



MMIC REFLECTIONLESS

# Low Pass Filter

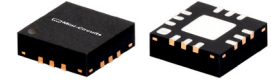
## XLF-173+

Mini-Circuits

50Ω DC to 17000 MHz

### THE BIG DEAL

- Match to 50Ω in the stop band, eliminates undesired reflections
- Cascadable
- Excellent Power handling
- Temperature sData, up to +105°C
- Small size, 3 x 3 mm
- Protected by US Patent No. 8,392,495



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

- Harmonics Rejection
- Satellite
- Radar
- Military & Space

### PRODUCT OVERVIEW

Mini-Circuits' XLF-173+ reflectionless filter employs a novel filter topology which absorbs and terminates stop band signals internally rather than reflecting them back to the source. This new capability enables unique applications for filter circuits beyond those suited to traditional approaches. Traditional filters are reflective in the stop band, sending signals back to the source at 100% of the power level. These reflections interact with neighboring components and often result in inter-modulation and other interferences. Reflectionless filters eliminate stop band reflections, allowing them to be paired with sensitive devices and used in applications that otherwise require circuits such as isolation amplifiers or attenuators.

### KEY FEATURES

Features	Advantages
Reflectionless Technology	Reflectionless filters absorb unwanted signals, preventing reflections back to the source. This reduces generation of additional unwanted signals without the need for extra components like attenuators, improving system dynamic range and saving board space.
50Ω Match in Stopband	Reflectionless filters maintain good impedance matching in the stopband, allowing for integration with high gain, wideband amplifiers without the risk of creating out-of-band instabilities.
Excellent RF Performance Repeatability	Fabricated on a GaAs process, X-series filters are inherently repeaData for large-volume production.
Excellent Stability over temperature	With ±0.3 dB variation over temperature, is ideal for use in wide temperature range applications without the need for additional temperature compensation.
Excellent Power Handling in a Compact Package	High power handling extends the usability of these filters to the transmit path for inter-stage filtering.





### ELECTRICAL SPECIFICATIONS<sup>1</sup> AT +25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Passband	Insertion Loss	DC - F1	DC-17000	—	2.3	3.4	dB
	Frequency Cut-off	F2	18000	—	3.0	—	dB
	VSWR	DC - F1	DC-17000	—	1.2	—	:1
Stopband	Rejection	F3 - F4	23900 - 26000	14	17	—	dB
		F4 - F5	26000 - 33000	18	21	—	dB
	VSWR	F3 - F4	23900 - 26000	—	2.6	—	:1
		F4 - F5	26000 - 33000	—	3	—	:1

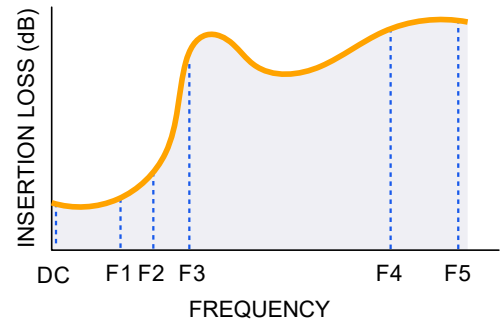
1. Measured on Mini-Circuits Characterization Test Board TB-844-173+

### ABSOLUTE MAXIMUM RATINGS<sup>2</sup>

Parameter	Ratings
Operating Temperature	-55°C to +105°C
Storage Temperature	-65°C to +150°C
RF Power Input, Passband (DC-F1) <sup>2</sup>	2 W at +25°C
RF Power Input, Stopband (F2-F5) <sup>3</sup>	30 mW at 25°C

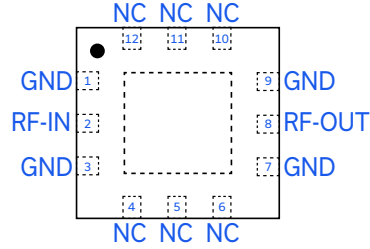
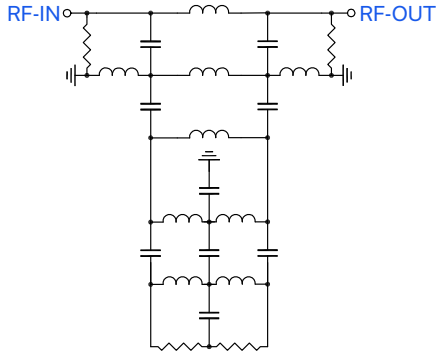
- 3. Passband rating derates linearly to 1 W at 105°C ambient
- 4. Stopband rating derates linearly to 0.25 W at 105°C ambient
- 2. Permanent damage may occur if any of these limits are exceeded.

### SPECIFICATION DEFINITION





### SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION



Function	Pad Number	Description
RF-IN	2	RF Input Pad
RF-OUT	8	RF Output Pad
GND	1,3,7,9, Paddle	Connected to ground
NC (GND Externally)	4,5,6,10,11,12	No internal connection

### PRODUCT MARKING



Marking may contain other features or characters for internal lot control



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# Low Pass Filter

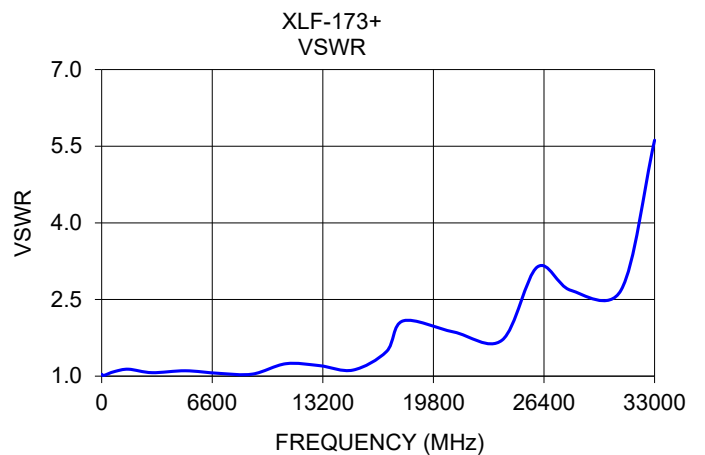
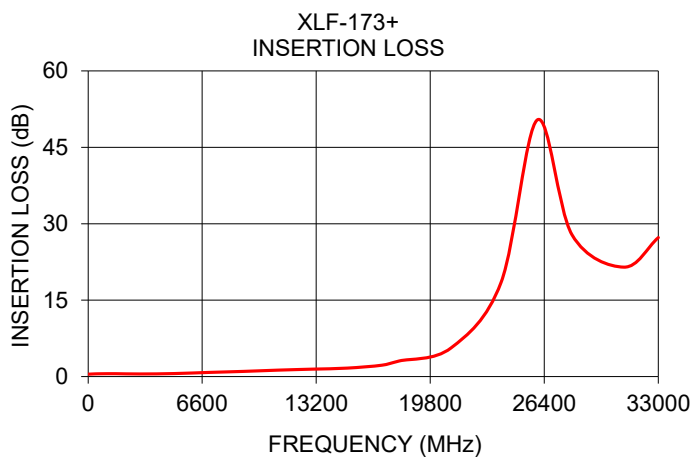
## XLF-173+

