Coaxial

Low Noise Amplifier

ZX60-242GLN-S+

50Ω 1710 to 2400 MHz

Features

- Ultra low noise figure, 0.85 dB typ.
- High gain, 30 dB typ.
- Output power, up to +20 dBm typ.
- Good output IP3, 36.5 dBm typ.
- Unconditionally stable
- Protected by US patent 6,790,049

Applications

- Base transceiver station, tower mounted amplifier, repeater
- WCDMA
- TD SCDMA
- PCS Rx / PCS Tx
- General purpose low noise amplifier
- Lab
- Instrumentation
- Test equipment

CASE STYLE: GA955

Connectors	Model
SMA	ZX60-242GLN-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		1710		2400	MHz
Noise Figure	1710 - 1880		0.80	1.05	dB
	1850 - 1990		0.80	1.05	
	1990 - 2200		0.90	1.10	
	2200 - 2400		0.90	1.20	
Gain	1710 - 1880	28.0	31.0		dB
	1850 - 1990	28.0	30.5		
	1990 - 2200	26.5	29.5		
	2200 - 2400	25.5	28.0		
Gain Flatness	1710 - 1880		± 0.60	± 1.20	dB
	1850 - 1990		± 0.50	± 1.00	
	1990 - 2200		± 0.70	± 1.40	
	2200 - 2400		± 0.65	± 1.30	
Output Power at 1dB compression	1710 - 1880	18.0	20.0		dBm
	1850 - 1990	18.0	20.0		
	1990 - 2200	18.0	20.5		
	2200 - 2400	18.5	21.0		
Output third order intercept point	1710 - 1880		36		dBm
	1850 - 1990		36		
	1990 - 2200		37		
	2200 - 2400		37		
Input VSWR	1710 - 1880		1.4		:1
	1850 - 1990		1.3		
	1990 - 2200		1.2		
	2200 - 2400		1.7		
Output VSWR	1710 - 1880		1.3		:1
	1850 - 1990		1.3		
	1990 - 2200		1.5		
	2200 - 2400		1.7		
Active Directivity	1710-2400		11.5		dB
DC Supply Voltage			5.0		V
Supply Current			120	150	mA

Notes

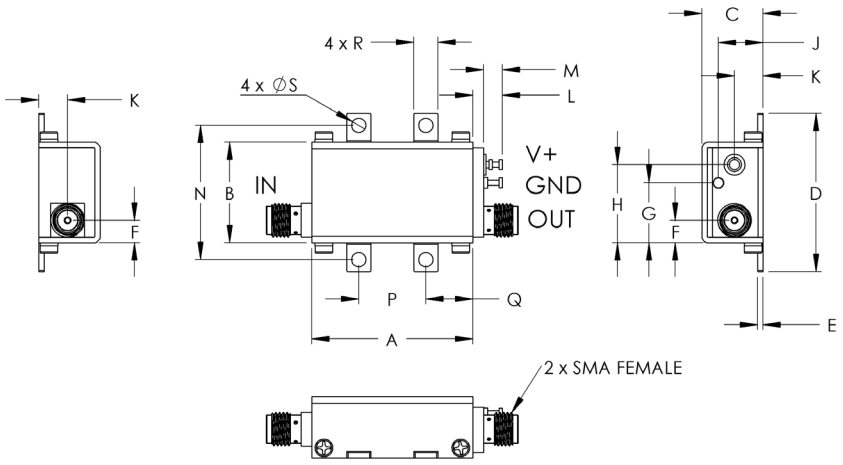
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's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

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)	+17 dBm
Power Consumption	825 mW

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

Outline Drawing

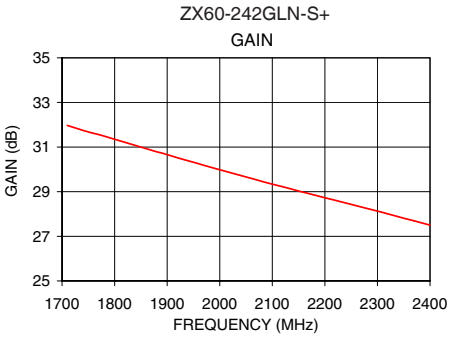


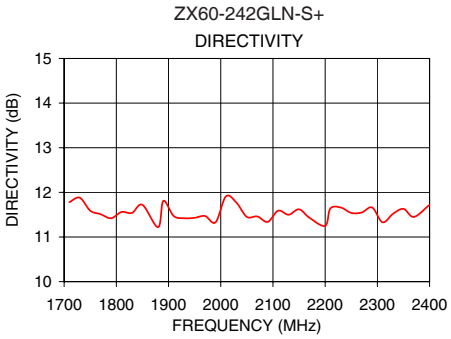
NOTE: When soldering the DC connections, caution must be used to avoid overheating the DC terminals. See Application Note AN-40-10 .

