COAXIAL

High Power Amplifier

ZHL-10M2G0020+
ZHL-10M2G0020X+

50Ω 10 to 2000 MHz Broadband 20W SMA-Female

KEY FEATURES

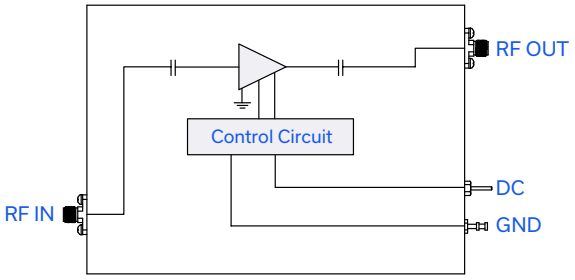
- Broadband, 10 to 2000 MHz
- High Gain, 53 dB typ.
- High P1dB, +40 dBm, typ.
- High OIP3, +43 dBm typ.

Generic photo used for illustration purposes only

APPLICATIONS

- Communication Systems
- R&D, Production, and Test Systems
- Test & Measurement Equipment
- General Laboratory Applications

FUNCTIONAL DIAGRAM



PRODUCT OVERVIEW

The ZHL-10M2G0020(X)+ is a high-power broadband amplifier providing more than 20W of output power with a typical small signal gain of 52 dB over the 10 to 2000 MHz frequency band. The amplifier uses state-of-the-art semiconductor technology and can be used in a wide range of applications. A single supply voltage ensures ease of operation. The amplifier is made with a rugged aluminum housing and can be supplied with or without a heatsink.

ELECTRICAL SPECIFICATIONS AT $T_{MOUNTING\ BASE}$= +25°C, V_{DC}= +28V

Parameter	Symbol	Condition	Min.	Typ.	Max.	Units
Frequency Range	f		10		2000	MHz
Small Signal Gain	G_{SS}	P_{IN}=-50dBm	45	53	55	dB
Small Signal Gain Flatness	$G_{SS-FLAT}$	P_{IN}=-50dBm		± 1.0	± 2.5	dB
Output Power at 1dB compression	P_{1dB}	$P_{OUT-REF}$ = +35dBm		+40		dBm
Output Power at Saturation	P_{SAT}	$P_{OUT-REF}$ = +35dBm	+42.8	+45		dBm
Noise Figure	NF			9.8		dB
Output Third Order Intercept Point	OIP3	P_{OUT}= +30dBm/tone	+39.5	+43		dBm
Input Return Loss	I-RL	P_{IN}=-50dBm	7.3	21		dB
Output Return Loss	O-RL	P_{IN}=-50dBm	3.5	9		dB
DC Supply Voltage	V_{DC}			28	30	V
Supply Current	I_{DC}	Without fan @ P_{SAT}		3.5	5.0	A
		With fan @ P_{SAT}		3.9	5.4	

