FEATURES:

- **High Gain:**
  - Typically 29 dB gain across 2.4-2.5 GHz
  - Typically 29-26 dB gain across 4.9-5.8 GHz

- **High linear output power:**
  - >25 dBm P1dB (Pulsed single-tone signal) across 2.4-2.5 GHz
  - Meets 802.11b OFDM ACPR requirement up to 23.5 dBm across 2.4-2.5 GHz
  - Meets 802.11g OFDM ACPR requirement up to 23 dBm across 2.4-2.5 GHz
  - Added EVM ~4% up to 19 dBm for 54 Mbps 802.11g signal across 2.4-2.5 GHz
  - >24 dBm P1dB across 4.9-5.8 GHz
  - Meets 802.11a OFDM ACPR requirement up to 22.5 dBm across 4.9-5.8 GHz
  - Added EVM ~4% up to 18 dBm for 54 Mbps 802.11a signal across 4.9-5.8 GHz

- **High power-added efficiency/Low operating current for 802.11a/b/g applications**
  - ~160 mA @ P_{OUT} = 19 dBm for 802.11g
  - ~235 mA @ P_{OUT} = 23.5 dBm for 802.11b
  - ~270 mA @ P_{OUT} = 18 dBm for 802.11a

- **Built-in Ultra-low I_{REF} power-up/down control**
  - I_{REF} < 2 mA

- **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 across 2.4-2.5 GHz
  - ~3/1 dB gain/max linear power variation between 0°C to +85°C across 4.9-5.8 GHz
  - ±0.5 dB detector variation between 0°C to +85°C

- **Low shut-down current (< 2 μA)**

- **20 dB dynamic range on-chip power detection**

- **Built-in input/output matching**

- **Packages available**
  - 16-contact LGA package (4mm x 4mm)

- **All non-Pb (lead-free) devices are ROHS compliant.**

APPLICATIONS:

- **WLAN (IEEE 802.11a/g/b)**
- **Japanese WLAN**
- **HyperLAN2**
- **Multimedia**
- **Home RF**
- **Cordless phones**

PRODUCT DESCRIPTION

The SST13LP05 is a fully matched, dual-band power amplifier module (PAM) based on the highly-reliable InGaP/GaAs HBT technology. This PAM provides excellent RF performance, temperature-stable power detectors, and low-current analog on/off control interfaces. The SST13LP05 provides stable RF and power detector performance over a large V_{CC} power supply variation, with an ultra-low shut-down current.

With a near-zero Rest of Bill of Materials (RBOM), the SST13LP05 is designed for 802.11a/b/g applications covering frequency bands 2.4-2.5 GHz and 4.9-5.8 GHz for U.S., European, and Japanese markets.

The SST13LP05 has excellent linearity, typically 4% added Error Vector Magnitude (EVM) at 19 dBm output power. This output power is essential for 54 Mbps 802.11g operation while meeting 802.11g spectrum mask at 23 dBm and 802.11b spectrum mask at 23.5 dBm. For 802.11a operation, the SST13LP05 typically demonstrates <4% added EVM at 18 dBm output power while meeting 802.11a spectrum mask at 22.5 dBm.

The SST13LP05 also has wide-range (>20 dB), temperature-stable (~0.5 dB across 0°C to +85°C), directionally-coupled, power detectors which provide a reliable and cost-effective solution to board-level power control. The device’s analog on/off control can be driven by an analog or digital control signal from either a transceiver or baseband chip.

These features, coupled with low operating current, make the SST13LP05 ideal for the final stage power amplification in both battery-powered 802.11a/b/g WLAN transmitters and access point applications.

The SST13LP05 is offered in a 16-contact LGA 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 16-contact LGA**
# PIN DESCRIPTIONS

