COAXIAL

High Power Amplifier

ZHL20M1G0100+
ZHL20M1G0100X+

50Ω 20 to 1000 MHz 100W SMA & N-Type

THE BIG DEAL

- Saturated power, 100W typ
- Wide bandwidth, 20 to 1000MHz
- High gain, 52 dB typ
- Self-protected from overheating and reverse polarity
- Built in current limiter
- Enable function
- Analog current monitor output
- Analog temperature output

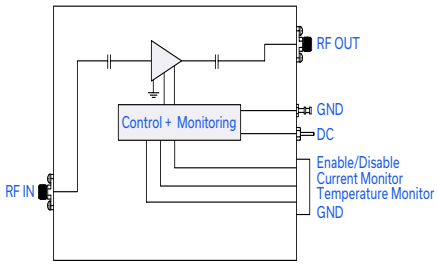


Generic photo used for illustration purposes only

APPLICATIONS

- High power test sets
- Burn-in set-ups
- Communication
- Radar

FUNCTIONAL DIAGRAM



PRODUCT OVERVIEW

The ZHL20M1G0100+ is a Class AB, high-power amplifier providing typically 100W saturated power over the 20 to 1000 MHz band, ideal for a variety of high-power test setups as well as applications including communications, radar and more. The ruggedly designed amplifier provides unconditional stability and built-in protection against reverse polarity, overheating and current consumption. The amplifier's output stage can operate into and open and short for two minutes at 40W of output power. The amplifier has an enable pin as well as analog outputs for current and temperature. The rugged aluminum alloy enclosure measures 230x150x30mm and features an SMA connector at the input and an N-connector at the output. A heatsink and fan attachment for cooling are optional.

KEY FEATURES

Features	Advantages
Wideband, usable from 20 to 1000 MHz	Suitable for a broad range of high-power, wideband applications, including test setups, communications and defense applications.
High power gain, 52 dB typ.	Enables signal amplification up to 100W output power without the need for multiple gain stages.
Built-in protection	Protected from overheating, reverse polarity and a current limiter.
Unconditional stability	Provides reliable performance independent of input and load conditions.
Ruggedness	Able to operate into an open and short for 2 minutes at 40W CW output power.

REV. OR
ECO-026800
ZHL20M1G0100+
MCIL
250925

ELECTRICAL SPECIFICATIONS AT $T_{MOUNTINGBASE}$ = +25°C, V_{DC}= +48 V

Parameter	Symbol	Condition	Min.	Typ.	Max.	Units
Frequency Range	f		20		1000	MHz
Small Signal Gain	G_{SS}	f=20-1000MHz, P_{IN}=-50dBm	48	53	58	dB
Small Signal Gain Flatness	$G_{SS-FLAT}$	f=20-1000MHz, P_{IN}=-50dBm		±1.5	±2.0	dB
Output Power at 1dB compression	P_{1dB}	f=20-1000MHz	47	48		dBm
Output Power at saturation	P_{SAT}	f=20-1000MHz	48	50		dBm
Noise Figure	NF	f=20-1000MHz		10	14	dB
Output Third Order Intercept Point	OIP3	f=20-1000MHz, P_{OUT}=40dBm/Tone	44			dBm
Power Gain	G_P	f=20-1000MHz, P_{OUT}=P1dB		52	57	dB
Power Flatness	G_{P-FLAT}	f=20-1000MHz, P_{OUT}=P1dB		±1.5	±2.0	dB
Input Return Loss	I-RL	f=20-1000MHz, P_{IN}=-50dBm	9.5	13		dB
Spurious Signals	Spur	P_{OUT}=48dBm			-60	dBc
DC Supply Voltage	V_{SUPPLY}		47	48	50	V
DC Supply Current	I_{SUPPLY}			7	10	A

