Solid State Broadband High Power Amplifier

The SKU 2236 is comprised of multi-drawer integrated subsystems to produce a minimum output of 24kW CW in the S-band frequency. The amplifier subsystem features multiple high power GaN devices that provide wide frequency response, high gain, high peak power capability, and low distortions. Exceptional performance, long-term reliability and high efficiency are achieved by employing advanced broadband RF matching networks and combining techniques, EMI/RFI filters, and all qualified components. Each drawer is a full gain PA with integrated single phase power supply and liquid cooling. It features gain and phase control and is fully hot swappable in case of failure.

The amplifier system includes a built-in control and monitoring system, with protection functions which preserve maximum output availability and reliability. Remote management and diagnostics are via Ethernet port to a LAN. It is performed remotely by a web browser or M2M (machine to machine interface) or locally by a panel computer. The control system runs an embedded OS (Linux), has a built-in non-volatile memory for factory setup.

We are delivering more than just RF power, the next generation family of systems provide dynamic adjustments linked to the processing power and digital controls, which focus on maximizing system availability time as well as power output under ALL conditions.


- Solid-state class AB design
- Suitable for CW, AM, FM, Pulse and some linear applications (consult for other modulation types).
- Compact Modular design and scalable architecture
- 50 ohm input/output impedance
- Built-in Control, Monitoring and Protection functions
- High reliability and ruggedness

**ELECTRICAL SPECIFICATIONS over temperature conditions (0 to +50ºC)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min</th>
<th>Typical</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Frequency</td>
<td>BW</td>
<td>2800</td>
<td>3500</td>
<td></td>
<td>MHz</td>
</tr>
<tr>
<td>Power Output – CW</td>
<td>PSAT</td>
<td>24</td>
<td></td>
<td></td>
<td>kW</td>
</tr>
<tr>
<td>Power Output @ 1dB Gain Compression</td>
<td>P1dB</td>
<td>18</td>
<td></td>
<td></td>
<td>kW</td>
</tr>
<tr>
<td>Power Gain @ Rated POUT</td>
<td>Gp</td>
<td>74</td>
<td></td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Input Power for Rated POUT – MGC Mode</td>
<td>PIN</td>
<td>-5</td>
<td></td>
<td>0</td>
<td>dBm</td>
</tr>
<tr>
<td>Input Power Range – ALC Mode</td>
<td>PIN_ALC</td>
<td>-10</td>
<td></td>
<td>0</td>
<td>dBm</td>
</tr>
<tr>
<td>Small Signal Gain (MGC) / Leveled ALC – Flatness</td>
<td>ΔG</td>
<td>±3.5 / ±1.0</td>
<td></td>
<td>dB</td>
<td></td>
</tr>
<tr>
<td>Gain Adjustment Range</td>
<td>VVA</td>
<td>15</td>
<td>20</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 @ Maximum Gain</td>
<td>NF</td>
<td>20</td>
<td>25</td>
<td></td>
<td>dB</td>
</tr>
<tr>
<td>Third Order Intermodulation @ 6dBm/tone, 1 MHz</td>
<td>IM3</td>
<td>-25</td>
<td></td>
<td></td>
<td>dBc</td>
</tr>
<tr>
<td>Harmonics @ 24kW</td>
<td>2ND</td>
<td>-40</td>
<td></td>
<td></td>
<td>dBc</td>
</tr>
<tr>
<td>Spurious Signals</td>
<td>Spur</td>
<td>-60</td>
<td></td>
<td></td>
<td>dBc</td>
</tr>
<tr>
<td>Operating Voltage @ 3-phase (Line-to-Line)</td>
<td>VAC</td>
<td>180</td>
<td>208</td>
<td>260</td>
<td>Volt</td>
</tr>
<tr>
<td>Power Consumption @ 24kW</td>
<td>PD</td>
<td>100</td>
<td></td>
<td></td>
<td>kVA</td>
</tr>
</tbody>
</table>

**NOTES:**
1. CW measurement is performed in MGC Mode (Manual Gain Control)
2. P1dB measurement is performed with AM 80% depth of modulation @ 1 kHz modulation signal.
# Solid State Broadband High Power Amplifier

**Stock No. 2236**

## MECHANICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Dimension W x H x D</td>
<td>2 x 19&quot; Racks, 40U height, 40&quot; depth</td>
<td>-</td>
</tr>
<tr>
<td>Total Weight</td>
<td>TBD</td>
<td>Pound</td>
</tr>
<tr>
<td>RF Connectors Input / Output</td>
<td>Input: N-Type Female</td>
<td>RF IN</td>
</tr>
<tr>
<td></td>
<td>Output: WR-284</td>
<td>RF OUT</td>
</tr>
<tr>
<td>RF Sample Connectors</td>
<td>System Level: SMA, Female</td>
<td>Forward/Reverse</td>
</tr>
<tr>
<td></td>
<td>Booster Level: SMA, Female</td>
<td></td>
</tr>
<tr>
<td>Blanking/Gating Input Connector</td>
<td>BNC, Female</td>
<td>BLANKING</td>
</tr>
<tr>
<td>Cooling System – Liquid</td>
<td>Pressure</td>
<td>20 typical</td>
</tr>
<tr>
<td></td>
<td>Liquid Flow</td>
<td>70 typical</td>
</tr>
</tbody>
</table>

## ENVIRONMENTAL CHARACTERISTICS:

<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>$T_C$</td>
<td>0</td>
<td>+50</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Non-operating Temperature</td>
<td>$T_{STG}$</td>
<td>-35</td>
<td>+75</td>
<td>°C</td>
<td></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)</td>
<td>ALT</td>
<td>10,000</td>
<td>Feet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock / Vibration (MIL-STD-810F, Shock Method 516.5, Vibration Method 514.5)</td>
<td>SH / VI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## PROTECTIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Overdrive</td>
<td>≥10 dBm – shutdown</td>
</tr>
<tr>
<td>Load VSWR Protection</td>
<td>The unit disables RF when reverse power exceeds the safe level of 3:1 VSWR or reduces power by 6dB</td>
</tr>
<tr>
<td>Thermal Shutdown</td>
<td>Baseplate ≥80 °C</td>
</tr>
<tr>
<td>Default Data Recovery</td>
<td>Factory Default Calibration Recovery</td>
</tr>
</tbody>
</table>

## COMMUNICATION INTERFACES:

<table>
<thead>
<tr>
<th>Function</th>
<th>Utility</th>
<th>Connector</th>
</tr>
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<tbody>
<tr>
<td>Ethernet</td>
<td>Network management of device / web interface</td>
<td>RJ45</td>
</tr>
</tbody>
</table>
Solid State Broadband High Power Amplifier

2236

2800 – 3500 MHz / 24 Kilowatts

NOTIONAL BLOCK DIAGRAM

2.8 - 3.5 GHz
24kW - CW

Rack – 1
Ethernet Switch

+16
Σ-16

PA - 2U Booster
2800 – 3500 MHz, 1 kW

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PA - 2U Booster
2800 – 3500 MHz, 1 kW

PA - 2U Booster
2800 – 3500 MHz, 1 kW

Control

Controller

Rack - 2
Ethernet Switch

+2
Σ-16

Σ-2

÷ 16
+2
÷ 2

Unbalance

50 Ω

90° Unbalance