## TABLE 1: Pin Description

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Pin No.</th>
<th>Pin Name</th>
<th>Type</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>GND</td>
<td>0</td>
<td>Ground</td>
<td></td>
<td>Ground Pad</td>
</tr>
<tr>
<td>NC</td>
<td>1</td>
<td>No Connection</td>
<td></td>
<td>Unconnected Pin</td>
</tr>
<tr>
<td>RF&lt;sub&gt;IN&lt;/sub&gt;_LB</td>
<td>2</td>
<td>I 50&lt;sup&gt;Ω&lt;/sup&gt;</td>
<td>Matched RF Input for Low Band, AC coupled</td>
<td></td>
</tr>
<tr>
<td>RF&lt;sub&gt;IN&lt;/sub&gt;_HB</td>
<td>3</td>
<td>I 50&lt;sup&gt;Ω&lt;/sup&gt;</td>
<td>Matched RF Input for High Band, AC coupled</td>
<td></td>
</tr>
<tr>
<td>NC</td>
<td>4</td>
<td>No Connection</td>
<td></td>
<td>Unconnected Pin</td>
</tr>
<tr>
<td>V&lt;sub&gt;REG&lt;/sub&gt;_HB</td>
<td>5</td>
<td>Power Supply</td>
<td>PWR</td>
<td>Analog current control for High Band</td>
</tr>
<tr>
<td>NC</td>
<td>6</td>
<td>No Connection</td>
<td></td>
<td>Unconnected Pin</td>
</tr>
<tr>
<td>V&lt;sub&gt;CC&lt;/sub&gt;_HB</td>
<td>7</td>
<td>Power Supply</td>
<td>PWR</td>
<td>V&lt;sub&gt;CC&lt;/sub&gt; Power Supply for High Band</td>
</tr>
<tr>
<td>DET&lt;sub&gt;HB&lt;/sub&gt;</td>
<td>8</td>
<td>O</td>
<td></td>
<td>Detector Voltage Output for High Band</td>
</tr>
<tr>
<td>NC</td>
<td>9</td>
<td>No Connection</td>
<td></td>
<td>Unconnected Pin</td>
</tr>
<tr>
<td>RF&lt;sub&gt;OUT&lt;/sub&gt;_HB</td>
<td>10</td>
<td>Power Supply</td>
<td>O/PWR</td>
<td>50&lt;sup&gt;Ω&lt;/sup&gt; Matched RF output for High Band</td>
</tr>
<tr>
<td>RF&lt;sub&gt;OUT&lt;/sub&gt;_LB</td>
<td>11</td>
<td>Power Supply</td>
<td>O/PWR</td>
<td>50&lt;sup&gt;Ω&lt;/sup&gt; Matched RF output for Low Band</td>
</tr>
<tr>
<td>NC</td>
<td>12</td>
<td>No Connection</td>
<td></td>
<td>Unconnected Pin</td>
</tr>
<tr>
<td>DET&lt;sub&gt;LB&lt;/sub&gt;</td>
<td>13</td>
<td>O</td>
<td></td>
<td>Detector Voltage Output for Low Band</td>
</tr>
<tr>
<td>V&lt;sub&gt;CC&lt;/sub&gt;_LB</td>
<td>14</td>
<td>Power Supply</td>
<td>PWR</td>
<td>V&lt;sub&gt;CC&lt;/sub&gt; Power Supply for Low Band</td>
</tr>
<tr>
<td>NC</td>
<td>15</td>
<td>No Connection</td>
<td></td>
<td>Unconnected Pin</td>
</tr>
<tr>
<td>V&lt;sub&gt;REG&lt;/sub&gt;_LB</td>
<td>16</td>
<td>Power Supply</td>
<td>PWR</td>
<td>Analog current control for Low Band</td>
</tr>
</tbody>
</table>
ELECTRICAL SPECIFICATIONS

The AC and DC specifications for the power amplifier interface signals. Refer to Tables 2 and 4 for the DC voltage and current specifications. Refer to Figures 3 through 22 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.

Supply Voltage \((V_{CC})\) .............................................................. -0.3V to +3.6V  
Reference Voltage \((V_{REF})\) ......................................................... -0.3V to +3.3V  
DC supply current \((I_{CC})\) ...................................................... 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
For 802.11b/g Operation

### TABLE 2: DC Electrical Characteristics

<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>VCC</td>
<td>Supply Voltage</td>
<td>3.0</td>
<td>3.3</td>
<td>3.6</td>
<td>V</td>
</tr>
<tr>
<td>ICC</td>
<td>Supply Current</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>for 802.11g, 19 dBm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>for 802.11b, 23.5 dBm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IREG</td>
<td>Analog control current at On state</td>
<td></td>
<td>2</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>VREG</td>
<td>Reference Voltage</td>
<td></td>
<td>2.95</td>
<td></td>
<td>V</td>
</tr>
</tbody>
</table>

