Reflectionless

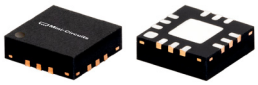
Low Pass Filter

XLF-123+

50Ω DC to 12200 MHz

Features

- Match to 50Ω in the stop band, eliminates undesired reflections
- Cascadable
- Excellent Power handling
- Temperature stable, 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 web site for RoHS Compliance methodologies and qualifications

Available Tape and Reel at no extra cost

Reel Size	Devices/Reel
7"	20, 50, 100, 200, 500, 1000, 2000

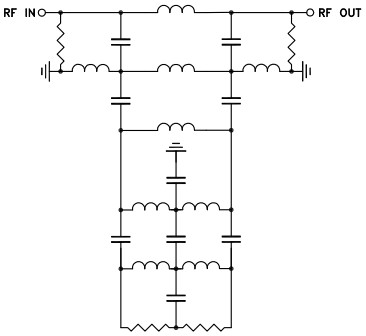
Applications

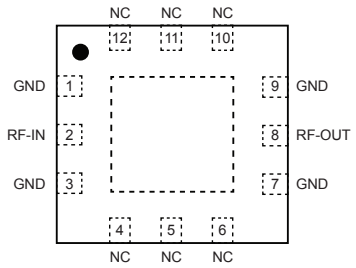
- Harmonics Rejection
- Satellite
- Radar
- Military & Space

General Description

Mini-Circuits' XLF-123+ 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.

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

Electrical Specifications[1] at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Insertion Loss	DC - F1	DC-12200	—	1.8	2.4	dB
	Frequency Cut-off	F2	15000	—	3.0	—	dB
	VSWR	DC - F1	DC-12200	—	1.3	—	:1
Stop Band	Rejection	F3 - F4	18100 - 19000	14	16	—	dB
		F4 - F5	19000 - 29000	18	20	—	dB
	VSWR	F3 - F4	18100 - 19000	—	1.3	—	:1
		F4 - F5	19000 - 29000	—	2.5	—	:1

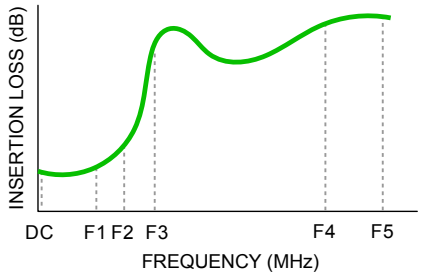
[1] Measured on Mini-Circuits Characterization Test Board TB-844-123+

Absolute Maximum Ratings[4]

Parameter	Ratings
Operating Temperature	-55°C to +105°C
Storage Temperature	-65°C to +150°C
RF Power Input, Passband (DC-F1)[2]	2W at 25°C
RF Power Input, Stopband (F2-F5)[3]	50mW at 25°C

[2] Passband rating derates linearly to 1W at 105°C ambient
[3] Stopband rating derates linearly to 25mW at 105°C ambient
[4] Permanent damage may occur if any of these limits are exceeded.

Specification Definition



ESD rating

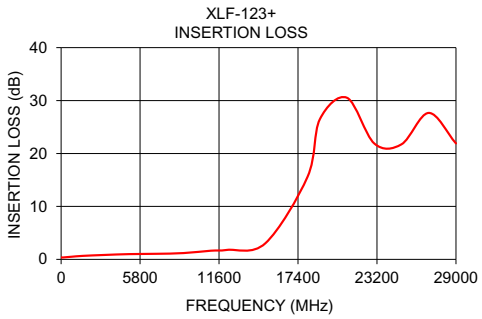
Human body model (HBM): Class 1A (250 to <500V) in accordance with ANSI/ESD 5.1-2001

