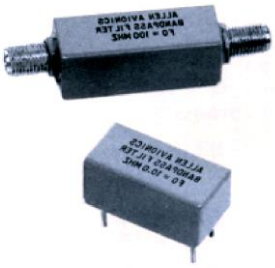
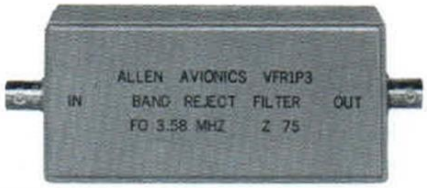
PRECISION FILTERS





PRECISION FILTERS FOR:

TESTING
A-D CONVERTERS
& AMPLIFIERS

- LOW PASS - HIGH PASS - BAND PASS
- NOTCH - DIPLEXERS

PRECISION FILTERS

PRECISION FILTERS FOR:

TESTING A-D CONVERTERS & AMPLIFIERS

- LOW PASS
- HIGH PASS
- BAND PASS
- NOTCH
- DIPLEXERS

Precision Signal Conditioning for High Performance testing Applications

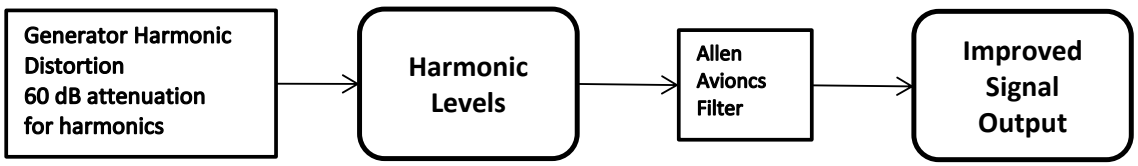
This family of filters is designed to enhance the performance of all test generators and signal sources used in testing A to D, D to A converters, amplifiers and other electronic components. They improve selectivity and dynamic range of all spectrum analyzers for harmonic distortion and intermodulation measurements. These extremely low distortion Lowpass, Highpass, Bandpass and Band reject filters in conjunction with diplexers for better impedance matching are used to clean any signal source or test generator by removing all harmonics of the test signal that would interfere with the test results.

Features

Frequency range 1KHz to 500MHz
Harmonic distortion less than - 100dB
Low intermodulation distortion
Low insertion loss
Input Signals to over 10 volts
Passive Device
50 Ohms matches all test generators
and signal sources
Supplied in shielded metal cases
BNC and SMA connectors available

Applications

In a typical application they are used to enhance the performance of all test generators and signal sources used in testing A to D, D to A converters, amplifiers and other electronic components. They improve selectivity and dynamic range of all spectrum analyzers for harmonic distortion and intermodulation measeurements.



ALLEN AVIONICS

ORDERING PROCEDURE

Type of Filter:
LP = LOW PASS
HP = HIGH PASS
BP = BAND PASS
NT = NOTCH
DP =DIPLEXER

FFSXXPXXC

Connector type:
B = BNC
S = SMA
N = TYPE N

FF = Type of Filter

XXPXX = Fundamental Frequency

C = Connector type

The fundamental frequency can be any 4-digit number from 1.0 KHz to 500 MHz. The "P" represents the decimal point.

ORDERING EXAMPLES

LPS0P001B = Lowpass filter for 1 KHz fundamental frequency with BNC connectors.

HPS10P00S = Highpass filter for 10 MHz fundamental frequency with SMA connectors.

BPS100P0N = Bandpass filter for 100 MHz fundamental frequency with type N connectors.

NTS25P30B = Notch filter for 25.3 MHz fundamental frequency with BNC connectors.

DPS183P5S = Diplexer with 183.5 MHz Cross-over frequency with SMA connectors.

LOW PASS FILTERS are designed to pass the fundamental frequency and attenuate all harmonics over 95 dB.

HIGH PASS FILTERS are designed to attenuate the fundamental frequency a minimum of 95 dB and pass all higher harmonics.

BAND PASS FILTERS provide over 95 dB attentuation to all harmonics.

NOTCH FILTERS are designed to remove the fundamental frequency on the input to the spectrum analyzer.

