ERF-XBPA-0002

100W 7.9GHz to 9.6GHz

ANTARES DEFENCE SYSTEMS

TYPICAL APPLICATIONS

The ERF-XBPA-0002 is ideal for:

- X-Band Radar
- Data Links
- Test and Measurement Equipment

GENERAL DESCRIPTION

The ERF-XBPA-0002 is a solid-state, Class AB X-Band power amplifier module based on advanced GaN HEMT technology. The ERF-XBPA-0002 is intended for pulsed applications, offering exceptional performance in a small and lightweight form factor. Advanced and unique features are accessible via an FPGA-based serial interface. The module primary functions may also be controlled using the discrete I/O interface.

PRODUCT FEATURES

Small Form Factor (180 x 120 x 30 mm): *Considerably Smaller and Lighter than Competing Models*

Exceptional Bandwidth, Output Power and Efficiency

Ultra-Fast and Effective Mute Function

Comprehensive Built-In Test, Telemetry and Protection

High-Resolution Power/Gain Control

Supports Internally-Stored Calibration Look-Up Tables

Innovative Space-Saving Connector System

ELECTRICAL CHARACTERISTICS T_C = +25 °C, 34 VDC, 50 Ω System (unless otherwise noted)

PARAMETER [1]	MIN	TYP	MAX	UNITS
Operating Frequency Range	7.9		9.6	GHz
Rated Output Power (ROP)		51.8		dBm
Saturated Output Power (P_{SAT})	51.8 [2]	52.6	53.5	dBm
Power-Added Efficiency @ROP [3]	16	20		%
Power Gain @ROP	50		65	dB
Input Return Loss	-10			dB
Output Return Loss	-14			dB
Input Power @ROP		-7	10 [2]	dBm
Noise Figure		7	12 [2]	dB
Output Third-Order Intercept Point		54		dBm
Harmonic Emissions			-65	dBc
Non-Harmonic Spurious Emissions			-70	dBc
Pulse Width			100	µs
Pulse Droop			0.6	dB
Pulse Rise/Fall Time			50	ns
Pulse ON-OFF Isolation [4]	60			dB
PRF [5]			6	kHz
Duty Cycle			15	%
DC Supply Voltage		34		V
Average DC Current Consumption [3]		3.5	5.0	A
Peak DC Current Consumption			22	A
Mute/Enable Mode Switching Characteristics: t_{ENABLE}, t_{MUTE} (50% CTRL to 10/90% RF)		200	1000	ns
Isolation in Mute Mode	80			dB
Output Noise Floor in Mute Mode		-160		dBm/Hz
Current Consumption in Mute Mode		220	240	mA
Power/Gain Control Characteristics: Adjustment Range Adjustment Resolution		 31 1		 dB dB

[1] Pulse Width ≤100 µs, Duty Cycle ≤15 %.
[2] T_C = 85 °C.
[3] Mute between RF pulses with 1 µs guard bands.
[4] When using Pulse Modulation Input.
[5] Pulse Width ≤25 µs.

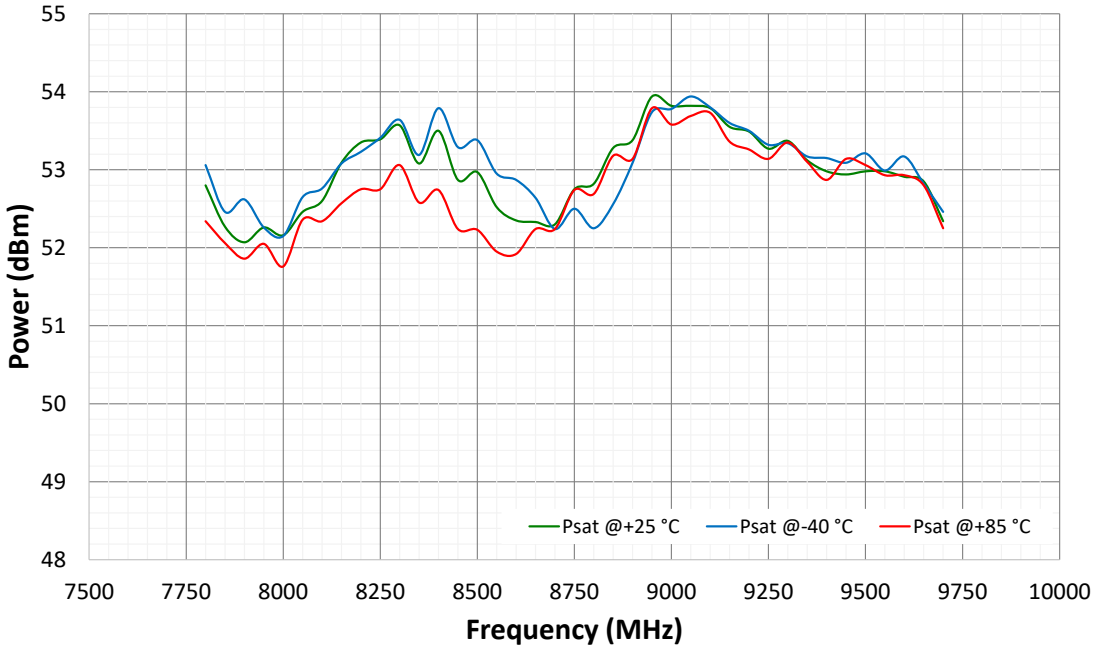
CONTROL CHARACTERISTICS AND ADVANCED FEATURES [6]

