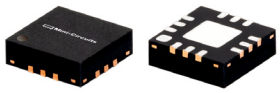
WIDEBAND

Low Noise Bypass Amplifier TSS-53LNB+

50Ω 0.5 to 5 GHz

THE BIG DEAL

- Wideband: 0.5 to 5 GHz
- Built-in Bypass switching
- Low Noise figure: 1.4 dB typ. at 2.0 GHz
- High Gain: 21.7 dB typ. at 2 GHz
- Ultra Flat Gain: 0.7 dB from 0.7 to 2.1 GHz
- P1dB: +21 dBm typ. at 2.0 GHz
- Minimal matching components
- Specified over full band operation



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

- Wireless Base Station Systems
- Test and Measurement Systems
- Multi-Band Receivers

PRODUCT OVERVIEW

TSS-53LNB+ (RoHS compliant) is an advanced ultra-flat gain Low Noise wideband amplifier fabricated using E-PHEMT technology offering extremely high dynamic range over a broad frequency range. It has integrated switches enabling users to bypass the amplifier during high signal conditions. In addition, the TSS-53LNB+has good input and output return loss over a broad frequency range without the need for external matching components. It is enclosed in a 12-lead 3x3mm MCLP package for good thermal performance.

KEY FEATURES

Feature	Advantages
Ultra-wideband: 500 MHz to 5 GHz	Ideal for a wide range of receiver applications including military, commercial wireless, and instrumentation.
Very flat gain	Ideal for broadband or multi-band applications. Just one, cost-efficient model required for multiple frequency usage.
Minimal external matching components required. 15 dB return loss typ.	Minimizes the need for external matching networks, simplifying circuit designs, and enabling the amplifier to operate over multiple bands in a single application circuit.
High IP3: 48 dBm typ. (bypass mode)	Provides enhanced linearity over broad frequency range under high signal conditions.
Internal bypass switch feature	Unique design handles low to high signal levels with minimal noise distortion.
Built-in DC blocking cap at RF-Out port & separate pads for RF-Out & Vdd	Simplifies biasing eliminates need for Bias-Tee at output.
Compact size: 3 x 3 x 0.9 mm	Saves space in dense system layouts. Low inductance, repeatable transitions, and excellent thermal contact.

REV. B
ECO-011809
TSS-53LNB+
MCL NY
240805

ELECTRICAL SPECIFICATIONS[1] AT +25°C, ZO=50Ω AND V_{DD}=+5V, UNLESS OTHERWISE NOTED

Parameter	Condition (GHz)	Amplifier-ON Min.	Amplifier-ON Typ.	Amplifier-ON Max.	Amplifier-Bypass Typ.	Units
Frequency Range		0.5		5.0		GHz
Noise Figure	0.5		1.3		0.7	dB
	1.0		1.2		0.9	
	2.0		1.4		0.9	
	3.0		1.4		1.0	
	4.0		1.6		1.4	
	5.0		1.7		1.1	
Gain	0.5	—	22.8	—	-0.7	dB
	1.0	—	22.7	—	-0.7	
	2.0	19.5	21.7	23.9	-0.9	
	3.0	—	20.5	—	-1.0	
	4.0	—	19.5	—	-0.9	
	5.0	—	18.7	—	-1.0	
Gain Flatness	0.7 - 2.1		±0.7		±0.14	dB
Input Return Loss	0.5	—	16.0		25.8	dB
	1.0	—	15.1		18.5	
	2.0	10.5	14.5		12.3	
	3.0	—	13.1		11.1	
	4.0	—	14.5		14.5	
	5.0	—	16.9		16.9	
Output Return Loss	0.5		11.8		22.8	dB
	1.0		12.5		17.1	
	2.0		17.0		12.6	
	3.0		14.1		11.7	
	4.0		10.7		14.0	
	5.0		10.0		11.9	
Output Power @1dB compression AMP-ON[2] Input Power @1dB compression AMP-Bypass[2]	0.5		+21.1		+32.0	dBm
	1.0		+21.0		—	
	2.0		+20.6		+33.0	
	3.0		+20.1		—	
	4.0		+20.2		—	
	5.0		+19.2		+27.0	
Output IP3	0.5		+35.1		+48.0	dBm
	1.0		+34.5		+48.4	
	2.0		+33.9		+45.2	
	3.0		+32.7		+42.9	
	4.0		+33.4		+42.0	
	5.0		+30.9		+40.8	
Device Operating Voltage (Vdd)		+4.8	+5.0	+5.2	+4.8-5.2 (5.0 typ.)	V
Device Operating Current (Id)			+82	105	2	mA
Enable Voltage (Ve)			+5.0		0	V
Enable Control Current (Ie)			+2.0		0	mA
DC Current (Id) Variation Vs. Temperature [3]			-19		—	µA/°C
DC Current (Id) Variation Vs. Voltage			0.008		—	mA/mV
Thermal Resistance, junction-to-ground lead			60		—	°C/W

1. Measured on Mini-Circuits Characterization test board TB-780+. See Characterization Test Circuit (Fig. 1)
2. Current increases at P1dB
3. (Current at 85°C - Current at -45°C)/130)

ABSOLUTE MAXIMUM RATINGS[5]

Parameter		Ratings
Operating Temperature (ground lead)		-40°C to +85°C
Storage Temperature		-65°C to +150°C
Total Power Dissipation		0.7 W
Input Power	Amplifier-ON	+8 dBm (continuous), 19 dBm (5 min max.)
	Amplifier Bypass	+16 dBm (continuous), 29 dBm (5 min max.)
DC Voltage Vdd		+7.0 V
DC Voltage Enable		+7.0 V
Max. Voltage on pad 8		+15 V

5. Permanent damage may occur if any of these limits are exceeded.
Electrical maximum ratings are not intended for continuous normal operation.

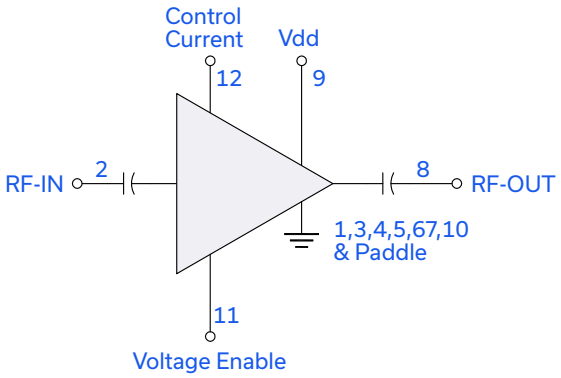
ENABLE VOLTAGE (VE) FIG. 1

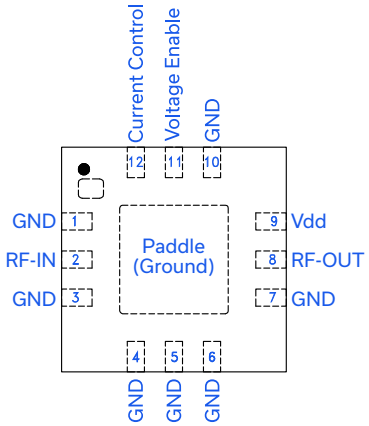
	Min.	Typ.	Max.	Units
Amplifier-ON	4.5	5.0	5.5	V
Amplifier-Bypass	0	—	0.5	V

SWITCHING SPECIFICATIONS (RISE/FALL TIME)

Parameter		Min.	Typ.	Max.	Units
Amplifier ON to Bypass	OFF TIME (50% Control to 10% RF)	—	50	—	ns
	FALL TIME (90 to 10% RF)	—	12	—	
Amplifier Bypass to ON	ON TIME (50% Control to 90% RF)	—	740	—	ns
	RISE TIME (10% to 90% RF)	—	240	—	
Control Voltage Leakage		—	65	—	mV

SIMPLIFIED SCHEMATIC AND BONDING PAD DESCRIPTION





Function	Pad Number	Description (See Figure 2)
RF-IN	2	RF-Input pad. Connect to Ground Via L1. Add a DC blocking cap in series of appropriate value if required.
RF-OUT	8	RF-Output pad. No external DC blocking cap required.
Current Control	12	Control Current pad, voltage level on this pad sets the Idd. Connect to pad 11 via 3.92 kΩ resistor.
Voltage Enable	11	Voltage Enable Pad. Voltage level on this pad determines Amplifier is ON or bypassed.
Vdd	9	Supply Voltage Pad. Connect to Vdd via L2.
Ground	1,3,4,5,6,7,10 Paddle	Connect to ground. Use via holes as shown in "Suggested Layout for PCB Design" to reduce ground path inductance for best performance.

