



ERZ-HPA-0600-2650-40-RM

The ERZ-HPA-0600-2650-40-RM is a Wideband High Power Amplifier with two independent bands operating from 6 to 18 GHz and from 18 to 26.5 GHz and providing an output power higher up to 20W. The module offers different gain levels through a controlled attenuator.

Main Features:

- Frequency Range:
 - Band 1: 6 – 18 GHz
 - Band 2: 18 - 26.5 GHz.
- Typical values: Psat 43 dBm, Gain 43 dB.
- Weight: < 15 Kg.
- RF connectors (I/O): 2.92 mm (F)
- Power supply: 230V AC
- Standard Rack 19" 4U
- Front LCD touch panel
- Control and monitoring features:
 - Band selection
 - Attenuation level (0-30 dB) with 1 dB step
 - Temperature monitoring and temperature alarm

Typical applications:

- Industrial / Laboratory
- Satcom / Telecom

Electrical specifications sub-band 1: 6-18 GHz

Parameter	Value			Units
	Min	Typ	Max	
Frequency	6	-	18	GHz
Output Power (Psat)	41	43	46	dBm
Gain @Pout: 40 dBm	38	42	50	dB
Gain Flatness @Pout: 40 dBm	-	±4	-	dB
VSWR Input	1.1:1	1.2:1	1.8:1	-
VSWR Output	1.1:1	1.3:1	1.8:1	-
2 nd Harmonic suppression @ -10 dBm input power	40	-	75	dBc
3 rd Harmonic suppression @ -10 dBm input power	25	-	65	dBc
Spurious @0 dBm input power	-	-	-50	dBc

Specifications at ambient temperature (25°)

Electrical specifications sub-band 2: 18-26.5 GHz

Parameter	Value			Units
	Min	Typ	Max	
Frequency	18	-	26.5	GHz
Output Power (Psat)	41	43	46	dBm
Gain @Pout: 40 dBm	43	48	55	dB
Gain Flatness @Pout: 40 dBm	-	±3.5	-	dB
VSWR Input	1.1:1	1.2:1	1.8:1	-
VSWR Output	1.1:1	1.3:1	1.8:1	-
2 nd Harmonic suppression @ -10 dBm input power	44	-	60	dBc
Spurious @0 dBm input power	-	-	-50	dBc

Specifications at ambient temperature (25°)

Common specifications

Parameter	Value			Units
	Min	Typ	Max	
Gain control (attenuation) 1 dB step	0	-	30	dB
Impedance	-	50	-	Ω
AC Power	-	230	-	V

Mechanics and interfaces

Parameter	Value	Units
Dimensions	483x508x177	mm
Weight	< 15 Kg	Kg
Housing	Standard box 19 inch, 4U	-
RF Connectors (I/O)	2.92 mm Female	-
Power	LEC320 C14 (rear pannel) ON/OFF button (front panel)	-
Control	RS232 Connector (rear panel) LCD touch screen (front panel)	-

Saturation Output Power (Band 1)

Figure 1 shows the saturation output power as a function of frequency of band 1 at room temperature (25°C) for band 1.

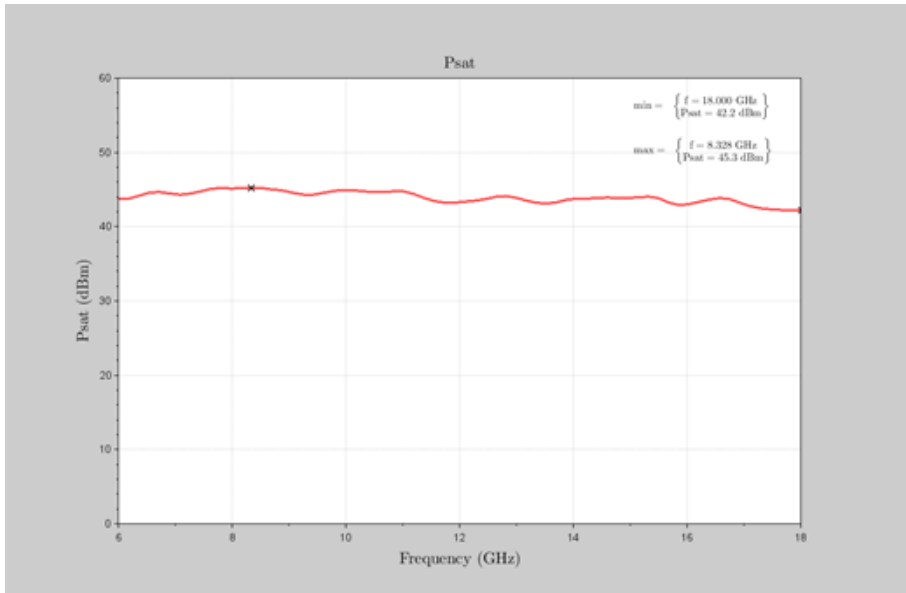


Figure 1: ERZ-HPA-0600-2650-40-RM Saturation Output Power (Band 1)

Saturation Output Power (Band 2)

Figure 2 shows the saturation output power as a function of frequency of band 2 at room temperature (25°C).