PARAMETER	VALUE
Ultra-Fast Mute/Enable Switching	Control via discrete input Additional control via Serial Comms Interface
Shutdown Function	Control via discrete input
Serial Communications Interface 1 (High Noise Immunity)	2-wire serial interface for accessing advanced features Interface : RS-485 Half Duplex Data Rate: 1 Mbps
Serial Communications Interface 2	2-wire serial interface for accessing advanced features Interface : I^2C Clock Rate: 100 kHz Configurable address for up to 4 units per bus
High-Resolution Power/Gain Control	Control via Serial Comms Interface
User Memory	16 MB (128 Mbit) serial flash memory Supports multiple calibration tables or user-specific data Control via Serial Comms Interface
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	Baseplate and core temperatures monitored Range: -40 °C to +125 °C Accuracy: ±3 °C
Voltage BIT	All critical voltage rails monitored Accuracy: ±5 %
Current BIT	Critical device currents and total input current monitored Accuracy: ±5 %
Memory Integrity BIT	CRC checking of User Settings and Factory Settings
Alarm Output	Discrete output Logical OR status of individual BIT flags Behaviour may be modified 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	Set Threshold: +90 °C Clear Threshold: +82 °C
Over-Current Protection	Threshold: 15 A
Pulse Width, PRF & Duty Cycle Protection	Threshold (Pulse Width): 110 µs Threshold (PRF): 6.6 kHz Threshold (Duty Cycle): 16.5 %
Additional Features	DC supply reverse polarity protection Control interface ESD protection Shutdown function

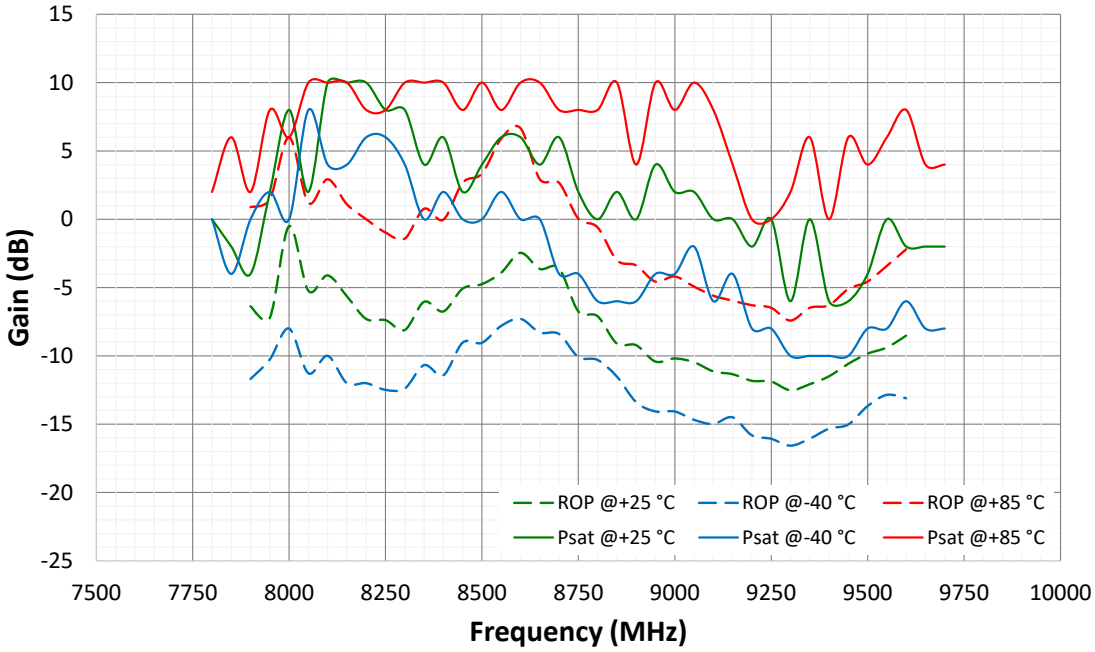
[6] Control Interface is described fully in the Interface Control Document for ERF PA Module *(Doc. No. 01-000-0004-01). Please contact Antares for details.*

