

Low Noise Amplifier

ZX60-272LN-S+
50Ω
2300 to 2700 MHz

Features

- Ultra low noise figure, 0.8 dB typ.
- Output power, up to +18.5 dBm typ.
- Good output IP3, 31.5 dBm typ.
- Good return loss
- Unconditionally stable
- Protected by US patent 6,790,049

Applications

- WiMAX 2.5GHz
- Base transceiver station, tower mounted amplifier, repeater
- General purpose low noise amplifier
- Lab
- Instrumentation
- Test equipment



CASE STYLE: GA955

Connectors	Model
SMA	ZX60-272LN-S+

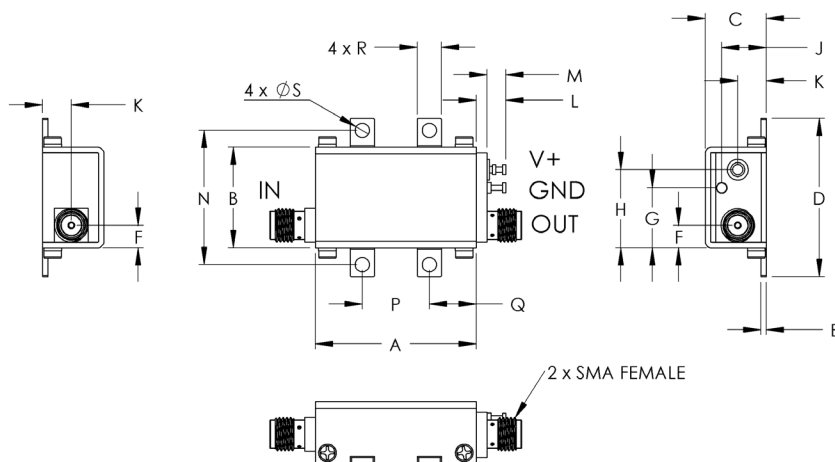
+RoHS Compliant

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		2300		2700	MHz
Noise Figure	2300-2700		0.8	1.1	dB
Gain	2300-2700	11.5	14.0		dB
Gain Flatness	2300-2700		± 0.55	± 1.1	dB
Output Power at 1dB compression	2300-2700	16.0	18.5		dBm
Output third order intercept point (OIP3)	2300-2700		31.5		dBm
Input VSWR	2300-2700		1.2		:1
Output VSWR	2300-2700		1.6		:1
Active Directivity	2300-2700		7		dB
DC Supply Voltage			5.0		V
Supply Current			55	70	mA

