



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**
 - ~34%/200 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 μ A)**
- **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



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} ~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.



Functional Blocks

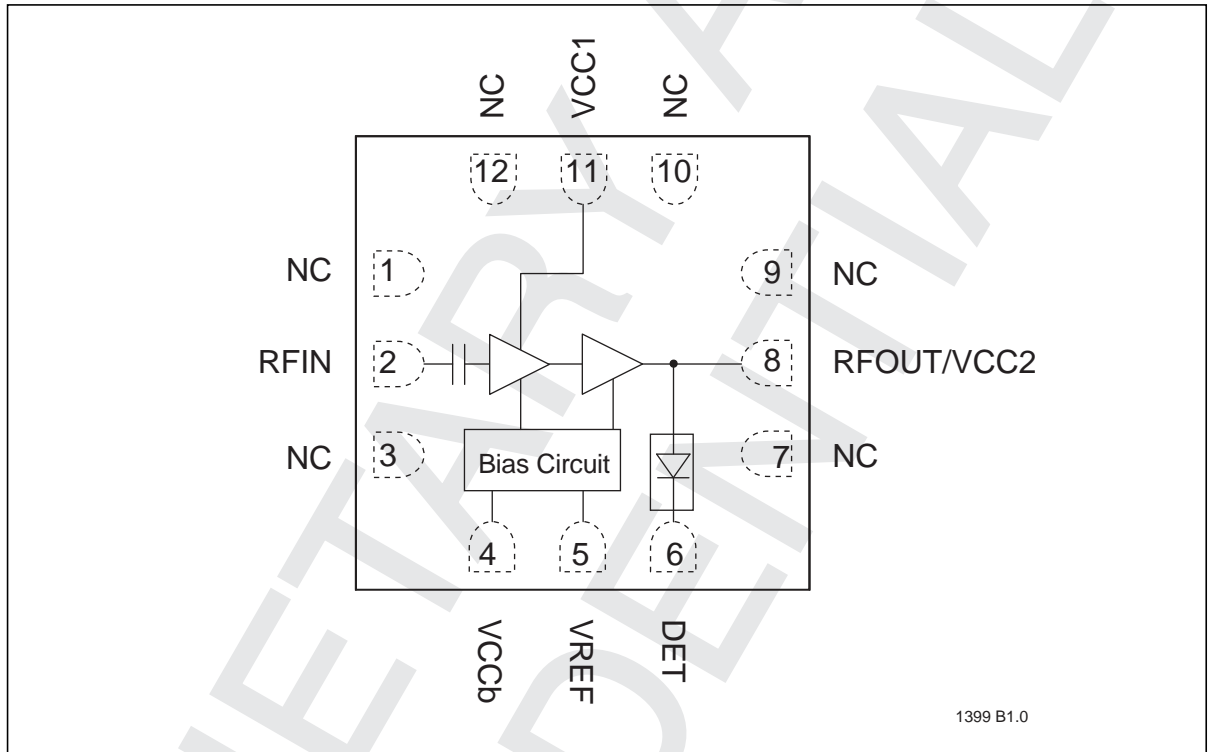


Figure 1: Functional Block Diagram 12-Contact XQFN (QXB)

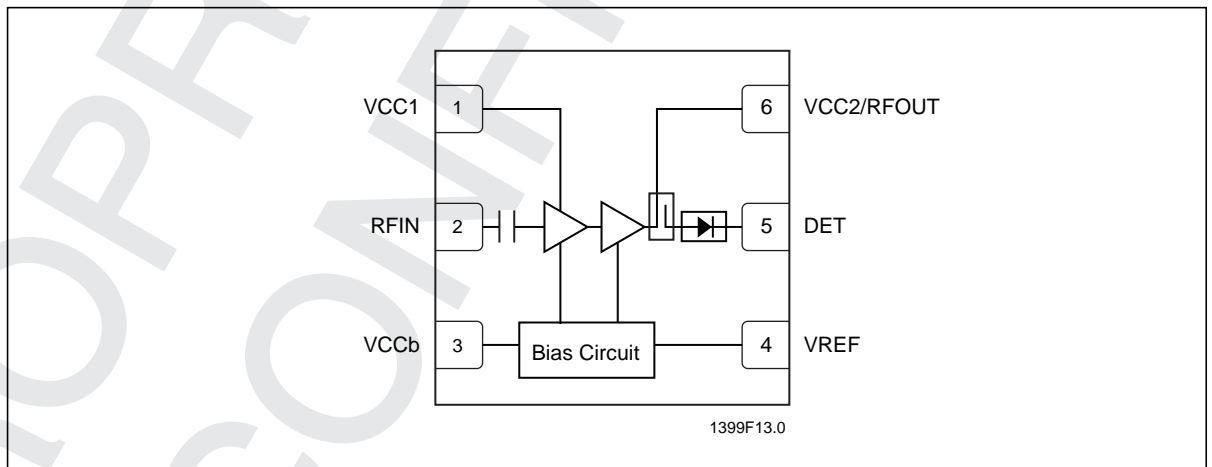


Figure 2: Functional Block Diagram 6-Contact XSON (QX6)