PROTECTIONS

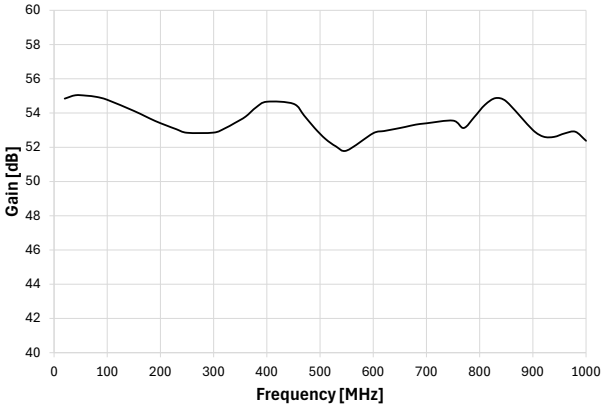
Parameter	Rating
Mounting Base Temperature	+90°C ± 5°C
Electrical Overload	Current Limiting
Over Voltage	51V ± 1V
Output Load Mismatch	No damage with an open or short at POUT=46dBm for 2 minutes

D-SUB9 PIN DESCRIPTION

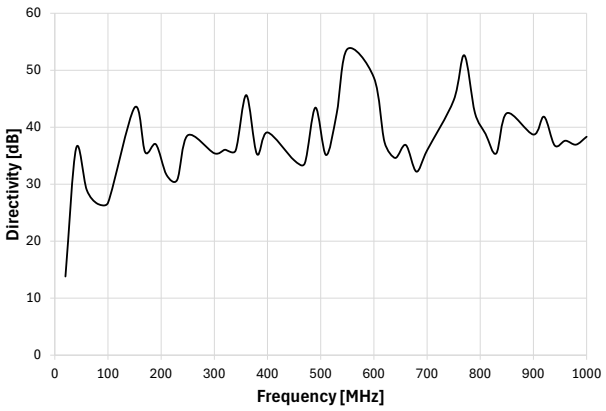
PIN #1	ENABLE / DISABLE	Enable: Open or TTL Logic Low (0V); Disable: TTL Logic High (3.3V) – Internally Pulled-Low
PIN #2	CURRENT MONITOR	Analog voltage relative to I_{SUPPLY} at 100mV per Ampere
PIN #3	TEMPERATURE MONITOR	Analog voltage relative to the module temperature at 500mV + 10mV / °C
PIN #4, 5, 6, 7	NC	
PIN #8, 9	GND	

