm output with 11g OFDM 54 Mbps signal		3		%
2f, 3f, 4f, 5f	Harmonics at 22 dBm, without external filters			-40	dBc

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Typical Performance Characteristics

Test Conditions: V_{CC} = 3.3V, T_A = 25°C, unless otherwise noted

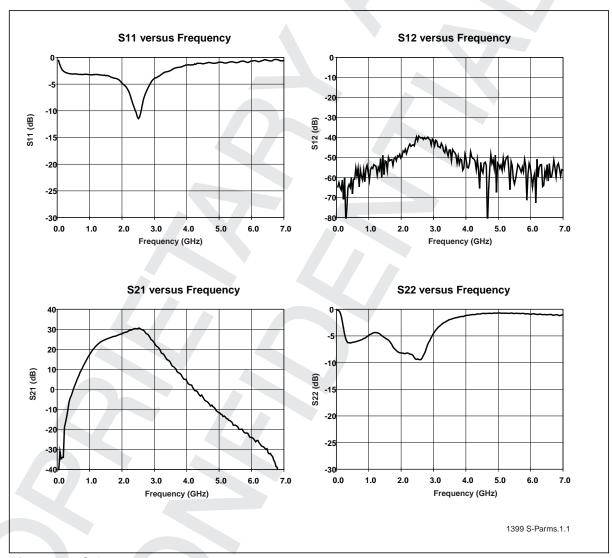


Figure 4: S-Parameters



Data Sheet

Typical Performance Characteristics

Test Conditions: $V_{CC} = 3.3V$, $T_A = 25^{\circ}C$, 54 Mbps 802.11g OFDM Signal, equalizer training using sequence plus data

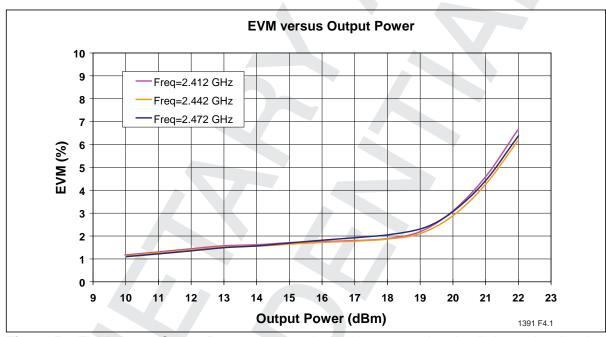


Figure 5: EVM versus Output Power measured with "sequence plus data" channel estimation

