WIDEBAND, MICROWAVE, SHUTDOWN

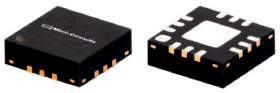
Monolithic Amplifier

TSS-44+

50Ω 22 to 43.5 GHz

THE BIG DEAL

- 22 to 43.5 GHz for 5G Applications
- Gain, 17.6 dB typ. & Flatness, ±0.9 dB to 40 GHz
- Excellent active directivity, 28 dB typ.
- Positive Supply Voltage, +4V, 22mA
- Integrated DC blocks, Bias-Tee & Microwave bypass capacitor
- Unconditionally Stable
- Aqueous washable; 3x3mm SMT package
- Shutdown feature



Generic photo used for illustration purposes only

CASE STYLE: DQ1225

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

APPLICATIONS

- 5G
- Radio Navigation
- Mobile
- Fixed satellite
- Space research

PRODUCT OVERVIEW

The TSS-44+ is a surface mount, MMIC amplifier with shutdown feature fabricated using E-PHEMT technology and is a fully integrated 3-stage gain block up to 43.5 GHz with excellent active directivity. It is packaged in industry standard 3x3 mm MCLP™ package, which provides excellent RF and thermal performance. The TSS-44+ integrates the entire matching network with the majority of the bias circuit inside the package, reducing the need for complicated external circuits. This approach makes the TSS-44+ extremely flexible and enables simple, straightforward use.

KEY FEATURES

Feature	Advantages
Wideband, 22 to 43.5 GHz	The broad frequency range supports a wide array of requirements including telecommunications applications such as 5G and microwave radio backhaul, broadband commercial test and measurement systems, radar and commercial satellite applications
Excellent Gain Flatness	Typical ±0.9 dB gain flatness across the entire frequency range minimizes the need for external equalizer networks making it a great fit for instrumentation and other broadband applications
High Directivity	With active directivity of 28 dB, the TSS-44+ is an excellent choice for buffering broadband circuits. eliminating the need for an expensive isolator in most cases.
Shutdown feature	Allow users to turn on and off the amplifier with pulsed signals while keeping the power supply at constant voltage.
Small size	3x3 mm, 12-lead MCLP™ package
Integrated DC Blocks & Bias-Tee	Saves motherboard space and minimizes overall cost. Very user friendly.

REV. A
ECO-011809
TSS-44+
MCL NY
240805

Monolithic Amplifier TSS-44+

ELECTRICAL SPECIFICATIONS[1] AT +25°C, ZO=50Ω, AND V_{DD}=+4V, UNLESS OTHERWISE NOTED.

Parameter	Condition (GHz)	Amplifier-ON			Amplifier-OFF	Units
		Min.	Typ.	Max.	Typ.	
Frequency Range		22		43.5	22-43.5	GHz
Noise Figure	22		3.7		—	dB
	25		3.3		—	
	30		3.2		—	
	35		3.3		—	
	40		3.5		—	
	43.5		4.2		—	
Gain	22	13.5	15.8	18.6	-41	dB
	25	14.3	16.8	19.7	-33	
	30	14.8	17.6	20.4	-29	
	35	—	17.7	—	-30	
	40	—	15.7	—	-27	
	43.5	—	10.0	—	-24	
Gain Flatness	22-40		0.9		—	dB
Directivity	22-43.5		28		—	dB
Input Return Loss	22		10		3	dB
	25		17		6	
	30		16		5	
	35		12		3	
	40		9		5	
	43.5		8		5	
Output Return Loss	22		13		9	dB
	25		14		8	
	30		18		9	
	35		9		7	
	40		7		4	
	43.5		9		9	
Output Power @1dB compression AMP-ON	22		+1.2		—	dBm
	25		+1.8		—	
	30		+4.1		—	
	35		+6.4		—	
	40		+7.8		—	
	43.5		+8.2		—	
Output IP3 (Pout=-10dBm/tone)	22		+10.1		—	dBm
	25		+10.1		—	
	30		+12.7		—	
	35		+16.7		—	
	40		+15.5		—	
	43.5		+15.9		—	
Device Operating Voltage (V_{DD})		+3.8	+4.0	+4.2	+4.0	V
Device Operating Current (Id)		—	22	36	3	mA
Control Voltage (V_G)		+3.8	+4.0	+4.2	0	V
Control Current (I_G)			8		2	mA
DC Current (Id) Variation Vs. Temperature[2]			-15		—	µA/°C
DC Current (Id) Variation Vs. Voltage			0.006		—	mA/mV
Thermal Resistance			51.9		—	°C/W

1 Measured on Mini-Circuits Characterization test board TB-TSS-44+. See Characterization Test Circuit (Fig. 1)
2 (Current at 85°C - Current at -45°C)/130

ABSOLUTE MAXIMUM RATINGS[3]

Parameter	Ratings
Operating Temperature (ground lead)	-40°C to +85°C
Storage Temperature	-55°C to +100°C
Total Power Dissipation	0.94 W
Input Power	+19 dBm (5 min. max), 8 dBm (continuous)
DC Voltage V_{DD}[4] (Pad 11)	+6 V
DC Voltage V_G[5] (Pad 12)	+5 V

3. Permanent damage may occur if these limits are exceeded.
4. Measured by keeping VG=0V.
5. Measured by keeping Vdd=5V.

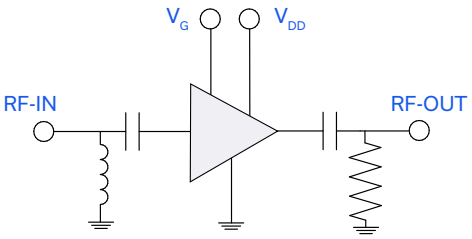
CONTROL VOLTAGE (V_G) FIG. 1

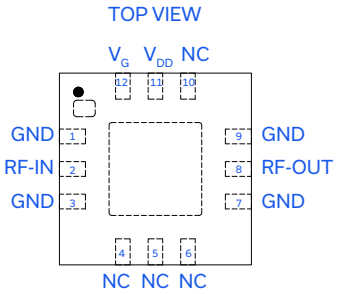
	Min.	Typ.	Max.	Units
Amplifier-ON	3.8	4	4.2	V
Amplifier-OFF	—	0	0.2	V

SWITCHING SPECIFICATIONS (RISE/FALL TIME)

Parameter		Min.	Typ.	Max.	Units
Amplifier ON to Shutdown	OFF TIME (50% Control to 10% RF)	—	9.8	—	µs
	FALL TIME (90 to 10% RF)	—	9.2	—	
Amplifier Shutdown to ON	ON TIME (50% Control to 90% RF)	—	11.2	—	µs
	RISE TIME (10% to 90% RF)	—	10.7	—	
Control Voltage Leakage		—	2.0	—	mV

SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION

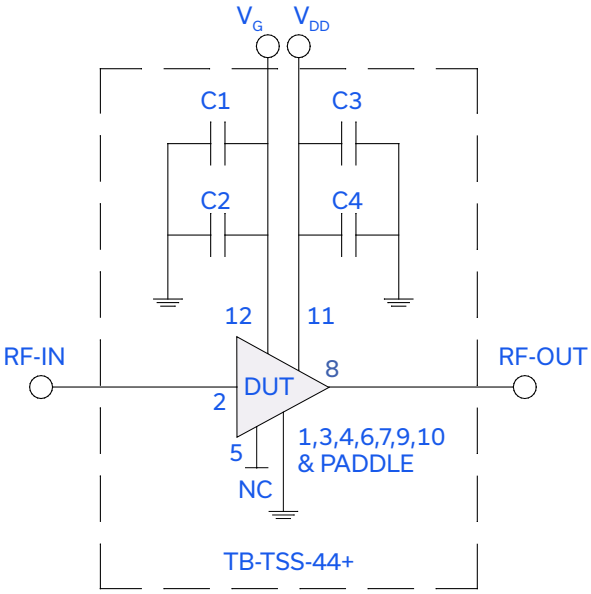




Function	Pad Number	Description (See Application Circuit, Fig. 1)
RF-IN	2	RF input pad
RF-OUT	8	RF output pad
V_{DD}	11	DC power supply (V_{DD})
GND	1,3.7,9	Connected to ground.
V_G	12	Control voltage for shutdown(VG)
NC	4,5,6,10	No internal connection. Recommended usage per PCB layer PL-616

Monolithic Amplifier TSS-44+

CHARACTERIZATION TEST CIRCUIT / RECOMMENDED APPLICATION CIRCUIT



Component	Size	Value	Part Number	Manufacturer
C1,C3	0402	0.1uF	GRM155R71C104KA88D	Murata
C2,C4	0402	100pF	GRM1555C1H101JA01J	Murata

Fig 1. Block diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-TSS-44+)

Gain, Return loss, Output power at 1dB compression (P1dB) , output IP3 (OIP3) and noise figure measured using Agilent's N5244A PNA-X microwave network analyzer.