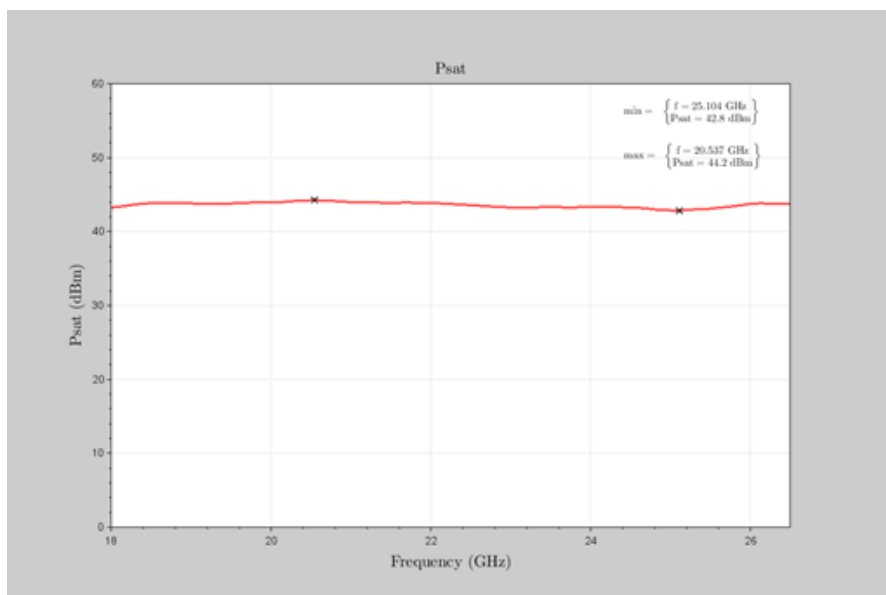


Figure 2: ERZ-HPA-0600-2650-40-RM Saturation Output Power (Band 2)

Power Gain (Band 1)

Figure 3 shows the gain at 40 dBm output power as a function of frequency of band 1 at room temperature (25°C).

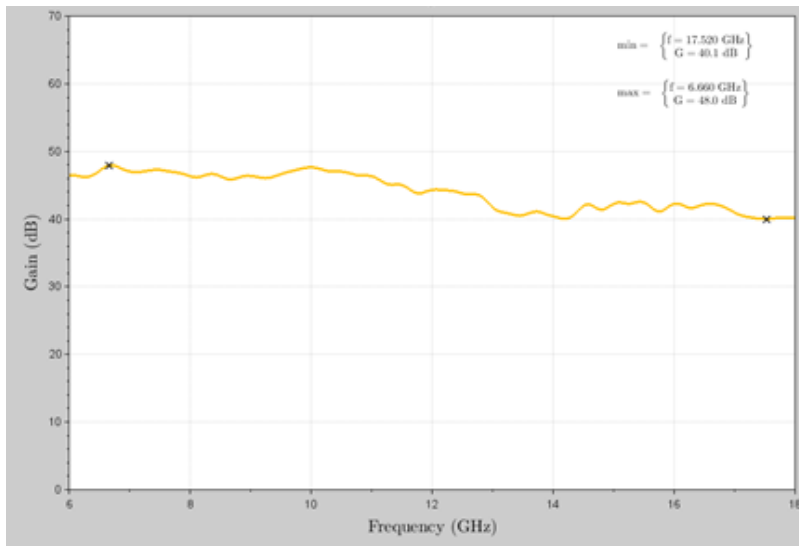


Figure 3: ERZ-HPA-2650-40-RM Power Gain (Band 1)

Power Gain (Band 2)

Figure 4 shows the gain at 40 dBm output power as a function of frequency of band 2 at room temperature (25°C).

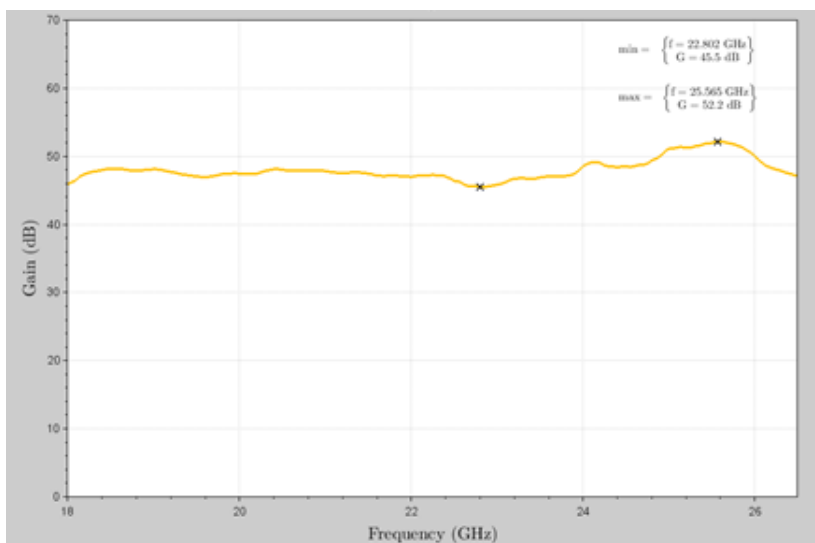


Figure 4: ERZ-HPA-2650-40-RM Power Gain (Band 2)

Input Matching (Band 1)

Figure 5 shows input VSWR (S11) as a function of frequency of band 1 at room temperature (25°C).

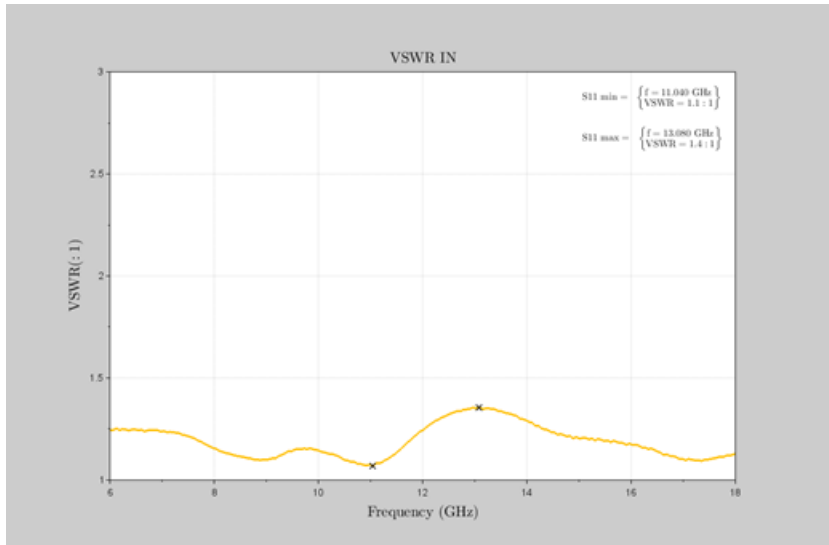


Figure 5: ERZ-HPA-0600-2650-40-RM Input Matching (Band 1).

