Coaxial

Low Noise Amplifier

ZX60-362LN-S+

50Ω 3300 to 3600 MHz

Features

- Ultra low noise figure, 0.9 dB typ.
- Output power, up to +10.5 dBm typ.
- Good output IP3, 22 dBm typ.
- Low current consumption, 20mA 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	ZX60-362LN-S+

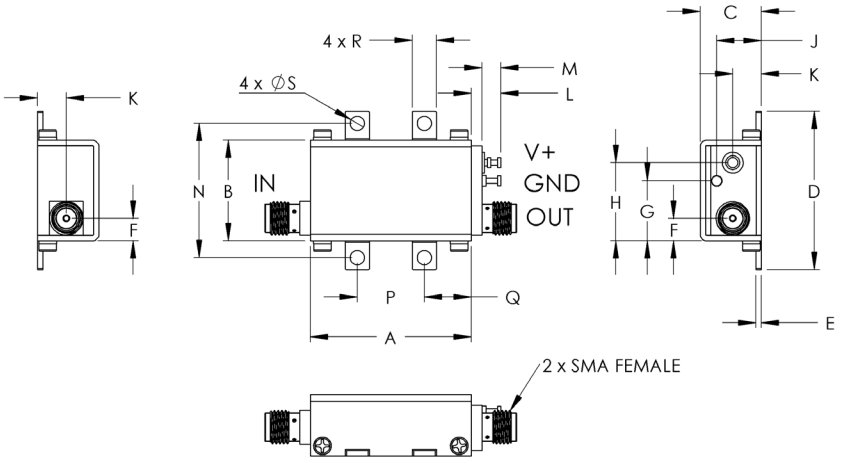
+RoHS Compliant

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	9.0	11.5		dB
Gain Flatness	3300-3600		± 0.5	± 1.0	dB
Output Power at 1dB compression	3300-3600	8.5	10.5		dBm
Output third order intercept point	3300-3600		22		dBm
Input VSWR	3300-3600		1.4		:1
Output VSWR	3300-3600		1.4		:1
Active Directivity	3300-3600		8		dB
DC Supply Voltage			5		V
Supply Current			20	30	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)	0 dBm
Power Consumption	165 mW

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

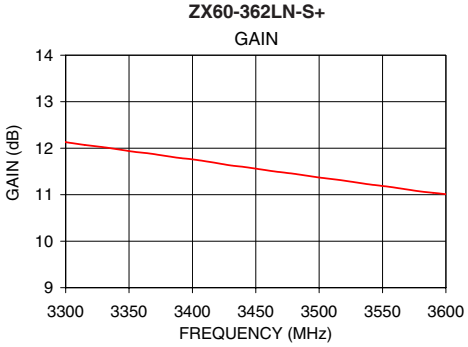
Outline Dimensions (inch / mm)

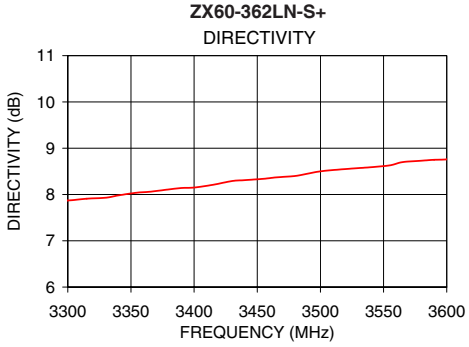
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	wt.
1.20	.75	.46	1.18	.04	.17	.45	.59	.33	.21	.22	.14	1.00	.50	.35	.18	.106	grams
30.48	19.05	11.68	29.97	1.02	4.32	11.43	14.99	8.38	5.33	5.59	3.56	25.40	12.70	8.89	4.57	2.69	35.0