Mini-Circuits

50Ω DC to 17000 MHz

### TYPICAL PERFORMANCE DATA AT +25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
10	0.49	1.04
100	0.49	1.01
400	0.54	1.05
800	0.56	1.09
1600	0.57	1.14
3000	0.52	1.07
5000	0.60	1.11
7000	0.83	1.06
9000	1.03	1.04
11000	1.27	1.24
13000	1.47	1.21
15000	1.67	1.12
17000	2.24	1.48
18000	3.07	2.08
21000	5.62	1.87
23900	18.50	1.71
26000	50.38	3.14
28000	27.85	2.68
31000	21.48	2.68
33000	27.29	5.62





MMIC REFLECTIONLESS

# Low Pass Filter

## XLF-173+



50Ω DC to 17000 MHz

ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASH BOARD. TO ACCESS [CLICK HERE](#)

Performance Data & Graphs	Data Swept 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 ,1000, 2000, 3000 devices
Suggested Layout for PCB Design	PL-451
Evaluation Board	TB-844-173+ (without connectors) TB-844-173C+ (with connectors) B20-118-F1+ connector sold separately
Environmental Ratings	ENV82

### ESD RATING

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

### MSL RATING

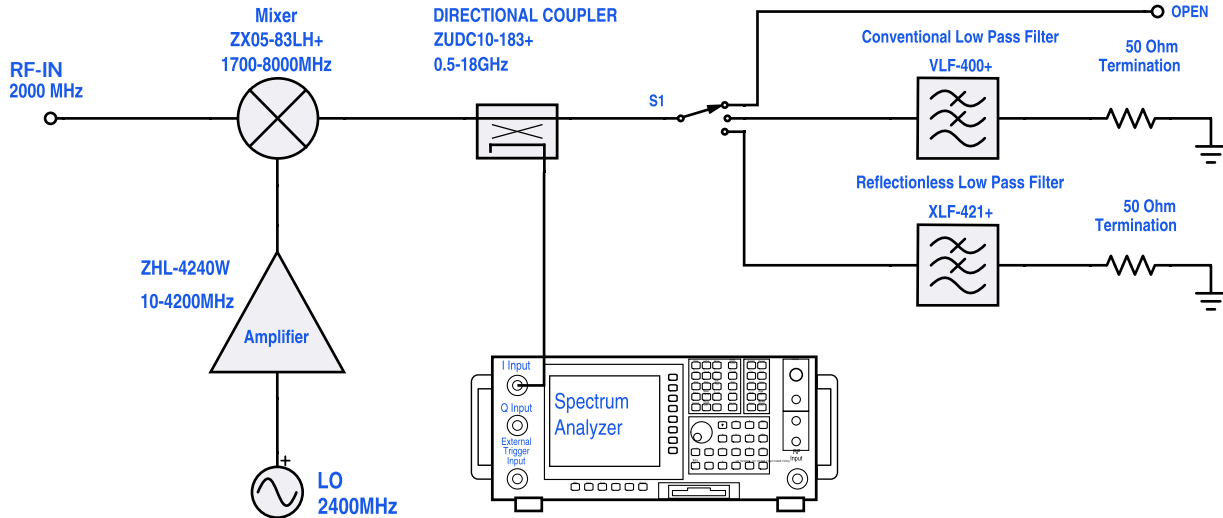
Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D





### REFLECTIONLESS FILTER APPLICATION NOTE

Application Circuit Example: Pairing mixers with reflectionless filters to improve system dynamic range



Test block diagram: IF output reflection spectrum with single input frequency

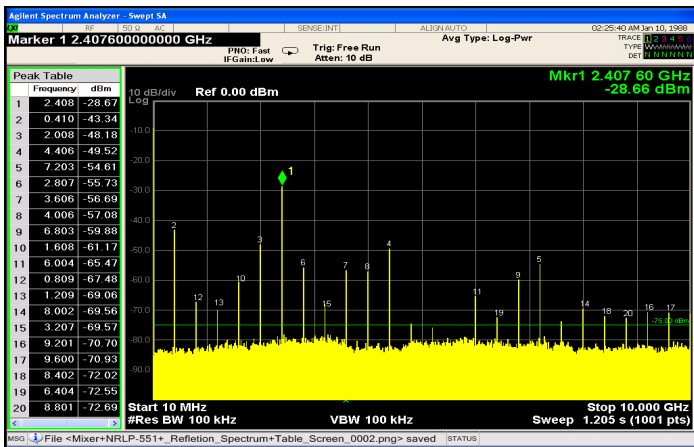


Figure 1. IF output reflection spectrum without filter

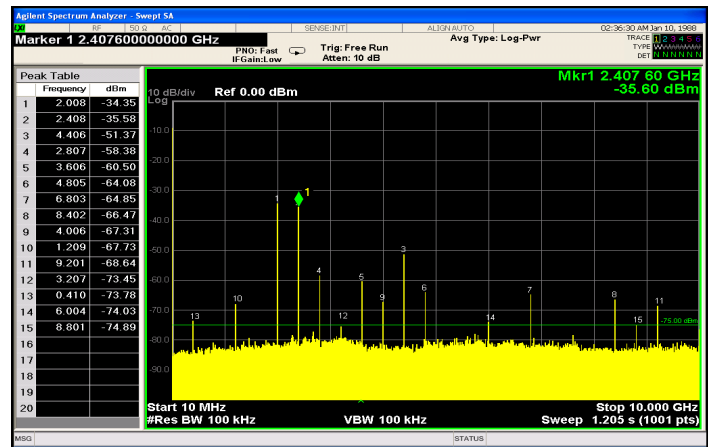
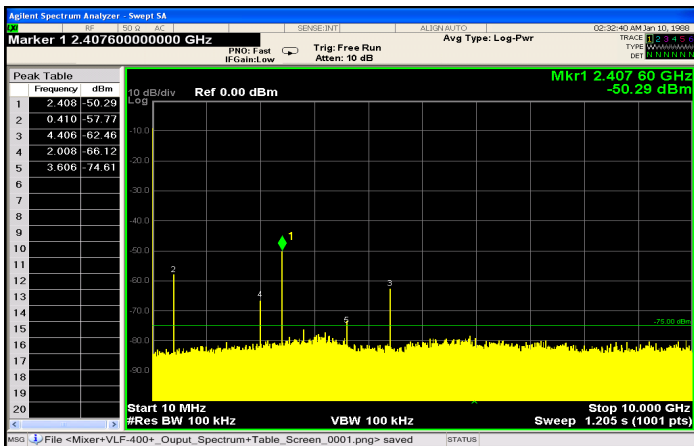