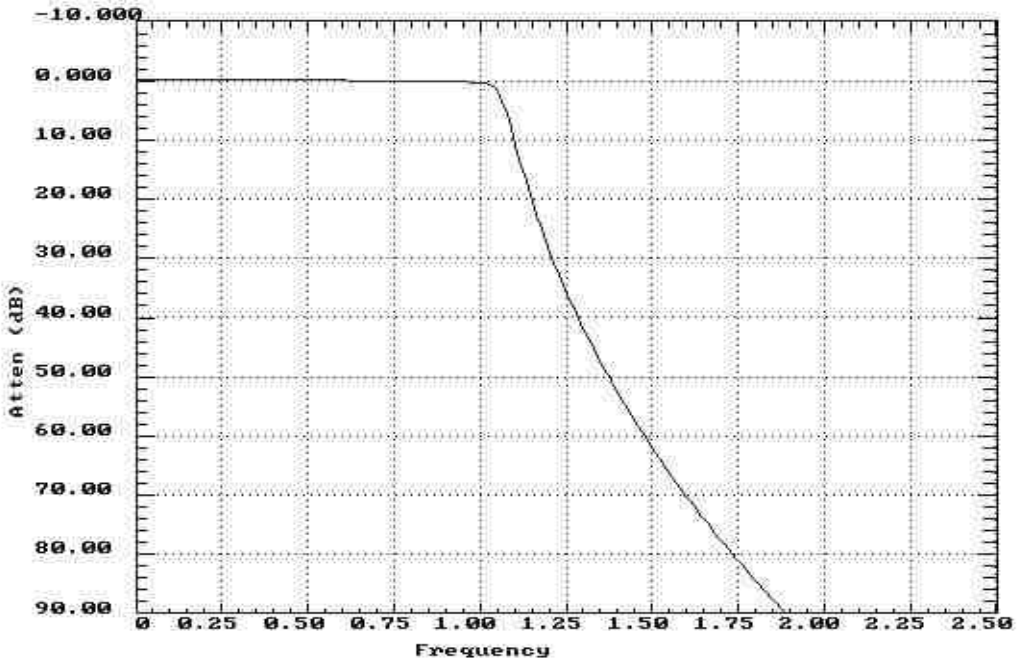
DIPLEXERS PROVIDE TWO OUTPUTS:

THE LOW PASS OUTPUT passes the fundamental frequency and attenuates the harmonics.

THE HIGH PASS OUTPUT provides a path for all harmonics from the generator.

LOWPASS SERIES

Designed to remove all harmonics of the Fundamental test frequency. Lowpass Series: Fundamental Frequency (Fd) less than 1.0dB attenuation. At 2 X Fd = 90dB minimum attenuation. Pick any Frequency between 1KHz & 500MHz.

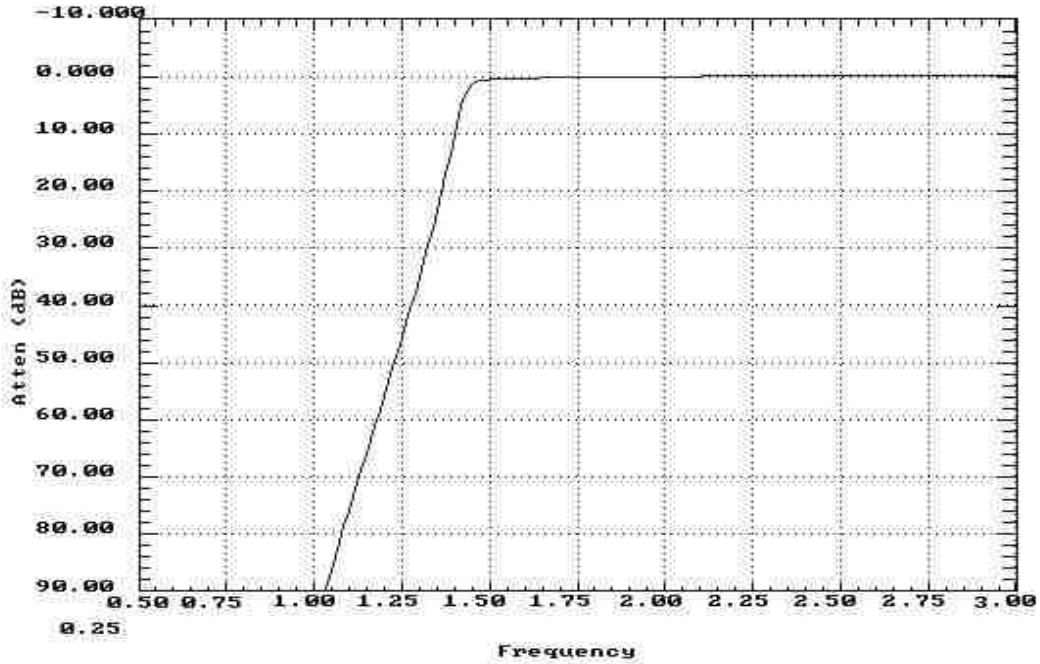


FUNDAMENTAL FREQUENCY (Fd)	SIZE
1 KHz	6 X 2 X 1¼
2 KHz	6 X 2 X 1¼
5 KHz	6 X 2 X 1¼
10 KHz	6 X 2 X 1¼
20 KHz	6 X 2 X 1¼
50 KHz	6 X 2 X 1¼
100 KHz	6 X 2 X 1¼
200 KHz	6 X 2 X 1¼
500 KHz	6 X 2 X 1¼
1.0 MHz	6 X 1½ X 1¼
2.0 MHz	6 X 1½ X 1¼
5.0 MHz	6 X 1½ X 1¼
7.5 MHz	5 X 1½ X 1¼
10.0 MHz	5 X 1½ X 1¼
20.0 MHz	5 X 1½ X 1¼
50.0 MHz	5 X 1½ X 1¼
100 MHz	4 X 1½ X 1¼
200 MHz	4 X 1½ X 1¼
500 MHz	4 X 1½ X 1¼

All Filters supplied in Metal Cases.