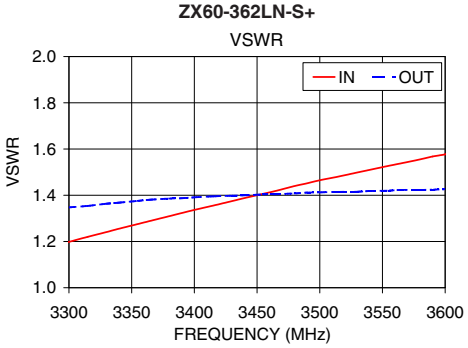
Notes

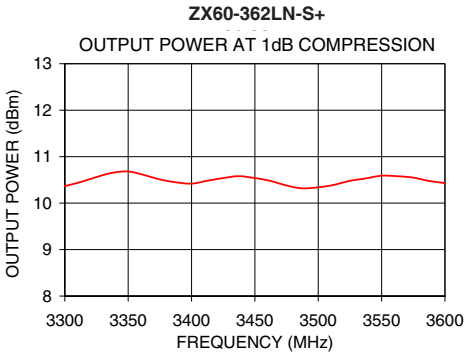
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's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

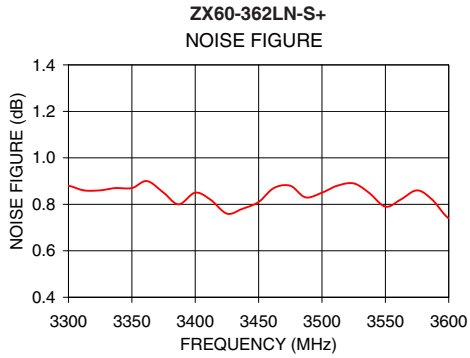
FREQUENCY (MHz)	GAIN (dB)	DIRECTIVITY (dB)	VSWR IN (:1)	VSWR OUT (:1)	POWER OUT @ 1dB COMPRESSION (dBm)	OUTPUT IP3 (dBm)	NF (dB)
3300.00	12.13	7.87	1.20	1.35	10.37	23.09	0.88
3320.00	12.06	7.93	1.23	1.36	10.51	22.80	0.86
3340.00	11.98	7.98	1.26	1.37	10.64	22.23	0.86
3360.00	11.91	8.03	1.28	1.38	10.63	22.50	0.90
3380.00	11.83	8.11	1.31	1.39	10.49	22.42	0.84
3400.00	11.76	8.15	1.34	1.39	10.42	22.16	0.85
3415.00	11.70	8.21	1.36	1.40	10.49	21.86	0.82
3420.00	11.68	8.24	1.36	1.40	10.52	22.34	0.79
3440.00	11.60	8.31	1.39	1.40	10.58	23.13	0.79
3450.00	11.56	8.34	1.40	1.40	10.54	22.23	0.81
3460.00	11.53	8.35	1.41	1.41	10.50	22.32	0.87
3470.00	11.48	8.37	1.43	1.41	10.43	22.17	0.88
3480.00	11.45	8.40	1.44	1.41	10.35	22.36	0.84
3500.00	11.37	8.50	1.46	1.41	10.34	22.44	0.85
3515.00	11.32	8.54	1.48	1.41	10.43	21.87	0.89
3520.00	11.30	8.53	1.49	1.42	10.45	21.97	0.88
3540.00	11.22	8.59	1.51	1.42	10.55	23.11	0.84
3560.00	11.15	8.65	1.53	1.42	10.57	22.52	0.81
3580.00	11.07	8.73	1.56	1.42	10.50	22.36	0.86
3600.00	11.01	8.76	1.58	1.43	10.43	22.77	0.74