Figure 2. IF output reflection spectrum with conventional filter



An application circuit was assembled to measure the IF reflection spectrum at the output of a mixer when the mixer was paired with a conventional filter versus a reflectionless filter.

While the conventional filter reduces the reflections present when the mixer is used alone (no filter), the reflectionless filter virtually eliminates those reflections altogether.

The reflected signal at marker 1 in the figures above exhibits a reduction of more than 20 dB from -28.7 dBm to -50.3 dBm when the reflectionless filter is used as compared to the conventional filter, thus eliminating unwanted spurious mixing products and improving system dynamic range.

For more information, refer to application note [AN-75-007](#)

- 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/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)

Typical Performance Data

FREQ. (MHz)	INSERTION LOSS					GROUP DELAY				
	(dB)					(nsec)				
	@-55°C	@-40°C	@+25°C	@+85°C	@+105°C	@-55°C	@-40°C	@+25°C	@+85°C	@+105°C
10	0.37	0.39	0.40	0.40	0.42	0.10	0.14	0.10	0.11	0.13
50	0.33	0.33	0.37	0.39	0.40	0.07	0.08	0.07	0.07	0.08
100	0.33	0.33	0.38	0.40	0.41	0.05	0.05	0.04	0.04	0.04
500	0.30	0.33	0.39	0.42	0.44	0.04	0.04	0.04	0.04	0.04
1000	0.31	0.34	0.43	0.47	0.49	0.04	0.04	0.03	0.03	0.03
1500	0.32	0.36	0.47	0.51	0.53	0.04	0.04	0.03	0.03	0.03
2000	0.34	0.37	0.50	0.54	0.57	0.04	0.04	0.03	0.03	0.03
2500	0.35	0.39	0.52	0.57	0.59	0.04	0.04	0.03	0.03	0.03
3000	0.36	0.39	0.54	0.59	0.62	0.04	0.04	0.03	0.03	0.03
3500	0.35	0.39	0.55	0.61	0.64	0.04	0.04	0.03	0.03	0.03
4000	0.36	0.40	0.58	0.65	0.68	0.04	0.04	0.03	0.03	0.03
4500	0.36	0.40	0.59	0.67	0.72	0.04	0.04	0.03	0.03	0.03
5000	0.37	0.41	0.62	0.71	0.76	0.04	0.04	0.03	0.03	0.03
5500	0.37	0.42	0.64	0.74	0.80	0.04	0.04	0.03	0.03	0.03
6000	0.38	0.44	0.67	0.78	0.84	0.04	0.04	0.03	0.03	0.03
6500	0.39	0.44	0.68	0.80	0.86	0.04	0.04	0.03	0.03	0.03
7000	0.39	0.45	0.71	0.84	0.90	0.04	0.04	0.03	0.03	0.03
7500	0.38	0.45	0.72	0.86	0.92	0.04	0.04	0.03	0.03	0.03
8000	0.39	0.46	0.75	0.90	0.96	0.04	0.04	0.03	0.03	0.03
8500	0.40	0.47	0.78	0.93	1.00	0.04	0.04	0.04	0.03	0.03
9000	0.41	0.48	0.81	0.98	1.05	0.04	0.04	0.04	0.04	0.04
9500	0.42	0.49	0.83	1.01	1.09	0.04	0.04	0.04	0.04	0.03
10000	0.45	0.53	0.88	1.06	1.14	0.04	0.04	0.04	0.04	0.04
10500	0.51	0.60	0.93	1.12	1.20	0.04	0.04	0.04	0.04	0.03
11000	0.56	0.64	0.98	1.18	1.26	0.04	0.04	0.04	0.04	0.04
11500	0.56	0.65	1.03	1.25	1.34	0.04	0.04	0.04	0.04	0.04
12000	0.54	0.64	1.07	1.30	1.41	0.04	0.04	0.04	0.04	0.03
12500	0.56	0.66	1.10	1.35	1.46	0.05	0.05	0.04	0.04	0.04
13000	0.59	0.69	1.12	1.38	1.49	0.05	0.05	0.04	0.04	0.04
13500	0.65	0.74	1.16	1.42	1.53	0.05	0.05	0.04	0.04	0.04