CHARACTERIZATION TEST CIRCUIT

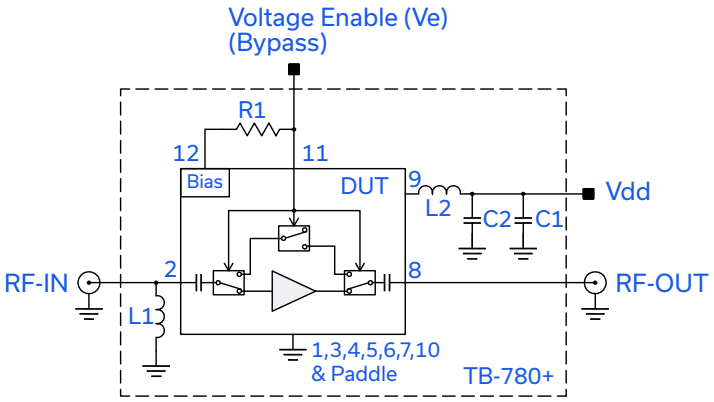


Fig 1. Block diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-780+)
Gain, Return loss, Output power at 1dB compression (P1 dB) , output IP3 (OIP3) and noise figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:
1. Gain and Return loss: P_{IN}= -25dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/tone at output.
3. Switching Time: P_{IN}=-25 dBm at 500 MHz. Venable=4.5, 5.0, 5.5V at 10 kHz. Vd=4.75, 5.0 and 5.5V.

Component	Size	Value	Units
L1	0402	47	nH
L2	0402	56	nH
C1	0402	0.1	µF
C2	0402	10	pF
R1	0402	3.92	KΩ

RECOMMENDED APPLICATION CIRCUIT

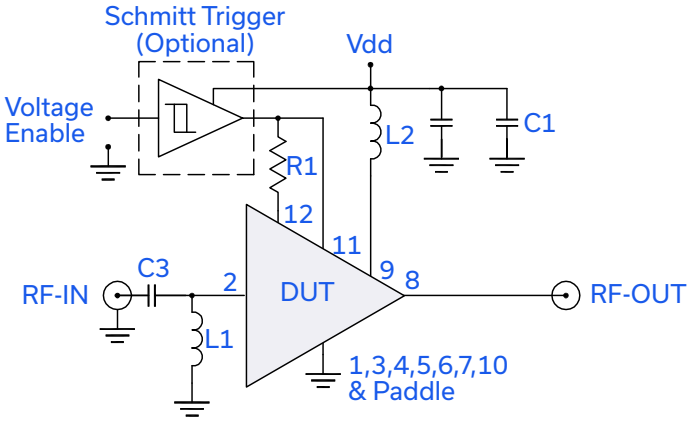


Fig 2. Recommended Application Circuit.

Component	Size	Value	Units
L1	0402	47	nH
L2	0402	56	nH
R1	0402	3.92	kΩ
C1	0402	0.1	µF
C2	0402	10	pF
C3	0402	1000	pF
Schmitt Trigger	SN74LVC2G17DCKR Texas Instruments		–

PRODUCT MARKING

Marking may contain other features or characters for internal lot control

ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD. CLICK HERE

Performance Data	Data Table Swept Graphs S-Parameter (S2P Files) Data Set (.zip file)
Case Style	DQ1225 Plastic package, exposed paddle, terminal 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-421
Evaluation Board	TB-779-3+
Environmental Ratings	ENV12

ESD RATING

Human Body Model (HBM): Class 1A (250 to <500V) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): Class M1 (pass 50V) in accordance with ANSI/ESD STM5.2-1999

MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

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 = Ve = 5V, Id = 86.38 mA @ Temperature = +25degC

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)
100.00	13.67	37.05	1.80	2.69	1.64	0.70	32.84	16.79	4.07
200.00	21.29	28.94	7.82	9.09	1.17	0.79	34.87	19.51	1.59
300.00	22.50	27.68	13.54	12.21	1.11	0.65	36.08	20.71	1.41
400.00	22.77	27.27	15.88	12.73	1.09	0.59	36.95	21.02	1.29
500.00	22.84	27.06	16.16	12.75	1.08	0.56	36.72	21.31	1.29
600.00	22.85	26.98	16.00	12.73	1.08	0.55	37.44	21.27	1.28
700.00	22.82	26.92	15.78	12.86	1.08	0.55	38.40	21.36	1.21
800.00	22.78	26.85	15.67	12.99	1.08	0.55	38.17	21.45	1.17
900.00	22.72	26.79	15.60	13.20	1.08	0.56	37.69	21.37	1.27
1000.00	22.65	26.82	15.59	13.47	1.08	0.57	36.34	21.23	1.18
1200.00	22.50	26.74	15.62	14.18	1.08	0.59	38.29	21.39	1.22
1400.00	22.32	26.68	15.74	15.04	1.09	0.62	36.43	21.23	1.21
1600.00	22.12	26.68	15.83	16.14	1.10	0.65	37.53	21.23	1.26
1800.00	21.92	26.67	15.89	17.33	1.11	0.68	36.42	20.97	1.28
2000.00	21.70	26.57	15.82	18.41	1.11	0.70	35.39	20.88	1.37
2200.00	21.47	26.61	15.69	18.99	1.13	0.73	35.16	21.10	1.34
2400.00	21.24	26.56	15.45	18.82	1.14	0.74	35.11	20.90	1.41
2600.00	20.99	26.55	15.22	18.08	1.15	0.76	34.29	20.59	1.46
2800.00	20.75	26.53	14.96	16.84	1.16	0.77	34.41	20.54	1.43
3000.00	20.53	26.55	14.67	15.62	1.17	0.77	33.99	20.28	1.43
3200.00	20.30	26.54	14.63	14.55	1.18	0.77	33.81	20.41	1.49
3400.00	20.08	26.48	14.73	13.69	1.19	0.77	34.11	20.34	1.50
3600.00	19.89	26.49	15.03	12.94	1.21	0.77	33.80	20.36	1.56
3800.00	19.69	26.54	15.46	12.39	1.23	0.77	34.20	20.61	1.56
4000.00	19.51	26.47	16.06	11.85	1.23	0.76	34.31	20.49	1.55
4200.00	19.34	26.53	17.03	11.58	1.25	0.77	33.98	20.38	1.58
4400.00	19.18	26.52	18.33	11.32	1.27	0.76	33.58	20.31	1.59
4800.00	18.85	26.56	19.64	11.07	1.29	0.78	33.15	19.95	1.71
5000.00	18.67	26.57	18.49	10.99	1.30	0.80	32.24	19.51	1.74
5200.00	18.44	26.76	16.42	11.03	1.32	0.83	32.74	19.53	1.86
5400.00	18.18	26.82	14.06	11.11	1.33	0.86	31.69	18.86	2.01
5600.00	17.84	27.12	11.87	11.14	1.36	0.91	31.15	18.50	2.12
5800.00	17.41	27.50	9.98	11.15	1.40	0.97	31.70	18.38	2.31
6000.00	16.83	28.04	8.38	11.09	1.46	1.04	31.13	18.10	2.67

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 =4.75V, Ve=5.0, Id =84.52 mA @ Temperature = +25degC

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)
100.00	13.63	36.91	1.80	2.64	1.61	0.69	31.96	16.16	4.07
200.00	21.24	29.03	7.80	8.99	1.17	0.79	34.29	18.90	1.60
300.00	22.45	27.60	13.48	12.09	1.11	0.65	35.07	20.15	1.42
400.00	22.73	27.20	15.84	12.61	1.09	0.59	36.27	20.57	1.31
500.00	22.80	27.01	16.15	12.62	1.08	0.56	36.43	20.87	1.27
600.00	22.81	26.91	15.99	12.62	1.08	0.55	37.18	20.83	1.25
700.00	22.77	26.89	15.76	12.73	1.08	0.55	38.46	20.92	1.19
800.00	22.74	26.81	15.63	12.87	1.08	0.55	37.75	21.03	1.16
900.00	22.68	26.78	15.54	13.08	1.08	0.56	36.60	20.94	1.22
1000.00	22.61	26.73	15.51	13.36	1.08	0.57	36.07	20.81	1.19
1200.00	22.45	26.74	15.50	14.06	1.09	0.60	37.53	20.95	1.22
1400.00	22.28	26.67	15.59	14.91	1.09	0.62	35.96	20.81	1.22
1600.00	22.07	26.63	15.65	15.98	1.10	0.65	36.13	20.82	1.26
1800.00	21.86	26.66	15.68	17.13	1.11	0.68	35.89	20.56	1.25
2000.00	21.64	26.59	15.59	18.16	1.12	0.71	35.06	20.49	1.36
2200.00	21.41	26.56	15.48	18.71	1.13	0.73	34.72	20.71	1.33
2400.00	21.18	26.56	15.23	18.57	1.14	0.75	34.66	20.52	1.41
2600.00	20.93	26.53	15.04	17.85	1.15	0.76	33.98	20.20	1.47
2800.00	20.70	26.51	14.83	16.65	1.16	0.77	33.90	20.17	1.43
3000.00	20.47	26.50	14.59	15.46	1.17	0.78	33.86	19.91	1.40
3200.00	20.24	26.47	14.56	14.43	1.18	0.77	33.44	20.03	1.49
3400.00	20.02	26.44	14.69	13.56	1.19	0.77	33.97	19.96	1.50
3600.00	19.83	26.41	15.04	12.84	1.20	0.77	33.64	19.99	1.53
3800.00	19.62	26.44	15.50	12.31	1.22	0.77	33.98	20.22	1.56
4000.00	19.45	26.49	16.12	11.77	1.24	0.77	34.04	20.09	1.55
4200.00	19.27	26.49	17.06	11.47	1.25	0.77	33.47	20.01	1.57
4400.00	19.11	26.49	18.35	11.22	1.27	0.77	33.62	19.94	1.61
4800.00	18.78	26.46	19.37	10.95	1.28	0.78	33.01	19.60	1.68
5000.00	18.59	26.61	18.14	10.88	1.30	0.80	32.11	19.20	1.73
5200.00	18.36	26.71	16.07	10.90	1.32	0.83	32.42	19.20	1.84
5400.00	18.09	26.87	13.78	10.97	1.34	0.87	31.65	18.58	2.00
5600.00	17.74	27.11	11.65	10.99	1.36	0.92	30.85	18.16	2.10
5800.00	17.31	27.50	9.82	11.00	1.40	0.98	31.57	18.06	2.33
6000.00	16.73	28.06	8.27	10.93	1.47	1.04	30.73	17.77	2.66

