Reflectionless
High Pass Filter

XHF2-Series

50Ω DC to 30 GHz

CASE STYLE: MC1630-1

The Big Deal

- *Patented design eliminates in band spurs*
- *Pass band cut-off up to 18.3 GHz*
- *Stop band up to 30 GHz*
- *Excellent repeatability through IPD* process*

Product Overview

Mini-Circuits' XHF2-Series reflectionless filters 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 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 isolation amplifiers or attenuators.

Key Features	*Advantages*
Easy integration with sensitive reflective components, e.g. mixers, multipliers	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.
Enables stable integration of wideband amplifiers	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.
Cascadable	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.
Excellent power handling in a tiny surface mount device	High power handling extends the usability of these filters to the transmit path for inter-stage filtering.
Small size, 2x2mm QFN	Allows replacement of filter/attenuator pairs with a single reflectionless filter, saving board space.
Excellent repeatability of RF performance	Through semiconductor IPD process, X-series filters are inherently repeatable for large volume production.
Excellent stability over temperature	With ±0.3 dB variation over temperature ideal for use in wide temperature range applications without the need for additional temperature compensation.
Operating temperature up to 105˚C	Suitable for operation close to high power components.

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

Reflectionless

High Pass Filter

XHF2-1832+

50Ω 18.3 to 30 GHz

Features

- Match to 50Ω in the stop band, eliminates undesired reflections
- Cascadable
- Excellent Power handling
- Temperature stable, up to 105°C
- Small size, 2 x 2 mm
- Protected by US Patent No. 8,392,495

Generic photo used for illustration purposes only

CASE STYLE: MC1630-1

+RoHS Compliant

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

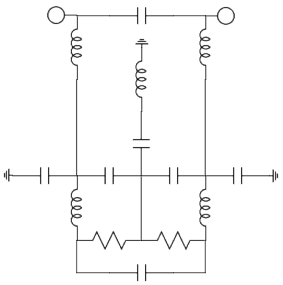
Applications

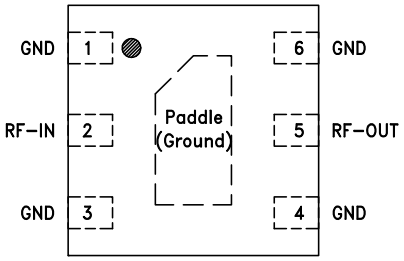
- Wi-Fi
- WiMax
- Microwave Radio
- Military & Space

General Description

Mini-Circuits' XHF2-1832+ 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	5	RF Output Pad
GND	1,3,4,6, Paddle	Connected to ground externally

Electrical Specifications[1] at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Stop Band	Rejection	DC - F'	DC - 9000	—	6.7	—	dB
		F' - F1	9000 - 14600	12.9	14.0	—	
	Frequency Cut-off	F2	17500	—	3.0	—	
	VSWR	DC - F'	DC - 9000	—	2.8	—	:1
		F' - F1	9000 - 14600	—	1.7	—	
Pass Band	Insertion Loss	F3 - F4	18300 - 25000	—	2.1	—	dB
		F4 - F5	25000 - 30000	—	1.3	—	
	VSWR	F3 - F4	18300 - 25000	—	1.7	—	:1
		F4 - F5	25000 - 30000	—	1.7	—	

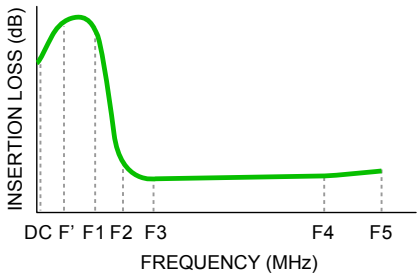
[1] Measured on Mini-Circuits Characterization Test Board TB-883-1832+

Absolute Maximum Ratings[4]

Parameter	Ratings
Operating Temperature	-55°C to +105°C
Storage Temperature	-65°C to +150°C
RF Power Input, Passband (F3-F5)[2]	0.32W at 25°C
RF Power Input, Stopband (DC-F3)[3]	0.09W at 25°C

[2] Passband rating derates linearly to 0.16W at 105°C ambient
[3] Stopband rating derates linearly to 0.04W at 105°C ambient
[4] Permanent damage may occur if any of these limits are exceeded.

