8.5-10.5 GHz Low Noise Amplifier

Features

- Frequency Range: 8.5-10.5 GHz
- Low Noise Figure < 1.5 dB
- 30 dB nominal gain
- 14 dBm P1dB
- High IP3
- Input Return Loss > 10 dB
- Output Return Loss > 10 dB
- Single supply operation
- No external matching required
- DC decoupled input and output
- 0.15 µm InGaAs pHEMT Technology
- Chip dimension: 3.3 x 2.9 x 0.1 mm

Typical Applications

- RADAR
- Military
- Test Equipment and sensors
- Point-to-Point Radios, Point-to-Multi-Point Radios & VSATS

Description

The ASL1016 is a three stage ultra low noise amplifier that operates from 8.5-10.5 GHz. The LNA features 30 dB gain and has a typical mid-band noise figure of 1.3 dB. The LNA has nominal input/output return losses of 10 dB. The nominal P1dB is 14 dBm. The LNA operates on a single positive supply. The die is fabricated using a reliable 0.15µm InGaAs pHEMT technology. The Circuit grounds on the die are provided through vias to backside metallization.

The Aelius ASL1016 performs well as a low noise amplifier in receive applications and as a driver or buffer amplifier where high gain, excellent linearity and low power consumption are important.

Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain Voltage</td>
<td>+6</td>
<td>V</td>
</tr>
<tr>
<td>Input RF Power</td>
<td>+10</td>
<td>dBm</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-55 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-65 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

1. Operation beyond these limits may cause permanent damage to the component
## Electrical Specifications \( T_A = 25 \, ^\circC, \, V_{d1} = 2V, \, V_{d2} = V_{d3} = 4V, \, Z_0 = 50 \, \Omega \)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Typ</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range</td>
<td>8.5 -10.5</td>
<td>GHz</td>
</tr>
<tr>
<td>Gain</td>
<td>30</td>
<td>dB</td>
</tr>
<tr>
<td>Gain Flatness</td>
<td>+1.2</td>
<td>dB</td>
</tr>
<tr>
<td>Noise Figure</td>
<td>1.5</td>
<td>dB</td>
</tr>
<tr>
<td>Input Return Loss</td>
<td>10</td>
<td>dB</td>
</tr>
<tr>
<td>Output Return Loss</td>
<td>10</td>
<td>dB</td>
</tr>
<tr>
<td>Output Power (P1dB)</td>
<td>+14</td>
<td>dBm</td>
</tr>
<tr>
<td>Saturated Output Power (Psat)</td>
<td>+17</td>
<td>dBm</td>
</tr>
<tr>
<td>Output Third Order Intercept (IP3)</td>
<td>27</td>
<td>dBm</td>
</tr>
<tr>
<td>Supply Current (Id) (Vd1 = 2V, Vd2= Vd3 = 4V)</td>
<td>75</td>
<td>mA</td>
</tr>
</tbody>
</table>

**Note:**

1. Electrical specifications as measured in a test fixture.
Test fixture data

\( V_{d1} = 2V, \ V_{d2} = V_{d3} = 4V, \ \text{Total Current} = 75\, ma, \ T_A = 25^\circ C \)

### Gain

- **8.5 GHz**: 31.17 dB
- **9.5 GHz**: 28.82 dB
- **10.5 GHz**: 28.93 dB

### Noise Figure

- **8 GHz**: 2.5 dB
- **9 GHz**: 2.2 dB
- **10 GHz**: 1.8 dB
- **11 GHz**: 1.5 dB
- **12 GHz**: 1.2 dB

---

Aelius Semiconductors Pte. Ltd., Singapore

Phone: +65 68092093
Fax: +65 63360650

Email: info@aeliussemi.com
URL: www.aeliussemi.com

Page 3 of 7
Test fixture data

\[ V_{d1} = 2V, \ V_{d2} = V_{d3} = 4V, \ \text{Total Current} = 75\text{ma}, \ T_A = 25^\circ C \]
Test fixture data
\[ V_{d1}=2\,V, \ V_{d2} = V_{d3} = 4\,V, \ \text{Total Current} = 75\,\text{mA}, \ T_A = 25^\circ C \]
Mechanical Characteristics

Units: Millimeters [Inches]
All RF and DC bond pads are 100µm x 100µm

Note:
1. Pad no. 14: Vd1
2. Pad no. 11: Vd2
3. Pad no. 9: Vd3
4. Pad no. 1: RF Input
5. Pad no. 8: RF Output
Die attach: For Epoxy attachment, use of a two-component conductive epoxy is recommended. An epoxy fillet should be visible around the total die periphery. If Eutectic attachment is preferred, use of fluxless AuSn (80/20) 1-2 mil thick preform solder is recommended. Use of AuGe preform should be strictly avoided.

Wire bonding: For DC pad connections use either ball or wedge bonds. For best RF performance, use of 150 - 200µm length of wedge bonds is advised. Single Ball bonds of 250-300µm though acceptable, may cause a deviation in RF performance.

GaAs MMIC devices are susceptible to Electrostatic discharge. Proper precautions should be observed during handling, assembly & testing

All information and Specifications are subject to change without prior notice