TYPICAL PERFORMANCE GRAPHS

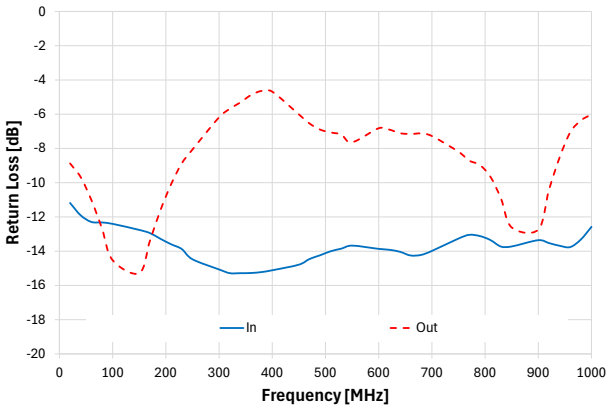
Gain vs. Frequency



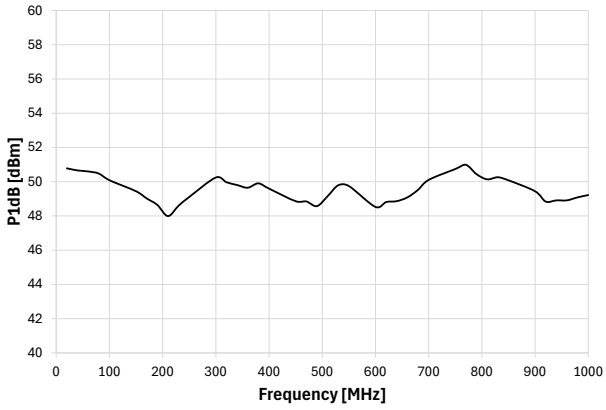
Directivity vs. Frequency



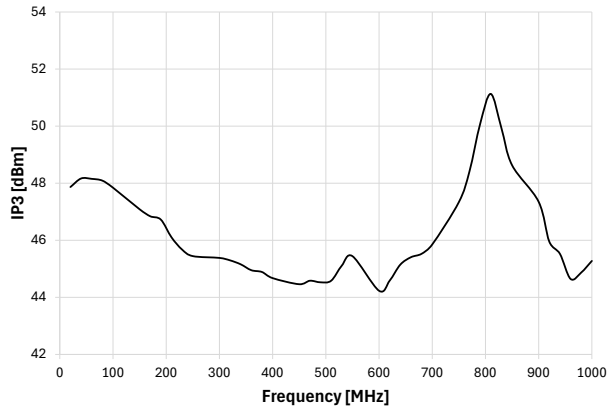
Return Loss vs. Frequency



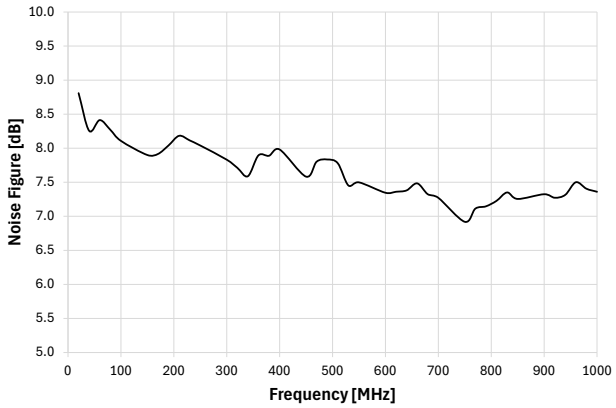
Output Power @ 1dB Compression vs. Frequency



IP3 vs. Frequency



Noise Figure vs. Frequency



ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings	
Operating Temperature	ZHL20M1G0100+	$T_{AMBIENT}$: -20 °C to +80 °C
	ZHL20M1G0100X+	$T_{MOUNTINGBASE}$: +90 °C ±5 °C
Storage Temperature	-55 °C to +100 °C	
No damage with an open or short at P_{OUT} = +46 dBm CW for 2 minutes max		
RF Input Power (no damage)	+20 dBm	
DC Operating Voltage	±50 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 = +65 °C (USER DEFINED) POWER DISSIPATION = 30 WATTS (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE) THEN MAXIMUM ALLOWABLE THERMAL RESISTANCE = 0.66 °C/W