### TABLE 3: AC Electrical Characteristics for Configuration

<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>2.4</td>
<td>2.5</td>
<td></td>
<td>GHz</td>
</tr>
<tr>
<td>G</td>
<td>Small signal gain</td>
<td>28</td>
<td>29</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>GVAR1</td>
<td>Gain variation over temperature 0°C – 85°C</td>
<td>-1</td>
<td>1</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>GVAR2</td>
<td>Gain flatness over any 50 MHz bandwidth</td>
<td>-0.3</td>
<td>0.3</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>ACPR</td>
<td>Meet 11b spectrum mask</td>
<td>22</td>
<td>23</td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td></td>
<td>Meet 11g OFDM 54 Mbps spectrum mask</td>
<td>22</td>
<td>23</td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td>Added EVM</td>
<td>P_{OUT} = 19 dBm with 54Mbps</td>
<td></td>
<td></td>
<td>-28</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>11g OFDM signal when operating at 3.3V Vcc</td>
<td></td>
<td></td>
<td>4</td>
<td>%</td>
</tr>
<tr>
<td>2f, 3f, 4f, 5f</td>
<td>Harmonics at P_{OUT} = 20 dBm</td>
<td></td>
<td></td>
<td>-50</td>
<td>dBc</td>
</tr>
<tr>
<td></td>
<td>Spurious non-harmonics at P_{OUT} = 20 dBm</td>
<td></td>
<td></td>
<td>-60</td>
<td>dBc</td>
</tr>
<tr>
<td></td>
<td>In/Out return loss at 50 Ω nominal impedance</td>
<td></td>
<td></td>
<td>6</td>
<td>dB</td>
</tr>
</tbody>
</table>
For 802.11a Operation

### TABLE 4: DC Electrical Characteristics

<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>VCC</td>
<td>Supply Voltage</td>
<td>3</td>
<td>3.3</td>
<td>3.6</td>
<td>V</td>
</tr>
<tr>
<td>ICC</td>
<td>Supply Current for 802.11a, 18 dBm</td>
<td></td>
<td>270</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>IREG</td>
<td>Analog control current at On state</td>
<td></td>
<td>2</td>
<td></td>
<td>μA</td>
</tr>
<tr>
<td>VREG</td>
<td>Reference Voltage</td>
<td>2.95</td>
<td></td>
<td></td>
<td>V</td>
</tr>
</tbody>
</table>

### TABLE 5: AC Electrical Characteristics for Configuration

<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>4.92</td>
<td>5.805</td>
<td></td>
<td>GHz</td>
</tr>
<tr>
<td>G</td>
<td>Small signal gain across 4.9- 5.8 GHz</td>
<td>26</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>GVAR1</td>
<td>Gain variation over temperature 0°C – 85°C</td>
<td>-1</td>
<td>1</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>GVAR2</td>
<td>Gain flatness over any 100 MHz bandwidth</td>
<td>-0.5</td>
<td>0.5</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>ACPR</td>
<td>Meet 11a OFDM 54 Mbps spectrum mask</td>
<td>22</td>
<td>22.5</td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td>Added EVM</td>
<td>POUT = 18 dBm with 54Mbps</td>
<td></td>
<td>-28</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>11aOFDM signal when operating at 3.3V Vcc</td>
<td></td>
<td>4</td>
<td></td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>2f, 3f, 4f, 5f Harmonics at 20 dBm</td>
<td></td>
<td>-45</td>
<td></td>
<td>dBc</td>
</tr>
</tbody>
</table>
Typical Low Band Performance for 802.11b/g
Test Conditions: $V_{CC} = 3.3V$, $T_A = 25^\circ C$, $V_{REF} = 2.95V$ unless otherwise noted

FIGURE 3: Low Band S-Parameters
Test Conditions: $V_{CC} = 3.3$ V, $V_{REF} = 2.95$ V, 54 Mbps 802.11g OFDM signal

FIGURE 4: Low Band Output Power versus Input Power

FIGURE 5: Low Band Power Gain versus Output Power
FIGURE 6: Low Band Supply Current versus Output Power

FIGURE 7: Low Band PAE versus Output Power
FIGURE 8: Low Band EMV versus Output Power

FIGURE 9: Low Band 802.11b Spectrum Mask at 23 dBm with DC Current of 220 mA
Test Conditions: $V_{CC} = 3.3V$, $V_{REF} = 2.95V$, $T_A = 25^\circ C$, 1 Mbps 802.11b CCK Signal