REV. OR
ECO-019297
ZHL-10M2G0020+
MCL NY
230922

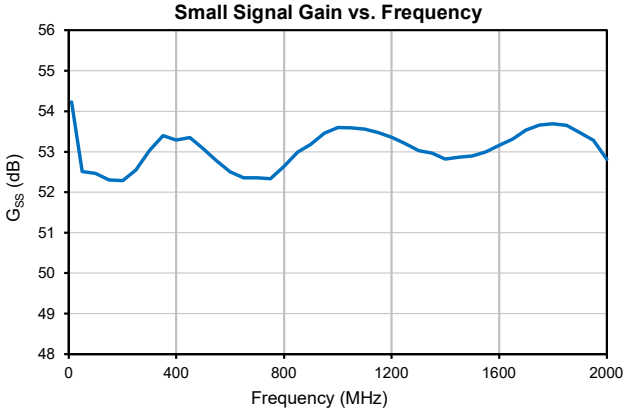
High Power Amplifier

ZHL-10M2G0020+
ZHL-10M2G0020X+

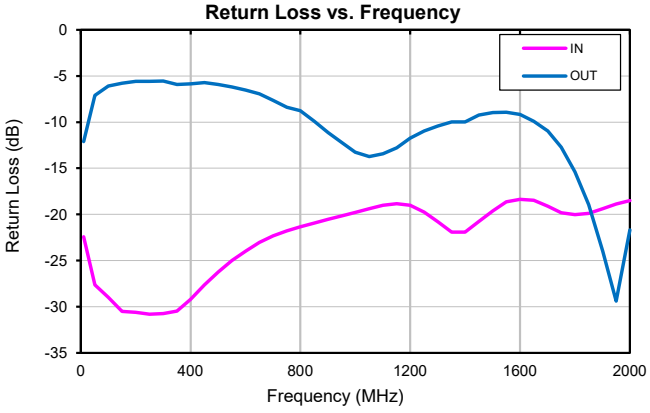
50Ω 10 to 2000 MHz Broadband 20W SMA-Female

TYPICAL PERFORMANCE DATA AT $T_{MOUNTINGBASE}$ = +25°C, V_{DC} = +28V, 50 OHM

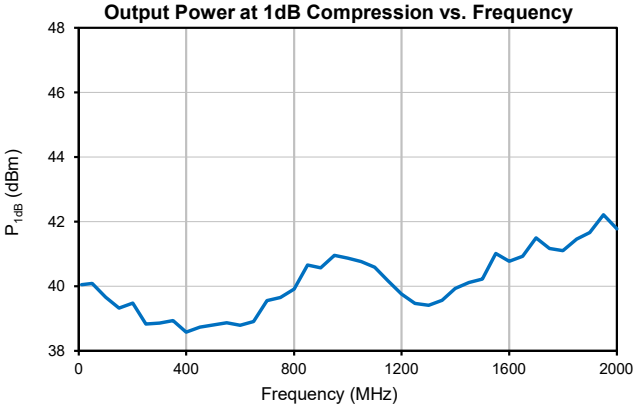
Small Signal Gain vs. Frequency



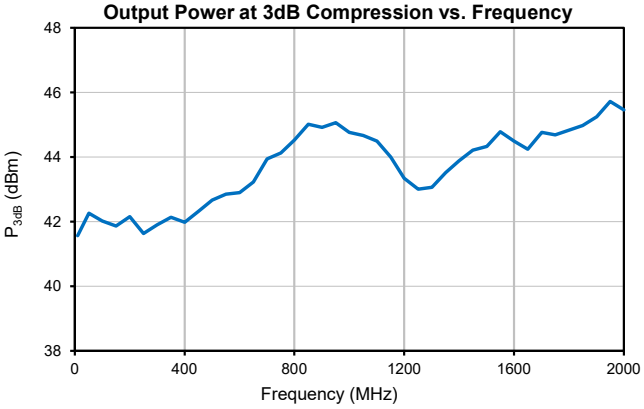
Return Loss vs. Frequency



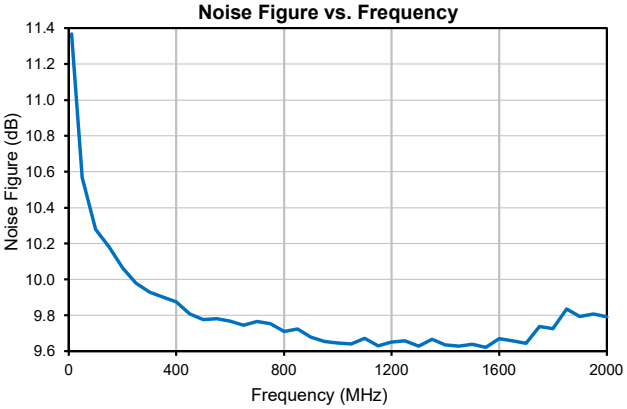
Output Power at 1dB Compression vs. Frequency