Output Matching (Band 1)

Figure 6: shows output VSWR (S22) as a function of frequency of band 1 at room temperature (25°C).

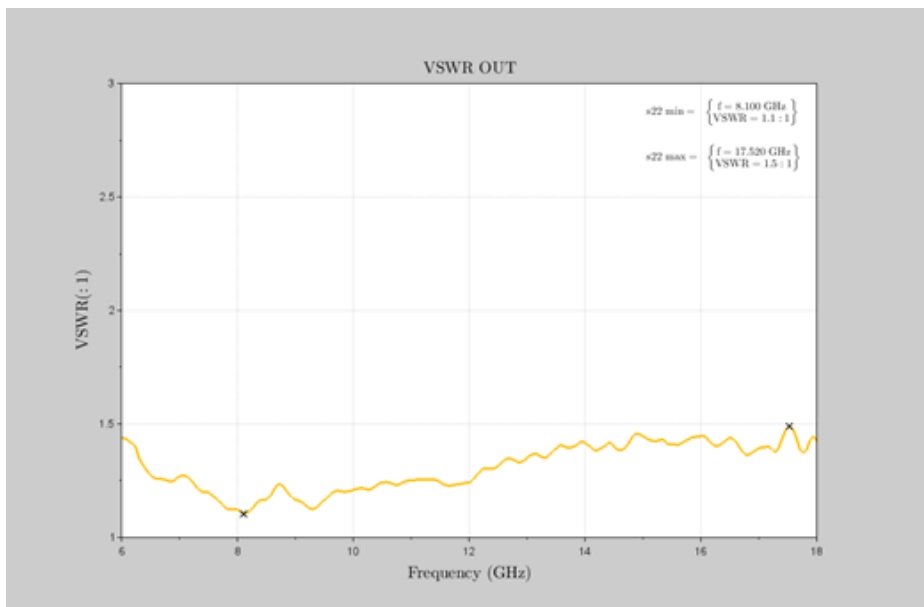


Figure 6: ERZ-HPA-0600-2650-40-RM Output Matching (Band 1).

Input Matching (Band 2)

Figure 7 shows input VSWR (S11) as a function of frequency of band 2 at room temperature (25°C).

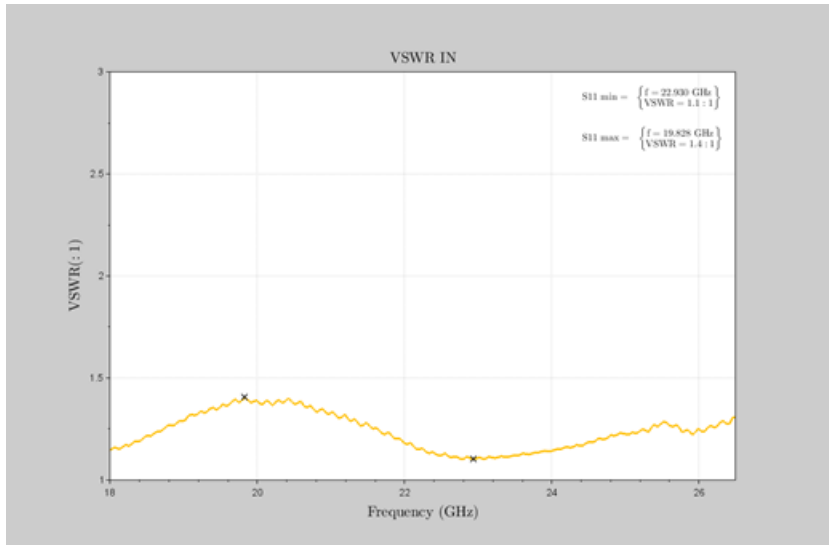


Figure 7: ERZ-HPA-0600-2650-40-RM Input Matching (Band 2).

Output Matching (Band 2)

Figure 8 shows output VSWR (S22) as a function of frequency of band 2 at room temperature (25°C).

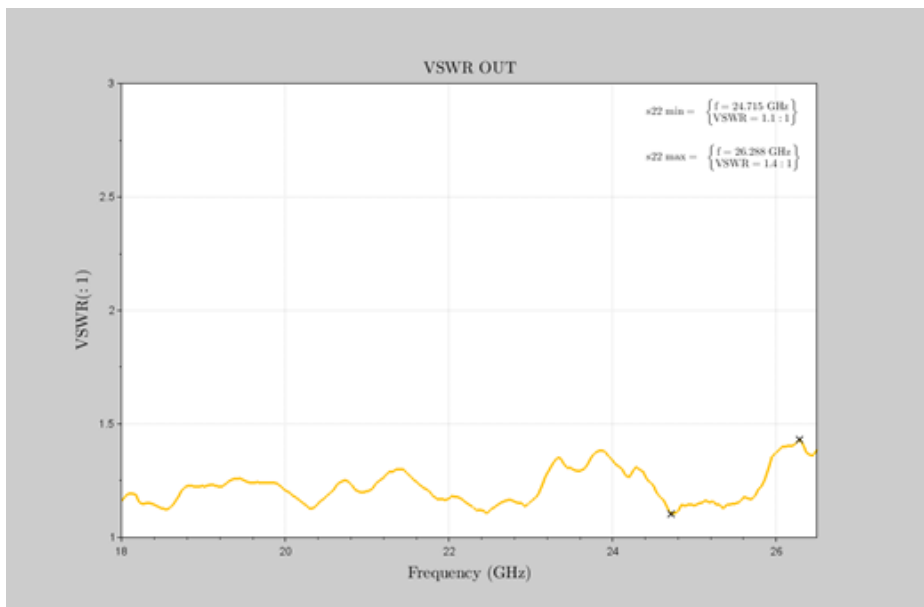


Figure 8: ERZ-HPA-0600-2650-40-RM Output Matching (Band 2)