Typical Performance Data

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

TEST CONDITIONS: Vd = 5.25V, Ve=5.0V, Id = 88.2 mA @ Temperature = +25degC

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)
100.00	13.68	37.17	1.80	2.78	1.68	0.72	32.98	17.26	4.40
200.00	21.30	29.08	7.83	9.30	1.18	0.80	34.78	20.02	1.60
300.00	22.51	27.61	13.56	12.49	1.11	0.65	35.87	21.15	1.43
400.00	22.77	27.35	15.90	13.00	1.10	0.60	36.07	21.42	1.32
500.00	22.84	27.09	16.17	13.00	1.09	0.57	37.22	21.70	1.30
600.00	22.85	27.04	16.02	12.99	1.08	0.56	37.38	21.64	1.29
700.00	22.82	26.98	15.81	13.11	1.08	0.56	38.68	21.73	1.21
800.00	22.79	26.94	15.71	13.23	1.08	0.56	37.89	21.81	1.18
900.00	22.73	26.92	15.67	13.46	1.08	0.57	37.72	21.74	1.22
1000.00	22.66	26.86	15.68	13.74	1.09	0.58	36.40	21.61	1.20
1200.00	22.51	26.79	15.74	14.46	1.09	0.60	38.64	21.75	1.24
1400.00	22.34	26.79	15.89	15.35	1.10	0.63	36.59	21.61	1.22
1600.00	22.13	26.70	16.02	16.47	1.10	0.65	37.19	21.59	1.29
1800.00	21.93	26.75	16.11	17.68	1.12	0.68	36.91	21.33	1.29
2000.00	21.71	26.68	16.05	18.82	1.12	0.70	35.64	21.24	1.40
2200.00	21.49	26.66	15.92	19.40	1.13	0.73	35.89	21.48	1.34
2400.00	21.26	26.60	15.67	19.20	1.14	0.74	35.58	21.23	1.45
2600.00	21.01	26.65	15.40	18.35	1.16	0.76	34.79	20.92	1.47
2800.00	20.78	26.60	15.09	17.05	1.17	0.77	34.66	20.90	1.42
3000.00	20.55	26.53	14.79	15.81	1.17	0.77	34.20	20.62	1.43
3200.00	20.33	26.64	14.68	14.72	1.19	0.78	33.82	20.75	1.48
3400.00	20.11	26.59	14.77	13.84	1.21	0.77	34.33	20.68	1.53
3600.00	19.91	26.57	15.05	13.09	1.22	0.77	34.36	20.72	1.58
3800.00	19.71	26.57	15.46	12.54	1.23	0.77	34.50	20.96	1.59
4000.00	19.54	26.54	16.01	12.03	1.24	0.76	34.46	20.82	1.58
4200.00	19.36	26.62	17.00	11.74	1.26	0.77	33.89	20.73	1.61
4400.00	19.21	26.56	18.33	11.48	1.27	0.77	33.84	20.63	1.61
4800.00	18.89	26.64	19.90	11.27	1.30	0.78	33.39	20.25	1.71
5000.00	18.71	26.77	18.86	11.19	1.32	0.80	32.62	19.78	1.77
5200.00	18.48	26.77	16.77	11.24	1.33	0.83	33.01	19.74	1.85
5400.00	18.22	26.99	14.33	11.33	1.36	0.87	32.04	19.02	2.02
5600.00	17.89	27.23	12.09	11.37	1.38	0.91	31.35	18.78	2.15
5800.00	17.46	27.57	10.14	11.36	1.41	0.97	32.00	18.71	2.36
6000.00	16.89	28.15	8.50	11.29	1.49	1.04	31.34	18.43	2.69

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 = Ve = 5V, Id =88.64 mA @ Temperature = -45degC

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)
100.00	13.19	36.68	1.65	2.30	1.49	0.62	40.69	16.82	3.58
200.00	21.01	28.70	8.06	7.70	1.15	0.71	39.60	19.29	1.16
300.00	22.12	27.47	13.26	9.45	1.10	0.58	40.47	20.53	1.09
400.00	22.31	27.13	13.47	9.34	1.09	0.52	40.36	20.97	0.98
500.00	22.36	26.97	12.83	9.28	1.08	0.50	42.54	21.27	1.00
600.00	22.37	26.87	12.45	9.27	1.07	0.48	47.11	21.25	0.99
700.00	22.36	26.83	12.27	9.37	1.07	0.49	42.88	21.36	0.92
800.00	22.34	26.76	12.29	9.50	1.07	0.49	47.56	21.44	0.88
900.00	22.31	26.75	12.36	9.70	1.08	0.50	43.30	21.31	0.85
1000.00	22.28	26.68	12.53	9.90	1.08	0.50	40.26	21.22	0.89
1200.00	22.18	26.60	12.90	10.33	1.08	0.52	43.39	21.39	0.89
1400.00	22.07	26.52	13.38	10.78	1.08	0.53	40.23	21.24	0.88
1600.00	21.94	26.48	14.06	11.50	1.09	0.56	41.76	21.23	0.97
1800.00	21.83	26.47	15.22	12.36	1.10	0.59	39.64	21.00	0.94
2000.00	21.69	26.34	16.22	13.43	1.11	0.61	37.71	20.87	0.99
2200.00	21.54	26.20	17.57	14.42	1.11	0.63	37.02	21.14	0.94
2400.00	21.39	26.19	18.93	15.52	1.12	0.65	36.80	20.95	1.03
2600.00	21.20	26.15	20.36	16.60	1.14	0.67	36.26	20.61	1.04
2800.00	21.03	26.12	21.49	17.41	1.15	0.69	35.51	20.56	1.02
3000.00	20.86	26.11	21.79	17.51	1.16	0.70	35.10	20.26	0.97
3200.00	20.68	26.09	22.12	17.05	1.17	0.71	34.83	20.32	1.02
3400.00	20.50	26.05	22.34	16.22	1.17	0.71	35.38	20.38	1.03
3600.00	20.32	25.99	22.42	15.35	1.18	0.71	34.90	20.30	1.11
3800.00	20.16	26.06	22.65	14.63	1.20	0.72	35.42	20.76	1.09
4000.00	20.01	26.05	23.43	13.93	1.21	0.72	35.55	20.68	1.09
4200.00	19.81	26.09	27.38	13.32	1.22	0.72	35.23	20.69	1.09
4400.00	19.69	26.05	33.92	12.93	1.23	0.72	35.03	20.63	1.09
4800.00	19.39	26.17	28.95	12.34	1.25	0.73	34.15	20.42	1.17
5000.00	19.26	26.26	23.12	12.20	1.26	0.75	33.21	19.90	1.23
5200.00	19.06	26.33	19.33	12.05	1.27	0.77	34.03	20.16	1.29
5400.00	18.85	26.52	16.45	11.99	1.29	0.80	32.91	19.58	1.44
5600.00	18.59	26.62	14.12	11.92	1.30	0.84	32.16	19.10	1.49
5800.00	18.30	26.96	12.09	12.18	1.33	0.90	32.88	18.91	1.67
6000.00	17.92	27.39	10.21	12.44	1.37	0.96	32.45	18.69	1.94

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 = 4.75V, Ve =5.0V, Id =86.26 mA @ Temperature = -45degC

