



COAXIAL

Medium Power Amplifier

ZHL-10M1G21W0+
ZHL-10M1G21W0X+

50Ω 10 to 1200 MHz Broadband 1.3 W SMA Female

KEY FEATURES

- Broadband, 10 to 1200 MHz
- High Gain, 27 dB Typ.
- High P1dB, +31 dBm, Typ.
- High OIP3, +48 dBm Typ.



Generic photo used for illustration purposes only

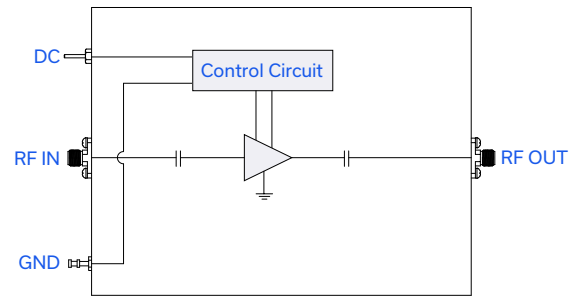
APPLICATIONS

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

PRODUCT OVERVIEW

Mini-Circuits' ZHL-10M1G21W0(X)+ is a medium power broadband amplifier providing more than 1.3 W of output power with a typical small signal gain of 27 dB over the 10 to 1200 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.

FUNCTIONAL DIAGRAM



ELECTRICAL SPECIFICATIONS AT $T_{\text{MOUNTING BASE}} = +25\text{ }^{\circ}\text{C}$, $V_{\text{DC}} = +24\text{ V}$

Parameter	Symbol	Condition	Min.	Typ.	Max.	Units
Frequency Range	f		10		1200	MHz
Small Signal Gain	G_{SS}	$P_{\text{OUT}} = -25\text{ dBm}$	24	27	30	dB
Small Signal Gain Flatness	$G_{\text{SS-FLAT}}$	$P_{\text{OUT}} = -25\text{ dBm}$		± 0.4	± 1.2	dB
Output Power at 1 dB Compression	$P_{1\text{dB}}$	$P_{\text{OUT-REF}} = +15\text{ dBm}$	+29	+31		dBm
Output Power at 3 dB Compression	$P_{3\text{dB}}$	$P_{\text{OUT-REF}} = +15\text{ dBm}$	+30	+31		dBm
Noise Figure	NF			5.3		dB
Output Third Order Intercept Point	OIP3	$P_{\text{OUT}} = +20\text{ dBm/ tone}$		+48		dBm
Input Return Loss	I-RL	$P_{\text{OUT}} = -25\text{ dBm}$	8.5	26		dB
Output Return Loss	O-RL	$P_{\text{OUT}} = -25\text{ dBm}$	8.5	17		dB
DC Supply Voltage	V_{DC}		+20	+24	+25	V
Supply Current	I_{DC}	Without fan at $P_{3\text{dB}}$ With fan at $P_{3\text{dB}}$		0.50 0.90	0.75 1.15	A