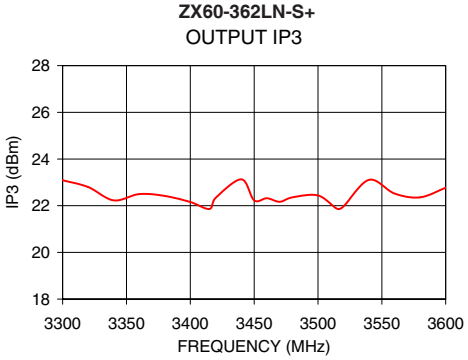












Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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 = 18mA, 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)
2600	8.64	26.90	1.76	6.68	1.50	0.50	20.21	8.94	2.26
2650	9.04	26.21	2.02	6.93	1.49	0.49	20.19	9.11	2.04
2700	9.43	25.53	2.33	7.22	1.48	0.49	20.40	9.42	1.86
2750	9.81	24.88	2.70	7.56	1.47	0.48	20.67	9.74	1.76
2800	10.16	24.25	3.13	7.94	1.46	0.47	21.00	10.01	1.61
2825	10.33	23.95	3.37	8.15	1.46	0.47	21.06	10.10	1.47
2850	10.49	23.65	3.64	8.37	1.46	0.47	21.03	10.18	1.47
2900	10.79	23.08	4.23	8.87	1.45	0.46	21.21	10.38	1.27
2950	11.06	22.55	4.93	9.43	1.45	0.46	21.42	10.57	1.29
3000	11.29	22.06	5.76	10.07	1.45	0.45	21.70	10.63	1.14
3050	11.49	21.61	6.74	10.80	1.44	0.44	21.82	10.77	1.25
3100	11.64	21.22	7.89	11.62	1.44	0.44	22.13	10.92	1.21
3150	11.75	20.86	9.23	12.54	1.44	0.43	22.14	10.87	1.07
3200	11.81	20.56	10.82	13.59	1.44	0.42	22.69	10.95	1.10
3250	11.83	20.29	12.65	14.76	1.44	0.42	22.85	10.75	0.91
3275	11.83	20.18	13.69	15.39	1.44	0.41	22.71	11.01	1.05
3300	11.82	20.08	14.77	16.07	1.44	0.41	23.15	10.96	0.90
3350	11.76	19.90	16.84	17.50	1.44	0.41	23.31	10.74	0.84
3400	11.67	19.75	18.16	19.15	1.44	0.40	23.43	10.64	0.74
3450	11.56	19.64	17.86	20.93	1.44	0.40	23.87	10.58	0.80
3500	11.42	19.55	16.36	22.86	1.43	0.39	23.82	10.67	0.76
3550	11.26	19.49	14.63	24.88	1.43	0.39	23.88	10.28	0.84
3600	11.09	19.45	13.07	26.62	1.43	0.38	23.81	10.48	0.95
3650	10.90	19.42	11.76	27.51	1.43	0.38	23.71	10.16	0.94
3700	10.70	19.40	10.67	27.17	1.43	0.37	23.55	10.11	0.91
3750	10.50	19.40	9.76	26.15	1.43	0.37	23.62	10.07	0.80
3800	10.30	19.40	9.00	24.94	1.43	0.37	23.41	9.71	0.88
3850	10.09	19.40	8.34	23.81	1.43	0.36	23.51	9.91	0.89
3900	9.88	19.40	7.79	22.75	1.44	0.36	23.19	9.70	1.01
3950	9.67	19.41	7.32	21.84	1.44	0.36	23.08	9.58	1.09
4000	9.47	19.42	6.90	21.05	1.44	0.36	23.03	9.12	1.05
4050	9.26	19.43	6.54	20.39	1.44	0.35	23.08	9.38	1.12
4100	9.06	19.44	6.22	19.78	1.44	0.35	22.95	8.98	1.13
4150	8.87	19.44	5.95	19.27	1.45	0.35	23.06	8.93	1.20
4200	8.67	19.44	5.71	18.81	1.45	0.35	23.02	8.78	1.29
4250	8.48	19.44	5.49	18.41	1.45	0.35	22.92	8.44	1.38
4300	8.29	19.43	5.30	18.05	1.46	0.34	22.65	8.59	1.59
4400	7.93	19.42	4.99	17.45	1.47	0.34	22.78	8.06	1.48

