



Mini-Circuits

COAXIAL

Medium Power Amplifier

ZHL-0G64G21W1+
ZHL-0G64G21W1X+

50Ω 600 to 4200 MHz Broadband 1.6 W SMA Female

THE BIG DEAL

- Broadband, 600 to 4200 MHz
- High Gain, 44 dB Typ.
- High P1dB, +32 dBm, Typ.
- High OIP3, +45 dBm Typ.



With Heatsink

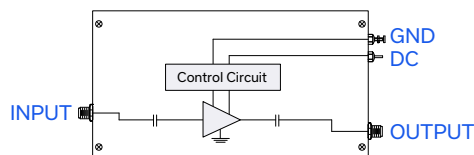
Without Heatsink

Generic photo used for illustration purposes only

APPLICATIONS

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

FUNCTIONAL DIAGRAM



PRODUCT OVERVIEW

The ZHL-0G64G21W1(X)+ is a medium power broadband amplifier providing more than 1 W of output power with a typical small signal gain of 44 dB over the 600 to 4200 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.

KEY FEATURES

Feature	Advantages
Extremely Broadband, 600 to 4200 MHz and High Power, 1.6 W	One single amplifier that covers the entire frequency band delivering rated power.
High Gain, 44 dB Typ.	High gain allows low drive levels to achieve rated output power which can be obtained from many standard lab generators.
Rugged By Design	Accidental reversing of the polarity of the power supply or accidental open/short (delivering P _{1dB} power) will not damage the amplifier.
High OIP3, +45 dBm Typ.	High OIP3 makes the amplifier suitable for applications requiring high linearity such as digitally modulated signals.
Rugged Enclosure	The solid aluminum enclosure makes the amplifier usable for any application from industrial, to laboratory environments.

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REV. OR
ECO-018311
ZHL-0G64G21W1+
MCL NY
260212

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ELECTRICAL SPECIFICATIONS AT $T_{\text{MOUNTINGBASE}} = +25\text{ }^{\circ}\text{C}$, $V_{\text{DC}} = +28\text{ V}$

Parameter	Symbol	Condition	Min.	Typ.	Max.	Units
Frequency Range	f		600		4200	MHz
Small Signal Gain	G_{SS}		40	44	47	dB
Small Signal Gain Flatness	$G_{\text{SS-FLAT}}$			± 1.2	± 1.6	dB
Output Power at 1 dB Compression	$P_{1\text{dB}}$		+28	+32		dBm
Output Power at 3 dB Compression	$P_{3\text{dB}}$		+29	+35		dBm
Noise Figure	NF			5.7		dB
Output Third Order Intercept Point	OIP3	$P_{\text{OUT}} = +20\text{ dBm/tone}$		+45		dBm
Input VSWR	I-VSWR			1.5	2.4	:1
Output VSWR	O-VSWR			1.5	2.4	:1
DC Supply Voltage	V_{DC}		+26	+28	+30	V
Supply Current	I_{DC}	at $P_{3\text{dB}}$		0.85	1.00	A



