

S-Band Power Amplifier

SVPA Technical Data Sheet

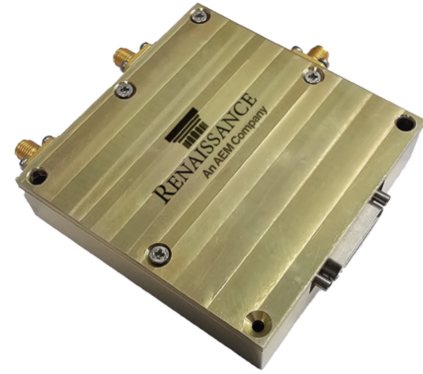
SVPA-HMPAS-619S

Features

- Type III size, S-Band power amplifier module
- Wide DC input range: 5V to 32V
- Three-stage architecture with high-efficiency GaN PA stage
- Digitally configurable output power: 1W to 8W
- Dual-mode operation (high power / low power bypass) for optimized efficiency
- Analog & digital forward/reverse RF power and current monitoring
- Digital temperature monitoring near GaN PA via RS-485
- Coupled forward RF sample (DPD output) for digital pre-distortion

Applications

- Satellite Communications
- Radar Systems
- EW / ECM Systems



Overview

The **SVPA-HMPAS-619S** is a compact, Type III size, S-Band power amplifier module operating from 5 V to 32 V DC. It uses a three-stage architecture with a high-efficiency GaN device in the final PA stage, offering digitally configurable RF output from 1 W to 8 W. Above 2 W, all three stages engage for maximum output; from 1 W–2 W, the final PA stage is bypassed, using only the pre-driver and driver stages for improved efficiency. The module provides analog and digital monitoring of forward/reverse RF power and current, GaN PA temperature sensing via RS-485, and a coupled forward RF sample (–16 dBm to –4 dBm) for DPD applications.

Configuration

Frequency Band	S-Band (2200 to 2300 MHz, typ.)
RF Ports	3 (RF-In, RF-Out, DPD-Out)
RF Connector	SMA-Female × 3
DC & Control Interface	21-Pin MIL-STD Micro-D Connector
Impedance	50 Ohms
Package	Type III (75 × 75 × 21 mm), 220 grams (Approx.)

RF Specifications

Notes: Values at +25 °C

Parameter	Specification	Remarks
RF Gain	50 dB	Small signal, max.
Gain Flatness over Frequency and Temperature	±1 dB	
RF Power Input	−19.2 dBm to −7.2 dBm (For 1 to 8 W, Typ)	Actual power depends upon the input and output matching conditions
RF Power Output	1 to 8 W	Power can be varied with: Input Power Control / Digital Attenuator Control (SPI) / Bias Control. Input Power Control for POEM
RF Output Power Selection	1 to 8 W in steps of 0.5 dB	
RF Output Power Variation	<1.2 dB	With temperature compensation
RF Saturated Output Power	9 W	
DPD Output Power	−16 dBm to −4 dBm (Typ)	Typical with 10 dB attenuator
Fwd RF Power Voltage	0.36 V (No RF) to 3.3 V	Available (Analog & Digital) on experimental basis through RS-485
Reverse RF Power Voltage	0.36 V (No RF) to 3.3 V	Available (Analog & Digital) on experimental basis through RS-485
Temperature Monitoring	−20 to 100 °C	Digital over SPI through RS-485
PA ON/OFF Option	0: OFF, 1: ON	Digital control through connector pin. Default state (ON/OFF) is resistor-settable through RS-485
Spurious/Harmonics	<−45 dBc for harmonics; <−{55+10log(P_{Tx})} dBc for Spur	

Electrical Specifications

Parameter	Specification	Remarks
Input Voltage	5 V to 32 V for RF power up to 5 W 12 V to 32 V for RF power up to 8 W	Input voltage needs to be selected based on overall efficiency and converter availability
DC Input Current	3.2 A (max) @ 5 V for 4 W output 1.01 A (max) @ 15 V for 4 W output 1.8 A (max) @ 15 V for 8 W output 1.0 A (max) @ 28 V for 8 W output	Exclusive of the external load current @ 2250 MHz
External Powering Option	5 V/1.5 A	2 A max. load
Overall Efficiency (PAE)	>8% at 1 W (Bias = -2.6 V) >15% at 2 W (Bias = -2.6 V) >25% at 4 W (Bias = -2.6 V) >36% at 8 W (Bias = -2.4 V)	Values at 2250 MHz. Device can be configured for better efficiency to operate only from 0.5 to 2 W

Interface

Parameter	Specification	Remarks
RF Interface	SMA-F × 3	RF-In, RF-Out, and DPD-Out
DC and Control Interface	21-pin MIL-STD Micro-D Connector	—

Mechanical Specifications

Parameter	Specification	Remarks
Package Size	Type III	
Geometry	(75 mm × 75 mm × 21 mm)	–
Weight	220 g	–
Package Material and Finish	Aluminum T6-6061 with yellow chromate finish	Finish can be customized to black anodizing based on customer requirements.

