



ULTRA HIGH IP3

Wideband Amplifier

ZX60-H242+

Mini-Circuits

50Ω 700 to 2400 MHz SMA Female

THE BIG DEAL

- Industry Leading High IP3, 46 dBm typ.
- Output Power at 1 dB Compression, +23 dBm
- Wideband, 700 - 2400 MHz
- Protected by US patent 6,790,049

APPLICATIONS

- LTE
- Buffer amplifier
- PCS
- Test Equipment
- High Dynamic range lab driver amps



Generic photo used for illustration purposes only

Model No.	ZX60-H242+
Case Style	GC957
Connectors	SMA

+RoHS Compliant

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

PRODUCT OVERVIEW

The ZX60-H242+ (RoHS compliant) uses Mini-Circuits' high dynamic MMIC technology and optimization circuits to provide industry leading linearity over a focused frequency range. Housed in a rugged, cost effective unibody chassis, this amplifier supports a wide variety of applications requiring moderate power output, low distortion and 50 ohm matched input/output ports.

KEY FEATURES

Feature	Advantages
Extremely High IP3 vs. Current 47.7 dBm typ at 1500 MHz versus DC Power Consumption of 145mA	The ZX60-H242+ offers industry leading IP3 performance relative to power consumption. The combination of the design and E-PHEMT provides enhanced linearity as evidence in the IP3. This feature makes this amplifier ideal for use in: <ul style="list-style-type: none"> • Driver amplifiers for complex waveform up converter paths • Drivers in linearized transmit systems • Secondary amplifiers in ultra High Dynamic range receivers
Optimized Frequency Range	Covering primary wireless communication bands: cellular and LTE
Low Noise Figure, 3.0 dB typ.	A unique feature of the ZX60-H242+ is the combination of low noise figure performance with the high dynamic range, differentiating this amplifier from the competition.
Unconditionally Stable	Capable to operate to a wide range of source and load impedances.
Very Small Size, 0.75" x 0.75"	The unique unibody size and construction enable the ZX60-H242+ to be used in extremely compact connectorized applications.





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ELECTRICAL SPECIFICATIONS AT 25°C AND +5.5V, UNLESS NOTED

Parameter	Condition GHz)	Min.	Typ.	Max.	Units
Frequency Range		0.7		2.4	GHz
Gain	0.7	12.5	15.6	15.3	dB
	0.9		15.4		
	1.2		15.0		
	1.5		14.5		
	1.8		14.0		
	2.1		13.4		
	2.4		12.9		
Input Return Loss	0.7		18.3		dB
	0.9		18.3		
	1.2		17.8		
	1.5		16.1		
	1.8		13.9		
	2.1		11.5		
	2.4		9.4		
Output Return Loss	0.7		14.6		dB
	0.9		14.4		
	1.2		13.9		
	1.5		13.9		
	1.8		14.2		
	2.1		14.7		
	2.4		15.0		
Output IP3	0.7	42	42.7		dBm
	0.9		43.1		
	1.2		44.4		
	1.5		47.7		
	1.8		46.8		
	2.1		45.0		
	2.4		42.6		
Output Power at 1dB Compression	0.7		22.5		dBm
	0.9		22.5		
	1.2		22.8		
	1.5		23.1		
	1.8		23.2		
	2.1		23.2		
	2.4		23.2		
Noise Figure	0.7		2.4		dB
	0.9		2.4		
	1.2		2.5		
	1.5		2.7		
	1.8		2.8		
	2.1		2.9		
	2.4		3.0		
Directivity (Isolation-Gain)	0.7 - 2.4		5.0		dB
DC Voltage		5.5	—	7.0	V
DC Current		110	145	180	mA





