Coaxial

Low Noise Amplifier

ZX60-362GLN-S+

50Ω 3300 to 3600 MHz

Features

- Ultra low noise figure, 0.9 dB typ.
- Output power, up to +16 dBm typ.
- Good output IP3, 29 dBm typ.
- Good return loss
- Unconditionally stable
- Protected by US patent 6,790,049

Applications

- WiMAX
- Defence system radar
- Base transceiver station, tower mounted amplifier, repeater
- General purpose low noise amplifier
- Lab
- Instrumentation
- Test equipment

CASE STYLE: GA955

Connectors	Model
SMA	ZX60-362GLN-S+

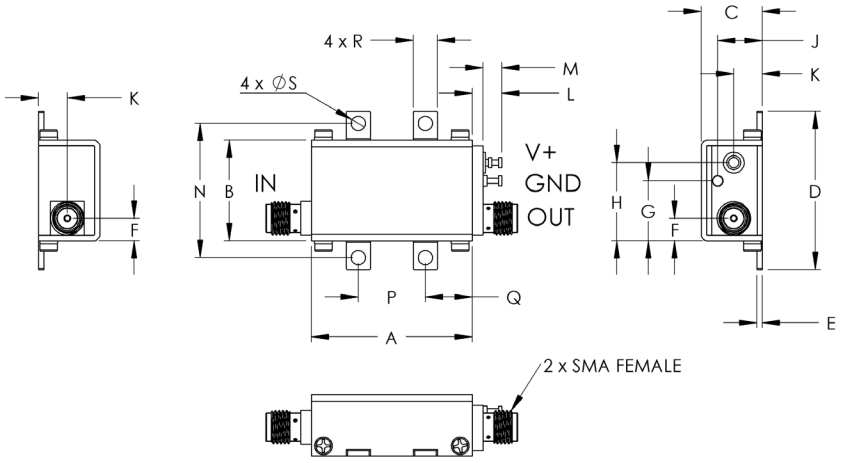
+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Electrical Specifications at 25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		3300		3600	MHz
Noise Figure	3300-3600		0.9	1.2	dB
Gain	3300-3600	18	20		dB
Gain Flatness	3300-3600		± 0.3	± 0.6	dB
Output Power at 1dB compression	3300-3600	13	16		dBm
Output third order intercept point	3300-3600		29		dBm
Input VSWR	3300-3600		1.2		:1
Output VSWR	3300-3600		1.4		:1
Active Directivity	3300-3600		22		dB
DC Supply Voltage			5		V
Supply Current			100	140	mA

Outline Drawing



NOTE: When soldering the DC connections, caution must be used to avoid overheating the DC terminals. See Application Note AN-40-10 .

Maximum Ratings

Parameter	Ratings
Operating Temperature	-40°C to 85°C Case
Storage Temperature	-55°C to 100°C
DC Voltage	5.5 V
Input RF Power (no damage)	+15 dBm
Power Consumption	770 mW

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

Outline Dimensions (inch / mm)

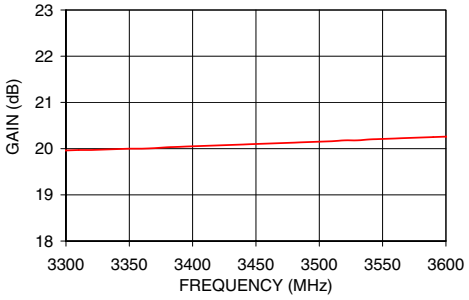
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	wt.
1.20	.75	.46	1.18	.04	.17	.45	.59	.33	.21	.22	.14	1.00	.50	.35	.18	.106	grams
30.48	19.05	11.68	29.97	1.02	4.32	11.43	14.99	8.38	5.33	5.59	3.56	25.40	12.70	8.89	4.57	2.69	35.0

Notes

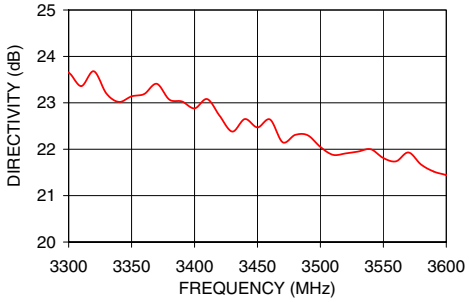
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's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