14000	0.69	0.78	1.20	1.46	1.57	0.05	0.05	0.04	0.04	0.04
14500	0.71	0.82	1.25	1.52	1.64	0.05	0.05	0.05	0.04	0.04
15000	0.72	0.83	1.32	1.60	1.72	0.05	0.05	0.05	0.05	0.05
15500	0.74	0.86	1.40	1.71	1.84	0.06	0.05	0.05	0.05	0.05
16000	0.80	0.93	1.52	1.87	2.02	0.06	0.06	0.05	0.05	0.05
16500	0.98	1.10	1.68	2.07	2.23	0.06	0.06	0.05	0.05	0.05
17000	1.25	1.37	1.89	2.28	2.43	0.06	0.06	0.06	0.06	0.05
17200	1.39	1.51	2.00	2.36	2.51	0.06	0.06	0.06	0.06	0.06
17400	1.52	1.65	2.14	2.49	2.63	0.06	0.06	0.06	0.06	0.06
17600	1.66	1.79	2.27	2.63	2.76	0.06	0.06	0.06	0.06	0.06
17800	1.78	1.92	2.44	2.81	2.93	0.06	0.06	0.06	0.06	0.07
18000	1.85	2.00	2.62	3.02	3.16	0.06	0.06	0.06	0.06	0.06
18500	2.06	2.25	3.14	3.68	3.85	0.07	0.07	0.06	0.06	0.06
19000	2.42	2.62	3.70	4.35	4.60	0.08	0.07	0.05	0.05	0.05
19500	3.03	3.20	4.19	4.85	5.14	0.07	0.07	0.06	0.05	0.05
20000	3.84	3.95	4.52	5.11	5.40	0.06	0.06	0.06	0.06	0.06
20500	4.34	4.44	4.75	5.28	5.56	0.07	0.07	0.08	0.08	0.08
21000	4.50	4.64	5.10	5.67	5.95	0.09	0.10	0.10	0.10	0.10
21500	4.92	5.13	5.85	6.54	6.87	0.12	0.11	0.11	0.11	0.11
22000	5.97	6.23	7.18	7.93	8.26	0.12	0.12	0.12	0.12	0.13
22500	7.77	8.08	9.01	10.01	10.39	0.10	0.09	0.11	0.12	0.12
23000	9.10	9.49	10.97	12.43	12.91	0.16	0.16	0.15	0.14	0.14
23500	11.56	12.06	14.15	15.91	16.49	0.18	0.18	0.16	0.15	0.16
23900	14.50	15.10	17.70	19.73	20.47	0.18	0.18	0.16	0.16	0.17
24000	15.35	15.97	18.72	20.90	21.65	0.18	0.17	0.17	0.16	0.16
24500	20.48	21.26	24.80	27.64	28.62	0.21	0.21	0.20	0.20	0.19
25000	27.38	28.23	32.20	35.93	37.10	0.26	0.27	0.30	0.35	0.31
25500	34.23	35.01	37.99	40.15	40.91	0.35	0.38	0.36	0.25	0.27
26000	37.99	38.29	39.63	41.81	42.56	0.22	0.16	0.29	0.20	0.11
26500	41.33	41.66	45.35	51.46	52.90	0.12	0.19	0.57	0.41	0.05
27000	45.64	46.33	46.16	42.66	42.60	0.54	0.56	0.48	0.00	-0.03
27500	36.34	36.04	36.03	34.88	33.98	0.28	0.28	0.16	0.07	0.12
28000	30.04	30.37	30.43	30.29	30.33	0.15	0.20	0.10	0.08	0.06
28500	26.96	26.84	27.16	27.47	27.48	0.17	0.09	0.11	0.07	0.06
29000	25.17	24.98	24.89	25.38	25.51	0.12	0.10	0.11	0.07	0.08
30000	22.53	22.70	22.59	22.77	22.97	0.10	0.10	0.11	0.09	0.10
31000	20.92	21.29	22.59	22.95	22.92	0.13	0.11	0.09	0.07	0.10
32000	21.57	21.96	24.16	25.12	25.31	0.18	0.17	0.15	0.10	0.12
33000	25.89	26.16	27.04	28.96	29.79	0.14	0.10	0.07	0.10	0.10
34000	30.81	30.81	30.51	32.59	33.21	0.10	0.11	0.21	0.13	0.14
35000	33.18	32.90	32.94	33.23	33.46	0.17	0.03	0.24	0.19	0.05
36000	29.51	30.13	31.84	31.63	31.78	0.13	0.15	0.01	0.06	0.10
37000	26.17	26.05	27.67	28.46	28.81	0.14	0.13	0.06	0.01	-0.04
38000	24.84	24.76	24.21	24.96	25.42	0.01	0.05	0.05	0.10	0.09
39000	21.91	22.00	21.05	20.98	21.47	0.04	0.06	0.09	0.05	0.07
40000	17.09	17.39	18.65	18.75	18.75	0.19	0.10	0.01	0.04	0.14