High Power Amplifier

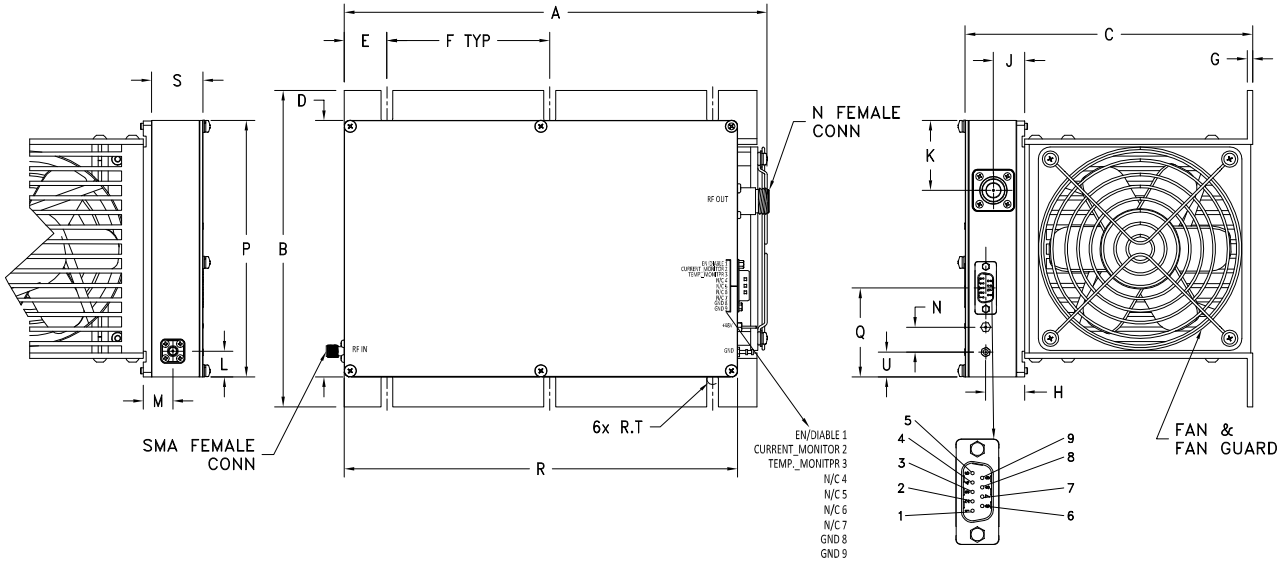
ZHL20M1G0100+
ZHL20M1G0100X+

50Ω 20 to 1000 MHz 100W SMA & N-Type

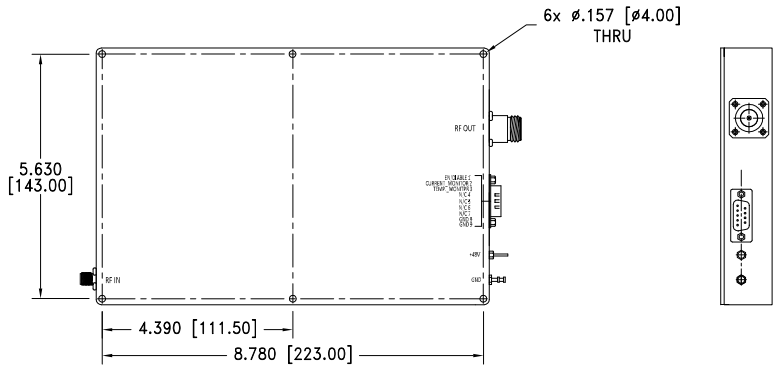
COAXIAL CONNECTIONS

IN (RF IN)	SMA
OUT (RF OUT)	N

CASE STYLE DRAWING WITH HEATSINK (ZHL20M1G0100+)



CASE STYLE DRAWING WITHOUT HEATSINK (ZHL20M1G0100X+)



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
BT3258	9.85 (250.19)	7.3 (185.0)	6.62 (168.1)	5.91 (150.0)	.98 (24.89)	3.75 (95.25)	.13 (3.18)	.90 (22.76)	.72 (18.25)	1.61 (40.9)	.59 (15.00)	.68 (17.20)	.57 (14.50)

CASE #	P	Q	R	S	T	U	WT, GRAM	WT WITHOUT HEATSINK, GRAM
BT3258	5.91 (150.00)	2.05 (52.07)	9.06 (230.00)	1.18 (30.00)	.135 (3.43)	.57 (14.50)	5350	1820

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

ADDITIONAL INFORMATION IS AVAILABLE ON OUR DASHBOARD.

Performance Data	Table Graphs S-Parameter (S2P Files) Data Set (.zip file)
RoHs Status	Compliant
Environmental Ratings	ENV154

ORDERING INFORMATION

Model No. Links	ZHL20M1G0100+	ZHL20M1G0100X+
Option	With heatsink	Without heatsink
Case Style	BT3258	
Connector	IN (SMA) / OUT (N-type)	