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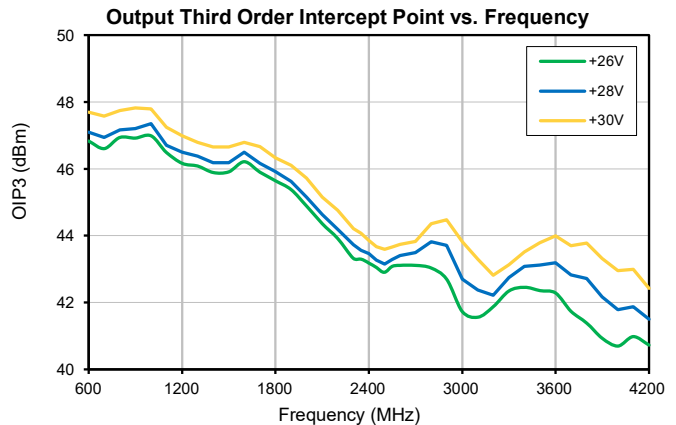
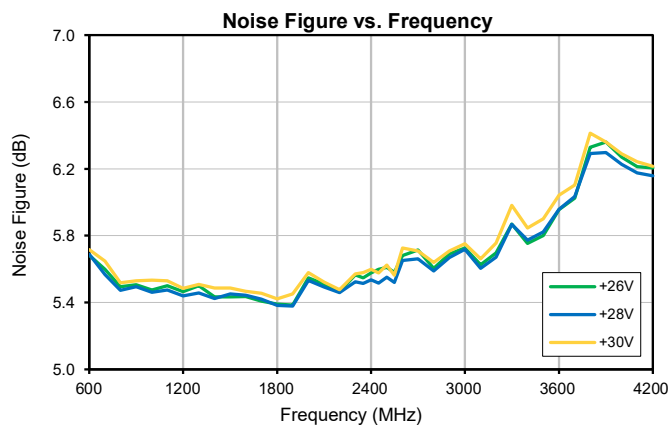
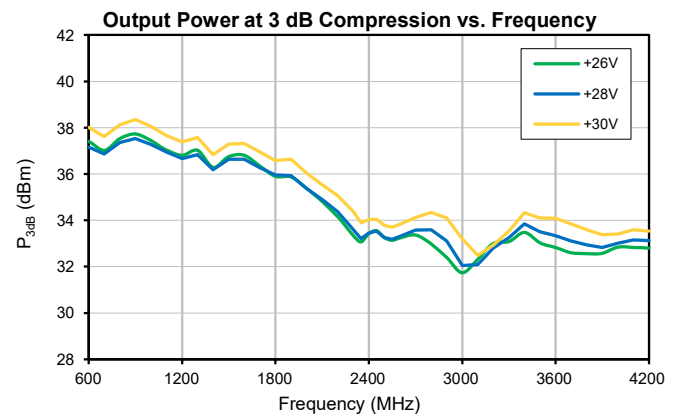
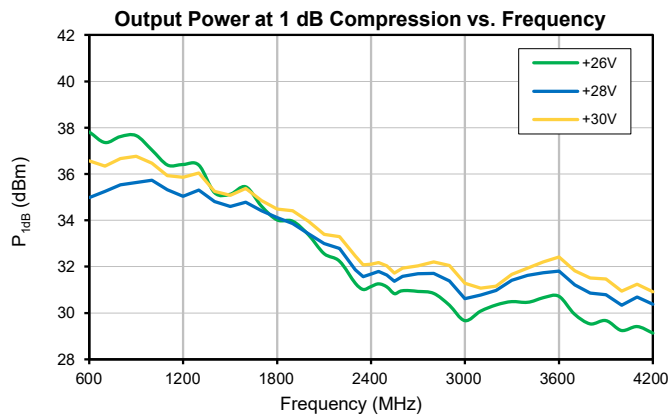
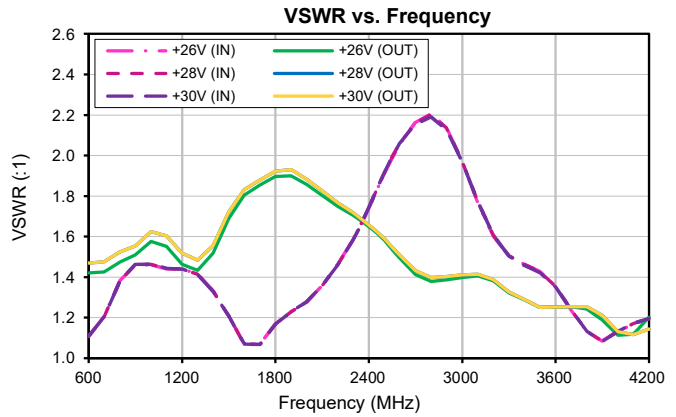
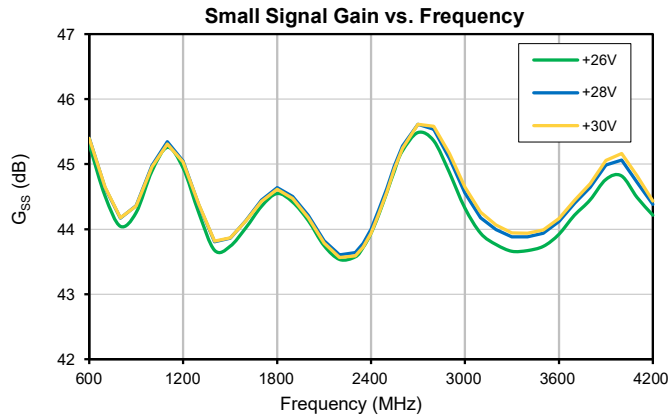
Medium Power Amplifier

ZHL-0G64G21W1+
ZHL-0G64G21W1X+

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



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Medium Power Amplifier

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ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings	
Operating Temperature	ZHL-0G64G21W1+	T _{AMBIENT} : -20 °C to +65 °C
	ZHL-0G64G21W1X+	T _{MOUNTINGBASE} : -20 °C to +85 °C
Storage Temperature	-55 °C to +100 °C	
No damage with an open or short at P _{OUT} = +30 dBm CW for 2 minutes max.		
RF Input Power (No Damage)	0 dBm	
DC Operating Voltage	+30 V	

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 = +65 °C (USER DEFINED) POWER DISSIPATION = 30 WATTS (CHECK MAXIMUM RATINGS TABLE FOR THIS VALUE) THEN MAXIMUM ALLOWABLE THERMAL RESISTANCE = 0.66 °C/W





