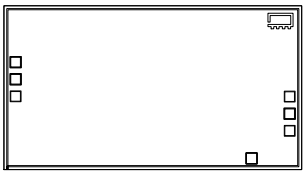
MMIC DIE

Wideband Amplifier AVA-183MP-D+

50Ω DC to 18 GHz

THE BIG DEAL

- Wideband, DC to 18 GHz
- P1dB, +23.2 dBm Typ. at 10 GHz
- OIP3, +29.5 dBm Typ. at 10 GHz
- Reverse Isolation, 27 dB Typ.



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

SEE ORDERING INFORMATION ON THE LAST PAGE

APPLICATIONS

- 5G MIMO and Back Haul Radio Systems
- Satellite Communications
- Test and Measurement Equipment
- Radar, EW, and ECM Defense Systems

PRODUCT OVERVIEW

AVA-183MP-D+ is a GaAs PHEMT MMIC wideband distributed amplifier operating from 0.05 to 18 GHz. The amplifier provides 14.5 dB of Gain, +23 dBm P1dB, and +29.5 dBm OIP3 typical performance while operating from an +8V supply with 160mA current consumption. The amplifier has excellent input and output impedance matches which makes for easy cascading with other devices in multi-chip modules. The AVA-183MP-D+ performance characteristics are ideal for use in wideband Defense Systems and Test and Measurement Equipment.

KEY FEATURES

Feature	Advantages
Wideband: DC to 18 GHz • 20.4 dB Gain Typ. at 50 MHz • 14.2 dB Gain Typ. at 18 GHz	Suitable for wide bandwidth Defense and Test and Measurement application as well as narrow band performance driven applications.
Medium Power • P1dB +23.5 dBm ± 1.5 dB from 0.05 to 18 GHz	Suitable as a driver amplifier in receiver/transmitter chains.
Reverse Isolation, 27 dB Typ.	Isolates adjacent circuitry without need for an external expensive isolator.
Good Input and Output Return Loss • 16 dB typical	Eliminates need for external matching circuit providing published Return Loss.
Unpackaged die	Suitable for chip and wire hybrid assemblies.

REV. OR
ECO-014454
AVA-183M-D+
GY/RS/CP
220804

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ELECTRICAL SPECIFICATIONS[1] AT 25°C, VDD = +8V, IDD = 160mA & Zo = 50Ω UNLESS NOTED OTHERWISE

Parameter	Condition (GHz)	VDD = +8V Min.	VDD = +8V Typ.	VDD = +8V Max.	Units
Frequency Range		0.05		18	GHz
Gain	0.05		20.4		dB
	5		15.9		
	10		14.5		
	15		14.6		
	18		14.2		
Input Return Loss	0.05		10		dB
	5		22		
	10		14		
	15		11		
	18		10		
Output Return Loss	0.05		9		dB
	5		17		
	10		19		
	15		18		
	18		21		
Reverse Isolation	0.05 - 18		27		dB
Output Power at 1 dB Compression[2]	0.05		25.4		dBm
	5		24.4		
	10		23.2		
	15		22.9		
	18		22.9		
Output Third-Order Intercept (Pout = +5 dBm/Tone)	0.05		38.6		dBm
	5		33.4		
	10		29.5		
	15		26.8		
	18		25.2		
Noise Figure	0.05		5.4		dB
	5		2.0		
	10		2.8		
	15		3.5		
	18		4.4		
Device Operating Voltage (VDD)			+8		V
Device Operating Current (IDD)		—	160	—	mA
Device Gate Voltage (VGG)		—	-1.3	—	V
Device Gate Current (IGG)		—	-0.5	—	mA
Thermal Resistance, Junction-to-Ground Lead (ΘJC)		—	17.3	—	°C/W

1. Die is soldered and measured in a die characterization test board. See characterization circuit (Fig. 1). Starting frequency of this device is dependent on the input blocking capacitor value.
2. DC current increases to 258mA Typ. at P1dB.

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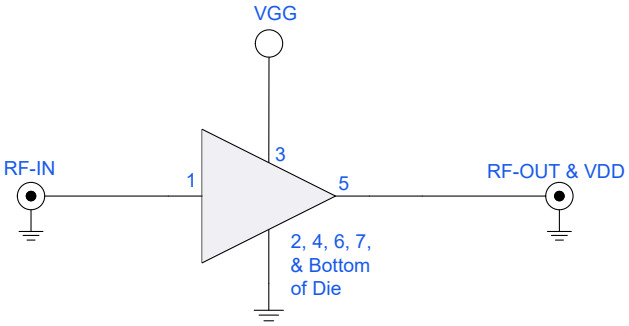
MAXIMUM RATINGS [3]

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to +85°C
Junction Temperature	+150°C[4]
Total Power Dissipation	2.8W
Input Power (CW)	+21dBm
DC Voltage on RF-OUT & VDD	+14V
DC Voltage on VGG	-2V to -0.5V
Current IDD	350mA
Current IGG	-1.5mA to 0mA

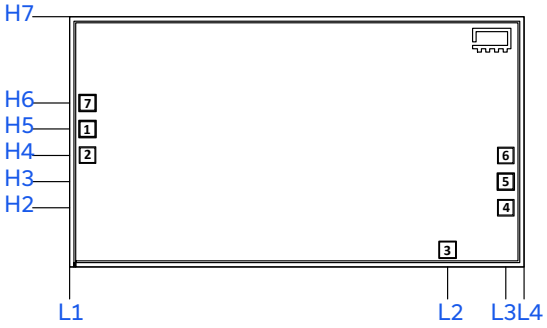
3. Permanent damage may occur if these limits are exceeding.
4. Tj = +85°C + (VDD)*(IDD)*(ΘJC) = +107°C. Keeping Tj below +107°C will ensure MTTF > 100 Years

SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION



Function	Pad #	Description
RF-IN	1	RF Input Pad
VGG	3	Gate Bias Pad
RF-OUT & VDD	5	RF Output and Drain Pad
GROUND	2,4,6,7 & Bottom of Die	The bond pads are connected to backside through vias and do not require wire-bond connections to ground.

BONDING PAD POSITION



DIMENSION IN µm, TYP.

L1	L2	L3	L4
103	2174	2508	2614

H1	H2	H3	H4	H5	H6	H7
98	340	490	640	793	943	1438

Thickness	Die size	Pad size 1,2,4,5,6 & 7	Pad size 3
100	2614 x 1438	85 x 85	93 x 93

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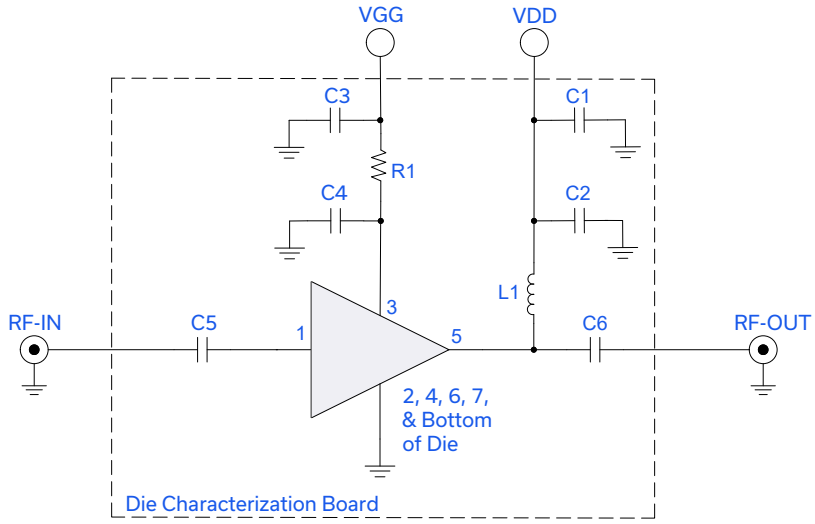
CHARACTERIZATION & APPLICATION TEST CIRCUIT



Component	Value	Size	Part Number	Manufacturer
C2, C3, C5 & C6	0.1uF	0402	0402BB104KG500	Passive Plus
C4	100pF	15 x 15mil	LSA1515B101M2H5C-F	Presidio
C1	NA	NA	Not Used	NA
L1	0.17uH	60 x 40mil	CC20T44K240G5-C	Piconics
R1	1kOhm	0402	RR0510P-102-D	Susumu

Fig 1. Characterization & Application Circuit
Note: This block diagram is used for characterization. (Die is attached and wire-bonded on die characterization test board). Gain, Return Loss, Output Power at 1dB Compression (P1dB), Output IP3 (OIP3) and Noise Figure are measured using Agilent's N5242A PNA-X Microwave Network Analyzer.

Conditions:
1. VDD = +8V
2. VG is set to obtain desired IDD as shown in specification table.
3. Gain and Return Loss: Pin= -25 dBm
4. Output IP3 (OIP3): Two Tones, spaced 1 MHz apart, +5 dBm/Tone at output.