Outline Drawing



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	400 mW

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



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

Notes

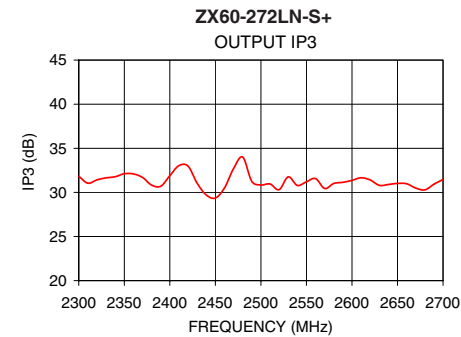
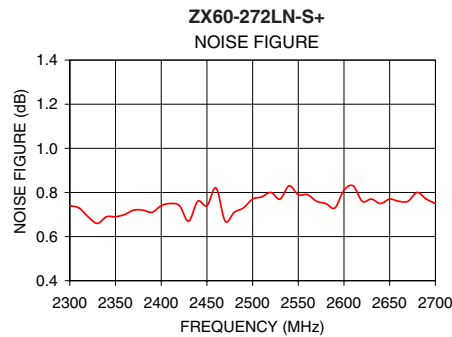
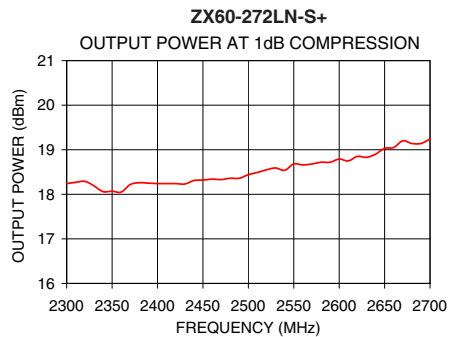
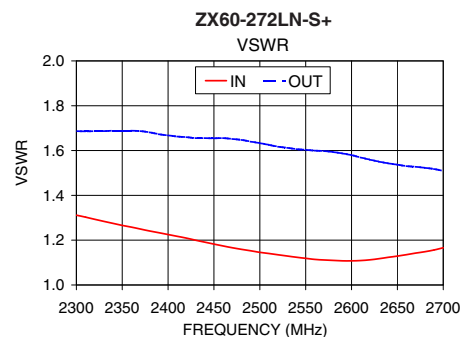
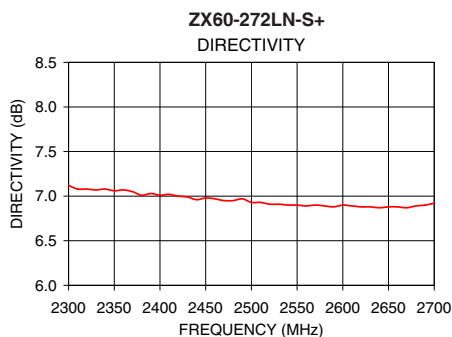
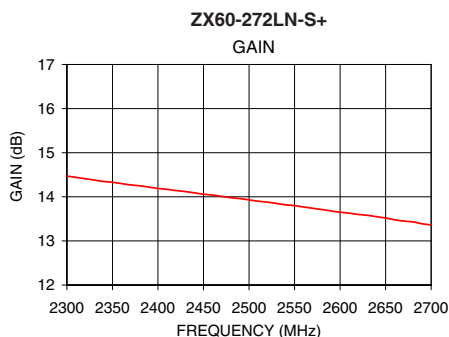
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FREQUENCY (MHz)	GAIN (dB)	DIRECTIVITY (dB)	VSWR IN (:1)	VSWR OUT (:1)	POWER OUT @ 1dB COMPRESSION (dBm)	OUTPUT IP3 (dBm)	NF (dB)
2300.00	14.47	7.12	1.31	1.69	18.24	31.83	0.74
2320.00	14.41	7.08	1.29	1.69	18.29	31.42	0.69
2340.00	14.35	7.08	1.27	1.69	18.06	31.78	0.69
2360.00	14.30	7.07	1.26	1.69	18.05	32.10	0.70
2380.00	14.25	7.01	1.24	1.68	18.26	30.83	0.72
2400.00	14.19	7.01	1.23	1.67	18.24	31.89	0.74
2420.00	14.14	7.00	1.21	1.66	18.24	32.98	0.74
2440.00	14.09	6.96	1.19	1.66	18.31	29.71	0.76
2460.00	14.04	6.97	1.17	1.66	18.34	30.51	0.82
2480.00	13.98	6.95	1.16	1.65	18.36	34.00	0.71
2500.00	13.93	6.93	1.15	1.63	18.44	30.84	0.77
2520.00	13.88	6.91	1.13	1.62	18.55	30.31	0.80
2540.00	13.82	6.90	1.12	1.61	18.54	30.79	0.83
2560.00	13.77	6.89	1.11	1.60	18.66	31.57	0.79
2580.00	13.71	6.89	1.11	1.59	18.72	31.01	0.75
2600.00	13.65	6.90	1.11	1.58	18.79	31.36	0.81
2620.00	13.60	6.88	1.11	1.56	18.85	31.41	0.76
2640.00	13.55	6.87	1.12	1.54	18.90	30.90	0.75
2680.00	13.43	6.89	1.15	1.52	19.14	30.29	0.80
2700.00	13.36	6.92	1.17	1.51	19.24	31.47	0.75