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)
100.00	13.14	36.86	1.66	2.27	1.51	0.62	40.39	16.24	3.60
200.00	20.95	28.66	8.04	7.65	1.15	0.71	38.46	18.66	1.15
300.00	22.07	27.31	13.28	9.41	1.10	0.57	38.45	19.90	1.09
400.00	22.26	27.11	13.54	9.30	1.09	0.52	38.43	20.44	0.99
500.00	22.30	26.94	12.90	9.23	1.08	0.50	40.43	20.78	1.01
600.00	22.32	26.83	12.51	9.25	1.07	0.49	48.67	20.78	0.97
700.00	22.30	26.74	12.33	9.33	1.07	0.48	44.44	20.89	0.92
800.00	22.29	26.68	12.35	9.47	1.07	0.48	44.47	20.98	0.87
900.00	22.26	26.64	12.43	9.67	1.07	0.49	50.04	20.86	1.30
1000.00	22.22	26.63	12.58	9.87	1.07	0.50	39.43	20.77	0.87
1200.00	22.13	26.54	12.94	10.30	1.08	0.52	43.50	20.94	0.92
1400.00	22.02	26.51	13.42	10.75	1.09	0.54	38.61	20.80	0.89
1600.00	21.89	26.41	14.07	11.46	1.09	0.56	39.83	20.79	0.96
1800.00	21.77	26.30	15.18	12.32	1.10	0.58	39.00	20.58	0.91
2000.00	21.63	26.22	16.14	13.38	1.10	0.61	36.92	20.46	1.00
2200.00	21.48	26.21	17.42	14.34	1.12	0.63	37.17	20.72	0.92
2400.00	21.33	26.13	18.75	15.44	1.12	0.65	36.43	20.54	1.01
2600.00	21.14	26.10	20.02	16.48	1.13	0.67	35.31	20.18	1.04
2800.00	20.97	26.10	21.04	17.23	1.15	0.69	35.01	20.12	1.00
3000.00	20.80	26.00	21.40	17.31	1.15	0.70	35.04	19.87	0.97
3200.00	20.62	26.00	21.74	16.82	1.16	0.71	34.79	19.91	1.03
3400.00	20.44	25.94	22.07	16.01	1.17	0.71	35.09	19.96	1.01
3600.00	20.26	26.00	22.23	15.15	1.18	0.72	34.87	19.87	1.09
3800.00	20.11	26.01	22.60	14.44	1.19	0.72	35.13	20.33	1.09
4000.00	19.95	25.98	23.44	13.73	1.20	0.71	35.47	20.25	1.08
4200.00	19.75	26.10	27.55	13.17	1.23	0.72	34.95	20.22	1.09
4400.00	19.63	26.02	34.74	12.77	1.23	0.72	34.45	20.18	1.14
4800.00	19.33	26.11	28.18	12.18	1.25	0.73	34.17	20.03	1.18
5000.00	19.19	26.23	22.67	12.05	1.26	0.75	33.17	19.64	1.21
5200.00	18.99	26.24	19.03	11.90	1.27	0.77	33.80	19.82	1.29
5400.00	18.78	26.42	16.20	11.84	1.28	0.80	32.41	19.27	1.43
5600.00	18.52	26.67	13.91	11.77	1.30	0.85	31.85	18.78	1.51
5800.00	18.22	26.89	11.90	12.02	1.32	0.90	32.39	18.50	1.67
6000.00	17.84	27.37	10.07	12.27	1.37	0.97	32.15	18.27	1.97

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 = 5.25V, Ve =5.0V, Id = 90.87 mA @ Temperature = -45degC

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)
100.00	13.22	36.82	1.66	2.38	1.54	0.64	40.83	17.35	3.62
200.00	21.03	28.83	8.05	7.84	1.16	0.73	40.94	19.84	1.17
300.00	22.15	27.56	13.24	9.62	1.11	0.59	44.19	21.04	1.12
400.00	22.33	27.19	13.44	9.49	1.09	0.53	41.32	21.43	0.99
500.00	22.38	27.05	12.78	9.42	1.08	0.51	42.90	21.71	1.03
600.00	22.39	26.95	12.41	9.43	1.08	0.50	47.09	21.67	0.99
700.00	22.37	26.92	12.23	9.53	1.08	0.50	40.39	21.76	0.93
800.00	22.36	26.89	12.26	9.65	1.08	0.50	45.09	21.86	0.89
900.00	22.33	26.81	12.34	9.85	1.08	0.50	45.66	21.72	5.51
1000.00	22.30	26.73	12.50	10.07	1.08	0.51	41.81	21.64	0.93
1200.00	22.20	26.71	12.86	10.48	1.09	0.53	42.34	21.80	0.91
1400.00	22.09	26.65	13.39	10.94	1.09	0.55	40.79	21.65	0.90
1600.00	21.96	26.54	14.10	11.65	1.10	0.57	42.71	21.64	0.98
1800.00	21.85	26.52	15.27	12.54	1.11	0.60	41.64	21.39	0.95
2000.00	21.72	26.44	16.30	13.62	1.12	0.62	37.82	21.26	1.01
2200.00	21.56	26.35	17.69	14.61	1.12	0.64	37.80	21.54	0.96
2400.00	21.41	26.24	19.16	15.76	1.13	0.65	36.87	21.34	1.01
2600.00	21.22	26.27	20.63	16.86	1.14	0.68	36.37	20.98	1.06
2800.00	21.06	26.19	21.88	17.70	1.15	0.69	36.12	20.94	1.04
3000.00	20.89	26.16	22.14	17.82	1.16	0.70	35.51	20.64	0.99
3200.00	20.70	26.12	22.39	17.32	1.17	0.71	35.26	20.72	1.01
3400.00	20.52	26.08	22.55	16.47	1.18	0.71	35.56	20.78	1.04
3600.00	20.35	26.16	22.45	15.57	1.19	0.72	35.26	20.68	1.11
3800.00	20.19	26.14	22.61	14.83	1.20	0.72	35.61	21.17	1.10
4000.00	20.03	26.11	23.25	14.13	1.21	0.72	35.66	21.11	1.09
4200.00	19.83	26.16	27.01	13.52	1.23	0.72	35.43	21.04	1.13
4400.00	19.72	26.18	32.75	13.13	1.24	0.72	34.82	20.89	1.12
4800.00	19.42	26.23	29.90	12.54	1.26	0.74	34.52	20.45	1.19
5000.00	19.28	26.32	23.64	12.41	1.27	0.75	33.45	19.92	1.22
5200.00	19.09	26.40	19.75	12.26	1.28	0.77	34.06	20.19	1.29
5400.00	18.89	26.54	16.76	12.20	1.30	0.80	33.04	19.58	1.45
5600.00	18.63	26.71	14.36	12.14	1.31	0.84	32.27	19.11	1.54
5800.00	18.34	27.05	12.28	12.41	1.34	0.90	32.87	19.07	1.68
6000.00	17.97	27.40	10.35	12.68	1.38	0.96	32.70	18.77	1.97

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 = Ve = 5V, Id = 84.93 mA @ Temperature = +85degC

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)
100.00	13.82	36.92	1.84	2.96	1.67	0.75	31.13	16.51	4.69
200.00	21.35	29.12	7.44	9.99	1.18	0.83	33.40	19.42	1.92
300.00	22.62	27.71	12.97	14.46	1.11	0.69	34.09	20.47	1.60
400.00	22.92	27.23	15.86	15.70	1.09	0.62	35.24	20.76	1.47
500.00	23.00	27.16	16.87	16.03	1.09	0.60	35.50	21.06	1.46
600.00	23.01	26.97	17.08	16.06	1.08	0.58	35.87	21.02	1.42
700.00	22.97	26.95	16.95	16.26	1.08	0.59	36.29	21.09	1.37
800.00	22.92	26.89	16.82	16.57	1.08	0.59	36.06	21.20	1.32
900.00	22.85	26.87	16.57	17.04	1.08	0.60	35.87	21.12	1.36
1000.00	22.77	26.80	16.33	17.58	1.08	0.61	35.17	20.99	1.37
1200.00	22.57	26.77	15.83	18.75	1.08	0.64	36.48	21.14	1.38
1400.00	22.36	26.78	15.26	20.01	1.09	0.67	35.34	20.98	1.38
1600.00	22.09	26.77	14.74	21.09	1.10	0.70	35.23	21.01	1.47
1800.00	21.85	26.82	14.09	21.59	1.11	0.73	35.11	20.75	1.48
2000.00	21.58	26.78	13.68	21.08	1.12	0.75	34.44	20.69	1.60
2200.00	21.30	26.75	13.19	19.70	1.13	0.77	34.30	20.84	1.57
2400.00	21.03	26.73	12.77	18.12	1.14	0.79	33.90	20.66	1.65
2600.00	20.73	26.75	12.49	16.68	1.15	0.80	33.72	20.34	1.69
2800.00	20.46	26.72	12.17	15.26	1.16	0.81	33.62	20.28	1.65
3000.00	20.20	26.75	11.93	14.06	1.18	0.81	33.51	20.05	1.63
3200.00	19.96	26.84	11.88	13.09	1.20	0.82	33.20	20.13	1.79
3400.00	19.72	26.67	11.98	12.37	1.20	0.81	33.33	20.07	1.81
3600.00	19.51	26.70	12.24	11.75	1.22	0.80	33.16	20.04	1.85
3800.00	19.32	26.69	12.58	11.29	1.23	0.80	33.24	20.10	1.88
4000.00	19.11	26.71	13.07	10.89	1.25	0.79	33.58	19.96	1.86
4200.00	18.93	26.73	13.85	10.71	1.27	0.80	33.20	19.76	1.90
4400.00	18.77	26.65	14.73	10.54	1.28	0.79	32.87	19.65	1.90
4800.00	18.40	26.69	15.60	10.31	1.31	0.81	32.10	18.99	1.98
5000.00	18.19	26.79	15.10	10.24	1.32	0.83	31.16	18.50	2.07
5200.00	17.91	26.91	13.74	10.23	1.34	0.86	31.36	18.29	2.19
5400.00	17.57	27.09	11.98	10.24	1.36	0.90	30.53	17.74	2.39
5600.00	17.15	27.44	10.30	10.14	1.40	0.95	29.65	17.28	2.52
5800.00	16.62	27.87	8.75	10.00	1.45	1.01	30.03	17.19	2.78
6000.00	15.93	28.50	7.43	9.83	1.55	1.06	29.14	16.77	3.20