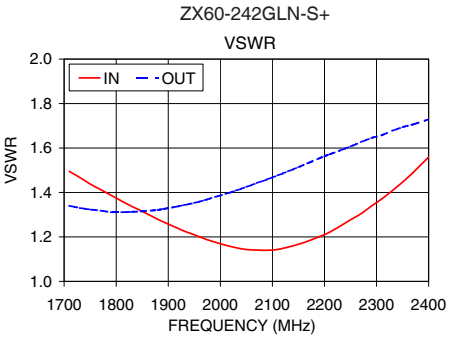
Outline Dimensions (inch / mm)

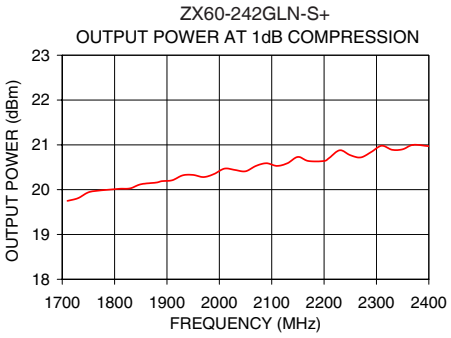
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	wt.
1.20	.75	.46	1.18	.04	.17	.45	.59	.33	.21	.22	.14	1.00	.50	.35	.18	.106	grams
30.48	19.05	11.68	29.97	1.02	4.32	11.43	14.99	8.38	5.33	5.59	3.56	25.40	12.70	8.89	4.57	2.69	35.0

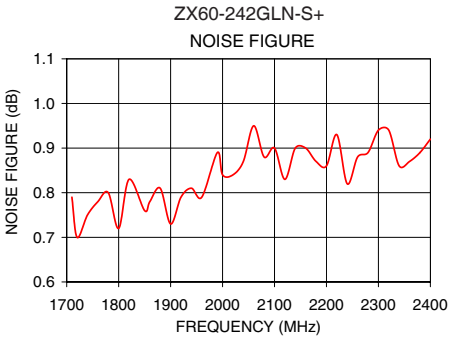
FREQUENCY (MHz)	GAIN (dB)	DIRECTIVITY (dB)	VSWR IN (:1)	VSWR OUT (:1)	POWER OUT @ 1dB COMPRESSION (dBm)	OUTPUT IP3 (dBm)	NF (dB)
1710.00	31.97	11.78	1.49	1.34	19.75	35.52	0.79
1750.00	31.68	11.59	1.44	1.32	19.94	35.65	0.77
1800.00	31.35	11.52	1.38	1.31	20.00	35.59	0.72
1850.00	31.00	11.72	1.32	1.32	20.12	35.86	0.76
1880.00	30.79	11.22	1.28	1.32	20.16	36.17	0.81
1900.00	30.66	11.28	1.26	1.33	20.21	36.29	0.73
1950.00	30.32	11.43	1.21	1.35	20.33	36.62	0.80
1990.00	30.05	11.33	1.18	1.38	20.35	36.98	0.89
2040.00	29.73	11.88	1.15	1.42	20.41	37.15	0.87
2060.00	29.60	11.50	1.14	1.43	20.45	37.00	0.95
2100.00	29.35	11.54	1.14	1.47	20.56	37.23	0.90
2140.00	29.09	11.53	1.16	1.51	20.68	37.23	0.90
2180.00	28.85	11.36	1.19	1.54	20.60	37.44	0.87
2200.00	28.73	11.25	1.21	1.56	20.64	37.37	0.86
2260.00	28.37	11.50	1.29	1.62	20.72	37.31	0.88
2300.00	28.12	11.35	1.35	1.65	20.90	37.52	0.94
2320.00	28.00	11.66	1.39	1.67	20.93	37.29	0.94
2360.00	27.75	11.73	1.47	1.70	20.95	37.42	0.87
2380.00	27.63	11.76	1.51	1.72	20.98	37.18	0.89
2400.00	27.50	11.72	1.56	1.73	20.97	37.63	0.92