Pin Assignments

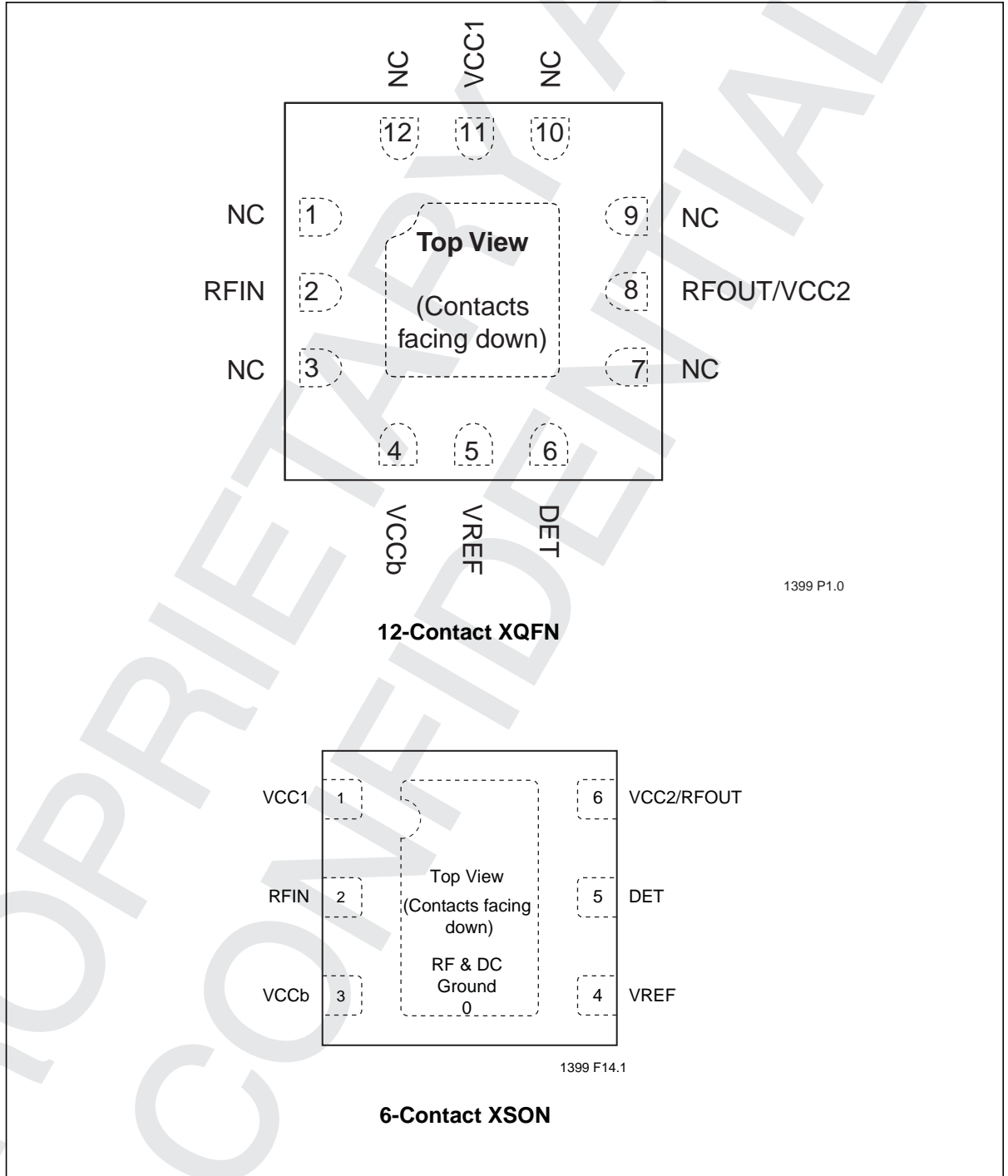


Figure 3: Pin Assignments



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 | | I | 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 | | O | 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 |

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1. I=Input, O=Output

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

| Symbol | Pin No. | Pin Name | Type ¹ | Function |
|-------------|---------|--------------|-------------------|--|
| GND | 0 | Ground | | Low inductance GND pad |
| VCC1 | 1 | Power Supply | PWR | Power supply, 1 st stage |
| RFIN | 2 | | I | RF input, DC decoupled |
| VCCb | 3 | Power Supply | PWR | Supply voltage for bias circuit |
| VREF | 4 | | PWR | 1 st and 2 nd stage idle current control |
| Det | 5 | | O | On-chip power detector |
| VCC2/ RFOUT | 6 | Power Supply | PWR/O | Power supply, 2 nd stage/ RF Output |

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1. I=Input, O=Output



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 | 260°C for 10 seconds |

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

Table 3: Operating Range

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

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Table 4: DC Electrical Characteristics at 25°C

| Symbol | Parameter | Min. | Typ | Max. | Unit | Test Conditions |
|--------------------------------|--|------|------|------|------|-------------------|
| V _{CC} | Supply Voltage at pins 4, 8, 11 for 12-contact XQFN | 2.75 | 3.3 | 4.2 | V | Figure 12 |
| | Supply Voltage at pins 1, 3, 6 for 6-contact XSON | 2.75 | 3.3 | 4.2 | V | Figures 13 and 14 |
| I _{CC} | Idle current for 802.11g to meet EVM ~3% @ 20 dBm for 12-contact XQFN | | 85 | | mA | Figure 12 |
| | 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 | | 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 |
| I _{CC} (802.11b/g) | Current consumption for 802.11b/g, 23.5 dBm for 12-contact XQFN | | 200 | | mA | Figure 12 |
| | 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 |
| V _{REG} | Reference Voltage for 12-contact XQFN with 75Ω resistor | 2.75 | 2.85 | 2.95 | V | Figure 12 |
| | 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. | Typ | 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: $V_{CC} = 3.3V$, $T_A = 25^\circ C$, unless otherwise noted