Power ON Sequence:
1) Set VGG = -1.8V. Apply VGG.
2) Set VDD = +8V. Apply VDD.
3) Adjust VGG until IDD = 160mA (Typically, VGG = -1.3V)
4) Apply RF Signal.

Power OFF Sequence:
1) Turn off RF Signal.
2) Adjust VGG down to -1.8V
3) Turn off VDD.
4) Turn off VGG.

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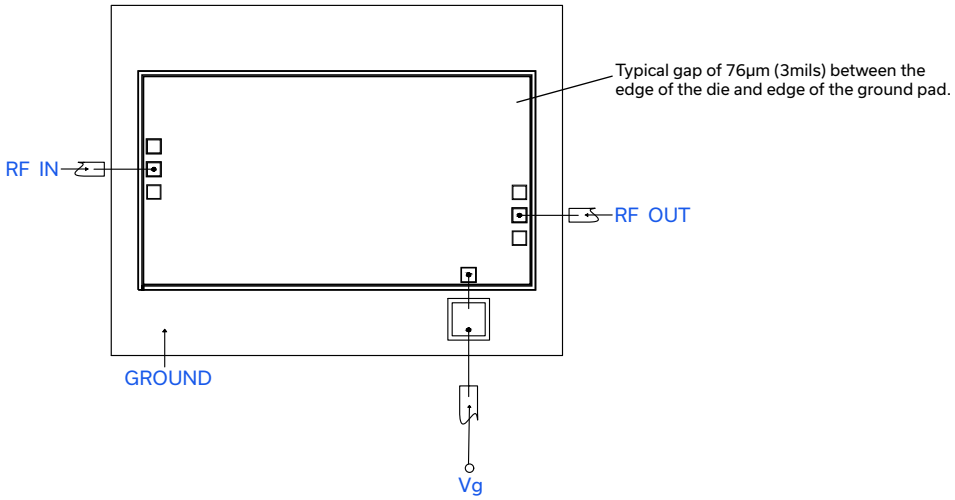
ASSEMBLY DIAGRAM



Note: Tested on die characterization board with following bond lengths:
1. Typical bond length for RF-IN: 305µm (12mils)
2. Typical bond length for RF-OUT & VDD: 330µm (13mils)
3. Typical bond lengths from die, capacitor, and VGG were kept as short as possible
4. 30 pF capacitor can be added as shown for increased stability.

ASSEMBLY AND HANDLING PROCEDURE

1. Storage
   Die should be stored in a dry nitrogen purged desiccators or equivalent.
2. ESD
   MMIC PHEMT amplifer die are susceptible to electrostatic and mechanical damage. Die are supplied in antistatic protected material, which should be open in clean room conditions at an appropriately grounded anti-static workstation.
3. Die Handling and Attachment
   Devices need careful handling using correctly designed collets, it is recommended to handle the chip along the edges with a custom design collet. The die mounting surface must be clean and flat. Using conductive silver filled epoxy, recommended epoxies are Ablestik 84-1 LMISR4 or equivalents. Apply sufficient epoxy to meet required epoxy bond line thickness, epoxy fillet height and epoxy coverage around total periphery. Parts shall be cured in a nitrogen filled atmosphere per manufacturer's cure condition. The surface of the chip has exposed air bridges and should not be touched with vacuum collet, tweezers or fingers.
4. Wire Bonding
   Bond pad openings in the surface passivation above the bond pads are provided to allow wire bonding to the Die gold bond pads. Thermo-sonic bonding is used with minimized ultrasonic content. Bond force, time, ultrasonic power and temperature are all critical parameters. Suggested wire is pure gold, 1mil diameter. Bonds must be made from the bond pads on the die to the packaged or substrate. All bond wire length and bond wire height should be kept as short as possible unless specified by the Assembly Drawing to minimize performance degradation due to undesirable series inductance.

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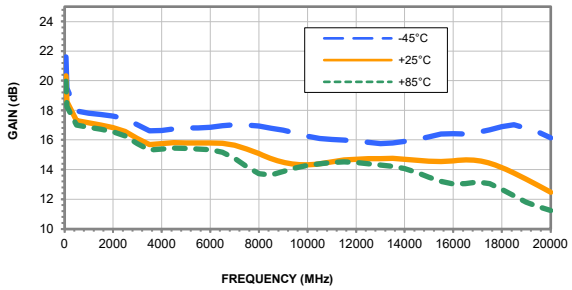
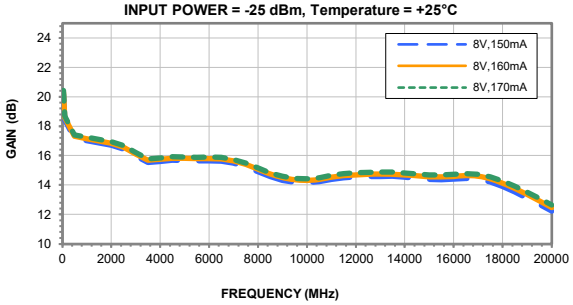
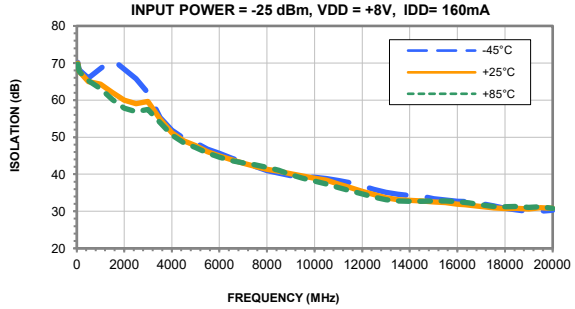
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25 dBm, VDD = +8V, IDD = 160mA



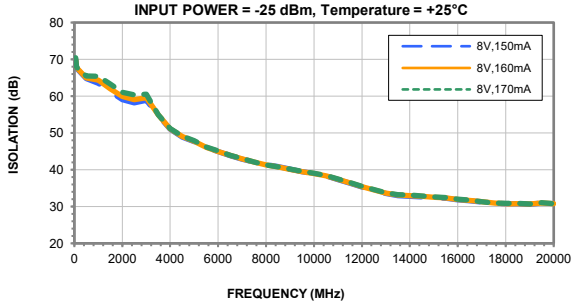
GAIN vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25 dBm, Temperature = +25°C



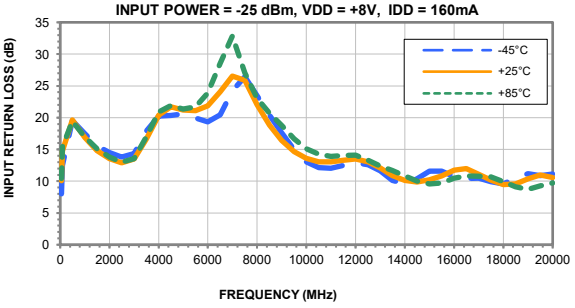
ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25 dBm, VDD = +8V, IDD= 160mA



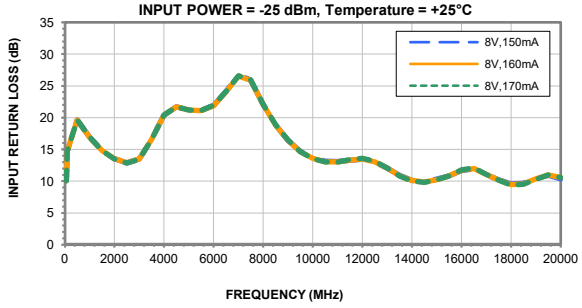
ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25 dBm, Temperature = +25°C



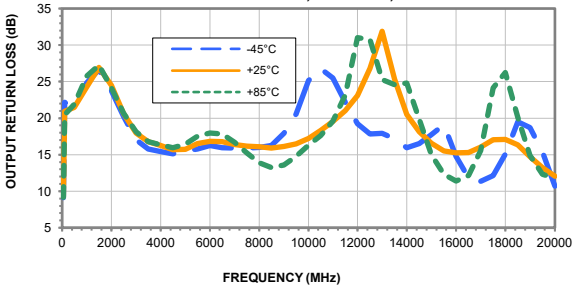
INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25 dBm, VDD = +8V, IDD = 160mA



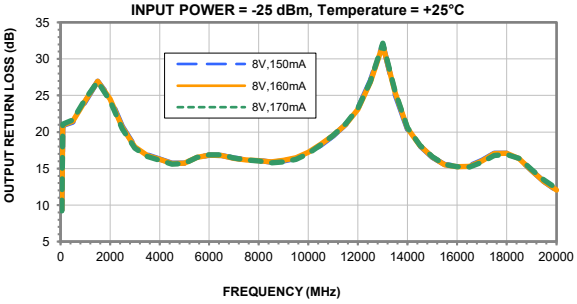
INPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25 dBm, Temperature = +25°C



OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25 dBm, VDD = +8V, IDD= 160mA



OUTPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25 dBm, Temperature = +25°C



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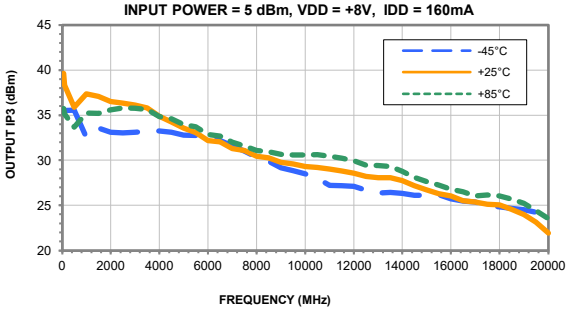
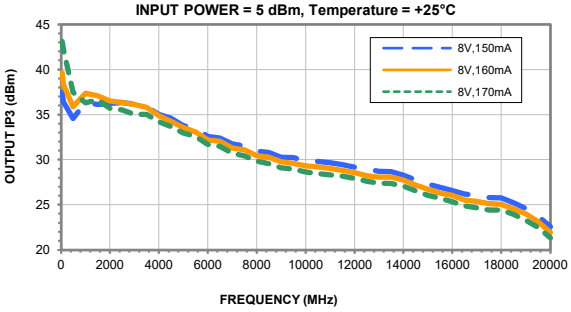
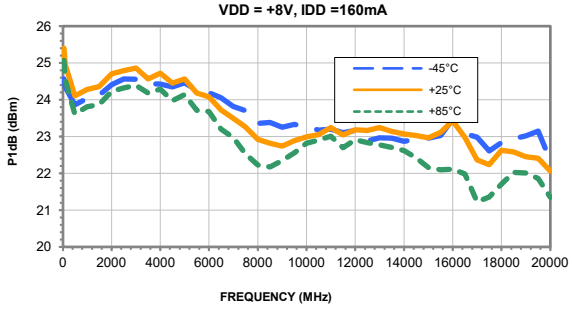
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE
INPUT POWER = 5 dBm, VDD = +8V, IDD = 160mA



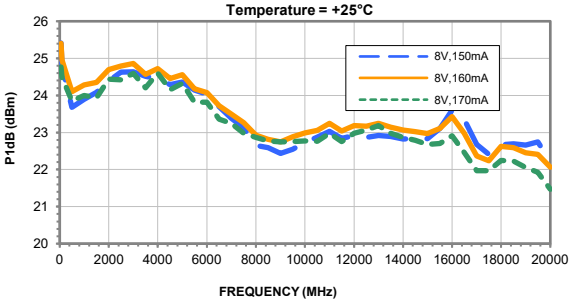
OUTPUT IP3 vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = 5 dBm, Temperature = +25°C



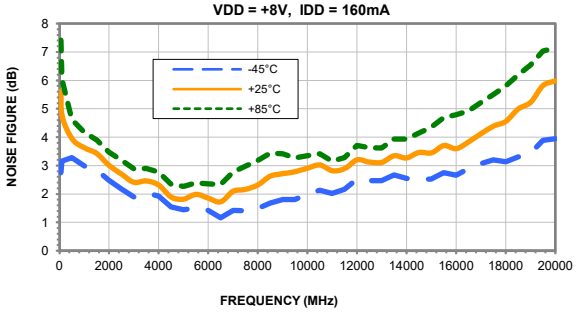
P1dB vs. FREQUENCY & TEMPERATURE
VDD = +8V, IDD =160mA



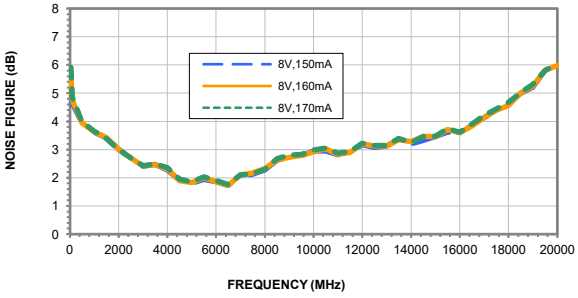
P1dB vs. FREQUENCY & DEVICE VOLTAGE
Temperature = +25°C



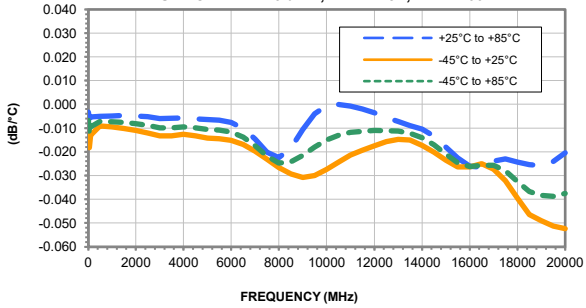
NOISE FIGURE vs. FREQUENCY & TEMPERATURE
VDD = +8V, IDD = 160mA



NOISE FIGURE vs. FREQUENCY & DEVICE VOLTAGE
Temperature = +25°C



GAIN VARIATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25 dBm, VDD = +8V, IDD = 160mA



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ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD.

Performance Data	Data Table Swept Graphs S-Parameter (S2P Files) Data Set with and without port extension(.zip file)
Case Style	Die
Die Ordering and packaging information	Quantity, Package — Model No. Gel - Pak: 5,10,50,100 KGD* — AVA-183MP-DG+ Medium†, Partial wafer: KGD*<570 — AVA-183MP-DP+ Full wafer — AVA-183MP-DF+ †Available upon request contact sales representative Refer to AN-60-067
Die Marking	EL-AMP-7-2
Die TB Reference	XM-C9A1-0404D
Environmental Ratings	ENV80

*Known Good Die ("KGD") means that the die in question have been subjected to Mini-Circuits DC test performance criteria and measurement instructions and that the parametric data of such die fall within a predefined range. While DC testing is not definitive, it does provide a higher degree of confidence that die are capable of meeting typical RF electrical parameters specified by Mini-Circuits.

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.

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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 = 8.00V, Id = 160mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	20.34	70.01	10.06	9.30	121.19	0.97	39.65	25.41	5.62
100	18.58	67.78	14.77	20.96	138.35	1.02	38.33	24.95	4.75
500	17.31	64.99	19.62	21.45	118.82	1.00	35.86	24.10	3.95
1000	17.14	64.33	16.88	24.26	111.59	1.02	37.36	24.28	3.63
1500	17.00	62.02	14.80	26.93	85.98	1.03	37.07	24.35	3.43
2000	16.84	59.94	13.53	24.50	68.05	1.04	36.51	24.70	3.01
2500	16.58	59.03	12.87	20.63	62.32	1.04	36.34	24.79	2.70
3000	16.11	59.59	13.48	17.94	70.13	1.03	36.13	24.86	2.41
3500	15.68	54.91	16.60	16.78	43.83	1.00	35.82	24.57	2.47
4000	15.74	51.17	20.39	16.24	28.58	0.99	34.87	24.72	2.31
4500	15.82	49.02	21.69	15.68	22.11	0.98	34.25	24.45	1.89
5000	15.80	47.72	21.19	15.72	19.04	0.98	33.56	24.56	1.82
5500	15.79	46.10	21.12	16.51	15.90	0.98	33.07	24.18	1.99
6000	15.80	44.97	21.87	16.83	14.00	0.99	32.18	24.08	1.86
6500	15.77	43.89	24.09	16.80	12.44	0.98	32.06	23.72	1.73
7000	15.64	42.95	26.57	16.37	11.32	0.98	31.29	23.49	2.10
7500	15.39	42.09	25.89	16.19	10.54	0.98	31.08	23.26	2.17
8000	15.07	41.34	22.06	16.10	9.98	0.98	30.46	22.93	2.32
8500	14.74	40.77	18.83	15.92	9.64	0.99	30.26	22.82	2.63
9000	14.50	40.12	16.42	16.12	9.10	1.00	29.78	22.74	2.72
9500	14.36	39.51	14.66	16.48	8.55	1.01	29.60	22.89	2.79
10000	14.32	38.94	13.59	17.23	8.01	1.02	29.31	22.99	2.91
10500	14.38	38.38	13.05	18.30	7.46	1.03	29.20	23.05	3.03
11000	14.52	37.36	13.02	19.53	6.57	1.03	29.01	23.25	2.82
11500	14.64	36.43	13.32	21.05	5.87	1.03	28.81	23.04	2.90
12000	14.69	35.40	13.49	23.10	5.20	1.03	28.56	23.18	3.21
12500	14.73	34.51	13.06	26.79	4.67	1.04	28.20	23.17	3.13
13000	14.73	33.64	12.10	31.89	4.19	1.05	28.08	23.25	3.12
13500	14.75	33.09	10.85	25.34	3.85	1.06	28.06	23.14	3.35
14000	14.68	32.94	10.11	20.50	3.75	1.07	27.73	23.07	3.27
14500	14.62	32.77	9.87	18.13	3.65	1.06	27.17	23.02	3.47
15000	14.56	32.50	10.25	16.57	3.56	1.05	26.70	22.97	3.45
15500	14.55	32.35	10.83	15.51	3.51	1.04	26.30	23.11	3.71
16000	14.58	31.91	11.74	15.23	3.36	1.03	26.05	23.42	3.60
16500	14.65	31.65	12.00	15.29	3.25	1.02	25.52	22.98	3.84
17000	14.60	31.27	11.06	16.05	3.11	1.04	25.36	22.36	4.13
17500	14.43	30.92	10.18	17.03	3.04	1.05	25.11	22.24	4.39
18000	14.12	30.82	9.49	17.07	3.09	1.06	25.06	22.62	4.56
18500	13.77	30.81	9.58	16.36	3.21	1.05	24.56	22.59	5.00
19000	13.35	30.70	10.40	14.70	3.33	1.03	23.99	22.45	5.24
19500	12.93	31.00	11.00	13.24	3.54	1.02	23.12	22.41	5.81
20000	12.48	30.77	10.56	12.05	3.50	1.02	21.96	22.06	5.99