COAXIAL

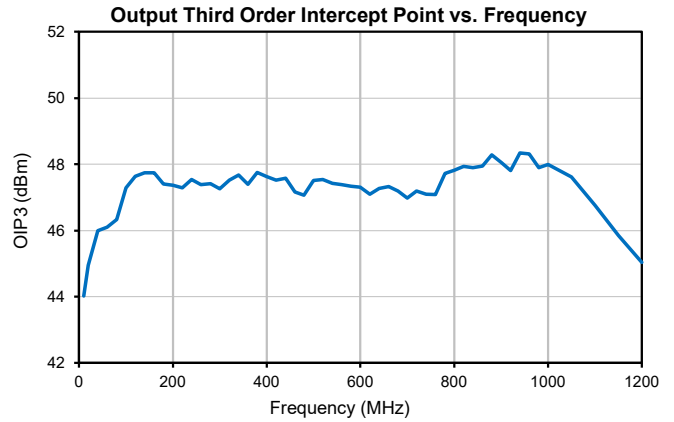
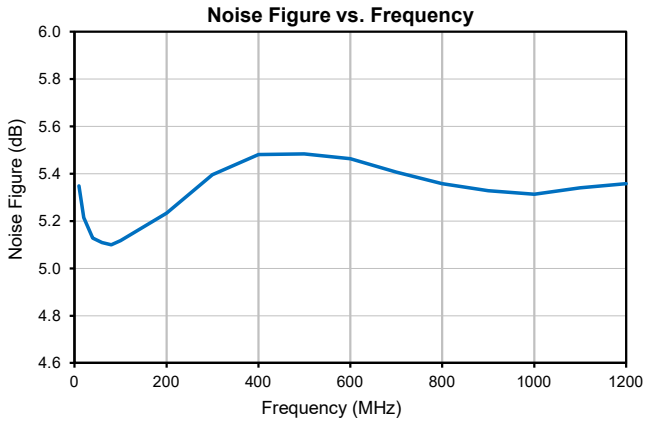
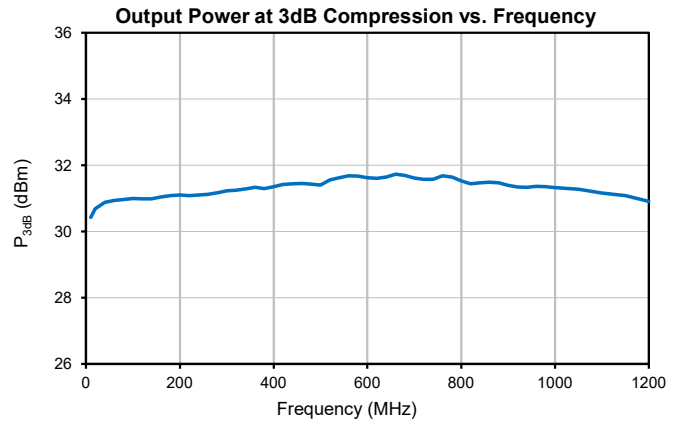
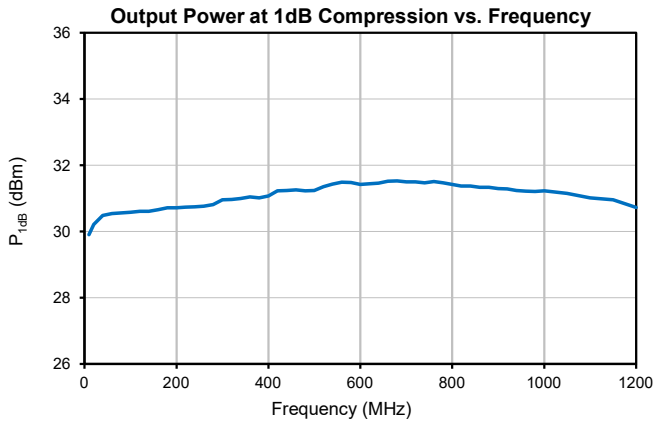
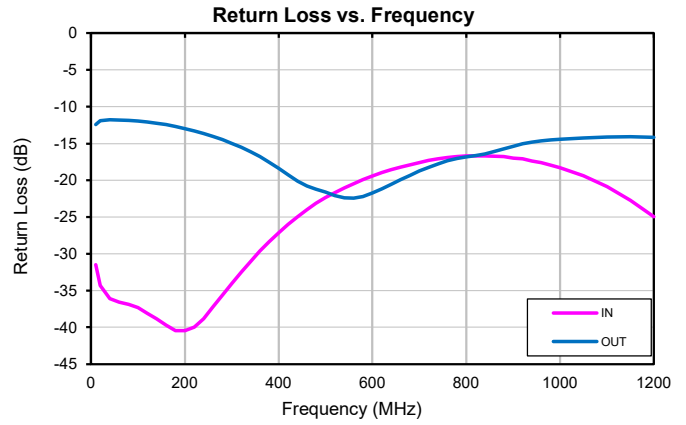
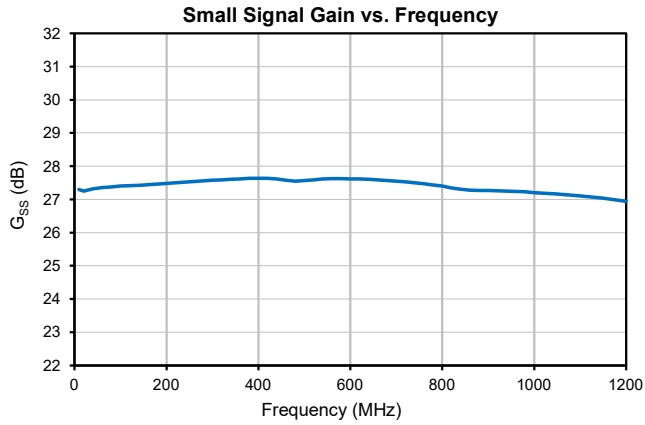
Medium Power Amplifier