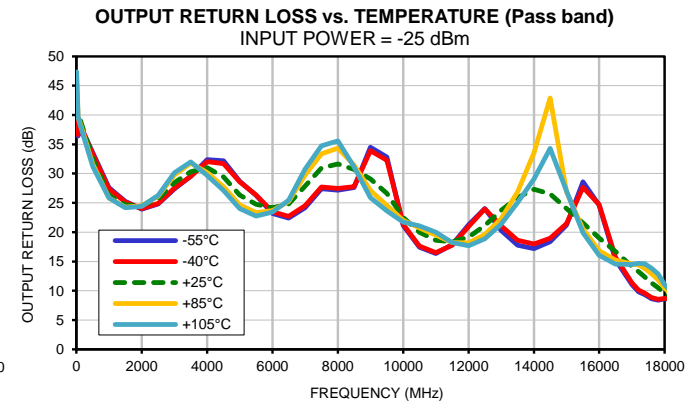
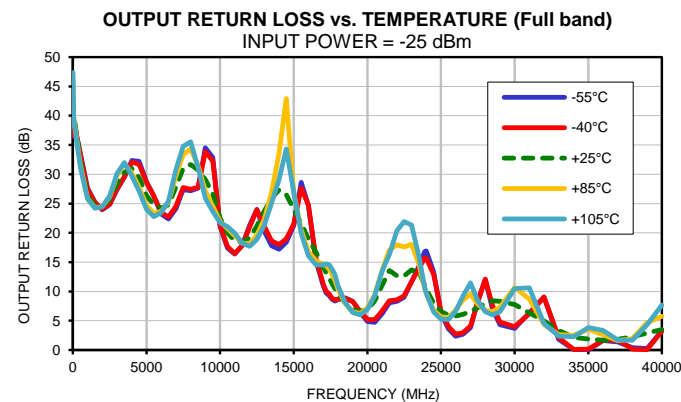
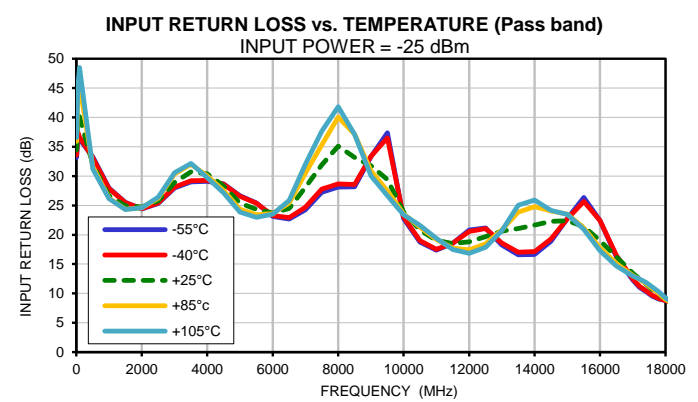
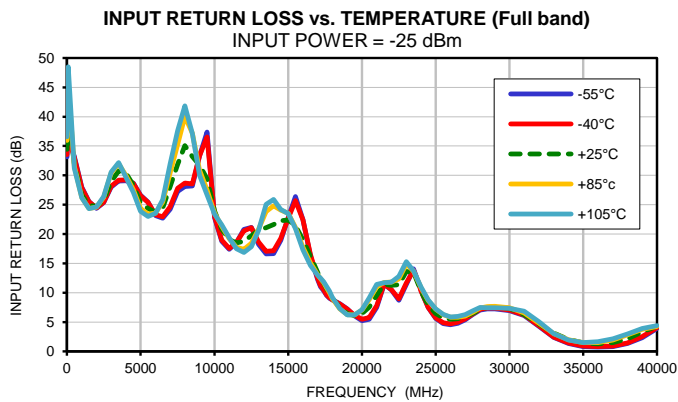
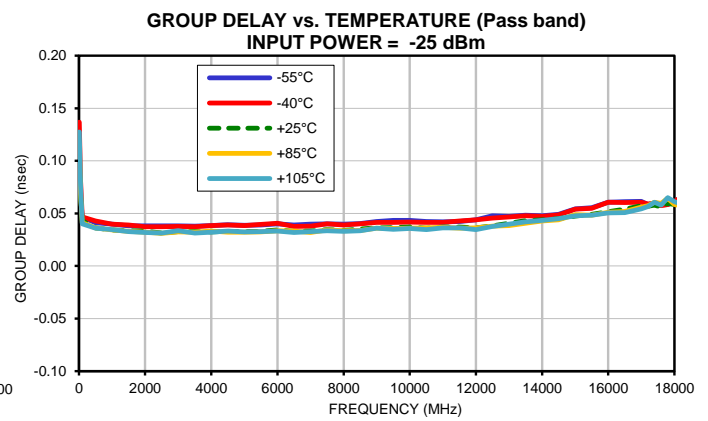
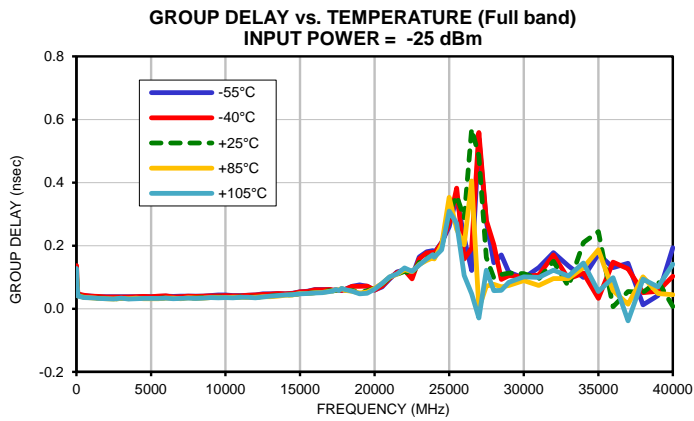
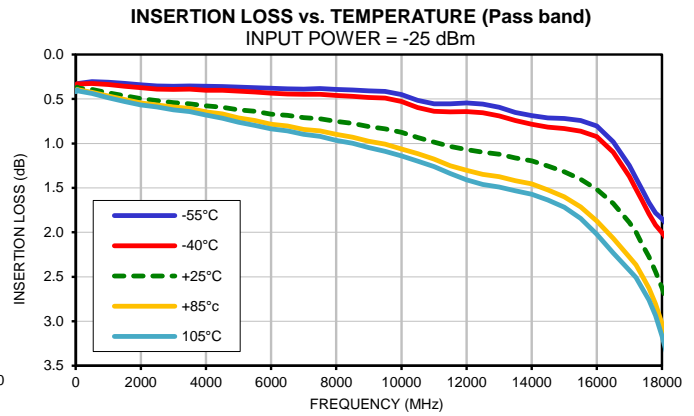
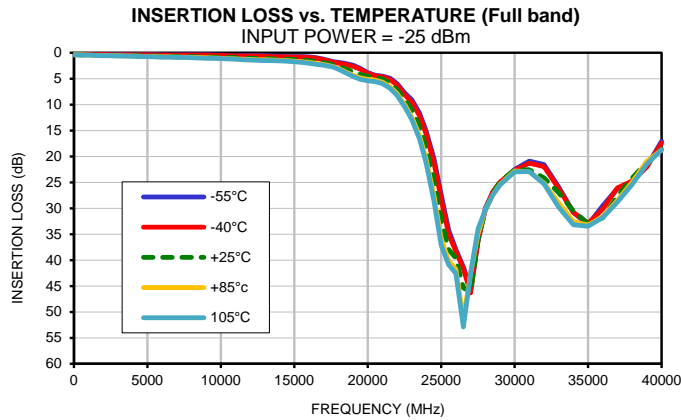
Typical Performance Data

