EMPOWER RF SYSTEMS, INC.

# Solid State Broadband High Power Amplifier

## 1131 - BBM5K8CGM | 2500 – 6000 MHz / 35 Watts

The BBM5K8CGM (SKU 1131) is suitable for broadband mobile Jamming and band specific high power applications in the P/L/S frequency bands. This compact module utilizes high power advanced GaN devices that provide excellent power density, high efficiency, wide dynamic range 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, machined housings and qualified components. Empower RF's ISO9001 Quality Assurance Program assures consistent performance and the highest reliability.


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

### ELECTRICAL SPECIFICATIONS @ +28.0$V_{DC}$, 25°C 50Ω System

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Frequency | BW | 2500 | | 6000 | MHz |
| Output Power CW | $P_{SAT}$ | 35 | 40 | | Watt |
| Output Power @ 1dB Gain Compression | $P_{1dB}$ | | 10 | | Watt |
| Power Gain @ $P_{1dB}$ | $G_{1dB}$ | 46 | 48 | | dB |
| Input Power for Rated $P_{SAT}$ | $P_{IN}$ | | 0 | | dBm |
| Gain Flatness @ Rated $P_{SAT}$ | ΔG | | ±1.0 | ±2.0 | dB |
| Gain Adjustment Range | VVA | 25 | | | dB |
| Input Return Loss | $S_{11}$ | | | -10 | dB |
| Noise Figure @ max. gain | NF | | | 10 | dB |
| Third Order Intercept Point<br>2-Tone @ 39.5 dBm/Tone, 100kHz Spacing | IP3 | | +50 | | dBm |
| Harmonics @ $P_{OUT}$ = 10W | $2^{nd}$ / $3^{rd}$ | | -25 / -40 | | dBc |
| Spurious Signals | Spur | | -70 | -60 | dBc |
| Operating Voltage | $V_{DC}$ | 27 | 28 | 29 | Volt |
| Current Consumption @ $P_{OUT}$ = 35W | $I_{DD}$ | | 7.5 | 10 | Amp |
| Quiescent Current | $I_{DQ}$ | | 4.0 | 6.0 | Amp |
| Switching Time @ 1kHz TTL, $P_{IN}$ = 0dBm | $T_{ON}$ / $T_{OFF}$ | | | 5.0 | µs |

### MECHANICAL SPECIFICATIONS

| Parameter | Value | Unit |
|---|---|---|
| Dimensions | 6.9 x 3.6 x 1.1 | Inch |
| Weight | 2.0 | Pound |
| RF Connectors Input/Output | Type-SMA, Female | |
| DC Interface Connector | D-Sub 9-Pin, Male | |
| Cooling | External Heatsink (Not Supplied) | |

### ENVIRONMENTAL CHARACTERISTICS (Design to Meet)

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Case Temperature | $T_C$ | -20 | | +70 | °C |
| Non-operating Temperature | $T_{STG}$ | -40 | | +85 | °C |
| Relative Humidity (non-condensing) | RH | | | 95 | % |
| Altitude (MIL-STD-810F Method 500.4) | ALT | | | 30,000 | Feet |
| Vibration/Shock<br>MIL-STD-810F - Method 514.5/516.5 – Proc I | VI/SH | | Airborne | | |