Conditions:
1. Gain and Return loss: P_{IN}= -25dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -10dBm/tone at output.
3. Switching Time:
RF Signal:P_{IN}=-25dBm, fRF=22GHz
Vdd=4VDC, VG=Pulse Signal at 1kHz with Vhigh=4V, Vlow=0V& 50% duty cycle

PRODUCT MARKING

Marking may contain other features or characters for internal lot control

ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD. CLICK HERE

Performance Data	Data Table Swept Graphs S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DQ1225 Plastic package, exposed paddle lead finish: Matte-Tin
Tape & Reel **Standard quantities available on reel**	F66 7" reels with 20, 50, 100, 200, 500, 1K, or 2K devices
Suggested Layout for PCB Design	PL-616
Evaluation Board	TB-TSS-44+
Environmental Ratings	ENV08T1

ESD RATING

Human Body Model (HBM): 0 (Pass 200V) in accordance with ANSI/ESD STM 5.1 - 2001

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 = 4.0V, Id = 26mA @ 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)
20000	14.41	57.43	4.77	13.43	45.05	1.27	10.43	0.12	4.72
20500	15.18	54.84	5.67	12.45	33.09	1.20	9.98	0.18	4.38
21000	15.84	53.94	6.69	12.13	29.72	1.14	10.28	0.28	4.16
21500	16.34	53.39	7.90	12.15	28.08	1.09	10.31	0.58	3.93
22000	16.68	53.08	9.29	11.94	27.37	1.04	11.42	0.97	3.78
22500	16.90	53.76	10.35	12.17	29.76	1.02	11.48	1.08	3.69
23000	17.08	53.40	11.27	12.27	28.56	1.01	11.71	1.34	3.55
23500	17.25	52.90	12.27	12.79	27.09	1.00	11.34	1.34	3.54
24000	17.43	51.49	13.39	13.04	22.92	0.99	11.24	1.44	3.48
24500	17.62	51.06	14.59	13.01	21.59	0.98	11.95	1.56	3.41
25000	17.81	49.99	16.17	13.47	19.00	0.98	11.65	1.58	3.38
25500	17.94	48.93	18.28	13.90	16.77	0.97	11.31	1.96	3.33
26000	18.04	48.37	18.83	14.75	15.71	0.98	12.03	2.10	3.26
26500	18.10	47.97	18.24	15.43	14.92	0.98	12.61	2.36	3.24
27000	18.17	47.73	17.60	16.06	14.42	0.99	12.84	2.41	3.22
27500	18.29	46.95	17.48	16.52	13.04	0.99	11.58	2.67	3.20
28000	18.44	45.66	17.73	17.54	11.11	1.00	13.24	2.75	3.21
28500	18.52	45.22	18.68	17.84	10.51	0.99	12.75	2.97	3.18
29000	18.54	45.71	18.50	17.55	11.07	0.99	13.27	3.27	3.18
29500	18.53	45.33	17.90	17.46	10.58	1.00	13.48	3.57	3.18
30000	18.54	45.73	16.56	17.09	10.99	1.00	14.00	3.90	3.21
30500	18.62	45.60	15.78	17.65	10.71	1.01	14.06	4.12	3.23
31000	18.74	45.61	15.52	18.16	10.57	1.01	14.58	4.45	3.21
31500	18.85	46.08	15.78	19.62	11.08	1.01	14.09	4.53	3.24
32000	18.99	45.27	17.04	22.36	10.07	1.01	15.10	5.01	3.28
32500	19.09	45.53	18.42	24.80	10.32	1.01	14.92	4.84	3.24
33000	19.13	45.59	20.87	21.05	10.37	1.00	15.39	5.36	3.19
33500	19.08	45.18	21.79	16.40	9.83	0.98	15.63	5.74	3.26
34000	19.13	43.45	18.10	13.70	7.80	0.97	15.83	5.99	3.25
34500	19.06	44.85	14.58	10.82	8.70	0.94	16.60	6.63	3.24
35000	18.85	46.12	13.30	9.39	9.82	0.92	16.70	6.39	3.21
35500	18.62	45.17	11.36	7.98	8.37	0.89	16.06	6.27	3.23
36000	18.34	45.88	11.22	7.43	9.07	0.88	15.68	6.08	3.25
36500	18.26	46.87	11.63	6.76	9.92	0.84	16.37	6.14	3.36
37000	18.28	47.48	11.84	6.49	10.45	0.83	15.48	5.75	3.45
37500	18.23	48.03	12.41	6.14	10.99	0.80	15.24	5.93	3.13
38000	17.85	48.82	13.21	6.21	12.79	0.80	15.71	6.53	3.63
38500	17.33	47.35	12.43	6.44	11.53	0.82	15.34	6.01	3.34
39000	17.48	46.65	11.47	6.47	10.27	0.83	15.59	6.65	3.31
39500	17.58	47.59	10.70	6.41	11.08	0.84	15.08	6.92	3.40
40000	17.36	48.20	10.45	6.46	12.17	0.85	15.29	7.14	3.45
40500	16.83	51.08	9.54	6.92	18.16	0.89	17.21	8.26	3.45
41000	16.09	52.97	8.40	7.41	24.30	0.94	16.58	8.28	3.60
41500	15.21	57.02	7.49	7.96	42.34	0.99	16.98	8.59	3.78
42000	14.33	60.54	7.01	8.12	69.05	1.02	17.72	8.70	3.82
42500	13.43	63.85	6.92	8.19	112.08	1.02	18.56	8.58	3.81
43000	12.49	64.41	7.31	8.31	136.68	1.01	18.33	8.23	3.86
43500	11.46	63.82	8.05	7.52	143.97	0.95	18.31	7.91	3.97

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 = 3.8V, Id = 24mA @ 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)
20000	14.16	56.82	4.70	13.49	42.91	1.28	9.99	-0.27	4.76
20500	14.94	55.25	5.60	12.50	35.47	1.20	9.46	-0.22	4.45
21000	15.59	53.46	6.60	12.18	28.79	1.14	9.82	-0.11	4.17
21500	16.10	53.26	7.79	12.19	28.35	1.09	9.83	0.19	3.99
22000	16.44	52.66	9.16	11.98	26.72	1.05	11.03	0.58	3.78
22500	16.66	54.13	10.20	12.22	31.84	1.03	10.99	0.59	3.72
23000	16.84	52.94	11.11	12.31	27.79	1.01	11.12	0.95	3.61
23500	17.00	52.26	12.09	12.84	25.81	1.00	10.86	0.85	3.54
24000	17.18	51.66	13.21	13.08	24.03	0.99	10.72	1.04	3.51
24500	17.37	50.36	14.38	13.06	20.49	0.98	11.38	1.16	3.44
25000	17.55	49.59	15.94	13.53	18.65	0.98	11.11	1.18	3.40
25500	17.69	49.11	18.01	13.96	17.61	0.97	10.80	1.56	3.37
26000	17.78	48.57	18.60	14.82	16.53	0.98	11.58	1.69	3.30
26500	17.85	47.67	18.10	15.49	14.85	0.99	12.11	1.95	3.26
27000	17.92	46.90	17.49	16.16	13.51	0.99	12.14	2.00	3.25
27500	18.04	46.55	17.38	16.59	12.81	0.99	11.15	2.16	3.18
28000	18.19	46.27	17.67	17.65	12.26	1.00	12.56	2.35	3.25
28500	18.27	45.65	18.65	17.88	11.36	1.00	12.23	2.58	3.17
29000	18.30	45.49	18.53	17.55	11.10	0.99	12.56	2.87	3.21
29500	18.30	45.32	17.91	17.45	10.86	1.00	12.89	3.18	3.25
30000	18.31	45.40	16.57	17.06	10.86	1.00	13.14	3.41	3.23
30500	18.40	45.43	15.77	17.59	10.77	1.01	13.44	3.74	3.22
31000	18.53	45.59	15.51	18.08	10.81	1.01	13.85	4.08	3.24
31500	18.65	45.47	15.72	19.53	10.58	1.01	13.84	4.07	3.26
32000	18.79	45.00	16.98	22.12	9.98	1.01	14.57	4.56	3.31
32500	18.91	45.29	18.31	24.38	10.26	1.01	14.44	4.50	3.24
33000	18.95	45.01	20.71	20.75	9.89	1.00	15.26	5.02	3.28
33500	18.91	44.79	21.69	16.24	9.57	0.98	14.92	5.31	3.26
34000	18.96	43.19	18.11	13.56	7.71	0.96	15.82	5.56	3.25
34500	18.90	45.09	14.60	10.68	9.08	0.94	16.05	6.31	3.31
35000	18.70	45.54	13.33	9.26	9.32	0.91	15.64	6.08	3.20
35500	18.48	44.60	11.38	7.87	7.94	0.89	15.47	5.87	3.27
36000	18.20	45.60	11.23	7.32	8.88	0.87	15.31	5.67	3.21
36500	18.12	46.89	11.63	6.65	10.03	0.84	15.54	5.84	2.97
37000	18.13	46.61	11.85	6.39	9.55	0.82	14.88	5.44	3.10
37500	18.09	47.55	12.43	6.04	10.50	0.80	15.17	5.64	3.18
38000	17.71	48.43	13.22	6.11	12.34	0.79	14.85	6.12	3.30
38500	17.19	47.59	12.45	6.33	11.97	0.81	14.98	5.70	3.37
39000	17.33	46.27	11.52	6.37	9.95	0.83	15.46	6.33	3.44
39500	17.43	47.34	10.76	6.32	10.90	0.84	14.76	6.73	3.36
40000	17.20	49.30	10.53	6.36	14.00	0.84	14.92	6.97	3.39
40500	16.67	49.68	9.62	6.84	15.67	0.89	16.48	8.00	3.46
41000	15.93	52.65	8.46	7.34	23.83	0.94	16.25	8.06	3.68
41500	15.05	56.32	7.56	7.91	39.83	0.99	16.56	8.36	3.75
42000	14.17	59.39	7.07	8.08	61.70	1.01	17.81	8.42	3.85
42500	13.27	61.86	6.98	8.16	90.91	1.02	18.50	8.29	3.88
43000	12.33	65.10	7.37	8.28	151.17	1.01	17.47	7.95	3.86
43500	11.30	62.68	8.12	7.49	128.72	0.95	17.09	7.72	4.00