Specification Definition

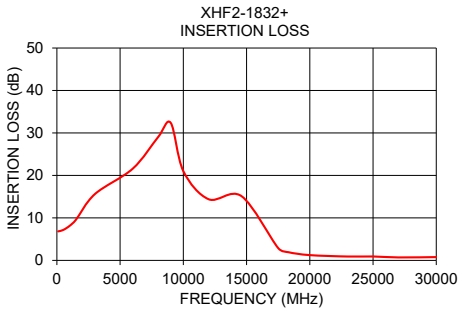


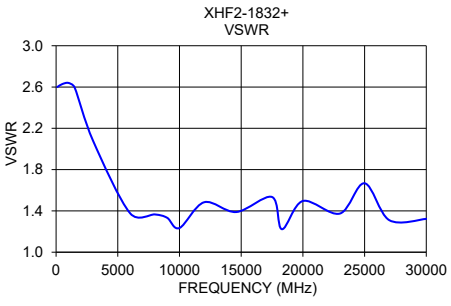
ESD rating

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

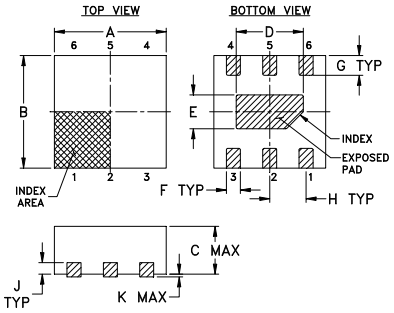
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
100	6.83	2.60
500	7.16	2.63
1000	8.12	2.64
1500	9.54	2.60
3000	15.60	2.08
6000	21.60	1.38
8000	29.02	1.37
9000	32.39	1.33
10000	21.01	1.23
12000	14.40	1.48
14600	15.12	1.39
17500	2.90	1.53
18300	1.93	1.22
20000	1.24	1.50
23000	0.91	1.37
25000	0.92	1.67
27000	0.70	1.31
30000	0.78	1.32

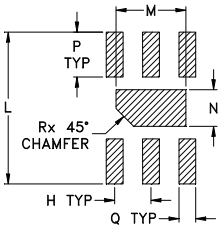




Outline Drawing

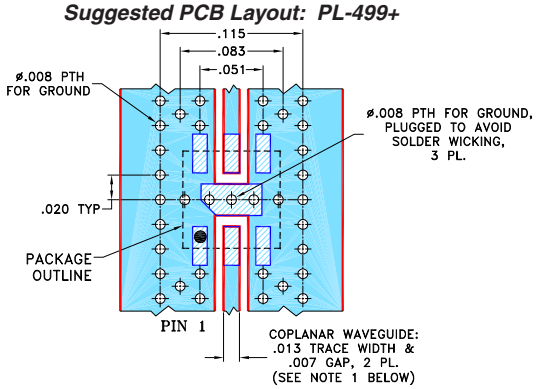


PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

Demo Board MCL P/N:
TB-883-1832+ *(without connectors)*
TB-883-1832C+ *(with connectors)*
B20-118-F1+ Connector *sold separately*
Suggested PCB Layout: PL-499+



NOTES:

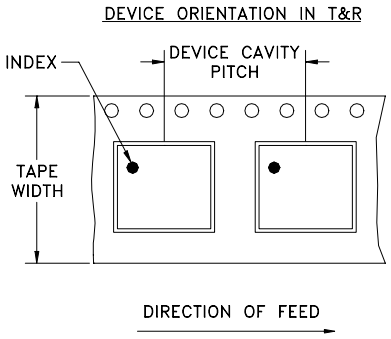
1. COPLANAR WAVEGUIDE IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .0066" ± .0007"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

Outline Dimensions (inch / mm)

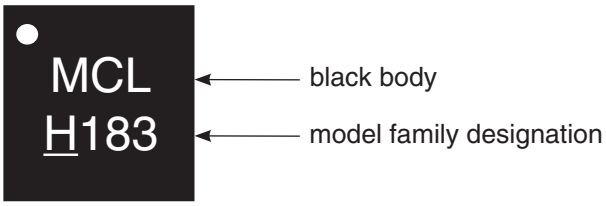
A	B	C	D	E	F	G	H	J
0.079	0.079	0.039	0.047	0.024	0.010	0.014	0.026	0.008
2.00	2.00	1.00	1.20	0.60	0.25	0.35	0.65	0.20
K	L	M	N	P	Q	R		wt
0.002	0.106	0.049	0.026	0.031	0.012	0.012		grams
0.05	2.70	1.25	0.65	0.80	0.30	0.30		0.006

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



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