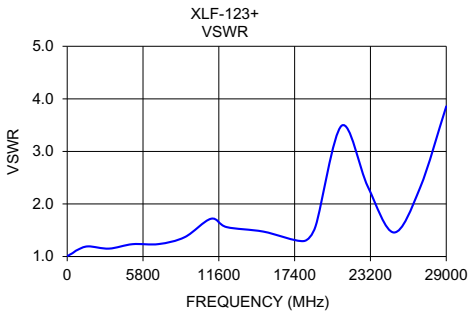
MSL rating

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

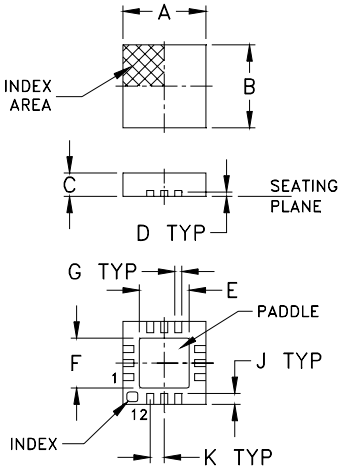
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
10	0.39	1.01
100	0.35	1.02
200	0.37	1.04
400	0.42	1.06
800	0.50	1.13
1600	0.66	1.19
3200	0.83	1.15
5000	0.99	1.24
7000	1.05	1.24
9000	1.19	1.37
11000	1.63	1.72
12200	1.79	1.56
15000	3.04	1.47
18100	15.60	1.29
19000	26.46	1.57
21000	30.52	3.49
23000	21.89	2.33
25000	21.74	1.46
27000	27.66	2.31
29000	21.90	3.86

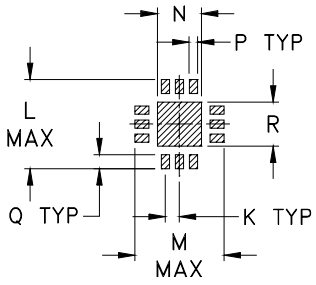




Outline Drawing

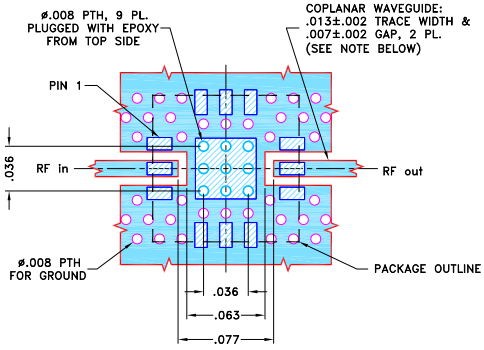


PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

Demo Board MCL P/N:
TB-844-123+ *(without connectors)*
TB-844-123C+ *(with connectors)*
B20-118-F1+ Connector *sold separately*
Suggested PCB Layout: PL-451+



NOTES:
1. TRACE WIDTH PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .0066"±.0007". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

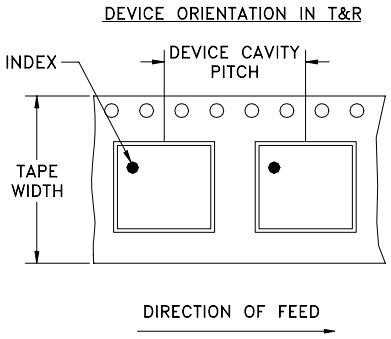
DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	J
.118	.118	.035	.008	.057	.057	.009	---	.016
3.00	3.00	0.89	0.20	1.45	1.45	0.23	---	0.41

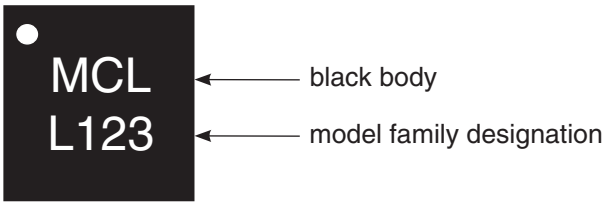
K	L	M	N	P	Q	R	wt
.020	.127	.127	.049	.010	.020	.049	grams
0.51	3.23	3.23	1.24	0.25	0.51	1.24	0.02