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 = 4.2V, Id = 27mA @ 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)
20000	14.64	56.75	4.83	13.40	40.87	1.27	10.92	0.47	4.70
20500	15.41	55.65	5.74	12.41	35.60	1.19	10.46	0.52	4.38
21000	16.06	53.85	6.77	12.09	28.82	1.13	10.79	0.72	4.14
21500	16.56	52.95	8.00	12.11	26.13	1.08	10.82	0.93	3.90
22000	16.89	53.39	9.41	11.90	27.77	1.04	12.01	1.32	3.75
22500	17.12	53.55	10.48	12.13	28.40	1.02	11.97	1.43	3.66
23000	17.30	53.37	11.42	12.22	27.81	1.01	12.07	1.78	3.55
23500	17.47	52.72	12.43	12.75	25.91	1.00	11.83	1.69	3.50
24000	17.66	52.10	13.57	12.99	23.98	0.99	11.76	1.79	3.45
24500	17.85	51.08	14.78	12.97	21.12	0.98	12.40	1.92	3.42
25000	18.03	49.96	16.40	13.42	18.44	0.97	12.08	2.03	3.38
25500	18.17	49.47	18.53	13.85	17.39	0.97	11.84	2.42	3.33
26000	18.26	48.61	19.02	14.69	15.71	0.98	12.57	2.55	3.27
26500	18.33	48.22	18.37	15.37	14.95	0.98	12.91	2.73	3.24
27000	18.40	47.78	17.69	16.02	14.14	0.99	13.40	2.77	3.20
27500	18.52	47.19	17.54	16.48	13.06	0.99	12.06	3.03	3.21
28000	18.66	46.44	17.80	17.53	11.85	1.00	13.55	3.20	3.18
28500	18.74	45.87	18.70	17.80	11.05	0.99	13.20	3.32	3.15
29000	18.75	45.96	18.54	17.55	11.13	0.99	13.77	3.61	3.21
29500	18.74	45.85	17.88	17.48	10.97	1.00	13.66	3.92	3.22
30000	18.74	45.57	16.55	17.13	10.55	1.00	14.20	4.24	3.21
30500	18.81	45.53	15.78	17.72	10.39	1.01	14.46	4.45	3.20
31000	18.93	45.91	15.56	18.22	10.72	1.01	14.88	4.88	3.21
31500	19.04	45.51	15.81	19.77	10.17	1.01	14.87	4.85	3.24
32000	19.16	45.79	17.15	22.66	10.49	1.01	15.52	5.33	3.27
32500	19.25	45.88	18.53	25.33	10.56	1.01	15.54	5.24	3.25
33000	19.28	45.60	20.99	21.40	10.21	1.00	15.45	5.75	3.27
33500	19.23	45.13	21.90	16.60	9.62	0.98	16.18	6.13	3.26
34000	19.27	43.18	18.04	13.85	7.45	0.97	16.88	6.37	3.34
34500	19.19	45.05	14.55	10.94	8.78	0.94	17.48	7.00	3.25
35000	18.98	46.43	13.29	9.52	10.05	0.92	16.36	6.76	3.18
35500	18.75	45.34	11.35	8.09	8.45	0.90	16.71	6.55	3.27
36000	18.46	45.96	11.23	7.54	9.08	0.88	16.46	6.35	3.15
36500	18.39	47.13	11.62	6.85	10.13	0.85	16.64	6.41	2.99
37000	18.41	47.56	11.83	6.60	10.46	0.83	16.41	6.12	3.20
37500	18.36	48.26	12.41	6.24	11.20	0.81	16.13	6.20	3.59
38000	17.97	49.32	13.20	6.32	13.45	0.80	16.25	6.90	3.24
38500	17.46	46.92	12.39	6.54	10.89	0.82	16.24	6.39	3.32
39000	17.61	46.84	11.43	6.56	10.42	0.84	16.12	7.02	3.35
39500	17.72	47.43	10.64	6.50	10.77	0.85	15.55	7.17	3.38
40000	17.50	48.84	10.37	6.54	12.95	0.85	15.99	7.37	3.47
40500	16.97	51.12	9.47	6.99	17.98	0.89	17.72	8.44	3.49
41000	16.23	54.18	8.33	7.47	27.54	0.94	17.28	8.53	3.61
41500	15.35	59.95	7.43	8.01	58.42	1.00	18.17	8.84	3.74
42000	14.47	61.47	6.95	8.16	75.50	1.02	19.07	8.95	3.81
42500	13.57	63.60	6.86	8.22	106.83	1.03	19.33	8.84	3.82
43000	12.63	68.16	7.25	8.32	206.64	1.01	19.02	8.42	3.87
43500	11.60	63.02	8.00	7.54	129.01	0.95	19.71	8.15	3.97

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 = 4.00V, Id = 27mA @ 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)
20000	16.05	57.66	4.46	13.25	36.80	1.29	10.52	0.07	3.46
20500	16.84	55.33	5.34	12.09	27.94	1.21	10.06	0.25	3.15
21000	17.53	53.84	6.36	11.62	23.52	1.14	10.34	0.36	2.93
21500	18.05	53.26	7.59	11.35	22.15	1.08	10.40	0.58	2.71
22000	18.37	53.49	9.04	11.34	23.23	1.04	11.62	1.10	2.58
22500	18.59	53.90	10.13	11.50	24.54	1.02	11.67	1.09	2.43
23000	18.79	53.59	11.07	11.88	23.77	1.01	11.97	1.61	2.42
23500	18.98	52.39	12.06	12.58	20.80	1.00	11.61	1.53	2.39
24000	19.17	51.50	13.16	12.87	18.72	0.99	11.60	1.65	2.31
24500	19.34	50.65	14.29	12.79	16.81	0.98	12.17	1.74	2.28
25000	19.50	49.85	15.89	12.76	15.24	0.97	11.84	1.76	2.28
25500	19.63	49.09	17.99	13.05	13.94	0.96	11.70	2.23	2.20
26000	19.75	48.58	18.28	13.55	13.05	0.97	12.48	2.37	2.16
26500	19.86	47.85	17.36	14.59	11.93	0.98	13.13	2.65	2.11
27000	19.97	47.33	16.57	15.70	11.14	0.99	13.26	2.63	2.07
27500	20.09	46.36	16.53	17.19	9.90	1.00	11.93	2.93	2.07
28000	20.22	45.78	17.10	18.31	9.18	1.00	13.49	3.12	2.09
28500	20.30	45.80	18.54	17.90	9.16	1.00	12.92	3.25	2.05
29000	20.34	45.29	18.28	17.30	8.56	0.99	13.52	3.53	2.07
29500	20.36	45.41	17.18	16.73	8.60	1.00	14.12	3.87	2.08
30000	20.37	45.30	15.45	16.94	8.42	1.01	14.10	4.16	2.10
30500	20.44	45.22	14.73	17.95	8.27	1.01	14.14	4.43	2.13
31000	20.57	45.23	14.60	19.73	8.18	1.02	14.89	4.83	2.09
31500	20.73	45.12	15.18	20.79	8.00	1.02	14.48	4.86	2.10
32000	20.88	44.90	16.76	22.79	7.77	1.01	15.41	5.32	2.12
32500	20.96	45.28	18.42	22.50	8.09	1.01	15.09	5.14	2.05
33000	20.99	45.22	21.30	19.78	8.01	0.99	15.84	5.73	2.11
33500	20.96	44.48	24.42	16.08	7.32	0.97	15.74	6.11	2.10
34000	20.94	43.23	21.36	13.73	6.24	0.96	16.71	6.68	2.15
34500	20.98	44.22	14.56	10.46	6.47	0.93	17.40	7.68	2.13
35000	20.66	45.53	12.72	8.58	7.25	0.90	17.23	7.56	2.00
35500	20.41	44.58	10.38	7.05	6.02	0.86	16.47	7.25	2.10
36000	19.95	45.89	10.15	6.42	6.98	0.84	16.16	7.27	2.01
36500	19.81	46.44	10.66	6.06	7.40	0.81	16.43	7.33	1.97
37000	19.87	46.70	11.02	5.88	7.49	0.80	16.37	6.90	2.12
37500	19.92	47.03	11.44	5.75	7.70	0.79	16.56	7.32	1.98
38000	19.63	49.25	11.91	5.74	10.38	0.78	16.40	8.52	2.27
38500	18.87	47.28	11.25	6.00	9.11	0.81	15.63	8.91	2.12
39000	18.97	46.11	10.21	5.84	7.55	0.82	16.09	7.77	2.16
39500	19.15	47.22	9.70	5.41	7.95	0.80	15.12	8.73	2.04
40000	18.99	48.76	10.02	5.54	9.88	0.80	15.94	8.70	2.24
40500	18.54	49.88	9.15	5.97	11.98	0.84	16.61	9.54	2.33
41000	17.83	53.99	7.74	6.66	20.79	0.92	17.10	9.56	2.39
41500	16.99	57.21	6.61	7.42	32.63	1.00	18.08	9.94	2.49
42000	16.15	61.79	6.13	8.04	60.83	1.05	18.48	10.14	2.54
42500	15.25	65.58	6.07	7.98	103.80	1.05	18.80	10.02	2.56
43000	14.32	73.56	6.52	7.57	293.53	1.01	19.17	9.71	2.51
43500	13.29	67.29	7.37	6.71	160.82	0.93	19.83	9.62	2.40