ZHL-10M1G21W0+
ZHL-10M1G21W0X+

Mini-Circuits

50Ω 10 to 1200 MHz Broadband 1.3 W SMA Female

TYPICAL PERFORMANCE DATA AT $T_{MOUNTINGBASE} = +25\text{ }^{\circ}\text{C}$, $V_{DC} = +24\text{ V}$, 50Ω





COAXIAL

Medium Power Amplifier

ZHL-10M1G21W0+
ZHL-10M1G21W0X+

Mini-Circuits

50Ω 10 to 1200 MHz Broadband 1.3 W SMA Female

ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	ZHL-10M1G21W0+ T _{AMBIENT} : -20 °C to +60 °C
	ZHL-10M1G21W0X+ 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} = +28 dBm CW	
RF Input Power (No Damage)	+10 dBm
DC Operating Voltage	+25 V
Total Power Dissipation (Without Fan at P3dB)	18.75 W
Total Power Dissipation (With Fan at P3dB)	28.75 W

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

DETERMINING MAXIMUM THERMAL RESISTANCE OF USERS' EXTERNAL HEATSINK

$\text{MAXIMUM THERMAL RESISTANCE} = \frac{\text{MAXIMUM OPERATING CASE TEMP} - \text{MAXIMUM USER AMBIENT TEMP}}{\text{POWER DISSIPATION}}$	
Example:	MAXIMUM MOUNTING BASE TEMP = +85 °C (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE) MAXIMUM USER AMBIENT TEMP = +60 °C (USER DEFINED) POWER DISSIPATION = 12 WATTS (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE) THEN MAXIMUM ALLOWABLE THERMAL RESISTANCE = 2.1 °C/W