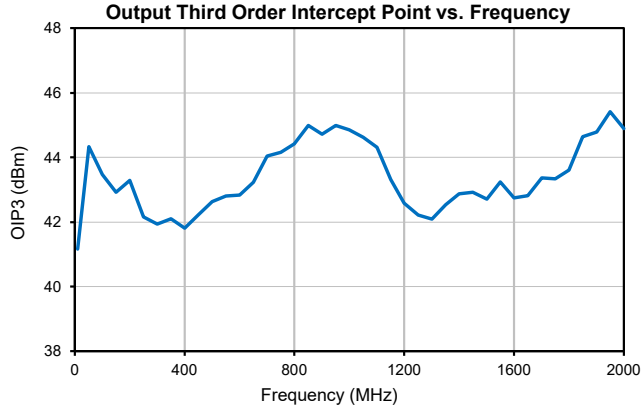
Output Power at 3dB Compression vs. Frequency



Noise Figure vs. Frequency



Output Third Order Intercept Point vs. Frequency



ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings	
Operating Temperature	ZHL-10M2G0020+	$T_{AMBIENT}$: -20 °C to +60 °C
	ZHL-10M2G0020X+	$T_{MOUNTING\ BASE}$: -20 °C to +85 °C
Storage Temperature	-55°C to +100°C	
No damage with an open or short at P_{OUT} = +43 dBm CW		
RF Input Power (no damage)	+5 dBm	
DC Operating Voltage	± 30 V	

Permanent damage may occur if any of these limits are exceeded.

DETERMINING MAXIMUM THERMAL RESISTANCE OF USERS' EXTERNAL HEAT SINK

$$\textit{MAXIMUM THERMAL RESISTANCE} = \frac{\textit{MAXIMUM OPERATING CASE TEMP} - \textit{MAXIMUM USER AMBIENT TEMP}}{\textit{POWER DISSIPATION}}$$

Example:	MAXIMUM MOUNTING BASE TEMP = +85 °C (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE) MAXIMUM USER AMBIENT TEMP = +60 °C (USER DEFINED) POWER DISSIPATION = 130 WATTS (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE) THEN MAXIMUM ALLOWABLE THERMAL RESISTANCE = 0.19 °C/W