Harmonic Suppression (Band 1)

The following figures show the 2nd and 3rd harmonic suppression as a function of frequency of band 1 at room temperature (25°C).

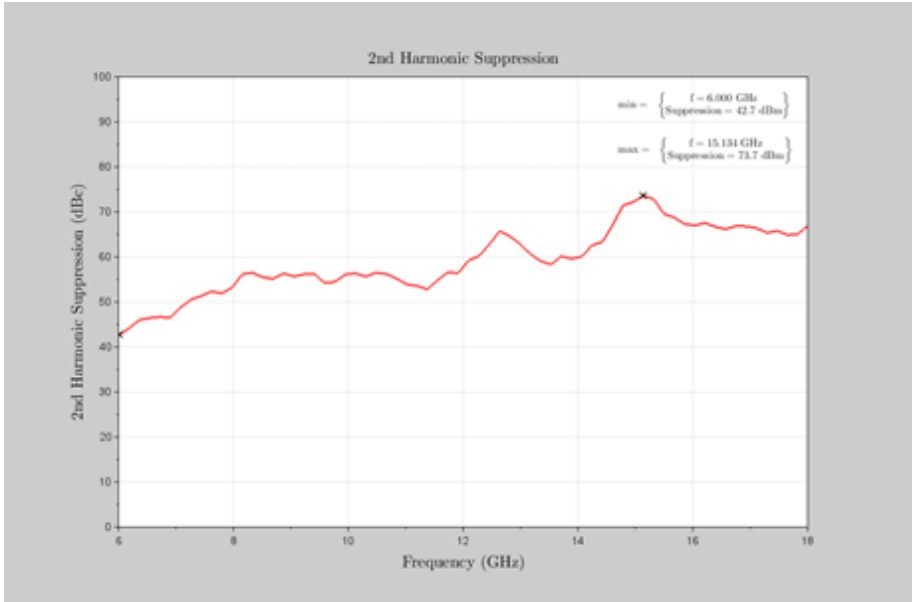


Figure 9: ERZ-HPA-0600-2650-40-RM 2nd Harmonic Suppression of Band 1 (Input Power: -10dBm)

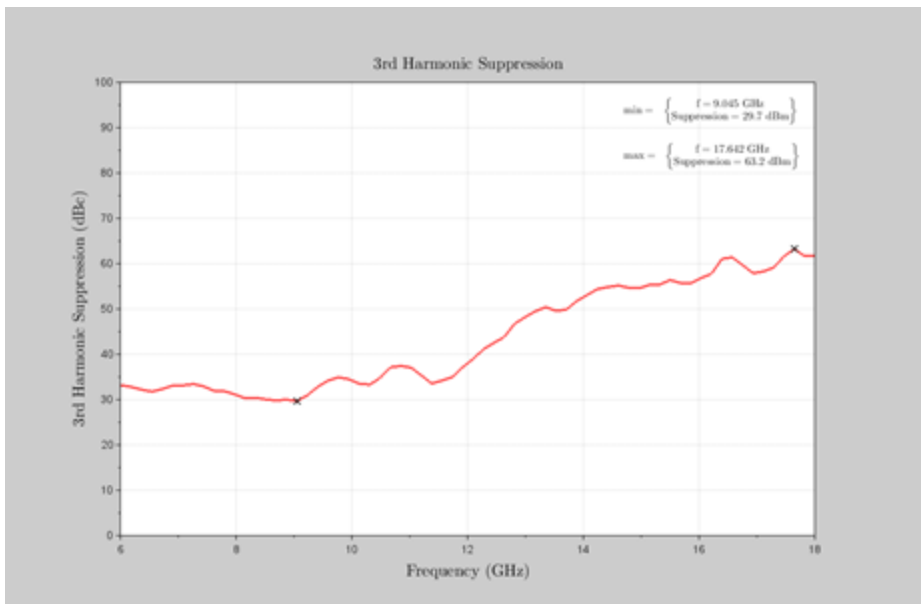


Figure 10: ERZ-HPA-0600-2650-40-RM 3rd Harmonic Suppression of Band 1 (Input Power: -10dBm)

Harmonic Suppression (Band 2)

Figure 11 shows the 2nd harmonic suppression as a function of frequency of band 2 at room temperature (25°C).

