The SST12LP07A is a versatile power amplifier based on the highly-reliable InGaP/GaAs HBT technology. It is easily configured for high-power applications with excellent (30.8%) power-added efficiency, operating over the 2.4-2.5 GHz frequency band and meeting 802.11 b/g spectrum mask at 23.5 dBm. The SST12LP07A has excellent linearity, typically ~2.5% added EVM at 20 dBm output power, which is essential for 54 Mbps 802.11g/n operation. The Power Amplifier has an excellent on-chip, single-ended power detector, providing a reliable solution to board-level power control. The SST12LP07A is offered in a 12-contact XQFN package.

Features

- **High Gain:**
  - Typically 28 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 5
  - Meets 802.11g OFDM ACPR requirement up to 23.5 dBm
  - ~2.5% added EVM up to 20 dBm for 54 Mbps 802.11g signal
  - Meets 802.11b ACPR requirement up to 24 dBm
- **High power-added efficiency/Low operating current for both 802.11g/b applications**
  - ~30.8%/220 mA @ POUT = 23.5 dBm for both 802.11g and 802.11b
- **Single-pin low IREF power-up/down control**
  - IREF <2 mA
- **Low idle current**
  - ~70 mA ICQ
- **High-speed power-up/down**
  - Turn on/off time (10%: 90%) <100 ns
  - Typical power-up/down delay with driver delay included <200 ns
- **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
- **All non-Pb (lead-free) devices are RoHS compliant**

Applications

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

The SST12LP07A is a versatile power amplifier based on the highly-reliable InGaP/GaAs HBT technology.

The SST12LP07A 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 28 dB gain with 30.8% power-added efficiency @ P_OUT = 23.5 dBm for both 802.11g and 802.11b.

The SST12LP07A has excellent linearity, typically ~2.5% 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 SST12LP07A 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 SST12LP07A controllable by an on/off switching signal directly from the baseband chip. These features coupled with low operating current make the SST12LP07A ideal for the final stage power amplification in battery-powered 802.11g/b WLAN transmitter applications.

The SST12LP07A 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 SST12LP07A is offered in 12-contact XQFN package. See Figure 2 for pin assignments and Table 1 for pin descriptions.
Functional Blocks

Figure 1: Functional Block Diagram
Pin Assignments

Figure 2: Pin Assignments for 12-contact XQFN

Pin Descriptions

Table 1: Pin Description

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Pin No.</th>
<th>Pin Name</th>
<th>Type¹</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>GND</td>
<td>0</td>
<td>Ground</td>
<td></td>
<td>Low-inductance GND pad</td>
</tr>
<tr>
<td>NC</td>
<td>1</td>
<td>No Connection</td>
<td></td>
<td>Unconnected pin</td>
</tr>
<tr>
<td>RFIN</td>
<td>2</td>
<td>No Connection</td>
<td></td>
<td>RF input, DC decoupled</td>
</tr>
<tr>
<td>NC</td>
<td>3</td>
<td>No Connection</td>
<td></td>
<td>Unconnected pin</td>
</tr>
<tr>
<td>VCCb</td>
<td>4</td>
<td>Power Supply</td>
<td>PWR</td>
<td>Supply voltage for bias circuit</td>
</tr>
<tr>
<td>VREF</td>
<td>5</td>
<td>Power Supply</td>
<td>PWR</td>
<td>1st and 2nd stage idle current control</td>
</tr>
<tr>
<td>Det</td>
<td>6</td>
<td>O</td>
<td></td>
<td>On-chip power detector</td>
</tr>
<tr>
<td>NC</td>
<td>7</td>
<td>No Connection</td>
<td></td>
<td>Unconnected pin</td>
</tr>
<tr>
<td>VCC2/RFOUT</td>
<td>8</td>
<td>Power Supply</td>
<td>PWR/O</td>
<td>Power Supply, 2nd stage / RF output</td>
</tr>
<tr>
<td>NC</td>
<td>9</td>
<td>No Connection</td>
<td></td>
<td>Unconnected pin</td>
</tr>
<tr>
<td>NC</td>
<td>10</td>
<td>No Connection</td>
<td></td>
<td>Unconnected pin</td>
</tr>
<tr>
<td>VCC1</td>
<td>11</td>
<td>Power Supply</td>
<td>PWR</td>
<td>Power supply, 1st stage</td>
</tr>
<tr>
<td>NC</td>
<td>12</td>
<td>No Connection</td>
<td></td>
<td>Unconnected pin</td>
</tr>
</tbody>
</table>

¹. I=Input, O=Output
2.4 GHz High-Power, High-Gain Power Amplifier
SST12LP07A

Data Sheet

Electrical Specifications

The AC and DC specifications for the power amplifier interface signals. Refer to Table 3 for the DC voltage and current specifications. Refer to Figures 3 through 10 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 (PIN) ..................................................... +5 dBm
Average output power (P_{OUT})¹ ................................................ +26 dBm
Supply Voltage at pins 4, 8, and 11 (V_{CC}) .......................... -0.3V to +4.6V
Reference voltage to pin 5 (V_{REF}) ..................................... -0.3V to +3.3V
DC supply current (I_{CC})² ............................................. 300 mA
Operating Temperature (T_A) ........................... -40ºC to +85ºC
Storage Temperature (T_{STG}) ................................. -40ºC to +120ºC
Maximum Junction Temperature (T_J) ......................... +150ºC
Surface Mount Solder Reflow Temperature ....................... 260ºC 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 2: Operating Range