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 = 4.75V, Ve =5.0V, Id = 83.15 mA @ Temperature = +85degC

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)
100.00	13.79	37.05	1.84	2.91	1.69	0.75	30.60	16.00	4.77
200.00	21.30	29.10	7.42	9.89	1.18	0.83	33.10	18.89	1.90
300.00	22.58	27.60	12.90	14.28	1.11	0.68	34.05	20.01	1.61
400.00	22.88	27.24	15.78	15.52	1.09	0.62	34.76	20.36	1.46
500.00	22.96	27.05	16.77	15.86	1.08	0.60	34.69	20.66	1.43
600.00	22.97	26.95	16.96	15.92	1.08	0.59	35.31	20.62	1.39
700.00	22.93	26.90	16.86	16.12	1.08	0.59	36.01	20.69	1.35
800.00	22.88	26.83	16.69	16.41	1.08	0.59	35.79	20.81	1.33
900.00	22.81	26.75	16.40	16.87	1.07	0.60	35.03	20.74	1.37
1000.00	22.73	26.77	16.14	17.40	1.08	0.61	34.56	20.59	1.37
1200.00	22.52	26.79	15.63	18.54	1.09	0.64	36.14	20.74	1.37
1400.00	22.31	26.75	15.07	19.75	1.09	0.67	34.85	20.62	1.38
1600.00	22.04	26.68	14.53	20.80	1.10	0.70	34.84	20.61	1.47
1800.00	21.79	26.78	13.91	21.25	1.11	0.73	35.13	20.39	1.49
2000.00	21.52	26.67	13.50	20.75	1.11	0.75	34.18	20.29	1.60
2200.00	21.24	26.71	13.04	19.44	1.13	0.78	33.99	20.46	1.56
2400.00	20.97	26.69	12.64	17.96	1.14	0.79	34.08	20.28	1.68
2600.00	20.67	26.79	12.37	16.54	1.16	0.81	33.22	19.98	1.70
2800.00	20.40	26.68	12.10	15.14	1.16	0.81	33.26	19.92	1.66
3000.00	20.14	26.75	11.86	13.96	1.18	0.82	33.02	19.71	1.62
3200.00	19.90	26.76	11.84	13.01	1.19	0.82	32.57	19.78	1.76
3400.00	19.65	26.69	11.97	12.27	1.20	0.81	33.22	19.72	1.80
3600.00	19.45	26.65	12.24	11.67	1.21	0.80	32.83	19.67	1.84
3800.00	19.25	26.73	12.61	11.20	1.24	0.80	33.26	19.76	1.85
4000.00	19.04	26.70	13.12	10.80	1.25	0.80	33.52	19.63	1.87
4200.00	18.86	26.58	13.89	10.62	1.26	0.79	33.04	19.44	1.88
4400.00	18.70	26.62	14.78	10.43	1.28	0.79	32.99	19.33	1.92
4800.00	18.32	26.61	15.52	10.19	1.30	0.81	31.77	18.71	1.99
5000.00	18.10	26.73	14.94	10.14	1.32	0.83	30.97	18.19	2.07
5200.00	17.82	26.82	13.55	10.11	1.33	0.86	31.14	18.07	2.20
5400.00	17.47	27.05	11.81	10.09	1.36	0.90	30.54	17.54	2.38
5600.00	17.04	27.40	10.15	10.00	1.40	0.95	29.57	17.08	2.52
5800.00	16.51	27.80	8.64	9.88	1.44	1.01	29.87	16.89	2.77
6000.00	15.82	28.39	7.35	9.70	1.53	1.06	29.03	16.50	3.20

Typical Performance Data

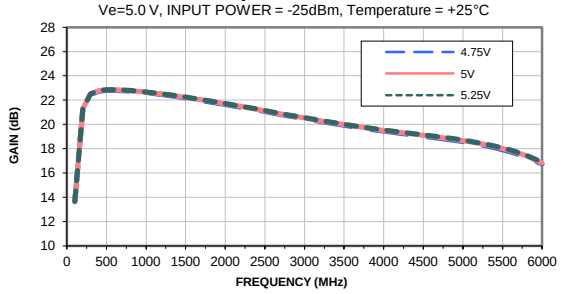
Definitions:
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: Vd = 5.25V, Ve = 5.0V, Id = 86.69 mA @ Temperature = +85degC

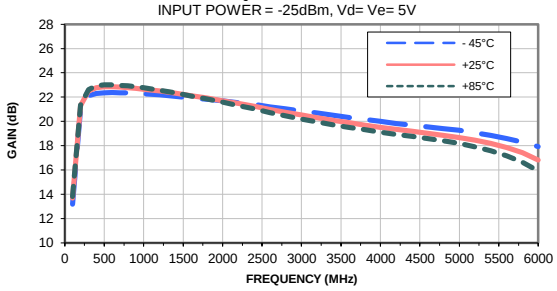
FREQ	Gain	Isolation	Input Return Loss	Output Return Loss	Stability		IP-3 Output	1dB Comp. Output	Noise Figure
(MHz)	(dB)	(dB)	(dB)	(dB)	K	Measure	(dBm)	(dBm)	(dB)
100.00	13.82	37.21	1.83	3.06	1.74	0.78	31.27	16.94	4.58
200.00	21.35	29.14	7.45	10.23	1.19	0.84	33.27	19.84	1.90
300.00	22.62	27.67	13.00	14.79	1.11	0.69	34.68	20.85	1.63
400.00	22.92	27.26	15.95	16.06	1.09	0.62	35.51	21.12	1.50
500.00	23.00	27.21	16.91	16.38	1.09	0.61	35.14	21.39	1.46
600.00	23.01	27.11	17.14	16.42	1.09	0.60	36.35	21.35	1.43
700.00	22.97	27.03	17.08	16.60	1.08	0.60	36.12	21.41	1.37
800.00	22.92	26.97	16.93	16.92	1.08	0.60	36.36	21.53	1.33
900.00	22.85	26.89	16.68	17.39	1.08	0.60	35.78	21.48	1.37
1000.00	22.77	26.90	16.47	17.97	1.09	0.62	35.10	21.32	1.39
1200.00	22.58	26.91	16.01	19.14	1.09	0.65	36.37	21.45	1.39
1400.00	22.37	26.81	15.48	20.47	1.10	0.67	35.33	21.30	1.39
1600.00	22.11	26.84	14.93	21.59	1.11	0.70	35.70	21.31	1.49
1800.00	21.86	26.87	14.30	22.10	1.12	0.73	35.76	21.09	1.51
2000.00	21.60	26.81	13.87	21.52	1.12	0.75	34.52	20.99	1.62
2200.00	21.33	26.82	13.35	19.97	1.14	0.77	34.28	21.14	1.59
2400.00	21.05	26.77	12.92	18.35	1.14	0.79	34.34	20.97	1.66
2600.00	20.75	26.87	12.61	16.86	1.17	0.81	33.93	20.65	1.71
2800.00	20.49	26.78	12.27	15.41	1.17	0.81	33.92	20.58	1.70
3000.00	20.23	26.83	11.99	14.21	1.19	0.82	33.80	20.38	1.67
3200.00	19.99	26.85	11.92	13.22	1.20	0.81	33.15	20.46	1.77
3400.00	19.75	26.79	12.02	12.50	1.21	0.81	33.52	20.40	1.83
3600.00	19.54	26.79	12.24	11.89	1.23	0.80	33.35	20.34	1.87
3800.00	19.35	26.76	12.59	11.41	1.24	0.80	33.70	20.40	1.88
4000.00	19.14	26.69	13.05	11.03	1.25	0.79	33.69	20.21	1.90
4200.00	18.96	26.75	13.84	10.87	1.28	0.80	33.42	20.05	1.92
4400.00	18.80	26.73	14.74	10.70	1.29	0.79	33.03	19.87	1.93
4800.00	18.44	26.73	15.70	10.49	1.32	0.81	32.08	19.23	2.03
5000.00	18.23	26.82	15.27	10.43	1.33	0.83	31.16	18.69	2.09
5200.00	17.96	26.96	13.94	10.43	1.35	0.86	31.20	18.39	2.20
5400.00	17.62	27.16	12.16	10.44	1.38	0.90	30.54	17.83	2.40
5600.00	17.20	27.52	10.45	10.34	1.42	0.95	29.73	17.42	2.53
5800.00	16.67	27.91	8.85	10.21	1.47	1.00	30.10	17.37	2.77
6000.00	15.99	28.52	7.51	10.03	1.56	1.06	29.10	16.97	3.19