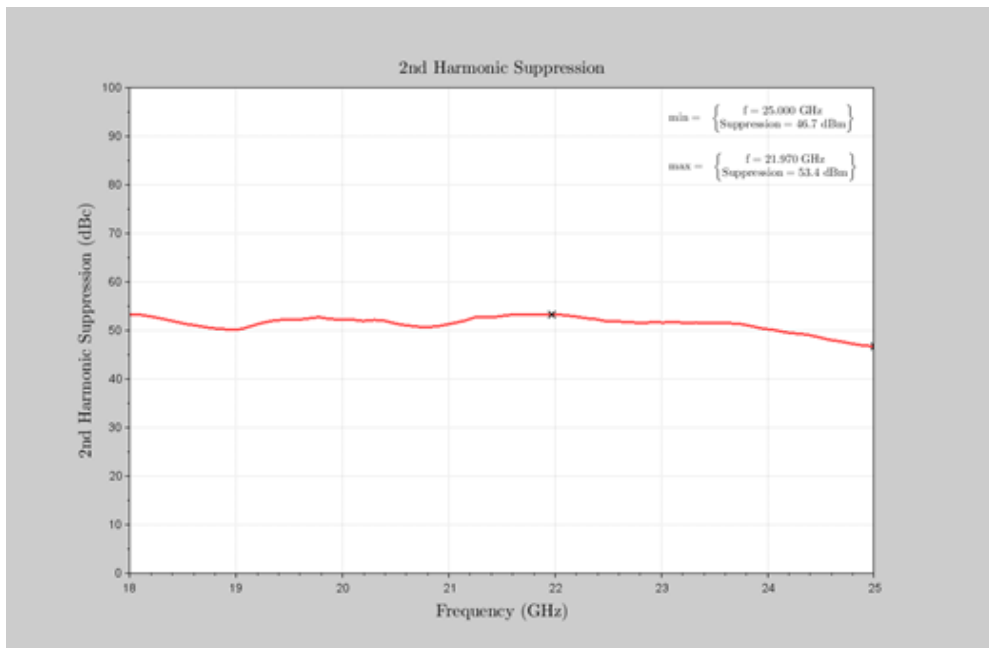


Figure 11: ERZ-HPA-0600-2650-40-RM 2nd Harmonic Suppression of Band 2 (Input Power: -10dBm)

Attenuation level (Band 1)

Figure 12 shows the main attenuation states as a function of frequency of band 1 at room temperature (25°C).

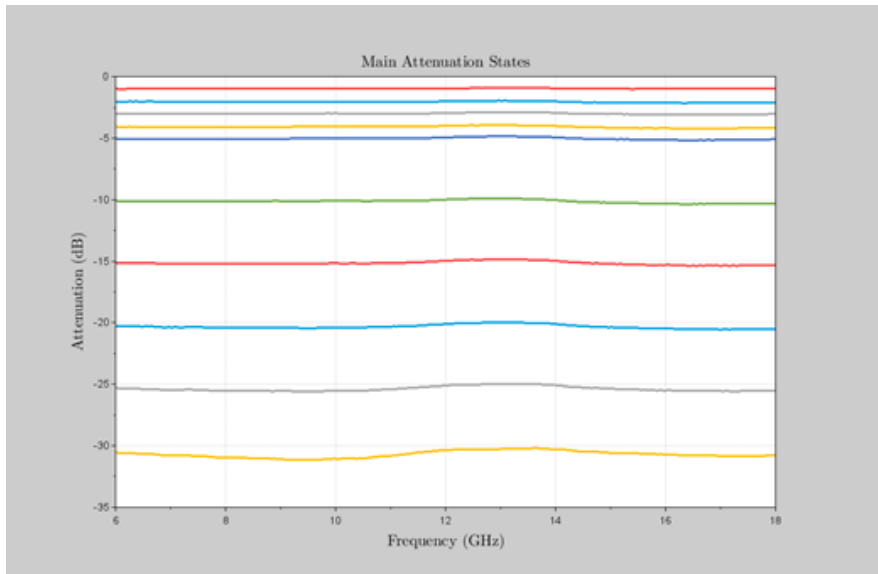


Figure 12: ERZ-HPA-0600-2650-40-RM Main Attenuation States (Band 1)

Attenuation level (Band 2)

Figure 13 shows the main attenuation states as a function of frequency of band 2 at room temperature (25°C).

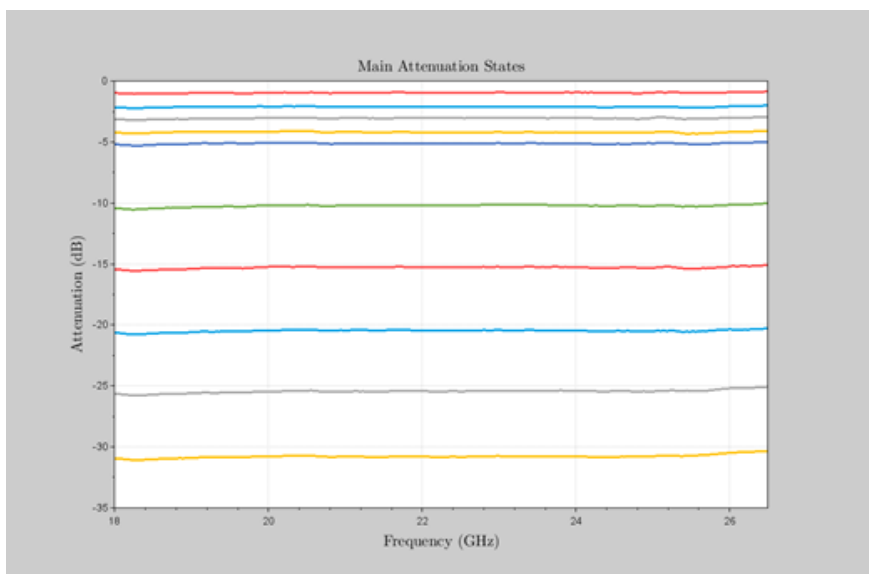


Figure 13: ERZ-HPA-0600-2650-40-RM Main Attenuation States (Band 2)

Spurious (Band 1)

Figure 14 shows the spurious as a function of frequency at room temperature (25°C) for band 1.