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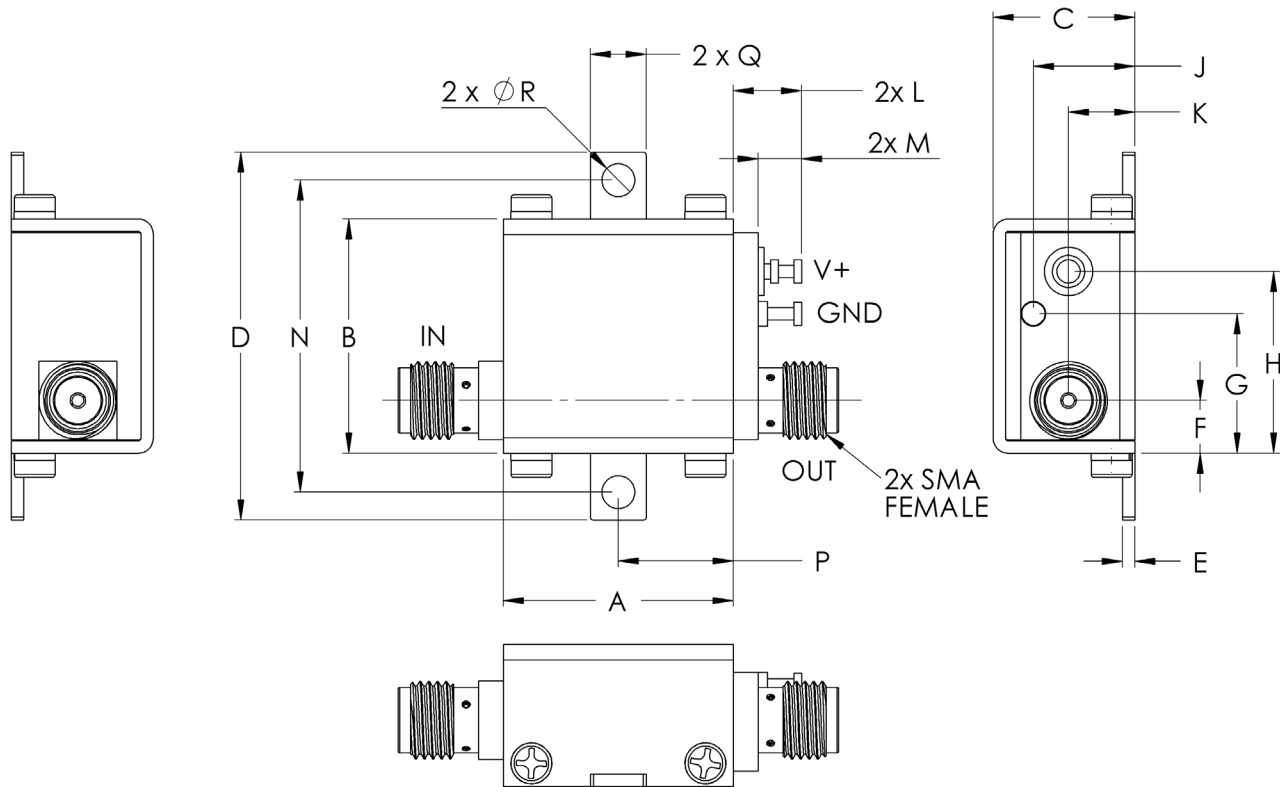
50Ω 700 to 2400 MHz SMA Female

ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-40°C to 85°C Case
Storage Temperature	-55°C to 100°C
DC Voltage	+7V
Input RF Power (no damage)	24 dBm
Power Consumption	1.25W

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 terminal. See Application Note. [AN-40-010](#).

OUTLINE DIMENSIONS (Inches/mm)

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	wt
.74	.75	.46	1.18	.04	.17	.45	.59	.33	.21	.22	.14	1.00	.37	.18	.106	grams
18.80	19.1	11.68	30.0	1.02	4.32	11.4	14.99	8.38	5.33	5.59	3.56	25.40	9.40	4.57	2.69	23.0