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 = 8.00V, Id = 150mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	20.19	70.03	10.06	9.33	123.62	0.97	37.49	25.42	5.38
100	18.43	67.55	14.77	20.90	136.94	1.02	36.42	24.81	4.64
500	17.17	64.75	19.62	21.35	117.52	1.00	34.56	23.67	3.95
1000	17.00	63.49	16.90	24.16	102.98	1.02	36.33	23.90	3.62
1500	16.86	61.21	14.80	26.93	79.69	1.03	36.14	24.08	3.41
2000	16.70	59.03	13.52	24.66	62.29	1.04	36.22	24.39	3.00
2500	16.43	58.19	12.88	20.76	57.53	1.04	36.33	24.62	2.70
3000	15.97	58.91	13.50	18.04	65.96	1.03	36.14	24.63	2.40
3500	15.54	54.80	16.62	16.86	43.96	1.00	35.84	24.52	2.47
4000	15.60	51.05	20.41	16.30	28.65	0.99	35.03	24.44	2.28
4500	15.67	48.89	21.70	15.72	22.15	0.98	34.58	24.29	1.90
5000	15.66	47.64	21.19	15.74	19.19	0.98	33.78	24.36	1.81
5500	15.64	46.04	21.16	16.52	16.08	0.98	33.47	24.15	1.94
6000	15.64	44.94	21.93	16.83	14.19	0.99	32.58	24.03	1.86
6500	15.62	43.82	24.13	16.80	12.55	0.98	32.39	23.69	1.73
7000	15.48	42.88	26.69	16.41	11.45	0.98	31.75	23.39	2.07
7500	15.23	42.08	25.94	16.21	10.73	0.98	31.49	23.12	2.12
8000	14.90	41.41	22.08	16.12	10.27	0.98	30.93	22.65	2.28
8500	14.56	40.87	18.81	15.88	9.94	0.99	30.79	22.59	2.62
9000	14.32	40.16	16.42	16.03	9.34	1.00	30.27	22.44	2.74
9500	14.19	39.50	14.71	16.39	8.70	1.01	30.23	22.54	2.78
10000	14.17	38.92	13.68	17.13	8.14	1.02	29.87	22.72	2.95
10500	14.23	38.35	13.15	18.18	7.57	1.03	29.80	22.87	2.94
11000	14.38	37.31	13.09	19.46	6.64	1.03	29.65	23.03	2.81
11500	14.50	36.35	13.29	21.03	5.91	1.03	29.46	22.84	2.89
12000	14.55	35.31	13.43	23.20	5.24	1.03	29.17	22.92	3.18
12500	14.58	34.40	13.00	27.05	4.69	1.04	28.94	22.87	3.08
13000	14.57	33.54	12.08	32.02	4.21	1.05	28.69	22.92	3.12
13500	14.59	32.98	10.93	25.07	3.88	1.06	28.67	22.90	3.37
14000	14.52	32.80	10.14	20.37	3.76	1.07	28.28	22.82	3.20
14500	14.44	32.65	9.92	18.08	3.68	1.06	27.76	22.84	3.33
15000	14.37	32.38	10.31	16.54	3.59	1.05	27.30	22.83	3.47
15500	14.37	32.23	10.83	15.55	3.53	1.04	26.92	23.11	3.62
16000	14.40	31.85	11.68	15.29	3.40	1.03	26.56	23.60	3.51
16500	14.44	31.59	11.91	15.36	3.30	1.03	26.19	23.35	3.88
17000	14.39	31.24	11.05	16.13	3.17	1.04	25.99	22.67	4.13
17500	14.20	30.91	10.20	17.10	3.11	1.05	25.79	22.41	4.42
18000	13.90	30.81	9.57	17.07	3.16	1.06	25.77	22.67	4.63
18500	13.53	30.79	9.67	16.35	3.30	1.05	25.23	22.70	5.00
19000	13.10	30.68	10.41	14.71	3.41	1.03	24.59	22.66	5.21
19500	12.69	30.99	10.93	13.22	3.63	1.02	23.74	22.74	5.82
20000	12.23	30.79	10.39	12.02	3.59	1.03	22.58	22.22	5.89

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 = 8.00V, Id = 170mA @ Temperature = +25°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	20.45	70.52	10.07	9.24	126.69	0.97	43.11	24.77	5.91
100	18.68	67.83	14.78	21.09	137.46	1.03	42.21	24.49	4.85
500	17.40	65.51	19.65	21.65	124.94	1.00	37.47	23.85	4.00
1000	17.24	65.39	16.90	24.47	124.61	1.02	36.28	24.00	3.65
1500	17.10	63.32	14.80	26.92	98.71	1.03	36.66	23.94	3.39
2000	16.94	61.03	13.52	24.24	76.22	1.04	35.70	24.43	3.00
2500	16.68	60.33	12.86	20.41	71.49	1.04	35.53	24.42	2.70
3000	16.20	60.49	13.47	17.77	76.89	1.03	35.03	24.59	2.43
3500	15.77	54.94	16.61	16.65	43.46	1.00	35.01	24.20	2.49
4000	15.84	51.26	20.41	16.14	28.53	0.98	34.21	24.60	2.36
4500	15.91	49.10	21.71	15.60	22.05	0.98	33.67	24.15	1.95
5000	15.90	47.91	21.18	15.67	19.24	0.98	32.95	24.33	1.85
5500	15.89	46.21	21.13	16.50	15.93	0.98	32.57	23.82	2.04
6000	15.89	45.10	21.94	16.86	14.05	0.99	31.69	23.81	1.91
6500	15.87	43.91	24.13	16.87	12.32	0.98	31.46	23.36	1.77
7000	15.73	43.03	26.59	16.42	11.31	0.98	30.71	23.24	2.10
7500	15.48	42.09	25.95	16.17	10.44	0.98	30.39	22.98	2.13
8000	15.15	41.34	22.11	16.03	9.90	0.98	29.84	22.86	2.30
8500	14.82	40.76	18.89	15.77	9.53	0.99	29.57	22.77	2.68
9000	14.58	40.13	16.45	15.91	9.02	1.00	29.08	22.74	2.80
9500	14.45	39.55	14.67	16.26	8.49	1.01	28.94	22.75	2.83
10000	14.42	39.05	13.56	17.04	8.00	1.02	28.61	22.78	2.98
10500	14.50	38.47	13.02	18.21	7.43	1.03	28.46	22.77	3.05
11000	14.65	37.47	13.01	19.53	6.56	1.03	28.31	22.98	2.87
11500	14.77	36.53	13.38	21.10	5.85	1.03	28.16	22.76	2.93
12000	14.83	35.51	13.58	23.22	5.20	1.03	27.91	22.98	3.22
12500	14.86	34.63	13.14	26.89	4.66	1.04	27.60	23.07	3.14
13000	14.87	33.76	12.10	32.18	4.18	1.05	27.38	23.18	3.15
13500	14.89	33.25	10.82	25.46	3.86	1.06	27.37	22.98	3.40
14000	14.81	33.10	10.04	20.61	3.75	1.07	27.07	22.87	3.25
14500	14.75	32.86	9.84	18.18	3.64	1.07	26.54	22.79	3.47
15000	14.69	32.61	10.23	16.63	3.56	1.05	26.05	22.68	3.48
15500	14.69	32.46	10.85	15.55	3.50	1.04	25.74	22.70	3.74
16000	14.72	32.01	11.77	15.24	3.34	1.03	25.33	22.91	3.61
16500	14.78	31.74	12.07	15.21	3.23	1.02	24.85	22.46	3.90
17000	14.73	31.34	11.10	15.86	3.08	1.04	24.67	21.97	4.21
17500	14.56	30.97	10.15	16.78	3.00	1.05	24.41	21.96	4.43
18000	14.26	30.85	9.41	16.92	3.04	1.06	24.40	22.24	4.67
18500	13.92	30.83	9.50	16.37	3.16	1.05	23.95	22.22	5.02
19000	13.51	30.74	10.29	14.85	3.29	1.03	23.28	22.05	5.31
19500	13.10	31.01	10.97	13.44	3.49	1.02	22.50	21.92	5.81
20000	12.65	30.78	10.58	12.25	3.45	1.03	21.34	21.47	6.03

