

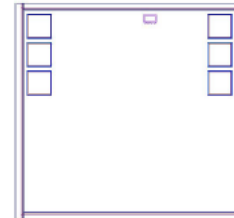
MMIC

# REFLECTIONLESS FILTER DICE

50Ω DC to 21 GHz

## The Big Deal

- Patented design eliminates in band spurs
- Pass band cut-off up to 21 GHz
- Stop band up to 35 GHz
- Excellent repeatability through IPD\* process
- Unpackaged Die Form



**X-Series**

Available in Low Pass, High Pass and Band Pass designs

## Product Overview

Mini-Circuits' X-Series reflectionless filters employ 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 which interact with neighboring components and often result in intermodulation 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 isolators, isolation amplifiers or attenuators.

### Key Features

Easy integration with sensitive reflective components, e.g. mixers, multipliers

Enables stable integration of wideband amplifiers

Cascadable

Excellent power handling in a tiny surface mount device

Excellent repeatability of RF performance

Excellent stability over temperature

Operating Temperature up to 105°C

Unpackaged Die form

### Advantages

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.

Because reflectionless filters maintain good impedance in the stop band; they can be integrated with high gain, wideband amplifiers without the risk of creating instabilities in these out of band regions.

Reflectionless filters can be cascaded in multiple sections to provide sharper and higher attenuation, while also preventing any standing waves that could affect pass band signals.

High power handling extends the usability of these filters to the transmit path for inter-stage filtering.

Through semiconductor IPD process, X-series filters are inherently repeatable for large volume production.

With  $\pm 0.3$  dB variation over temperature ideal for use in wide temperature range applications without the need for additional temperature compensation.

Suitable for operation close to high power components

Enables direct integration into customer hybrids

\*IPD – Integrated Passive Device, is a GaAs semiconductor process



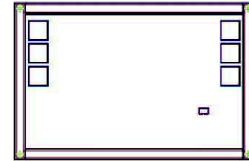
# Reflectionless Low Pass Filter Die

## XLF-133-D+

50Ω DC to 13.1 GHz

### Features

- Match to 50Ω in the stop band, eliminates undesired reflections
- Cascadable
- Excellent Power handling
- Protected by US Patent No. 8,392,495



### Applications

- Harmonics Rejection
- Satellite
- Radar
- Military & Space

#### +RoHS Compliant

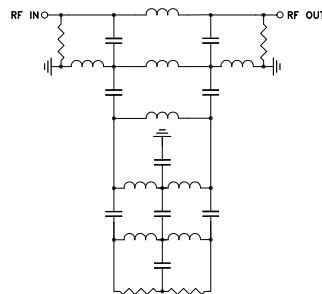
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Ordering Information: Refer to Last Page

### General Description

Mini-Circuits' XLF-133-D+ reflectionless filter die 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.

### Simplified Schematic



Pad	Description
RF-IN	RF Input Pad
RF-OUT	RF Output Pad
Ground	Ground Bonding Pad

**Electrical Specifications<sup>1</sup> at 25°C**

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Insertion Loss	DC - F1	DC-13100		2.0		dB
	Frequency Cut-off	F2	15800		3.0		dB
	VSWR	DC - F1	DC-13100		1.3		:1
Stop Band	Rejection	F3 - F4	19500 - 20000		16		dB
		F4 - F5	20000 - 30000		21		dB
	VSWR	F3 - F4	19500 - 20000		1.5		:1
		F4 - F5	20000 - 30000		2.7		:1

<sup>1</sup> Measured on Mini-Circuits Characterization test board. Die packaged in 3mm x 3mm, 12-lead MCLP package and soldered on TB-844-133+

**Absolute Maximum Ratings<sup>1,4</sup>**

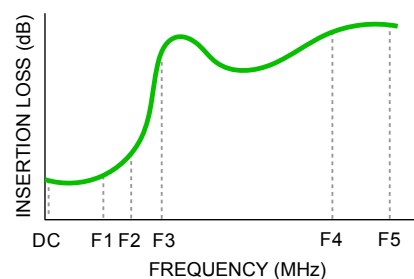
Parameter	Ratings
Operating Temperature	-55°C to +105°C
RF Power Input, Passband (DC-F1) <sup>2</sup>	2W at 25°C
RF Power Input, Stopband (F2-F5) <sup>3</sup>	50mW at 25°C

