

The ERF-SFFPA-0002 is a solid-state, Class AB broadband power amplifier module based on advanced GaN HEMT technology. The ERF-SFFPA-0002 is ideal for pulsed or CW applications, offering exceptional performance and functionality in a small and lightweight form factor. The design employs proprietary matching networks and combining techniques that ensure optimum performance at low cost. Advanced and unique features are accessible via an FPGA-based serial interface. Alternatively or in addition, the module may be fully controlled by the discrete I/O interface.

### PRODUCT FEATURES

- Small Form Factor (180 x 90 x 16 mm): Half the Height and Volume Compared with Competing Models
- Exceptional Bandwidth, Output Power and Efficiency
- Ultra-Fast and Effective Mute Function
- Comprehensive Built-In Test, Telemetry and Protection
- High-Resolution Gain Control
- Supports Internally-Stored Calibration Look-Up Tables
- High Reliability and Ruggedness
- Innovative Space-Saving Connector System

### TYPICAL APPLICATIONS

The ERF-SFFPA-0002 is ideal for:

- Electronic Warfare/Countermeasures
- Broadband Mobile Jamming Applications
- Airborne, Aircraft and UAV Equipment
- Power Amplifier Stage for Wireless Infrastructure
- Test and Measurement Equipment
- General Purpose Broadband Transmitter Amplification

### ELECTRICAL CHARACTERISTICS TC = +25 °C, 28 VDC, 50 Ω System (unless otherwise noted)

PARAMETER	MIN	TYP	MAX	UNITS
Operating Frequency Range	420		2700	MHz
Rated Output Power CW (ROP)		48.5		dBm
Saturated Output Power (Psat)	48.5	49.3	50.5	dBm
Power-Added Efficiency @ ROP (PAE)	35	39		%
Small Signal Gain (S21)	53		57	dB
Input Return Loss	15			dB
Output Return Loss	10			dB
Input Power @ ROP	-5		2	dBm
Input Power @ Psat			5	dBm
Gain Flatness @ ROP [1]	-0.25		0.25	dB
Noise Figure (NF)			22	dB
Output Third-Order Intercept Point (OIP3) [2]	53.5			dBm
Second Harmonic Emissions @ Psat			-14	dBc
Third Harmonic Emissions @ Psat			-17	dBc
Higher Harmonic Emissions @ Psat			-22	dBc
Non-Harmonic Spurious Emissions		-65	-60	dBc
DC Supply Voltage [3]	27.5	28.0	28.5	V
Current Consumption @ Psat [4]	1.8 [5]	7.1	9.2	A
Mute / Enable Mode Switching Characteristics:				
tenable, tmute (50% CTRL to 10/90% RF)		700	1000	ns
Isolation in Mute Mode [6]	40	80		dB
Output Noise Floor in Mute Mode [6] [7]		-165	-140	dBm/Hz
Current Consumption in Mute Mode		175	200	mA
Gain Control Characteristics:				
Full-Scale Gain Reduction (Relative to Default)	30	34.5		dB
Adjustment Resolution		0.25		dB

[1] Measured in any 5 MHz sub-band at a given temperature. Relative to sub-band centre frequency.

[2] Measured at +20 dBm/100 Hz, 1 MHz tone spacing.

[3] For no performance degradation. Also see Absolute Maximum Ratings.

[4] At 28V DC supply voltage.

[5] Quiescent current (IDQ).

[6] Over the frequency range 10 MHz to 10 GHz.

[7] Assumes noise floor at RF input  $\leq$  -144 dBm/Hz.