Typical Performance Curves

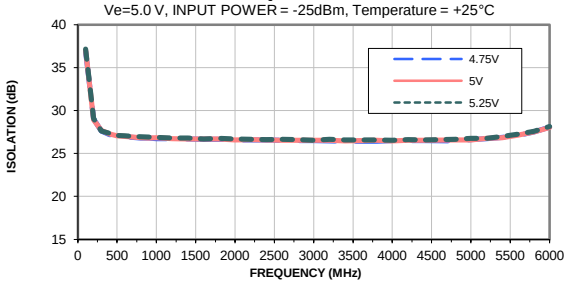
GAIN vs. FREQUENCY & DEVICE VOLTAGE
Ve=5.0 V, INPUT POWER = -25dBm, Temperature = +25°C



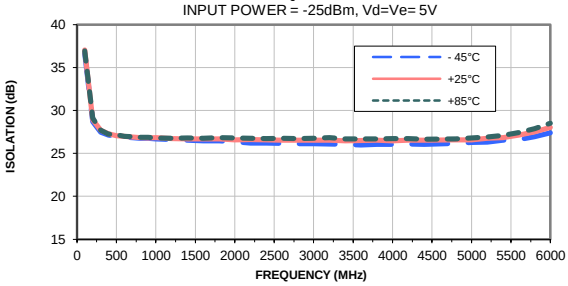
GAIN vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd= Ve= 5V



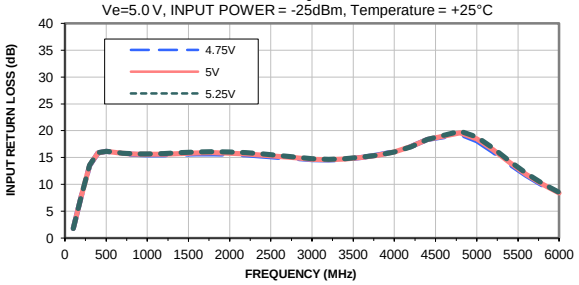
ISOLATION vs. FREQUENCY & DEVICE VOLTAGE
Ve=5.0 V, INPUT POWER = -25dBm, Temperature = +25°C



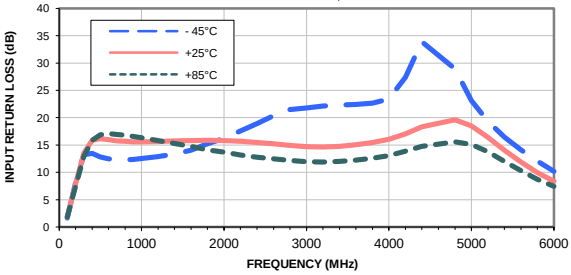
ISOLATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd=Ve= 5V



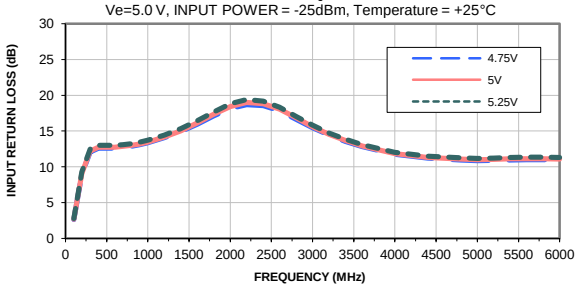
INPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
Ve=5.0 V, INPUT POWER = -25dBm, Temperature = +25°C



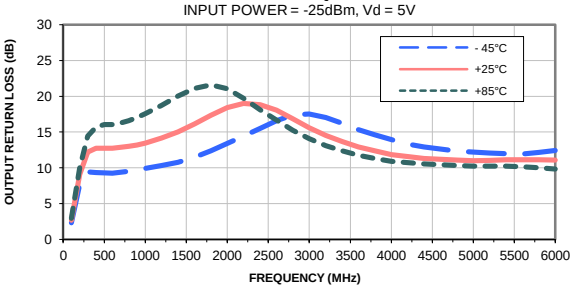
INPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd=Ve=5V



OUTPUT RETURN LOSS vs. FREQUENCY & DEVICE VOLTAGE
Ve=5.0 V, INPUT POWER = -25dBm, Temperature = +25°C

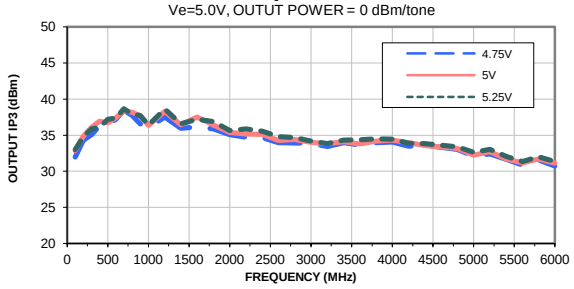


OUTPUT RETURN LOSS vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd = 5V

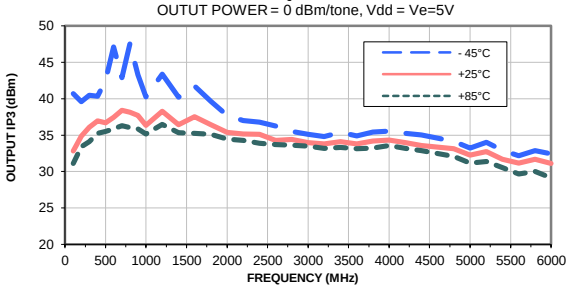


Typical Performance Curves

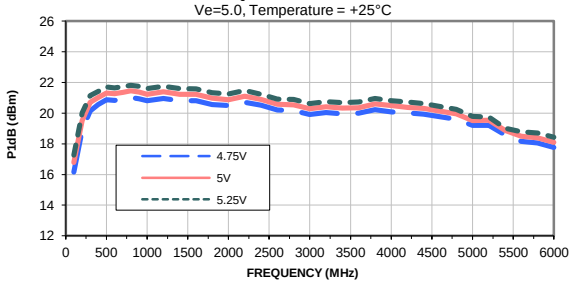
OUTPUT IP3 vs. FREQUENCY & DEVICE VOLTAGE
Ve=5.0V, OUTUT POWER = 0 dBm/tone



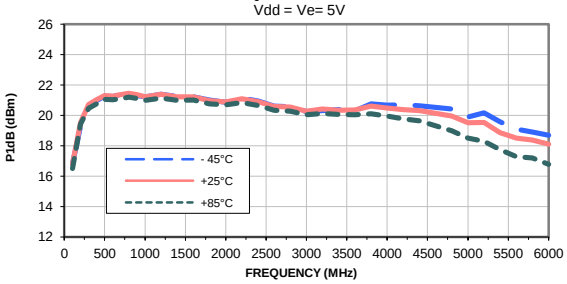
OUTPUT IP3 vs. FREQUENCY & TEMPERATURE
OUTUT POWER = 0 dBm/tone, Vdd = Ve=5V



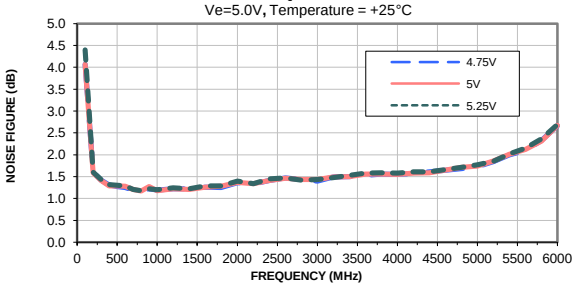
P1dB vs. FREQUENCY & DEVICE VOLTAGE
Ve=5.0, Temperature = +25°C



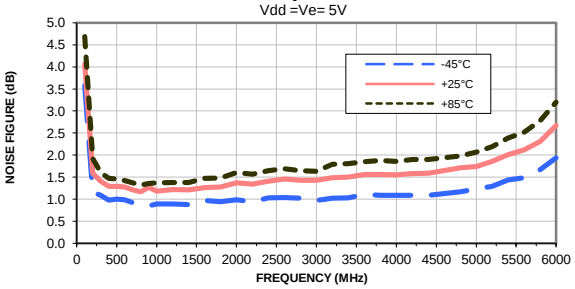
P1dB vs. FREQUENCY & TEMPERATURE
Vdd = Ve= 5V