<sup>2</sup> Passband rating derates linearly to 1W at 105°C ambient

<sup>3</sup> Stopband rating derates linearly to 25mW at 105°C ambient

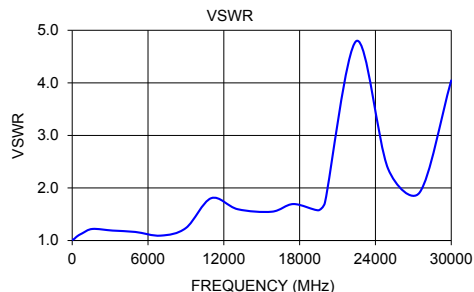
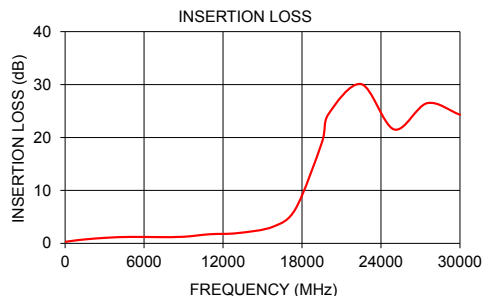
<sup>4</sup> Permanent damage may occur if any of these limits are exceeded.

**Specification Definition**



**Typical Performance Data at 25°C<sup>1</sup>**

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
10	0.34	1.02
100	0.33	1.02
200	0.36	1.04
400	0.42	1.08
800	0.56	1.14
1600	0.77	1.22
3200	1.07	1.19
5000	1.22	1.16
7000	1.18	1.09
9000	1.25	1.24
11000	1.73	1.81
13100	1.94	1.60
15800	3.15	1.55
17500	6.49	1.69
19500	18.98	1.58
20000	24.37	1.72
22500	30.09	4.80
25000	21.52	2.37
27500	26.48	1.91
30000	24.30	4.05



**Die Layout**



Fig 1. Die Layout

**Bonding Pad Position**  
(Dimensions in  $\mu\text{m}$ , Typical)

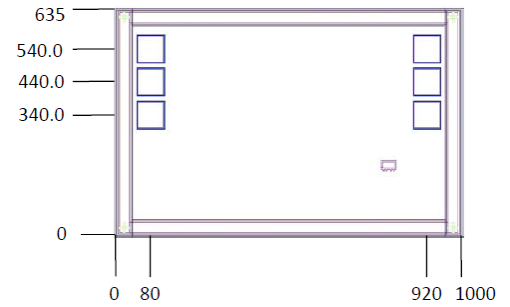


Fig 2. Bonding Pad Positions

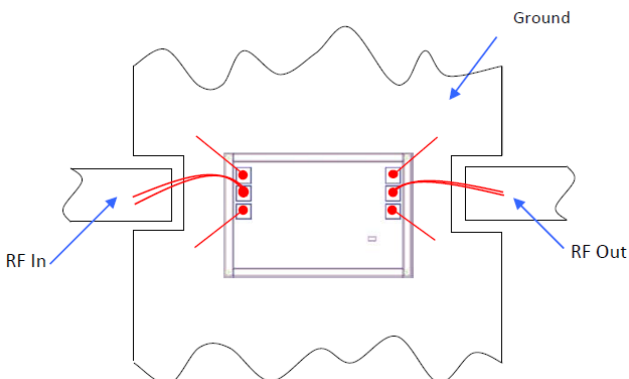
**Critical Dimensions**

Parameter	Values
Die Thickness, $\mu\text{m}$	100
Die Width, $\mu\text{m}$	1000
Die Length, $\mu\text{m}$	635
Bond Pad Size (Ground pad), $\mu\text{m}$	75 x 75