Environmental Specifications

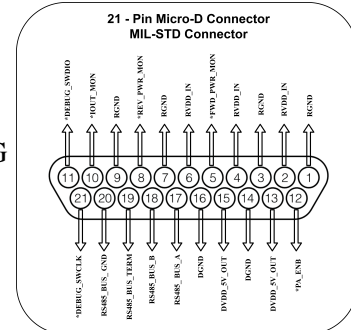
Parameter	Specification
Operating Temperature Range	–20 to +70 °C
Storage Temperature Range	–40 to +85 °C
Vibration	MIL-202, M204, TC: D 20G peak, 10 Hz to 2000 Hz, 4 minutes for each sweep × 4 times in each 3-axis Random 20 g RMS, 2 min, 20 Hz to 2000 Hz, in each axis
EMI Compatibility	MIL-STD-810F Compliant

Absolute Maximum Ratings

Parameter	Specification	Remarks
RF Input Power	+0 dBm	With digital attenuator set to 0 dB.
DC Voltage	+32 V	–
VSWR Load Mismatch	3:1	Device is capable of withstanding open- and short-circuit conditions for a short duration.
Maximum Temperature	+85 °C	Measured at the base of the enclosure.

Electrical Interface Details

CONNECTOR TYPE : 21 pin Female Micro D Connector
 CONNECTOR : KF1 DESIGNATION: SVPA POW-SIG
 FUNCTION : SVPA Power & Digital Interface



PinNo	Signal Name	Range	Direction	Remarks
1	RGND	0V	IN/OUT	Supply Ground
2	RVDD_IN	5-32V	IN	Supply Voltage In
3	RGND	0V	IN/OUT	Supply Ground
4	RVDD_IN	5-32V	IN	Supply Voltage In
5	*FWD_PWR_MON	0-2.5V	OUT	Fwd Pow Analog Mon
6	RVDD_IN	5-32V	IN	Supply Voltage In
7	RGND	0V	IN/OUT	Supply Ground
8	*REV_PWR_MON	0-3.3V	OUT	Rev Pow Mon
9	RGND	0V	IN/OUT	Supply Ground
10	*IOUT_MON	0-3.3V	OUT	Package Int Cur Mon
11	*DEBUG_SWCLK	0-3.3V	IN/OUT	μ C Debug Data pin
12	*PA_ENB	0-3.3V	IN	PA Enable (Default Pulled UP)
13	DVDD_5V_OUT	5V	OUT	5V Supply Out
14	DGND	0V	IN/OUT	Supply Ground
15	DVDD_5V_OUT	5V	OUT	5V Supply Out
16	DGND	0V	IN/OUT	Supply Ground
17	RS485_BUSA	0-3.3V	IN/OUT	Rs-485 BUS A
18	RS485_BUSB	0-3.3V	IN/OUT	Rs-485 BUS B
19	RS485_BUS_TERM	0V	IN	RS485 Bus termination
20	RS485_BUS_GND	0V	IN	RS485 Bus Ground
21	*DEBUG_SWCLK	0-3.3V	IN	μ C Debug Data clock

* For external Interface, RGND and DGND are internally shorted

Performance Data

Note: Measured values at their respective temperatures.

The plots shown below were measured across temperatures.

Test Conditions

- All measurements were performed at RF input frequency of 2.2 GHz.
- The DC supply voltage was maintained at 15 V throughout the measurements.