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 = 17mA, 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)
2600	8.86	27.06	1.57	6.22	1.40	0.53	20.93	9.13	1.76
2650	9.25	26.38	1.81	6.44	1.40	0.52	21.16	9.31	1.63
2700	9.63	25.71	2.09	6.71	1.39	0.52	21.33	9.58	1.44
2750	10.02	25.04	2.41	7.01	1.38	0.51	21.44	9.87	1.29
2800	10.38	24.40	2.80	7.37	1.38	0.51	21.76	10.07	1.27
2825	10.55	24.09	3.01	7.57	1.38	0.50	21.79	10.17	1.17
2850	10.71	23.79	3.26	7.78	1.38	0.50	21.85	10.31	1.06
2900	11.03	23.20	3.80	8.28	1.38	0.49	22.32	10.42	0.98
2950	11.32	22.64	4.44	8.83	1.37	0.49	22.48	10.68	0.89
3000	11.59	22.12	5.22	9.46	1.37	0.48	22.60	10.77	0.86
3050	11.81	21.65	6.12	10.20	1.37	0.47	22.88	10.90	0.89
3100	11.98	21.23	7.21	11.02	1.37	0.47	23.15	11.02	0.58
3150	12.11	20.85	8.46	11.92	1.37	0.46	23.22	10.99	0.74
3200	12.19	20.52	9.93	12.95	1.37	0.45	23.68	11.06	0.66
3250	12.23	20.24	11.52	14.06	1.37	0.45	23.81	10.89	0.50
3275	12.23	20.11	12.48	14.66	1.37	0.45	23.99	11.15	0.60
3300	12.22	20.00	13.46	15.35	1.37	0.44	24.15	11.05	0.69
3350	12.19	19.80	15.37	16.69	1.37	0.44	24.40	10.88	0.55
3400	12.11	19.64	16.97	18.24	1.37	0.43	24.50	10.74	0.50
3450	12.01	19.52	17.51	20.04	1.37	0.43	24.71	10.69	0.53
3500	11.89	19.41	16.79	21.93	1.37	0.42	25.02	10.80	0.48
3550	11.74	19.34	15.14	23.92	1.37	0.42	24.87	10.42	0.58
3600	11.57	19.29	13.46	25.51	1.37	0.41	25.33	10.67	0.64
3650	11.39	19.25	12.06	26.04	1.37	0.41	24.78	10.45	0.65
3700	11.20	19.23	10.94	25.60	1.37	0.41	24.44	10.34	0.52
3750	11.00	19.21	10.03	24.88	1.36	0.40	24.30	10.29	0.53
3800	10.81	19.20	9.25	23.92	1.36	0.40	24.73	9.97	0.59
3850	10.61	19.19	8.61	23.24	1.36	0.40	24.41	10.10	0.56
3900	10.42	19.18	8.06	22.37	1.36	0.39	24.22	10.03	0.78
3950	10.22	19.18	7.57	21.67	1.36	0.39	23.93	9.97	0.61
3975	10.12	19.19	7.34	21.32	1.36	0.39	23.82	10.00	0.80
4000	10.02	19.19	7.11	20.90	1.36	0.39	23.78	9.49	0.72
4050	9.82	19.20	6.72	20.30	1.36	0.38	23.69	9.79	0.73
4100	9.63	19.19	6.41	19.71	1.36	0.38	23.96	9.38	0.60
4150	9.44	19.18	6.15	19.19	1.36	0.38	24.12	9.35	0.90
4200	9.26	19.18	5.91	18.80	1.37	0.38	23.70	9.19	0.64
4250	9.08	19.17	5.69	18.33	1.37	0.37	23.92	8.88	0.92
4300	8.91	19.15	5.51	18.03	1.37	0.37	23.55	8.95	1.04
4400	8.55	19.12	5.19	17.38	1.38	0.37	23.34	8.42	1.08

Typical Performance Data

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

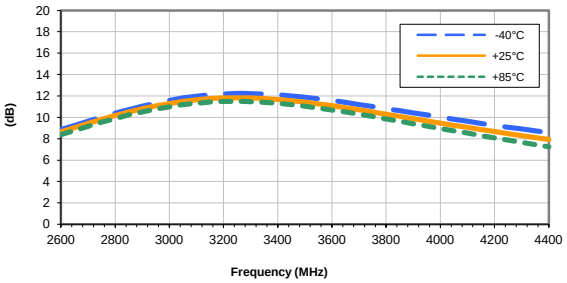
TEST CONDITIONS: I = 18mA, Vd = 5V @Temperature = +85degC