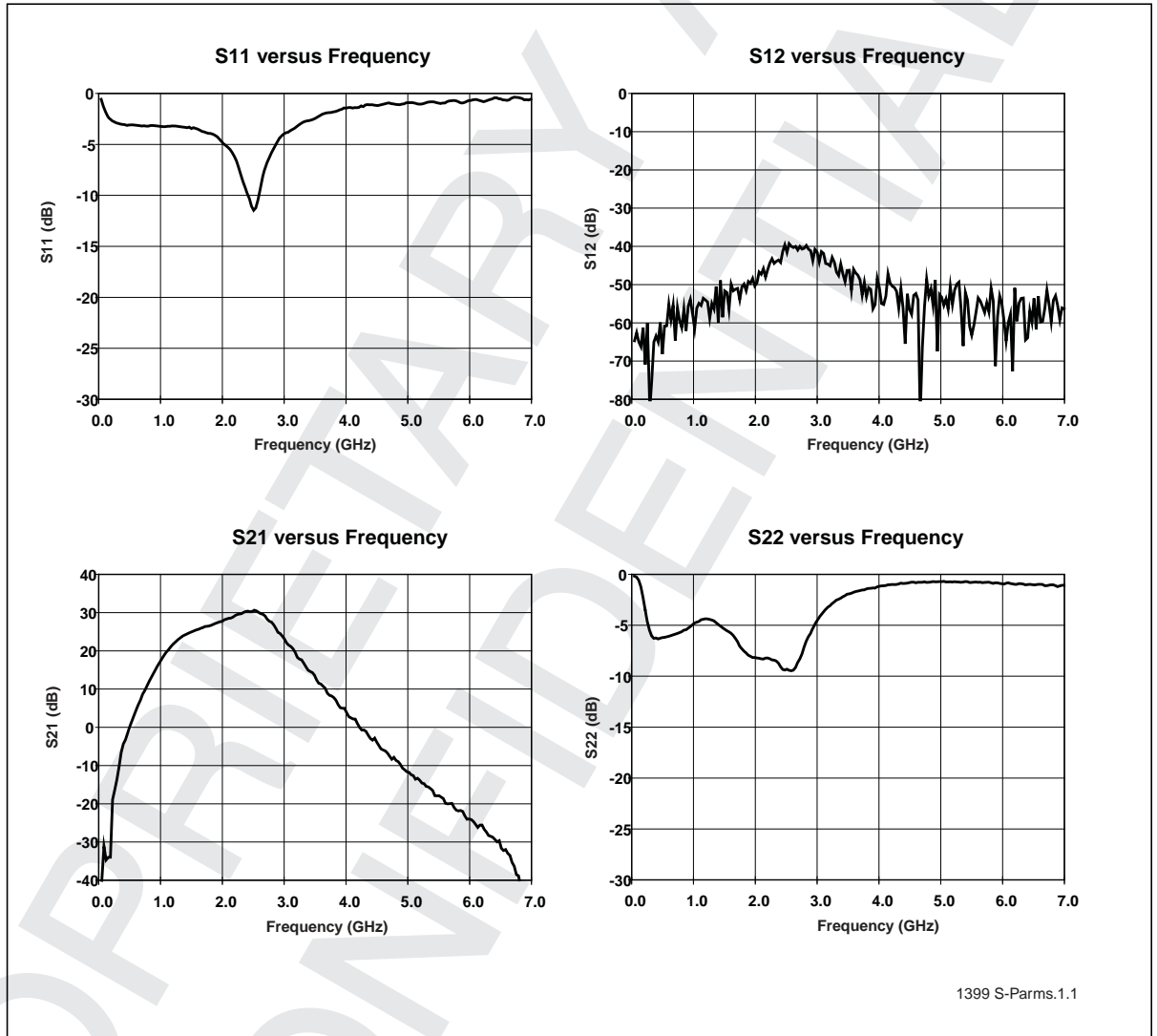


Figure 4: S-Parameters



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

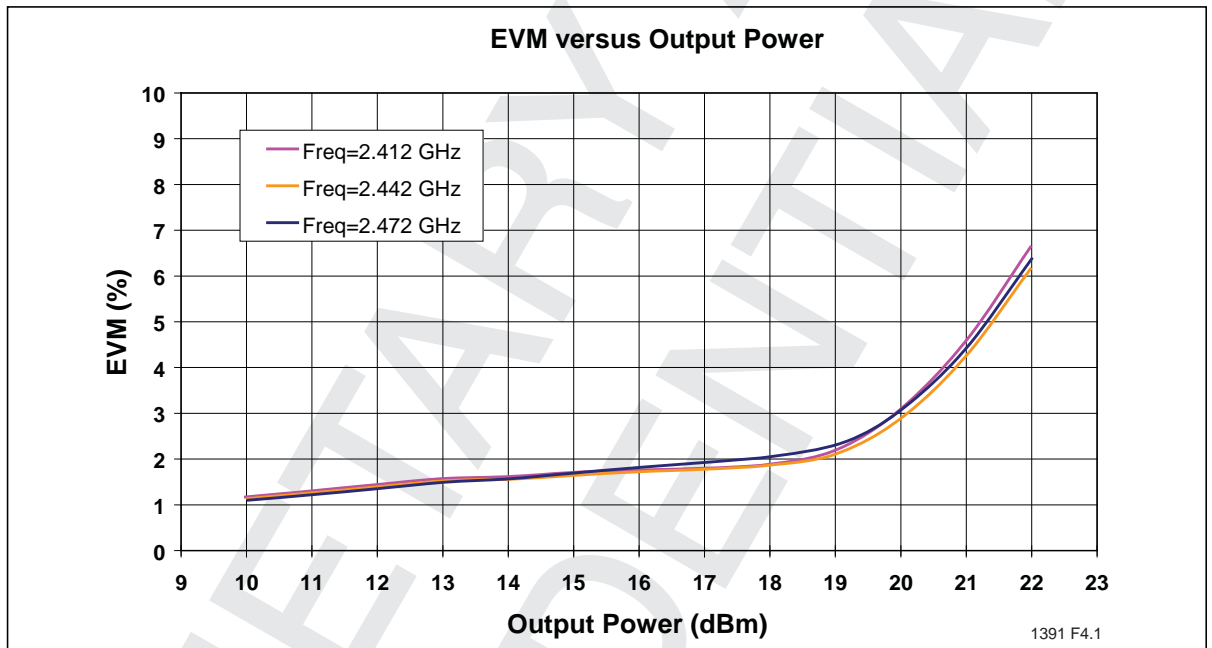


Figure 5: EVM versus Output Power measured with “sequence plus data” channel estimation