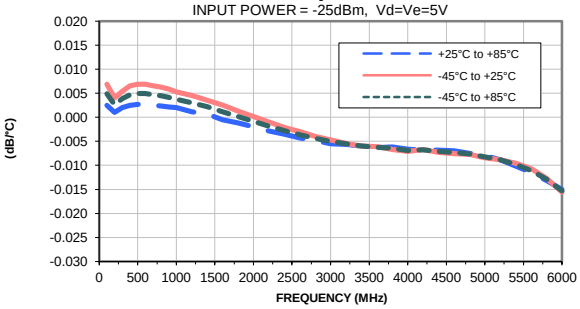
NOISE FIGURE vs. FREQUENCY & DEVICE VOLTAGE
Ve=5.0V, Temperature = +25°C



NOISE FIGURE vs. FREQUENCY & TEMPERATURE
Vdd =Ve= 5V



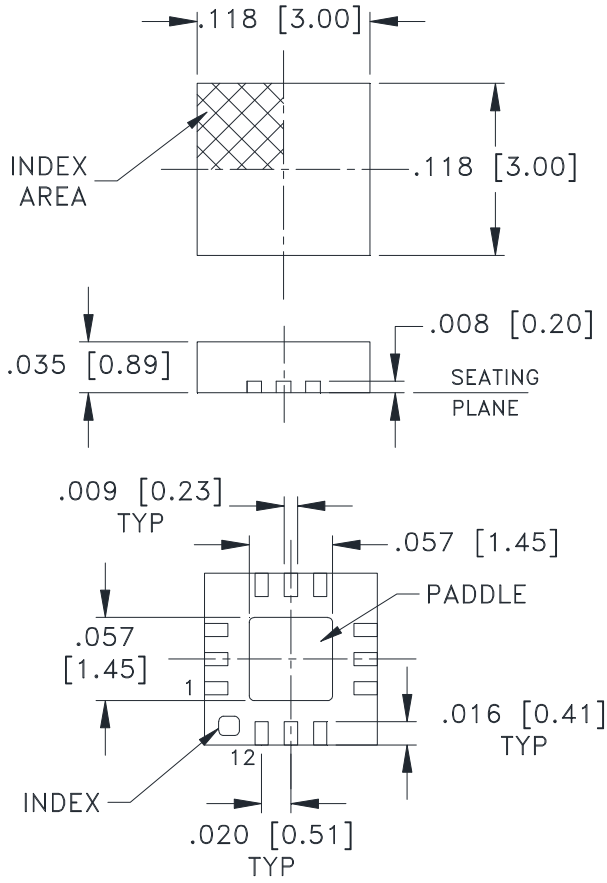
GAIN VARIATION vs. FREQUENCY & TEMPERATURE
INPUT POWER = -25dBm, Vd=Ve=5V

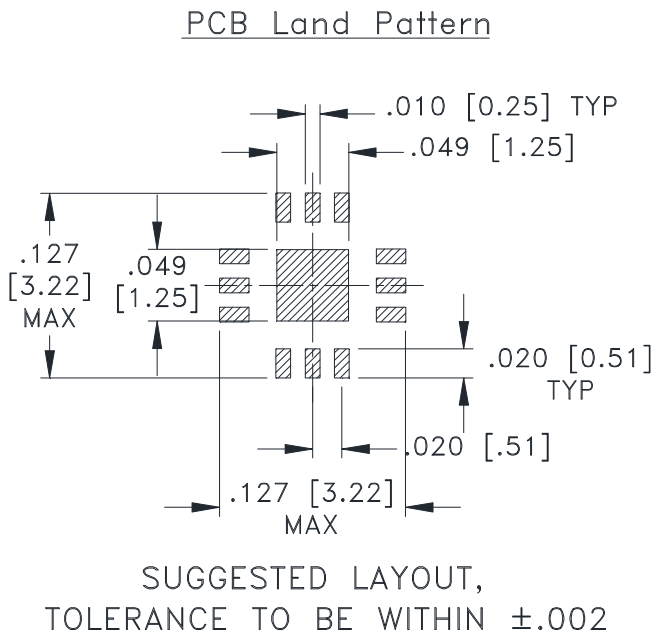


Case Style DQ

DQ1225

Outline Dimensions





Weight: .02 Grams

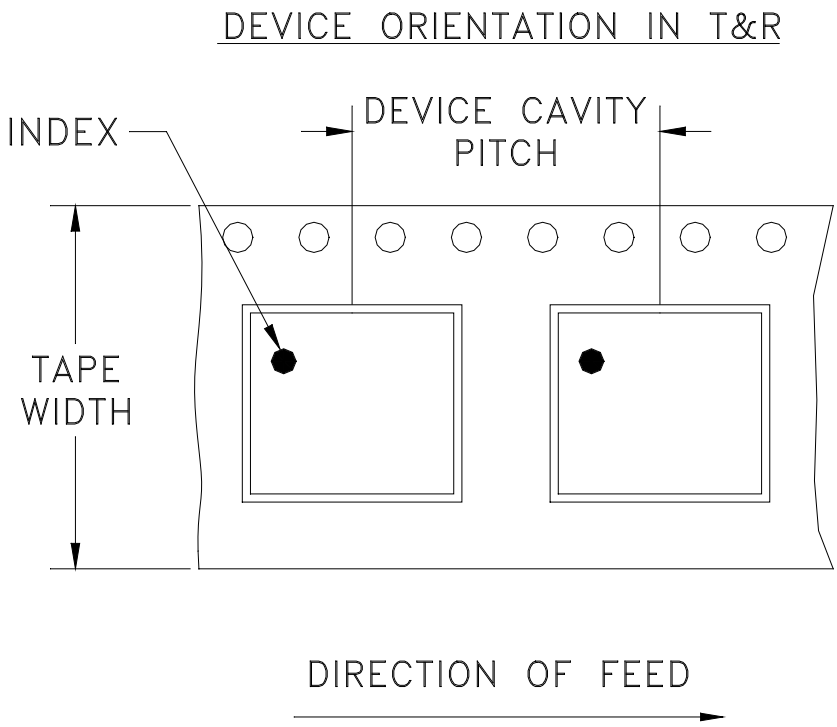
Dimensions are in inches (mm). Tolerances: 2Pl. ± .01; 3 Pl. ± .004

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.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

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.

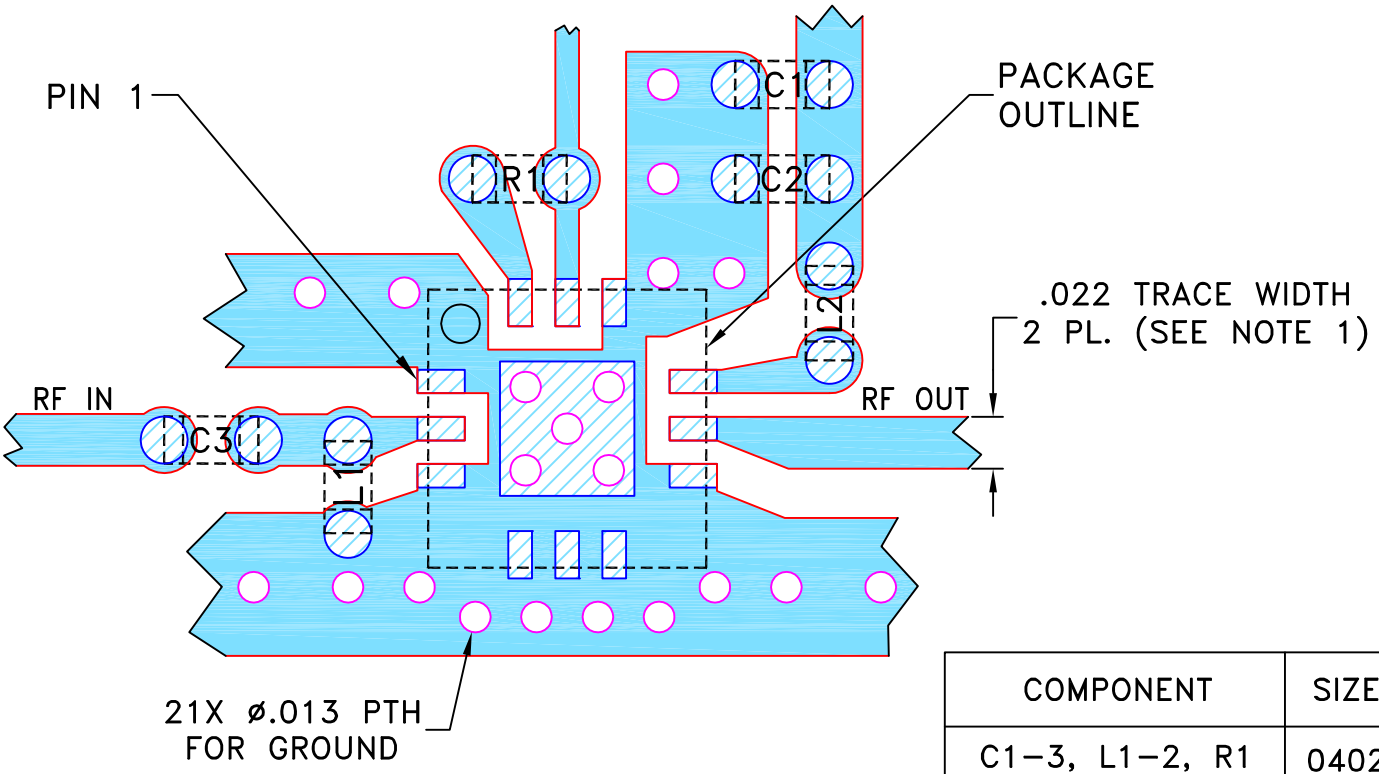
Go to: www.minicircuits.com/pages/pdfs/tape.pdf