Notes

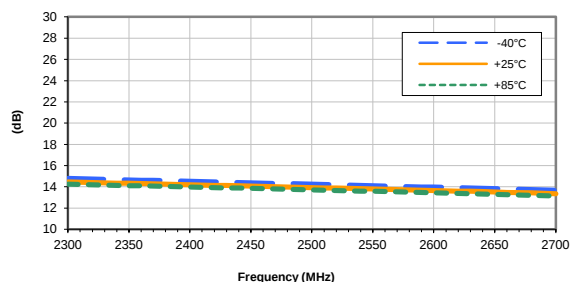
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Typical Performance Curves

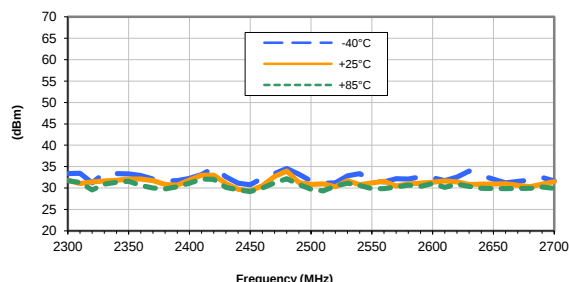
GAIN vs. FREQUENCY & TEMPERATURE

INPUT POWER = -20, VOLTAGE = 5V



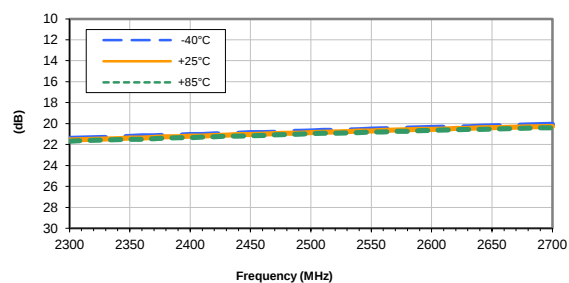
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE

INPUT POWER = -20, VOLTAGE = 5V



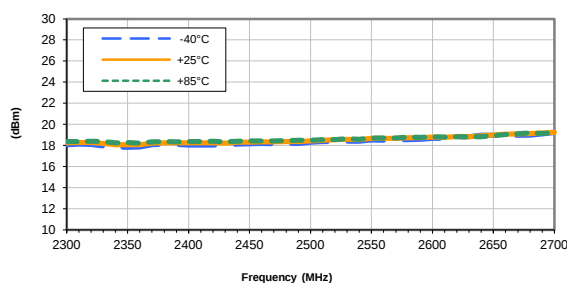
ISOLATION vs. FREQUENCY & TEMPERATURE

INPUT POWER = -20, VOLTAGE = 5V



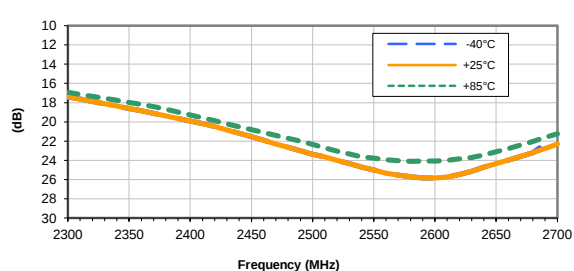
OUTPUT POWER at 1dB COMPRESSION vs. FREQUENCY & TEMPERATURE

VOLTAGE = 5V



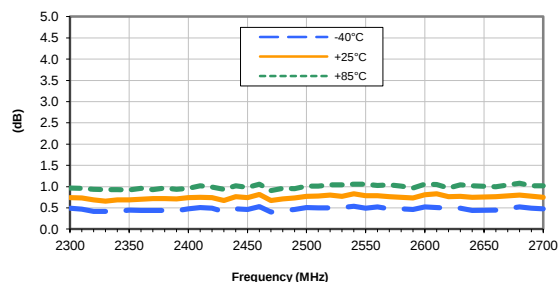
INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE

INPUT POWER = -20, VOLTAGE = 5V



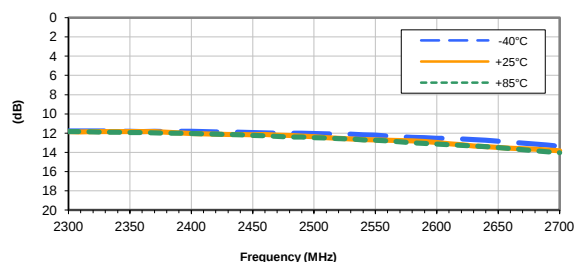
NOISE FIGURE vs. FREQUENCY & TEMPERATURE