ULTRA HIGH IP3

Wideband Amplifier

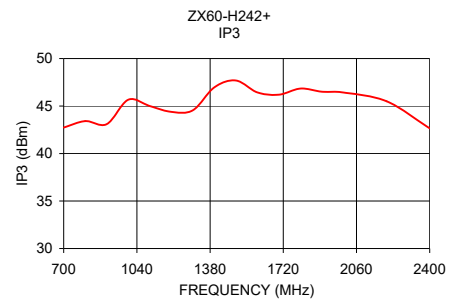
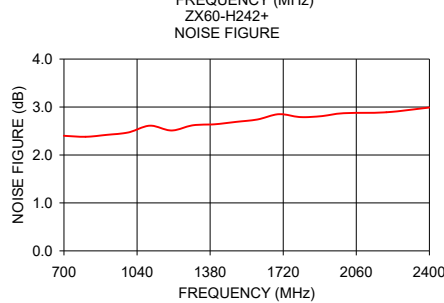
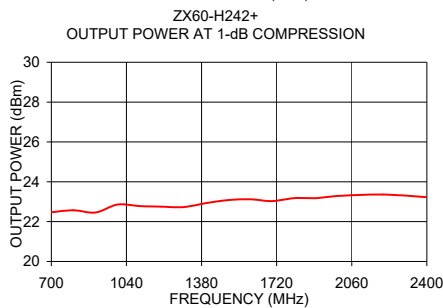
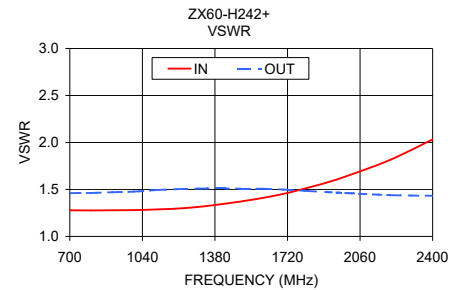
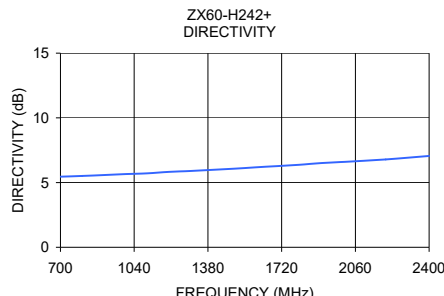
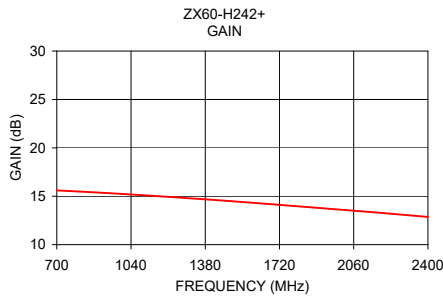
ZX60-H242+

Mini-Circuits

50Ω 700 to 2400 MHz SMA Female

TYPICAL PERFORMANCE DATA/CURVES

Frequency (MHz)	Gain (dB)	Directivity (dB)	VSWR (:1)		Power Out @ 1 dB COMPR. (dBm)	Noise Figure (dB)	Output IP3 (dBm)
			IN	OUT			
700.00	15.60	5.46	1.28	1.46	22.5	2.4	42.7
800.00	15.49	5.51	1.28	1.46	22.6	2.4	43.4
900.00	15.37	5.58	1.28	1.47	22.5	2.4	43.1
1000.00	15.24	5.66	1.28	1.48	22.9	2.5	45.7
1100.00	15.10	5.72	1.29	1.49	22.8	2.6	45.0
1200.00	14.95	5.82	1.30	1.50	22.8	2.5	44.4
1300.00	14.80	5.89	1.31	1.51	22.7	2.6	44.6
1400.00	14.65	5.99	1.34	1.51	22.9	2.6	47.0
1500.00	14.49	6.07	1.37	1.51	23.1	2.7	47.7
1600.00	14.32	6.18	1.41	1.51	23.1	2.7	46.4
1700.00	14.15	6.27	1.45	1.50	23.0	2.9	46.2
1800.00	13.97	6.38	1.51	1.49	23.2	2.8	46.8
1900.00	13.79	6.50	1.57	1.47	23.2	2.8	46.5
2000.00	13.61	6.59	1.64	1.46	23.3	2.9	46.4
2200.00	13.25	6.79	1.81	1.44	23.4	2.9	45.5
2400.00	12.86	7.06	2.03	1.43	23.2	3.0	42.6



