Ka-Band Low Noise Amplifiers

**LK-20S000 Series**

**Overview**

- **LK-20S000 series Ka-Band Ultra Low Noise Amplifiers** are specially designed for satellite earth station and other telecommunications applications. Utilizing state-of-the-art HEMT and GaAs FET technology, these amplifiers have been designed for both fixed and transportable applications. High performance models are available with noise temperatures from 130° K to 110° K. All noise temperature specifications are guaranteed over the full bandwidth of the LNA.

- **Low gain, 50 dB typical**
- **Input/output isolation**
- **Reverse polarity protection**
- **Universal input AC power supply**

**Wideband coverage**

Noise temperatures to 110° K

High reliability HEMT design

Reverse polarity protection

Other Products

- Solid-State Power Amplifiers and SSPA Systems
- Solid-State Power BUCs and SSPB Systems
- Low Noise Amplifiers and LNA Systems
- Low Noise Block Converters and LNB Systems
- Block Up and Block Down Converters
- Synthesized Converters
- Line Drive Amplifiers
- Power Supply Monitors
- Redundant Control Panels for SSPAs, SSPBs, and LNAs
### Table 1 – Part Number/Ordering Information

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Notes</th>
<th>Min</th>
<th>Nom./Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td></td>
<td>18.2</td>
<td>20.2</td>
<td>20.2</td>
<td>GHz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21.2</td>
<td></td>
<td></td>
<td>GHz</td>
</tr>
<tr>
<td>Gain</td>
<td>Standard</td>
<td>57</td>
<td>60</td>
<td>63</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>Option 1</td>
<td>41</td>
<td>50</td>
<td>53</td>
<td>dB</td>
</tr>
<tr>
<td>Gain Flatness</td>
<td>Full band</td>
<td>±0.5</td>
<td>±0.5</td>
<td>±0.5</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>Per 40 MHz</td>
<td></td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>VSWR</td>
<td>Input</td>
<td>1.25</td>
<td>1.30</td>
<td>1.50</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Output</td>
<td>1.40</td>
<td>1.50</td>
<td>1.50</td>
<td>1</td>
</tr>
<tr>
<td>Noise Temperature</td>
<td>At +23 °C</td>
<td>See Table 2</td>
<td>See Table 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Versus temperature</td>
<td></td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Power Output at 1 dB compression (P 1 dB)</td>
<td>Standard</td>
<td>+12</td>
<td>+14</td>
<td>+16</td>
<td>dBm</td>
</tr>
<tr>
<td></td>
<td>Option 2</td>
<td>+20</td>
<td>+22</td>
<td>+24</td>
<td>dBm</td>
</tr>
<tr>
<td>3rd Order Output Intercept Point, OIP 3</td>
<td>Standard</td>
<td>+22</td>
<td>+24</td>
<td>+26</td>
<td>dBm</td>
</tr>
<tr>
<td></td>
<td>Option 2</td>
<td>+28</td>
<td>+30</td>
<td>+32</td>
<td>dBm</td>
</tr>
<tr>
<td>Group Delay per 40 MHz</td>
<td>Linear</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>ns/MHz</td>
</tr>
<tr>
<td></td>
<td>Parabolic</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>ns/MHz</td>
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<tr>
<td></td>
<td>Ripple</td>
<td>0.1</td>
<td></td>
<td></td>
<td>ns-p-p</td>
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<tr>
<td>AM/PM Conversion</td>
<td>-5 dBm Output</td>
<td>0.05</td>
<td></td>
<td></td>
<td>%/dB</td>
</tr>
<tr>
<td>Gain Stability (Constant Temp.)</td>
<td>Short term (10 min)</td>
<td>±0.1</td>
<td>±0.2</td>
<td>±0.3</td>
<td>dB</td>
</tr>
<tr>
<td></td>
<td>Medium term (24 hrs)</td>
<td>±0.2</td>
<td>±0.3</td>
<td>±0.4</td>
<td>dB</td>
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<tr>
<td></td>
<td>Long term (1 week)</td>
<td>±0.5</td>
<td>±0.6</td>
<td>±0.7</td>
<td>dB</td>
</tr>
<tr>
<td>Gain Stability Versus temperature (Standard)</td>
<td>Improved stable (Option 3)</td>
<td>-0.08</td>
<td>2.0</td>
<td>4.0</td>
<td>dB per °C</td>
</tr>
<tr>
<td></td>
<td>over operational temp range</td>
<td></td>
<td></td>
<td></td>
<td>dB per °C</td>
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<tr>
<td>Maximum Input Power</td>
<td>Damage threshold</td>
<td>0</td>
<td></td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td></td>
<td>Desens. threshold 29.0–31.0 GHz</td>
<td>-25</td>
<td></td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td>Connectors</td>
<td>Input</td>
<td>WR42 Cover Flange (A4-40 THD holes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Output</td>
<td>SMA Female</td>
<td>PT02E-8-4P-027</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Power</td>
<td>Mate supplied</td>
<td>mate supplied</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>WR42 Cover Flange (A4-40 THD holes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Voltage (Standard)</td>
<td>11</td>
<td>15</td>
<td>24</td>
<td>Vdc</td>
</tr>
<tr>
<td></td>
<td>Current, P 1 dB (Standard)</td>
<td>600</td>
<td>600</td>
<td>400</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>Current, P 1 dB (Option 1)</td>
<td>400</td>
<td>400</td>
<td>400</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>Current, P 1 dB (Option 2)</td>
<td>600</td>
<td>600</td>
<td>400</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td>Voltage (Option 4)*</td>
<td>90</td>
<td></td>
<td>265</td>
<td>Vac</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>TAMB (Standard)</td>
<td>-40</td>
<td></td>
<td>-70</td>
<td>°C</td>
</tr>
<tr>
<td></td>
<td>TAMB (Option 4)*</td>
<td>-40</td>
<td></td>
<td>+80</td>
<td>°C</td>
</tr>
</tbody>
</table>

1 When there is only one value on a line, the Nom./Typ. column is a nominal value; otherwise it is a typical value. Typical values are intended to illustrate typical performance, but are not guaranteed.

2 Maximum noise temperature at +23 °C at any frequency in the specified band.

3 Consult factory for AC power option.

### Table 2 – Noise Temperature vs. Ambient Temperature

<table>
<thead>
<tr>
<th>Ambient Temperature</th>
<th>Ratio NT2/NT1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.86</td>
</tr>
<tr>
<td>+23</td>
<td>1.00</td>
</tr>
<tr>
<td>+40</td>
<td>1.11</td>
</tr>
<tr>
<td>+50</td>
<td>1.17</td>
</tr>
<tr>
<td>+60</td>
<td>1.24</td>
</tr>
</tbody>
</table>

NT2/NT1 = (T2/T1)1.8

Example: For model LK20S110-XXXXX, NT1 = 110 K at +23 °C, what is NT2 at +50 °C? From the table, NT2/NT1 at 50 °C = 1.17: NT2 = 117 x (110 K) = 128.7 K at 50 °C

### Typical Applications

1:1 System

1:2 System