COAXIAL

Medium Power Amplifier

ZHL-10M1G21W0+
ZHL-10M1G21W0X+

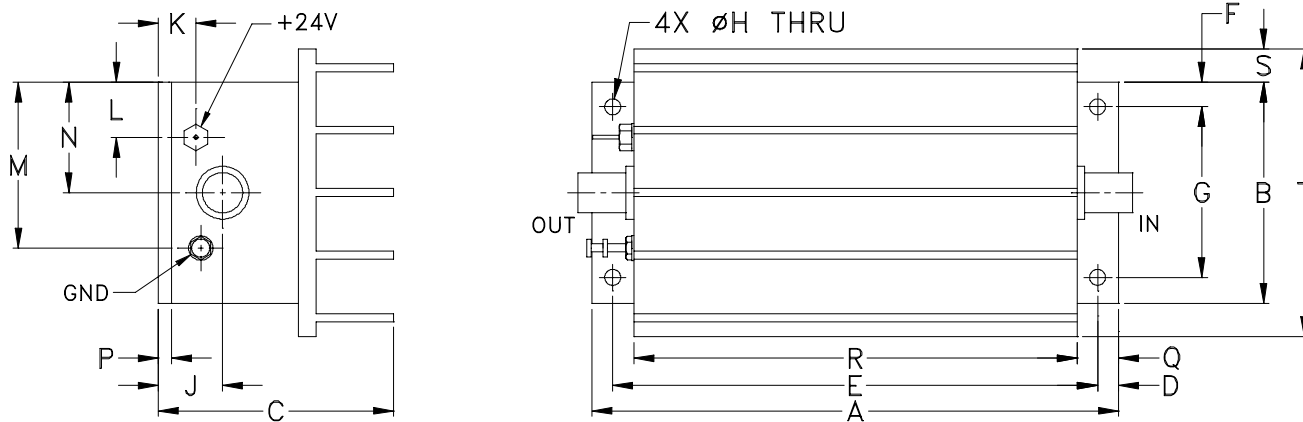
Mini-Circuits

50Ω 10 to 1200 MHz Broadband 1.3 W SMA Female

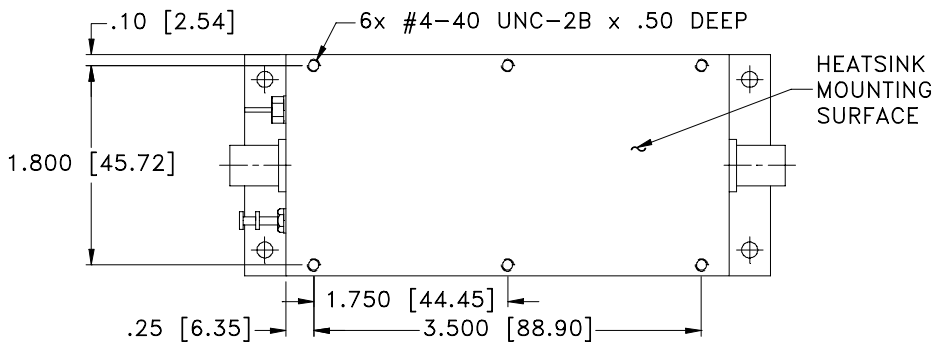
COAXIAL CONNECTIONS

IN (RF-IN)	SMA female
OUT (RF-OUT)	SMA female

CASE STYLE DRAWING WITH HEATSINK (ZHL-10M1G21W0+)



CASE STYLE DRAWING WITHOUT HEATSINK (ZHL-10M1G21W0X+)



Weight: 440 grams Weight without heatsink: 325 grams Dimensions are in inches [mm].
Tolerances: 2 Pl.±03; 3 Pl. ±.015 Inch

OUTLINE DIMENSIONS (Inch/mm)

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt
4.75	2.00	2.12	.19	4.375	.23	1.540	.144	.58	.34	.50	1.50	1.00	.12	.38	4.00	.30	2.60	grams*
120.65	50.80	53.85	4.83	111.13	5.84	39.12	3.66	14.73	8.64	12.70	38.10	25.40	3.05	9.65	101.60	7.62	66.04	440.0

*325 grams without heatsink





COAXIAL

Medium Power Amplifier

ZHL-10M1G21W0+
ZHL-10M1G21W0X+

50Ω 10 to 1200 MHz Broadband 1.3 W SMA Female

ADDITIONAL INFORMATION IS AVAILABLE ON OUR DASHBOARD.

Performance Data & Graphs	Table
	Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
RoHS Status	Compliant
Environmental Ratings	ENV23T15

ORDERING INFORMATION

Model No. Links	ZHL-10M1G21W0+	ZHL-10M1G21W0X+
Option	With Heatsink	Without Heatsink
Case Style	T34	
Connector	IN (SMA female) / OUT (SMA female)	