FREQUENCY (MHz)	GAIN (dB)	DIRECTIVITY (dB)	VSWR IN (:1)	VSWR OUT (:1)	POWER OUT @ 1dB COMPRESSION (dBm)	OUTPUT IP3 (dBm)	NF (dB)
3300.00	19.96	23.65	1.17	1.47	16.16	27.48	1.03
3320.00	19.97	23.68	1.17	1.47	16.33	28.09	1.03
3330.00	19.98	23.20	1.17	1.47	16.30	28.29	1.03
3350.00	20.00	23.14	1.17	1.46	16.20	28.70	1.04
3360.00	20.00	23.19	1.17	1.46	16.21	28.29	1.04
3380.00	20.03	23.07	1.18	1.45	16.27	28.43	1.06
3400.00	20.05	22.88	1.18	1.45	16.24	28.85	1.04
3410.00	20.06	23.08	1.18	1.44	16.29	28.69	1.04
3430.00	20.08	22.38	1.19	1.44	16.45	28.75	1.05
3450.00	20.10	22.47	1.20	1.43	16.49	27.86	1.05
3470.00	20.12	22.15	1.22	1.42	16.28	28.82	1.05
3480.00	20.13	22.31	1.23	1.42	16.26	29.05	1.07
3500.00	20.15	22.05	1.24	1.41	16.56	28.59	1.08
3520.00	20.18	21.91	1.26	1.40	16.57	29.00	1.08
3530.00	20.18	21.95	1.27	1.39	16.49	29.16	1.09
3550.00	20.21	21.81	1.28	1.38	16.53	29.19	1.11
3560.00	20.22	21.74	1.30	1.38	16.63	29.35	1.13
3580.00	20.24	21.67	1.32	1.37	16.74	29.55	1.12
3590.00	20.25	21.52	1.33	1.37	16.66	29.53	1.13
3600.00	20.26	21.44	1.34	1.36	16.59	30.57	1.14

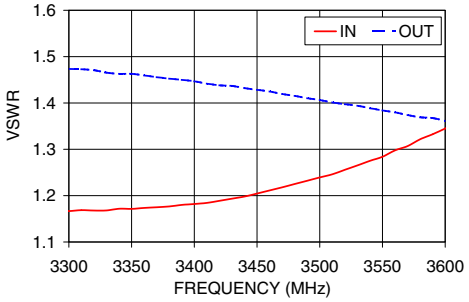
ZX60-362GLN-S+
GAIN



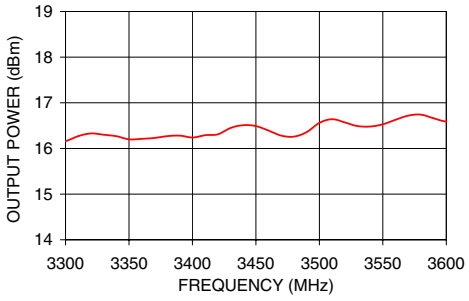
ZX60-362GLN-S+
DIRECTIVITY



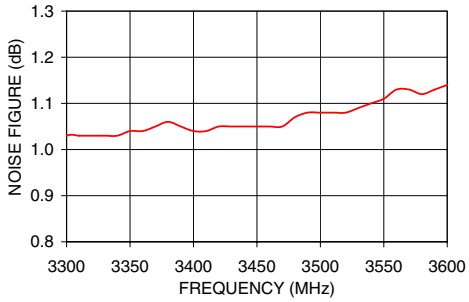
ZX60-362GLN-S+
VSWR



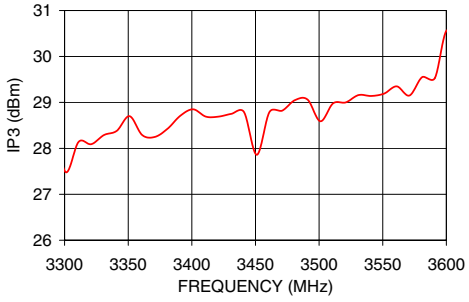
ZX60-362GLN-S+
OUTPUT POWER AT 1dB COMPRESSION



ZX60-362GLN-S+
NOISE FIGURE



ZX60-362GLN-S+
OUTPUT IP3



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/MCLStore/terms.jsp

Typical Performance Data

NOTE: Use PDF Bookmarks to view DATA at required conditions or to view GRAPHS.

Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: I = 101mA, Vd = 5V @Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(dBm)	(dBm)	(dB)
3100	20.08	44.27	22.40	14.09	7.78	0.08	28.54	15.94	0.85
3200	20.08	43.66	23.04	14.14	7.28	0.08	28.92	16.02	0.91
3300	20.14	42.97	24.21	14.43	6.70	0.08	28.88	16.22	0.92
3310	20.15	42.92	24.32	14.47	6.66	0.08	28.98	16.22	0.94
3320	20.15	42.84	24.37	14.52	6.60	0.08	28.98	16.23	0.98
3330	20.17	42.77	24.53	14.57	6.53	0.08	28.96	16.25	0.97
3340	20.18	42.73	24.57	14.63	6.50	0.08	28.96	16.29	0.99
3350	20.18	42.64	24.76	14.68	6.43	0.08	28.99	16.21	0.95
3360	20.20	42.56	24.78	14.74	6.37	0.08	29.17	16.13	0.98
3370	20.21	42.49	24.79	14.80	6.31	0.08	29.25	16.17	0.95
3380	20.22	42.42	24.77	14.86	6.26	0.08	29.38	16.29	0.96
3390	20.23	42.36	24.71	14.91	6.21	0.08	29.64	16.33	0.95
3400	20.24	42.28	24.65	14.98	6.14	0.08	29.82	16.31	0.98
3420	20.27	42.13	24.26	15.13	6.02	0.08	30.17	16.31	0.89
3430	20.28	42.08	24.11	15.21	5.98	0.08	30.22	16.37	0.95
3440	20.29	41.99	23.86	15.29	5.92	0.08	30.27	16.40	0.96
3450	20.30	41.90	23.68	15.37	5.85	0.09	30.28	16.40	1.00
3460	20.32	41.85	23.36	15.47	5.80	0.09	30.21	16.41	0.95
3470	20.33	41.78	23.02	15.55	5.75	0.09	30.14	16.41	0.97
3480	20.35	41.71	22.64	15.65	5.70	0.09	30.10	16.39	0.98
3490	20.37	41.63	22.28	15.74	5.64	0.09	30.03	16.30	0.98
3500	20.38	41.57	21.89	15.84	5.59	0.09	30.01	16.29	0.93
3520	20.40	41.44	21.12	16.04	5.49	0.09	29.83	16.44	0.94
3530	20.42	41.35	20.68	16.14	5.42	0.09	29.82	16.55	0.93
3540	20.43	41.28	20.28	16.25	5.37	0.09	29.82	16.60	0.97
3550	20.44	41.22	19.89	16.36	5.32	0.09	29.84	16.61	0.98
3560	20.45	41.13	19.40	16.48	5.26	0.09	29.78	16.59	1.02
3570	20.47	41.07	19.06	16.59	5.22	0.09	29.84	16.53	1.05
3580	20.48	40.99	18.63	16.70	5.16	0.09	29.94	16.46	1.09
3590	20.50	40.94	18.27	16.82	5.11	0.09	29.96	16.48	1.09
3600	20.51	40.87	17.87	16.94	5.06	0.09	29.88	16.57	0.98
3700	20.60	40.17	14.32	18.11	4.55	0.09	30.64	16.90	1.01
3800	20.64	39.54	11.41	18.82	4.07	0.10	30.59	16.89	1.11
3900	20.58	39.00	9.05	18.52	3.64	0.10	30.42	16.86	1.04
4000	20.37	38.62	7.22	17.41	3.29	0.11	30.09	17.01	0.99
4200	19.55	38.26	4.80	15.35	2.82	0.11	30.20	16.14	1.17
4300	18.98	38.25	4.08	14.78	2.70	0.11	29.81	15.92	1.17
4400	18.35	38.30	3.60	14.57	2.67	0.10	29.75	15.62	1.29