TYPICAL PERFORMANCE (34 VDC, 100 µs Pulse, 15 % Duty Cycle, Mute between Pulses)

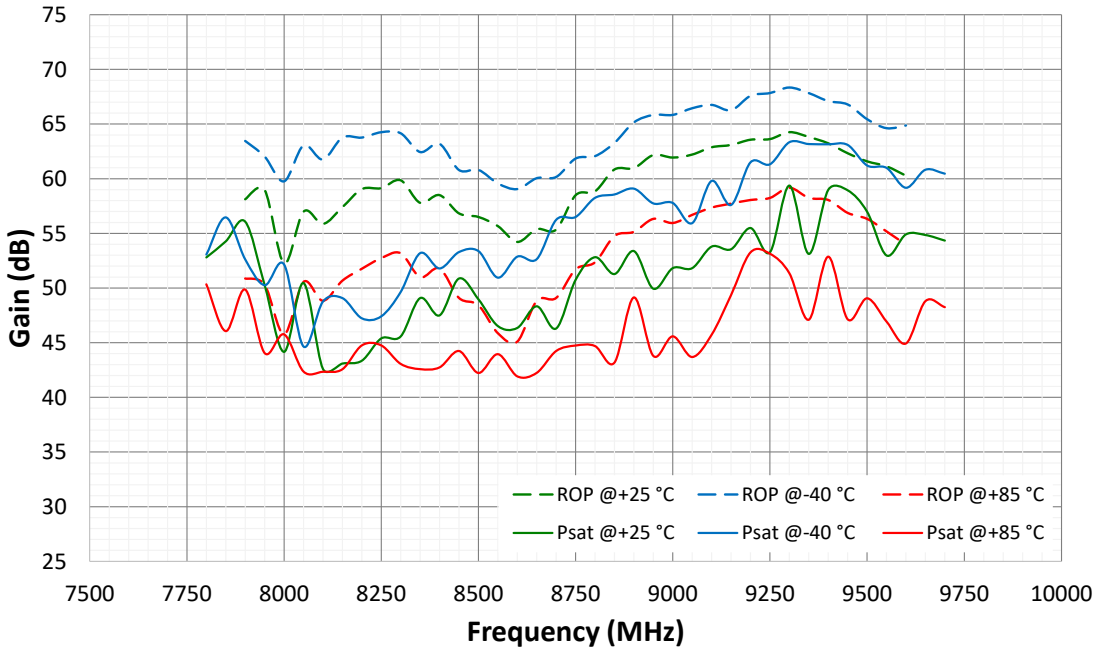
Output Power vs. Frequency vs. Temperature