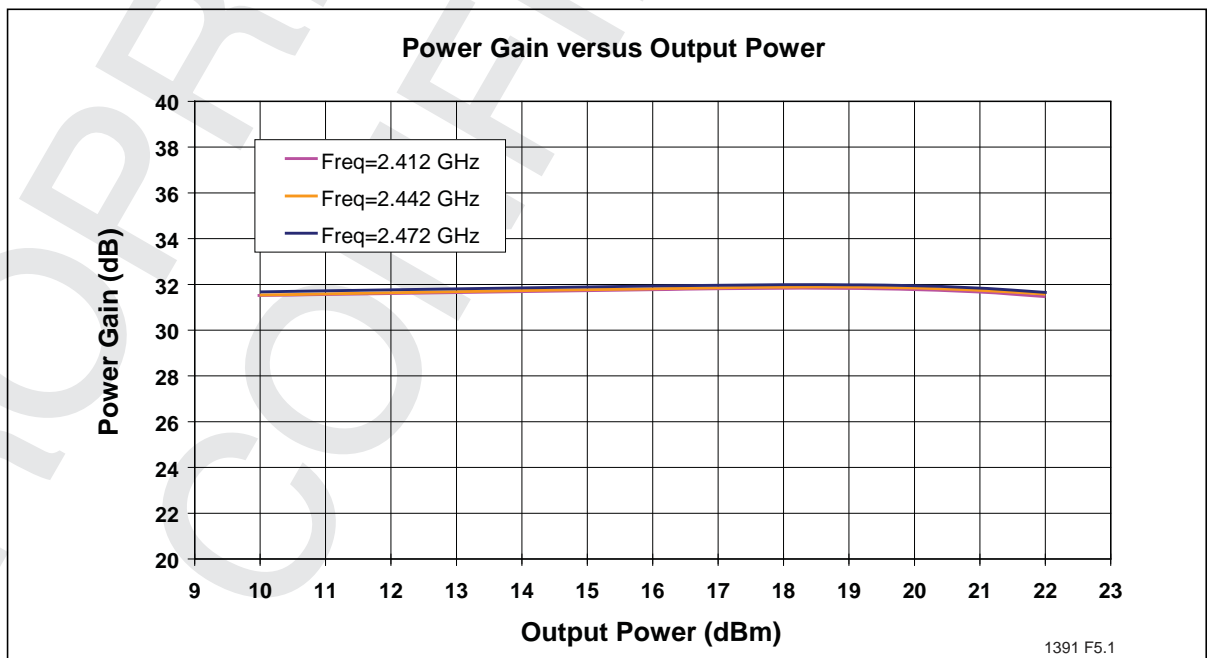


Figure 6: Power Gain versus Output Power

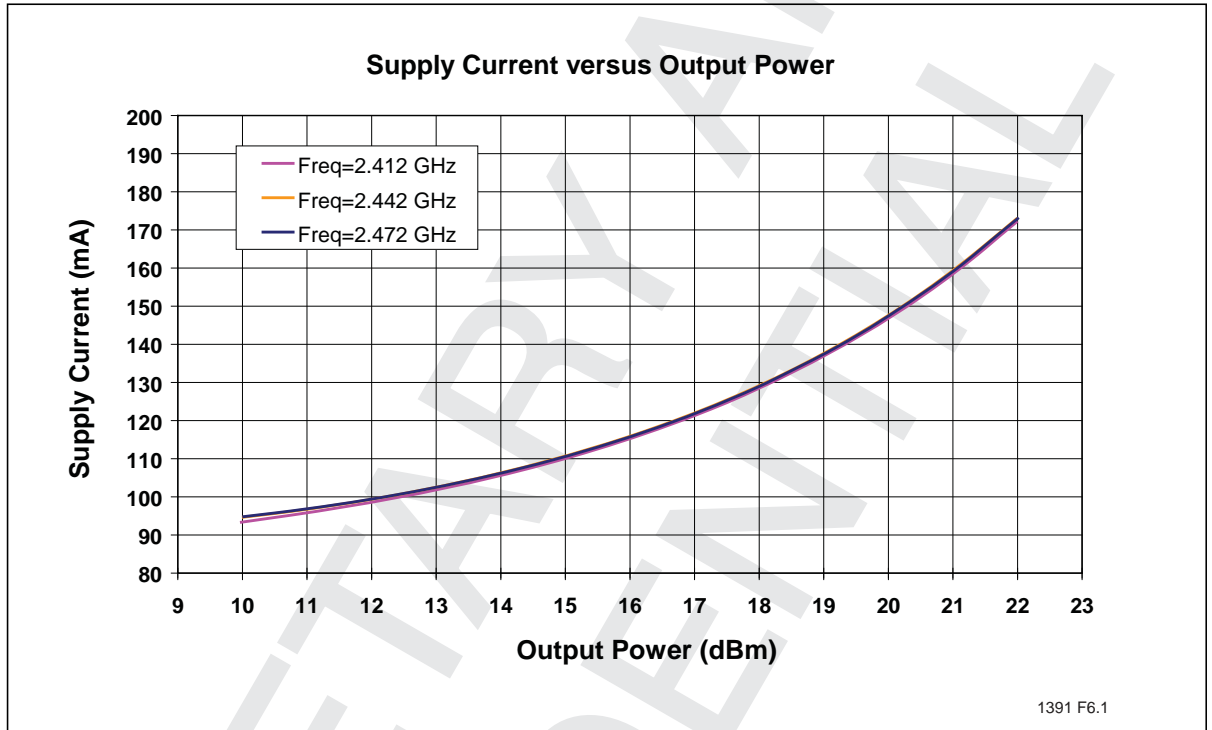


Figure 7: Total Current Consumption for 802.11g operation versus Output Power

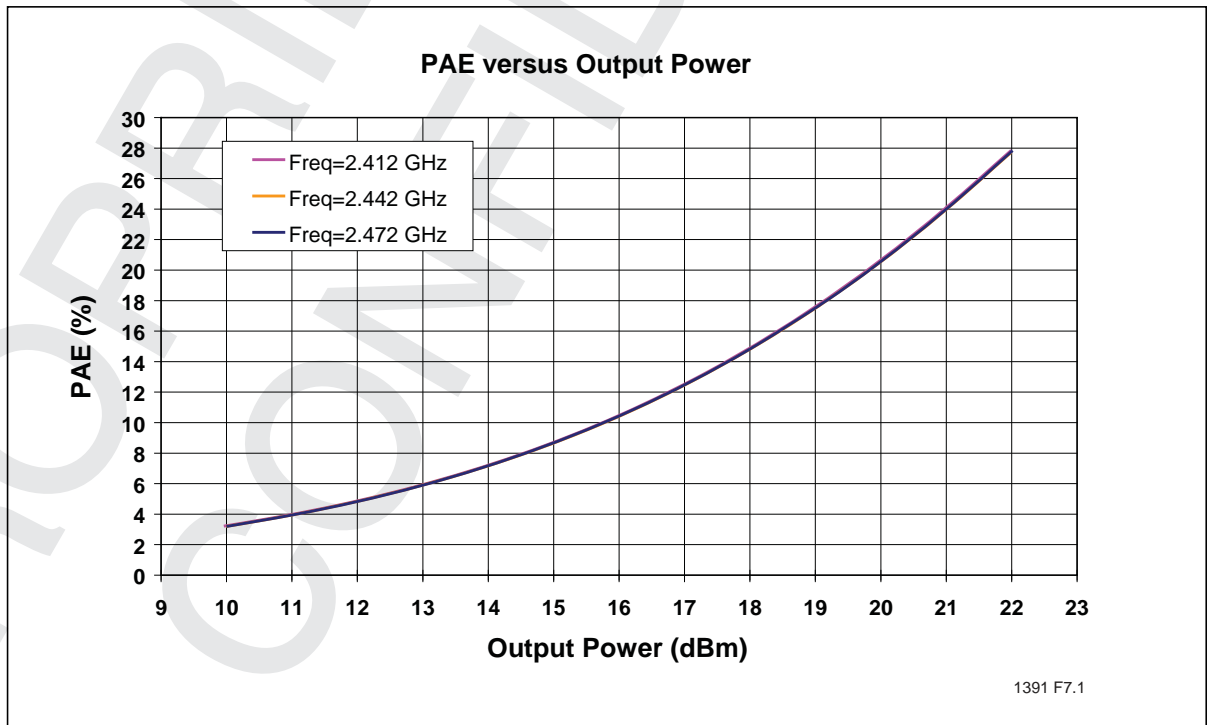


Figure 8: PAE versus Output Power



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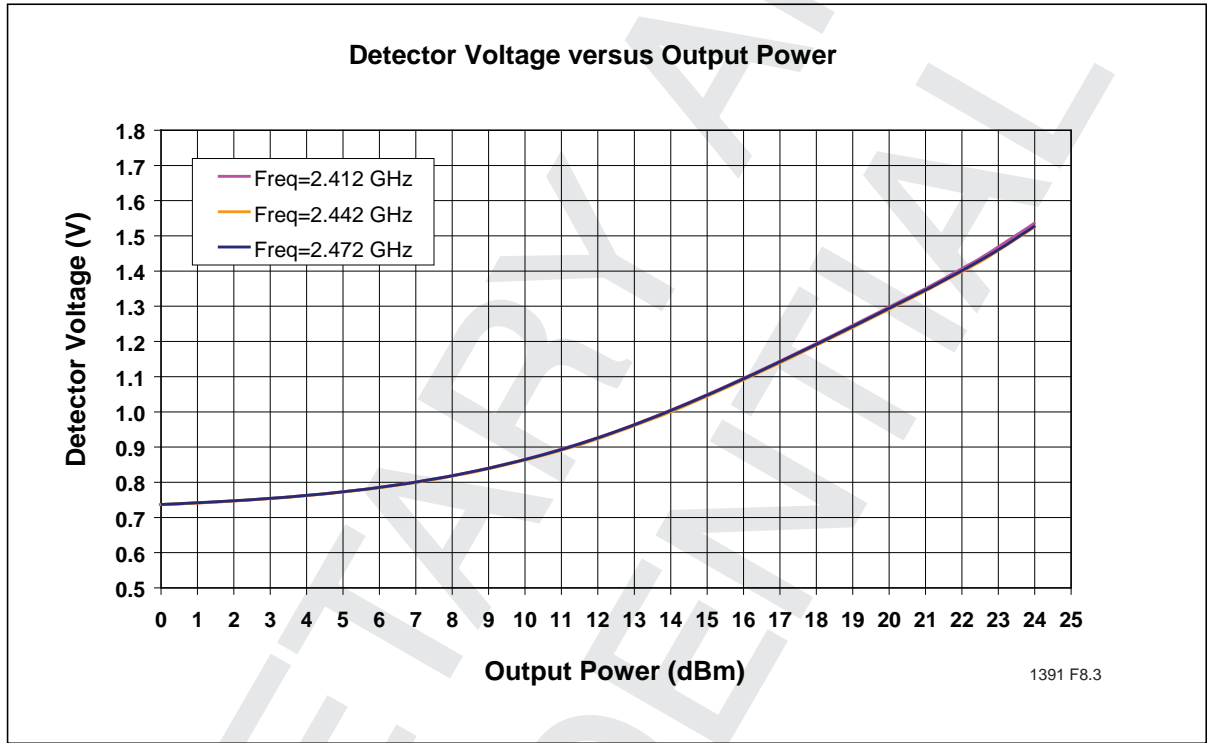