Typical Performance Data

Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: I = 102mA, Vd = 5V @Temperature = -40degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(dBm)	(dBm)	(dB)
3100	20.87	43.95	21.01	14.21	6.86	0.09	29.48	16.02	0.54
3200	20.84	43.31	21.33	14.15	6.39	0.09	29.86	16.06	0.57
3300	20.88	42.67	22.78	14.33	5.94	0.10	30.14	16.19	0.58
3310	20.89	42.58	22.99	14.36	5.87	0.10	30.15	16.20	0.59
3320	20.90	42.52	23.21	14.40	5.84	0.10	30.16	16.20	0.64
3330	20.90	42.46	23.47	14.43	5.80	0.10	30.10	16.23	0.63
3340	20.92	42.40	23.72	14.47	5.75	0.10	30.13	16.24	0.65
3350	20.92	42.32	23.85	14.51	5.69	0.10	30.19	16.17	0.60
3360	20.93	42.25	24.10	14.55	5.65	0.10	30.21	16.08	0.66
3370	20.94	42.19	24.32	14.58	5.60	0.10	30.29	16.16	0.62
3380	20.95	42.11	24.65	14.63	5.55	0.10	30.33	16.29	0.64
3390	20.97	42.04	24.81	14.67	5.50	0.10	30.42	16.35	0.62
3400	20.97	41.96	25.05	14.71	5.45	0.10	30.46	16.30	0.65
3420	21.00	41.83	25.35	14.81	5.36	0.10	30.46	16.31	0.55
3430	21.01	41.76	25.43	14.87	5.31	0.10	30.48	16.37	0.59
3440	21.02	41.69	25.58	14.93	5.26	0.10	30.53	16.39	0.61
3450	21.03	41.62	25.64	14.99	5.22	0.10	30.52	16.37	0.66
3460	21.05	41.54	25.64	15.05	5.16	0.10	30.54	16.38	0.61
3470	21.07	41.48	25.52	15.11	5.12	0.10	30.52	16.41	0.63
3480	21.08	41.39	25.50	15.17	5.06	0.10	30.58	16.36	0.66
3490	21.09	41.32	25.40	15.24	5.02	0.10	30.66	16.29	0.65
3500	21.10	41.27	25.07	15.30	4.98	0.10	30.65	16.28	0.59
3520	21.13	41.12	24.43	15.43	4.88	0.10	30.70	16.49	0.58
3530	21.14	41.05	24.01	15.50	4.84	0.10	30.73	16.56	0.58
3540	21.16	40.98	23.56	15.58	4.79	0.10	30.78	16.56	0.62
3550	21.17	40.90	23.15	15.66	4.74	0.10	30.79	16.59	0.61
3560	21.19	40.84	22.71	15.75	4.70	0.10	30.81	16.56	0.67
3570	21.20	40.76	22.22	15.83	4.65	0.10	30.85	16.48	0.70
3580	21.21	40.69	21.69	15.92	4.61	0.10	30.90	16.42	0.76
3590	21.23	40.61	21.22	16.00	4.55	0.10	30.98	16.48	0.75
3600	21.24	40.54	20.75	16.08	4.51	0.10	30.90	16.57	0.64
3700	21.36	39.86	16.26	17.04	4.08	0.11	31.39	16.90	0.66
3800	21.43	39.21	12.73	17.80	3.65	0.12	31.38	16.89	0.76
3900	21.41	38.64	9.98	17.80	3.26	0.12	31.31	16.92	0.69
4000	21.25	38.20	7.81	17.00	2.92	0.13	31.19	17.04	0.62
4100	20.94	37.93	6.18	15.93	2.66	0.14	31.19	16.44	0.71
4200	20.47	37.81	4.99	15.09	2.46	0.13	31.23	15.99	0.75
4300	19.92	37.78	4.18	14.59	2.34	0.13	31.25	15.79	0.74
4400	19.30	37.82	3.63	14.43	2.29	0.11	31.44	15.41	0.87