FREQ.  (MHz)	INPUT RETURN LOSS					OUTPUT RETURN LOSS				
	(dB)					(dB)				
	@-55°C	@-40°C	@+25°C	@+85°C	@+105°C	@-55°C	@-40°C	@+25°C	@+85°C	@+105°C
10	33.17	33.57	34.45	35.94	36.58	38.71	39.21	41.41	46.06	47.36
50	36.44	37.43	40.54	44.21	45.26	36.43	36.64	39.17	39.65	39.72
100	36.25	36.64	40.12	45.48	48.50	38.49	38.53	39.54	38.95	38.65
500	33.27	33.08	32.01	31.59	31.24	33.58	33.32	32.47	31.59	31.23
1000	28.00	27.86	26.67	26.24	26.17	27.61	27.38	26.30	25.87	25.83
1500	25.55	25.48	24.91	24.35	24.31	25.24	25.18	24.65	24.29	24.19
2000	24.38	24.47	24.72	24.59	24.60	23.93	24.02	24.52	24.49	24.43
2500	25.33	25.42	25.75	26.23	26.39	24.82	24.90	25.72	26.14	26.30
3000	27.98	28.14	28.92	30.38	30.55	27.36	27.50	28.43	29.75	30.11
3500	29.02	29.20	30.75	31.98	32.17	29.56	29.53	30.34	31.81	32.00
4000	29.09	29.23	30.39	30.03	29.73	32.36	32.06	30.99	30.19	29.68
4500	28.69	28.63	28.33	27.55	27.13	32.20	31.70	29.43	27.75	27.12
5000	26.64	26.54	25.36	24.36	23.87	28.70	28.58	26.36	24.65	24.01
5500	25.44	25.39	24.35	23.41	22.98	26.30	26.32	24.78	23.36	22.76
6000	23.14	23.27	23.71	23.59	23.53	23.20	23.47	24.20	23.66	23.45
6500	22.68	22.94	24.48	25.44	25.86	22.38	22.71	24.79	25.26	25.44
7000	24.24	24.68	28.10	30.46	31.99	24.15	24.53	27.84	29.73	30.77
7500	27.26	27.79	31.90	35.28	37.62	27.40	27.71	30.96	33.35	34.75
8000	28.12	28.69	35.08	40.04	41.82	27.17	27.46	31.65	34.34	35.57
8500	28.19	28.56	33.19	37.16	37.13	27.63	27.76	30.73	31.44	31.13
9000	33.31	33.35	31.75	30.88	30.01	34.51	33.90	29.09	27.12	25.92
9500	37.37	36.53	29.41	27.51	26.65	32.84	32.27	26.64	24.55	23.65
10000	22.79	23.00	23.92	23.57	23.40	21.11	21.32	22.50	22.07	21.72
10500	18.76	18.98	20.82	21.30	21.58	17.43	17.64	19.99	20.75	21.06
11000	17.40	17.54	19.06	19.19	19.37	16.37	16.49	18.61	19.50	19.98
11500	18.54	18.55	18.48	17.73	17.49	17.86	17.79	18.35	18.23	18.23
12000	20.79	20.56	18.79	17.42	16.86	21.29	20.98	19.17	18.16	17.69
12500	21.15	21.06	19.70	18.43	17.86	24.02	23.96	21.13	19.60	18.88
13000	18.26	18.61	20.64	20.83	20.66	20.28	21.09	23.76	22.31	21.36
13500	16.61	17.04	21.07	23.85	25.04	17.79	18.63	25.90	26.90	25.05
14000	16.65	17.14	21.64	24.80	25.91	17.21	17.99	27.34	33.56	29.09
14500	18.91	19.28	22.26	24.06	24.16	18.39	18.98	26.52	42.90	34.32
15000	22.78	22.71	22.40	23.51	23.48	21.22	21.49	24.05	26.87	27.01
15500	26.37	25.69	21.40	21.15	20.91	28.60	27.68	21.57	20.52	19.89
16000	22.45	22.42	19.01	17.75	17.28	24.63	24.71	19.00	16.83	16.06
16500	16.26	16.50	16.23	15.11	14.66	15.26	15.70	16.70	15.24	14.54
17000	12.26	12.47	13.47	13.07	12.96	11.04	11.36	14.16	14.58	14.50
17200	11.02	11.23	12.50	12.41	12.47	9.80	10.10	13.24	14.38	14.70
17400	10.31	10.46	11.59	11.69	11.86	9.31	9.57	12.31	13.80	14.57
17600	9.55	9.67	10.66	10.83	11.08	8.65	8.85	11.36	12.92	13.83
17800	9.05	9.14	9.82	9.99	10.27	8.38	8.54	10.49	11.88	12.86
18000	8.77	8.79	9.04	8.99	9.20	8.61	8.69	9.69	10.46	11.08
18500	8.13	8.07	7.47	7.24	7.30	8.89	8.79	8.02	7.92	8.05
19000	7.24	7.21	6.47	6.24	6.22	8.32	8.26	6.96	6.52	6.39
19500	6.07	6.17	6.12	6.21	6.20	6.42	6.64	6.58	6.24	6.00
20000	5.24	5.45	6.44	7.02	7.09	4.85	5.22	6.99	7.19	6.94
20500	5.49	5.77	7.55	8.81	9.11	4.73	5.17	8.37	9.41	9.22
21000	7.49	7.76	9.55	11.00	11.41	6.22	6.69	11.08	13.60	13.48
21500	11.47	11.46	11.39	11.77	11.72	8.06	8.42	13.56	17.08	16.25
22000	10.47	10.53	11.25	11.81	11.82	8.30	8.54	12.70	17.95	20.37
22500	8.73	8.93	11.35	12.36	12.77	9.00	9.26	12.61	17.59	21.91
23000	11.41	11.67	13.63	14.88	15.28	11.65	11.64	13.65	18.04	21.33
23500	14.06	13.80	13.45	13.67	13.71	14.36	13.96	13.28	14.62	15.93
23900	11.20	11.05	10.86	11.39	11.53	16.82	15.73	11.00	10.46	10.61
24000	10.40	10.28	10.25	10.84	10.99	16.90	15.68	10.39	9.67	9.68
24500	7.48	7.49	7.86	8.68	8.75	13.33	12.88	7.97	6.77	6.49
25000	5.61	5.73	6.44	7.20	7.22	6.31	6.66	6.60	5.65	5.27
25500	4.73	4.88	5.73	6.28	6.28	3.64	4.01	5.94	5.55	5.20
26000	4.53	4.68	5.49	5.82	5.87	2.36	2.69	5.82	6.77	6.58
26500	4.80	4.96	5.57	5.80	5.98	2.69	2.97	6.07	8.57	9.26
27000	5.37	5.53	5.92	6.01	6.27	3.84	4.11	6.59	9.56	11.48
27500	6.24	6.37	6.46	6.67	6.90	8.29	8.22	7.25	7.84	8.39
28000	7.05	7.19	7.13	7.41	7.48	12.04	12.10	7.97	6.76	6.53
28500	7.23	7.38	7.50	7.66	7.46	7.03	7.62	8.39	6.55	6.02
29000	7.23	7.36	7.65	7.71	7.43	4.33	4.78	8.33	7.28	6.52
30000	6.93	7.03	7.36	7.42	7.32	3.70	3.98	7.77	10.66	10.49
31000	6.12	6.20	6.28	6.55	6.84	6.36	6.17	6.35	8.71	10.61
32000	4.25	4.33	4.63	4.78	5.02	9.07	9.04	4.96	4.40	4.54
33000	2.36	2.45	3.10	3.02	3.04	1.81	2.11	3.35	2.59	2.34
34000	1.35	1.44	2.01	1.98	1.96	0.10	0.10	2.18	2.51	2.24
35000	0.83	0.91	1.43	1.49	1.50	0.00	0.15	1.87	3.54	3.83
36000	0.74	0.82	1.28	1.52	1.64	1.62	1.66	1.68	2.62	3.35
37000	0.82	0.93	1.51	1.93	2.13	1.40	1.74	1.82	1.60	1.72
38000	1.36	1.47	2.15	2.80	2.96	0.39	0.13	2.28	1.91	1.66
39000	2.33	2.52	3.29	3.76	3.89	0.26	0.05	2.89	4.67	4.32
40000	3.89	4.03	4.27	4.26	4.38	3.30	3.25	3.48	5.77	7.65