## Assembly and Handling Procedure

1. Storage  
Dice should be stored in a dry nitrogen purged desiccators or equivalent.
2. ESD  
MMIC Gallium Arsenide (GaAs) filter dice are susceptible to electrostatic and mechanical damage. Die are supplied in antistatic protected material, which should be opened in clean room conditions at an appropriately grounded anti-static workstation. Devices need careful handling using correctly designed collets, vacuum pickup tips or sharp antistatic tweezers to deter ESD damage to dice.
3. Die Attach  
The die mounting surface must be clean and flat. Using conductive silver filled epoxy, recommended epoxies are DieMat DM6030Hk-PT/H579/H579 or Ablestik 84-1LMISR4. Apply sufficient epoxy to meet required epoxy bond line thickness, epoxy fillet height and epoxy coverage around total die periphery. Parts shall be cured in a nitrogen filled atmosphere per manufacturer's cure condition. It is recommended to use antistatic die pick up tools only.
4. Wire Bonding  
Bond pad openings in the surface passivation above the bond pads are provided to allow wire bonding to the dice gold bond pads. Thermosonic bonding is used with minimized ultrasonic content. Bond force, time, ultrasonic power and temperature are all critical parameters. Suggested wire is pure gold, 1 mil diameter. Bonds must be made from the bond pads on the die to the package or substrate. All bond wires should be kept as short as low as reasonable to minimize performance degradation due to undesirable series inductance.