Typical Performance Data

Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

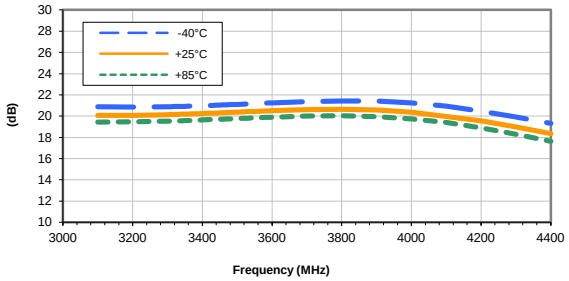
TEST CONDITIONS: I = 100mA, Vd = 5V @Temperature = +85degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(dBm)	(dBm)	(dB)
3100	19.43	44.46	25.75	14.30	8.61	0.07	28.19	15.62	1.16
3200	19.45	43.80	26.52	14.40	7.97	0.07	28.72	15.73	1.20
3300	19.53	43.16	27.11	14.74	7.37	0.07	29.13	15.96	1.23
3310	19.53	43.09	26.98	14.79	7.30	0.07	29.13	15.97	1.24
3320	19.54	43.02	26.98	14.84	7.24	0.07	29.20	16.00	1.28
3330	19.55	42.94	26.84	14.89	7.17	0.07	29.14	16.03	1.26
3340	19.57	42.89	26.74	14.94	7.12	0.07	29.16	16.06	1.31
3350	19.58	42.81	26.41	14.99	7.05	0.07	29.20	16.01	1.26
3360	19.59	42.75	26.16	15.05	6.99	0.07	29.35	15.94	1.31
3370	19.60	42.69	25.83	15.11	6.94	0.07	29.45	15.96	1.29
3380	19.61	42.60	25.51	15.18	6.85	0.07	29.51	16.07	1.30
3390	19.63	42.53	25.21	15.25	6.79	0.07	29.52	16.15	1.29
3400	19.64	42.49	24.77	15.33	6.75	0.07	29.58	16.12	1.29
3420	19.67	42.33	23.94	15.49	6.61	0.07	29.53	16.11	1.23
3430	19.68	42.25	23.53	15.58	6.54	0.07	29.56	16.17	1.25
3440	19.69	42.19	23.09	15.66	6.49	0.07	29.66	16.21	1.28
3450	19.70	42.11	22.70	15.74	6.42	0.07	29.72	16.20	1.31
3460	19.72	42.04	22.22	15.82	6.36	0.07	29.70	16.20	1.28
3470	19.74	41.98	21.74	15.91	6.30	0.07	29.72	16.24	1.31
3480	19.74	41.91	21.33	16.01	6.24	0.07	29.75	16.22	1.32
3490	19.76	41.82	20.90	16.11	6.16	0.07	29.79	16.17	1.33
3500	19.77	41.77	20.47	16.21	6.12	0.07	29.82	16.11	1.27
3520	19.80	41.62	19.63	16.43	5.99	0.07	29.84	16.28	1.27
3530	19.81	41.55	19.26	16.54	5.93	0.07	29.83	16.36	1.24
3540	19.83	41.49	18.88	16.64	5.88	0.07	29.93	16.40	1.28
3550	19.84	41.40	18.48	16.75	5.81	0.07	29.98	16.43	1.26
3560	19.85	41.35	18.08	16.86	5.76	0.07	29.99	16.43	1.33
3570	19.87	41.26	17.72	16.97	5.69	0.08	30.00	16.37	1.37
3580	19.88	41.19	17.34	17.09	5.63	0.08	30.01	16.31	1.43
3590	19.89	41.13	16.99	17.21	5.57	0.08	30.04	16.33	1.43
3600	19.90	41.06	16.61	17.34	5.52	0.08	29.93	16.42	1.33
3700	20.00	40.38	13.41	18.57	4.95	0.08	30.44	16.77	1.36
3800	20.03	39.77	10.79	19.32	4.43	0.09	30.37	16.77	1.45
3900	19.96	39.25	8.65	18.99	3.96	0.10	30.29	16.75	1.38
4000	19.74	38.89	6.94	17.91	3.59	0.10	30.08	16.92	1.33
4100	19.40	38.64	5.65	16.70	3.29	0.11	29.95	16.44	1.44
4200	18.89	38.57	4.68	15.73	3.10	0.11	29.94	16.14	1.53
4300	18.30	38.56	4.00	15.09	2.99	0.10	29.83	15.93	1.56
4400	17.64	38.64	3.53	14.77	2.98	0.10	29.77	15.63	1.73