High Power Amplifier

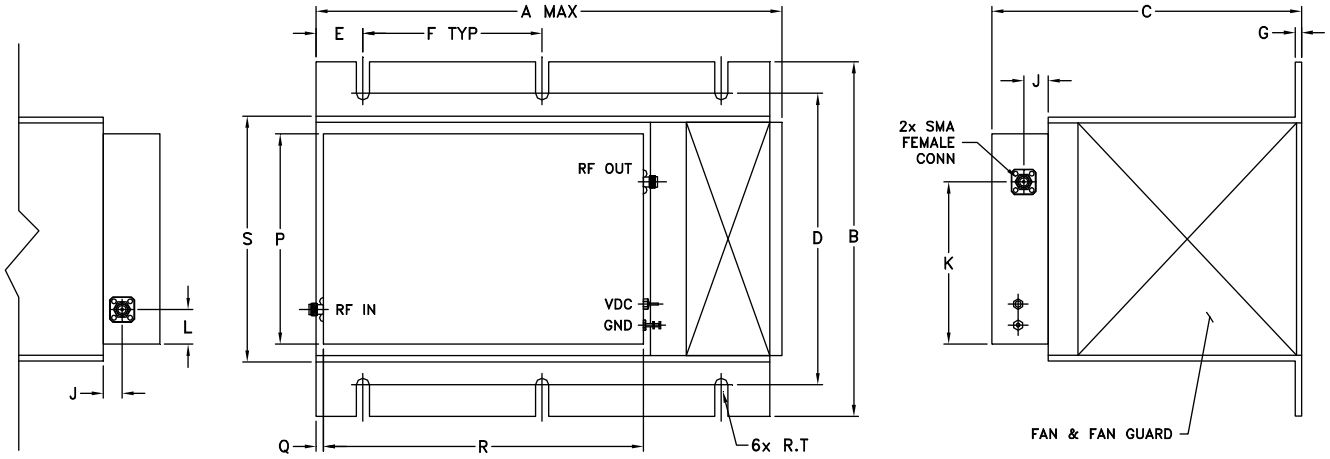
ZHL-10M2G0020+
ZHL-10M2G0020X+

50Ω 10 to 2000 MHz Broadband 20W SMA-Female

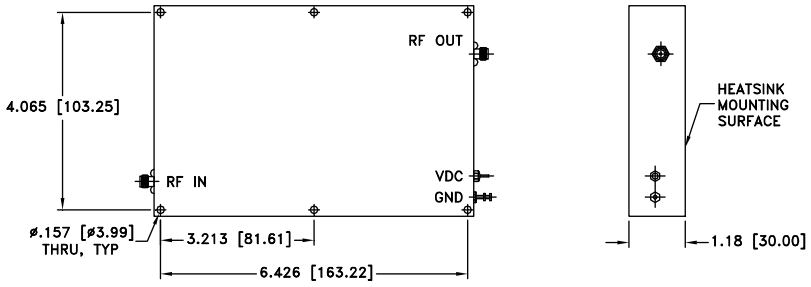
COAXIAL CONNECTIONS

IN (RF IN)	SMA-Female
OUT (RF OUT)	SMA-Female

CASE STYLE DRAWING WITH HEATSINK (ZHL-10M2G0020+)



CASE STYLE DRAWING WITHOUT HEATSINK (ZHL-10M2G0020X+)



OUTLINE DIMENSIONS (Inch / mm)

A	B	C	D	E	F	G	J	K	L	M	P	Q	R	S	T	wt
9.85	7.30	6.50	6.00	0.98	3.75	0.13	0.47	3.34	0.71	--	4.33	0.20	6.69	5.10	0.14	grams*
250.19	185.42	167.64	152.4	24.89	95.25	3.30	12.00	84.80	18.00	--	110.00	5.08	170.00	129.54	3.45	4565

*880 grams without heatsink

ADDITIONAL INFORMATION IS AVAILABLE ON OUR DASHBOARD.

Performance Data	Table Graphs S-Parameter (S2P Files) Data Set (.zip file)
RoHs Status	Compliant
Environmental Ratings	ENV23T19

ORDERING INFORMATION

Model No. Links	ZHL-10M2G0020+	ZHL-10M2G0020X+
Option	With heatsink	Without heatsink
Case Style	BT1689-1	
Connector	IN (SMA-Female) / OUT (SMA-Female)	

NOTES

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

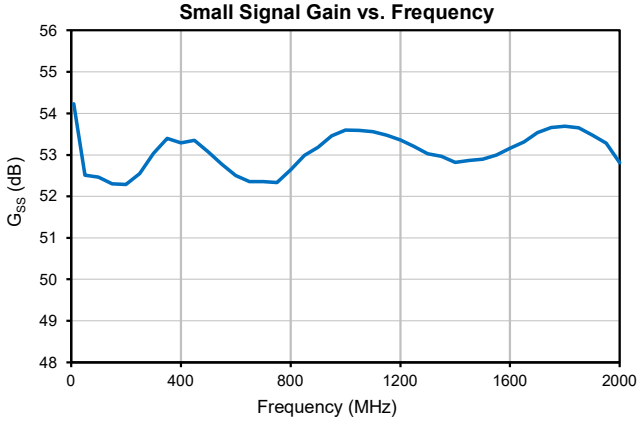
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/terms/viewterm.html