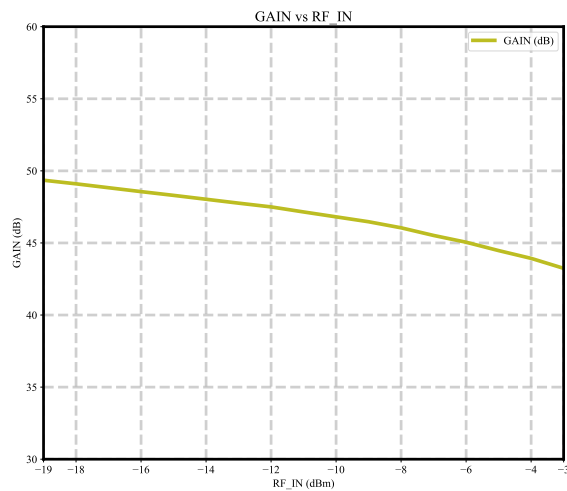


Figure 1: Gain vs. Input Power at 2.2 GHz

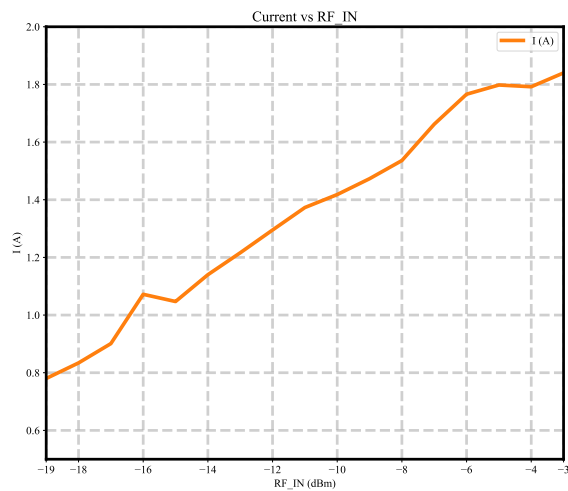


Figure 2: Current (A) vs. Input Power at 25°C and 2.2 GHz

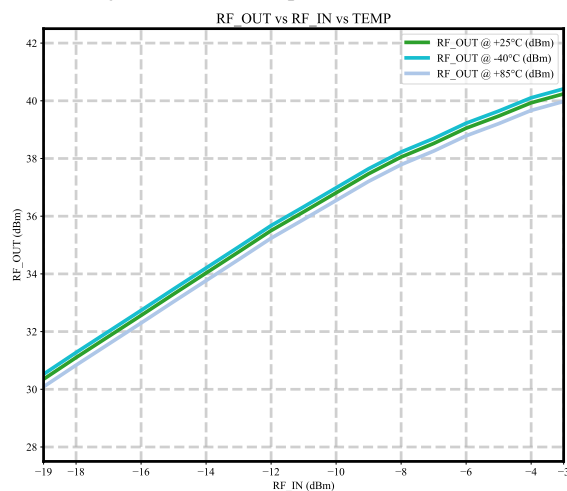


Figure 3: Output Power vs. Input Power across Temperatures (2.2 GHz)

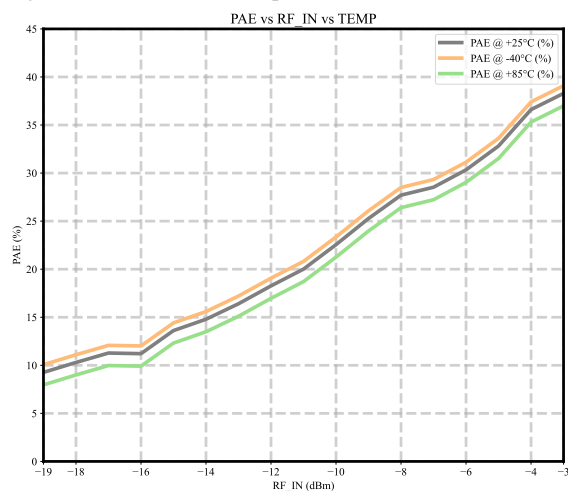


Figure 4: Power Added Efficiency (PAE) vs. Input Power across Temperatures (2.2 GHz)

SVPA-HMPAS-619S CAD Drawing

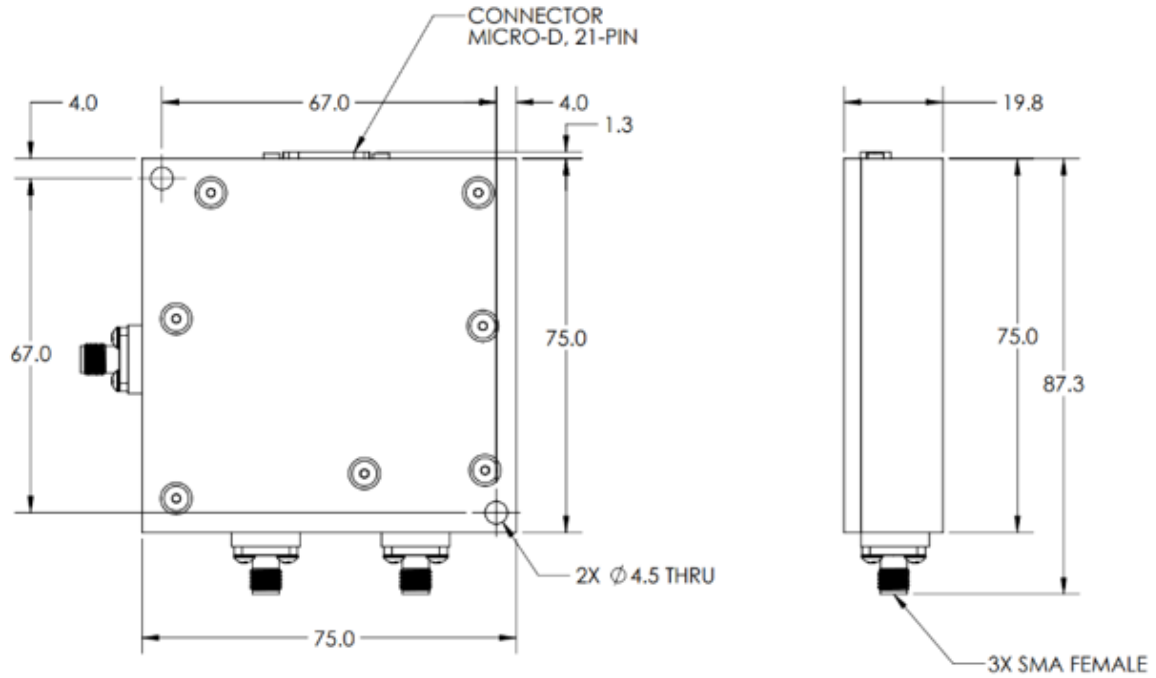


Figure 5: SVPA-HMPAS-619S mechanical drawing (All units are in mm)