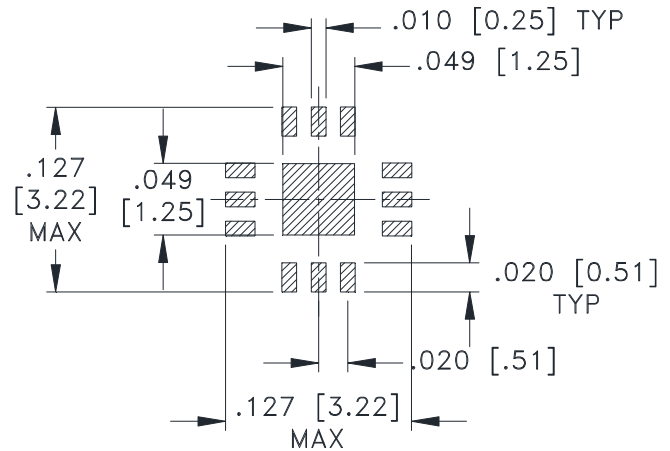
## Typical Performance Curves



### Outline Dimensions



### PCB Land Pattern



SUGGESTED LAYOUT,  
TOLERANCE TO BE WITHIN  $\pm .002$

**Weight: .02 Grams**

**Dimensions are in inches (mm). Tolerances: 2Pl.  $\pm .01$ ; 3 Pl.  $\pm .004$**

### 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.

# 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](http://www.minicircuits.com/pages/pdfs/tape.pdf)

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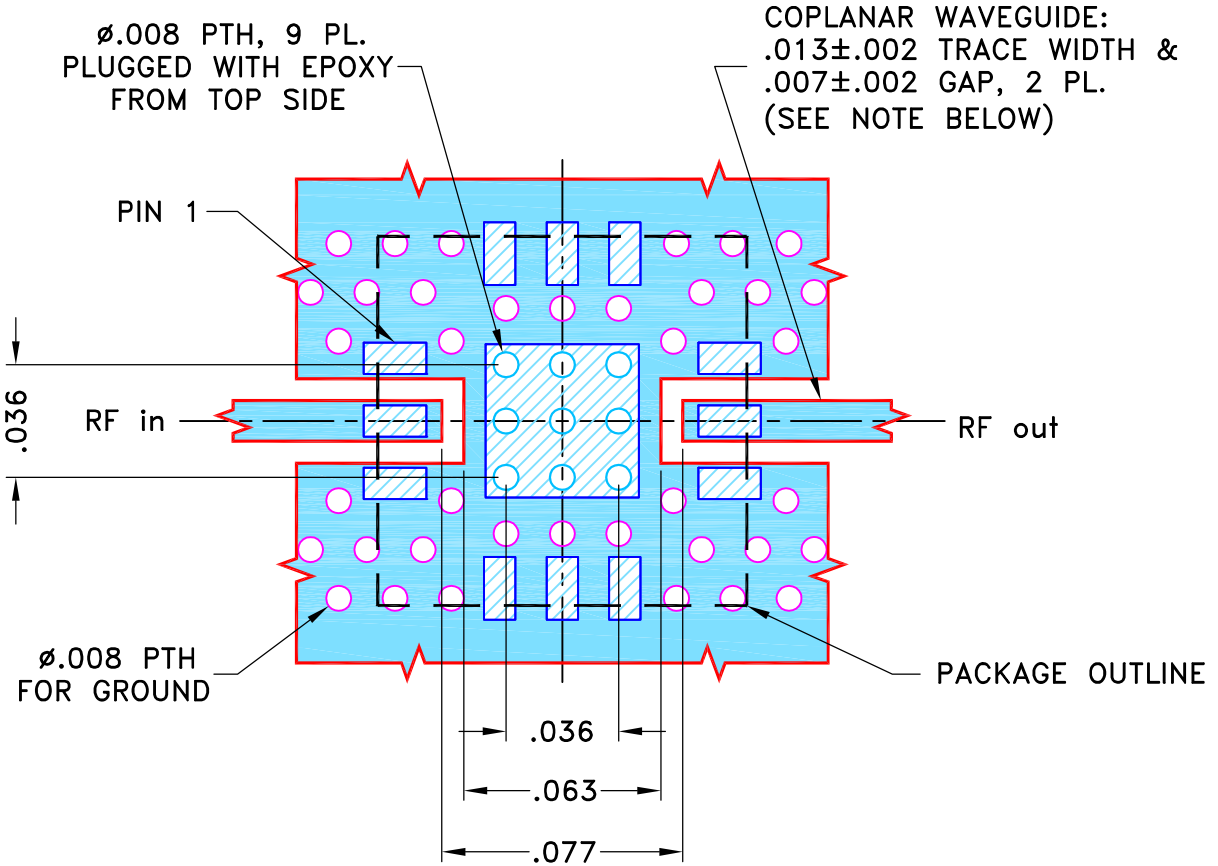
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M152656	NEW RELEASE	09/11/15	ITG	MY

SUGGESTED MOUNTING CONFIGURATION  
FOR DQ1225 CASE STYLE, "12FL02" PIN CODE



**NOTES:**

- TRACE WIDTH PARAMETERS ARE SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS  $.0066 \pm .0007$ ". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
- 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 TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ±	DRAWN	ITG	09/10/15
	CHECKED	GF	09/11/15
	APPROVED	MY	09/11/15