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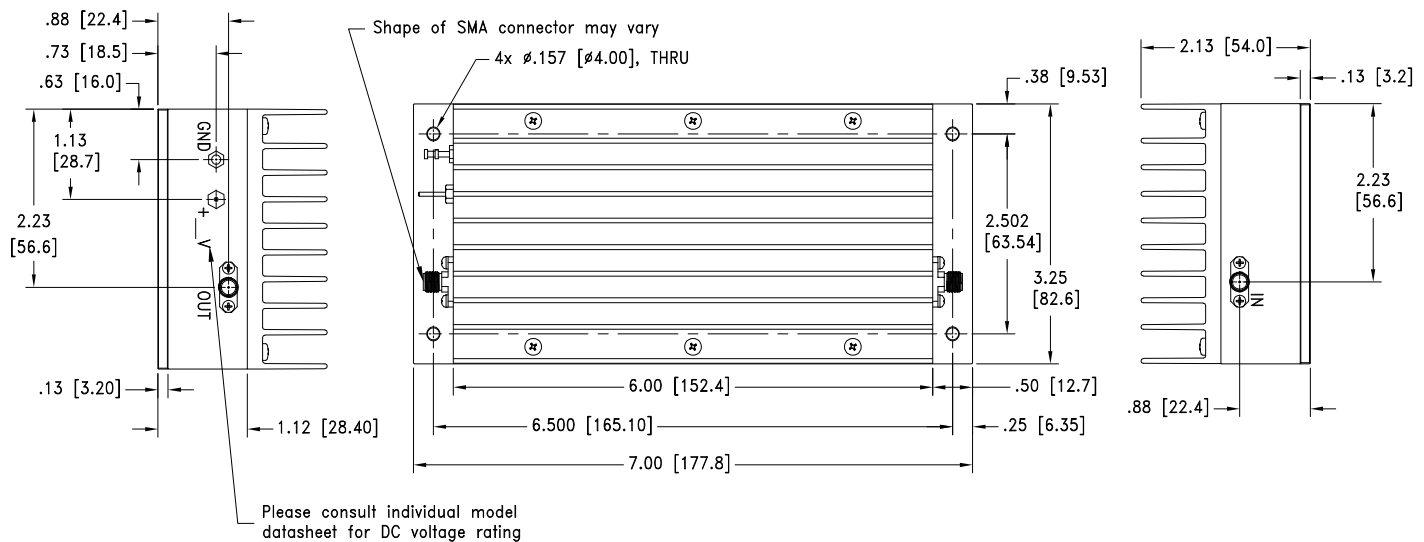
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50Ω 600 to 4200 MHz Broadband 1.6 W SMA Female

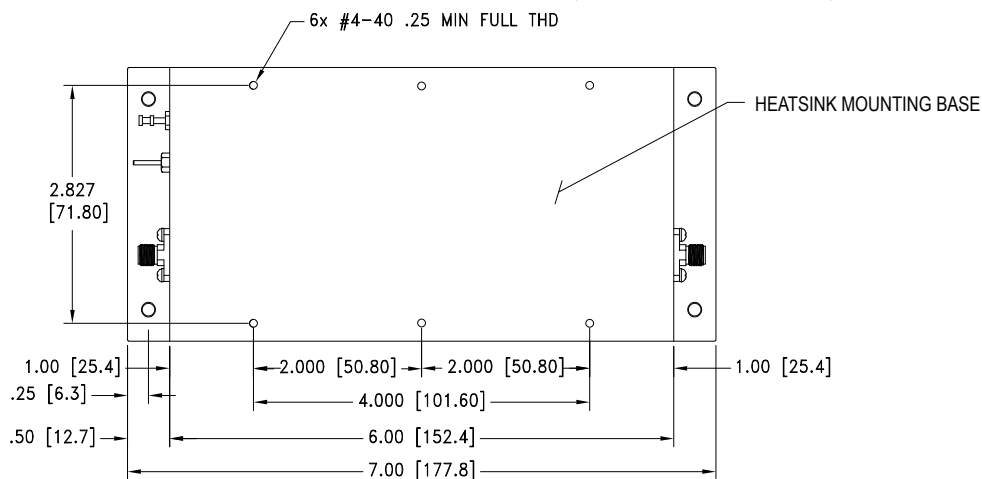
COAXIAL CONNECTIONS

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

CASE STYLE DRAWING WITH HEATSINK (ZHL-0G64G21W1+)



CASE STYLE DRAWING WITHOUT HEATSINK (ZHL-0G64G21W1X+)



Weight: 900.0 grams. Weight without heatsink: 600.0 grams
 Dimensions are in inches [mm]. Tolerances: 2 Pl. $\pm$ 03; 3 Pl. $\pm$.015 Inch

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50Ω 600 to 4200 MHz Broadband 1.6 W SMA Female

ADDITIONAL INFORMATION IS AVAILABLE ON OUR DASHBOARD.