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 = 3.8V, Id = 25mA @ 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)
20000	15.95	56.65	4.37	13.34	32.76	1.30	10.21	-0.39	3.43
20500	16.75	55.30	5.25	12.07	27.86	1.22	9.64	-0.20	3.14
21000	17.45	53.99	6.30	11.58	24.01	1.15	9.97	-0.17	2.93
21500	17.97	53.28	7.52	11.29	22.31	1.09	10.04	0.14	2.68
22000	18.29	53.53	8.93	11.27	23.43	1.04	11.21	0.56	2.57
22500	18.51	53.84	9.99	11.47	24.49	1.02	11.20	0.65	2.46
23000	18.71	52.79	10.90	11.92	21.82	1.01	11.52	1.07	2.39
23500	18.91	52.36	11.89	12.65	20.89	1.00	11.24	0.99	2.39
24000	19.10	51.74	13.01	12.97	19.40	0.99	11.13	1.20	2.30
24500	19.27	50.38	14.11	12.85	16.44	0.98	11.73	1.29	2.28
25000	19.42	49.68	15.75	12.76	15.07	0.97	11.35	1.31	2.25
25500	19.55	49.03	17.86	12.98	13.96	0.96	11.32	1.78	2.20
26000	19.65	48.54	18.10	13.43	13.11	0.97	12.04	1.91	2.14
26500	19.76	47.51	17.13	14.50	11.56	0.98	12.55	2.10	2.11
27000	19.88	47.03	16.33	15.74	10.86	0.99	12.84	2.17	2.07
27500	20.01	46.64	16.33	17.42	10.32	1.00	11.54	2.48	2.08
28000	20.14	45.79	17.07	18.59	9.29	1.00	12.83	2.57	2.07
28500	20.23	45.25	18.74	17.92	8.67	0.99	12.32	2.80	2.06
29000	20.27	45.53	18.44	17.12	8.88	0.99	13.09	3.09	2.09
29500	20.29	45.11	17.09	16.59	8.37	1.00	13.19	3.42	2.08
30000	20.30	45.00	15.20	16.84	8.18	1.01	13.80	3.62	2.08
30500	20.37	45.24	14.47	17.96	8.33	1.02	13.81	3.90	2.08
31000	20.52	45.63	14.47	19.85	8.62	1.02	14.02	4.30	2.06
31500	20.68	45.06	15.22	21.00	7.99	1.02	13.83	4.33	2.10
32000	20.84	45.15	16.94	22.45	8.03	1.01	14.87	4.80	2.11
32500	20.93	45.00	18.58	21.95	7.85	1.00	14.66	4.52	2.05
33000	20.97	45.22	21.12	19.48	8.03	0.99	15.16	5.21	2.08
33500	20.94	44.84	24.11	16.07	7.64	0.98	15.25	5.60	2.09
34000	20.93	42.82	21.68	13.72	5.96	0.96	15.59	6.18	2.11
34500	20.99	44.06	14.51	10.39	6.33	0.93	16.43	7.19	2.12
35000	20.64	45.91	12.56	8.43	7.53	0.89	16.39	6.96	2.11
35500	20.39	44.81	10.22	6.86	6.10	0.85	15.79	6.76	2.09
36000	19.92	45.30	10.03	6.26	6.46	0.83	15.64	6.78	2.08
36500	19.80	46.16	10.68	5.90	7.09	0.80	16.13	7.07	2.05
37000	19.87	46.87	11.15	5.79	7.61	0.79	15.73	6.64	2.25
37500	19.93	47.83	11.55	5.67	8.38	0.78	15.50	7.07	2.27
38000	19.64	49.08	11.76	5.68	10.09	0.78	15.63	8.39	1.98
38500	18.86	47.05	11.01	5.91	8.78	0.80	15.24	8.68	2.09
39000	18.93	45.78	10.02	5.72	7.19	0.81	16.17	7.40	2.07
39500	19.11	46.65	9.67	5.26	7.34	0.79	15.17	8.38	2.15
40000	18.97	48.91	10.20	5.38	9.97	0.79	15.79	8.55	2.14
40500	18.53	50.48	9.24	5.81	12.75	0.83	16.18	9.27	2.32
41000	17.82	53.62	7.68	6.58	19.79	0.92	16.49	9.28	2.40
41500	16.97	57.05	6.49	7.39	31.85	1.00	17.96	9.66	2.45
42000	16.15	58.72	6.05	8.07	42.50	1.06	18.09	9.83	2.52
42500	15.26	62.27	6.05	7.99	70.69	1.05	17.98	9.70	2.52
43000	14.33	63.40	6.58	7.47	90.76	1.00	18.25	9.41	2.48
43500	13.29	64.73	7.45	6.57	119.23	0.92	17.84	9.29	2.48

Typical Performance Data

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

TEST CONDITIONS: Vd = 4.2V, Id = 28mA @ 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)
20000	16.42	57.20	4.45	13.24	33.40	1.29	10.95	0.56	3.49
20500	17.23	55.39	5.36	11.95	26.92	1.21	10.57	0.62	3.12
21000	17.92	53.87	6.44	11.45	22.60	1.14	10.90	0.74	2.93
21500	18.44	53.04	7.71	11.15	20.68	1.08	10.99	1.05	2.72
22000	18.76	53.58	9.15	11.14	22.42	1.03	12.26	1.48	2.58
22500	18.97	54.23	10.21	11.37	24.37	1.01	12.18	1.57	2.49
23000	19.18	53.40	11.14	11.84	22.26	1.00	12.56	2.00	2.39
23500	19.38	52.86	12.17	12.60	21.02	1.00	12.12	1.91	2.37
24000	19.58	51.73	13.33	12.89	18.39	0.99	12.14	2.04	2.31
24500	19.75	51.06	14.48	12.74	16.84	0.98	12.72	2.13	2.35
25000	19.90	50.20	16.19	12.60	15.14	0.96	12.37	2.15	2.28
25500	20.03	49.09	18.36	12.79	13.27	0.96	12.24	2.62	2.23
26000	20.14	48.88	18.40	13.23	12.87	0.96	12.98	2.75	2.18
26500	20.26	47.94	17.23	14.34	11.48	0.98	13.65	3.05	2.10
27000	20.37	47.30	16.39	15.60	10.58	0.99	13.66	3.03	2.10
27500	20.50	47.21	16.42	17.41	10.41	1.00	12.40	3.32	2.10
28000	20.63	46.07	17.26	18.53	9.08	1.00	14.00	3.49	2.06
28500	20.70	45.73	18.96	17.81	8.69	0.99	13.39	3.63	2.02
29000	20.73	44.88	18.44	16.98	7.81	0.99	14.08	3.90	2.11
29500	20.74	45.09	16.92	16.51	7.92	1.00	14.38	4.24	2.13
30000	20.73	45.34	15.01	16.87	8.08	1.01	14.54	4.53	2.13
30500	20.80	45.75	14.38	18.14	8.41	1.02	14.62	4.80	2.12
31000	20.94	45.39	14.46	20.21	8.00	1.02	15.47	5.19	2.10
31500	21.09	45.32	15.38	21.47	7.88	1.02	14.95	5.21	2.12
32000	21.23	45.42	17.22	23.03	7.93	1.01	16.00	5.77	2.16
32500	21.30	45.54	18.87	22.54	8.02	1.00	15.76	5.47	2.11
33000	21.32	45.16	21.41	20.02	7.68	0.99	16.12	6.17	2.18
33500	21.28	44.97	24.47	16.59	7.48	0.98	16.07	6.43	2.14
34000	21.26	43.25	21.76	14.06	6.05	0.96	17.48	7.12	2.16
34500	21.30	44.68	14.33	10.62	6.58	0.93	17.85	8.10	2.15
35000	20.94	46.16	12.39	8.58	7.52	0.90	16.82	7.87	1.91
35500	20.67	45.49	10.08	6.99	6.41	0.86	16.89	7.66	2.13
36000	20.20	45.80	9.95	6.39	6.68	0.84	16.85	7.68	2.15
36500	20.09	47.15	10.69	6.07	7.79	0.81	17.12	7.86	2.15
37000	20.17	46.75	11.20	5.97	7.36	0.80	16.74	7.54	2.04
37500	20.25	47.47	11.58	5.88	7.92	0.79	16.85	7.85	1.99
38000	19.93	49.37	11.63	5.87	10.22	0.79	16.95	8.92	2.22
38500	19.14	47.09	10.85	6.09	8.63	0.82	16.63	9.17	2.13
39000	19.22	46.50	9.82	5.87	7.62	0.82	16.44	8.29	2.11
39500	19.42	47.03	9.56	5.38	7.47	0.80	16.02	9.03	2.27
40000	19.30	49.74	10.14	5.49	10.67	0.79	16.44	8.97	2.31
40500	18.86	51.75	9.12	5.91	14.28	0.84	17.33	9.89	2.37
41000	18.14	54.84	7.50	6.68	21.95	0.93	17.62	9.88	2.43
41500	17.29	56.94	6.32	7.54	30.17	1.02	18.64	10.29	2.57
42000	16.47	62.19	5.89	8.21	60.67	1.07	19.51	10.48	2.70
42500	15.59	63.34	5.93	8.08	76.61	1.06	18.98	10.36	2.59
43000	14.67	66.09	6.49	7.49	118.55	1.01	18.87	10.08	2.53
43500	13.62	71.15	7.35	6.54	238.61	0.92	19.12	9.94	2.58