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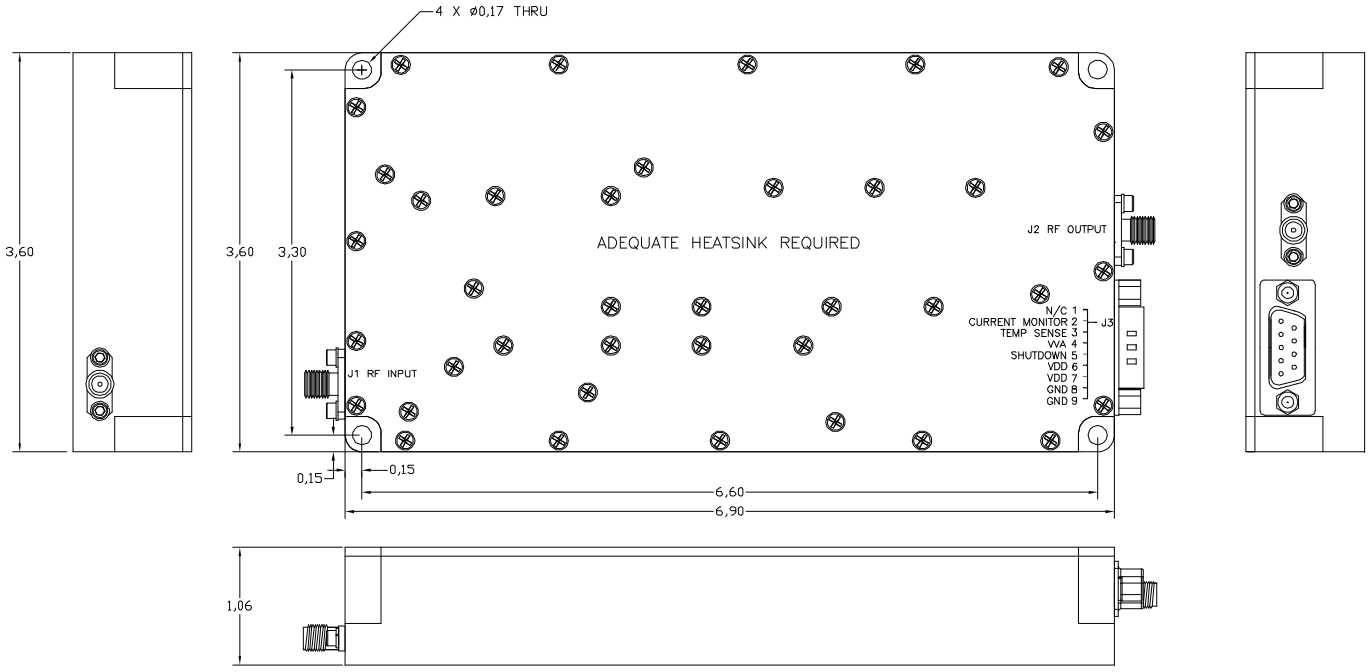
## LIMITS

| | | |
|---|---|---|
| Input RF drive level without damage | +10 dBm | Max |
| Load VSWR @ $P_{OUT}$ = 35W | ∞ @ all load phase & amplitude for duration of 1 minute<br>3:1 @ all load phase & amplitude continuous | - |
| Thermal Degradation | 85°C | Typ |

## DC INTERFACE CONNECTOR – D-Sub 9-Pin, Male

| Pin # | Description | Specification |
|---|---|---|
| 1 | N/C | No Connection |
| 2 | Current Monitor | Analog voltage relative to $I_{DD}$ @ 50mV/100mA |
| 3 | Temp Sense | Analog voltage relative to Module's temperature @ 10mV/°C (0.25V = 25°C) |
| 4 | VVA | Control voltage range: 0-5$V_{DC}$<br>Maximum Gain: 0$V_{DC}$, Minimum Gain: 5$V_{DC}$ |
| 5 | Shutdown | Amplifier Disable: TTL Logic High (5V)<br>(*Internally Pulled-Low*) |
| 6&7 | VDD | +27.0-29.0$V_{DC}$ |
| 8&9 | GND | Ground |