Figure 9: Detector Characteristics versus Output Power

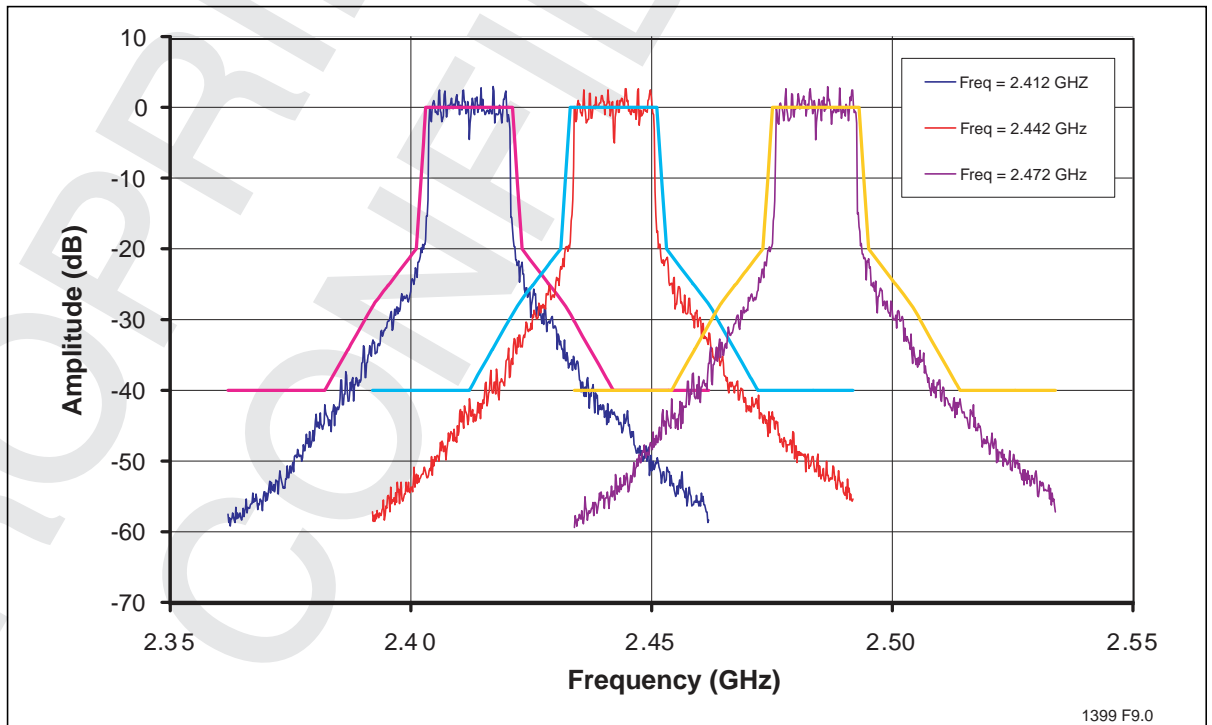


Figure 10: 802.11g Spectrum Mask at 23.5 dBm, Total Current 200 mA



Typical Performance Characteristics

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

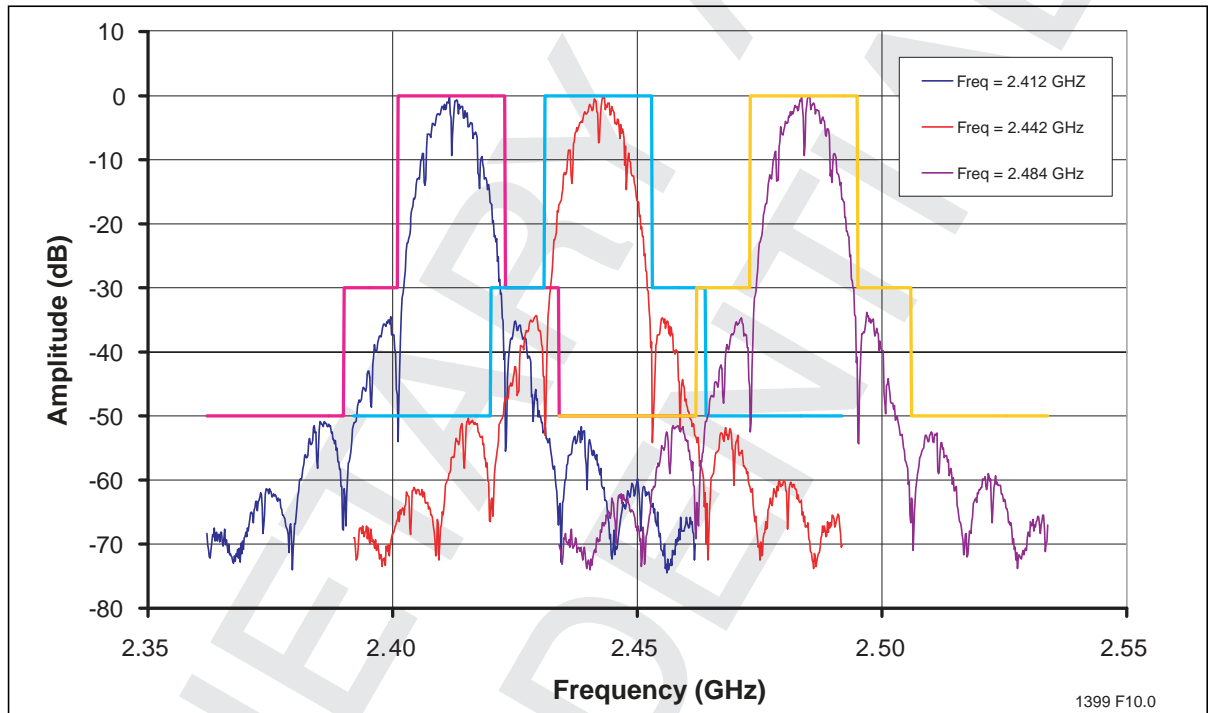


Figure 11: 802.11b Spectrum Mask at 23.5 dBm, Total Current 200mA