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 = 8.00V, Id = 160mA @ Temperature = -45°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	21.62	70.15	8.05	9.14	99.06	1.02	35.68	24.57	2.75
100	19.49	68.16	12.48	22.18	127.19	1.05	35.50	24.35	3.15
500	17.95	65.95	19.54	21.49	123.34	1.00	35.54	23.86	3.28
1000	17.81	68.53	17.47	24.84	168.23	1.01	32.55	24.04	2.99
1500	17.71	70.99	15.58	26.63	223.83	1.03	33.55	24.12	2.84
2000	17.61	68.34	14.49	23.73	165.32	1.03	33.09	24.41	2.48
2500	17.42	65.75	13.79	20.24	123.74	1.03	33.05	24.57	2.17
3000	17.03	61.95	14.35	17.03	83.17	1.02	33.09	24.56	1.89
3500	16.61	55.31	17.87	15.78	41.23	0.99	33.22	24.43	2.03
4000	16.63	51.83	20.27	15.43	27.69	0.98	33.23	24.42	1.92
4500	16.74	49.68	20.35	15.11	21.30	0.98	33.10	24.35	1.55
5000	16.80	48.52	20.62	15.49	18.57	0.98	32.77	24.46	1.45
5500	16.80	46.78	19.95	15.76	15.22	0.98	32.73	24.27	1.51
6000	16.86	45.63	19.34	16.25	13.26	0.99	32.36	24.19	1.43
6500	16.96	44.35	20.47	15.95	11.32	0.98	32.18	24.05	1.17
7000	17.02	43.20	24.22	15.91	9.90	0.98	31.61	23.81	1.41
7500	17.01	42.10	26.45	15.91	8.75	0.97	31.03	23.71	1.41
8000	16.94	41.01	23.49	16.00	7.78	0.98	30.35	23.36	1.49
8500	16.80	40.29	20.42	16.23	7.25	0.98	29.89	23.38	1.68
9000	16.66	39.61	17.61	17.94	6.81	1.00	29.15	23.25	1.80
9500	16.46	39.28	14.95	20.53	6.66	1.02	28.86	23.33	1.80
10000	16.24	39.18	13.05	25.13	6.68	1.04	28.50	23.26	1.99
10500	16.09	38.81	12.11	26.80	6.45	1.05	27.98	23.18	2.13
11000	16.02	38.30	12.02	25.49	6.12	1.05	27.20	23.20	2.02
11500	16.00	37.67	12.48	22.17	5.74	1.04	27.17	23.11	2.16
12000	15.91	36.82	12.88	19.25	5.24	1.03	27.10	23.17	2.52
12500	15.83	35.85	12.59	17.85	4.68	1.03	26.67	22.88	2.47
13000	15.76	35.08	11.64	17.90	4.27	1.04	26.37	22.96	2.46
13500	15.80	34.60	10.13	17.20	3.94	1.06	26.41	22.96	2.67
14000	15.89	34.28	9.60	15.94	3.71	1.05	26.32	22.87	2.54
14500	16.03	34.06	10.35	16.52	3.62	1.05	26.11	22.93	2.51
15000	16.20	33.34	11.58	17.73	3.35	1.03	26.10	22.95	2.52
15500	16.40	33.00	11.56	19.11	3.18	1.03	26.19	23.03	2.75
16000	16.43	32.73	10.73	14.75	2.98	1.02	25.71	23.47	2.66
16500	16.40	32.57	10.42	11.83	2.78	1.01	25.48	23.08	2.90
17000	16.51	32.11	10.46	11.33	2.54	1.01	25.35	22.98	3.06
17500	16.68	31.48	9.90	12.15	2.38	1.01	24.95	22.61	3.20
18000	16.89	30.75	9.55	15.09	2.26	1.02	24.83	22.83	3.14
18500	17.02	30.35	10.52	19.50	2.23	1.02	24.67	22.94	3.30
19000	16.78	30.00	11.19	18.71	2.22	1.00	24.52	23.01	3.43
19500	16.52	30.04	10.89	15.37	2.24	1.00	24.24	23.14	3.89
20000	16.14	30.24	11.12	10.68	2.19	0.96	23.29	22.35	3.95

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 = 8.00V, Id = 150mA @ Temperature = -45°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	21.31	70.71	8.06	9.14	109.34	1.01	34.89	24.82	2.76
100	19.19	68.17	12.48	22.17	131.83	1.05	34.27	24.27	3.15
500	17.64	65.81	19.41	21.48	125.67	1.00	34.28	23.70	3.25
1000	17.50	68.06	17.26	24.80	165.01	1.02	31.60	23.89	2.98
1500	17.39	70.51	15.39	26.55	219.33	1.03	32.48	24.01	2.81
2000	17.29	68.02	14.28	23.65	165.03	1.03	32.08	24.29	2.45
2500	17.09	65.97	13.60	20.19	131.70	1.03	31.95	24.48	2.19
3000	16.70	61.96	14.16	16.99	86.30	1.02	31.85	24.50	1.88
3500	16.28	55.30	17.64	15.74	42.74	0.99	31.92	24.42	1.96
4000	16.30	51.79	20.22	15.39	28.60	0.98	31.83	24.44	1.89
4500	16.42	49.64	20.46	15.07	22.01	0.98	31.72	24.39	1.49
5000	16.47	48.57	20.80	15.43	19.40	0.98	31.39	24.46	1.36
5500	16.48	46.75	20.16	15.74	15.74	0.98	31.23	24.32	1.51
6000	16.53	45.60	19.58	16.25	13.72	0.99	30.85	24.29	1.41
6500	16.62	44.31	20.72	16.03	11.71	0.98	30.68	24.23	1.15
7000	16.68	43.27	24.44	16.02	10.38	0.98	30.05	23.95	1.39
7500	16.67	42.13	25.82	16.04	9.14	0.98	29.58	23.75	1.37
8000	16.58	41.10	22.56	16.16	8.18	0.98	29.06	23.41	1.46
8500	16.43	40.42	19.66	16.37	7.66	0.99	28.68	23.32	1.70
9000	16.27	39.68	17.09	17.96	7.16	1.00	28.08	23.21	1.79
9500	16.07	39.33	14.61	20.37	6.99	1.02	27.84	23.27	1.79
10000	15.85	39.21	12.89	24.55	7.00	1.04	27.41	23.27	1.93
10500	15.68	38.83	12.04	26.40	6.76	1.05	27.16	23.21	2.06
11000	15.62	38.23	12.01	25.41	6.36	1.05	26.35	23.23	2.01
11500	15.59	37.60	12.51	22.31	5.97	1.04	26.27	23.14	2.13
12000	15.50	36.71	12.83	19.43	5.43	1.03	26.14	23.12	2.52
12500	15.41	35.77	12.40	17.91	4.86	1.04	25.80	22.89	2.42
13000	15.33	35.00	11.36	17.74	4.42	1.05	25.54	22.93	2.49
13500	15.37	34.53	9.90	16.94	4.08	1.06	25.58	22.91	2.66
14000	15.46	34.18	9.43	15.95	3.84	1.06	25.47	22.76	2.49
14500	15.60	34.06	10.25	16.77	3.79	1.05	25.28	22.78	2.52
15000	15.77	33.27	11.47	18.17	3.49	1.04	25.12	22.94	2.53
15500	15.93	32.96	11.48	19.68	3.33	1.04	25.10	23.15	2.76
16000	15.95	32.75	10.76	15.15	3.15	1.03	24.65	23.69	2.61
16500	15.91	32.53	10.52	12.21	2.94	1.01	24.45	23.36	2.90
17000	15.99	32.08	10.39	11.62	2.70	1.02	24.27	23.28	3.14
17500	16.10	31.51	9.69	12.20	2.54	1.02	23.87	22.93	3.22
18000	16.26	30.83	9.42	14.74	2.43	1.03	23.79	23.07	3.21
18500	16.36	30.46	10.47	18.48	2.41	1.02	23.58	23.11	3.37
19000	16.10	30.14	11.22	18.17	2.42	1.01	23.40	23.13	3.53
19500	15.79	30.19	10.98	15.29	2.46	1.00	23.13	23.26	3.99
20000	15.38	30.42	11.09	10.89	2.43	0.98	22.21	22.56	4.08