Tape & Reel Packaging



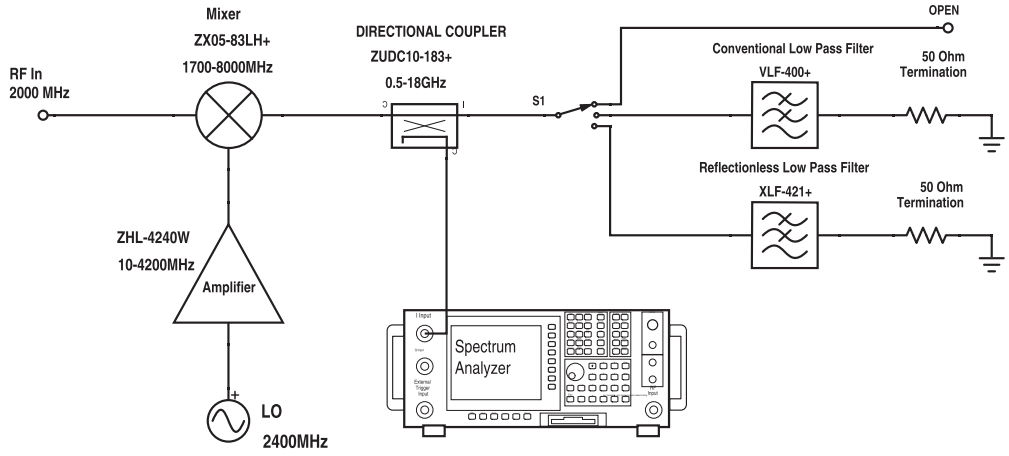
Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
8	4	7	Small quantity standard	20
				50
				100
				200
				500
		7	Standard	1000, 2000

Product Marking



Application Circuit Example

Pairing mixers with reflectionless filters to improve system dynamic range



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

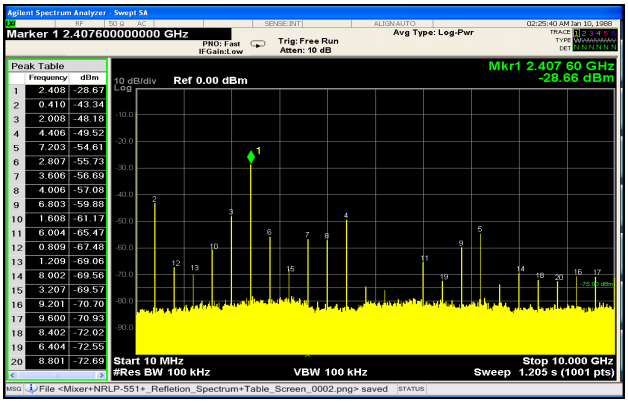


Figure 1. IF output reflection spectrum without filter

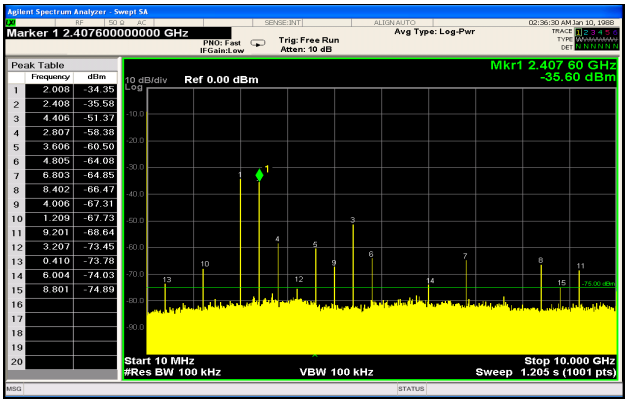


Figure 2. IF output reflection spectrum with conventional filter

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

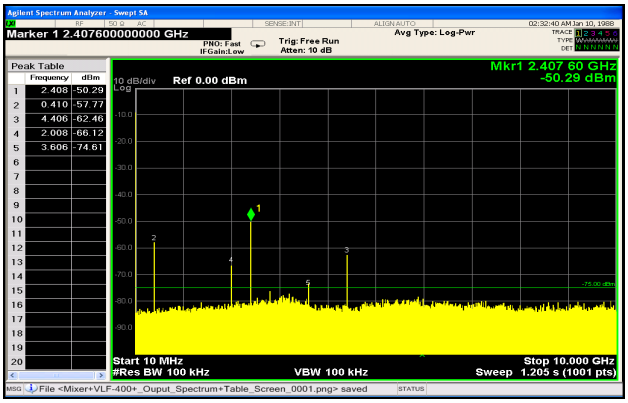


Figure 3. IF output reflection spectrum with reflectionless filter

Additional Notes

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

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