VOLTAGE = 5V



OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE

INPUT POWER = -20, VOLTAGE = 5V



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IF/RF MICROWAVE COMPONENTS

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Amplifier

ZX60-272LN-S+

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 = 50mA, 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)
2300	14.47	21.58	17.41	11.85	1.24	0.42	31.83	18.24	0.74
2310	14.44	21.53	17.62	11.86	1.24	0.43	31.05	18.27	0.73
2320	14.41	21.50	17.87	11.85	1.24	0.43	31.42	18.29	0.69
2330	14.38	21.46	18.11	11.85	1.24	0.43	31.65	18.19	0.66
2340	14.35	21.43	18.36	11.83	1.25	0.43	31.78	18.06	0.69
2350	14.33	21.39	18.61	11.83	1.25	0.43	32.12	18.07	0.69
2360	14.30	21.37	18.84	11.83	1.25	0.43	32.10	18.05	0.70
2370	14.27	21.32	19.10	11.85	1.25	0.43	31.70	18.22	0.72
2380	14.25	21.26	19.37	11.90	1.25	0.43	30.83	18.26	0.72
2390	14.22	21.25	19.63	11.98	1.25	0.43	30.70	18.25	0.71
2400	14.19	21.20	19.90	12.03	1.25	0.43	31.89	18.24	0.74
2410	14.17	21.19	20.18	12.08	1.25	0.43	33.03	18.24	0.75
2420	14.14	21.14	20.48	12.11	1.25	0.43	32.98	18.24	0.74
2430	14.12	21.10	20.84	12.15	1.25	0.43	31.05	18.23	0.67
2440	14.09	21.05	21.18	12.15	1.25	0.44	29.71	18.31	0.76
2450	14.06	21.04	21.55	12.16	1.25	0.44	29.37	18.32	0.74
2460	14.04	21.01	21.92	12.15	1.25	0.44	30.51	18.34	0.82
2470	14.01	20.95	22.31	12.19	1.25	0.44	32.70	18.33	0.67
2480	13.98	20.93	22.65	12.23	1.25	0.44	34.00	18.36	0.71
2490	13.96	20.92	22.99	12.31	1.26	0.44	31.25	18.36	0.73
2500	13.93	20.86	23.36	12.38	1.26	0.44	30.84	18.44	0.77
2510	13.90	20.83	23.65	12.46	1.26	0.44	30.96	18.49	0.78
2520	13.88	20.79	24.00	12.55	1.26	0.44	30.31	18.55	0.80
2530	13.85	20.77	24.33	12.60	1.26	0.44	31.76	18.59	0.77
2540	13.82	20.72	24.69	12.67	1.26	0.44	30.79	18.54	0.83
2550	13.80	20.70	25.01	12.70	1.26	0.44	31.20	18.68	0.79
2560	13.77	20.66	25.34	12.74	1.26	0.44	31.57	18.66	0.79
2570	13.74	20.63	25.54	12.76	1.26	0.44	30.44	18.68	0.76
2580	13.71	20.60	25.69	12.81	1.26	0.44	31.01	18.72	0.75
2590	13.68	20.57	25.83	12.88	1.26	0.44	31.14	18.72	0.73
2600	13.65	20.55	25.83	12.97	1.26	0.44	31.36	18.79	0.81
2610	13.63	20.52	25.72	13.09	1.26	0.44	31.66	18.75	0.83
2620	13.60	20.48	25.48	13.21	1.26	0.44	31.41	18.85	0.76
2630	13.58	20.46	25.13	13.32	1.26	0.44	30.80	18.83	0.77
2640	13.55	20.41	24.71	13.41	1.26	0.44	30.90	18.90	0.75
2660	13.48	20.36	23.96	13.57	1.27	0.44	30.98	19.05	0.76
2680	13.43	20.32	23.21	13.67	1.27	0.44	30.29	19.14	0.80
2700	13.36	20.28	22.31	13.85	1.27	0.44	31.47	19.24	0.75