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: Vd = 8.00V, Id = 170mA @ Temperature = -45°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	21.80	70.72	8.07	9.14	103.52	1.01	37.43	24.03	2.84
100	19.68	68.42	12.52	22.18	128.27	1.05	37.33	24.00	3.15
500	18.14	66.13	19.65	21.51	123.19	1.00	36.64	23.65	3.28
1000	18.01	68.80	17.61	24.84	169.78	1.01	33.56	23.85	2.99
1500	17.92	72.05	15.74	26.59	247.33	1.02	35.08	23.90	2.83
2000	17.82	68.81	14.63	23.68	170.50	1.03	34.65	24.19	2.46
2500	17.63	65.93	13.94	20.21	123.49	1.03	34.52	24.31	2.23
3000	17.24	61.62	14.46	17.01	78.21	1.02	34.69	24.29	1.91
3500	16.82	55.19	17.99	15.77	39.70	0.99	34.88	24.15	2.03
4000	16.84	51.72	20.29	15.43	26.71	0.98	35.01	24.25	1.98
4500	16.95	49.70	20.29	15.10	20.85	0.98	34.65	24.09	1.53
5000	17.00	48.50	20.45	15.50	18.10	0.98	34.27	24.17	1.44
5500	17.01	46.78	19.87	15.77	14.85	0.98	34.03	23.99	1.52
6000	17.06	45.65	19.35	16.24	12.98	0.99	33.55	23.84	1.42
6500	17.16	44.35	20.39	15.96	11.06	0.98	33.24	23.72	1.15
7000	17.22	43.23	24.05	15.93	9.71	0.98	32.66	23.52	1.40
7500	17.22	42.05	26.86	15.90	8.50	0.97	31.93	23.45	1.37
8000	17.15	40.97	24.11	16.00	7.57	0.98	31.16	23.09	1.45
8500	17.00	40.21	20.97	16.23	7.02	0.98	30.64	23.21	1.72
9000	16.86	39.55	17.98	17.93	6.62	1.00	29.91	23.04	1.80
9500	16.65	39.24	15.18	20.59	6.49	1.02	29.62	23.08	1.82
10000	16.44	39.19	13.17	25.07	6.55	1.04	29.06	23.03	1.99
10500	16.27	38.90	12.18	26.52	6.39	1.05	28.65	22.87	2.16
11000	16.21	38.39	12.06	25.05	6.06	1.05	27.77	22.87	1.97
11500	16.20	37.79	12.48	21.76	5.68	1.04	27.70	22.68	2.15
12000	16.12	36.93	12.89	18.90	5.18	1.03	27.58	22.81	2.51
12500	16.04	35.95	12.67	17.62	4.62	1.03	27.23	22.50	2.43
13000	15.99	35.16	11.78	18.04	4.21	1.04	26.92	22.63	2.41
13500	16.05	34.66	10.30	17.57	3.88	1.05	26.99	22.65	2.68
14000	16.14	34.35	9.72	16.21	3.66	1.05	26.95	22.56	2.50
14500	16.27	34.13	10.49	16.68	3.57	1.04	26.88	22.55	2.55
15000	16.45	33.36	11.73	17.72	3.28	1.03	26.85	22.58	2.48
15500	16.66	32.99	11.63	19.13	3.09	1.03	27.01	22.62	2.70
16000	16.70	32.74	10.71	14.68	2.89	1.02	26.40	23.11	2.66
16500	16.68	32.57	10.39	11.63	2.69	1.00	26.27	22.63	2.82
17000	16.82	32.09	10.53	11.14	2.45	1.00	26.13	22.58	3.00
17500	17.01	31.47	10.03	12.06	2.29	1.01	25.67	22.14	3.14
18000	17.26	30.71	9.60	15.23	2.17	1.02	25.60	22.41	3.12
18500	17.39	30.27	10.52	20.36	2.13	1.01	25.35	22.51	3.25
19000	17.17	29.91	11.16	19.39	2.12	1.00	25.20	22.66	3.38
19500	16.91	29.90	10.76	15.56	2.12	0.99	25.06	22.78	3.78
20000	16.56	30.09	11.06	10.61	2.07	0.96	24.17	21.91	3.76

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 = 8.00V, Id = 160mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	19.97	69.78	10.44	9.19	123.76	0.96	35.74	25.07	7.42
100	18.25	67.74	15.41	20.47	143.46	1.02	35.13	24.54	6.04
500	17.01	65.25	19.42	21.90	126.86	1.00	33.68	23.61	4.62
1000	16.85	63.10	16.96	25.76	100.32	1.02	35.24	23.81	4.17
1500	16.72	60.16	15.13	27.23	71.96	1.03	35.21	23.87	3.89
2000	16.54	57.77	13.81	24.13	55.00	1.04	35.60	24.23	3.47
2500	16.27	56.86	12.98	20.69	50.38	1.04	35.80	24.32	3.19
3000	15.74	57.45	13.54	18.12	57.24	1.03	35.78	24.39	2.89
3500	15.32	53.93	16.98	16.79	40.86	1.00	35.63	24.18	2.89
4000	15.39	50.52	20.88	16.32	27.64	0.98	34.85	24.29	2.77
4500	15.45	48.46	21.91	15.94	21.67	0.98	34.59	23.97	2.34
5000	15.42	47.22	21.38	16.41	18.89	0.98	33.95	24.14	2.27
5500	15.39	45.69	21.71	17.51	15.97	0.99	33.71	23.71	2.39
6000	15.34	44.59	23.89	17.96	14.22	0.99	32.87	23.68	2.35
6500	15.16	43.70	28.58	17.81	13.14	0.98	32.67	23.20	2.33
7000	14.75	43.05	32.87	16.69	12.73	0.98	32.00	22.98	2.78
7500	14.18	42.51	27.04	15.26	12.64	0.97	31.58	22.53	2.98
8000	13.72	41.87	23.05	13.88	12.21	0.96	31.08	22.23	3.17
8500	13.64	41.06	20.67	13.22	11.09	0.96	30.93	22.18	3.44
9000	13.86	39.90	18.77	13.58	9.45	0.97	30.65	22.35	3.42
9500	14.11	38.88	16.65	14.77	8.19	0.99	30.59	22.55	3.27
10000	14.28	38.09	15.12	16.28	7.36	1.00	30.60	22.82	3.34
10500	14.38	37.34	14.24	17.63	6.69	1.01	30.63	22.91	3.41
11000	14.48	36.41	13.91	19.59	5.98	1.02	30.45	23.01	3.15
11500	14.52	35.55	14.03	23.15	5.43	1.02	30.24	22.69	3.28
12000	14.48	34.67	14.09	31.05	4.95	1.03	29.96	22.91	3.71
12500	14.39	33.85	13.29	30.73	4.53	1.03	29.44	22.84	3.63
13000	14.29	33.11	12.40	25.29	4.17	1.04	29.43	22.77	3.61
13500	14.21	32.76	11.67	24.58	4.00	1.05	29.29	22.71	3.94
14000	14.06	32.66	10.83	24.79	3.97	1.06	28.78	22.62	3.94
14500	13.81	32.69	10.02	19.84	4.00	1.07	28.09	22.42	4.14
15000	13.48	32.75	9.54	15.00	4.04	1.06	27.63	22.16	4.35
15500	13.20	32.79	9.72	12.30	4.04	1.04	27.24	22.09	4.69
16000	13.02	32.58	10.45	11.40	3.99	1.02	26.80	22.11	4.79
16500	13.06	32.27	10.80	12.13	3.93	1.02	26.49	21.99	4.92
17000	13.17	31.72	10.76	15.55	3.82	1.04	26.05	21.23	5.21
17500	13.05	31.33	10.66	24.12	3.80	1.07	26.13	21.35	5.49
18000	12.66	31.26	9.92	26.24	3.86	1.09	26.04	21.71	5.81
18500	12.24	31.30	9.10	20.09	3.97	1.09	25.67	22.03	6.19
19000	11.80	31.08	8.76	14.90	3.98	1.07	25.22	22.01	6.54
19500	11.49	31.24	9.25	12.33	4.08	1.04	24.42	21.86	7.03
20000	11.25	30.85	9.71	11.78	3.95	1.04	23.53	21.35	7.14

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 = 8.00V, Id = 150mA @ Temperature = +85°C

FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	19.84	69.94	10.45	9.23	128.16	0.96	35.53	25.16	7.23
100	18.13	67.64	15.44	20.37	143.85	1.02	34.49	24.50	5.92
500	16.89	64.68	19.46	21.72	120.35	1.00	33.13	23.28	4.59
1000	16.73	62.16	16.99	25.55	91.32	1.02	34.83	23.48	4.15
1500	16.60	59.17	15.17	27.33	65.11	1.03	34.61	23.62	3.89
2000	16.43	56.77	13.85	24.39	49.68	1.04	34.99	23.88	3.44
2500	16.15	55.79	13.04	20.91	45.20	1.04	35.51	24.12	3.18
3000	15.63	56.44	13.58	18.28	51.67	1.03	35.30	24.06	2.86
3500	15.22	53.55	17.02	16.92	39.64	1.00	35.31	24.00	2.89
4000	15.28	50.27	20.87	16.43	27.24	0.99	34.65	23.87	2.72
4500	15.34	48.21	21.89	16.02	21.32	0.98	34.43	23.79	2.30
5000	15.30	46.97	21.33	16.47	18.59	0.98	33.92	23.79	2.23
5500	15.27	45.51	21.69	17.54	15.85	0.99	33.85	23.57	2.40
6000	15.22	44.42	23.86	17.95	14.15	0.99	33.07	23.42	2.40
6500	15.04	43.56	28.56	17.79	13.11	0.98	32.87	23.05	2.26
7000	14.63	42.93	33.57	16.66	12.74	0.98	32.21	22.67	2.72
7500	14.05	42.45	27.31	15.21	12.75	0.97	31.99	22.20	2.95
8000	13.60	41.86	23.19	13.84	12.37	0.96	31.49	21.82	3.23
8500	13.53	41.01	20.78	13.22	11.18	0.96	31.48	21.88	3.39
9000	13.76	39.84	18.86	13.61	9.51	0.97	31.08	22.00	3.40
9500	14.01	38.82	16.77	14.83	8.24	0.99	31.12	22.27	3.25
10000	14.18	38.00	15.23	16.36	7.38	1.00	31.12	22.56	3.31
10500	14.28	37.23	14.34	17.69	6.69	1.01	31.10	22.71	3.31
11000	14.37	36.30	13.97	19.62	5.98	1.02	31.01	22.82	3.13
11500	14.41	35.43	14.01	23.13	5.43	1.02	30.79	22.52	3.25
12000	14.36	34.53	14.03	30.90	4.94	1.03	30.40	22.63	3.61
12500	14.27	33.71	13.29	30.53	4.52	1.03	30.00	22.48	3.60
13000	14.17	32.96	12.46	25.22	4.16	1.04	29.88	22.44	3.62
13500	14.09	32.62	11.79	24.51	4.00	1.05	29.87	22.39	3.91
14000	13.93	32.51	10.96	24.58	3.96	1.06	29.32	22.32	3.86
14500	13.68	32.52	10.08	19.68	3.99	1.07	28.69	22.12	4.11
15000	13.34	32.60	9.58	14.90	4.03	1.06	28.16	21.91	4.28
15500	13.06	32.66	9.70	12.25	4.04	1.04	27.83	21.98	4.67
16000	12.88	32.45	10.38	11.39	3.98	1.02	27.47	22.15	4.63
16500	12.93	32.16	10.75	12.18	3.94	1.02	27.13	22.08	4.90
17000	13.04	31.60	10.77	15.76	3.83	1.04	26.75	21.36	5.17
17500	12.91	31.23	10.73	24.79	3.82	1.07	26.83	21.38	5.41
18000	12.53	31.17	10.02	26.76	3.89	1.09	26.81	21.70	5.77
18500	12.12	31.20	9.17	20.36	3.99	1.09	26.42	21.99	6.17
19000	11.69	30.99	8.80	14.98	3.99	1.07	25.90	22.17	6.51
19500	11.38	31.13	9.26	12.32	4.07	1.05	25.16	22.22	7.01
20000	11.16	30.72	9.69	11.72	3.93	1.04	24.39	21.47	6.94

Typical Performance Data

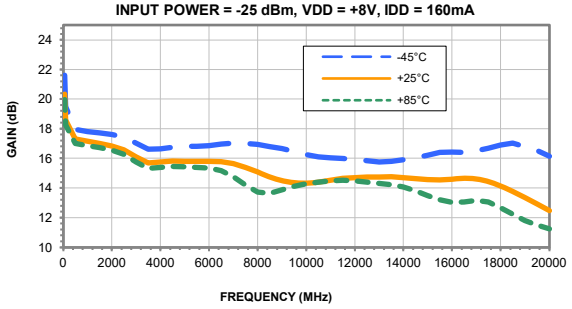
Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 8.00V, Id = 170mA @ Temperature = +85°C

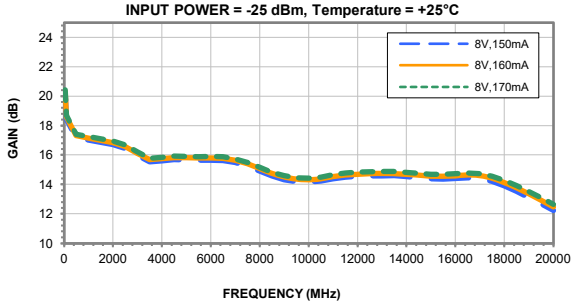
FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
50	20.08	70.24	10.46	9.15	128.79	0.96	36.78	24.40	7.64
100	18.36	67.98	15.43	20.50	145.65	1.02	35.50	24.06	6.22
500	17.12	65.25	19.44	22.01	125.31	1.00	34.10	23.39	4.64
1000	16.96	63.62	16.97	25.90	105.21	1.02	35.75	23.59	4.18
1500	16.82	60.85	15.14	27.14	76.92	1.03	35.53	23.56	3.95
2000	16.65	58.38	13.82	23.96	58.25	1.04	35.89	24.01	3.49
2500	16.38	57.49	12.98	20.55	53.49	1.04	35.95	24.03	3.21
3000	15.85	58.01	13.52	18.01	60.27	1.03	35.87	24.18	2.92
3500	15.43	54.14	16.98	16.71	41.32	1.00	35.62	23.88	2.95
4000	15.50	50.66	20.88	16.26	27.73	0.98	34.83	24.19	2.78
4500	15.55	48.55	21.90	15.90	21.62	0.98	34.55	23.68	2.35
5000	15.52	47.33	21.35	16.40	18.88	0.98	33.84	23.93	2.29
5500	15.50	45.76	21.72	17.53	15.92	0.99	33.54	23.39	2.46
6000	15.45	44.66	23.94	18.00	14.17	0.99	32.76	23.47	2.34
6500	15.26	43.75	28.60	17.85	13.06	0.98	32.49	22.91	2.31
7000	14.86	43.06	33.14	16.66	12.59	0.98	31.75	22.77	2.80
7500	14.28	42.52	27.08	15.17	12.50	0.97	31.36	22.34	3.03
8000	13.83	41.89	23.11	13.78	12.08	0.96	30.87	22.15	3.22
8500	13.76	41.02	20.76	13.14	10.88	0.96	30.62	22.13	3.46
9000	13.99	39.86	18.88	13.52	9.27	0.97	30.39	22.28	3.46
9500	14.25	38.87	16.69	14.73	8.06	0.99	30.28	22.41	3.36
10000	14.41	38.11	15.12	16.27	7.26	1.00	30.29	22.59	3.34
10500	14.51	37.38	14.22	17.65	6.62	1.01	30.28	22.69	3.32
11000	14.61	36.47	13.90	19.67	5.93	1.02	30.14	22.77	3.15
11500	14.65	35.61	14.05	23.26	5.39	1.02	29.96	22.49	3.33
12000	14.60	34.73	14.15	31.03	4.92	1.03	29.46	22.75	3.64
12500	14.52	33.91	13.35	30.67	4.50	1.03	29.07	22.78	3.63
13000	14.42	33.17	12.42	25.34	4.14	1.04	29.02	22.71	3.65
13500	14.34	32.84	11.64	24.63	3.98	1.05	28.87	22.58	3.93
14000	14.18	32.77	10.81	24.87	3.96	1.06	28.41	22.49	3.92
14500	13.94	32.75	9.99	19.91	3.97	1.07	27.85	22.25	4.23
15000	13.60	32.82	9.53	15.02	4.02	1.06	27.36	21.91	4.40
15500	13.32	32.86	9.72	12.30	4.02	1.03	26.89	21.76	4.73
16000	13.15	32.62	10.48	11.39	3.95	1.02	26.50	21.68	4.66
16500	13.19	32.32	10.83	12.09	3.89	1.02	26.09	21.55	4.94
17000	13.31	31.73	10.75	15.52	3.75	1.04	25.69	20.79	5.08
17500	13.21	31.34	10.61	24.13	3.73	1.07	25.69	21.02	5.55
18000	12.83	31.21	9.88	25.99	3.76	1.09	25.62	21.35	5.81
18500	12.42	31.28	9.06	20.18	3.88	1.10	25.26	21.66	6.27
19000	11.99	31.06	8.76	15.02	3.89	1.07	24.78	21.56	6.54
19500	11.70	31.18	9.27	12.44	3.97	1.04	24.00	21.35	7.05
20000	11.48	30.74	9.79	11.93	3.82	1.04	23.17	21.04	7.05

