Solid State Broadband High Power Amplifier

The BBS3O6QNQ (2153) is a broadband high power amplifier suitable for ultra broadband high power linear applications, laboratory, and RFI/EMC susceptibility testing. This amplifier utilizes GaN devices that provide high gain wide dynamic range and good linearity. Employing advanced broadband RF matching networks and combining techniques, EMI/RFI filters, and all qualified components achieve exceptional performance, and high efficiency. The system includes a universal voltage, single phase, power supply and a built-in forced air-cooling system. Empower RF’s ISO9001:2015 Quality Assurance Program assures consistent performance and the highest reliability.

- Solid-state class AB design
- Instantaneous ultra broadband
- Small form factor and lightweight
- Suitable for CW, AM and FM (Consult factory for other modulation types)
- 50 ohm input/output impedance
- High reliability and ruggedness
- Built-in control, monitoring and protection circuits

### ELECTRICAL SPECIFICATIONS @ 220VAC, 25°C, 50Ω System

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Frequency</td>
<td>BW</td>
<td>700</td>
<td></td>
<td>3800</td>
<td>MHz</td>
</tr>
<tr>
<td>Output Power CW</td>
<td>PSAT</td>
<td>200</td>
<td></td>
<td></td>
<td>Watt</td>
</tr>
<tr>
<td>Power Gain @ Rated PSAT</td>
<td>GSAT</td>
<td>52</td>
<td>54</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Input Power for Rated PSAT</td>
<td>PIN</td>
<td>0</td>
<td>3</td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td>Power Gain Flatness @ 200W</td>
<td>ΔGP</td>
<td>±2.0</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Gain Adjustment Range (PN = -20dBm)</td>
<td>VVA</td>
<td>18</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Input Return loss</td>
<td>S11</td>
<td>-10</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Noise Figure</td>
<td>NF</td>
<td>15</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Third Order Intercept Point</td>
<td>IP3</td>
<td>+56</td>
<td></td>
<td></td>
<td>dBm</td>
</tr>
<tr>
<td>Harmonics @ POUT = 200W</td>
<td>2nd</td>
<td>-20</td>
<td>-12</td>
<td></td>
<td>dBC</td>
</tr>
<tr>
<td></td>
<td>3rd</td>
<td>-20</td>
<td></td>
<td></td>
<td>dBC</td>
</tr>
<tr>
<td>Spurious Signals</td>
<td>SPUR</td>
<td>-70</td>
<td>-60</td>
<td></td>
<td>dBC</td>
</tr>
<tr>
<td>Operating Voltage (1-phase)</td>
<td>VAC</td>
<td>180</td>
<td></td>
<td>280</td>
<td>Volt</td>
</tr>
<tr>
<td>Power Consumption @ POUT = 200W CW</td>
<td>PD</td>
<td>1800</td>
<td></td>
<td></td>
<td>Watt</td>
</tr>
</tbody>
</table>

### MECHANICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (W x H x L)</td>
<td>19 x 5.25 x 22</td>
<td>Inch</td>
</tr>
<tr>
<td>Weight</td>
<td>50</td>
<td>Pound</td>
</tr>
<tr>
<td>RF Connectors Input/Output</td>
<td>Type-N, Female</td>
<td></td>
</tr>
<tr>
<td>I/O Interface Connector</td>
<td>D-sub 9-pin, Female</td>
<td></td>
</tr>
<tr>
<td>Cooling</td>
<td>Built-in forced air cooling system</td>
<td></td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL CHARACTERISTICS (Design to Meet)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Ambient Temperature</td>
<td>TA</td>
<td>0</td>
<td></td>
<td>+45</td>
<td>°C</td>
</tr>
<tr>
<td>Non-operating Temperature</td>
<td>TSTG</td>
<td>-40</td>
<td></td>
<td>+85</td>
<td>°C</td>
</tr>
<tr>
<td>Relative Humidity (non-condensing)</td>
<td>RH</td>
<td>95</td>
<td></td>
<td></td>
<td>%</td>
</tr>
<tr>
<td>Altitude (MIL-STD-810F Method 500.4)</td>
<td>ALT</td>
<td>30,000</td>
<td></td>
<td>Feet</td>
<td></td>
</tr>
<tr>
<td>Vibration/Shock</td>
<td>VI/SH</td>
<td></td>
<td></td>
<td></td>
<td>Airborne</td>
</tr>
</tbody>
</table>