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 = 4.00V, Id = 27mA @ 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)
20000	13.56	56.28	5.00	12.76	44.32	1.25	10.04	-0.36	5.42
20500	14.32	54.89	5.95	12.03	37.39	1.17	9.61	-0.23	5.03
21000	14.96	53.36	6.97	11.76	31.12	1.12	10.02	-0.06	4.81
21500	15.43	52.89	8.11	11.94	29.62	1.08	9.99	0.22	4.54
22000	15.74	53.51	9.29	12.16	32.14	1.05	11.17	0.62	4.41
22500	15.96	53.40	10.15	12.40	31.77	1.03	11.22	0.62	4.26
23000	16.18	52.72	10.91	12.74	29.28	1.02	11.37	1.00	4.21
23500	16.37	52.06	12.09	12.94	27.17	1.01	10.95	0.90	4.20
24000	16.56	51.53	13.51	12.97	25.47	0.99	10.80	1.01	4.10
24500	16.73	50.47	15.13	12.61	22.31	0.97	11.42	1.13	4.06
25000	16.87	49.54	17.13	12.69	19.98	0.96	11.17	1.14	4.00
25500	17.00	48.97	19.43	13.14	18.70	0.96	10.90	1.50	3.93
26000	17.11	48.56	19.30	13.76	17.72	0.97	11.64	1.63	3.86
26500	17.20	47.61	18.36	14.80	15.83	0.98	12.20	1.89	3.79
27000	17.28	47.11	17.61	15.35	14.82	0.99	12.51	1.95	3.77
27500	17.38	47.58	17.58	16.34	15.54	0.99	11.15	2.20	3.74
28000	17.48	45.68	17.96	16.80	12.41	0.99	12.78	2.37	3.78
28500	17.53	45.67	18.87	17.29	12.38	0.99	12.26	2.49	3.74
29000	17.58	45.35	19.04	17.04	11.85	0.99	12.82	2.79	3.78
29500	17.62	45.50	18.60	17.02	11.99	0.99	13.01	3.09	3.75
30000	17.63	45.21	17.57	16.87	11.53	1.00	13.55	3.31	3.80
30500	17.70	45.81	16.80	17.30	12.25	1.00	13.36	3.53	3.78
31000	17.80	45.90	16.55	17.86	12.24	1.00	14.11	3.84	3.78
31500	17.93	45.52	16.64	18.25	11.57	1.00	13.84	3.92	3.82
32000	18.06	45.48	17.69	20.65	11.48	1.01	14.69	4.37	3.85
32500	18.14	45.72	18.54	22.72	11.75	1.01	14.41	4.21	3.81
33000	18.17	45.71	19.86	21.49	11.73	1.00	15.04	4.69	3.84
33500	18.12	44.74	19.79	16.50	10.39	0.99	15.30	4.87	3.84
34000	18.17	43.49	16.69	13.59	8.69	0.97	16.12	5.10	3.92
34500	18.10	45.24	14.18	10.25	9.99	0.93	16.07	5.57	3.86
35000	17.94	46.06	13.26	8.82	10.62	0.90	15.86	5.17	3.93
35500	17.73	45.34	11.81	7.37	9.25	0.86	15.83	5.03	3.84
36000	17.56	46.36	12.11	7.06	10.41	0.85	14.89	4.81	3.79
36500	17.50	46.55	12.91	6.62	10.53	0.82	15.84	4.81	3.77
37000	17.53	47.59	13.17	6.35	11.63	0.81	14.64	4.55	3.82
37500	17.44	47.80	13.60	6.16	11.93	0.79	15.08	4.57	3.93
38000	17.02	48.33	13.93	6.25	13.44	0.79	15.31	4.81	4.02
38500	16.70	46.58	12.77	6.26	11.25	0.80	14.89	4.82	3.90
39000	16.83	46.89	11.81	5.93	11.01	0.80	15.22	5.09	3.93
39500	16.80	47.49	11.26	6.03	11.80	0.81	15.03	5.27	4.09
40000	16.49	48.96	10.85	6.36	14.72	0.84	15.02	5.64	4.01
40500	15.90	51.30	9.87	6.82	20.79	0.88	16.38	6.88	4.09
41000	15.19	52.49	8.78	7.28	25.72	0.92	16.97	7.02	4.24
41500	14.34	56.43	8.05	7.66	44.32	0.96	17.63	7.37	4.32
42000	13.50	60.21	7.69	7.79	74.74	0.98	17.49	7.29	4.35
42500	12.57	61.49	7.83	7.28	94.69	0.95	17.46	7.02	4.39
43000	11.60	69.27	8.28	7.50	267.76	0.94	17.26	6.48	4.43
43500	10.54	61.33	8.78	6.87	119.25	0.90	17.21	6.24	4.44

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 = 4.00V, Id = 27mA @ 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)
20000	13.25	57.46	4.94	12.78	52.28	1.25	9.62	-0.78	5.45
20500	14.02	54.50	5.88	12.06	36.82	1.18	9.15	-0.65	5.08
21000	14.66	53.74	6.88	11.79	33.47	1.12	9.49	-0.47	4.83
21500	15.13	52.56	8.01	11.97	29.39	1.08	9.58	-0.20	4.57
22000	15.44	53.17	9.16	12.19	31.84	1.05	10.74	0.20	4.44
22500	15.66	53.05	10.00	12.44	31.49	1.04	10.67	0.20	4.35
23000	15.88	52.45	10.76	12.78	29.30	1.02	10.82	0.58	4.24
23500	16.07	52.28	11.93	12.98	28.78	1.01	10.50	0.48	4.21
24000	16.26	51.12	13.33	13.01	25.11	0.99	10.34	0.49	4.13
24500	16.43	50.61	14.92	12.65	23.48	0.97	10.98	0.70	4.09
25000	16.57	49.33	16.89	12.73	20.20	0.96	10.70	0.71	4.00
25500	16.69	49.04	19.16	13.18	19.51	0.96	10.43	1.07	3.95
26000	16.80	48.11	19.13	13.78	17.43	0.97	11.11	1.19	3.89
26500	16.89	47.56	18.25	14.82	16.29	0.98	11.72	1.46	3.82
27000	16.97	47.12	17.54	15.34	15.36	0.99	12.04	1.52	3.79
27500	17.07	46.84	17.51	16.36	14.80	0.99	10.70	1.77	3.77
28000	17.18	45.80	17.91	16.82	13.03	0.99	12.22	1.95	3.76
28500	17.23	45.47	18.86	17.27	12.53	0.99	11.81	2.07	3.72
29000	17.29	45.38	19.08	16.99	12.31	0.99	12.33	2.28	3.84
29500	17.33	44.93	18.68	16.92	11.60	0.99	12.40	2.67	3.78
30000	17.35	44.86	17.61	16.74	11.43	0.99	12.96	2.91	3.82
30500	17.42	45.26	16.81	17.20	11.86	1.00	12.96	3.13	3.80
31000	17.54	45.34	16.52	17.69	11.82	1.00	13.46	3.54	3.80
31500	17.67	45.45	16.62	18.05	11.81	1.00	13.27	3.54	3.84
32000	17.81	45.17	17.64	20.34	11.39	1.01	14.31	3.89	3.90
32500	17.90	45.46	18.47	22.21	11.72	1.01	14.24	3.84	3.84
33000	17.94	44.99	19.76	21.08	11.07	1.00	14.40	4.23	3.92
33500	17.90	44.55	19.70	16.34	10.41	0.98	14.52	4.51	3.87
34000	17.96	43.19	16.70	13.46	8.59	0.97	15.40	4.75	3.86
34500	17.89	45.10	14.21	10.14	10.04	0.93	15.60	5.13	3.91
35000	17.74	45.68	13.28	8.70	10.37	0.90	15.11	4.83	3.85
35500	17.53	45.07	11.83	7.27	9.11	0.86	15.12	4.60	3.88
36000	17.36	45.78	12.11	6.95	9.90	0.84	14.57	4.48	3.84
36500	17.30	46.66	12.94	6.52	10.83	0.82	14.81	4.47	3.91
37000	17.33	47.00	13.20	6.24	11.03	0.80	14.46	4.22	3.69
37500	17.25	47.81	13.65	6.06	12.12	0.79	14.64	4.25	3.74
38000	16.84	48.03	13.96	6.16	13.17	0.79	14.65	4.52	3.92
38500	16.51	46.88	12.80	6.16	11.83	0.80	14.10	4.61	3.95
39000	16.63	45.98	11.84	5.84	10.07	0.79	14.43	4.79	3.87
39500	16.60	47.12	11.34	5.94	11.50	0.81	14.58	5.17	3.91
40000	16.29	49.42	10.94	6.28	15.83	0.83	14.71	5.46	4.09
40500	15.70	50.52	9.96	6.75	19.40	0.87	15.86	6.70	4.17
41000	14.99	54.27	8.84	7.22	32.30	0.92	15.97	6.85	4.28
41500	14.14	56.66	8.13	7.61	46.59	0.96	16.45	7.25	4.33
42000	13.30	58.87	7.76	7.75	65.57	0.97	17.11	7.19	4.38
42500	12.37	60.96	7.91	7.26	91.25	0.94	16.71	6.90	4.45
43000	11.40	61.97	8.36	7.49	118.33	0.94	16.62	6.37	4.48
43500	10.35	60.81	8.85	6.85	115.04	0.90	16.63	5.99	4.51

