

# 1 kW Solid State Pulsed Power Amplifier

X-Band Microwave Power Module using GaN Technology



## Features

- 1 kW Peak Output Power
- Typical frequency range of 9.0 to 9.8 GHz
- Efficiencies as high as 20%
- Up to 100  $\mu$ sec pulse width, 10% duty cycle
- Targeted for TWT Amplifier Replacement
- Military and Commercial Radar Applications

API Technologies' Model QBS-609 is a 1kW peak output power, solid state amplifier designed as a replacement for traveling wave tube modules over the 9.2 to 9.8 GHz frequency range. Operating from a +28VDC isolated supply, the QBS-609 has 60dB minimum gain with performance up to 100  $\mu$ sec pulse widths at 10% duty cycle. Amplitude droop across a pulse of this duration is less than 1.3 dB. Phase distortion is minimized by gating the discrete power supply OFF during pulsed RF operation. Additional advantages of the GaN power module over a traveling wave tube counterpart include increased MTBF, soft fail vs. catastrophic fail, and lower long term replacement/repair cost. An integrated controller provides customer interface and fault monitoring options.

## Technical Specifications @ 25°C <sup>(1)</sup>

Parameter	Specification
Frequency	9.2 – 9.8 GHz
Output Power	+60 dBm Peak (min)
Input Power	+2 to +4 dBm
RF Pulse Width	0.05 to 100 $\mu$ sec
Duty Cycle	10% (max)
Pulse Repetition Rate	40 kHz (max)
Rise / Fall Time	300 nsec (max)
Efficiency <sup>(2)</sup>	15% (min)
P <sub>OUT</sub> On/Off Ratio	80 dB (min) @ 1kW
2 <sup>nd</sup> Harmonic	-40 dBc (max) @ 1kW
3 <sup>rd</sup> Harmonic	-45 dBc (max) @ 1kW
Spurious (non-harmonic)	-70 dBc (max) @ 1kW
Noise Power Density <sup>(3)</sup>	-34 dBm/MHz (max)
Input / Output Impedance	50 $\Omega$ (nominal)
Input / Output VSWR	1.5 :1
DC Prime Power <sup>(4)</sup>	+28 VDC

## Mechanical Specifications

Parameter	Specification
Case Dimensions	11.8" (L) x 6.1" (W) x 2.2" (H)
Material	6061-T6 Aluminum Alloy
Finish	Silver Plate per QQ-S-365 Type II, Grade B
Connectors	
RF Input	SMA Female Captivated 4-Hole Flange
RF Output <sup>(5)</sup>	TNC Female 4-Hole Flange
DC Power	Male 15 Pin Filtered D-Sub Standard Density
Control / Interface	21 Pin Micro D-Sub
Weight	11 lbs. (max)
Grounding	Chassis
Outline Drawing	080-23140

## Environmental Specifications

Ambient Operating Temperature	-40°C to +70°C	—
Absolute Max Baseplate Temperature	+90°C	—
Storage Temperature	-55°C to +100°C	—
Cooling	Adequate Heat Sink Required	Conduction
Relative Humidity	0 to 95%	Non-condensing
Altitude	0 to 40,000 ft.	Above Sea Level
Shock and Vibration	Airborne	—

## Miscellaneous

Control / Interface Signals	Standby/Operate, Pre-trigger, Remote On/Off, Synchronization	TTL Logic
Synchronization Frequency	250 kHz (nominal)	—
Maximum Load VSWR	Open / Short (All Phase Angles)	No Damage
MTBF	21,500 hrs. @ +50°C Baseplate Temperature	MIL-HDBK-217 Note 6

## Notes

1. Specification ratings are based on measurements in a 50 ohm system.
2. Total efficiency of +28 VDC power supply integrated with solid state amplifier.
3. Measured at the RF output with the RF input terminated into a 50 ohm load.
4. Alternate DC power supply voltages available as a custom solution.
5. RF output configuration transitions from WR-90 to a TNC connector. Package can be modified to support a direct WR-90 launch.
6. MTBF calculation based on an Airborne Inhibited Cargo (AIC) environment.



Outline Drawing