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Amplifier

ZX60-272LN-S+

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 = 49mA, 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)
2300	14.79	21.40	17.50	11.77	1.20	0.45	33.41	18.07	0.49
2310	14.77	21.39	17.75	11.77	1.20	0.45	33.46	18.11	0.47
2320	14.73	21.34	17.96	11.77	1.20	0.45	31.24	18.10	0.42
2330	14.71	21.32	18.19	11.79	1.20	0.45	33.55	17.93	0.42
2340	14.68	21.27	18.42	11.80	1.20	0.45	33.37	17.81	0.42
2350	14.65	21.24	18.69	11.80	1.20	0.45	33.33	17.83	0.45
2360	14.62	21.18	18.86	11.83	1.20	0.46	32.93	17.86	0.44
2370	14.60	21.17	19.15	11.82	1.20	0.46	32.11	18.07	0.44
2380	14.57	21.10	19.36	11.83	1.20	0.46	31.65	18.11	0.44
2390	14.54	21.12	19.67	11.82	1.21	0.46	31.74	18.09	0.43
2400	14.51	21.04	19.97	11.82	1.20	0.46	32.24	18.03	0.48
2410	14.48	21.05	20.30	11.83	1.21	0.46	33.12	18.02	0.51
2420	14.46	21.00	20.64	11.86	1.21	0.46	34.72	18.03	0.49
2430	14.43	20.95	21.00	11.88	1.21	0.46	32.65	18.04	0.41
2440	14.40	20.91	21.33	11.91	1.21	0.46	31.11	18.13	0.48
2450	14.37	20.87	21.71	11.94	1.21	0.46	30.75	18.15	0.46
2460	14.35	20.86	22.04	11.97	1.21	0.46	32.36	18.17	0.53
2470	14.32	20.82	22.42	12.00	1.21	0.46	33.37	18.16	0.40
2480	14.30	20.75	22.79	12.00	1.21	0.47	34.54	18.17	0.43
2490	14.27	20.74	23.20	12.02	1.21	0.46	33.23	18.18	0.46
2500	14.24	20.72	23.64	12.05	1.21	0.47	31.66	18.30	0.51
2510	14.21	20.65	24.15	12.07	1.21	0.47	31.12	18.36	0.50
2520	14.18	20.64	24.73	12.10	1.21	0.47	31.24	18.38	0.50
2530	14.15	20.62	25.17	12.12	1.21	0.47	32.85	18.41	0.51
2540	14.12	20.59	25.76	12.18	1.22	0.47	33.41	18.39	0.54
2550	14.10	20.54	26.17	12.22	1.21	0.47	31.71	18.51	0.49
2560	14.07	20.51	26.68	12.30	1.22	0.47	31.44	18.49	0.52
2570	14.05	20.46	27.10	12.36	1.21	0.47	32.19	18.53	0.48
2580	14.02	20.44	27.53	12.44	1.22	0.47	32.10	18.54	0.48
2590	13.99	20.41	27.85	12.47	1.22	0.47	32.66	18.59	0.46
2600	13.97	20.37	28.28	12.53	1.22	0.47	32.43	18.66	0.52
2610	13.94	20.35	28.56	12.55	1.22	0.47	31.75	18.67	0.51
2620	13.91	20.31	28.71	12.60	1.22	0.47	32.57	18.82	0.49
2630	13.88	20.30	28.77	12.68	1.22	0.47	33.98	18.83	0.49
2640	13.85	20.25	28.56	12.73	1.22	0.47	32.92	18.96	0.44
2660	13.80	20.19	27.52	12.93	1.22	0.47	31.22	18.93	0.45
2680	13.75	20.14	26.20	13.15	1.22	0.47	31.91	18.97	0.52
2690	13.72	20.09	25.43	13.25	1.22	0.47	32.45	19.08	0.49
2700	13.69	20.08	24.88	13.36	1.22	0.47	31.67	19.21	0.48