## OUTLINE DRAWING



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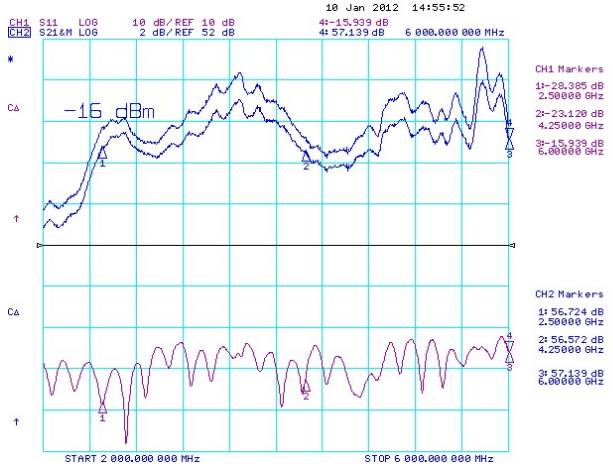
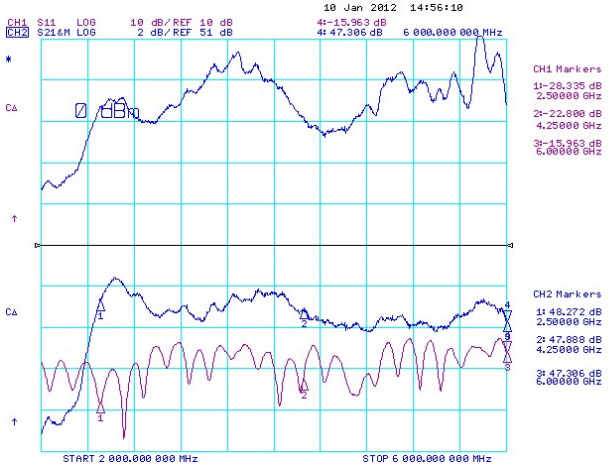
### TYPICAL PERFORMANCE PLOTS

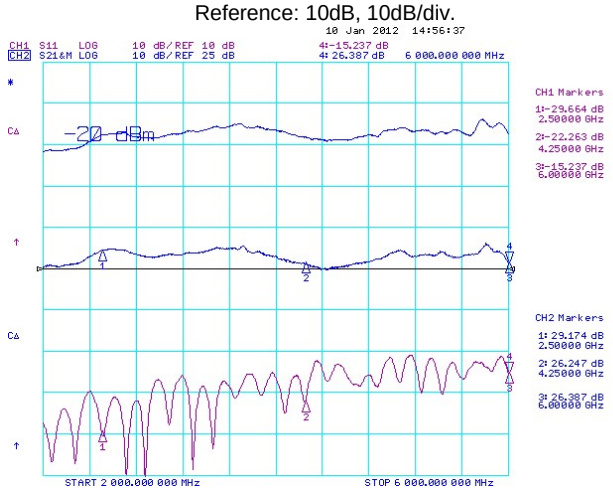
**Plot 1 – Small Signal Gain and $P_{1dB}$ Gain**
Top Curve: Small Signal Gain @ $P_{IN}$ = -20dBm
Middle Curve: Power Gain @ $P_{1dB}$, $P_{IN}$ = -16dBm
Reference: 52dB, 2dB/div.
Bottom Curve: Input Return Loss
Reference: 10dB, 10dB/div




**Plot 2 – Small Signal Gain and $P_{SAT}$**
Top Curve: Small Signal Gain @ $P_{IN}$ = -20dBm
Bottom Curve: Power Gain @ $P_{SAT}$, $P_{IN}$ = 0dBm
Reference: 51dB, 2dB/div.
Middle Curve: Input Return Loss
Reference: 10dB, 10dB/div.




**Plot 3 – Gain Adjustment Range@ $P_{IN}$ = -20dBm**
Top Curve: Max. Gain @ $VVA_{CTRL}$ = 0V
Middle Curve: Min. Gain @ $VVA_{CTRL}$ = 5V
Reference: 25dB, 10dB/div.
Bottom Curve: Input Return Loss @ Minimum Gain
Reference: 10dB, 10dB/div.




**Plot 4 – Performance at 60 Deg C (Base)**
Top Curve: $P_{SAT}$ @ $P_{IN}$ = 0dBm at 25 Deg C(Base)
Middle Curve: $P_{SAT}$ @ $P_{IN}$ = 0dBm at 60 Deg C(Base)
Reference: 46dB, 1dB/Div.
Bottom Curve: Input Return Loss
Reference: 10dB, 10dB/Div.