Typical Performance Data

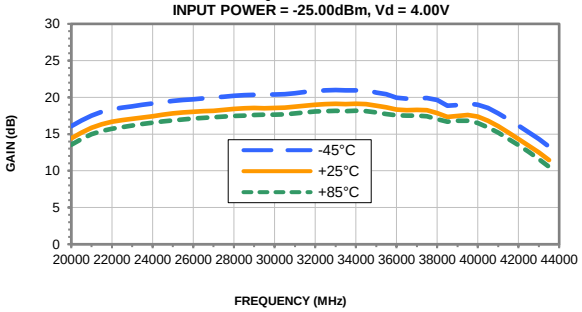
Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 4.00V, Id = 27mA @ Temperature = +85°C

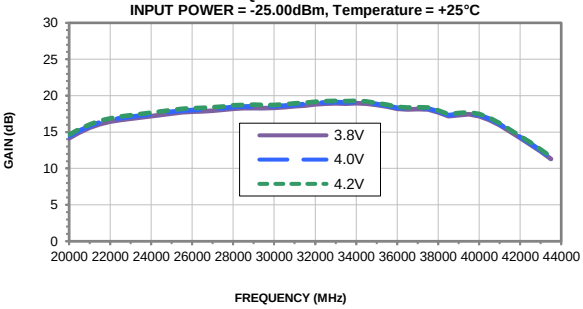
FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
20000	13.79	57.10	5.08	12.72	47.77	1.24	10.68	0.11	5.38
20500	14.55	54.70	6.04	12.01	35.85	1.17	10.20	0.14	4.99
21000	15.19	54.14	7.07	11.75	33.31	1.11	10.56	0.32	4.72
21500	15.66	53.20	8.22	11.92	30.04	1.07	10.62	0.60	4.52
22000	15.96	52.96	9.41	12.13	29.49	1.04	11.81	0.99	4.36
22500	16.19	53.65	10.27	12.37	31.95	1.03	11.67	1.08	4.26
23000	16.40	52.90	11.05	12.72	29.22	1.02	11.87	1.36	4.18
23500	16.60	52.66	12.25	12.91	28.43	1.00	11.50	1.27	4.12
24000	16.79	51.37	13.70	12.95	24.39	0.99	11.44	1.38	4.08
24500	16.96	50.79	15.35	12.58	22.57	0.97	12.06	1.50	3.98
25000	17.10	49.66	17.41	12.66	19.74	0.96	11.72	1.60	3.99
25500	17.23	49.08	19.75	13.10	18.43	0.96	11.50	1.87	3.89
26000	17.34	48.44	19.50	13.70	17.02	0.97	12.26	2.09	3.83
26500	17.43	47.78	18.45	14.74	15.72	0.98	12.80	2.27	3.79
27000	17.51	47.53	17.65	15.29	15.14	0.99	13.05	2.42	3.76
27500	17.61	46.55	17.61	16.33	13.45	0.99	11.76	2.58	3.73
28000	17.70	45.75	18.01	16.82	12.19	0.99	13.02	2.73	3.67
28500	17.75	45.79	18.96	17.34	12.25	0.99	12.63	2.85	3.71
29000	17.79	45.59	19.09	17.08	11.90	0.99	13.39	3.15	3.78
29500	17.83	45.08	18.66	17.08	11.17	0.99	13.34	3.44	3.72
30000	17.83	45.55	17.58	16.92	11.73	1.00	14.07	3.76	3.76
30500	17.89	45.58	16.80	17.41	11.67	1.00	14.14	3.97	3.79
31000	17.99	45.85	16.57	17.99	11.92	1.00	14.58	4.27	3.76
31500	18.11	45.46	16.70	18.40	11.27	1.00	14.58	4.35	3.79
32000	18.23	45.50	17.78	20.90	11.30	1.01	14.92	4.69	3.84
32500	18.30	45.69	18.67	23.11	11.51	1.01	15.26	4.52	3.82
33000	18.32	45.66	19.96	21.88	11.47	1.00	15.51	5.01	3.87
33500	18.27	45.18	19.84	16.74	10.76	0.99	15.83	5.26	3.78
34000	18.32	43.60	16.64	13.74	8.66	0.97	16.25	5.50	3.80
34500	18.23	45.67	14.15	10.39	10.36	0.94	16.61	5.87	3.85
35000	18.07	46.36	13.24	8.94	10.87	0.91	16.57	5.56	3.71
35500	17.85	45.56	11.79	7.48	9.39	0.87	16.41	5.31	3.82
36000	17.69	46.42	12.12	7.16	10.40	0.85	15.90	5.10	3.77
36500	17.63	47.10	12.96	6.73	11.14	0.83	15.86	5.18	4.10
37000	17.66	47.42	13.21	6.46	11.33	0.81	15.35	4.94	3.76
37500	17.57	48.40	13.65	6.28	12.71	0.80	15.79	4.86	4.04
38000	17.15	48.34	13.93	6.38	13.38	0.80	15.64	4.98	3.65
38500	16.83	46.71	12.74	6.38	11.36	0.81	15.65	5.08	3.90
39000	16.96	46.34	11.75	6.04	10.26	0.81	15.73	5.35	3.94
39500	16.93	47.99	11.21	6.13	12.39	0.82	15.00	5.52	3.98
40000	16.62	49.82	10.78	6.44	16.11	0.84	15.27	5.78	3.89
40500	16.03	51.27	9.82	6.88	20.46	0.88	16.96	7.02	4.11
41000	15.32	54.78	8.73	7.35	33.07	0.93	16.80	7.17	4.17
41500	14.47	55.97	8.00	7.71	41.42	0.96	18.24	7.52	4.34
42000	13.63	61.14	7.64	7.83	81.90	0.98	17.31	7.44	4.33
42500	12.70	68.72	7.80	7.31	214.61	0.95	18.24	7.16	4.37
43000	11.72	66.69	8.25	7.53	195.99	0.95	18.35	6.62	4.43
43500	10.67	67.22	8.73	6.89	231.40	0.90	17.17	6.38	4.57

Typical Performance Curves

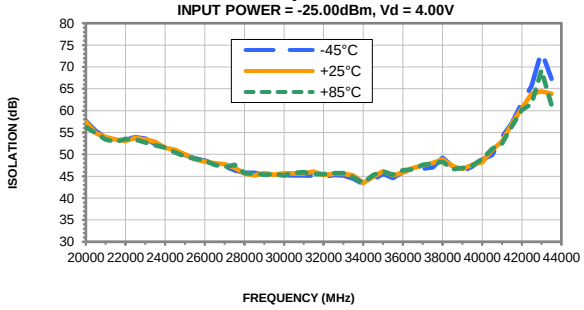
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 4.00V



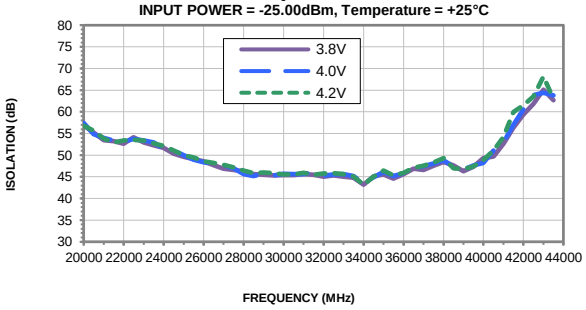
GAIN vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



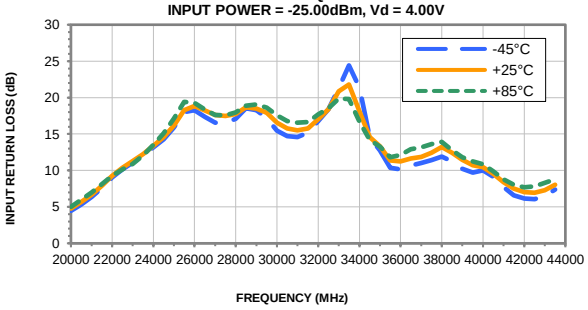
ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 4.00V



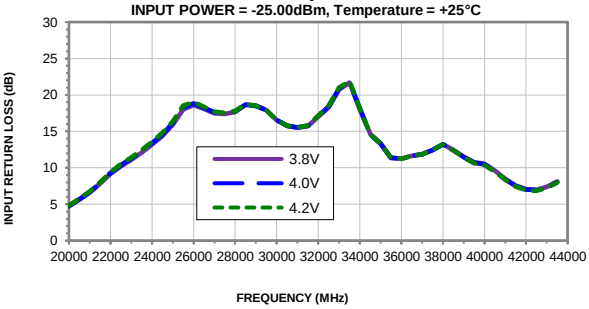
ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



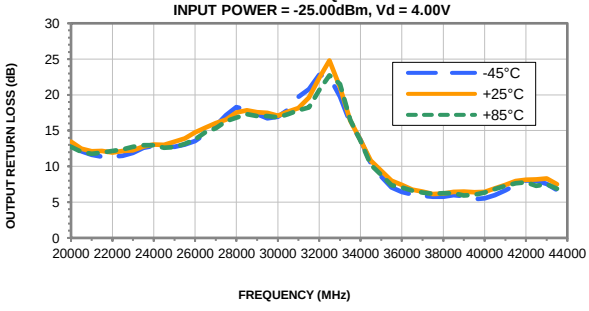
INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 4.00V



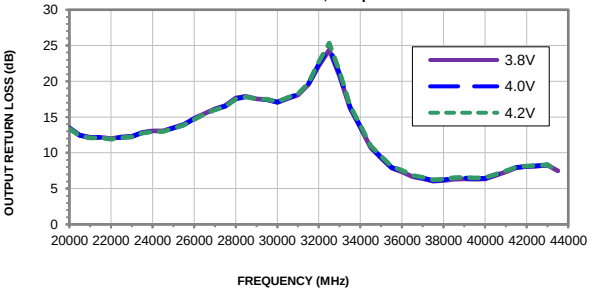
INPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C