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)
2600	8.37	26.86	1.89	6.95	1.59	0.48	19.50	8.69	2.79
2650	8.78	26.18	2.16	7.24	1.58	0.47	19.76	8.85	2.57
2700	9.16	25.50	2.49	7.57	1.57	0.46	19.95	9.20	2.39
2750	9.54	24.86	2.87	7.95	1.55	0.46	20.02	9.55	2.18
2800	9.89	24.24	3.32	8.38	1.54	0.45	20.24	9.88	2.11
2825	10.05	23.93	3.58	8.62	1.54	0.45	20.32	9.94	1.99
2850	10.22	23.64	3.86	8.88	1.54	0.44	20.40	9.99	1.85
2900	10.51	23.08	4.48	9.44	1.53	0.43	20.71	10.25	1.75
2950	10.77	22.57	5.20	10.08	1.52	0.43	20.68	10.42	1.62
3000	10.99	22.09	6.06	10.79	1.52	0.42	21.05	10.49	1.59
3050	11.18	21.65	7.07	11.64	1.51	0.41	21.28	10.61	1.56
3100	11.32	21.27	8.26	12.56	1.51	0.41	21.52	10.77	1.32
3150	11.42	20.93	9.66	13.61	1.51	0.40	21.64	10.70	1.44
3200	11.48	20.63	11.34	14.81	1.51	0.39	22.06	10.82	1.32
3250	11.49	20.38	13.28	16.10	1.50	0.39	22.34	10.60	1.18
3275	11.48	20.27	14.43	16.81	1.50	0.39	22.33	10.82	1.21
3300	11.47	20.17	15.66	17.60	1.50	0.38	22.46	10.83	1.32
3350	11.40	20.00	18.06	19.20	1.50	0.38	22.79	10.55	1.18
3400	11.31	19.87	19.52	21.04	1.50	0.37	22.96	10.51	1.14
3450	11.19	19.76	18.91	23.15	1.50	0.37	23.15	10.43	1.16
3500	11.04	19.69	17.10	25.39	1.50	0.36	23.42	10.47	1.14
3550	10.87	19.64	15.07	28.24	1.50	0.36	23.40	10.11	1.25
3600	10.69	19.61	13.37	31.81	1.50	0.35	23.51	10.25	1.33
3650	10.49	19.59	12.01	36.28	1.51	0.35	23.32	9.91	1.31
3700	10.29	19.58	10.88	44.61	1.51	0.34	23.03	9.88	1.19
3750	10.08	19.58	9.96	53.42	1.51	0.34	23.11	9.84	1.19
3800	9.86	19.60	9.14	40.14	1.51	0.33	23.01	9.47	1.29
3850	9.63	19.62	8.46	35.77	1.52	0.32	22.99	9.60	1.23
3900	9.41	19.64	7.88	32.52	1.52	0.32	22.74	9.34	1.47
3950	9.19	19.66	7.40	30.30	1.53	0.31	22.66	9.21	1.35
3975	9.07	19.67	7.17	29.34	1.53	0.31	22.56	9.28	1.48
4000	8.96	19.68	6.96	28.38	1.53	0.31	22.50	8.78	1.51
4050	8.74	19.71	6.56	26.81	1.53	0.30	22.62	8.98	1.44
4100	8.52	19.73	6.22	25.27	1.54	0.30	22.48	8.58	1.42
4150	8.30	19.76	5.93	23.95	1.55	0.29	22.48	8.51	1.66
4200	8.08	19.78	5.66	22.83	1.55	0.29	22.44	8.37	1.43
4250	7.86	19.81	5.41	21.68	1.56	0.29	22.32	8.01	1.79
4300	7.65	19.83	5.19	20.70	1.57	0.29	22.41	8.23	1.77
4400	7.23	19.86	4.81	18.86	1.58	0.29	22.09	7.72	1.86