NOTES

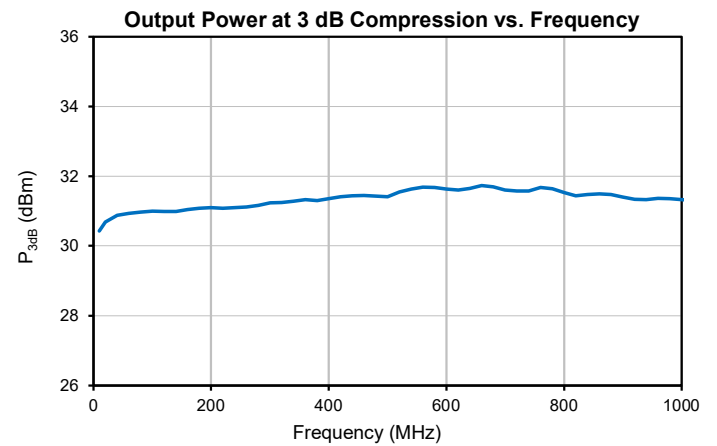
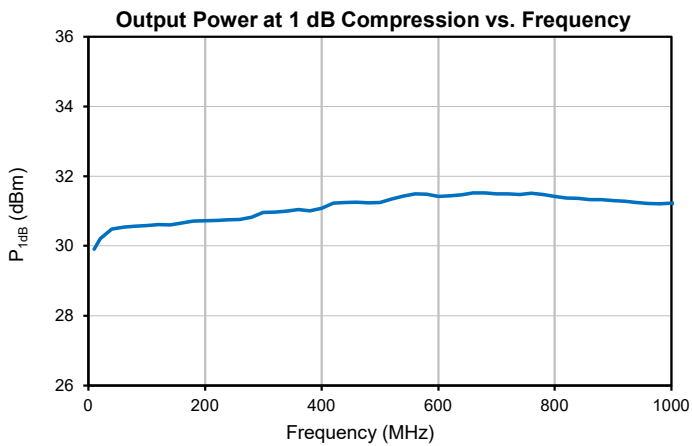
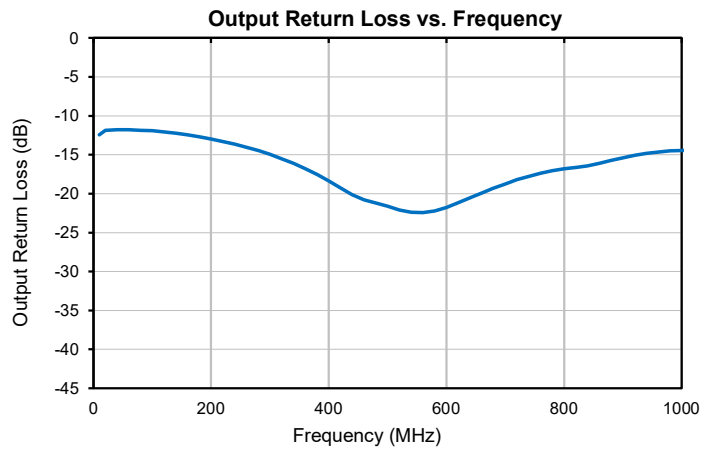
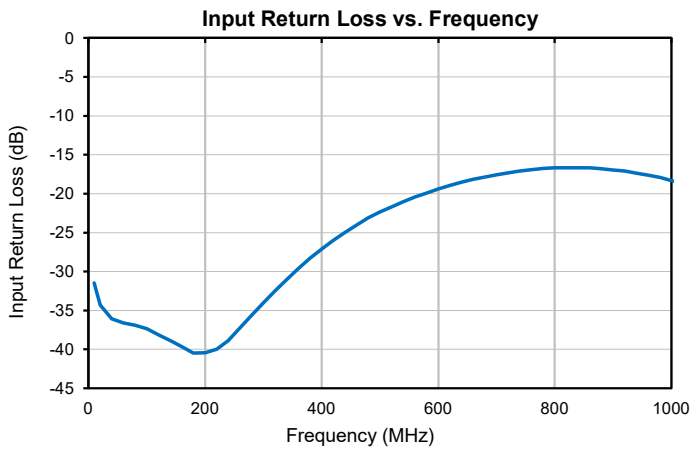
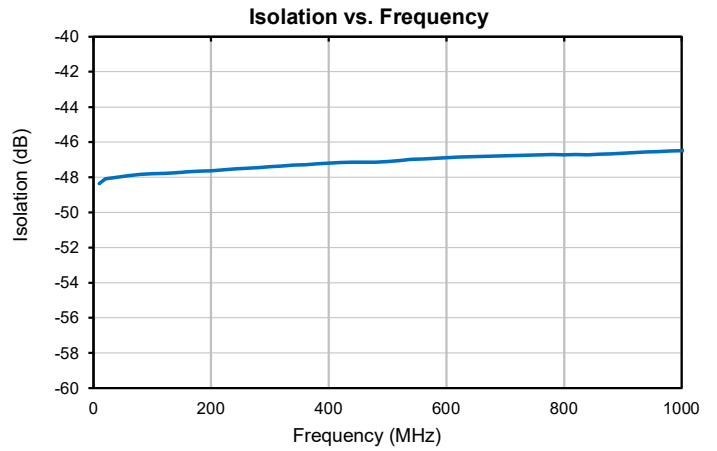
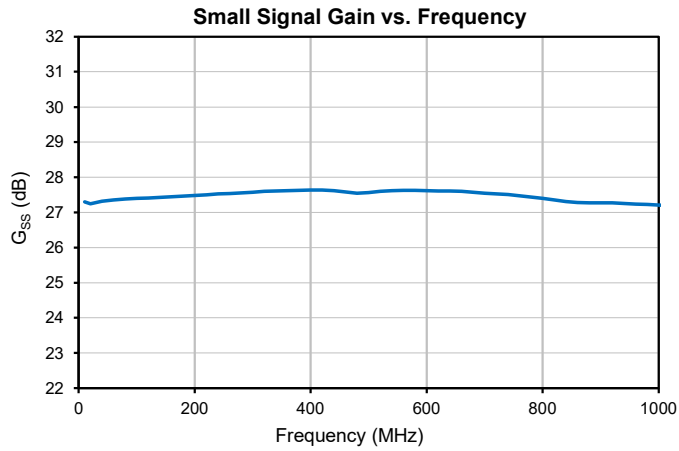
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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