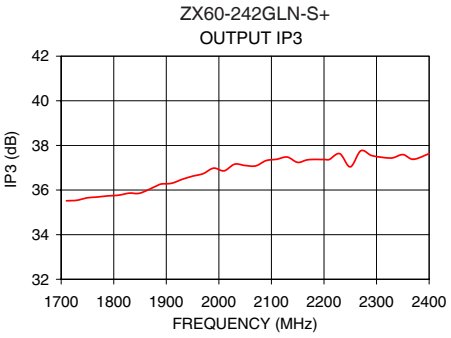












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Typical Performance Data

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 = 119mA, Vd = 5V @Temperature = +25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP3 Output	1dB Comp. Output	FREQ	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(dBm)	(dBm)	(MHz)	(dB)
1200	34.62	49.14	7.20	7.77	1.77	0.15	28.75	16.49	1000	0.76
1300	34.24	47.94	7.99	9.04	1.81	0.17	32.39	17.40	1050	0.77
1400	33.73	46.82	8.87	10.52	1.85	0.20	34.52	18.02	1100	0.80
1500	33.16	45.80	9.82	12.15	1.89	0.22	35.39	18.34	1150	0.73
1600	32.53	44.89	10.93	13.86	1.94	0.23	35.63	18.96	1200	0.75
1700	31.88	44.06	12.27	15.43	1.97	0.24	35.45	19.54	1250	0.79
1710	31.83	43.95	12.40	15.60	1.97	0.24	35.36	19.37	1300	0.70
1720	31.76	43.88	12.57	15.77	1.97	0.24	35.29	19.26	1350	0.73
1750	31.56	43.63	13.08	16.18	1.98	0.24	35.32	19.67	1400	0.73
1780	31.38	43.41	13.57	16.46	1.98	0.24	35.27	19.63	1450	0.73
1800	31.25	43.25	13.89	16.68	1.99	0.25	35.25	19.55	1500	0.74
1820	31.13	43.10	14.29	16.92	1.99	0.25	35.24	19.88	1550	0.80
1850	30.94	42.88	14.91	17.22	2.00	0.25	35.14	19.57	1600	0.76
1880	30.75	42.67	15.61	17.27	2.00	0.25	35.26	20.05	1650	0.84
1900	30.63	42.53	16.03	17.19	2.00	0.25	35.26	19.83	1700	0.78
1920	30.51	42.38	16.51	17.17	2.00	0.25	35.18	19.91	1750	0.83
1950	30.33	42.16	17.35	17.21	2.00	0.25	35.10	19.92	1800	0.85
1990	30.09	41.89	18.60	16.96	2.00	0.25	35.13	20.12	1850	0.81
2000	30.03	41.83	18.89	16.83	2.00	0.25	35.17	20.25	1880	0.87
2020	29.91	41.68	19.59	16.61	2.00	0.25	35.12	20.05	1900	0.87
2050	29.74	41.48	20.62	16.38	2.00	0.26	35.10	20.20	1950	0.85
2080	29.57	41.29	21.97	16.12	2.00	0.26	35.09	20.18	2000	0.92
2100	29.45	41.16	22.82	15.83	1.99	0.26	35.11	20.26	2050	0.90
2120	29.34	41.03	23.67	15.54	1.99	0.26	35.12	20.36	2100	0.94
2150	29.18	40.88	24.66	15.23	1.99	0.26	35.10	20.30	2150	0.97
2180	29.01	40.67	25.15	14.90	1.98	0.27	35.12	20.33	2200	1.00
2200	28.90	40.53	24.95	14.64	1.97	0.27	35.16	20.45	2250	0.95
2250	28.63	40.26	23.06	14.06	1.97	0.28	35.18	20.32	2350	0.98
2280	28.46	40.09	21.53	13.74	1.96	0.28	35.17	20.65	2400	1.03
2300	28.36	40.01	20.44	13.50	1.96	0.28	35.14	20.62	2450	0.97
2350	28.07	39.72	17.98	13.00	1.94	0.29	35.17	20.82	2550	1.13
2380	27.91	39.57	16.65	12.81	1.94	0.29	35.22	20.38	2600	1.08
2400	27.80	39.48	15.78	12.61	1.93	0.29	35.17	20.78	2650	1.24
2500	27.20	39.05	12.24	11.96	1.90	0.30	35.06	20.73	2700	1.26
2600	26.53	38.72	9.40	11.59	1.86	0.31	34.91	20.72	2750	1.33
2700	25.73	38.56	7.09	11.47	1.82	0.31	34.56	20.68	2800	1.29
2800	24.75	38.61	5.22	11.74	1.79	0.30	34.11	20.55	2900	1.45
2900	23.58	38.85	3.75	12.23	1.75	0.29	33.56	20.23	3000	1.60