## Assembly Diagram



### Recommended Wire Length, Typical

Wire	Wire Length (mm)	Wire Loop Height (mm)
All wires	1.0	0.15

Note: Use double bond wire at RF IN & RF OUT



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	0.38	0.38	0.42	0.45	0.44	0.05	0.05	0.06	0.02	0.03
50	0.34	0.34	0.38	0.40	0.41	0.05	0.05	0.05	0.04	0.05
100	0.33	0.34	0.38	0.41	0.42	0.05	0.05	0.04	0.04	0.04
200	0.32	0.33	0.38	0.41	0.42	0.05	0.05	0.04	0.04	0.04
300	0.33	0.33	0.40	0.42	0.43	0.04	0.04	0.04	0.04	0.04
400	0.33	0.33	0.40	0.44	0.44	0.04	0.04	0.04	0.04	0.04
500	0.32	0.34	0.40	0.44	0.45	0.04	0.04	0.04	0.04	0.04
600	0.32	0.34	0.41	0.45	0.47	0.04	0.04	0.04	0.04	0.04
700	0.33	0.34	0.42	0.46	0.47	0.04	0.04	0.04	0.04	0.04
800	0.32	0.34	0.43	0.47	0.49	0.04	0.04	0.04	0.04	0.04
900	0.33	0.35	0.44	0.48	0.50	0.04	0.04	0.04	0.04	0.04
1000	0.33	0.35	0.44	0.48	0.50	0.04	0.04	0.04	0.04	0.04
1500	0.35	0.38	0.49	0.54	0.55	0.04	0.04	0.04	0.04	0.03
2000	0.37	0.40	0.52	0.57	0.60	0.04	0.04	0.03	0.03	0.03
2500	0.39	0.42	0.55	0.60	0.62	0.04	0.04	0.03	0.03	0.03
3000	0.38	0.41	0.55	0.62	0.64	0.04	0.04	0.03	0.03	0.03
3500	0.38	0.41	0.57	0.64	0.66	0.04	0.04	0.03	0.04	0.04
4000	0.38	0.42	0.59	0.67	0.70	0.04	0.04	0.04	0.03	0.04
4500	0.38	0.42	0.61	0.70	0.74	0.04	0.04	0.04	0.04	0.03
5000	0.40	0.44	0.64	0.74	0.79	0.04	0.04	0.04	0.04	0.03
5500	0.40	0.45	0.66	0.78	0.82	0.04	0.04	0.04	0.04	0.03
6000	0.42	0.46	0.68	0.81	0.85	0.04	0.04	0.04	0.04	0.04
6500	0.42	0.47	0.70	0.83	0.88	0.04	0.04	0.04	0.04	0.04
7000	0.42	0.47	0.73	0.86	0.91	0.04	0.04	0.04	0.04	0.04
7500	0.42	0.47	0.75	0.90	0.96	0.05	0.04	0.04	0.04	0.04
8000	0.43	0.49	0.78	0.95	1.01	0.04	0.04	0.04	0.04	0.04
8500	0.44	0.51	0.82	0.99	1.07	0.05	0.05	0.04	0.04	0.04
9000	0.50	0.57	0.89	1.07	1.16	0.05	0.05	0.04	0.04	0.04
9500	0.56	0.63	0.97	1.17	1.24	0.05	0.05	0.04	0.04	0.04
10000	0.70	0.77	1.10	1.31	1.37	0.05	0.05	0.04	0.04	0.04
10500	0.87	0.94	1.27	1.46	1.53	0.05	0.05	0.04	0.04	0.04
11000	0.97	1.04	1.41	1.64	1.71	0.05	0.05	0.04	0.04	0.04
11500	1.00	1.09	1.53	1.79	1.88	0.05	0.05	0.04	0.04	0.04
12000	1.04	1.13	1.60	1.90	2.00	0.05	0.05	0.05	0.04	0.04
12500	1.11	1.19	1.65	1.95	2.06	0.06	0.06	0.05	0.05	0.05
13000	1.22	1.29	1.69	1.98	2.09	0.06	0.06	0.05	0.05	0.05
13100	1.25	1.32	1.71	1.99	2.10	0.06	0.06	0.05	0.05	0.05
13500	1.32	1.40	1.76	2.03	2.13	0.06	0.06	0.06	0.06	0.06