- 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

NOTE: Use PDF Bookmarks to view DATA at required conditions

Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 5.50V, Id = 136.54mA @ Temperature = 25degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)			(dBm)	(dBm)	(dB)
500.0	15.81	21.20	18.42	15.05	1.14	0.71	42.24	22.29	2.19
600.0	15.73	21.14	18.28	15.18	1.15	0.71	41.87	22.32	2.32
700.0	15.64	21.09	18.26	14.97	1.15	0.71	43.16	22.47	2.24
800.0	15.52	21.03	18.32	14.72	1.15	0.71	44.00	22.57	2.25
900.0	15.39	20.98	18.26	14.49	1.15	0.72	43.15	22.46	2.27
1000.0	15.26	20.89	18.22	14.31	1.15	0.72	44.46	22.86	2.41
1050.0	15.19	20.89	18.15	14.20	1.16	0.72	46.76	22.63	2.42
1100.0	15.12	20.83	18.05	14.08	1.15	0.72	44.94	22.78	2.46
1150.0	15.04	20.82	17.96	14.01	1.16	0.73	44.48	22.79	2.45
1200.0	14.97	20.78	17.80	13.94	1.16	0.73	44.82	22.75	2.36
1250.0	14.89	20.76	17.60	13.89	1.16	0.74	44.90	22.78	2.42
1300.0	14.81	20.74	17.37	13.86	1.16	0.74	43.53	22.73	2.51
1350.0	14.73	20.68	17.10	13.83	1.16	0.75	44.98	22.85	2.50
1400.0	14.65	20.66	16.75	13.84	1.16	0.75	46.26	22.93	2.50
1450.0	14.57	20.65	16.43	13.84	1.17	0.76	44.40	23.15	2.56
1500.0	14.49	20.56	16.10	13.87	1.16	0.76	46.60	23.08	2.59
1550.0	14.40	20.57	15.80	13.87	1.17	0.77	46.34	22.86	2.50
1600.0	14.32	20.54	15.42	13.88	1.17	0.78	47.36	23.12	2.66
1650.0	14.23	20.50	15.09	13.92	1.17	0.78	47.45	23.12	2.74
1700.0	14.15	20.42	14.68	14.00	1.17	0.79	47.91	23.03	2.77
1750.0	14.06	20.41	14.29	14.04	1.17	0.79	45.84	23.07	2.67
1800.0	13.98	20.38	13.86	14.19	1.17	0.80	45.63	23.18	2.72
1850.0	13.88	20.34	13.49	14.28	1.17	0.81	47.03	23.16	2.67
1900.0	13.80	20.33	13.07	14.37	1.18	0.82	44.39	23.18	2.72
1950.0	13.71	20.30	12.66	14.46	1.18	0.83	43.75	23.26	2.75
2000.0	13.63	20.22	12.26	14.55	1.17	0.83	46.62	23.29	2.78
2050.0	13.54	20.23	11.89	14.61	1.18	0.84	46.22	23.09	2.72
2100.0	13.45	20.19	11.53	14.72	1.17	0.85	44.82	23.21	2.59
2150.0	13.36	20.21	11.17	14.74	1.18	0.86	43.48	23.31	2.75
2200.0	13.27	20.10	10.78	14.89	1.17	0.87	44.68	23.36	2.77
2250.0	13.18	20.13	10.43	14.91	1.18	0.88	44.56	23.34	2.87
2300.0	13.09	20.07	10.05	15.04	1.18	0.88	45.91	23.28	2.91
2350.0	12.99	20.06	9.72	15.02	1.18	0.89	43.73	23.28	2.76
2400.0	12.90	20.07	9.36	15.08	1.18	0.90	45.21	23.23	2.90
2500.0	12.70	19.97	8.74	14.91	1.18	0.92	45.66	23.24	2.98
2600.0	12.50	19.98	8.14	14.60	1.18	0.93	44.29	23.33	3.18
2700.0	12.30	19.95	7.57	14.17	1.18	0.94	45.09	23.26	3.10
2800.0	12.09	19.90	7.02	13.60	1.18	0.95	43.68	23.19	3.21
2900.0	11.87	19.91	6.49	12.94	1.18	0.96	45.20	23.16	3.23
3000.0	11.65	19.92	5.98	12.19	1.18	0.97	44.95	23.07	3.25

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: Vd = 5.50V, Id = 138.24mA @ Temperature = -45degC