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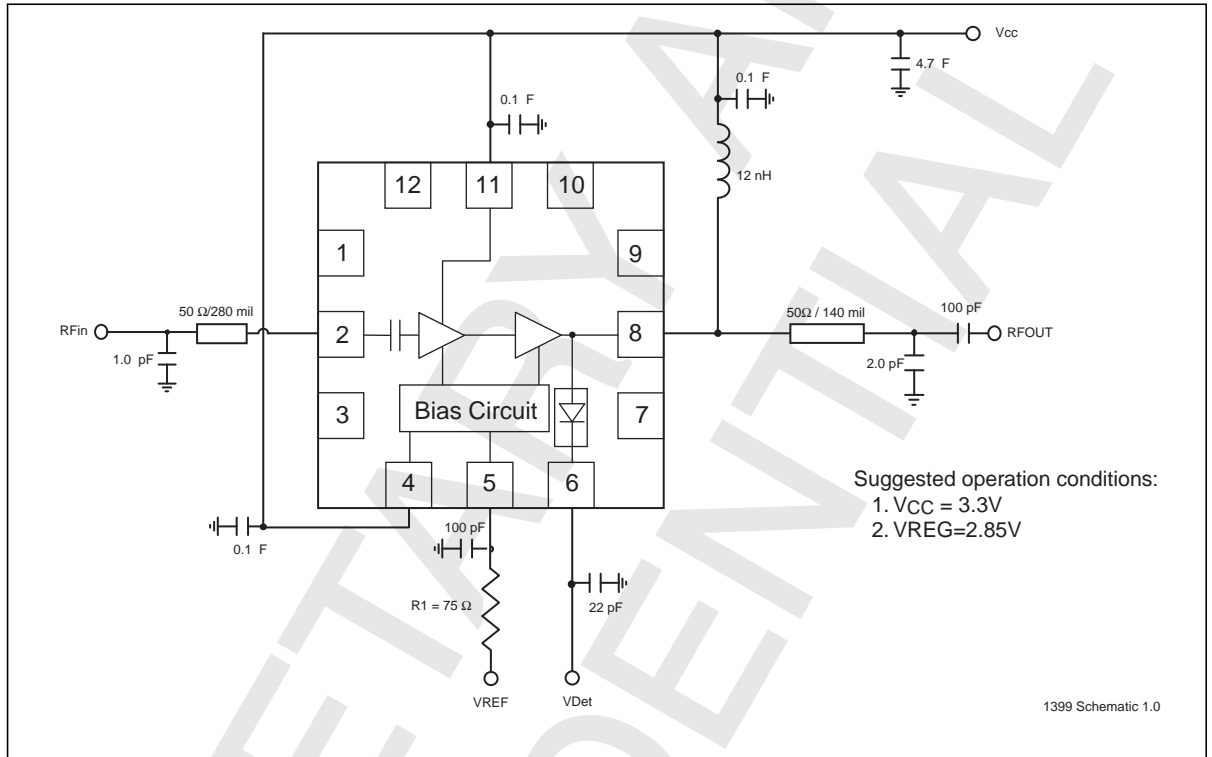


Figure 12: Typical Schematic for 12-Contact XQFN (QXB) for High-Power Applications

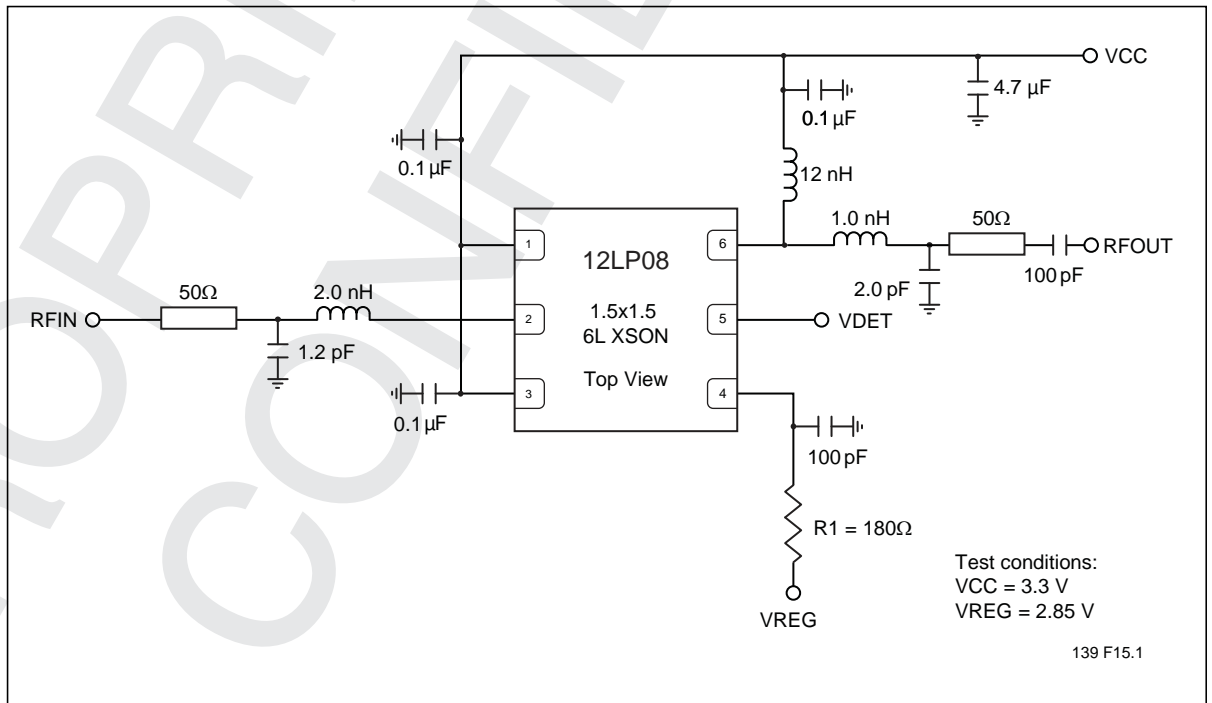


Figure 13: Typical Schematic for 6-Contact XSON (QX6) for High-Power Applications