Typical Performance Curves

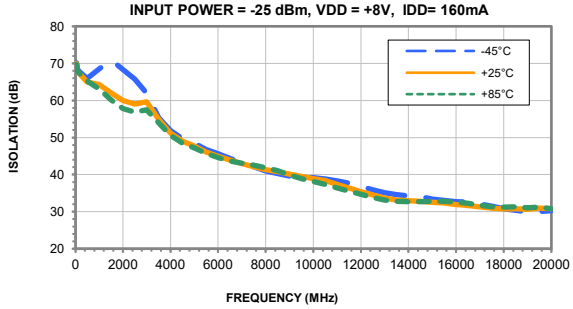
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25 dBm, VDD = +8V, IDD = 160mA



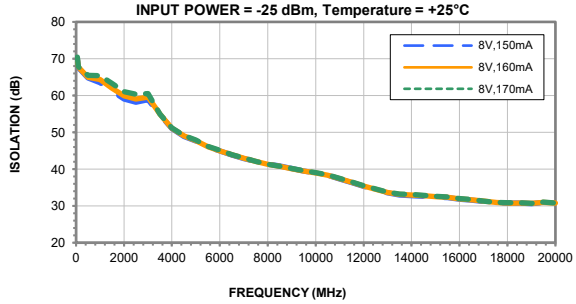
GAIN vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25 dBm, Temperature = +25°C



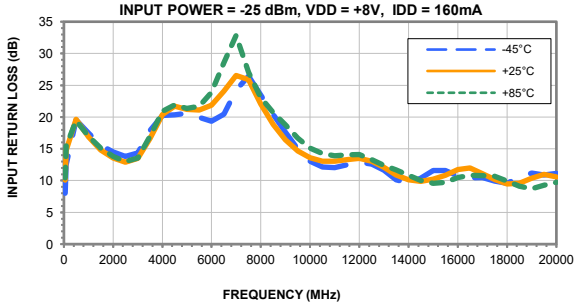
ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25 dBm, VDD = +8V, IDD= 160mA



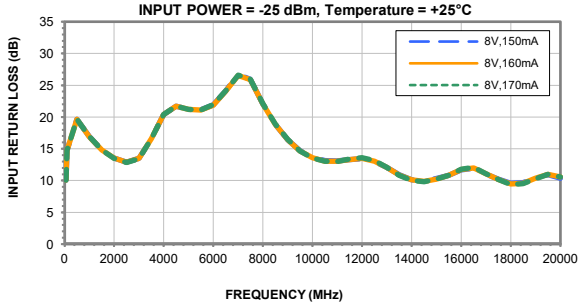
ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25 dBm, Temperature = +25°C



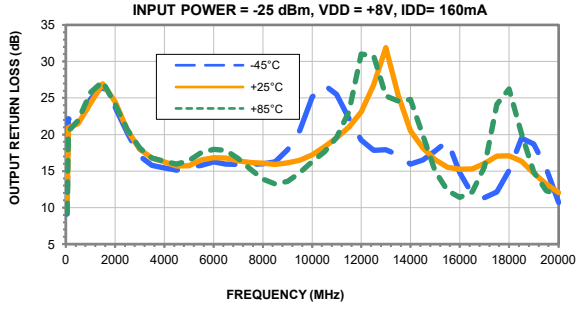
INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25 dBm, VDD = +8V, IDD = 160mA



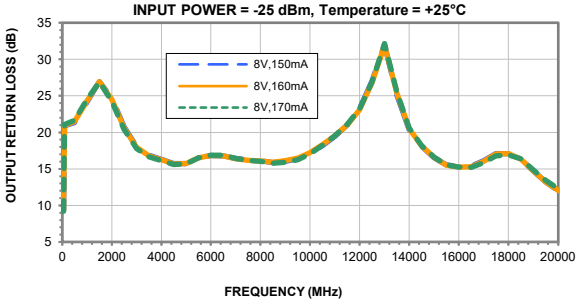
INPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25 dBm, Temperature = +25°C



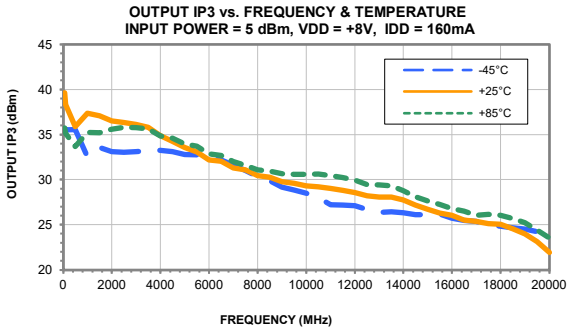
OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25 dBm, VDD = +8V, IDD= 160mA

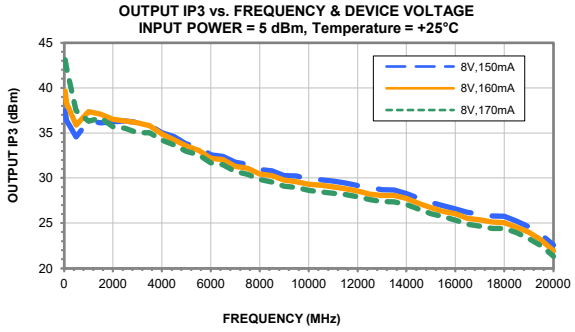


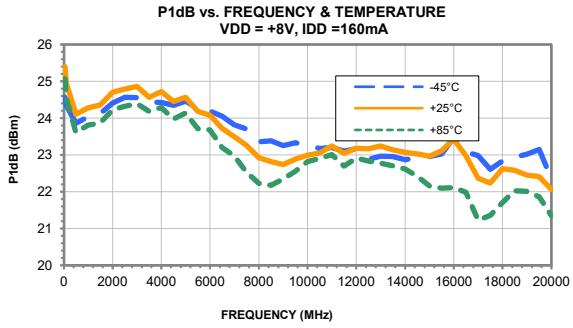
OUTPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25 dBm, Temperature = +25°C

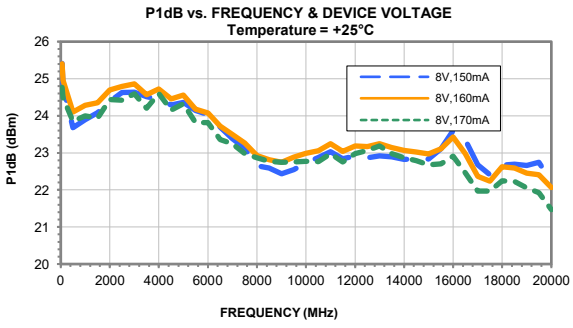


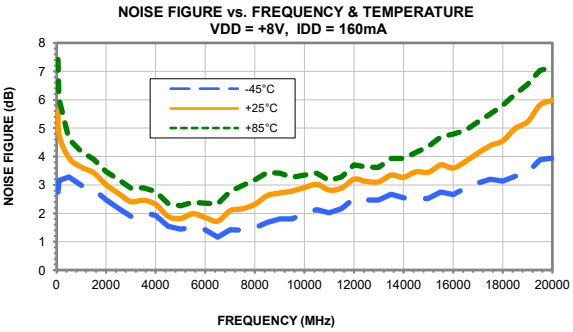
Typical Performance Curves

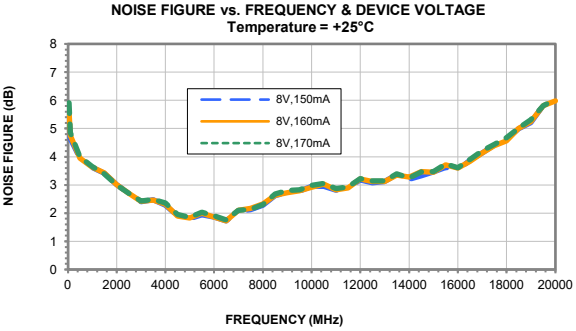


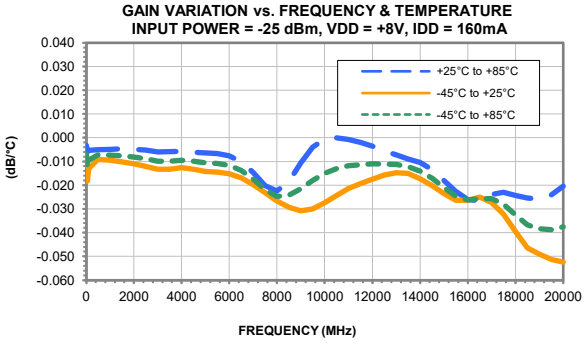












Mini-Circuits

Environmental Specifications ENV80

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 or -40° to 105° C or -55° to 105° C or -45° to 105° C Ambient Environment	Refer to Individual Model Data Sheet
Storage Environment (Die)	-65° to 150°C	Individual Model Data Sheet
Storage Environment(Packaging)	-40° to 70°C and 40 to 60% humidity (In Factory Shipped Package)	