Typical Performance Data

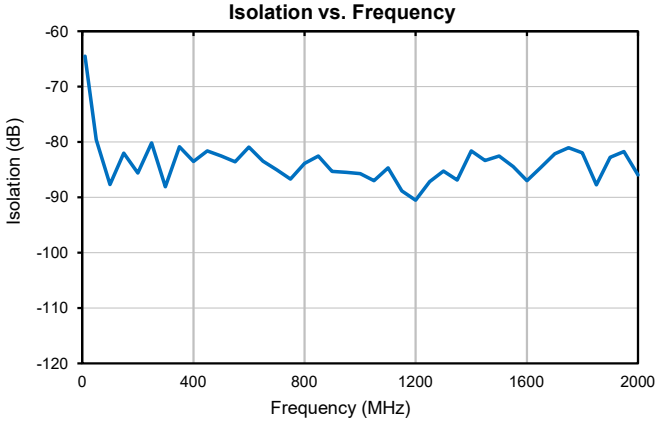
Frequency (MHz)	Gain (dB)	Isolation (dB)	Return Loss (dB)		P_{OUT} @ 1dB Compression (dBm)	P_{OUT} @ 3dB Compression (dBm)	P_{OUT} @ Saturation (dBm)	OIP3 (dBm)	Noise Figure (dB)
			IN	OUT					
	28V	28V	28V	28V	28V	28V	28V	28V	28V
10	54.23	64.48	22.41	12.12	40.05	41.56	41.56	41.16	11.37
50	52.50	79.59	27.62	7.09	40.09	42.26	43.21	44.33	10.57
100	52.46	87.68	29.01	6.06	39.66	42.02	43.25	43.47	10.28
150	52.30	82.04	30.49	5.75	39.32	41.87	43.40	42.92	10.18
200	52.28	85.61	30.60	5.55	39.47	42.16	44.01	43.28	10.06
250	52.54	80.19	30.82	5.56	38.83	41.63	43.73	42.15	9.98
300	53.04	88.08	30.76	5.52	38.86	41.90	44.28	41.94	9.93
350	53.40	80.86	30.46	5.90	38.93	42.13	44.59	42.10	9.90
400	53.29	83.52	29.21	5.84	38.58	41.98	44.77	41.81	9.88
450	53.35	81.64	27.62	5.71	38.73	42.32	45.22	42.23	9.81
500	53.07	82.53	26.23	5.91	38.80	42.66	45.13	42.63	9.78
550	52.77	83.54	24.99	6.19	38.86	42.85	45.02	42.80	9.78
600	52.50	80.89	23.96	6.52	38.79	42.89	44.85	42.84	9.77
650	52.35	83.43	23.05	6.93	38.90	43.23	44.75	43.23	9.74
700	52.36	85.05	22.32	7.61	39.55	43.94	45.04	44.04	9.76
750	52.33	86.71	21.77	8.37	39.65	44.12	45.01	44.16	9.75
800	52.65	83.85	21.36	8.73	39.91	44.53	44.88	44.42	9.71
850	52.99	82.52	20.95	9.89	40.66	45.02	45.42	44.98	9.72
900	53.18	85.34	20.52	11.10	40.57	44.92	45.41	44.72	9.68
950	53.46	85.49	20.18	12.20	40.96	45.06	45.81	44.99	9.65
1000	53.59	85.72	19.78	13.25	40.87	44.76	46.03	44.85	9.65
1050	53.59	87.00	19.35	13.72	40.76	44.67	45.66	44.62	9.64
1100	53.56	84.70	19.01	13.41	40.59	44.49	45.45	44.32	9.67
1150	53.47	88.85	18.86	12.79	40.16	43.99	45.13	43.32	9.63
1200	53.36	90.52	19.03	11.75	39.76	43.35	45.01	42.58	9.65
1250	53.20	87.14	19.75	10.97	39.47	43.00	44.74	42.21	9.66
1300	53.02	85.28	20.80	10.43	39.41	43.07	44.67	42.09	9.63
1350	52.96	86.92	21.91	9.99	39.57	43.52	44.98	42.53	9.67
1400	52.81	81.58	21.92	9.95	39.93	43.89	44.86	42.87	9.64
1450	52.86	83.36	20.77	9.22	40.12	44.22	45.01	42.92	9.63
1500	52.89	82.53	19.61	8.95	40.22	44.34	44.89	42.71	9.64
1550	53.00	84.46	18.63	8.91	41.02	44.78	45.21	43.24	9.62
1600	53.15	87.00	18.36	9.16	40.78	44.49	44.87	42.74	9.67
1650	53.31	84.62	18.48	9.91	40.93	44.24	44.62	42.82	9.66
1700	53.53	82.11	19.11	10.95	41.50	44.76	45.04	43.36	9.64
1750	53.66	81.03	19.82	12.70	41.17	44.69	44.93	43.33	9.74
1800	53.69	82.00	20.04	15.41	41.11	44.83	45.06	43.61	9.73
1850	53.65	87.74	19.88	18.92	41.45	44.97	45.77	44.64	9.84
1900	53.47	82.76	19.37	23.98	41.67	45.25	45.89	44.79	9.79
1950	53.28	81.71	18.88	29.39	42.21	45.72	46.81	45.41	9.81
2000	52.81	85.96	18.49	21.66	41.78	45.46	46.76	44.89	9.79