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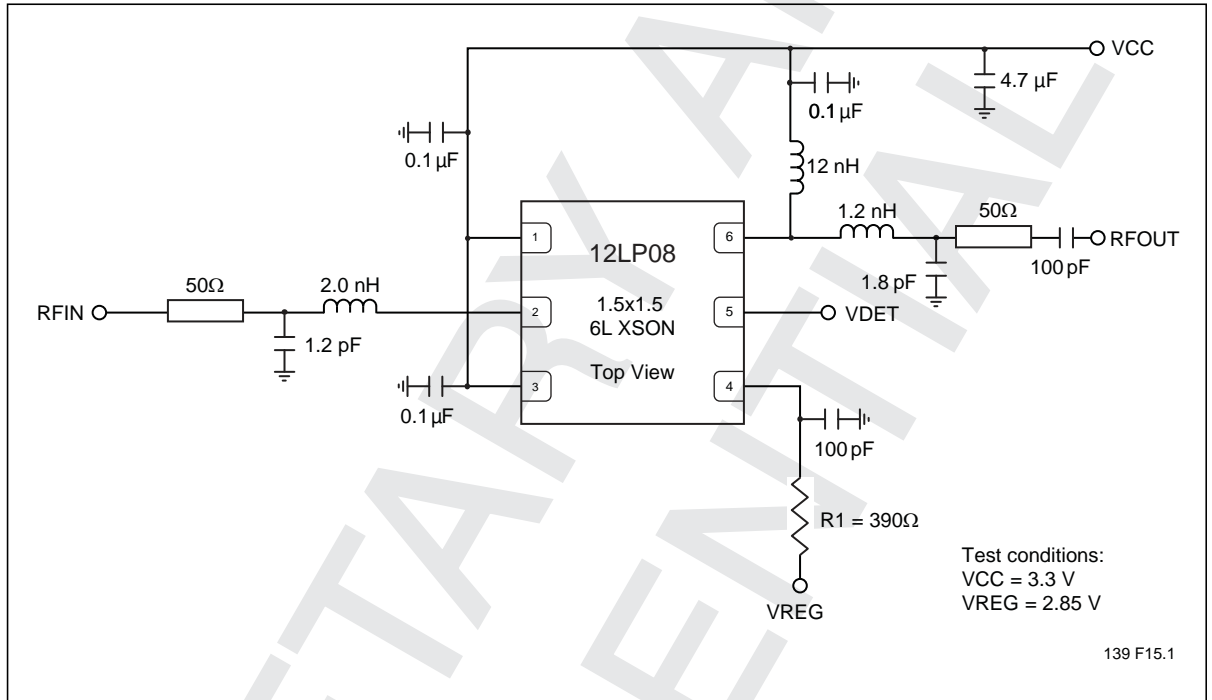
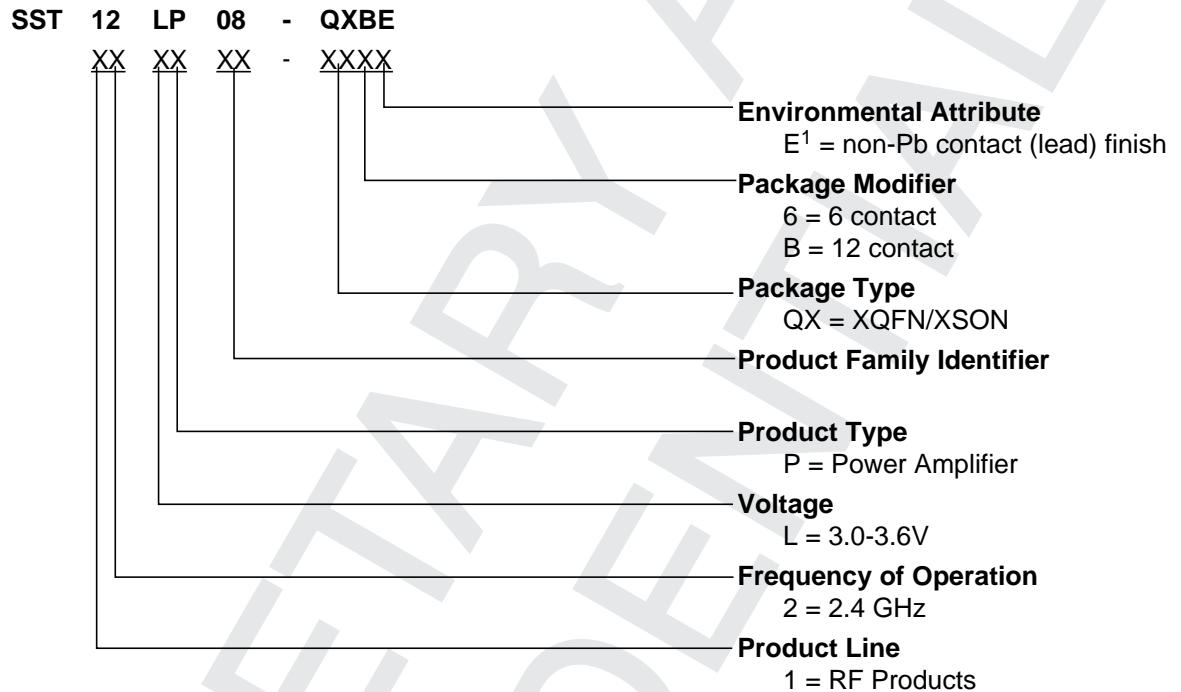


Figure 14: Typical Schematic for 6-Contact XSON (QX6) for High-Efficiency Applications



Product Ordering Information



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

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.