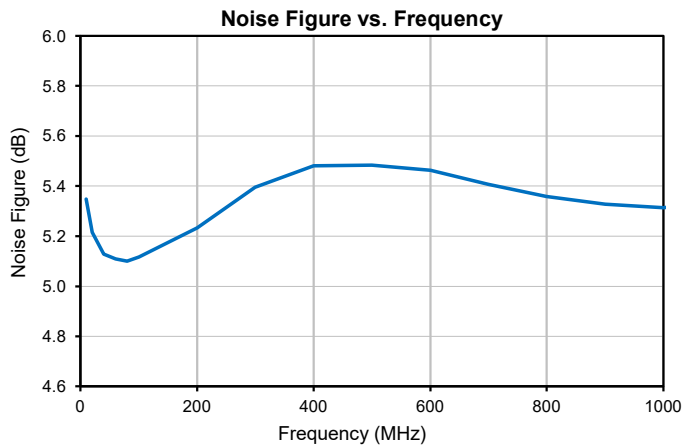
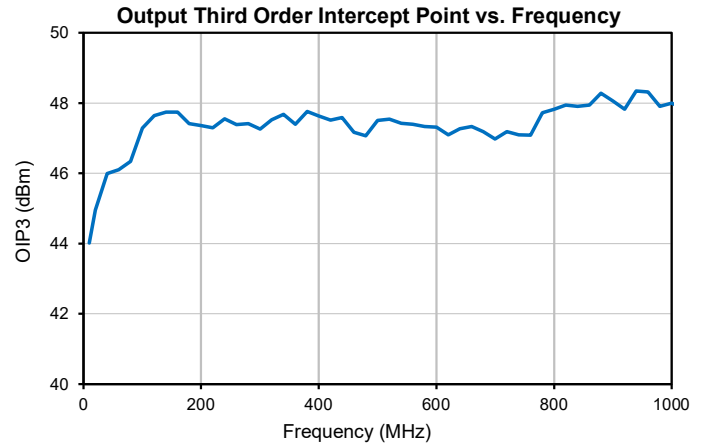
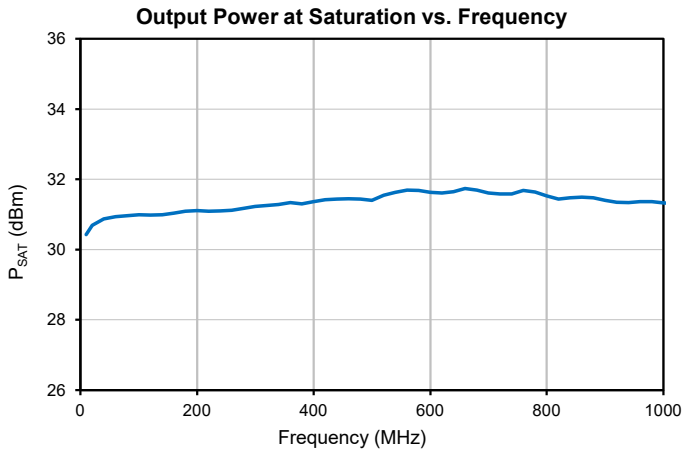
Typical Performance Data