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)			(dBm)	(dBm)	(dB)
500.0	15.25	20.60	25.28	14.52	1.15	0.69	37.73	22.35	1.86
600.0	15.19	20.56	24.81	15.01	1.16	0.69	37.81	22.45	1.86
700.0	15.14	20.53	24.39	15.27	1.16	0.69	38.54	22.53	1.88
800.0	15.05	20.48	24.38	15.36	1.16	0.70	39.06	22.60	1.93
900.0	14.95	20.44	24.38	15.27	1.17	0.70	38.58	22.51	1.95
1000.0	14.85	20.44	24.17	15.24	1.17	0.71	40.36	22.83	1.99
1050.0	14.80	20.37	23.81	15.22	1.17	0.71	39.43	22.65	2.05
1100.0	14.75	20.34	23.41	15.19	1.17	0.71	40.97	22.76	2.10
1150.0	14.69	20.32	22.96	15.27	1.17	0.71	40.74	22.77	2.07
1200.0	14.63	20.31	22.61	15.24	1.17	0.72	40.26	22.76	2.00
1250.0	14.57	20.28	22.16	15.30	1.18	0.72	41.27	22.77	2.05
1300.0	14.51	20.25	21.65	15.27	1.18	0.72	40.03	22.72	2.11
1350.0	14.45	20.25	21.20	15.26	1.18	0.73	41.07	22.81	2.11
1400.0	14.38	20.22	20.56	15.26	1.18	0.73	41.42	22.90	2.12
1450.0	14.32	20.15	20.04	15.29	1.18	0.74	42.78	23.07	2.14
1500.0	14.25	20.16	19.42	15.34	1.18	0.74	41.50	23.03	2.18
1550.0	14.18	20.12	18.90	15.42	1.18	0.75	40.64	22.87	2.09
1600.0	14.12	20.11	18.26	15.56	1.19	0.76	42.64	23.09	2.25
1650.0	14.05	20.08	17.71	15.67	1.19	0.76	42.05	23.08	2.30
1700.0	13.98	20.04	17.15	15.84	1.19	0.77	40.93	23.01	2.33
1750.0	13.90	20.02	16.59	15.97	1.19	0.77	41.04	23.05	2.24
1800.0	13.83	19.99	16.02	16.19	1.19	0.78	42.62	23.12	2.31
1850.0	13.76	19.97	15.52	16.24	1.19	0.79	42.28	23.13	2.24
1900.0	13.68	19.95	15.01	16.42	1.19	0.80	42.55	23.11	2.31
1950.0	13.61	19.92	14.44	16.40	1.19	0.80	42.63	23.20	2.29
2000.0	13.54	19.87	13.98	16.52	1.19	0.81	43.60	23.23	2.34
2050.0	13.47	19.85	13.51	16.47	1.19	0.82	42.48	23.07	2.31
2100.0	13.39	19.82	13.05	16.67	1.19	0.82	44.28	23.17	2.32
2150.0	13.31	19.81	12.62	16.57	1.19	0.83	43.59	23.23	2.30
2200.0	13.24	19.80	12.12	16.78	1.19	0.84	43.38	23.29	2.34
2250.0	13.15	19.78	11.69	16.66	1.19	0.85	45.05	23.25	2.44
2300.0	13.07	19.72	11.20	16.79	1.19	0.85	46.37	23.20	2.43
2350.0	12.98	19.77	10.79	16.62	1.19	0.86	47.05	23.19	2.29
2400.0	12.90	19.72	10.35	16.57	1.19	0.87	46.47	23.18	2.43
2500.0	12.73	19.69	9.61	16.02	1.19	0.88	44.24	23.21	2.51
2600.0	12.56	19.68	8.91	15.30	1.19	0.89	46.61	23.24	2.61
2700.0	12.36	19.70	8.24	14.48	1.19	0.91	49.06	23.22	2.62
2800.0	12.15	19.68	7.59	13.58	1.19	0.91	46.93	23.18	2.78
2900.0	11.94	19.71	7.00	12.67	1.19	0.92	46.83	23.18	2.73
3000.0	11.73	19.75	6.50	11.78	1.19	0.92	45.39	23.17	2.71

Typical Performance Data

Definitions:

Input Return Loss = -S11 (dB)

Gain(Power Gain) = S21 (dB)

Reverse Isolation = -S12 (dB)

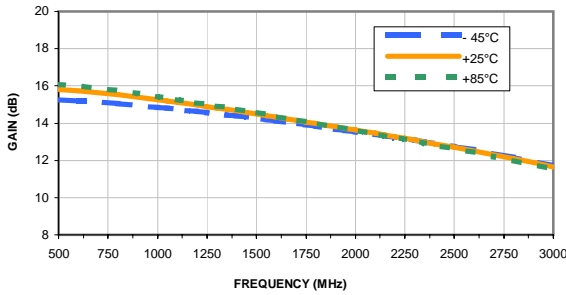
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 5.50V, Id = 139.26mA @ Temperature = 85degC