Performance Data	Table
	Graphs
	S-Parameter (S2P Files) Data Set (.zip file)
RoHS Status	Compliant
Environmental Ratings	ENV23T3

ORDERING INFORMATION

Model No. Links	ZHL-0G64G21W1+	ZHL-0G64G21W1X+
Option	With Heatsink	Without Heatsink
Case Style	U36	
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)	Small Signal Gain (dB)			Isolation (dB)			VSWR (:1)					
							In			Out		
	26V	28V	30V	26V	28V	30V	26V	28V	30V	26V	28V	30V
600	45.30	45.40	45.40	94.03	99.87	93.95	1.11	1.11	1.11	1.42	1.47	1.47
700	44.52	44.64	44.65	92.32	97.69	93.05	1.21	1.21	1.21	1.43	1.48	1.48
800	44.05	44.17	44.17	93.01	96.32	95.12	1.38	1.38	1.38	1.48	1.52	1.52
900	44.25	44.36	44.36	91.63	94.40	92.73	1.46	1.46	1.46	1.51	1.55	1.55
1000	44.89	44.98	44.96	90.37	90.56	89.43	1.46	1.46	1.46	1.58	1.62	1.62
1100	45.26	45.34	45.31	88.05	90.69	90.06	1.44	1.44	1.44	1.55	1.60	1.60
1200	44.94	45.05	45.03	89.49	89.73	90.74	1.44	1.44	1.44	1.46	1.52	1.52
1300	44.25	44.37	44.38	87.65	89.15	90.62	1.42	1.41	1.41	1.43	1.48	1.48
1400	43.68	43.81	43.82	93.00	90.66	92.34	1.33	1.33	1.33	1.52	1.55	1.55
1500	43.73	43.86	43.87	88.76	92.22	89.75	1.21	1.21	1.21	1.69	1.72	1.72
1600	44.02	44.13	44.12	89.53	90.88	91.43	1.07	1.07	1.07	1.80	1.83	1.83
1700	44.35	44.45	44.43	86.29	87.16	89.66	1.07	1.07	1.07	1.85	1.88	1.88
1800	44.55	44.64	44.61	84.70	88.13	86.80	1.17	1.17	1.17	1.90	1.92	1.92
1900	44.42	44.50	44.47	87.16	85.87	86.93	1.23	1.23	1.23	1.90	1.93	1.93
2000	44.13	44.21	44.18	87.24	87.69	87.49	1.28	1.28	1.28	1.86	1.88	1.88
2100	43.75	43.82	43.78	84.89	85.19	87.35	1.36	1.36	1.36	1.80	1.83	1.83
2200	43.54	43.60	43.56	87.05	87.80	87.77	1.46	1.46	1.46	1.75	1.77	1.77
2300	43.57	43.64	43.59	85.22	85.60	87.61	1.59	1.59	1.58	1.70	1.72	1.72
2350	43.72	43.78	43.73	87.13	86.99	88.98	1.66	1.66	1.66	1.68	1.69	1.69
2400	43.94	44.00	43.94	85.23	85.62	86.52	1.74	1.74	1.74	1.65	1.66	1.66
2450	44.23	44.29	44.23	84.43	85.58	86.67	1.83	1.83	1.83	1.62	1.63	1.63
2500	44.56	44.62	44.57	84.36	84.53	86.13	1.91	1.92	1.92	1.58	1.59	1.59
2550	44.90	44.97	44.92	83.70	84.85	84.33	1.99	1.99	2.00	1.54	1.55	1.55
2600	45.20	45.28	45.24	83.70	85.10	86.02	2.06	2.06	2.06	1.49	1.51	1.51
2700	45.49	45.61	45.61	82.18	85.17	85.37	2.16	2.16	2.16	1.41	1.43	1.43
2800	45.36	45.54	45.58	83.38	83.99	84.96	2.21	2.20	2.19	1.38	1.40	1.40
2900	44.87	45.09	45.17	84.58	84.05	84.89	2.14	2.14	2.13	1.39	1.40	1.40
3000	44.33	44.56	44.65	82.78	84.01	85.39	1.97	1.97	1.97	1.40	1.41	1.41
3100	43.94	44.17	44.26	83.91	86.07	85.29	1.77	1.77	1.77	1.41	1.41	1.41
3200	43.76	43.99	44.06	84.89	86.08	85.95	1.60	1.61	1.61	1.38	1.39	1.39
3300	43.66	43.88	43.94	85.49	87.15	87.47	1.50	1.51	1.50	1.32	1.33	1.33
3400	43.67	43.88	43.94	84.87	85.44	86.96	1.46	1.46	1.46	1.29	1.29	1.29
3500	43.74	43.94	43.99	85.31	87.06	87.20	1.43	1.43	1.42	1.25	1.25	1.25
3600	43.92	44.12	44.17	85.64	86.74	87.85	1.35	1.35	1.35	1.25	1.25	1.25
3700	44.21	44.40	44.45	85.71	86.01	87.60	1.24	1.24	1.24	1.25	1.25	1.25
3800	44.45	44.65	44.70	85.75	87.79	86.27	1.13	1.13	1.13	1.24	1.25	1.25
3900	44.77	44.99	45.06	84.85	85.94	85.19	1.08	1.08	1.08	1.19	1.21	1.21
4000	44.82	45.07	45.17	87.76	86.13	85.57	1.13	1.13	1.13	1.11	1.13	1.13
4100	44.49	44.72	44.82	85.16	85.29	87.47	1.17	1.17	1.17	1.12	1.12	1.12
4200	44.21	44.38	44.43	86.63	86.89	86.04	1.20	1.20	1.20	1.20	1.14	1.14