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 = 119mA, Vd = 5V @Temperature = -40degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP3 Output	1dB Comp. Output	FREQ	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(dBm)	(dBm)	(MHz)	(dB)
1200	35.61	48.93	6.97	6.87	1.42	0.14	25.65	16.21	1000	0.56
1300	35.28	47.71	7.79	7.99	1.48	0.17	28.69	17.13	1050	0.56
1400	34.78	46.63	8.78	9.26	1.55	0.21	32.11	17.78	1100	0.57
1500	34.19	45.66	9.86	10.63	1.62	0.24	34.42	18.11	1150	0.53
1600	33.53	44.72	11.08	12.12	1.68	0.26	35.79	18.83	1200	0.53
1700	32.85	43.87	12.63	13.49	1.73	0.27	36.36	19.50	1250	0.55
1710	32.79	43.80	12.79	13.63	1.73	0.27	36.33	19.28	1300	0.46
1720	32.72	43.71	12.98	13.76	1.74	0.27	36.33	19.19	1350	0.49
1750	32.51	43.45	13.56	14.09	1.75	0.27	36.54	19.68	1400	0.46
1780	32.32	43.22	14.07	14.37	1.75	0.28	36.56	19.61	1450	0.49
1800	32.19	43.09	14.46	14.60	1.77	0.28	36.62	19.53	1500	0.47
1820	32.05	42.95	14.90	14.81	1.77	0.28	36.63	19.92	1550	0.53
1850	31.86	42.70	15.56	15.10	1.78	0.28	36.56	19.55	1600	0.52
1880	31.64	42.48	16.32	15.21	1.79	0.28	36.72	20.09	1650	0.57
1900	31.51	42.34	16.78	15.20	1.79	0.28	36.76	19.83	1700	0.52
1920	31.38	42.21	17.30	15.24	1.79	0.28	36.68	19.94	1750	0.54
1950	31.18	42.01	18.19	15.29	1.80	0.28	36.62	19.96	1800	0.56
1990	30.92	41.75	19.42	15.20	1.81	0.28	36.75	20.19	1850	0.51
2000	30.86	41.67	19.70	15.15	1.81	0.29	36.73	20.31	1880	0.58
2020	30.73	41.53	20.41	15.06	1.81	0.29	36.61	20.05	1900	0.57
2050	30.54	41.33	21.33	14.95	1.81	0.29	36.53	20.25	1950	0.55
2080	30.35	41.15	22.54	14.87	1.81	0.29	36.52	20.20	2000	0.65
2100	30.23	41.00	23.13	14.75	1.81	0.29	36.54	20.30	2050	0.61
2120	30.11	40.88	23.61	14.59	1.81	0.29	36.53	20.41	2100	0.61
2150	29.94	40.70	24.07	14.41	1.81	0.30	36.48	20.32	2150	0.65
2180	29.76	40.52	23.97	14.23	1.81	0.30	36.49	20.37	2200	0.69
2200	29.65	40.38	23.61	14.09	1.80	0.30	36.52	20.51	2250	0.64
2220	29.54	40.26	22.98	13.93	1.80	0.30	36.51	20.70	2300	0.66
2250	29.37	40.10	21.79	13.72	1.80	0.31	36.48	20.32	2350	0.64
2280	29.20	39.94	20.46	13.52	1.79	0.31	36.44	20.70	2400	0.69
2300	29.09	39.81	19.54	13.37	1.79	0.31	36.37	20.65	2450	0.61
2350	28.79	39.54	17.49	12.98	1.78	0.32	36.37	20.86	2550	0.76
2380	28.62	39.40	16.20	12.78	1.78	0.32	36.35	20.42	2600	0.71
2400	28.50	39.30	15.41	12.58	1.77	0.33	36.27	20.84	2650	0.81
2500	27.88	38.86	12.09	11.80	1.75	0.34	36.03	20.77	2700	0.83
2600	27.20	38.49	9.42	11.29	1.71	0.35	35.76	20.80	2750	0.91
2700	26.41	38.30	7.17	10.95	1.67	0.35	35.30	20.80	2800	0.87
2800	25.46	38.28	5.31	11.10	1.63	0.34	34.72	20.64	2900	0.96
2900	24.30	38.51	3.80	11.56	1.59	0.33	34.09	20.28	3000	1.10