Typical Performance Curves

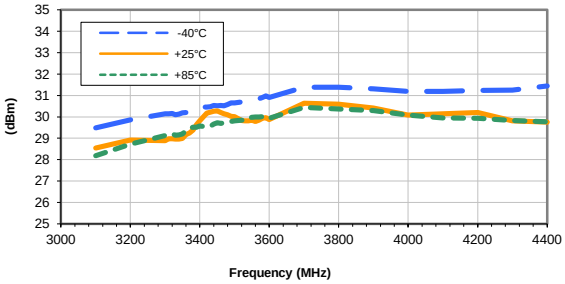
GAIN vs. FREQUENCY & TEMPERATURE

INPUT POWER = -25, VOLTAGE = 5V



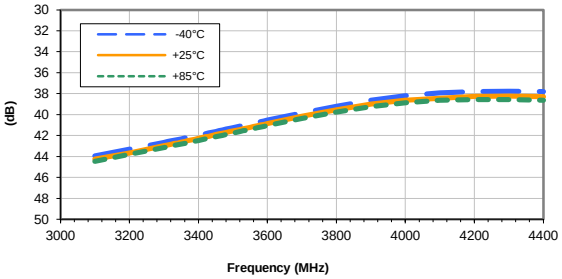
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE

INPUT POWER = -25, VOLTAGE = 5V



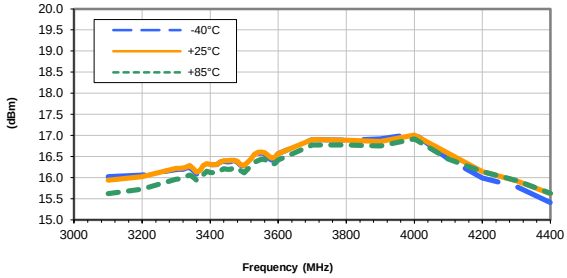
ISOLATION vs. FREQUENCY & TEMPERATURE

INPUT POWER = -25, VOLTAGE = 5V



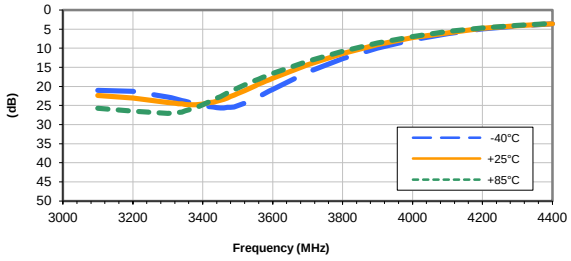
OUTPUT POWER at 1dB COMPRESSION vs. FREQUENCY & TEMPERATURE

VOLTAGE = 5V



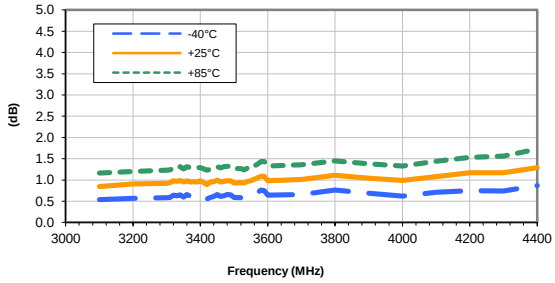
INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE

INPUT POWER = -25, VOLTAGE = 5V



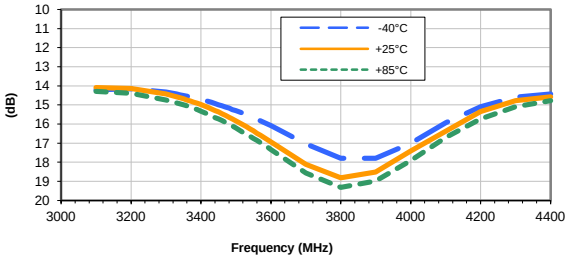
NOISE FIGURE vs. FREQUENCY & TEMPERATURE