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Amplifier

ZX60-272LN-S+

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 = 52mA, 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)
2300	14.25	21.69	16.93	11.84	1.27	0.40	31.75	18.36	0.97
2310	14.22	21.64	17.16	11.85	1.27	0.41	31.28	18.38	0.96
2320	14.19	21.61	17.36	11.88	1.27	0.41	29.58	18.39	0.94
2330	14.17	21.58	17.56	11.90	1.27	0.41	30.90	18.37	0.93
2340	14.14	21.53	17.76	11.92	1.27	0.41	31.35	18.25	0.93
2350	14.11	21.51	17.99	11.93	1.27	0.41	31.55	18.27	0.92
2360	14.09	21.49	18.17	11.95	1.28	0.41	30.62	18.22	0.96
2370	14.06	21.43	18.43	11.97	1.28	0.41	30.02	18.35	0.93
2380	14.03	21.39	18.67	11.99	1.28	0.41	29.82	18.36	0.97
2390	14.01	21.35	18.97	12.02	1.28	0.41	30.33	18.33	0.94
2400	13.98	21.34	19.28	12.04	1.28	0.41	31.10	18.38	0.96
2410	13.95	21.29	19.58	12.06	1.28	0.41	32.12	18.38	1.02
2420	13.93	21.26	19.88	12.10	1.28	0.41	32.03	18.39	0.99
2430	13.90	21.21	20.21	12.14	1.28	0.42	30.18	18.34	0.94
2440	13.88	21.19	20.51	12.18	1.28	0.42	29.53	18.41	1.02
2450	13.85	21.17	20.82	12.23	1.28	0.42	29.17	18.42	0.98
2460	13.83	21.13	21.10	12.28	1.28	0.42	29.99	18.44	1.06
2470	13.80	21.09	21.41	12.34	1.28	0.42	31.23	18.44	0.91
2480	13.77	21.06	21.72	12.39	1.29	0.42	32.18	18.46	0.96
2490	13.74	21.01	22.02	12.41	1.28	0.42	30.84	18.48	0.95
2500	13.72	20.96	22.34	12.47	1.28	0.42	29.69	18.50	1.01
2510	13.69	20.93	22.71	12.51	1.28	0.42	29.31	18.54	1.01
2520	13.66	20.92	23.05	12.57	1.29	0.42	30.48	18.55	1.04
2530	13.63	20.88	23.33	12.61	1.29	0.42	31.15	18.63	1.04
2540	13.60	20.86	23.64	12.69	1.29	0.42	30.60	18.57	1.06
2550	13.58	20.81	23.78	12.74	1.29	0.42	29.84	18.71	1.06
2560	13.55	20.79	23.95	12.82	1.29	0.42	29.86	18.71	1.03
2570	13.52	20.75	24.02	12.92	1.29	0.42	30.26	18.70	1.04
2580	13.50	20.73	24.09	13.00	1.29	0.42	30.65	18.80	1.01
2590	13.47	20.69	24.08	13.06	1.29	0.42	30.37	18.77	0.97
2600	13.44	20.66	24.06	13.15	1.29	0.42	31.06	18.83	1.06
2610	13.41	20.63	23.99	13.20	1.29	0.42	30.14	18.78	1.05
2620	13.39	20.60	23.85	13.26	1.29	0.42	30.94	18.82	0.97
2630	13.35	20.57	23.69	13.34	1.29	0.42	30.37	18.81	1.04
2640	13.32	20.55	23.45	13.41	1.30	0.42	29.96	18.82	1.02
2660	13.27	20.49	22.78	13.61	1.30	0.42	29.88	19.04	1.00
2680	13.21	20.43	22.05	13.82	1.30	0.42	29.93	19.20	1.08
2690	13.18	20.41	21.60	13.93	1.30	0.42	30.20	19.13	1.02
2700	13.14	20.41	21.23	14.05	1.30	0.42	29.97	19.21	1.02