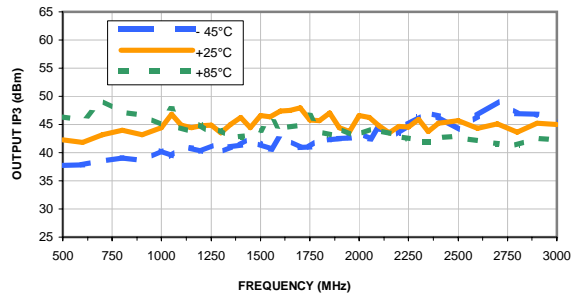
FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
					K	Measure			
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
500.0	16.09	21.57	15.66	14.80	1.14	0.72	46.35	22.13	2.51
600.0	16.00	21.52	15.53	14.69	1.14	0.72	45.79	22.15	2.55
700.0	15.88	21.46	15.62	14.29	1.14	0.72	49.28	22.33	2.61
800.0	15.74	21.39	15.63	13.92	1.14	0.73	47.21	22.43	2.57
900.0	15.59	21.30	15.54	13.57	1.14	0.73	46.63	22.32	2.60
1000.0	15.43	21.23	15.49	13.36	1.14	0.73	44.96	22.76	2.70
1050.0	15.35	21.23	15.47	13.24	1.15	0.74	47.60	22.51	2.76
1100.0	15.27	21.16	15.46	13.14	1.15	0.74	44.38	22.66	2.77
1150.0	15.18	21.11	15.40	13.05	1.15	0.74	43.68	22.70	2.78
1200.0	15.10	21.08	15.36	12.93	1.15	0.75	44.99	22.64	2.72
1250.0	15.01	21.02	15.25	12.88	1.15	0.75	43.41	22.69	2.81
1300.0	14.92	20.98	15.10	12.82	1.15	0.75	43.93	22.63	2.84
1350.0	14.83	20.98	14.95	12.77	1.15	0.76	42.88	22.76	2.85
1400.0	14.74	20.93	14.69	12.76	1.15	0.77	42.89	22.83	2.88
1450.0	14.65	20.90	14.51	12.77	1.15	0.77	43.14	23.05	2.93
1500.0	14.56	20.87	14.28	12.78	1.16	0.78	44.11	22.99	2.94
1550.0	14.46	20.79	14.07	12.77	1.15	0.78	46.39	22.74	2.89
1600.0	14.37	20.79	13.81	12.79	1.16	0.79	43.83	23.00	3.01
1650.0	14.27	20.69	13.54	12.78	1.15	0.79	44.50	23.01	3.07
1700.0	14.18	20.67	13.25	12.84	1.16	0.80	44.84	22.91	3.14
1750.0	14.08	20.65	12.93	12.86	1.16	0.81	46.52	22.96	3.02
1800.0	13.98	20.59	12.58	13.01	1.16	0.82	43.75	23.05	3.13
1850.0	13.89	20.56	12.26	13.03	1.16	0.82	43.18	23.04	3.06
1900.0	13.80	20.51	11.94	13.21	1.16	0.83	44.31	23.02	3.12
1950.0	13.70	20.46	11.56	13.25	1.16	0.84	43.33	23.12	3.11
2000.0	13.60	20.44	11.26	13.40	1.16	0.85	43.32	23.12	3.19
2050.0	13.51	20.45	10.95	13.41	1.17	0.86	44.06	22.94	3.15
2100.0	13.41	20.37	10.64	13.59	1.16	0.87	43.84	23.05	3.18
2150.0	13.31	20.37	10.35	13.53	1.17	0.88	43.37	23.13	3.18
2200.0	13.22	20.29	10.01	13.73	1.16	0.88	42.95	23.15	3.21
2250.0	13.12	20.29	9.71	13.75	1.17	0.89	42.51	23.12	3.29
2300.0	13.03	20.24	9.39	13.97	1.17	0.90	41.83	23.07	3.28
2350.0	12.92	20.24	9.12	13.98	1.17	0.91	41.81	23.05	3.19
2400.0	12.82	20.19	8.83	14.16	1.17	0.92	42.68	22.99	3.34
2500.0	12.62	20.14	8.27	14.18	1.17	0.94	42.81	23.02	3.41
2600.0	12.42	20.11	7.73	14.13	1.17	0.95	42.07	23.11	3.57
2700.0	12.21	20.06	7.21	13.93	1.17	0.97	41.60	23.03	3.58
2800.0	11.99	20.00	6.72	13.57	1.17	0.98	41.31	22.96	3.74
2900.0	11.78	19.98	6.24	13.18	1.17	0.99	42.47	22.92	3.76
3000.0	11.55	19.97	5.77	12.59	1.17	1.00	42.38	22.83	3.77