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					
			24V	24V					
10	27.30	48.37	31.49	12.43	29.90	30.43	30.43	44.02	5.35
20	27.25	48.09	34.31	11.89	30.21	30.69	30.69	44.95	5.21
40	27.32	48.01	36.09	11.77	30.48	30.88	30.88	45.99	5.13
60	27.35	47.91	36.59	11.78	30.54	30.93	30.93	46.10	5.11
80	27.38	47.84	36.87	11.83	30.56	30.97	30.97	46.33	5.10
100	27.40	47.80	37.32	11.93	30.59	30.99	30.99	47.29	5.12
120	27.41	47.77	38.11	12.07	30.61	30.98	30.98	47.63	
140	27.43	47.74	38.84	12.24	30.61	30.99	30.99	47.74	
160	27.45	47.70	39.68	12.44	30.66	31.04	31.04	47.74	
180	27.46	47.66	40.46	12.69	30.71	31.09	31.09	47.40	
200	27.48	47.62	40.43	12.97	30.72	31.10	31.10	47.36	5.23
220	27.50	47.58	39.98	13.28	30.73	31.09	31.09	47.29	
240	27.52	47.54	38.83	13.64	30.75	31.10	31.10	47.54	
260	27.54	47.49	37.25	14.03	30.76	31.12	31.12	47.39	
280	27.56	47.45	35.62	14.47	30.82	31.17	31.17	47.41	
300	27.57	47.40	34.08	14.97	30.96	31.23	31.23	47.26	5.40
320	27.59	47.36	32.48	15.51	30.97	31.25	31.25	47.52	
340	27.60	47.32	31.03	16.12	30.99	31.28	31.28	47.67	
360	27.62	47.28	29.64	16.80	31.04	31.33	31.33	47.39	
380	27.63	47.24	28.32	17.55	31.01	31.30	31.30	47.76	
400	27.64	47.20	27.14	18.38	31.08	31.36	31.36	47.62	5.48
420	27.63	47.17	26.02	19.27	31.22	31.42	31.42	47.52	
440	27.62	47.14	24.98	20.13	31.24	31.44	31.44	47.58	
460	27.58	47.14	24.01	20.79	31.26	31.45	31.45	47.16	
480	27.55	47.13	23.11	21.19	31.24	31.43	31.43	47.07	
500	27.56	47.10	22.34	21.61	31.24	31.40	31.40	47.51	5.48
520	27.59	47.05	21.70	22.08	31.35	31.55	31.55	47.54	
540	27.62	46.99	21.03	22.38	31.43	31.63	31.63	47.42	
560	27.63	46.96	20.44	22.43	31.49	31.68	31.68	47.39	
580	27.63	46.92	19.91	22.21	31.48	31.68	31.68	47.34	
600	27.62	46.89	19.40	21.75	31.42	31.63	31.63	47.31	5.46
620	27.61	46.86	18.95	21.17	31.44	31.60	31.60	47.10	
640	27.60	46.83	18.55	20.55	31.46	31.65	31.65	47.27	
660	27.59	46.81	18.19	19.90	31.52	31.73	31.73	47.33	
680	27.57	46.79	17.89	19.33	31.53	31.69	31.69	47.19	
700	27.55	46.77	17.59	18.76	31.50	31.61	31.61	46.97	5.41
720	27.52	46.75	17.32	18.22	31.49	31.58	31.58	47.19	
740	27.50	46.75	17.10	17.75	31.47	31.58	31.58	47.10	
760	27.47	46.73	16.92	17.35	31.51	31.68	31.68	47.09	
780	27.44	46.71	16.77	17.04	31.47	31.64	31.64	47.72	
800	27.40	46.72	16.70	16.81	31.42	31.53	31.53	47.82	5.36
820	27.35	46.72	16.68	16.63	31.37	31.44	31.44	47.94	
840	27.31	46.72	16.68	16.43	31.37	31.47	31.47	47.90	
860	27.28	46.70	16.71	16.10	31.33	31.49	31.49	47.94	
880	27.27	46.67	16.81	15.73	31.33	31.47	31.47	48.28	
900	27.27	46.63	16.96	15.40	31.30	31.40	31.40	48.05	5.33
920	27.27	46.60	17.10	15.07	31.28	31.34	31.34	47.81	
940	27.25	46.56	17.37	14.85	31.24	31.33	31.33	48.34	
960	27.24	46.54	17.61	14.66	31.22	31.37	31.37	48.31	
980	27.23	46.51	17.93	14.52	31.21	31.36	31.36	47.89	
1000	27.21	46.49	18.30	14.44	31.23	31.32	31.32	47.99	5.31
1050	27.16	46.43	19.39	14.25	31.15	31.27	31.27	47.61	
1100	27.11	46.38	20.86	14.14	31.02	31.16	31.16	46.76	5.34
1150	27.03	46.33	22.74	14.10	30.96	31.08	31.08	45.85	
1200	26.94	46.30	24.96	14.15	30.72	30.91	30.91	45.04	5.36