SKU#: 2153DEFAAXLXX
Solid State Broadband High Power Amplifier

2153 – BBS3O6QNN  
700 – 3800 MHz / 200 Watts

LIMITS

<table>
<thead>
<tr>
<th>Description</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input RF drive level without damage</td>
<td>+6 dBm Max</td>
</tr>
<tr>
<td>Load VSWR @ P_OUT = 100W</td>
<td>∞ @ all load phase &amp; amplitude for duration of 1 minute 3:1 @ all load phase &amp; amplitude continuous -</td>
</tr>
<tr>
<td>Thermal Overload</td>
<td>85°C shutdown Max</td>
</tr>
</tbody>
</table>

AVAILABLE OPTION

<table>
<thead>
<tr>
<th>SKU #</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2153DEFAAXLXX</td>
<td>LCD, Ethernet, Front RF connectors 180-260VAC, 50/60Hz.</td>
<td>Touchscreen Digital Display, including FWD/REV Power indication (dBm or Watt scale), Gain Adjustment, ALC Fast/Slow, On/Off, Standby mode, Fault indication, Rear panel Ethernet, GPIB/IEEE-488.2 and Half Duplex RS-232.</td>
</tr>
<tr>
<td>2153-001</td>
<td>LCD, Ethernet, Rear RF connectors 180-260VAC, 47-440Hz, MIL-STD Circular AC input connector.</td>
<td>Touchscreen Digital Display, including FWD/REV Power indication (dBm or Watt scale), Gain Adjustment, ALC Fast/Slow, On/Off, Standby mode, Fault indication, Rear panel Ethernet and Half Duplex RS-232.</td>
</tr>
</tbody>
</table>

I/O INTERFACE CONNECTOR – D-sub 9-pin, Female

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Description</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forward Test Point</td>
<td>Analog Voltage 0-5V DC proportional to Forward Power Level</td>
</tr>
<tr>
<td>2</td>
<td>Reverse Test Point</td>
<td>Analog Voltage 0-5V DC proportional to Reverse Power Level</td>
</tr>
<tr>
<td>3</td>
<td>5V Test Point</td>
<td>+5.0V DC ±0.2V</td>
</tr>
<tr>
<td>4</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>5</td>
<td>EXT Shutdown</td>
<td>Amplifier Disable: TTL Logic High (5.0V) (Internally Pulled-Low)</td>
</tr>
<tr>
<td>6</td>
<td>12V Test Point</td>
<td>+12.0V DC ±0.5V</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>No Connection</td>
</tr>
<tr>
<td>8</td>
<td>P/S Test Point</td>
<td>+26.0-30.0V DC</td>
</tr>
<tr>
<td>9</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>

MECHANICAL OUTLINE

SKU #: 2153DEFAAXLXX
TYPICAL PERFORMANCE PLOTS

Plot 1 – Small Signal Gain and $P_{\text{SAT}}$
- Top Curve: Small Signal Gain @ $P_{\text{IN}} = -20\text{dBm}$
- Middle Curve: Power Gain @ $P_{\text{SAT}}$, $P_{\text{IN}} = -3\text{dBm}$ (Note 2, 3)
- Bottom Curve: Input Return Loss

Plot 2 – ALC Flatness
- Top Curve: ALC @ 100W, $P_{\text{IN}} = -4\text{dBm}$
- Middle Curve: ALC @ 20W, $P_{\text{IN}} = -4\text{dBm}$
- Bottom Curve: Input Return Loss
  - Reference: 0dB, 10dB/Div.

Plot 3 – Gain Adjustment Range
- Top Curve: Maximum Gain @ $P_{\text{IN}} = -20\text{dBm}$
- Middle Curve: Minimum Gain @ $P_{\text{IN}} = -20\text{dBm}$
  - Reference: 40dB, 10dB/Div.
- Bottom Curve: Input Return Loss @ Minimum Gain
  - Reference: 10dB, 10dB/Div.