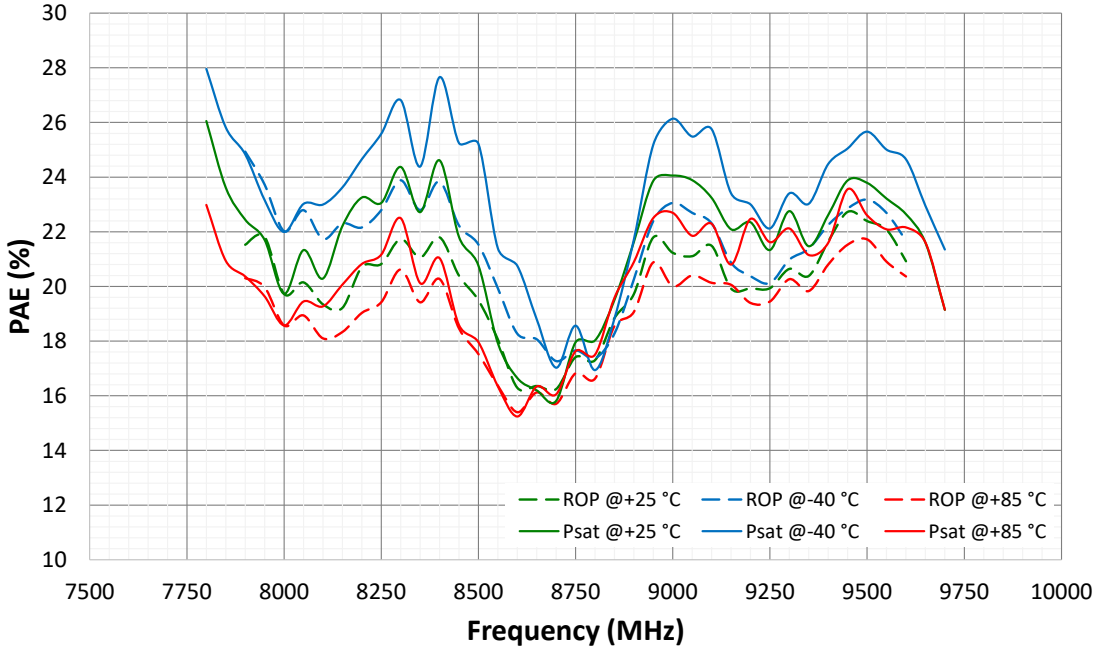
Input Power vs. Frequency vs. Temperature