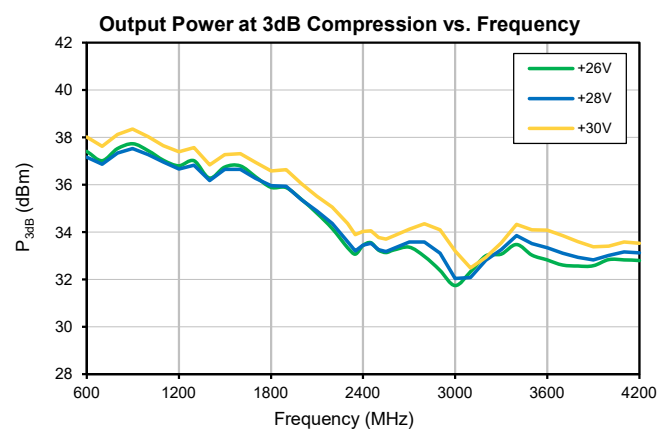
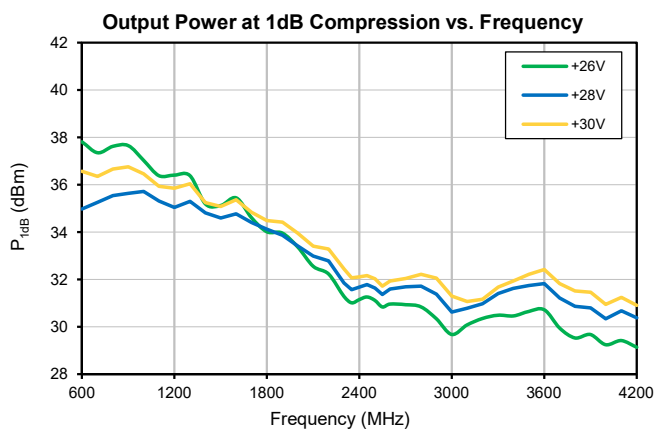
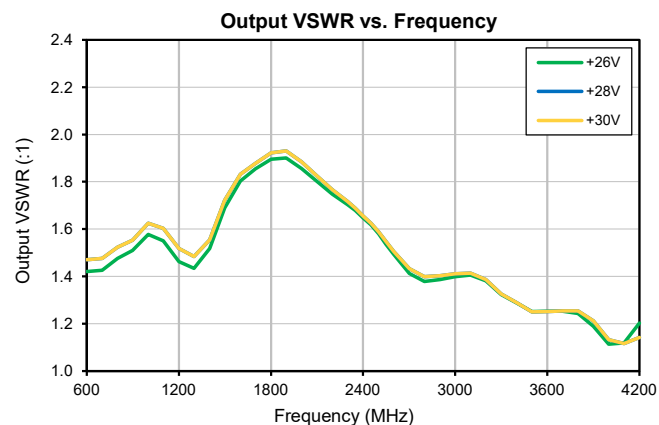
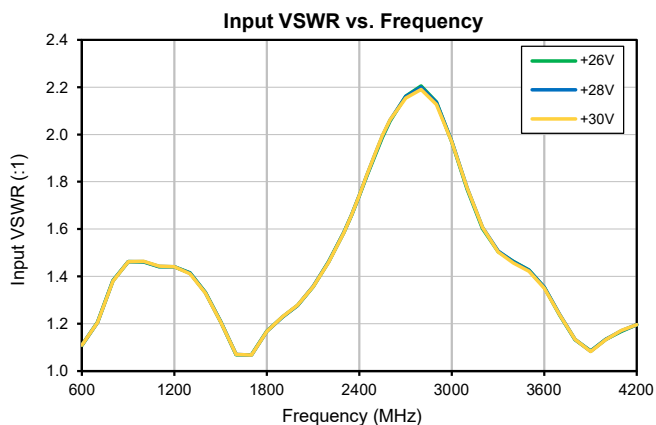
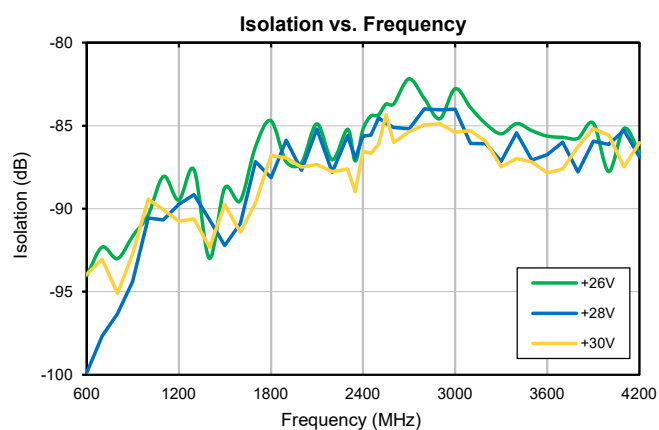
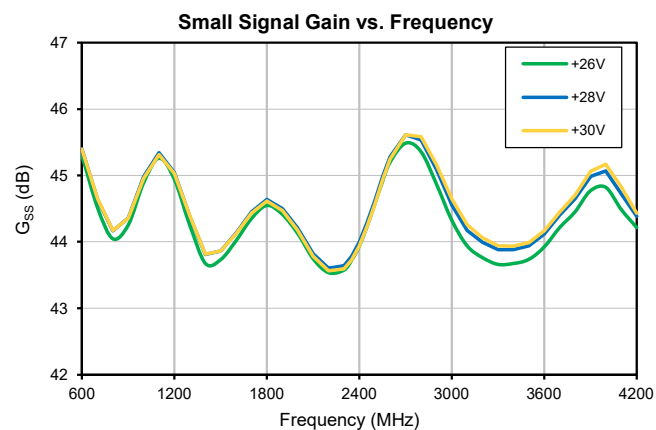
Typical Performance Data