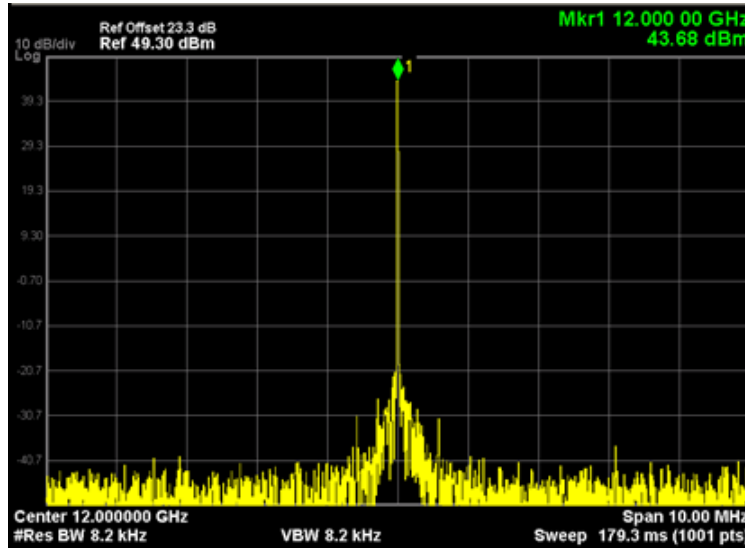


Figure 14: ERZ-HPA-0600-1840-RM Spurious of Band 1 @12GHz (Input Power: 0 dBm; span: 10MHz)

Spurious (Band 1)

Figure 15 shows the spurious as a function of frequency at room temperature (25°C) for band 1.

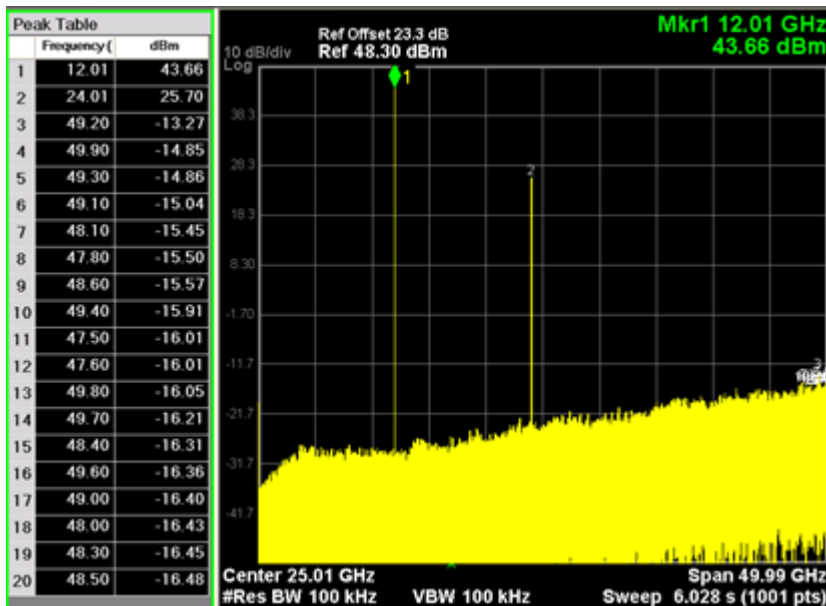


Figure 15: ERZ-HPA-0600-2650-40-RM Spurious of Band 1 @12GHz (Input Power: 0 dBm; Full span)

Spurious (Band 2)

Figure 16 shows the spurious as a function of frequency at room temperature (25°C) for band 2.

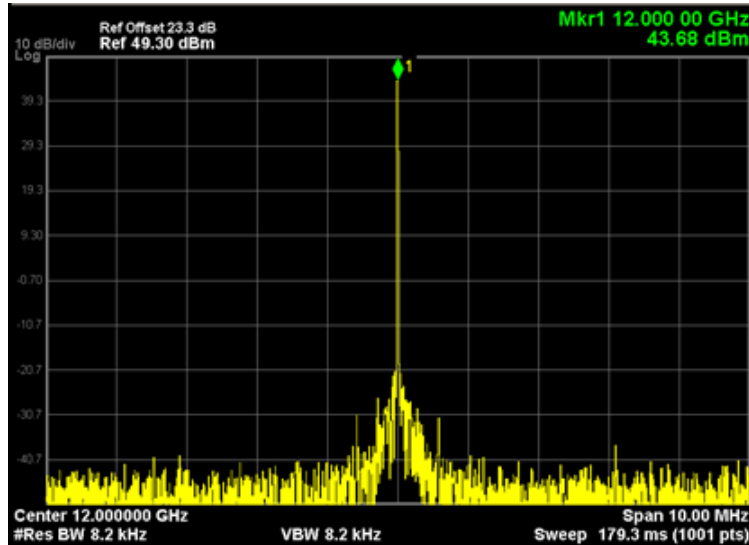


Figure 16: ERZ-HPA-0600-2650-40-RM Spurious of Band 2 @22GHz (Input Power: 0 dBm; span: 10MHz)

Spurious (Band 2)

Figure 17 shows the spurious as a function of frequency at room temperature (25°C) for band 2.