14000	1.38	1.47	1.87	2.15	2.25	0.06	0.06	0.06	0.06	0.06
14500	1.40	1.51	2.01	2.35	2.47	0.07	0.07	0.07	0.07	0.07
15000	1.47	1.60	2.25	2.66	2.81	0.08	0.08	0.07	0.07	0.07
15500	1.68	1.82	2.56	3.06	3.23	0.09	0.09	0.08	0.08	0.08
15800	1.91	2.07	2.83	3.37	3.57	0.09	0.09	0.08	0.08	0.08
16000	2.11	2.27	3.03	3.59	3.79	0.10	0.09	0.09	0.09	0.08
16500	2.81	2.97	3.69	4.27	4.48	0.10	0.10	0.09	0.10	0.10
17000	3.65	3.84	4.61	5.24	5.45	0.10	0.10	0.10	0.10	0.10
17500	4.66	4.89	5.88	6.63	6.89	0.12	0.12	0.11	0.11	0.11
18000	6.07	6.35	7.67	8.65	8.97	0.13	0.13	0.12	0.11	0.12
18500	8.15	8.47	10.04	11.21	11.63	0.13	0.14	0.12	0.12	0.12
19000	10.88	11.25	13.04	14.44	14.93	0.15	0.15	0.14	0.13	0.13
19500	14.45	14.85	16.87	18.65	19.28	0.16	0.16	0.15	0.15	0.14
20000	19.32	19.88	22.38	24.55	25.34	0.18	0.17	0.15	0.14	0.12
20500	26.44	27.11	30.01	32.38	33.21	0.17	0.17	0.10	0.04	0.05
21000	35.91	36.45	37.98	39.54	39.80	-0.02	-0.04	-0.02	-0.02	-0.02
21500	41.23	41.20	39.85	39.53	39.85	-0.06	-0.08	0.06	0.18	0.14
22000	38.23	37.61	36.50	35.63	35.47	0.01	0.04	0.07	0.11	0.11
22500	33.74	33.73	32.84	32.01	31.68	0.08	0.07	0.11	0.09	0.12
23000	29.86	29.82	29.53	29.02	28.82	0.11	0.08	0.08	0.09	0.09
24000	24.31	24.35	25.03	25.10	25.17	0.10	0.09	0.07	0.08	0.08
25000	21.99	22.01	22.12	22.64	22.98	0.11	0.10	0.09	0.09	0.10
26000	21.20	21.33	21.72	22.37	22.66	0.11	0.11	0.11	0.12	0.12
27000	22.37	22.57	23.64	24.53	25.04	0.14	0.15	0.15	0.12	0.16
28000	24.67	25.09	26.98	28.90	29.07	0.26	0.21	0.18	0.27	0.25
29000	25.44	25.69	26.90	28.18	28.72	0.23	0.24	0.22	0.18	0.16
30000	24.31	24.47	24.38	25.06	25.23	0.10	0.12	0.14	0.13	0.13
31000	22.73	22.93	23.63	23.59	23.43	0.06	0.07	0.04	0.09	0.08
32000	21.99	22.13	23.85	24.45	24.57	0.13	0.10	0.01	-0.01	0.03
33000	24.52	24.28	23.92	24.81	25.37	0.00	-0.04	0.05	-0.03	-0.03
33500	25.16	24.97	23.34	24.29	25.01	-0.07	-0.02	0.03	-0.01	-0.01
34000	25.01	24.75	23.04	23.40	24.02	-0.02	-0.02	0.02	-0.01	0.01
35000	22.99	22.84	21.71	21.29	21.31	-0.04	-0.03	0.03	0.02	0.00
36000	18.30	18.53	19.74	19.62	19.23	0.05	0.05	-0.01	0.04	0.02
37000	15.31	15.20	16.79	17.60	17.69	0.10	0.09	0.01	0.02	0.01
38000	14.29	14.21	13.75	14.48	15.01	0.03	0.02	0.05	0.04	0.04
39000	11.49	11.56	11.05	11.19	11.56	0.05	0.05	0.06	0.08	0.09
40000	7.91	8.20	9.85	10.40	10.48	0.10	0.12	0.00	0.03	0.07