VOLTAGE = 5V



OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE

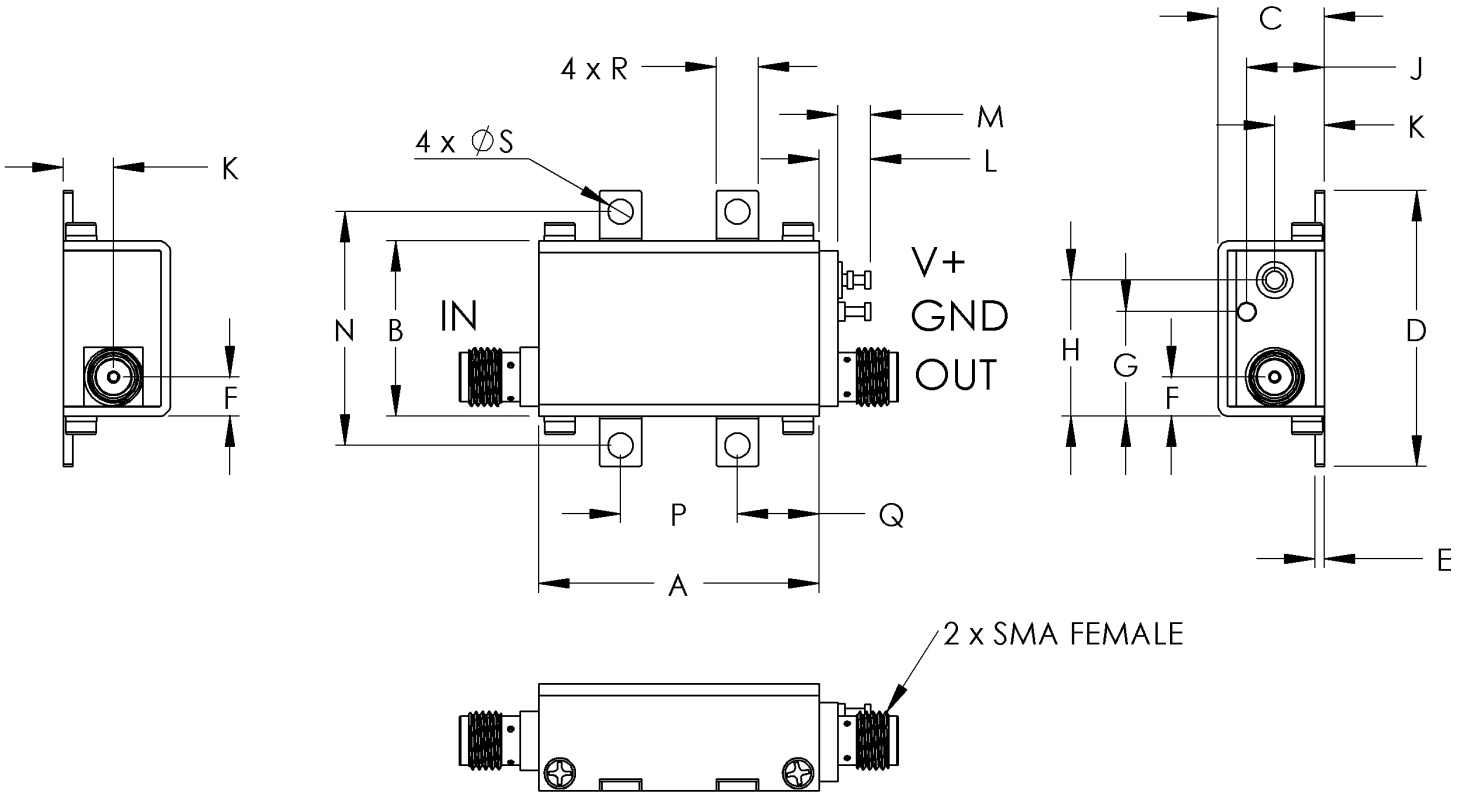
INPUT POWER = -25, VOLTAGE = 5V



Case Style GA

Outline Dimensions

GA955



CASE #.	A	B	C	D	E	F	G	H	J	K	L	M	N
GA955	1.20 (30.48)	.75 (19.05)	.46 (11.61)	1.18 (29.97)	.04 (1.02)	.17 (4.27)	.45 (11.35)	.58 (14.81)	.33 (8.46)	.21 (5.44)	.22 (5.59)	.14 (3.56)	1.000 (25.4)

CASE #.	P	Q	R	S	WT GRAMS
GA955	.500 (12.70)	.35 (8.89)	.18 (4.57)	.106 (2.69)	35.0

Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3Pl. ± .015
Tolerance on hole size and interaxes dimensions to be ± .005.

Note:

1. Case material: Brass
2. Case finish: Nickel plate

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
*Mini-Circuits **ISO 9001 & ISO 14001** Certified*

Mini-Circuits

Environmental Specifications ENV23T10

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	-40° to 85° C Case 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 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