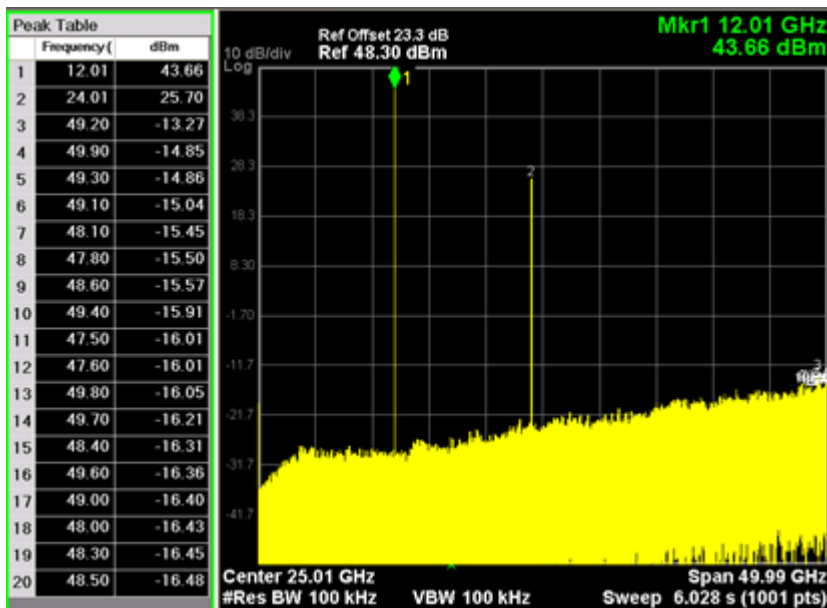


Figure 17: ERZ-HPA-0600-2650-40-RM Spurious of Band 2 @22GHz (Input Power: 0 dBm; Full span)

Absolute Maximum Ratings

Condition	Value
DC Voltage	240
Maximum Input Power (CW)	+13 dBm
Operation temperature (at case)	0 to 40°C
Storage temperature	0 to 75°C

- Stress above these ratings may cause permanent damage to the device.
- It is final user responsibility to maintain the amplifier within the specified ranges.

Measurements Conditions

All measurements provided in this report were performed at the following conditions:

Condition	Value
Temperature (DUT ON)	25°C ± 1°C
Humidity	44% ± 10%
DUT Warm up time	30 min
DUT minimum operation time	24 hours
Test equipment warm up time	2 hours
Additional temperature cycles in climatic chamber (DUT OFF)	-40°C to 85°C

RoHS & REACH Compliance

This part is compliant with EU 2011/65/UE RoHS (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) and REACH (Registration, Evaluation, Authorization and restriction of Chemical substances) directives.



Control Interface

Functions implemented:

- Band Selection
 - Band 1: 6-18 GHz
 - Band 2: 18-26.5 GHz
- Gain Control: 0-30 dB attenuation range with 1dB step
- Temperature Monitoring
- Temperature Alarm

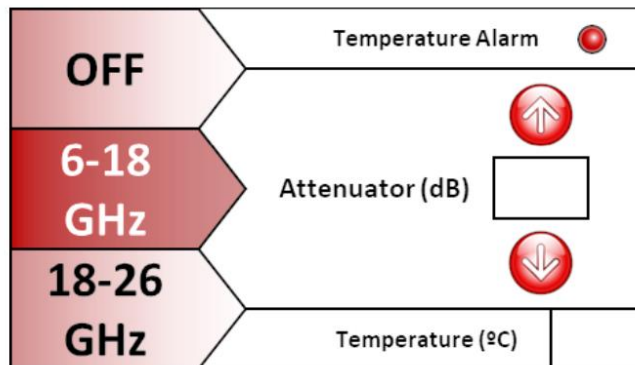
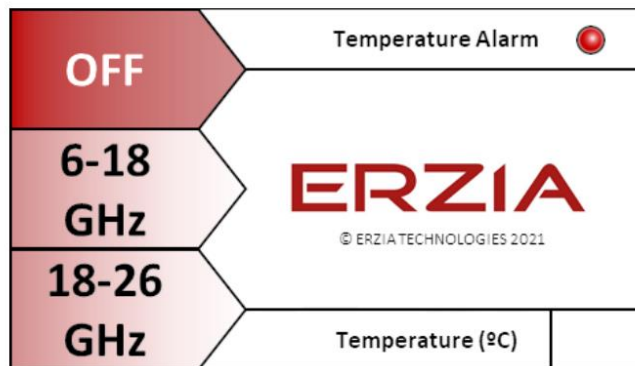


Figure 18: ERZ-HPA-0600-2650-40-RM Front panel display

Control Interface: RS232 Serial Data

The RS232 interface is an asynchronous single ended serial data source based on the electrical interface standard ANSI/TIA/EIA-232-F to interconnecting a PC to peripheral functions.

A logic 0 is represented by a driven voltage between 3 V and 15 V and a logic 1 of between -3 V and -15 V. Voltages between ± 3 V are undefined and lie in the transition region. This effectively gives a 2-V minimum noise margin at the receiver.

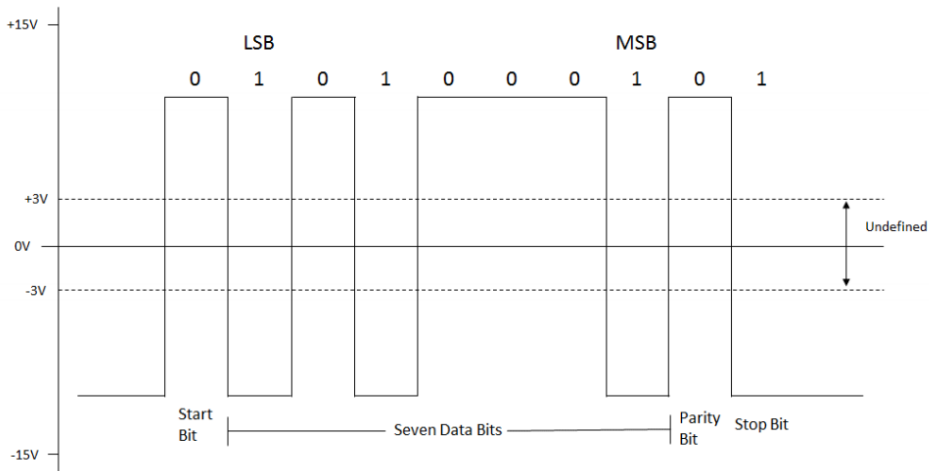


Figure 19: ERZ-HPA-0600-2650-40-RM RS232 data packet ASCII character E

The maximum cable length originally was defined in RS-232-C as 15 meters; however, this has been revised in EIA-232-D and TIA/EIA-232-E and is now specified more correctly as a maximum capacitive load of 2500 pF. This equates to about 15 to 20 meters of line length, depending on cable capacitance.