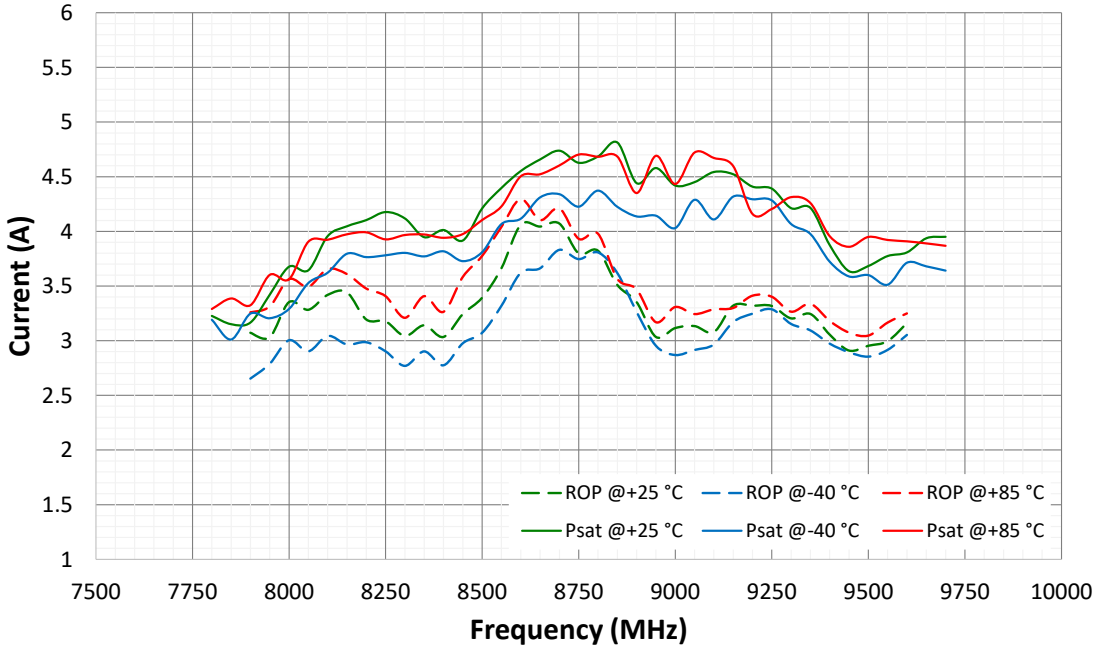
Gain vs. Frequency vs. Temperature



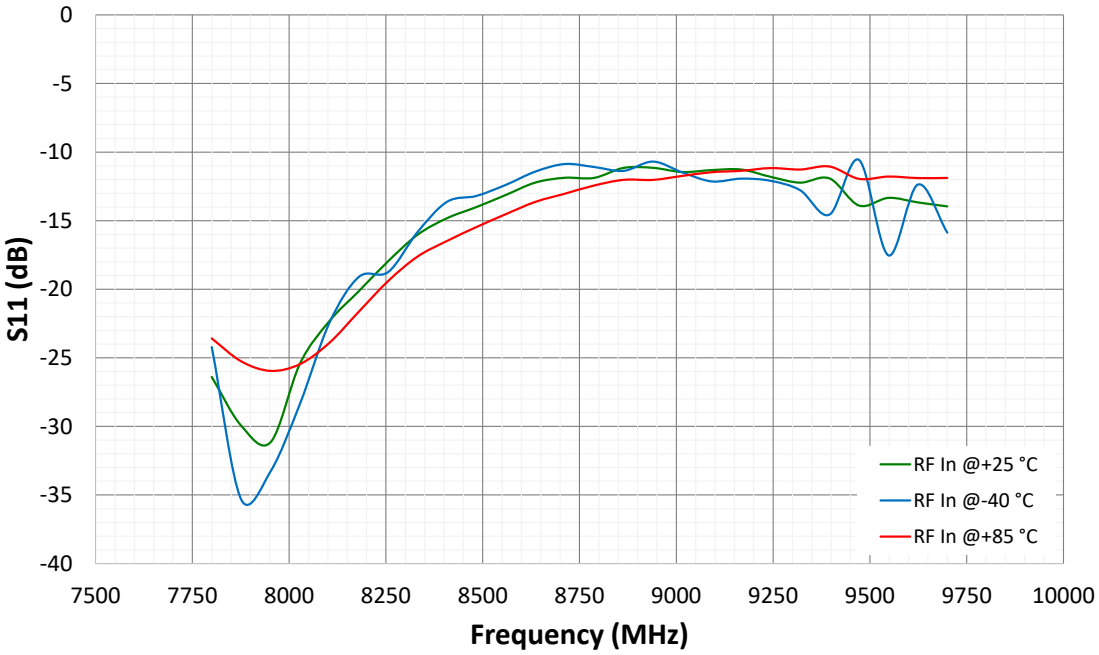
PAE vs. Frequency vs. Temperature



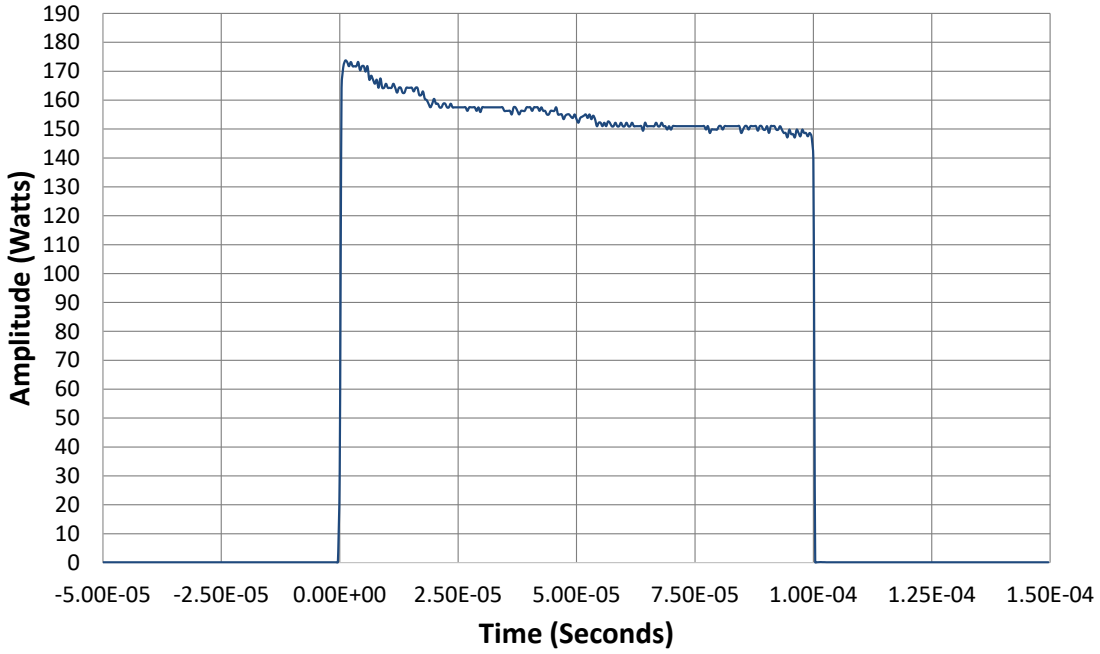
Average DC Current vs. Frequency vs. Temperature