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

Coaxial

Amplifier

ZHL20M1G0100X+

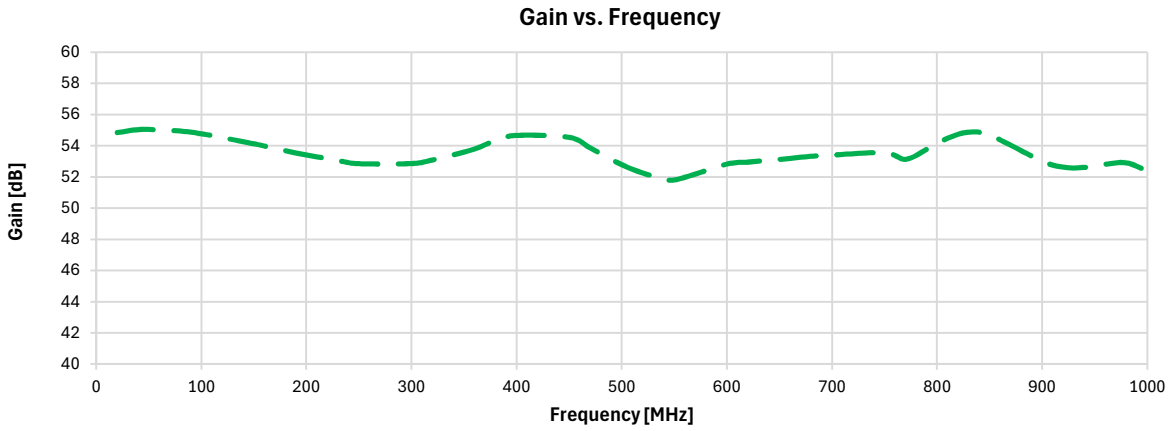
Typical Performance Data

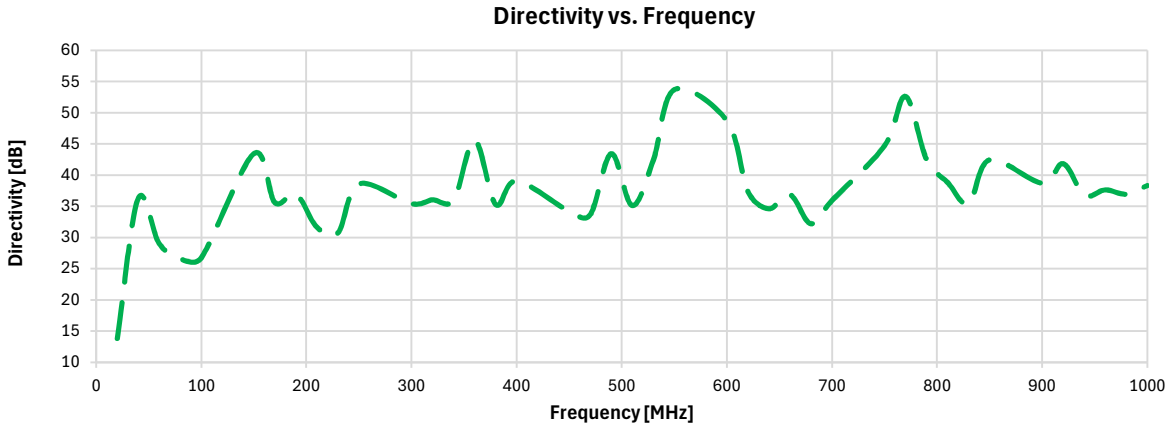
Test Conditions: Supply Current = 6500 mA, DC Supply Voltage = 50V.

Freq. (MHz)	Gain (dB)	Directivity (dB)	Return Loss In (dB)	Return Loss Out (dB)	Stability K	1dB Comp. (dBm)	IP3 Output (dBm)	Noise Figure (dB)
20	54.84	13.81	-11.18	-8.87	1.98	50.78	47.87	8.81
40	55.04	36.27	-11.91	-9.68	26.94	50.66	48.17	8.26
60	55.02	29.01	-12.29	-11.01	12.16	50.60	48.15	8.41
80	54.94	26.59	-12.32	-12.67	9.48	50.48	48.09	8.27
100	54.77	26.73	-12.40	-14.53	9.96	50.09	47.84	8.11
150	54.13	43.45	-12.76	-15.29	68.83	49.44	47.09	7.90
170	53.83	35.60	-12.94	-13.41	27.65	49.02	46.84	7.92
190	53.54	37.00	-13.28	-11.60	31.80	48.64	46.72	8.04
210	53.29	31.65	-13.60	-10.08	16.76	47.99	46.10	8.18
230	53.05	30.74	-13.88	-8.87	14.70	48.60	45.67	8.11
250	52.85	38.58	-14.47	-8.07	35.17	49.11	45.45	8.04
300	52.86	35.43	-15.07	-6.18	22.28	50.25	45.38	7.83
320	53.09	36.05	-15.28	-5.69	22.97	49.97	45.30	7.71
340	53.42	35.92	-15.28	-5.32	21.77	49.81	45.16	7.59
360	53.79	45.64	-15.27	-4.88	64.55	49.65	44.95	7.90
380	54.34	35.31	-15.22	-4.64	18.89	49.90	44.89	7.89
400	54.66	39.09	-15.11	-4.68	29.38	49.60	44.68	7.98
450	54.54	34.21	-14.79	-6.01	18.88	48.86	44.46	7.58
470	53.86	33.67	-14.46	-6.54	18.40	48.85	44.58	7.80
490	53.12	43.44	-14.24	-6.90	57.85	48.57	44.53	7.83
510	52.49	35.12	-14.00	-7.07	22.48	49.15	44.58	7.78
530	52.05	42.39	-13.85	-7.19	51.99	49.79	45.11	7.45
550	51.81	53.71	-13.67	-7.64	194.84	49.75	45.44	7.50
600	52.82	48.71	-13.86	-6.82	104.80	48.53	44.23	7.35
620	52.95	37.38	-13.92	-6.90	28.73	48.81	44.59	7.36
640	53.06	34.61	-14.04	-7.11	21.14	48.86	45.15	7.38
660	53.19	36.88	-14.25	-7.16	27.67	49.08	45.41	7.48
680	53.32	32.21	-14.22	-7.12	16.20	49.52	45.53	7.32
700	53.40	35.94	-13.99	-7.27	24.96	50.10	45.85	7.27
750	53.56	44.72	-13.26	-8.19	70.95	50.74	47.34	6.92
770	53.13	52.62	-13.05	-8.71	179.62	50.99	48.42	7.11
790	53.77	42.51	-13.11	-8.97	56.55	50.44	50.08	7.15
810	54.48	38.82	-13.35	-9.65	37.97	50.14	51.13	7.23
830	54.87	35.40	-13.73	-10.94	26.42	50.26	49.93	7.35
850	54.68	42.47	-13.72	-12.61	61.11	50.08	48.63	7.26
900	53.01	38.72	-13.36	-12.74	39.42	49.44	47.35	7.32
920	52.62	41.84	-13.53	-10.43	54.73	48.84	45.95	7.27
940	52.61	36.80	-13.68	-8.53	29.01	48.91	45.53	7.32
960	52.81	37.63	-13.76	-7.06	30.03	48.91	44.65	7.50
980	52.91	36.95	-13.32	-6.37	26.55	49.09	44.87	7.41
1000	52.38	38.34	-12.58	-6.01	30.22	49.22	45.28	7.36