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Brooklyn NY 11235

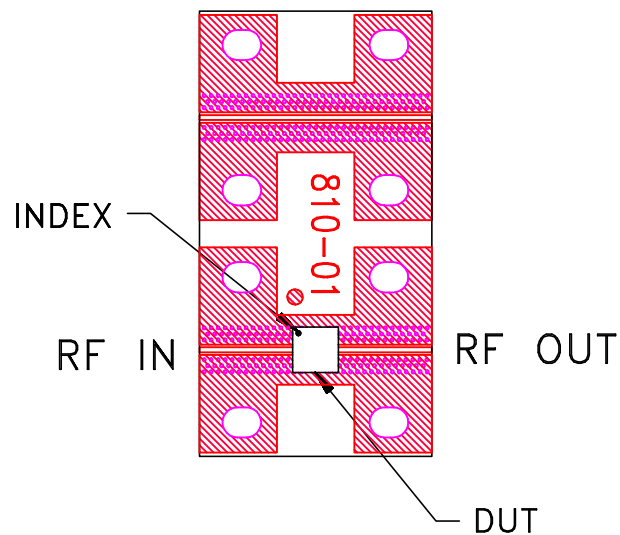
PL, 12FL02, DQ1225, TB-844+

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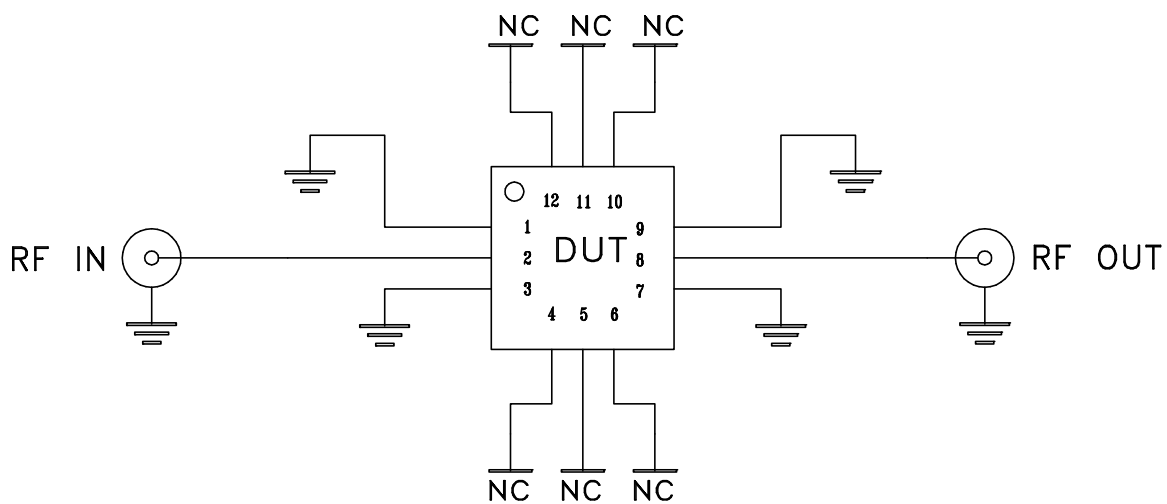
SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-451	REV: OR
FILE: 98PL451	SCALE: 16:1	SHEET: 1 OF 1	

# Evaluation Board and Circuit

To be used with Mini-Circuits 50 Ohm 2.92 connectors B20-118-F1+.  
Connectors are sold separately.




TB-844-173+



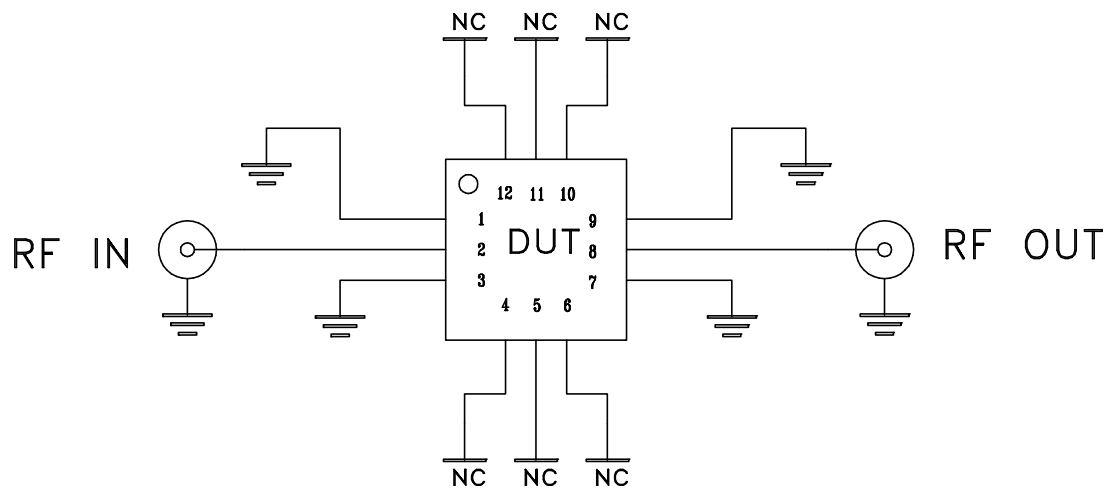
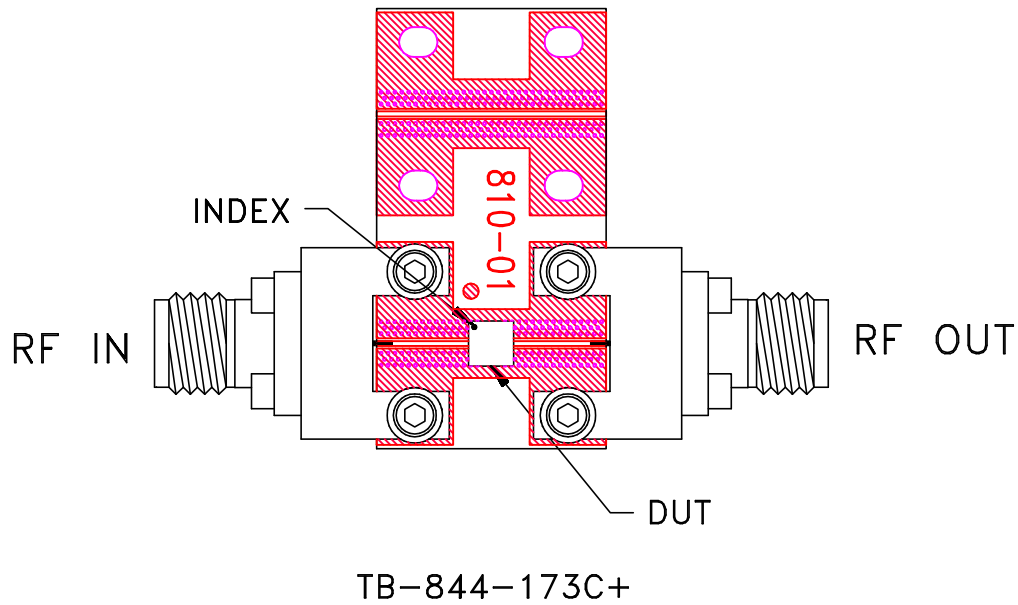
Schematic Diagram

## Note:

PCB Material: R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.0066 inch.

 **Mini-Circuits®**


# Evaluation Board and Circuit



Schematic Diagram

## Notes:

1. 50 Ohm 2.92 mm Female connectors.
2. PCB Material: R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.0066 inch.

 **Mini-Circuits®**



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	-55° to 105°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-020C
Solderability	10X magnification, 95% coverage	JESD22-B102, Method 1: Dip and Look Test
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