## CONTROL CHARACTERISTICS AND ADVANCED FEATURES [3]

PARAMETER	VALUE
Ultra-Fast Mute / Enable Switching	See Electrical Characteristics and Absolute Maximum Ratings Control via Discrete Input [9]
Serial Communications Interface (High Noise Immunity)	2-wire serial interface required to access most advanced features Interface: RS-485 Half Duplex Data Rate: 1 Mbps Also see Re-Mappable I/O Pins
High-Resolution Gain Control	See Electrical Characteristics and Absolute Maximum Ratings Control via Serial Comms Interface Limited Discrete Control via Re-Mappable I/O Pins [9]
User Memory	16 MB (128 Mbit) Serial Flash Memory Allocation Supports multiple Calibration Tables or User-Specific Data Control via Serial Comms Interface Limited Discrete Control via Re-Mappable I/O Pins [9]
Built-In Test Functions	Power-On BIT (PBIT) Continuous BIT (CBIT) Initiated BIT (IBIT) All BIT data is accessible via the Serial Comms Interface
Temperature BIT (P/C/I)	Baseplate and core temperatures monitored Range: -40 °C to +125 °C Accuracy: $\pm 3$ °C
Voltage BIT (P/C/I)	All critical voltage rails monitored Accuracy: $\pm 5$ %
Current BIT (P/C/I)	Critical device currents and total input current monitored Accuracy: $\pm 5$ %
Memory Integrity BIT (P/I)	CRC checking of User Data and Factory Data
Alarm Output	Discrete Output [9] Logical OR status of individual BIT flags Behaviour may be modified or disabled via Serial Comms Interface
Elapsed On-Time Recorder	34 Years of Total (Power-On) Time Accumulation 17-Bit Power-Up Event Counter
Electronic Identification Data (Non-Volatile)	Part number Serial Number Revision
Thermal Overload Protection	Threshold: $+90 \pm 3$ °C Hysteresis (TMUTE - TENABLE): 8 °C typ. Behaviour may be modified or disabled via Serial Comms Interface
Re-Mappable I/O Pins [9]	Up to 4 discrete I/O pins with re-configurable functionality. Applications may include: <ul style="list-style-type: none"> <li>• Add SPI Bus or RS232 as the Serial Communications Interface</li> <li>• Event triggers or encoded address bits to cycle between or select pre-programmed calibration settings in timing-critical situations</li> </ul>

[8] Control Interface is described fully in the Interface Control Document for SFF PA Module (Doc. No. 01-000-0004-01).

[9] I/O Pins are 3V3 TTL/CMOS compatible. Inputs are 5V tolerant..

### MECHANICAL CHARACTERISTICS

PARAMETER	VALUE	UNITS
Dimensions [10]	180 x 90 x 16	mm
Mass	430 ±20	g
RF In / Out Connectors	SMA Female	-
DC In / Control Connector [11]	Mixed Technology Male: 2 Power + 8 Signal	-
Cooling Method	External Heatsink to Baseplate (Not Supplied)	-

[10] Also see Outline Drawing.

[11] Please contact Antares for connector specifics.

### ENVIRONMENTAL CHARACTERISTICS

PARAMETER	MIN	TYP	MAX	UNITS
Case or Baseplate Temperature	-40 [12]		+85	°C
Humidity (MIL-STD-810F, Method 507.4, para. 4.5.2) [13]			95	%
Altitude (MIL-STD-810F, Method 500.4, para. 4.5.2, 4.5.3) [13]			30,000	ft
Vibration (MIL-STD-810F, Method 514.5, para. 4.5.2) [13]		Operational – Aircraft & Ground		-
Shock (MIL-STD-810F, Method 516.5, para. 4.5.2.3) [13]			40	g's
Ingress Protection		IP51		-

[12] Includes Cold Start after ≥2 hour Cold Soak.

