2.4-2.5 GHz Low-Noise Amplifier
SST12LN01

FEATURES:

• Suitable Gain:
  – Typically 14 dB gain across 2.4–2.5 GHz
• Low-Noise Figure:
  – Typically 1.55 dB across 2.4–2.5 GHz
• IIP3:
  – 3 dBm across 2.4–2.5 GHz
• Low-Current Consumption
  – 10-12 mA across 2.4–2.5 GHz
• 50Ω Input/Output Matched
• Packages available
  – 6-contact UQFN – 3 mm x 1.6 mm
• All non-Pb (lead-free) devices are RoHS compliant

APPLICATIONS:

• WLAN
• Bluetooth
• Wireless Network

PRODUCT DESCRIPTION

The SST12LN01 is a cost effective Low-Noise Amplifier (LNA) which requires no external RF-matching components. This device is based on the 0.5m GaAs PHEMT technology, and complies with 802.11 b/g applications.

SST12LN01 provides high-performance, low-noise, and moderate-gain operation within the 2.4–2.5 GHz frequency band. Across this frequency band, the LNA typically provides 14 dB gain and 1.55 dB noise figure.

This LNA cell is designed with a self DC-biasing scheme, which maintains low DC current consumption, nominally at 11 mA, during operation. Optimum performance is achieved with only a single power supply, and no external bias resistors or networks are required. The input and output ports are single-ended 50Ω matched. RF ports are also DC isolated requiring no DC blocking capacitors or matching components.

The SST12LN01 is offered in a 6-contact UQFN 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 UQFN

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></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>I</td>
<td></td>
<td>2.4G RF input</td>
</tr>
<tr>
<td>NC</td>
<td>3</td>
<td>No Connection</td>
<td></td>
<td>Unconnected pin</td>
</tr>
<tr>
<td>NC</td>
<td>4</td>
<td>No Connection</td>
<td></td>
<td>Unconnected pin</td>
</tr>
<tr>
<td>RFOUT</td>
<td>5</td>
<td>O</td>
<td></td>
<td>2.4G RF output</td>
</tr>
<tr>
<td>VDD</td>
<td>6</td>
<td>Power Supply</td>
<td>PWR</td>
<td></td>
</tr>
</tbody>
</table>

1. I=Input, O=Output
ELECTRICAL SPECIFICATIONS

The AC and DC specifications for the power amplifier interface signals. Refer to Table 2 for the DC voltage and current specifications. Refer to Figure 3 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}). 0 Bm
Average output power (P_{OUT}) 9 dBm
Supply Voltage at pin 6 (V_{DD}). -0.3V to +4.6V
DC supply current (I_{CC}) 14 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.

Range | Ambient Temp | V_{CC} |
---|---|---|
Extended | -20 to +80°C | 2.9–3.5V |

**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>V_{CC}</td>
<td>Supply Voltage at pin 6</td>
<td>3.3</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>I_{CC}</td>
<td>Supply Current 2.4–2.5 GHz</td>
<td>11</td>
<td></td>
<td></td>
<td>mA</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>F_{LU}</td>
<td>Frequency range</td>
<td>2400</td>
<td></td>
<td>2550</td>
<td>MHz</td>
</tr>
<tr>
<td>G</td>
<td>Small signal gain, 2.4–2.55 GHz</td>
<td>14</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>NF</td>
<td>Noise Figure, 2.4–2.55 GHz</td>
<td>1.55</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>IIP3</td>
<td>2.4–2.55 GHz</td>
<td>3</td>
<td></td>
<td></td>
<td>dBm</td>
</tr>
</tbody>
</table>
TYPICAL PERFORMANCE CHARACTERISTICS
Test Conditions: $V_{DDL} = 3.0V$, $T_A = 25^\circ C$, unless otherwise specified

FIGURE 3: S-Parameters

- S11 verus Frequency
- S12 verus Frequency
- S21 verus Frequency
- S22 verus Frequency
FIGURE 4: Noise Figure versus Frequency

FIGURE 5: Frequency Response of Gain (S21) for three Temperatures
FIGURE 6: Input P1dB versus Frequency
FIGURE 7: Input IP3 versus Frequency

FIGURE 8: Typical Application Circuit
## PRODUCT ORDERING INFORMATION

<table>
<thead>
<tr>
<th>SST12LN</th>
<th>01</th>
<th>-</th>
<th>QU6</th>
<th>F</th>
</tr>
</thead>
</table>

**Environmental Attribute**
- F: non-Pb/non-Sn contact (lead) finish

**Package Modifier**
- 6: 6 contact

**Package Type**
- QU: UQFN

**Product Family Identifier**
- SSTXXLN

**Product Type**
- N: Low-Noise Amplifier

**Voltage**
- L: 3.0-3.6V

**Frequency of Operation**
- 2: 2.4 GHz

**Product Line**
- 1: SST Communications

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

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**Valid combinations for SST12LN01**
- SST12LN01-QU6F

**SST12LN01 Evaluation Kits**
- SST12LN01-QU6F-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.
2.4-2.5 GHz Low-Noise Amplifier
SST12LN01

Data Sheet

PACKAGING DIAGRAMS

FIGURE 9: 6-contact Ultra-thin Quad Flat No-lead (UQFN)
SST Package Code: QU6

TABLE 4: Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Description</th>
<th>Date</th>
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<tbody>
<tr>
<td>00</td>
<td>• Initial release of data sheet</td>
<td>Sep 2006</td>
</tr>
<tr>
<td>01</td>
<td>• Updated “Features:” on page 1</td>
<td>Sep 2007</td>
</tr>
<tr>
<td>02</td>
<td>• Revised Product Description on page 1</td>
<td>Jun 2008</td>
</tr>
<tr>
<td></td>
<td>• Change Suitable Gain to 14 dB globally</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Changed low-noise figure 1.55 dB globally</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Changes low-current consumption to 10-12 mA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Edited Table 2, DC Electrical Characteristics and Table 3, AC Electrical</td>
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</tr>
<tr>
<td></td>
<td>Characteristics on page</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Replaced Figures 3 through 7, pages 5 through 8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Edited Figure 8, page 8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Added Figure 5 on page 8</td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>• Updated “Contact Information” on page 11</td>
<td>Feb 2009</td>
</tr>
<tr>
<td>04</td>
<td>• Updated document status from “Preliminary Specifications” to “Data Sheet”</td>
<td>Dec 2009</td>
</tr>
</tbody>
</table>

Note: 1. Although many dimensions are similar to those of JEDEC JEP95 MO-220I, this specific package is not registered.
2. The external paddle is electrically connected to the die back-side and possibly to certain VSS leads. This paddle can be soldered to the PC board; it is suggested to connect this paddle to the VSS of the unit. Connection of this paddle to any other voltage potential can result in shorts and/or electrical malfunction of the device.
3. Untoleranced dimensions are nominal target dimensions.
4. All linear dimensions are in millimeters (max/min).
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