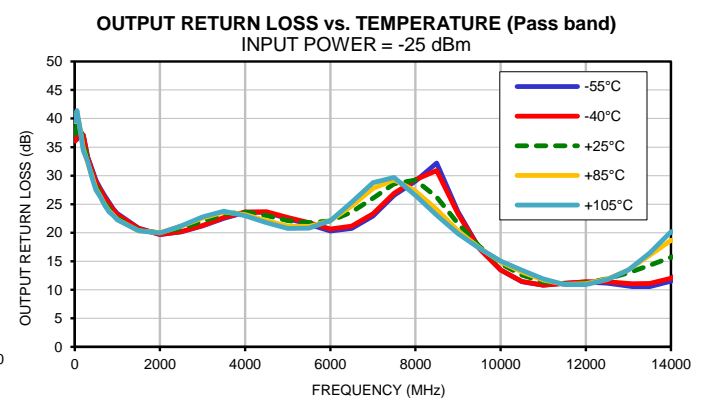
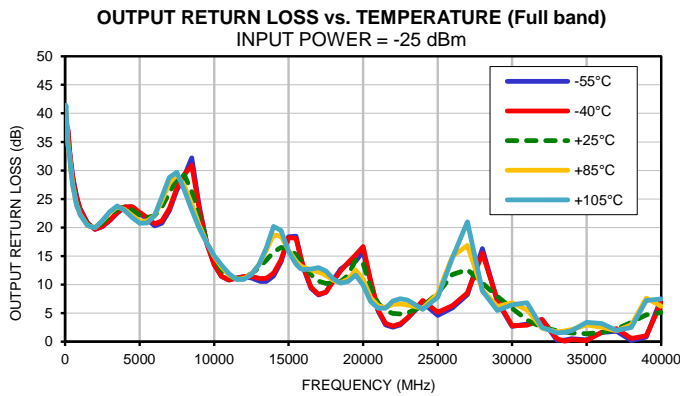
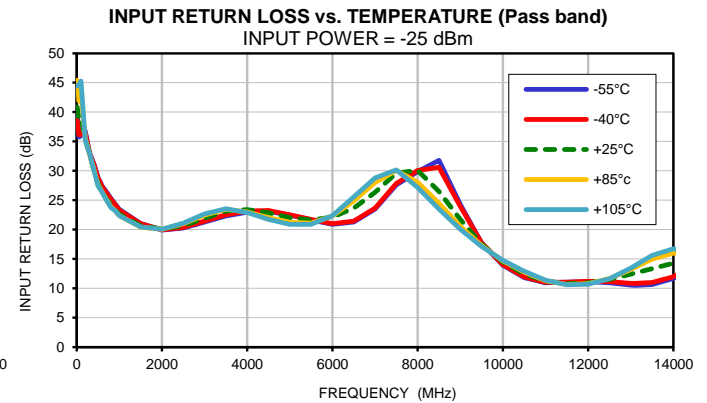
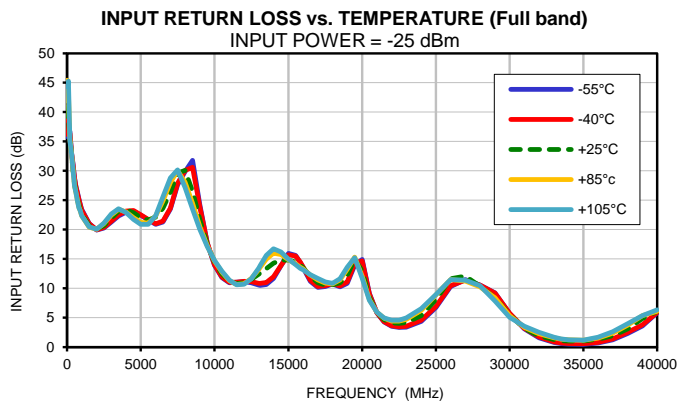
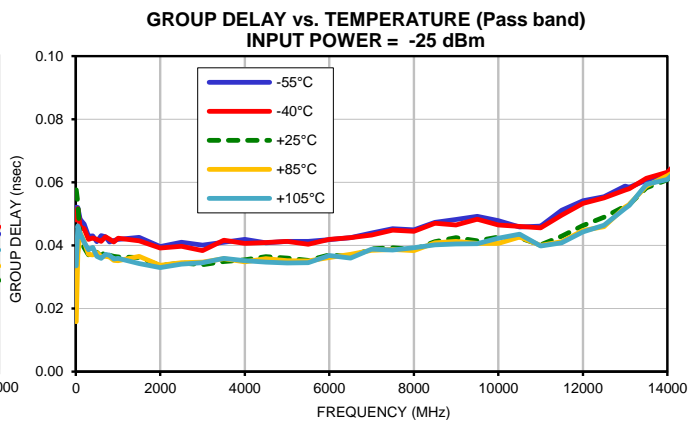
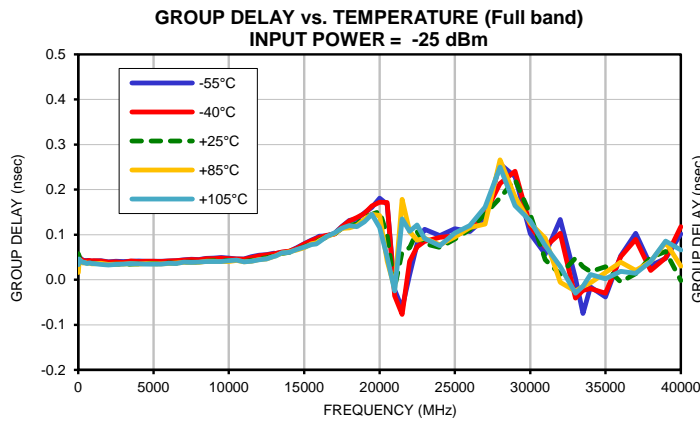
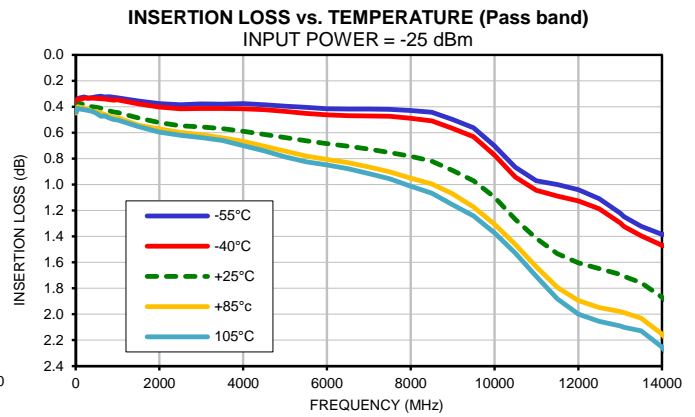
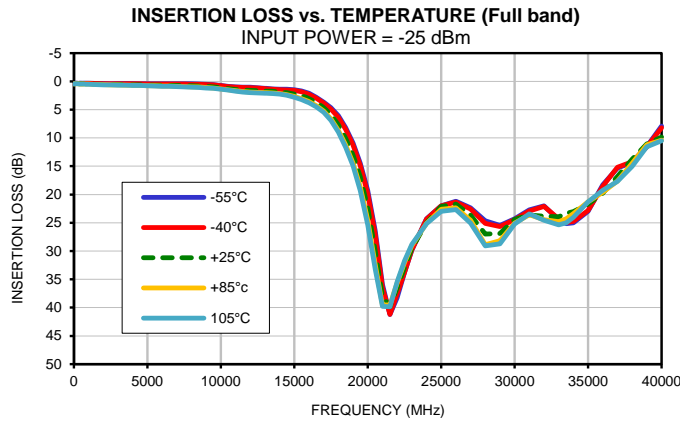
Typical Performance Data