Typical Performance Curves

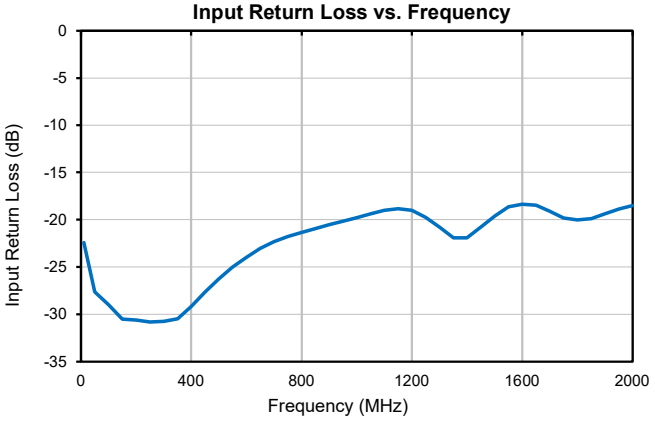
Small Signal Gain vs. Frequency



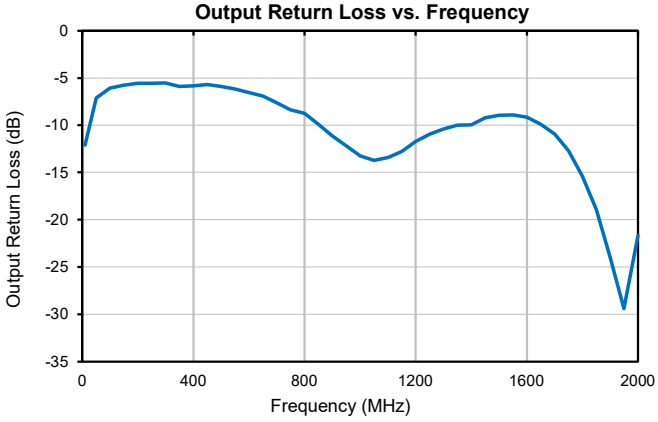
Isolation vs. Frequency



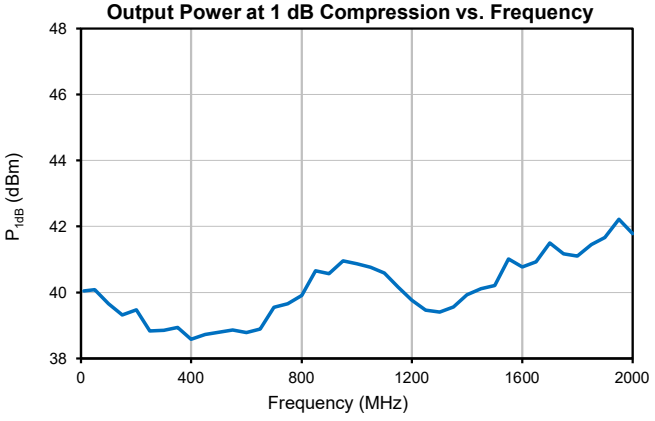
Input Return Loss vs. Frequency



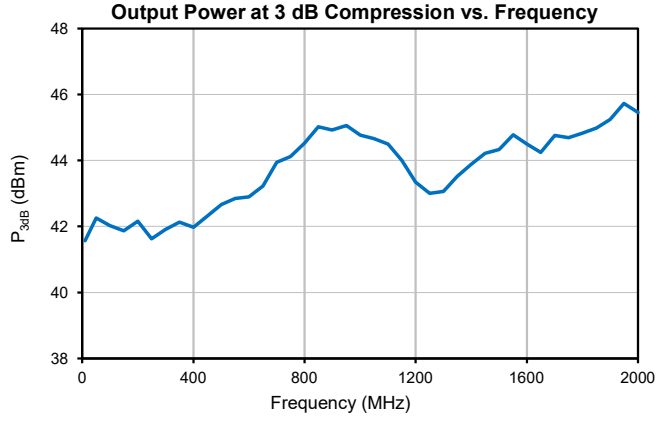
Output Return Loss vs. Frequency