Frequency (MHz)	P _{OUT} @ 1 dB Compression			P _{OUT} @ 3 dB Compression			P _{OUT} at Saturation		
	(dBm)			(dBm)			(dBm)		
	26V	28V	30V	26V	28V	30V	26V	28V	30V
600	37.82	34.98	36.57	37.41	37.16	38.02	37.90	37.89	38.57
700	37.36	35.25	36.35	37.02	36.86	37.62	37.84	37.89	38.52
800	37.62	35.54	36.67	37.53	37.35	38.14	37.90	37.93	38.53
900	37.66	35.64	36.76	37.73	37.53	38.35	37.95	37.93	38.60
1000	37.03	35.73	36.46	37.44	37.27	38.04	37.98	38.01	38.68
1100	36.39	35.32	35.94	37.03	36.96	37.65	37.61	37.69	38.32
1200	36.41	35.04	35.86	36.81	36.67	37.39	37.76	37.79	38.44
1300	36.39	35.30	36.05	37.01	36.83	37.57	37.62	37.62	38.25
1400	35.19	34.81	35.25	36.28	36.18	36.84	37.30	37.31	37.89
1500	35.13	34.60	35.09	36.75	36.65	37.28	37.50	37.52	38.08
1600	35.45	34.78	35.37	36.80	36.65	37.31	37.78	37.76	38.36
1700	34.61	34.41	34.85	36.35	36.28	36.95	36.91	36.91	37.50
1800	34.02	34.11	34.49	35.90	35.95	36.59	37.16	37.25	37.82
1900	33.97	33.86	34.42	35.88	35.93	36.64	36.63	36.72	37.34
2000	33.38	33.42	33.96	35.38	35.38	36.05	36.20	36.28	36.93
2100	32.56	32.99	33.40	34.81	34.89	35.52	35.60	35.70	36.30
2200	32.23	32.79	33.29	34.16	34.37	35.06	35.38	35.51	36.13
2300	31.28	31.86	32.46	33.35	33.59	34.37	34.91	35.04	35.67
2350	31.01	31.57	32.07	33.07	33.21	33.90	33.98	34.11	34.75
2400	31.15	31.68	32.11	33.43	33.45	34.03	34.72	34.77	35.35
2450	31.26	31.79	32.17	33.55	33.54	34.05	35.01	34.94	35.42
2500	31.12	31.63	32.03	33.25	33.26	33.78	35.17	35.14	35.58
2550	30.84	31.37	31.72	33.14	33.18	33.70	35.42	35.48	35.94
2600	30.96	31.59	31.93	33.24	33.32	33.84	35.18	35.34	35.90
2700	30.94	31.70	32.04	33.37	33.58	34.12	35.59	35.86	36.47
2800	30.84	31.71	32.21	32.98	33.58	34.35	35.13	35.42	36.07
2900	30.33	31.39	32.05	32.40	33.11	34.10	35.22	35.48	36.17
3000	29.68	30.63	31.29	31.74	32.05	33.20	34.99	35.29	35.97
3100	30.08	30.78	31.08	32.32	32.09	32.49	34.30	34.48	35.14
3200	30.35	30.97	31.16	33.00	32.81	32.93	34.79	34.75	35.21
3300	30.49	31.41	31.67	33.08	33.25	33.54	34.79	34.86	35.27
3400	30.46	31.63	31.93	33.48	33.85	34.32	34.57	34.75	35.21
3500	30.66	31.75	32.21	33.03	33.51	34.10	34.54	34.77	35.26
3600	30.72	31.82	32.42	32.82	33.34	34.09	34.47	34.75	35.29
3700	29.95	31.22	31.83	32.61	33.11	33.85	34.36	34.78	35.43
3800	29.53	30.86	31.51	32.57	32.94	33.60	33.89	34.37	35.08
3900	29.67	30.80	31.47	32.58	32.83	33.38	33.51	33.74	34.42
4000	29.24	30.34	30.95	32.85	33.02	33.41	34.45	34.51	34.92
4100	29.41	30.69	31.24	32.83	33.16	33.58	34.57	34.72	35.13
4200	29.14	30.37	30.91	32.80	33.12	33.53	34.77	34.97	35.34