Signal lines are ESD protected complied IEC 61000-4-2 ± 15 kV (air) and ± 8 kV (contact), IEC 61000-4-4 EFT events 40 A (5/50 ns) and IEC 61000-4-5 lightning 12 A (8/20 s).

Control Interface: Protocol Description

The RS232 protocol is based on eight bits data format with one start bit and one stop bit. The level of the serial interface is low (1) if the interface transmits no data. The baud rate is 115.2 Kb/s.

IDLE	START BIT	7	6	5	4	3	2	1	0	STOP BIT	IDLE
1	0	LSB 7 BITS DATA MSB							1	1	

Table 1: ERZ-HPA-0600-2650-40-RM RS232 data format

The following table shows HyperTerminal settings:

Baud Rate	115200
Data bits	8
Parity	None
Stop Bits	1

Table 2: ERZ-HPA-0600-2650-40-RM RS232 settings

Control Interface: Protocol Description

COMMAND DESCRIPTION:

The RS232 commands are based on ASCII code to represent binary data in characters. The table below shows the ASCII character set with corresponding code values.

DEC	BIN	Symbol	DEC	BIN	Symbol	DEC	BIN	Symbol	DEC	BIN	Symbol
0	00000000	Null char	32	00100000	Space	64	01000000	@	96	01100000	`
1	00000001	Start of Heading	33	00100001	!	65	01000001	A	97	01100001	a
2	00000010	Start of Text	34	00100010	"	66	01000010	B	98	01100010	b
3	00000011	End of Text	35	00100011	#	67	01000011	C	99	01100011	c
4	00000100	End of Transmission	36	00100100	\$	68	01000100	D	100	01100100	d
5	00000101	Enquiry	37	00100101	%	69	01000101	E	101	01100101	e
6	00000110	Acknowledgment	38	00100110	&	70	01000110	F	102	01100110	f
7	00000111	Bell	39	00100111	'	71	01000111	G	103	01100111	g
8	00001000	Back Space	40	00101000	(	72	01001000	H	104	01101000	h
9	00001001	Horizontal Tab	41	00101001	)	73	01001001	I	105	01101001	i
10	00001010	Line Feed	42	00101010	*	74	01001010	J	106	01101010	j
11	00001011	Vertical Tab	43	00101011	+	75	01001011	K	107	01101011	k
12	00001100	Form Feed	44	00101100	,	76	01001100	L	108	01101100	l
13	00001101	Carriage Return	45	00101101	-	77	01001101	M	109	01101101	m
14	00001110	Shift Out / X-On	46	00101110	.	78	01001110	N	110	01101110	n
15	00001111	Shift In / X-Off	47	00101111	/	79	01001111	O	111	01101111	o
16	00010000	Data Line Escape	48	00110000	0	80	01010000	P	112	01110000	p
17	00010001	Device Control 1 (oft. XON)	49	00110001	1	81	01010001	Q	113	01110001	q
18	00010010	Device Control 2	50	00110010	2	82	01010010	R	114	01110010	r
19	00010011	Device Control 3 (oft. XOFF)	51	00110011	3	83	01010011	S	115	01110011	s
20	00010100	Device Control 4	52	00110100	4	84	01010100	T	116	01110100	t
21	00010101	Negative Acknowledgement	53	00110101	5	85	01010101	U	117	01110101	u
22	00010110	Synchronous Idle	54	00110110	6	86	01010110	V	118	01110110	v
23	00010111	End of Transmit Block	55	00110111	7	87	01010111	W	119	01110111	w
24	00011000	Cancel	56	00111000	8	88	01011000	X	120	01111000	x
25	00011001	End of Medium	57	00111001	9	89	01011001	Y	121	01111001	y
26	00011010	Substitute	58	00111010	:	90	01011010	Z	122	01111010	z
27	00011011	Escape	59	00111011	;	91	01011011	[	123	01111011	{
28	00011100	File Separator	60	00111100	<	92	01011100	\	124	01111100	|
29	00011101	Group Separator	61	00111101	=	93	01011101	]	125	01111101	}
30	00011110	Record Separator	62	00111110	>	94	01011110	^	126	01111110	~

Table 3: ERZ-HPA-0600-2650-40-RM ASCII Characters

Control Interface: Protocol Description

The format is the following:

Command type	First parameter	Second Parameter	End of command
1 Byte (R or S)	3 Bytes	3 Bytes	"\n"
Mandatory	Mandatory	Optional	Mandatory

Table 4: ERZ-HPA-0600-2650-40-RM Command format

Unit always answers with ACK or NAK and a "\n" end of command.

User must wait for a response before send another command.

Command	Parameter	Description
R TMP	-	To get the temperature (Conversion TBC)
R ATT	-	To get the attenuation
R AMP	-	To get the amplifier (OFF/LOW/HIG)
R ALM	-	To get the temperature alarm

Table 5: ERZ-HPA-0600-2650-40-RM Read commands

Command	Parameter	Description
S ATT	-	To set the attenuation
S AMP	-	To set the amplifier (OFF/LOW/HIG)

Table 6: ERZ-HPA-0600-2650-40-RM Set commands

ERZIA

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