Typical Performance Data

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

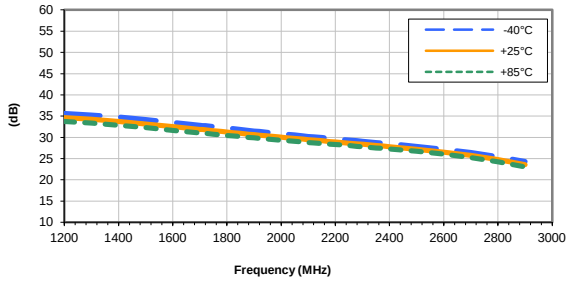
TEST CONDITIONS: I = 117mA, Vd = 5V @Temperature = +85degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP3 Output	1dB Comp. Output	FREQ	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Delta	(dBm)	(dBm)	(MHz)	(dB)
1200	33.75	49.16	7.30	8.60	2.06	0.16	32.36	16.64	1000	0.96
1300	33.34	47.97	8.03	10.05	2.09	0.18	34.54	17.55	1050	0.96
1400	32.83	46.89	8.81	11.73	2.12	0.19	34.90	18.10	1100	0.99
1500	32.27	45.87	9.67	13.63	2.14	0.21	34.73	18.37	1150	0.93
1600	31.66	44.97	10.67	15.61	2.16	0.21	34.48	18.92	1200	0.97
1700	31.05	44.12	11.88	17.33	2.17	0.22	34.18	19.44	1250	0.96
1710	30.99	44.07	12.02	17.51	2.18	0.22	34.10	19.30	1300	0.90
1720	30.93	43.98	12.17	17.68	2.18	0.22	34.02	19.17	1350	0.93
1750	30.75	43.73	12.62	18.06	2.18	0.22	34.05	19.51	1400	0.94
1780	30.58	43.48	13.05	18.29	2.17	0.22	34.00	19.51	1450	0.91
1800	30.45	43.35	13.34	18.47	2.18	0.22	34.02	19.42	1500	0.97
1820	30.34	43.20	13.68	18.66	2.18	0.22	34.01	19.70	1550	1.00
1850	30.17	42.97	14.23	18.84	2.18	0.22	33.97	19.45	1600	1.00
1880	29.99	42.75	14.85	18.74	2.18	0.22	33.99	19.86	1650	1.06
1900	29.88	42.61	15.25	18.57	2.18	0.22	33.99	19.69	1700	0.99
1920	29.76	42.45	15.68	18.47	2.17	0.22	33.99	19.73	1750	1.10
1950	29.59	42.26	16.42	18.38	2.18	0.23	33.99	19.76	1800	1.06
1990	29.38	41.98	17.58	17.93	2.17	0.23	34.04	19.92	1850	1.05
2000	29.32	41.91	17.85	17.77	2.17	0.23	34.08	20.04	1880	1.13
2020	29.21	41.76	18.49	17.48	2.16	0.23	34.06	19.90	1900	1.11
2050	29.06	41.58	19.56	17.15	2.16	0.23	34.07	20.01	1950	1.07
2080	28.90	41.36	20.94	16.78	2.15	0.23	34.09	20.00	2000	1.19
2100	28.80	41.26	22.00	16.45	2.15	0.24	34.10	20.07	2050	1.14
2120	28.70	41.11	23.05	16.11	2.14	0.24	34.14	20.16	2100	1.16
2150	28.55	40.92	24.72	15.74	2.14	0.24	34.16	20.13	2150	1.20
2180	28.40	40.73	26.68	15.37	2.13	0.24	34.20	20.14	2200	1.26
2200	28.30	40.61	27.59	15.10	2.12	0.25	34.26	20.24	2250	1.19
2220	28.20	40.48	27.85	14.81	2.11	0.25	34.28	20.47	2300	1.25
2250	28.05	40.33	26.62	14.47	2.11	0.25	34.33	20.11	2350	1.26
2280	27.89	40.13	24.45	14.16	2.09	0.26	34.34	20.44	2400	1.28
2300	27.79	40.02	23.03	13.93	2.09	0.26	34.34	20.43	2450	1.28
2350	27.52	39.75	19.75	13.40	2.07	0.26	34.42	20.61	2550	1.44
2380	27.37	39.62	17.98	13.19	2.07	0.27	34.49	20.20	2600	1.42
2400	27.27	39.51	16.88	12.99	2.05	0.27	34.46	20.56	2650	1.53
2500	26.70	39.08	12.70	12.36	2.01	0.28	34.45	20.54	2700	1.56
2600	26.05	38.76	9.59	12.03	1.97	0.29	34.41	20.53	2750	1.65
2700	25.22	38.64	7.10	11.98	1.93	0.29	34.16	20.49	2800	1.64
2800	24.21	38.76	5.16	12.22	1.90	0.28	33.78	20.39	2900	1.78
2900	23.01	39.05	3.69	12.65	1.87	0.27	33.30	20.09	3000	2.02