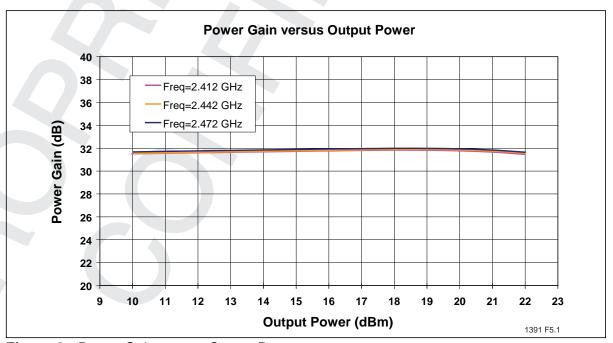


Figure 6: Power Gain versus Output Power



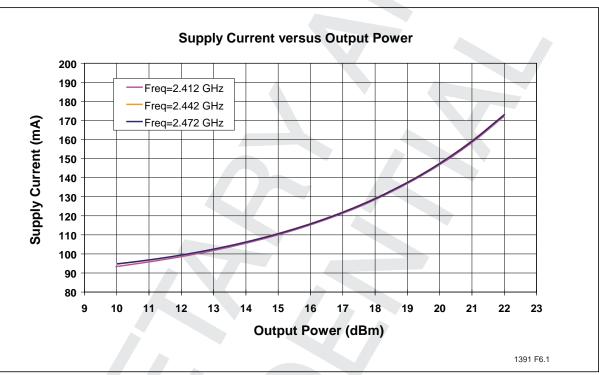


Figure 7: Total Current Consumption for 802.11g operation versus Output Power

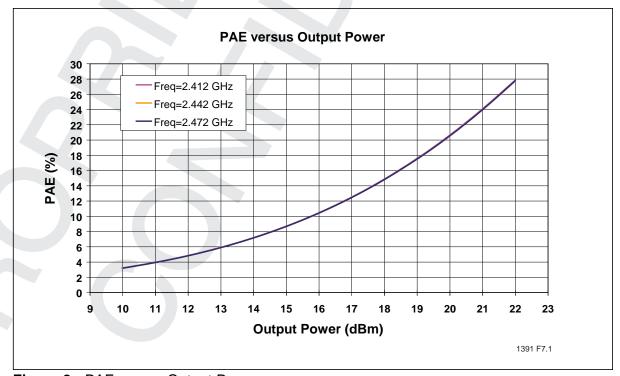


Figure 8: PAE versus Output Power



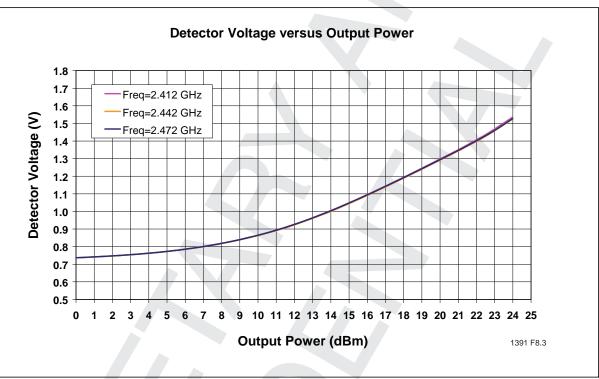


Figure 9: Detector Characteristics versus Output Power

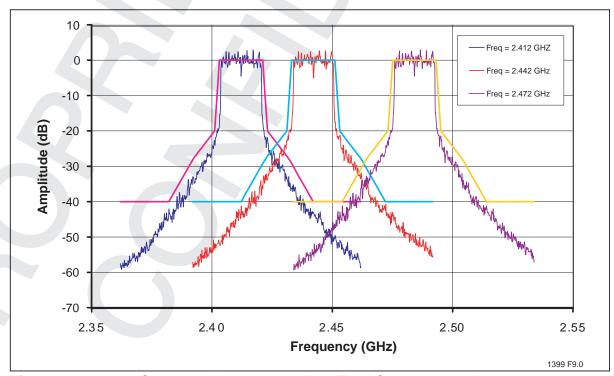


Figure 10:802.11g Spectrum Mask at 23.5 dBm, Total Current 200 mA



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Typical Performance Characteristics

Test Conditions: V_{CC} = 3.3V, T_A = 25°C, 1 Mbps 802.11b CCK Signal

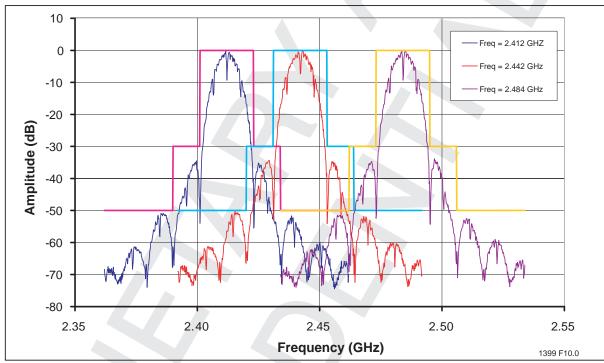


Figure 11:802.11b Spectrum Mask at 23.5 dBm, Total Current 200mA



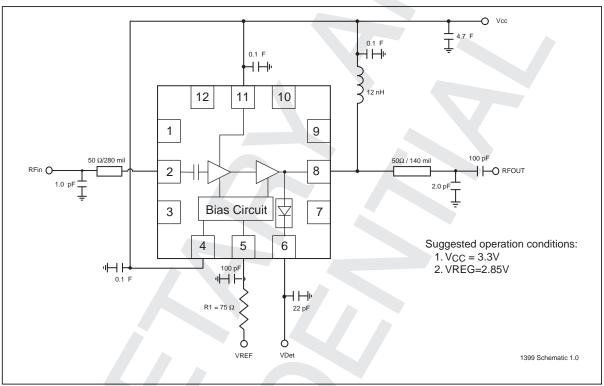


Figure 12: Typical Schematic for 12-Contact XQFN (QXB) for High-Power Applications

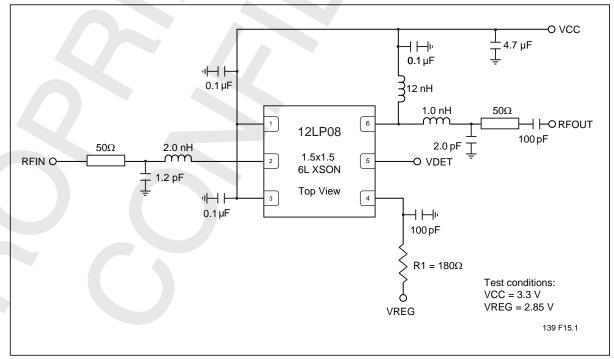


Figure 13: Typical Schematic for 6-Contact XSON (QX6) for High-Power Applications