Packaging Diagrams

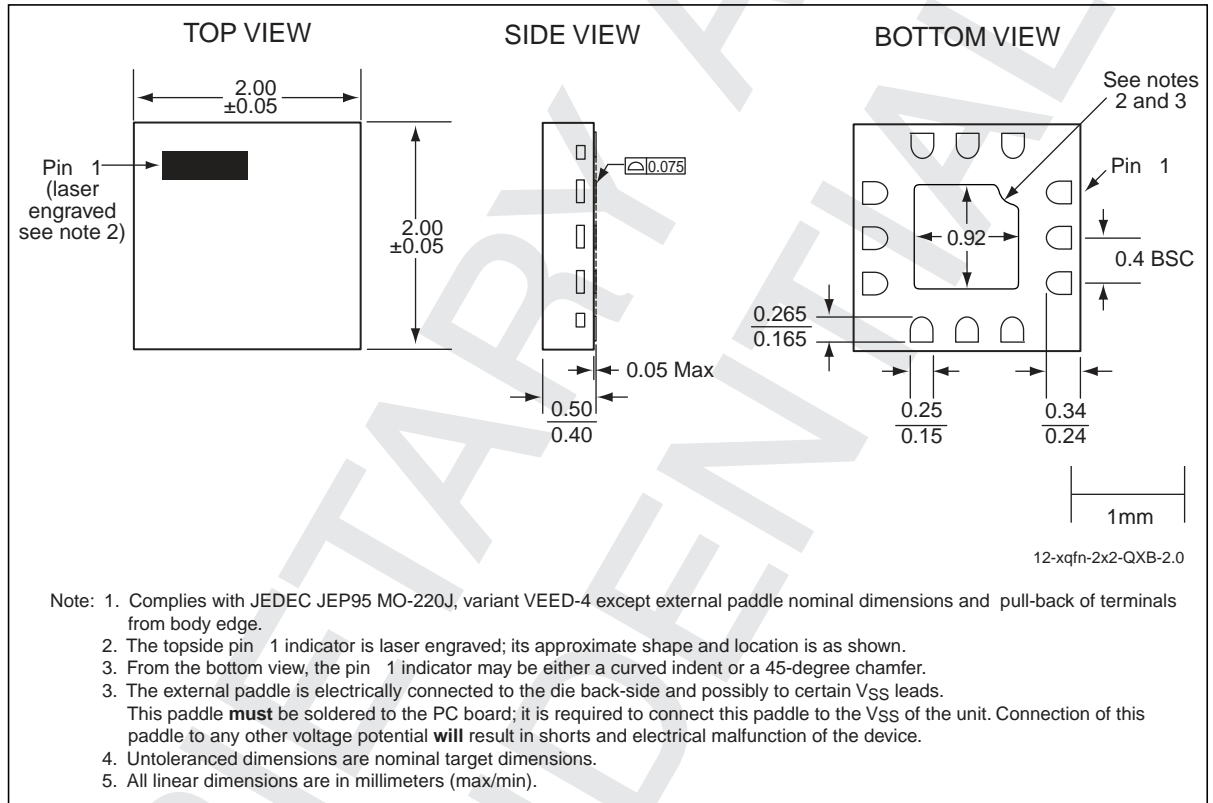


Figure 15: 12-Contact Extremely-thin Quad Flat No-lead (XQFN)
SST Package Code: QXB



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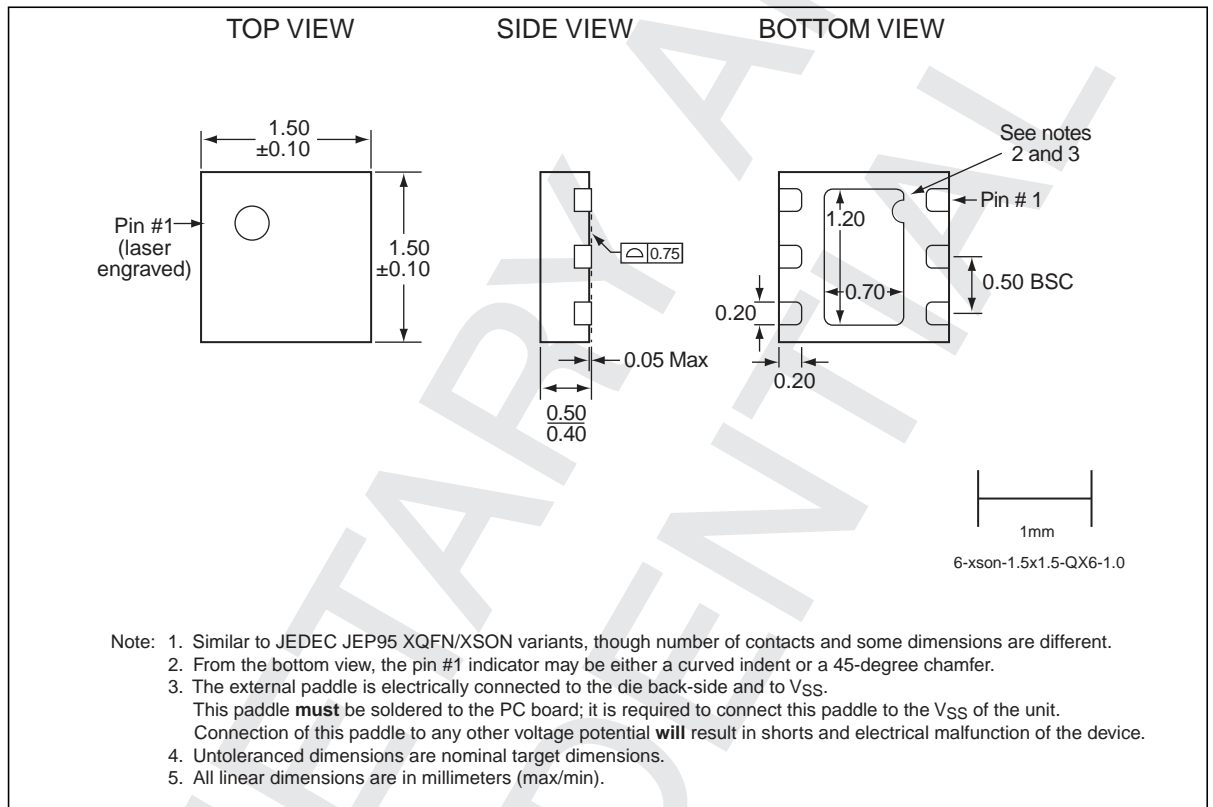


Figure 16: 6-Contact Extremely-thin Quad Small Outline No-lead (XSON)
SST Package Code: QX6



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Table 6:Revision History

| Revision | Description | Date |
|----------|---|----------|
| 00 | <ul style="list-style-type: none"> Initial release of data sheet | Apr 2009 |
| 01 | <ul style="list-style-type: none"> Revised Figure 9 on page 11 | May 2009 |
| 02 | <ul style="list-style-type: none"> Added information for Qx6 package. Revised Table 4 | Aug 2009 |
| 03 | <ul style="list-style-type: none"> Updated "Electrical Specifications" and Table 4 | Nov 2009 |
| 04 | <ul style="list-style-type: none"> Changed document status to "Data Sheet." | Feb 2010 |
| A | <ul style="list-style-type: none"> Applied new document format Released document under letter revision system Updated Spec number from S71399 to DS75073 | Mar 2012 |
| B | <ul style="list-style-type: none"> Updated Figure 15 on page 16 to reflect new Pin1 indicator Updated "Test Conditions" statement on page 9 | Jun 2012 |

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