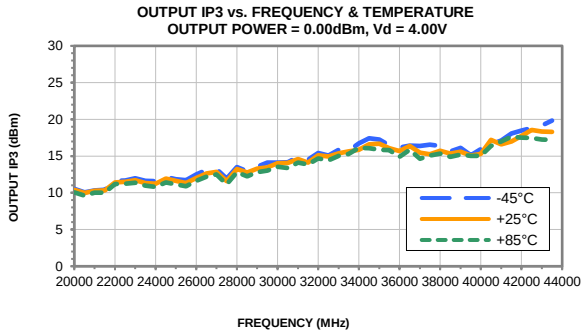
OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25.00dBm, Vd = 4.00V

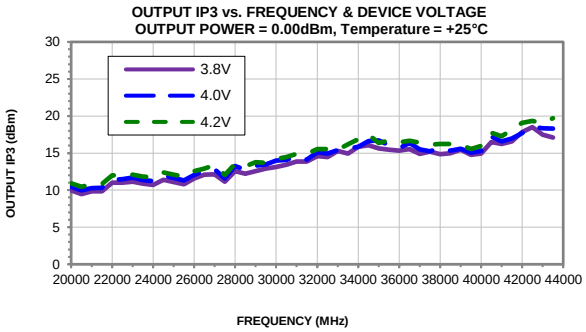


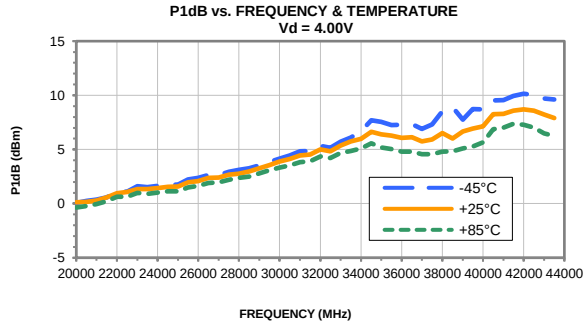
OUTPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
INPUT POWER = -25.00dBm, Temperature = +25°C

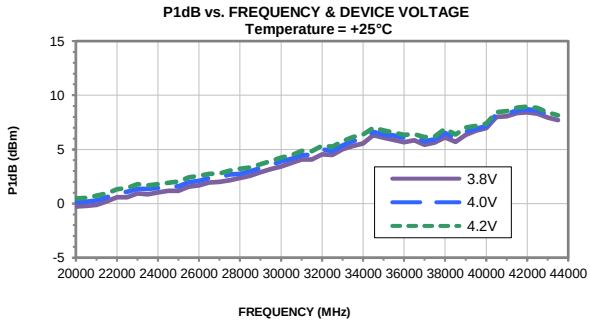


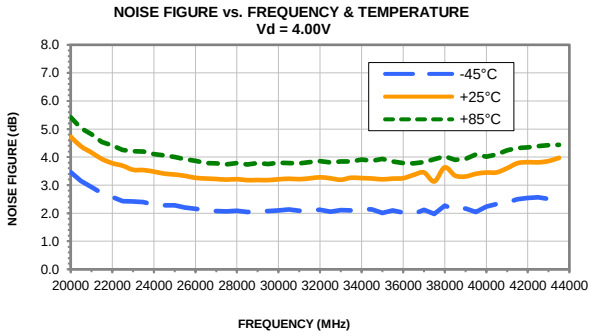
Typical Performance Curves

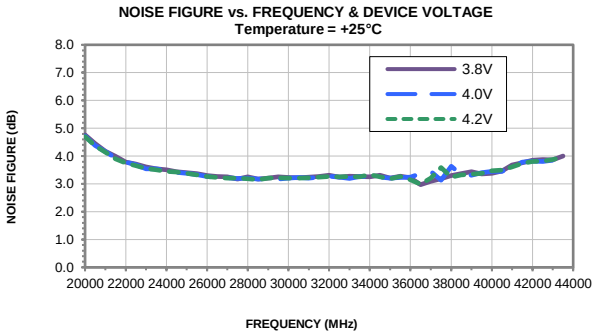


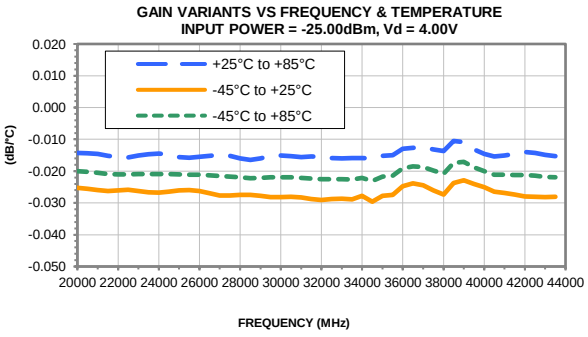








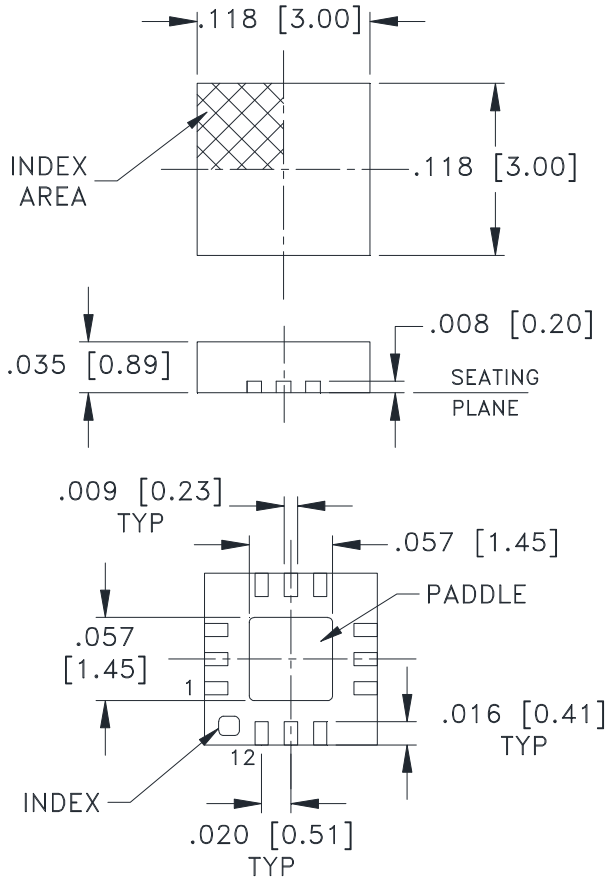


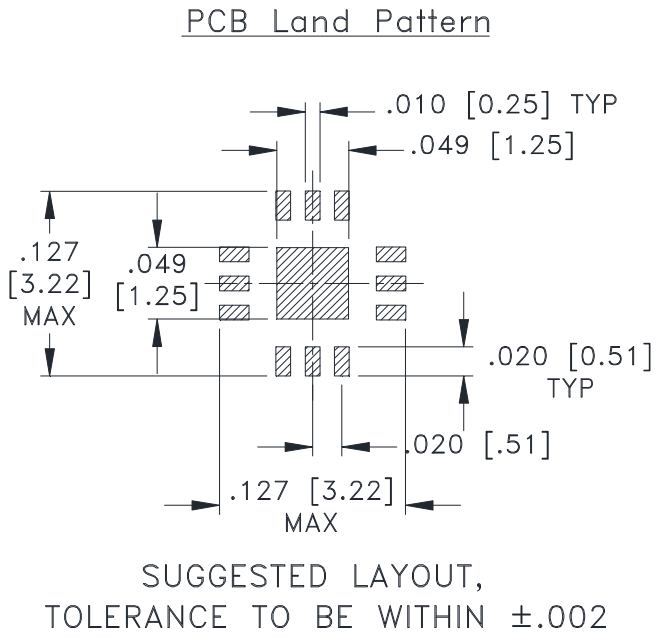


Case Style DQ

DQ1225

Outline Dimensions





Weight: .02 Grams

Dimensions are in inches (mm). Tolerances: 2Pl. ± .01; 3 Pl. ± .004

Notes:

1. Case material: Plastic.
2. Termination finish:
   - For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin. All models, (+) suffix. See Data sheet.
   - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

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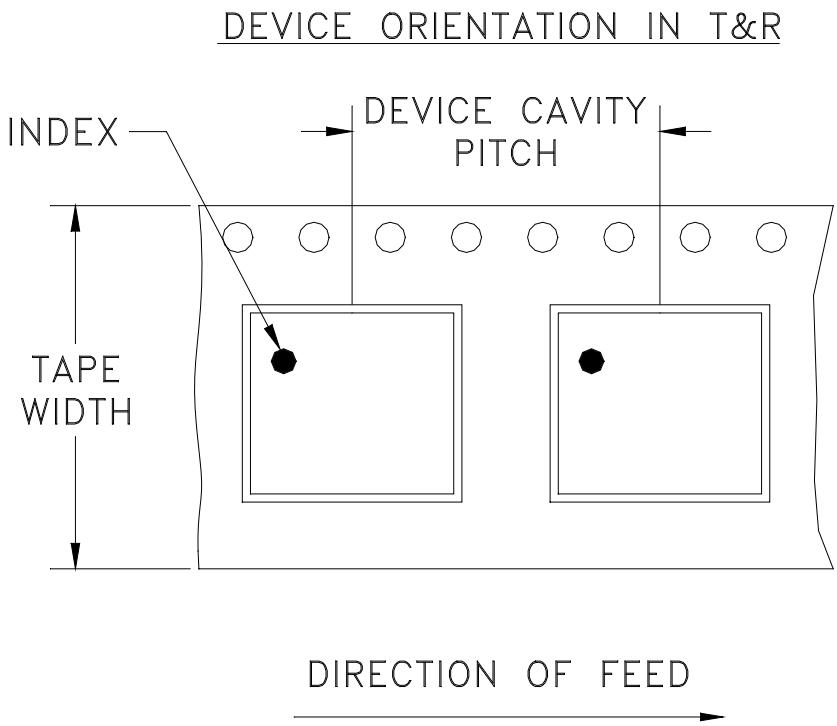
Tape & Reel Packaging TR-F66