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	40.03	38.63	40.87	45.43	44.42	36.54	36.06	37.24	39.44	39.53
50	35.77	36.17	38.84	41.88	44.74	36.34	36.85	39.03	40.38	41.41
100	36.00	36.22	39.06	43.12	45.29	37.92	37.63	39.14	39.44	39.33
200	36.73	36.40	35.57	35.51	35.19	37.08	37.09	35.84	34.80	34.39
300	33.07	32.91	32.77	32.82	32.88	33.29	33.15	32.74	32.29	32.52
400	31.21	31.00	30.05	30.20	30.09	31.19	30.89	30.05	29.96	29.70
500	28.89	28.74	27.96	27.63	27.47	29.19	28.82	28.22	27.69	27.44
600	27.37	27.26	26.36	26.33	26.28	27.78	27.55	26.60	26.41	26.30
700	26.39	26.22	25.22	25.05	24.96	26.49	26.17	25.21	24.93	24.83
800	25.29	25.15	24.29	23.89	23.77	25.33	25.10	24.26	23.82	23.66
900	24.34	24.22	23.43	23.20	23.21	24.20	24.03	23.29	23.11	23.03
1000	23.43	23.31	22.61	22.38	22.37	23.38	23.18	22.53	22.32	22.28
1500	21.05	21.01	20.64	20.43	20.45	20.81	20.73	20.45	20.33	20.32
2000	19.93	19.98	20.11	20.05	20.06	19.68	19.70	19.97	19.98	19.95
2500	20.26	20.38	20.67	20.99	21.08	20.16	20.20	20.82	21.14	21.19
3000	21.29	21.45	21.96	22.48	22.68	21.20	21.25	22.04	22.55	22.75
3500	22.35	22.54	23.18	23.46	23.53	22.51	22.66	23.28	23.60	23.78
4000	22.98	23.16	23.43	22.99	22.91	23.56	23.65	23.64	23.17	22.99
4500	23.13	23.23	22.85	22.04	21.73	23.55	23.67	23.01	22.10	21.76
5000	22.47	22.54	22.06	21.23	20.88	22.44	22.66	22.13	21.16	20.77
5500	21.65	21.74	21.63	21.12	20.92	21.46	21.78	21.78	21.09	20.81
6000	20.89	21.00	22.12	22.30	22.39	20.29	20.65	22.05	22.09	22.09
6500	21.29	21.44	23.64	24.89	25.54	20.73	21.13	23.63	24.69	25.32
7000	23.49	23.67	26.33	27.99	28.78	22.93	23.34	26.05	27.74	28.75
7500	27.63	27.89	29.64	30.08	30.16	26.56	26.92	28.55	29.27	29.69
8000	29.89	30.05	30.05	28.09	27.17	29.04	29.30	29.20	27.33	26.57
8500	31.80	30.60	26.49	24.46	23.48	32.22	30.88	26.23	24.06	23.06
9000	24.29	23.93	21.73	20.56	20.09	23.65	23.32	21.60	20.36	19.84
9500	17.73	17.75	17.54	17.26	17.15	17.25	17.19	17.62	17.35	17.25
10000	13.93	14.03	14.49	14.67	14.76	13.46	13.51	14.57	14.88	15.07
10500	11.84	11.94	12.47	12.77	12.93	11.42	11.45	12.57	13.12	13.43
11000	10.98	11.03	11.25	11.32	11.39	10.80	10.79	11.42	11.73	11.91
11500	11.05	11.07	10.80	10.64	10.59	11.16	11.10	11.00	10.94	10.93
12000	11.13	11.20	10.97	10.80	10.69	11.34	11.42	11.21	11.05	10.93
12500	10.96	11.15	11.56	11.67	11.66	11.17	11.44	11.92	11.88	11.77
13000	10.56	10.86	12.42	13.20	13.44	10.64	11.11	12.98	13.50	13.48
13100	10.52	10.83	12.62	13.59	13.91	10.53	11.05	13.25	14.00	14.02
13500	10.67	11.01	13.36	14.95	15.60	10.55	11.11	14.31	16.06	16.45
14000	11.70	11.96	14.30	16.02	16.76	11.49	12.03	15.71	18.68	20.21