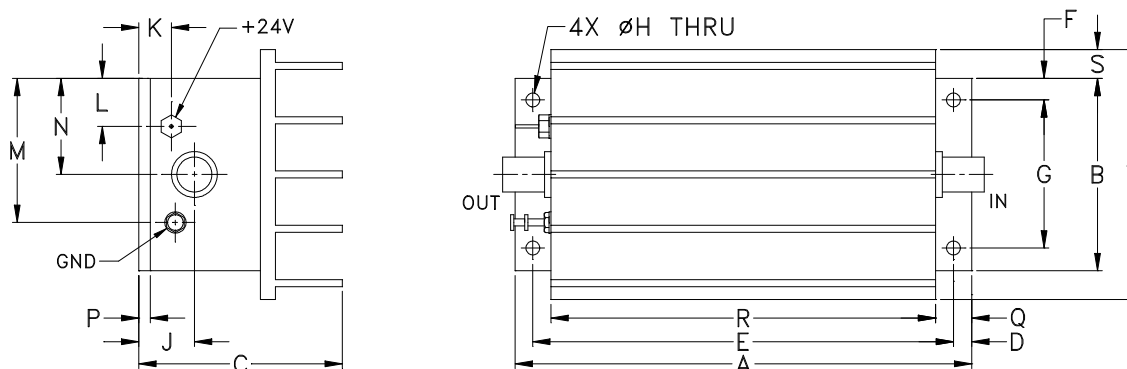
Typical Performance Curves



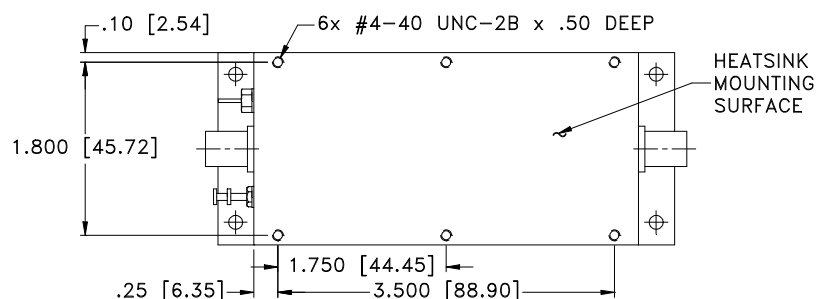
Typical Performance Curves



Outline Dimensions



MOUNTING INFORMATION FOR MODELS WITHOUT HEATSINK



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
T34	4.75 (120.65)	2.00 (50.80)	2.12 (53.85)	.19 (4.83)	4.375 (111.13)	.23 (5.84)	1.540 (39.12)	.144 (3.66)	.58 (14.73)	.34 (8.64)	.50 (12.70)	1.50 (38.10)	1.00 (25.40)

CASE#	P	Q	R	S	T	WT. GRAMS	WT. WITHOUT HEATSINK GRAMS
T34	.12 (3.05)	.38 (9.65)	4.00 (101.60)	.30 (7.62)	2.60 (66.04)	440.0	325.0

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .03$; 3 Pl. $\pm .015$

Notes:

- Case material: Aluminum alloy.
- Case finish and mounting bracket finish:
For RoHS Case Styles: Clear chemical conversion coating, non-chrome or trivalent chrome based.
- Heat sink finish: Black anodize.



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



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 60°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 85° C	MIL-STD-202, Method 108
Thermal Shock	-55° to 100°C, 5 cycles	MIL-STD-202, Method 107, Condition A, except 100°C