Typical Performance Graphs

Test Conditions: Supply Current = 6500 mA, DC Supply Voltage = 50V.



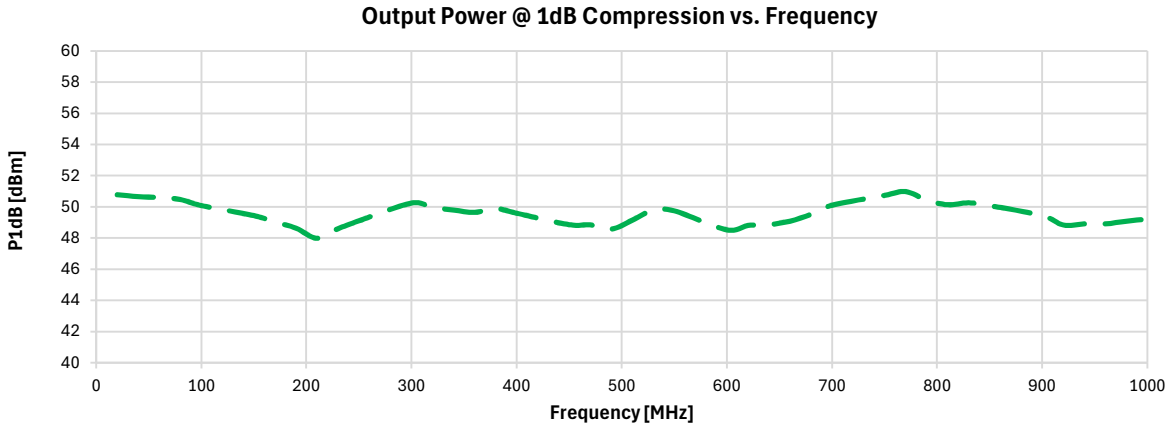


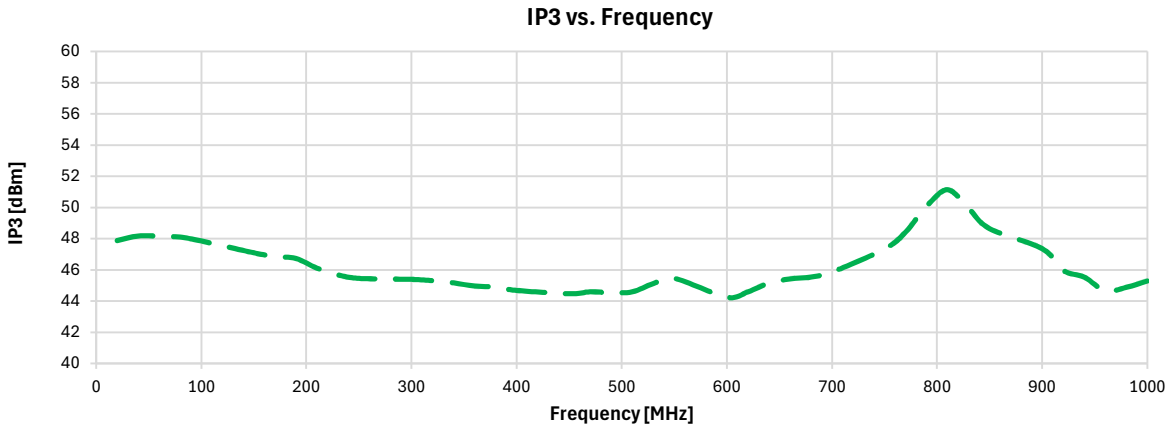


Typical Performance Graphs

Test Conditions: Supply Current = 6500 mA, DC Supply Voltage = 50V.