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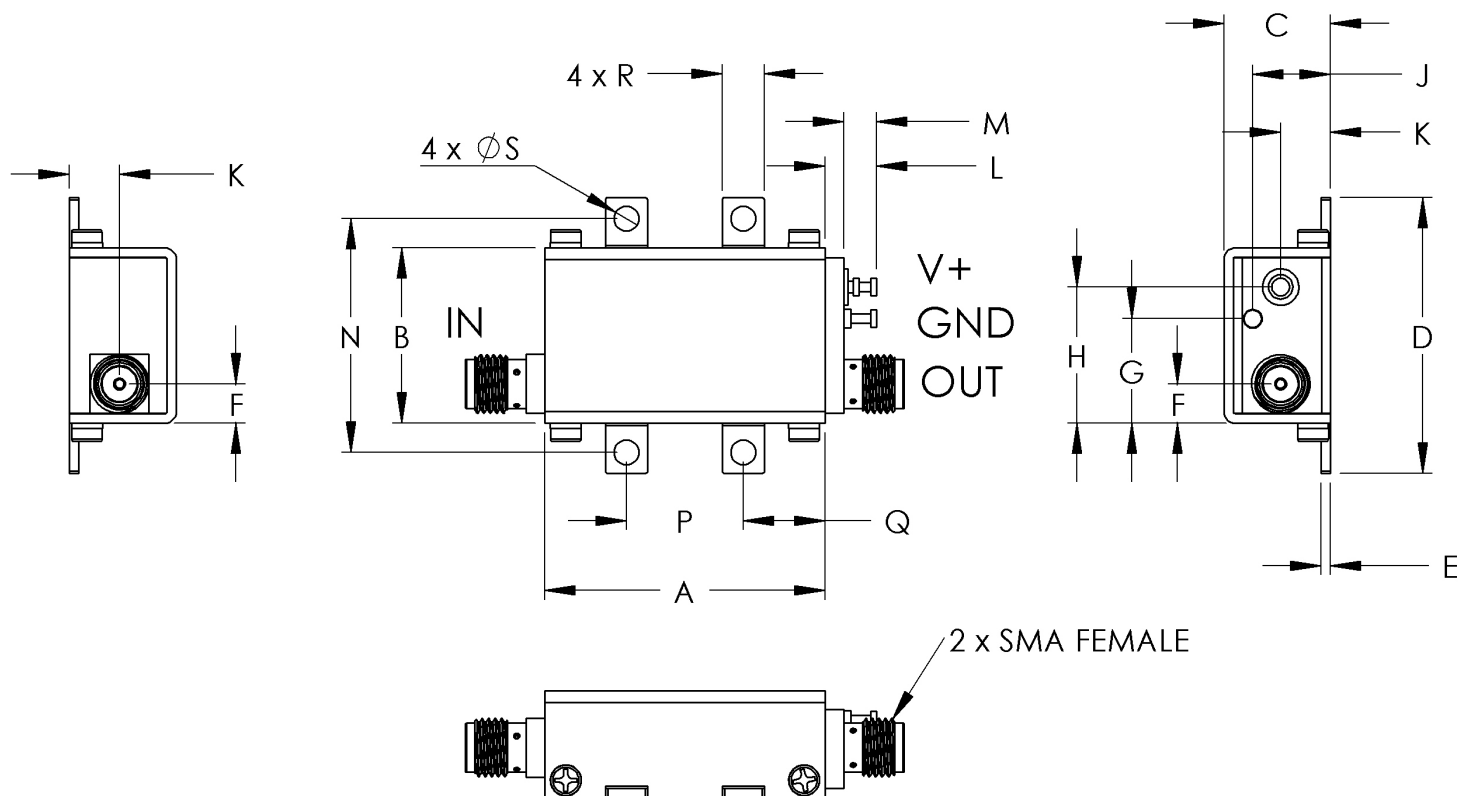
REV. OR
ZX60-272LN-S+
190227
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Case Style

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. $\pm .03$; 3Pl. $\pm .015$
Tolerance on hole size and interaxes dimensions to be $\pm .005$.

Note:

- Case material: Brass
- Case finish: Nickel plate



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Mini-Circuits ISO 9001 & ISO 14001 Certified



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