Typical Performance Curves

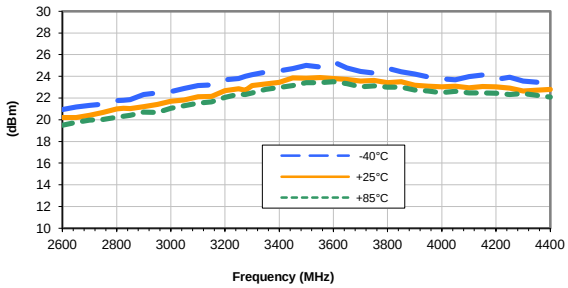
GAIN vs. TEMPERATURE

INPUT POWER = -25, VOLTAGE = 5V



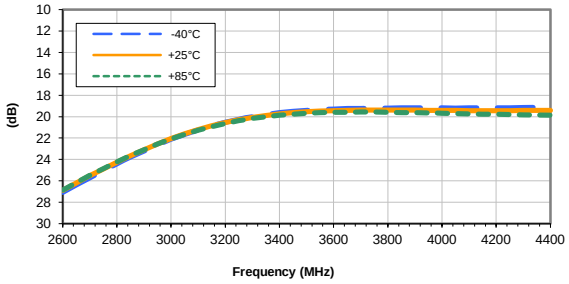
OUTPUT IP3 vs. TEMPERATURE

INPUT POWER = -25, VOLTAGE = 5V



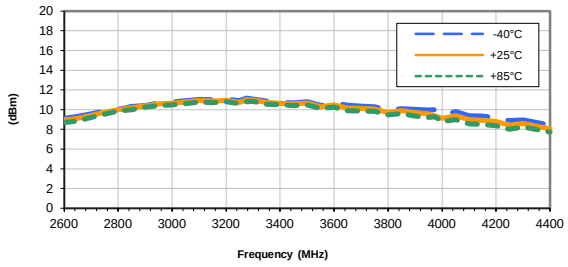
ISOLATION vs. TEMPERATURE

INPUT POWER = -25, VOLTAGE = 5V



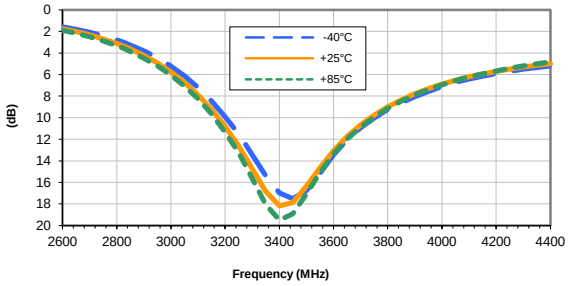
OUTPUT POWER at 1dB Compression vs. TEMPERATURE