Output Power at 1 dB Compression vs. Frequency

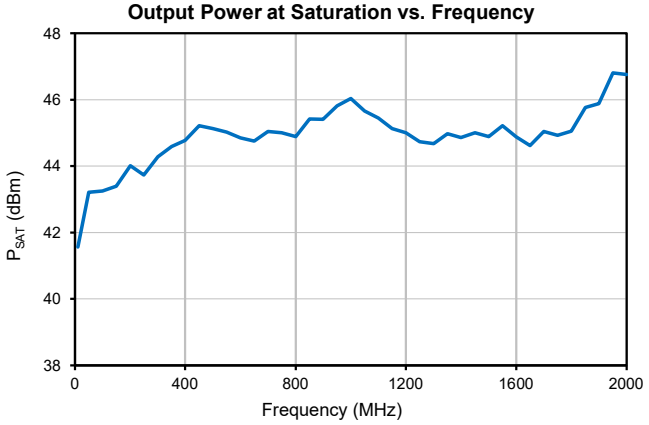


Output Power at 3 dB Compression vs. Frequency

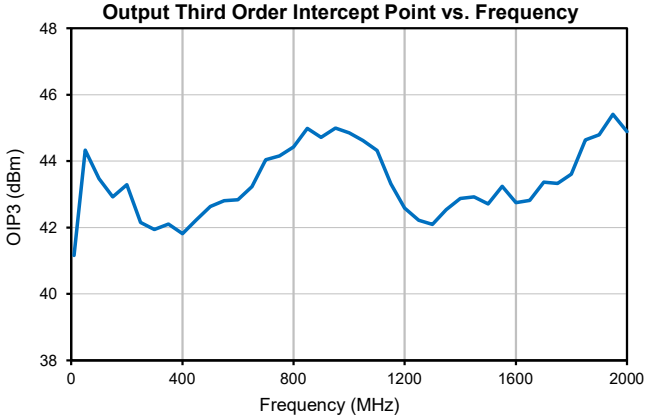


Typical Performance Curves

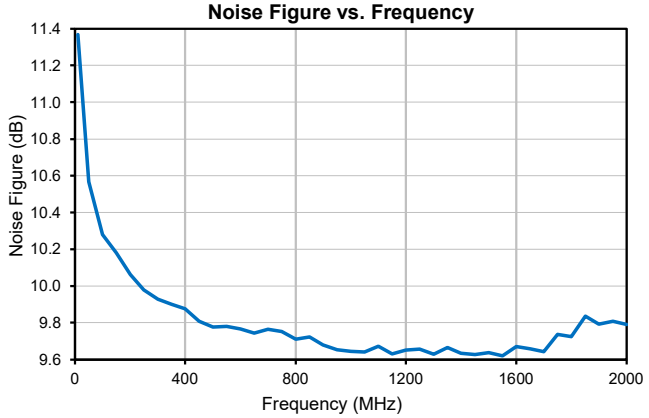
Output Power at Saturation vs. Frequency