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
8	4	7	Small quantity standard	20
				50
				100
				200
				500
		7	Standard	1000, 2000, 3000

Note: Please consult individual model data sheet to determine device per reel availability.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

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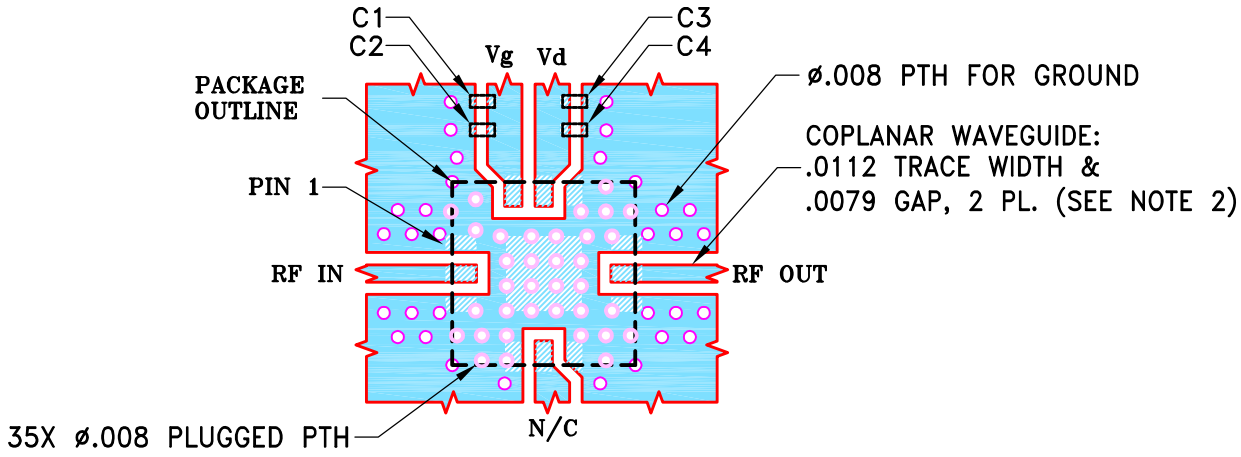
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M171265	NEW RELEASE	12/05/18	ITG	JG

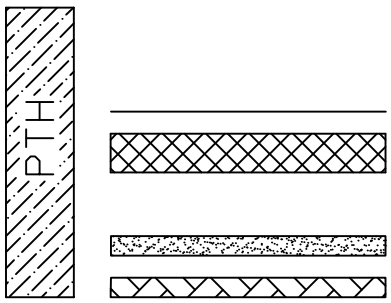
SUGGESTED MOUNTING CONFIGURATION FOR DQ1225 CASE STYLE, "12AM04" PIN CODE



TOP VIEW

COMPONENT	SIZE
C1...C4	0402

2 LAYER STACKUP DETAIL



IMMERSION GOLD (0.025um–0.075um)
ELECTROLESS NICKEL (3um–6um)
L1 COPPER: 1.00Z (3
BASE: RO4350B 6.6mil (0.1512mm–0.1848mm)
L2 COPPER: 1.00Z (31.5um–38.5um)

.025um–0.075um)

NOTES:
1. PCB IS 2 LAYERS PCB, SEE STACK-UP DIAGRAM.
2. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .0066"±.0007"; COPPER: 1 OZ. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
3. CHIP COMPONENT FOOTPRINTS SHOWN FOR REFERENCE. FOR COMPONENT VALUES REFER TO TB-TSS-44+.
4. COPPER LAYER L2 OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	ITG	11/30/18
TOLERANCES ON:	CHECKED	GF	12/05/18
2 PL DECIMALS ±	APPROVED	JG	12/05/18
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

ASHEETA1.DWG REV:A DATE:01/12/95

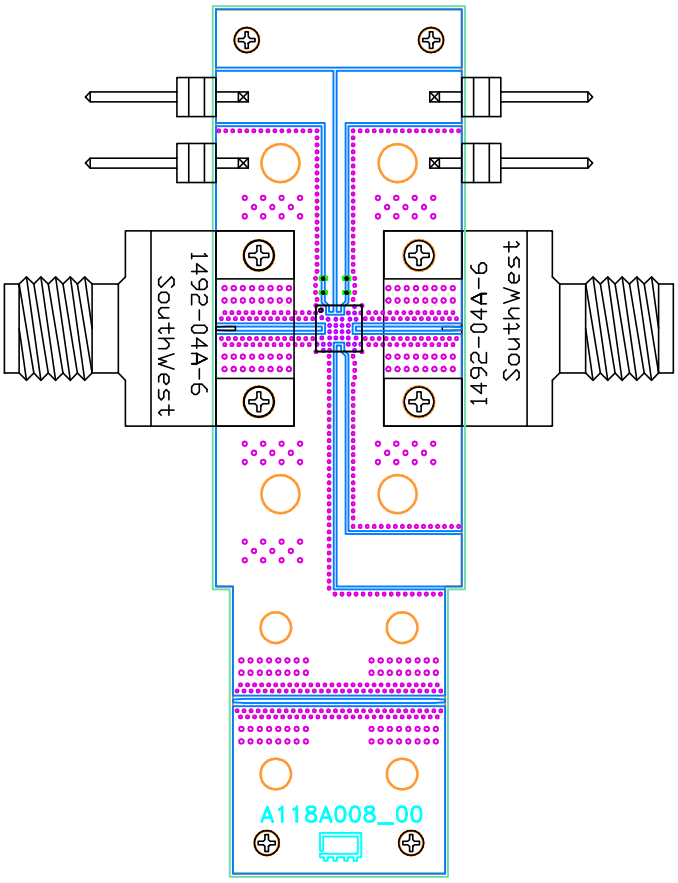
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

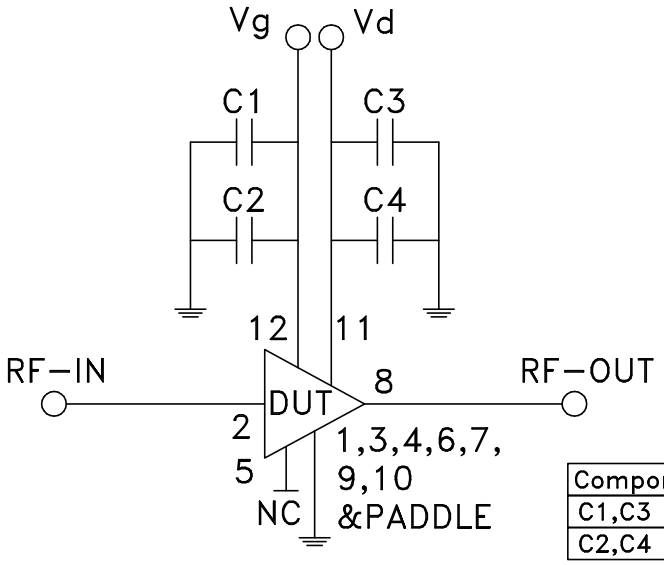
PL, 12AM04, DQ1225, TB-TSS-44+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-616	OR

FILE:	SCALE:	SHEET:
98PL616	8:1	1 OF 1

Evaluation Board and Circuit





Schematic Diagram

Function	Pad
RF IN	2
RF OUT	8
Vd	11
Vg	12
GND	1,3,4,6,7,9,10
NC	5

Component	Size	Value	Part Number	Manufacturer
C1,C3	0402	0.1uF	GRM155R71C104KA88D	Murata
C2,C4	0402	100pF	GRM1555C1H101JA01J	Murata

NOTES:

1. 2.4 mm Female Connectors.
2. PCB Material: Roger RO4350B or equivalent, Dielectric constant=3.5, Thickness=0.0066 inch

Mini-Circuits®

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Environmental Specifications ENV08T1

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 -45° to 85° C or -55° to 105° C or -40° to 105° C or -40° to 95° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C or -65° to 150° Ambient Environment	Individual Model Data Sheet
HTOL	1000 hours at 125°C	MIL-STD-883, Method 1005, Condition B
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Mechanical Shock	1.5Kg, 0.5 ms, 5 shock pulses, Y1 direction only	MIL-STD-883, Method 2002, Condition B, except Y1 direction only
Vibration (Variable Frequency)	50g peak	MIL-STD-883, Method 2007, Condition B
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102, Condition C
HAST	130°C, 85% RH, 96 hours	JESD22-A110
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Solder Reflow Heat	Sn-Pb Eutetic Process: 240°C peak Pb-Free Process: 260°C peak	J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1
Moisture Sensitivity: Level 1	Bake at 125°C for 24 hours Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 260°C peak	J-STD-020

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
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215