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M146226	NEW RELEASE	05/05/14	ITG	SK

SUGGESTED MOUNTING CONFIGURATION
FOR DQ1225 CASE STYLE, "12AM01" PIN CODE



COMPONENT	SIZE
C1–3, L1–2, R1	0402

NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010" ± .001". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. CHIP COMPONENT FOOT PRINTS SHOWN FOR REFERENCE. FOR COMPONENT VALUES REFER TO TB–779+.
2. BOTTOM SIDE 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	04/28/14
TOLERANCES ON:	CHECKED	IL	04/30/14
2 PL DECIMALS ±	APPROVED	SK	05/05/14
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

Mini-Circuits®

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

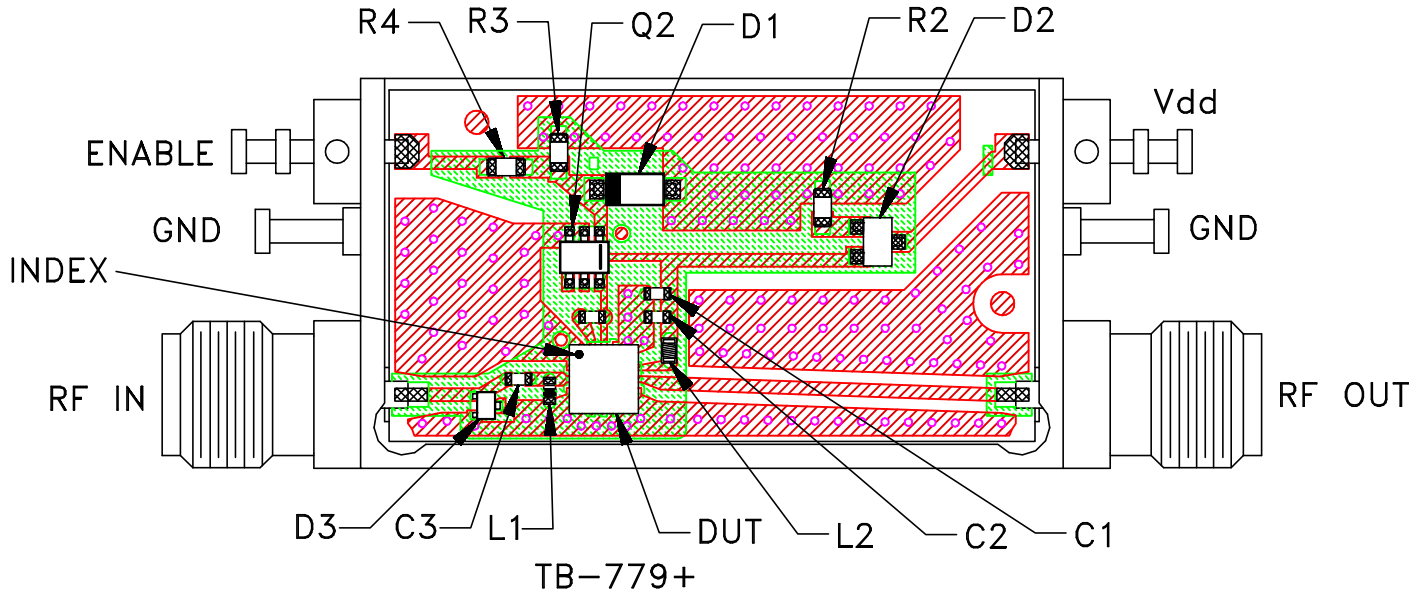
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, 12AM01, DQ1225, TB–779+

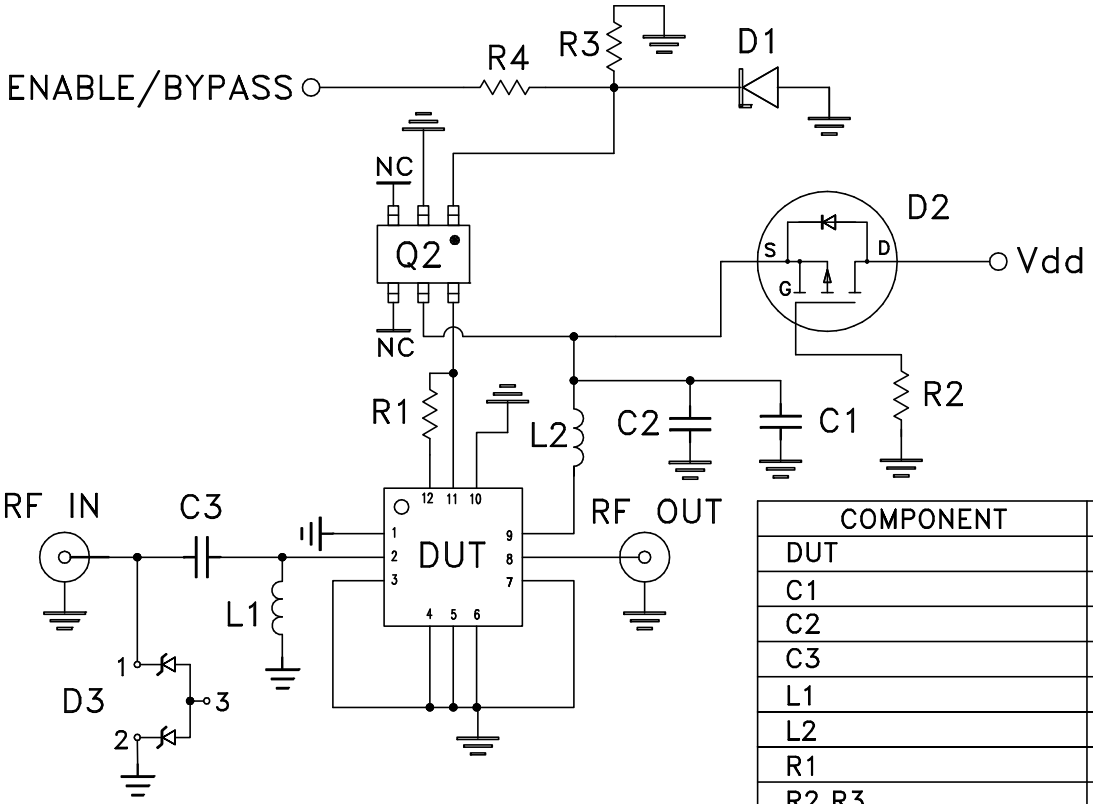
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98–PL–421	OR

FILE:	SCALE:	SHEET:
98PL421	12:1	1 OF 1

Evaluation Board and Circuit



TB-779+



Schematic Diagram

COMPONENT		VALUE	SIZE
DUT		TSS-53LNB+	
C1		.1 uF	0402
C2		10 pF	
C3		.001 uF	
L1		47 nH	
L2		56 nH	
R1		3.92 kOhm	
R2,R3		10 kOhm	0603
R4		1 kOhm	
D1	MCL	B40-28-5230B+	
	ON SEMI	MMSZ5230BT1G	
D2	MCL	B43-4101PT1+	
	ON SEMI	NTS4101PT1G	
D3	MCL	B40-ESD7L5+	
	ON SEMI	ESD7L5.0DT5G	
Q2	MCL	B49-SN74-17+	
	TEXAS INSTRUMENT	SN74LVC2G17DCKR	

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.010 inch.

Mini-Circuits®

Mini-Circuits

Environmental Specifications ENV12

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 Ambient Environment	Individual Model Data Sheet
Storage Temperature	-65° to 150° C Ambient Environment	Individual Model Data Sheet
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102-C, Condition C
Temperature Cycling	-65° to 150°C, 100 cycles	JESD22-A104
Temperature Humidity	85°C/ 85% RH, 168 hours	JESD22-113
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 240°C peak (Non-RoHS) or 260°C (RoHS)	J-STD-020
Solderability	10X magnification, 95% coverage	JESD22-B102, Method 1: Dip and Look Test
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D