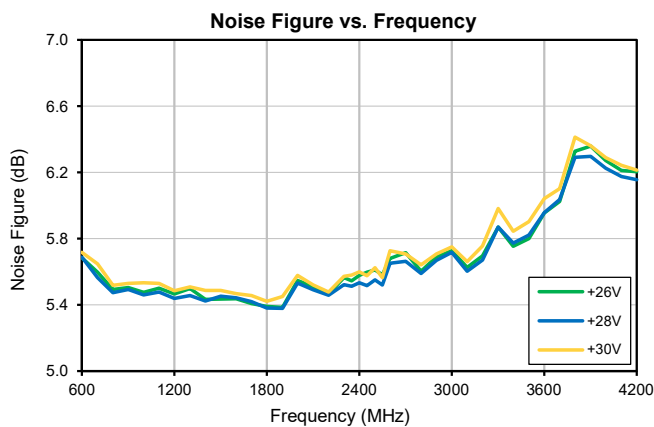
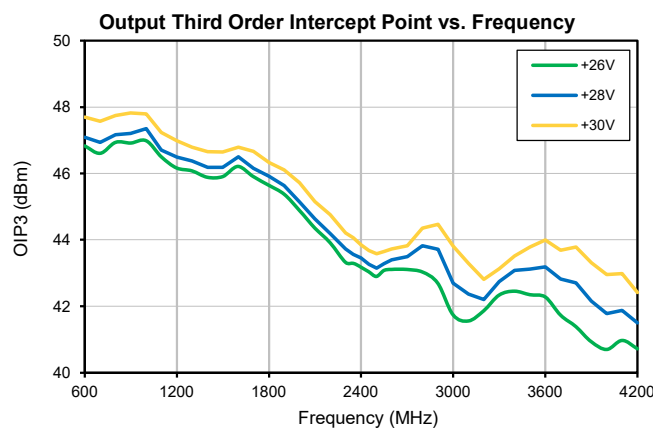
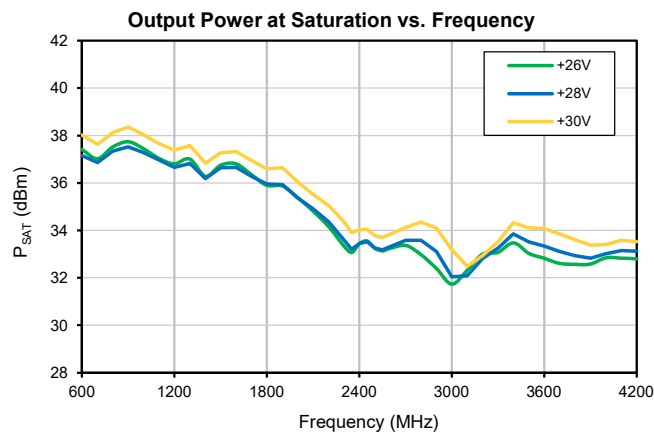
Typical Performance Data