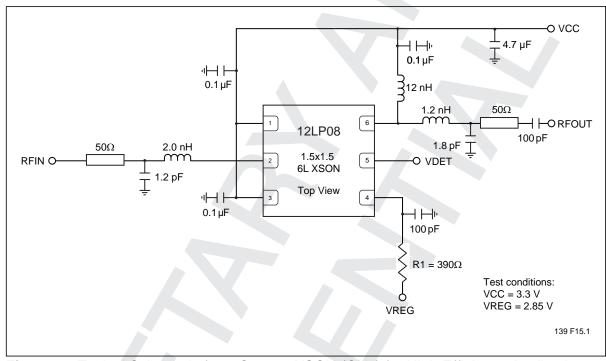
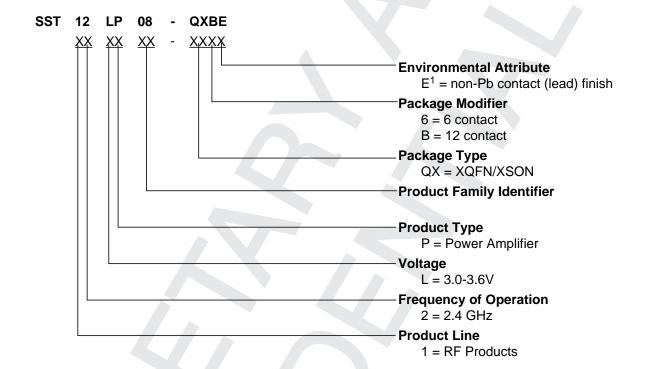


Figure 14: Typical Schematic for 6-Contact XSON (QX6) for High-Efficiency Applications



Data Sheet

Product Ordering Information



Valid combinations for SST12LP08

SST12LP08-QXBE

SST12LP08-QX6E

SST12LP08 Evaluation Kits

SST12LP08-QXBE-K

SST12LP08-QX6E-K

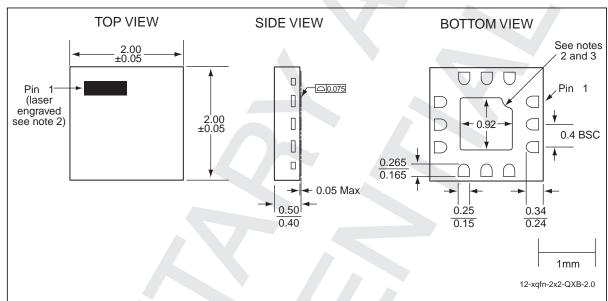
Note: Valid combinations are those products in mass production or will be in mass production. Consult your SST sales representative to confirm availability of valid combinations and to determine availability of new combinations.

Environmental suffix "E" denotes non-Pb solder. SST non-Pb solder devices are "RoHS Compliant".



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Packaging Diagrams



- Note: 1. Complies with JEDEC JEP95 MO-220J, variant VEED-4 except external paddle nominal dimensions and pull-back of terminals from body edge.
 - 2. The topside pin 1 indicator is laser engraved; its approximate shape and location is as shown.
 - 3. From the bottom view, the pin 1 indicator may be either a curved indent or a 45-degree chamfer.
 - 3. The external paddle is electrically connected to the die back-side and possibly to certain V_{SS} leads. This paddle must be soldered to the PC board; it is required to connect this paddle to the V_{SS} of the unit. Connection of this paddle to any other voltage potential will result in shorts and electrical malfunction of the device.
 - 4. Untoleranced dimensions are nominal target dimensions.
 - 5. All linear dimensions are in millimeters (max/min).

Figure 15:12-Contact Extremely-thin Quad Flat No-lead (XQFN) SST Package Code: QXB



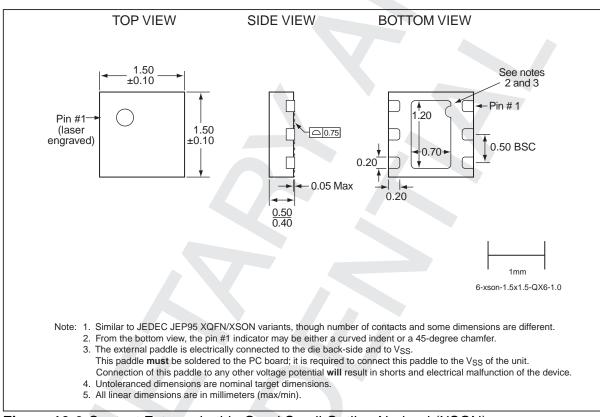


Figure 16:6-Contact Extremely-thin Quad Small Outline No-lead (XSON) SST Package Code: QX6



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Table 6: Revision History

Revision	Description	Date
00	Initial release of data sheet	Apr 2009
01	Revised Figure 9 on page 11	May 2009
02	Added information for Qx6 package.	Aug 2009
	Revised Table 4	
03	Updated "Electrical Specifications" and Table 4	Nov 2009
04	Changed document status to "Data Sheet."	Feb 2010
А	Applied new document format	Mar 2012
	Released document under letter revision system	
	 Updated Spec number from S71399 to DS75073 	
В	Updated Figure 15 on page 16 to reflect new Pin1 indicator	Jun 2012
	 Updated "Test Conditions" statement on page 9 	

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