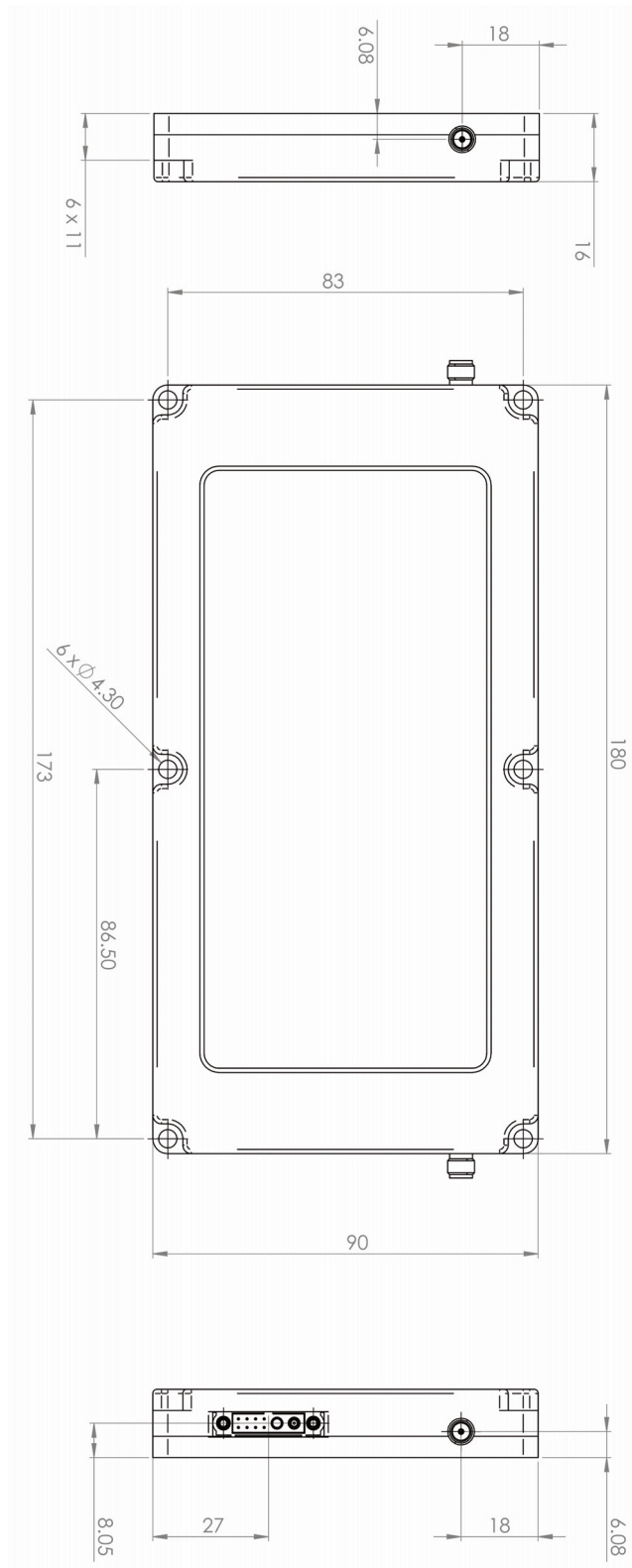
[13] Designed to meet.

### ABSOLUTE MAXIMUM RATINGS (Not simultaneous)

RF Input Power	+15 dBm
RF Output Mismatch	VSWR ∞:1 at all phase angles (for 1 minute)
Case or Baseplate Temperature (Operating)	-40 °C to +85 °C
Case or Baseplate Temperature (Non-Operating)	-40 °C to +100 °C
DC Supply Voltage (DC IN+ to GND)	24 V to 32 V
Control Interface (I/O and RS485-HD to GND)	-0.5 V to 5.5 V
Mute / Enable Mode Switching Frequency	40 kHz
Gain Control Setting Update Frequency	25 kHz
ESD Sensitivity	HBM Class 1A

Exceeding maximum ratings may cause permanent damage. Operation between operating range maximum and absolute maximum for extended periods may reduce device reliability. Absolute maximum ratings are stress figures only and functional operation under these conditions is not implied.

### OUTLINE DIMENSIONED DRAWING: (in millimetres)



### ESD PRECAUTIONS

Although this product contains circuitry to protect it from damage due to ESD, when handling this product observe the same precautions as with any other ESD-sensitive device.



### RoHS COMPLIANCE

RoHS compliant parts and processes are used in the manufacture of this product.

### ECCN

The highest ECCN grading of any component used in the product is US Department of Commerce EAR99 (ITAR-free).



### QUALITY

This product is designed and manufactured in the United Kingdom in accordance with the ISO 9001:2015 Quality Management System.

### ORDERING INFORMATION

MODEL NAME	PART NUMBER	FINISH
ERF-SFFPA-0002	10-000-0002-01	Iridite TM NCP

### REVISION HISTORY

REVISION	DATE	CHANGE DESCRIPTION	ECN
A	-	-	-