Typical Performance Curves

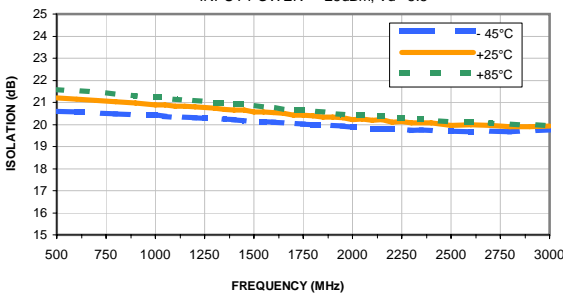
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 5.5V



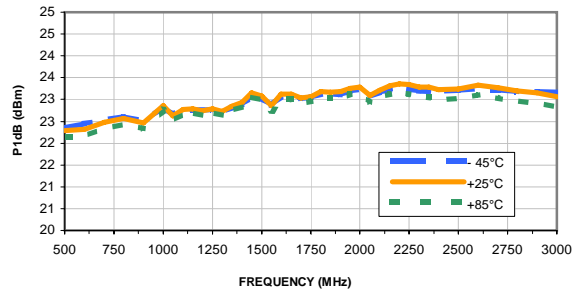
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE
OUTPUT POWER = 5 dBm/1tone, Vd = 5.5V



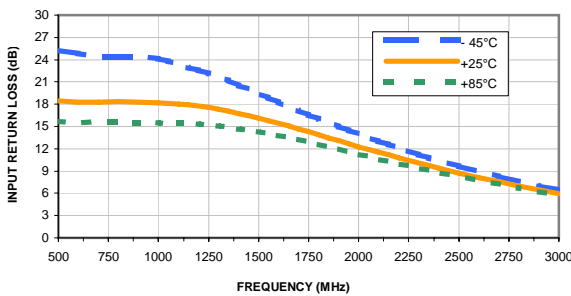
ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 5.5V



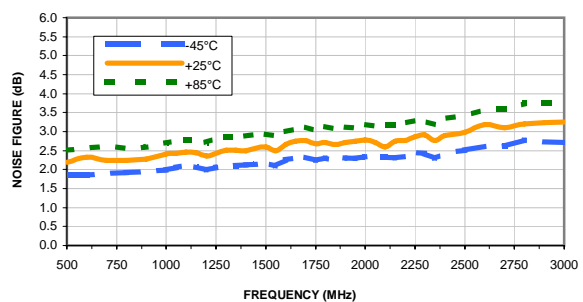
P1dB vs. FREQUENCY & TEMPERATURE
Vd = 5.5V



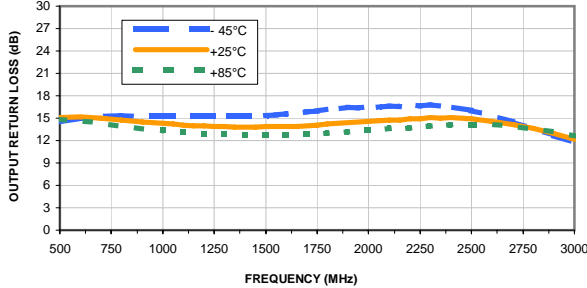
INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 5.5V



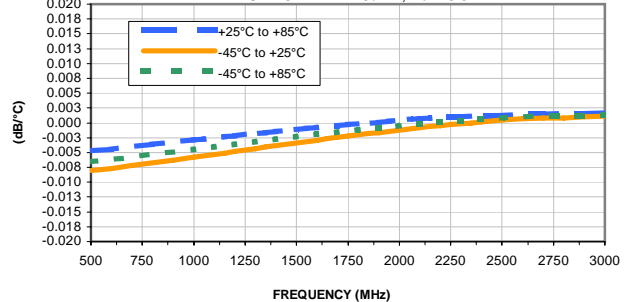
NOISE FIGURE vs. FREQUENCY & TEMPERATURE
Vd = 5.5V



OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 5.5V



GAIN VARIATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 5.5V

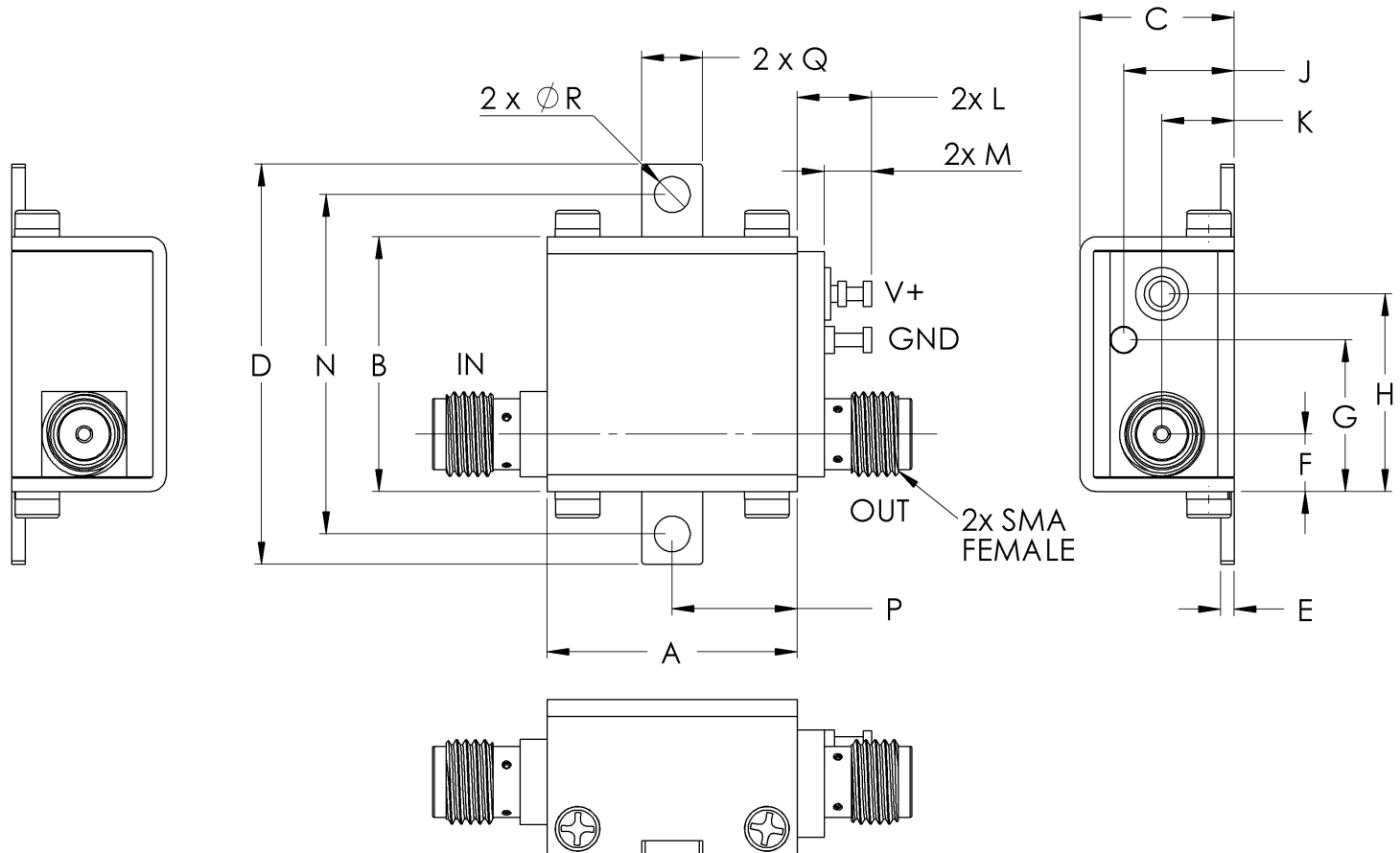


Case Style

GC

Outline Dimensions

GC957



CASE #.	A	B	C	D	E	F	G	H	J	K	L	M	N
GC957	.74 (18.80)	.75 (19.15)	.46 (11.61)	1.18 (30.07)	.04 (1.02)	.17 (4.32)	.45 (11.40)	.59 (14.86)	.33 (8.31)	.21 (5.44)	.22 (5.59)	.14 (3.56)	1.00 (25.4)

CASE #.	P	Q	R	WT GRAMS
GC957	.37 (9.40)	.18 (4.57)	.106 (2.69)	23.0

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

Note:

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

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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