Typical Performance Curves

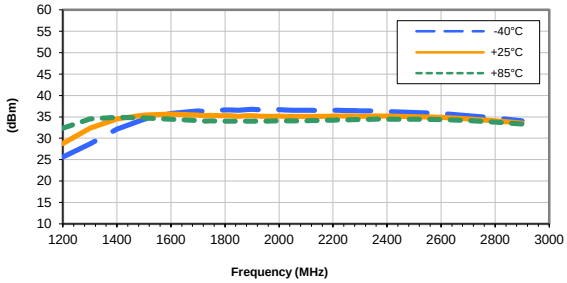
GAIN vs. FREQUENCY & TEMPERATURE

INPUT POWER = -25, VOLTAGE = 5V



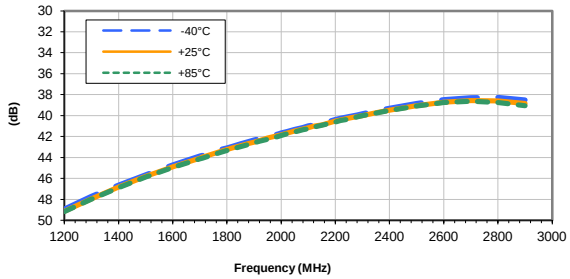
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE

INPUT POWER = -25, VOLTAGE = 5V



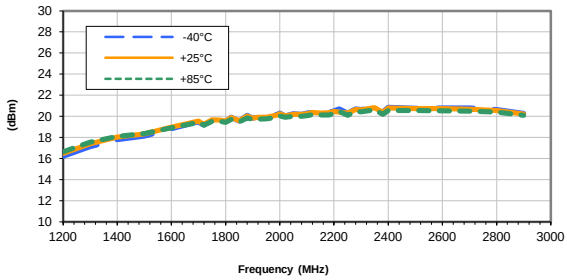
ISOLATION vs. FREQUENCY & TEMPERATURE

INPUT POWER = -25, VOLTAGE = 5V



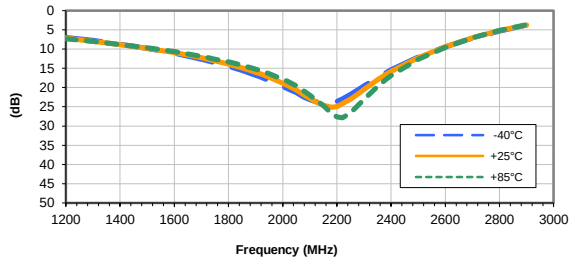
OUTPUT POWER at 1dB COMPRESSION vs. FREQUENCY & TEMPERATURE

VOLTAGE = 5V



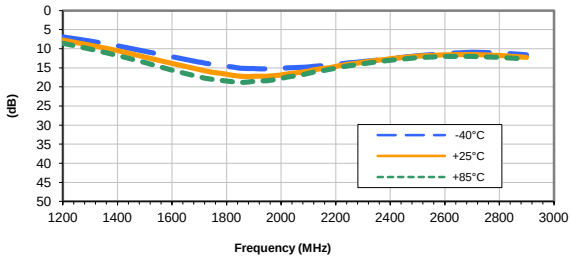
INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE

INPUT POWER = -25, VOLTAGE = 5V



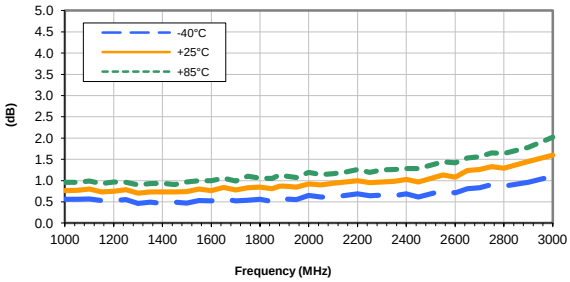
OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE

INPUT POWER = -25, VOLTAGE = 5V



NOISE FOGURE vs. FREQUENCY & TEMPERATURE

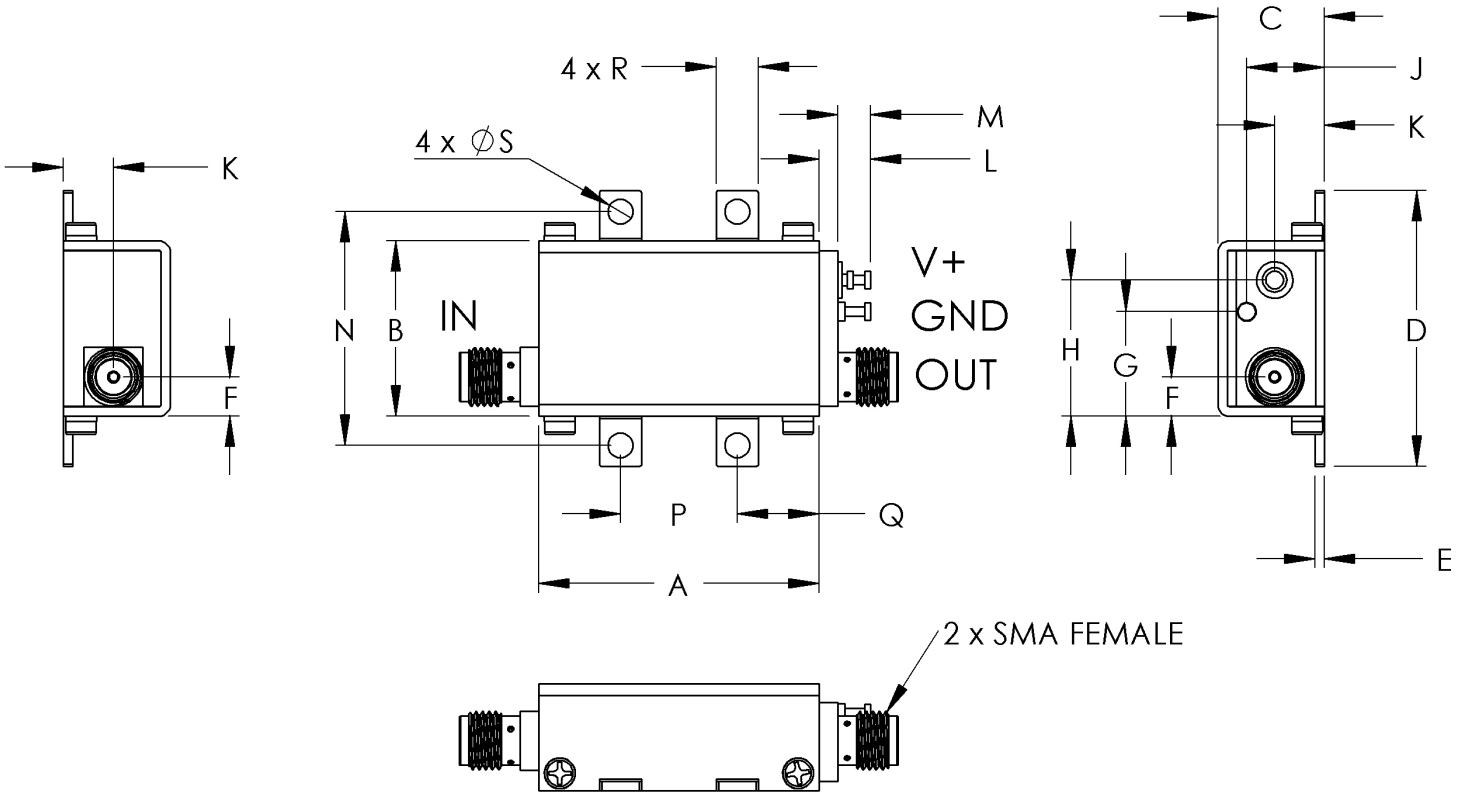
VOLTAGE = 5V



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

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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