VOLTAGE = 5V



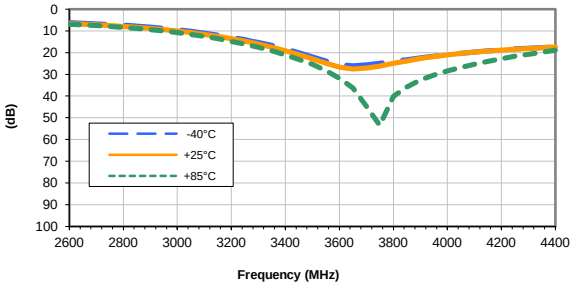
INPUT RETURN LOSS vs. TEMPERATURE

INPUT POWER = -25, VOLTAGE = 5V



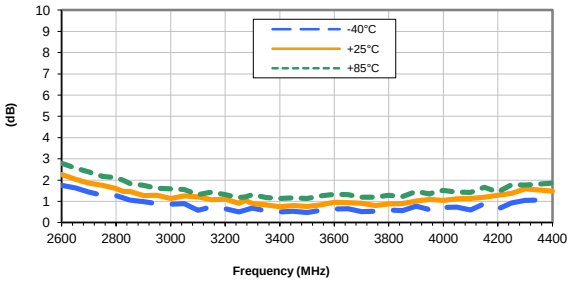
OUTPUT RETURN LOSS vs. TEMPERATURE

INPUT POWER = -25, VOLTAGE = 5V



Noise Figure vs. TEMPERATURE

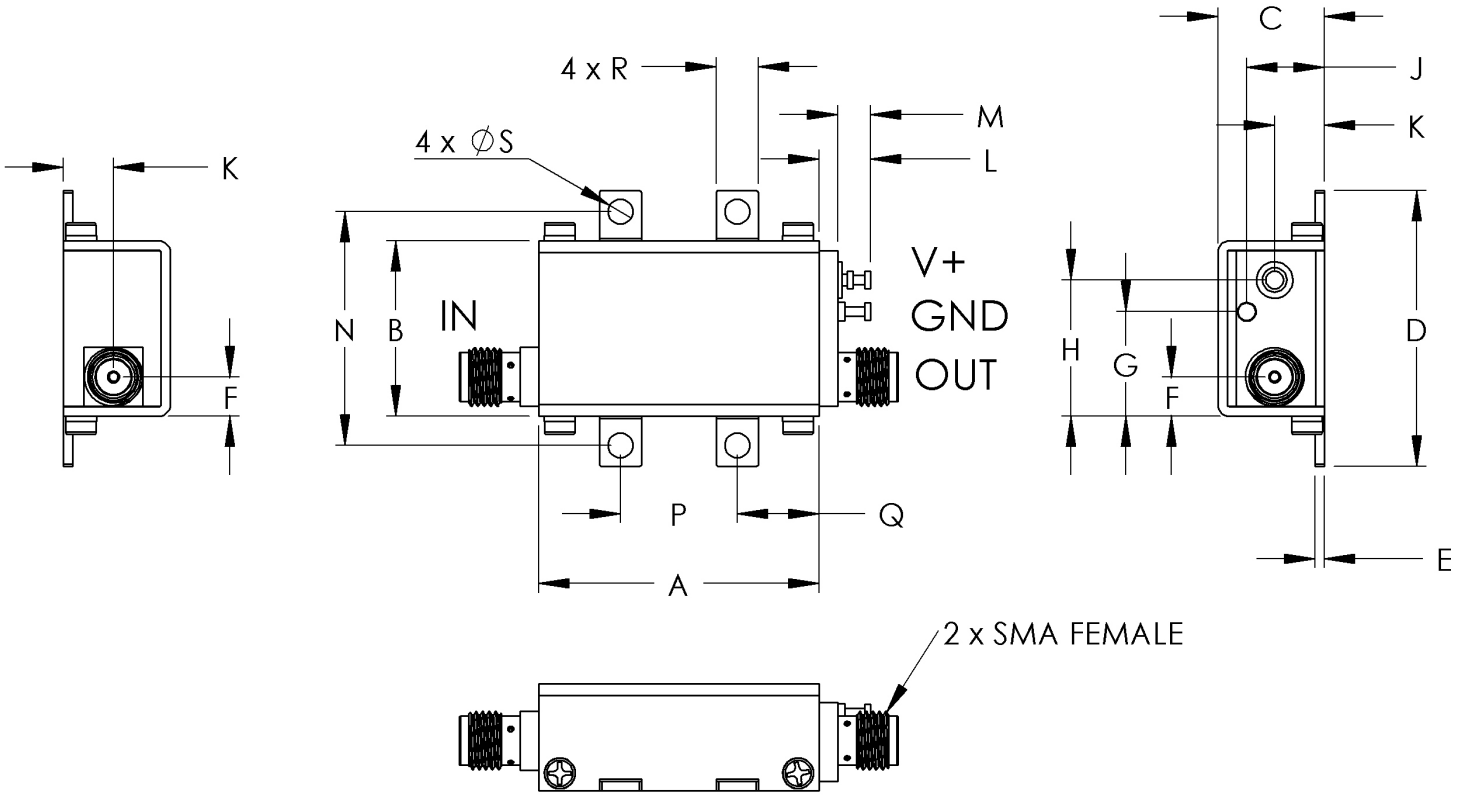
VOLTAGE = 5V



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