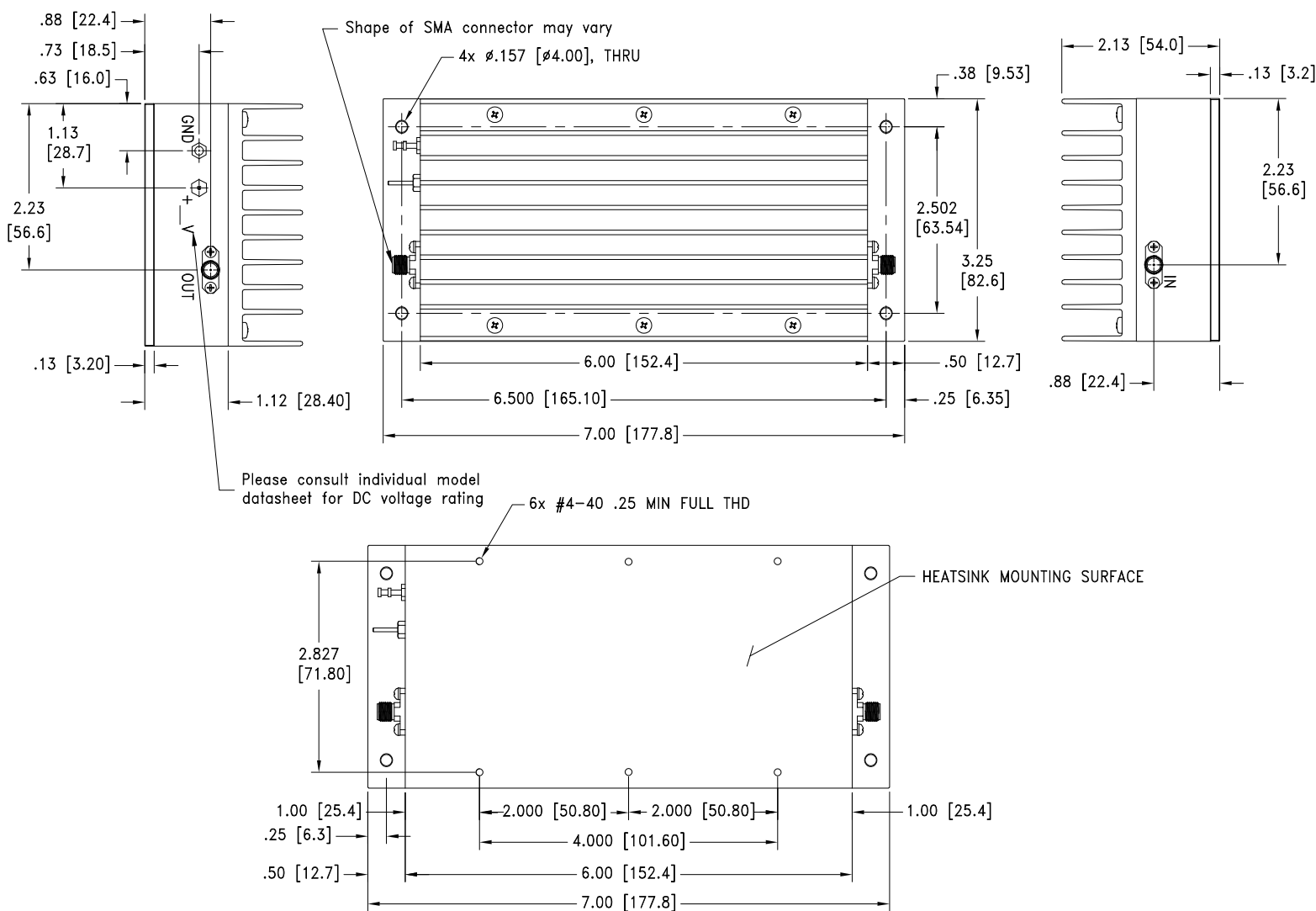
Frequency (MHz)	OIP3			Noise Figure		
	(dBm)			(dB)		
	26V	28V	30V	26V	28V	30V
600	46.83	47.09	47.69	5.68	5.69	5.72
700	46.60	46.94	47.57	5.60	5.57	5.65
800	46.94	47.16	47.75	5.49	5.47	5.52
900	46.92	47.20	47.83	5.50	5.49	5.53
1000	46.99	47.35	47.79	5.47	5.46	5.53
1100	46.49	46.70	47.24	5.50	5.48	5.53
1200	46.16	46.49	46.98	5.47	5.44	5.48
1300	46.08	46.38	46.79	5.50	5.46	5.51
1400	45.89	46.19	46.66	5.43	5.42	5.49
1500	45.91	46.18	46.65	5.43	5.45	5.49
1600	46.21	46.50	46.78	5.44	5.44	5.47
1700	45.90	46.16	46.66	5.41	5.42	5.46
1800	45.65	45.92	46.32	5.39	5.38	5.42
1900	45.38	45.63	46.10	5.38	5.38	5.45
2000	44.89	45.14	45.72	5.55	5.53	5.58
2100	44.36	44.63	45.15	5.51	5.49	5.52
2200	43.91	44.19	44.76	5.46	5.46	5.48
2300	43.32	43.72	44.21	5.56	5.52	5.57
2350	43.30	43.56	44.07	5.55	5.51	5.58
2400	43.18	43.46	43.85	5.58	5.53	5.60
2450	43.04	43.26	43.67	5.60	5.52	5.58
2500	42.90	43.15	43.59	5.61	5.55	5.62
2550	43.08	43.28	43.65	5.58	5.52	5.56
2600	43.11	43.40	43.73	5.68	5.65	5.73
2700	43.11	43.49	43.82	5.71	5.66	5.71
2800	43.03	43.82	44.35	5.60	5.59	5.64
2900	42.70	43.71	44.47	5.69	5.67	5.71
3000	41.74	42.70	43.81	5.73	5.72	5.75
3100	41.56	42.37	43.29	5.63	5.60	5.66
3200	41.87	42.21	42.81	5.70	5.67	5.76
3300	42.34	42.74	43.13	5.87	5.87	5.98
3400	42.46	43.08	43.52	5.75	5.77	5.84
3500	42.35	43.12	43.79	5.80	5.82	5.90
3600	42.28	43.18	43.99	5.95	5.96	6.04
3700	41.73	42.82	43.69	6.02	6.03	6.10
3800	41.38	42.71	43.78	6.33	6.29	6.41
3900	40.93	42.16	43.31	6.36	6.30	6.36
4000	40.70	41.78	42.95	6.27	6.23	6.29
4100	40.97	41.87	42.99	6.21	6.17	6.24
4200	40.72	41.50	42.42	6.20	6.16	6.21

Typical Performance Curves



Typical Performance Curves





MOUNTING INFORMATION FOR MODELS WITHOUT HEATSINK

Weight: 900.0 grams

Weight without heatsink: 600.0 grams

Dimensions are in inches [mm]. Tolerances: 2 Pl. ±.03; ; 3 Pl. ±.015 Inch

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.

For Non-RoHS Case Styles: Yellow hexavalent chrome based conversion coating.

Due to transition from non-RoHS to RoHS, models will be supplied with either case style finish until the non-RoHS case inventory is depleted.

- Heat sink finish: Black anodize.

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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 65° 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