Output Third Order Intercept Point vs. Frequency



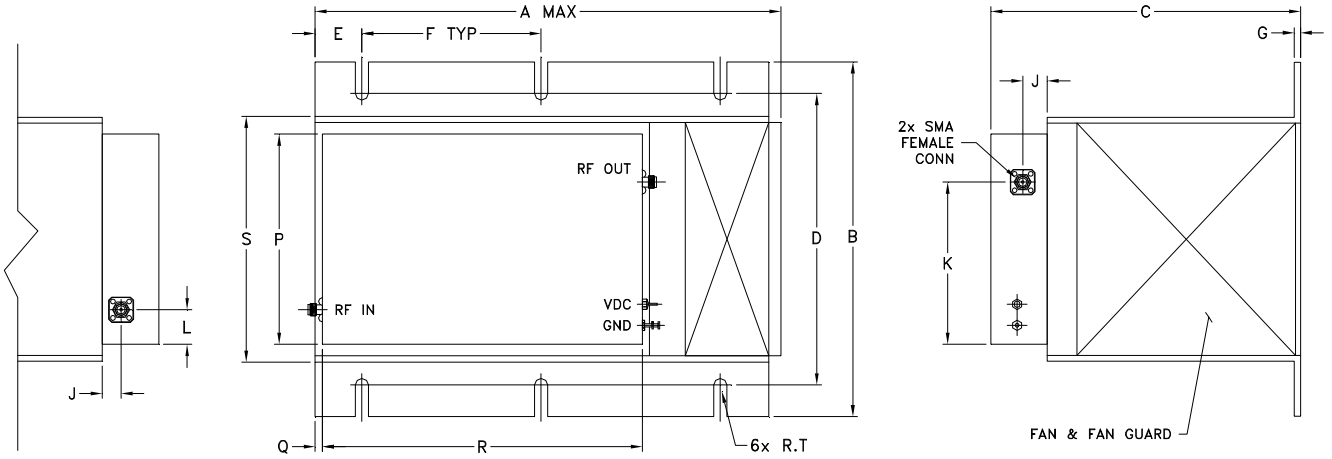
Noise Figure vs. Frequency



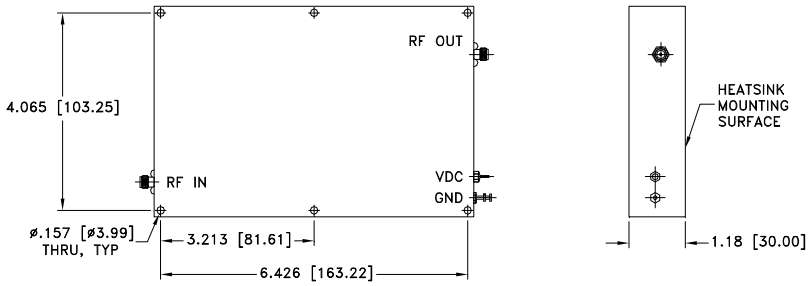
Case Style BT

BT1689-1

Outline Dimensions



MOUNTING INFORMATION FOR MODELS WITHOUT HEATSINK



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
BT1689-1	9.85 (250.19)	7.3 (185.42)	6.5 (165.10)	6.00 (152.40)	.98 (24.89)	3.75 (95.25)	.13 (3.30)	- -	.47 (12.0)	3.34 (84.8)	.71 (18.0)	- -	- -

CASE#	P	Q	R	S	T	WT, GRAM	WT WITHOUT HEATSINK, GRAM
BT1689-1	4.33 (110.00)	.2 (5.08)	6.69 (170.00)	5.1 (129.54)	.136 (3.45)	4565	880

Dimensions in inches (mm). Tolerances: 1 Pl. ± .1; 2Pl. ± .03; 3 Pl. ± .015

Notes:

1. Case material: Aluminum alloy.
2. Finish:
   For RoHS Case Styles: Clear Chemical conversion coating, non-chrome or trivalent chrome based.
3. Heatsink finish: Black anodize.
4. Refer to the individual model data sheet for the type of connectors available.
5. Recommended screws for mounting model without heat sink on 3/32” thick sheet: #6-32, 1.50” Length.
6. Shape of connector flange may vary.

Mini-Circuits

Environmental Specifications **ENV23T19**

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-20° to 45°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Stabilization Bake	(non-operating) 125°C, 24 hours	- - -
Burn-in at Elevated Temp.	(DC on) 160 hours at 60° C base plate Temperature	MIL-STD-202, Method 108
Thermal Shock	-55° to 100°C, 5 cycles	MIL-STD-202, Method 107, Condition A, except 100°C