14500	13.84	13.88	14.83	15.78	16.19	13.97	14.37	16.52	18.46	19.48
15000	15.95	15.72	14.81	14.89	14.96	18.37	18.25	16.32	15.99	15.82
15500	15.62	15.53	14.48	14.18	14.04	18.47	18.12	15.25	14.11	13.59
15800	14.38	14.46	13.95	13.60	13.39	14.84	14.82	14.19	13.30	12.77
16000	13.52	13.65	13.49	13.30	13.15	12.89	12.98	13.51	13.02	12.60
16500	11.20	11.40	12.08	12.27	12.32	9.36	9.53	11.73	12.58	12.75
17000	10.15	10.30	10.96	11.47	11.67	8.17	8.29	10.58	12.20	12.99
17500	10.34	10.44	10.55	10.92	11.09	8.66	8.68	10.22	11.61	12.35
18000	10.78	10.84	10.59	10.76	10.85	10.80	10.57	10.31	10.75	11.03
18500	10.28	10.44	10.93	11.46	11.65	12.75	12.44	10.54	10.34	10.25
19000	10.85	11.12	12.24	13.25	13.59	13.69	13.90	11.63	10.94	10.55
19500	13.95	14.26	14.95	15.30	15.24	14.09	15.18	14.37	12.54	11.65
20000	14.95	14.67	12.98	12.06	11.73	15.79	16.68	13.75	10.91	9.88
20500	9.12	9.03	8.46	8.11	7.96	10.57	10.69	9.38	7.72	7.02
21000	5.84	5.88	5.94	5.98	5.96	5.36	5.57	6.72	6.27	5.87
21500	4.26	4.34	4.69	4.90	4.98	2.94	3.19	5.44	6.00	5.88
22000	3.55	3.65	4.14	4.44	4.57	2.52	2.71	4.93	6.53	7.10
22500	3.33	3.46	4.02	4.42	4.61	2.95	3.12	4.85	6.63	7.55
23000	3.41	3.54	4.17	4.71	4.96	4.16	4.22	5.05	6.40	7.27
24000	4.40	4.56	5.35	6.27	6.55	6.83	7.25	6.27	5.86	5.65
25000	6.74	6.95	8.10	8.87	8.96	4.59	5.13	8.46	8.40	7.79
26000	10.33	10.44	11.65	11.49	11.48	5.91	6.32	11.75	14.96	14.69
27000	11.47	11.39	12.07	11.24	11.39	8.23	8.55	12.61	16.84	21.00
28000	10.55	10.54	10.35	10.27	10.48	16.30	15.52	10.23	9.02	8.89
29000	9.22	9.19	8.39	8.39	7.88	7.01	7.27	7.94	6.19	5.46
30000	5.71	5.75	5.51	5.36	5.07	2.67	2.80	5.86	6.82	6.47
31000	3.12	3.19	3.20	3.38	3.55	3.08	2.88	3.81	5.57	6.83
32000	1.60	1.71	1.91	2.30	2.54	3.89	3.91	2.49	2.38	2.50
33000	0.81	0.92	1.29	1.61	1.69	0.28	0.53	1.90	1.72	1.54
33500	0.59	0.69	1.11	1.36	1.38	0.26	0.08	1.71	1.86	1.62
34000	0.49	0.59	1.04	1.23	1.25	0.52	0.36	1.52	2.14	1.95
35000	0.47	0.57	1.07	1.17	1.19	0.32	0.19	1.39	2.95	3.39
36000	0.72	0.80	1.35	1.56	1.69	1.62	1.64	1.65	2.52	3.19
37000	1.24	1.37	1.91	2.36	2.61	1.80	2.28	2.24	1.94	2.00
38000	2.32	2.50	3.10	3.74	3.98	0.21	0.54	3.40	2.95	2.47
39000	3.58	3.77	4.87	5.35	5.39	0.83	1.01	4.70	7.62	7.22
40000	5.87	5.91	6.08	6.11	6.33	7.54	6.81	5.11	6.21	7.50





Typical Performance Curves



All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85° C or -40° to 105° C or -55° to 105° C or -45° to 105° C Ambient Environment	Refer to Individual Model Data Sheet
Storage Environment (Die)	-65° to 150°C	Individual Model Data Sheet
Storage Environment(Packaging)	-40° to 70°C and 40 to 60% humidity (In Factory Shipped Package)	