FIGURE 10: Low Band 802.11b Spectrum Mask at 23.5 dBm with DC Current of 235 mA
Low Band Power Detector Characteristics
Test Conditions: $V_{CC} = 3.3V$, $V_{REF} = 2.95V$, $T_A = 25^\circ C$, 54 Mbps 802.11g OFDM Signal

![Detector Voltage versus Output Power](image)

**FIGURE 11: Low Band Detector Voltage versus Output Power**
Typical High Band Performance for 802.11a
Test Conditions: $V_{CC} = 3.3V$, $T_A = 25^\circ C$, $V_{REF} = 2.95V$ unless otherwise noted

FIGURE 12: High Band S-Parameters
Test Conditions: $V_{CC} = 3.3V$, $V_{REF} = 2.95V$, 54 Mbps 802.11a OFDM Signal

**FIGURE 13:** High Band Output Power versus Input Power

**FIGURE 14:** High Band Power Gain versus Output Power
FIGURE 15: High Band Supply Current versus Output Power

FIGURE 16: High Band PAE versus Output Power
FIGURE 17: High Band EVM versus Output Power

FIGURE 18: High Band 802.11a Spectrum Mask at 4.92 GHz at Output Power 22.5 dBm with DC Current at 370 mA
FIGURE 19: High Band 802.11a Spectrum Mask at 5.18 GHz at Output Power 22.5 dBm with DC Current at 355 mA

FIGURE 20: High Band 802.11a Spectrum Mask at 5.32 GHz at Output Power 23 dBm with DC Current at 360 mA
FIGURE 21: High Band 802.11a Spectrum Mask at 5.805 GHz at Output Power 23 dBm with DC Current at 350 mA
High Band Power Detector characteristics
Test Conditions: $V_{CC} = 3.3V$, $V_{REF} = 2.95V$, $T_A = 25^\circ C$, 54 Mbps 802.11a OFDM Signal

**FIGURE 22: High Band Detector Voltage versus Output Power**

Detector Voltage versus Output Power

Detector Voltage (V) vs. Output Power (dBm) for different frequencies:
- $F_{req} = 4.920$ GHz
- $F_{req} = 5.180$ GHz
- $F_{req} = 5.320$ GHz
- $F_{req} = 5.805$ GHz

$V_{CC} = 3.3V$, $V_{REF} = 2.95V$, $T_A = 25^\circ C$, 54 Mbps 802.11a OFDM Signal
FIGURE 23: Typical Application Circuit
## PRODUCT ORDERING INFORMATION

<table>
<thead>
<tr>
<th>SST13LP</th>
<th>05</th>
<th>MLC</th>
<th>F</th>
</tr>
</thead>
</table>

### Environmental Attribute
- F = non-Pb contact (lead) finish

### Package Modifier
- C = 16 leads

### Package Type
- ML = LFLGA

### Product Family Identifier

### Product Type
- P = Power Amplifier

### Voltage
- L = 3.0-3.6V

### Frequency of Operation
- 3 = 2.4 GHz / 5 GHz Dual-Band

### Product Line
- 1 = SST Communications

---

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

### Valid combinations for SST13LP05
- SST13LP05-MLCF

### SST13LP05 Evaluation Kits
- SST13LP05-MLCF-K

**Note:** Consult your SST sales representative to confirm availability of valid combinations.
FIGURE 24: 16-Contact Low-profile, Fine-pitch, Land Grid Array (LFLGA)
SST Package Code: MLC

TABLE 6: 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>Dec 2006</td>
</tr>
<tr>
<td>01</td>
<td>• Updated document status from Preliminary Specification to Data Sheet</td>
<td>Apr 2008</td>
</tr>
<tr>
<td>02</td>
<td>• Updated “Contact Information” on page 24.</td>
<td>Feb 2009</td>
</tr>
</tbody>
</table>

Note: 1. From the bottom view, the pin #1 indicator may be either a 45-degree chamfer or a half-circle notch.
2. The external paddle is electrically connected to the die back-side and should be soldered to the VSS of the PC board. Connection of this paddle to any other voltage potential will result in shorts and/or electrical malfunction of the device.
3. Untoleredanced dimensions are nominal target values.
4. Land set back from body edge applies to all lands of package.
5. All linear dimensions are in millimeters (max/min).

See notes 1 and 2.
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