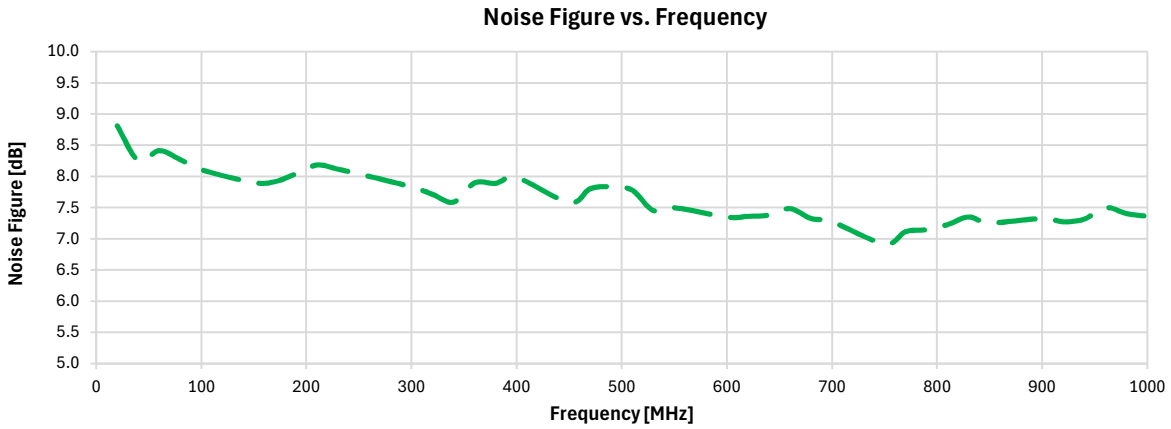






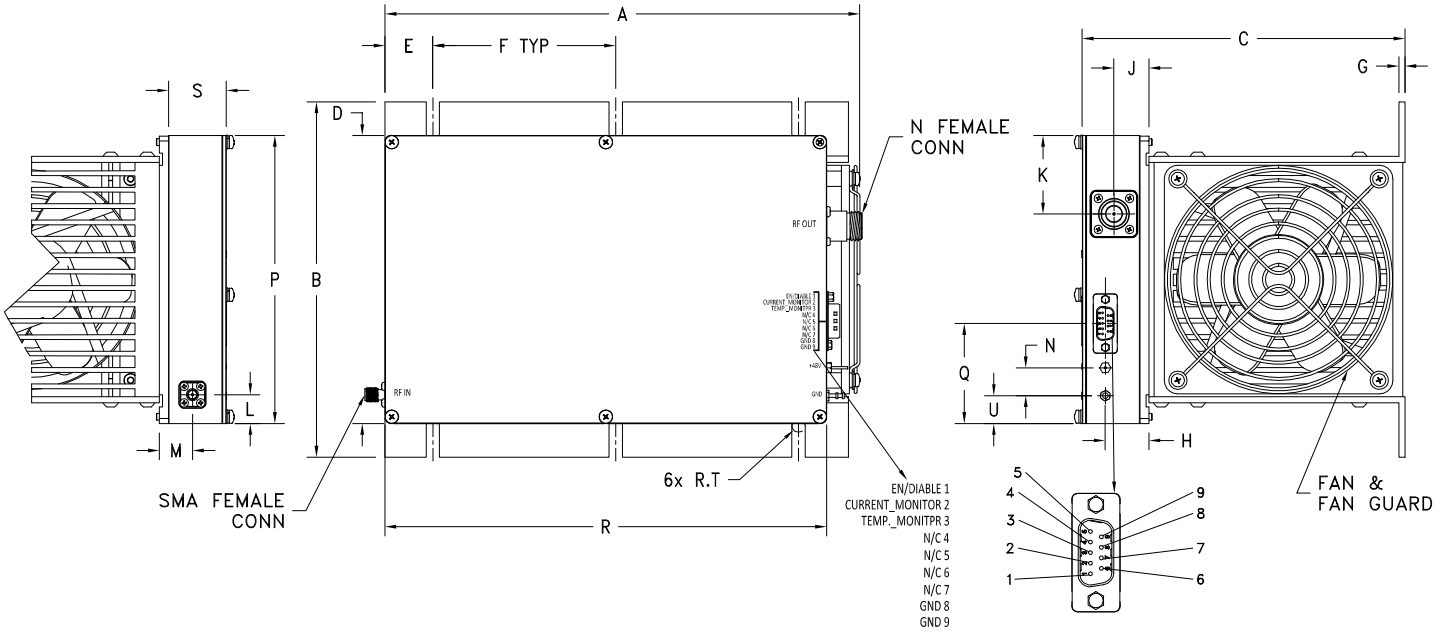
Typical Performance Graphs

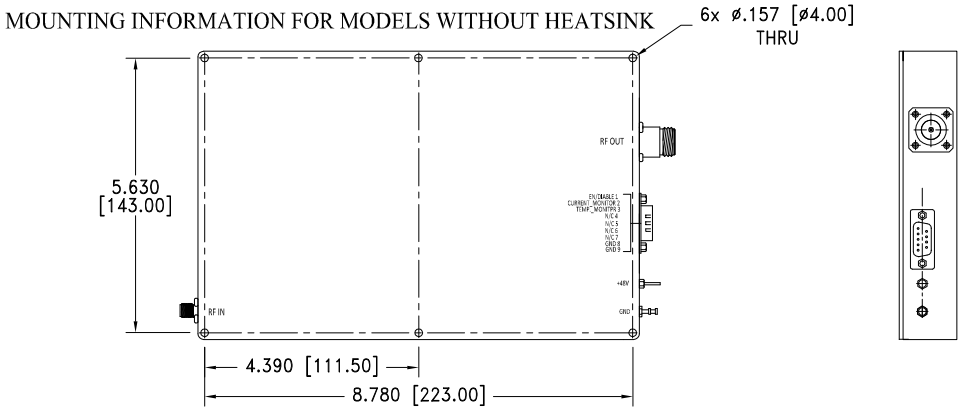
Test Conditions: Supply Current = 6500 mA, DC Supply Voltage = 50V.



Case Style BT

Outline Dimensions BT3258





CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
BT3258	9.85 (250.19)	7.3 (185.0)	6.62 (168.1)	5.91 (150.0)	.98 (24.89)	3.75 (95.25)	.13 (3.18)	.90 (22.76)	.72 (18.25)	1.61 (40.9)	.59 (15.00)	.68 (17.20)	.57 (14.50)

CASE #	P	Q	R	S	T	U	WT, GRAM	WT WITHOUT HEATSINK, GRAM
BT3258	5.91 (150.00)	2.05 (52.07)	9.06 (230.00)	1.18 (30.00)	.135 (3.43)	.57 (14.50)	5350	1820

Dimensions are in inches (mm). Tolerances: 2 Pl.±.03; 2 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 screw for mounting model without heatsink on 3/32” thick sheet: #6-32, 1.50” Length.

Mini-Circuits®
ISO 9001 ISO 14001 CERTIFIED
minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site
The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com
RF/IF MICROWAVE COMPONENTS

This document and its contents are the property of Mini-Circuits

Environmental Specifications **ENV154**

Mini-Circuits

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 80° C Baseplate Temperature	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: Elevated Temperature	(DC On) 72 hours at 90° C Baseplate	At Full Power
Burn-in: Open at Output	2 hours Operating at 90° C Baseplate	46 dBm Output Power
Burn-in: Short at Output	2 hours Operating at 90° C Baseplate	46 dBm Output Power
Life Test	500 hours at 90° C Baseplate	MIL-STD-202F METHOD 108A, COND. C, 500 HOURS

This document and its contents are the property of Mini-Circuits