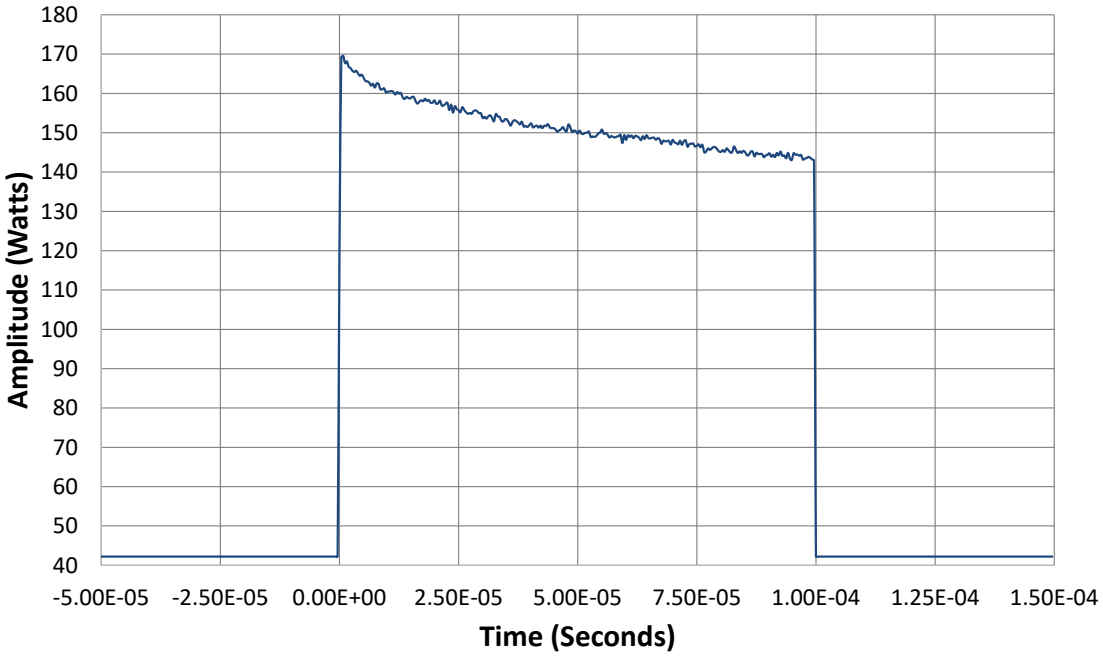
Return Loss vs. Frequency vs. Temperature



Pulse Power (9150 MHz, ROP, +25 °C)



Pulse Droop (9150 MHz, ROP, +85 °C)



MECHANICAL CHARACTERISTICS

PARAMETER	VALUE	UNITS
Dimensions (excluding RF connectors)	180 x 120 x 30	mm
Mass	1000 ±50	g
RF In / Out Connectors	SMA Female	-
DC In / Control Connector [7]	Mixed Technology Male – 4 Power + 12 Signal	-
Cooling Method	External Heatsink to Baseplate (Not Supplied)	-

[7] Please contact Antares for connector specifics.

ENVIRONMENTAL CHARACTERISTICS

PARAMETER	MIN	TYP	MAX	UNITS
Case or Baseplate Temperature	-40		+85	°C
Relative Humidity (non-condensing)			95	%
Ingress Protection		IP67		-

ABSOLUTE MAXIMUM RATINGS (Not simultaneous)

RF Input Power	+15 dBm
RF Output Mismatch	VSWR ∞:1 at all phase angles (for 1 minute) VSWR 5:1 at all phase angles (continuous)
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 36 V
Control Interface (I/O and RS485-HD to GND)	-0.5 V to 5.5 V
Mute/Enable Mode Switching Frequency	100 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.

ESD PRECAUTIONS

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

RoHS COMPLIANCE

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

QUALITY

This product is designed and manufactured in the United Kingdom in accordance with the ISO 9001:2008 Quality Management System.

ORDERING INFORMATION

MODEL NAME	PART NUMBER	FINISH
ERF-XBPA-0002	10-000-0029-01	Iridite ™ NCP

REVISION HISTORY

REVISION	DATE	CHANGE DESCRIPTION	ECO
A	04/02/2019	First release	

Disclaimer: This datasheet is subject to change without notice.