<table>
<thead>
<tr>
<th>Range</th>
<th>Ambient Temp</th>
<th>V_{CC}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial</td>
<td>-40ºC to +85ºC</td>
<td>3.3V</td>
</tr>
</tbody>
</table>

Table 3: DC Electrical Characteristics at 25ºC

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Min.</th>
<th>Typ</th>
<th>Max.</th>
<th>Unit</th>
<th>Test Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{CC}</td>
<td>Supply Voltage at pins 4, 8, 11</td>
<td>3.0</td>
<td>3.3</td>
<td>4.2</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>I_{CC}</td>
<td>Supply Current for 802.11g, 23.5 dBm</td>
<td>220</td>
<td></td>
<td></td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>for 802.11b, 23.5 dBm</td>
<td>220</td>
<td></td>
<td></td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>I_{Q}</td>
<td>Idle current for 802.11g to meet EVM ~2.5% @ 20 dBm</td>
<td>70</td>
<td></td>
<td></td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>V_{REG}</td>
<td>Reference Voltage for, with 130Ω resistor</td>
<td>2.75</td>
<td>2.85</td>
<td>2.95</td>
<td>V</td>
<td></td>
</tr>
</tbody>
</table>
### 2.4 GHz High-Power, High-Gain Power Amplifier

**SST12LP07A**

**Data Sheet**

#### Table 4: AC Electrical Characteristics for Configuration at 25°C

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Min.</th>
<th>Typ</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>FL-U</td>
<td>Frequency range</td>
<td>2412</td>
<td></td>
<td>2484</td>
<td>MHz</td>
</tr>
<tr>
<td>G</td>
<td>Small signal gain</td>
<td>27</td>
<td>28</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>G VAR1</td>
<td>Gain variation over band (2412–2484 MHz)</td>
<td></td>
<td></td>
<td>±0.5</td>
<td>dB</td>
</tr>
<tr>
<td>G VAR2</td>
<td>Gain ripple over channel (20 MHz)</td>
<td></td>
<td></td>
<td>0.2</td>
<td>dB</td>
</tr>
<tr>
<td>ACPR</td>
<td>Meet 11b spectrum mask</td>
<td>23</td>
<td></td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td></td>
<td>Meet 11g OFDM 54 Mbps spectrum mask</td>
<td>23</td>
<td></td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td>Added EVM</td>
<td>@ 20 dBm output with 11g OFDM 54 Mbps signal</td>
<td></td>
<td></td>
<td>2.5</td>
<td>%</td>
</tr>
<tr>
<td>2f, 3f, 4f, 5f</td>
<td>Harmonics at 22 dBm, without external filters</td>
<td></td>
<td></td>
<td>-40</td>
<td>dBc</td>
</tr>
</tbody>
</table>
Typical Performance Characteristics

Test Conditions: \( V_{CC} = 3.3V, T_A = 25^\circ C \), unless otherwise specified

**Figure 3:** S-Parameters
Typical Performance Characteristics

Test Conditions: \( V_{CC} = 3.3V, \ T_A = 25^\circ C, \ 54 \text{ Mbps} \ 802.11g \text{ OFDM Signal} \)

**Figure 4:** EVM versus Output Power

**Figure 5:** Power Gain versus Output Power
2.4 GHz High-Power, High-Gain Power Amplifier
SST12LP07A

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Figure 6: Total Current Consumption for 802.11g operation versus Output Power

Figure 7: PAE versus Output Power
Figure 8: Detector Characteristics versus Output Power

Figure 9: 802.11g Spectrum Mask at 23.5 dBm, Total Current 220 mA
Typical Performance Characteristics

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

Figure 10: 802.11b Spectrum Mask at 23.5 dBm, Total Current 220 mA
Figure 11: Typical Schematic for High-Power/High-Efficiency 802.11b/g Applications

Suggested operation conditions:
1. \( V_{CC} = 3.3V \)
2. \( V_{REG}=2.85V \)

Can be replaced by a \(~1.5\) nH chip inductor for compactness.
Product Ordering Information

Valid combinations for SST12LP07A
SST12LP07A-QXBE

SST12LP07A Evaluation Kits
SST12LP07A-QXBE-K

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

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

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.
4. The external paddle is electrically connected to the die back-side and possibly to certain VSS leads.
   This paddle must be soldered to the PC board; it is required to connect this paddle to the VSS of the unit. Connection of this paddle to any other voltage potential will result in shorts and electrical malfunction of the device.
5. Untoleranced dimensions are nominal target dimensions.
6. All linear dimensions are in millimeters (max/min).
### Table 5: Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Initial release of data sheet</td>
<td>Aug 2008</td>
</tr>
<tr>
<td>01</td>
<td>Revised “Features” and “Product Description” on page 2</td>
<td>Nov 2008</td>
</tr>
<tr>
<td></td>
<td>Updated Table 3 and Table 4 on page 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Modified Figure 11</td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>Updated Contact Information</td>
<td>Mar 2009</td>
</tr>
<tr>
<td>A</td>
<td>Updated “Absolute Maximum Stress Ratings” on page 5 from 4.0V to 4.6V</td>
<td>Mar 2012</td>
</tr>
<tr>
<td></td>
<td>Updated max Supply Voltage in Table 3 on page 5 from 3.6V to 4.2V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Applied new document format</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Released document under letter revision system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Updated Spec number from S71391 to DS75039</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Updated Figure 12 to reflect new Pin1 indicator.</td>
<td>May 2012</td>
</tr>
</tbody>
</table>


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Memory sizes denote raw storage capacity; actual usable capacity may be less.

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