HIGHPASS SERIES

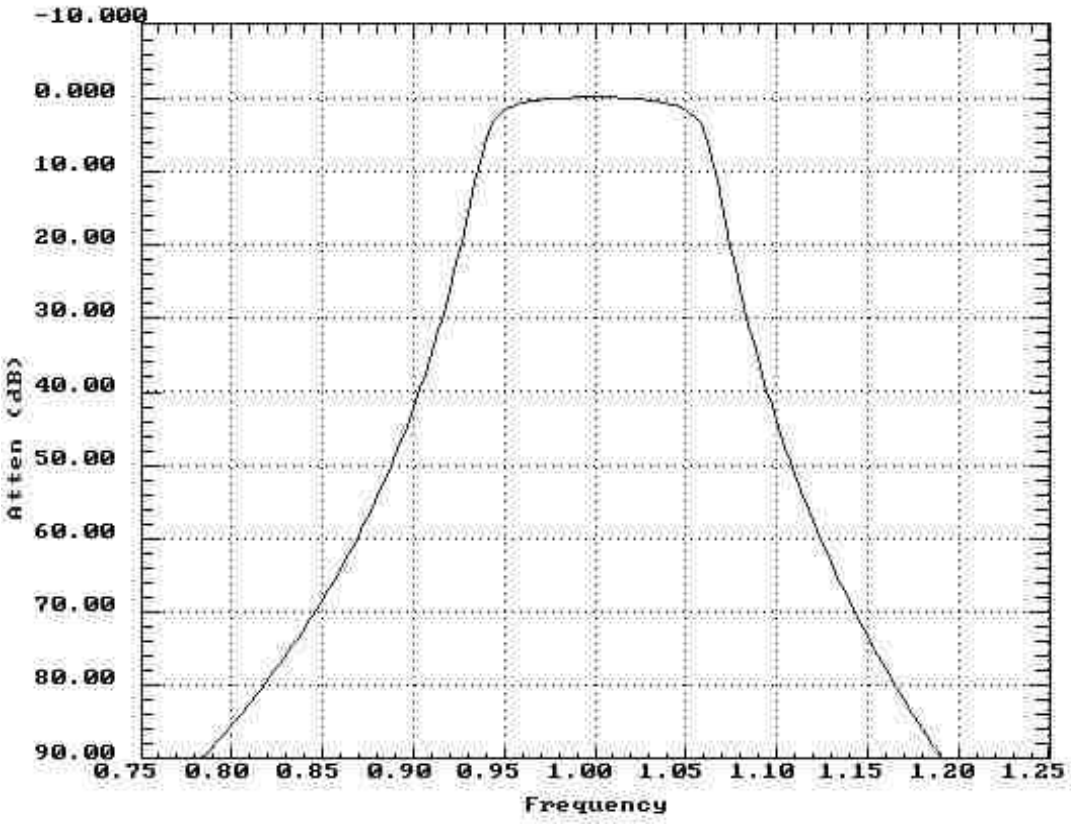
Designed to remove the Fundamental test frequency to enhance selectivity and dynamic range of Spectrum Analyzers. Highpass Series: Fundamental Frequency (Fd) attenuation = 90 dB minimum. less than 1.0dB attenuation @ 2 X Fd to 5 x Fd. Pick any Frequency between 1KHz & 100MHz



FUNDAMENTAL FREQUENCY (Fd)	SIZE
1 KHz	6 X 2 X 1¼
2 KHz	6 X 2 X 1¼
5 KHz	6 X 2 X 1¼
10 KHz	6 X 2 X 1¼
20 KHz	6 X 2 X 1¼
50 KHz	6 X 2 X 1¼
100 KHz	6 X 2 X 1¼
200 KHz	6 X 2 X 1¼
500 KHz	6 X 2 X 1¼
750 KHz	6 X 2 X 1¼
1.0 MHz	6 X 1½ X 1¼
2.0 MHz	6 X 1½ X 1¼
5.0 MHz	6 X 1½ X 1¼
7.5 MHz	5 X 1½ X 1¼
10.0 MHz	5 X 1½ X 1¼
20.0 MHz	5 X 1½ X 1¼
50.0 MHz	5 X 1½ X 1¼
75.0 MHz	4 X 1½ X 1¼
100 MHz	4 X 1½ X 1¼

BANDPASS SERIES

In many high performance testing applications a clean harmonic free signal is required. The Bandpass Series of low harmonic distortion filters was designed to eliminate all harmonics from any test generators output signal providing a clean signal source. This will improve the harmonic distortion measurements of Amplifiers, A to D and D to A converters Filters etc. Most test generators and frequency synthesizers have harmonics present up to the 6th and7th harmonics. For most serious testing applications this is not acceptable. These filters can even be used in 16 Bit applications where harmonic distortion must be below -95dB.

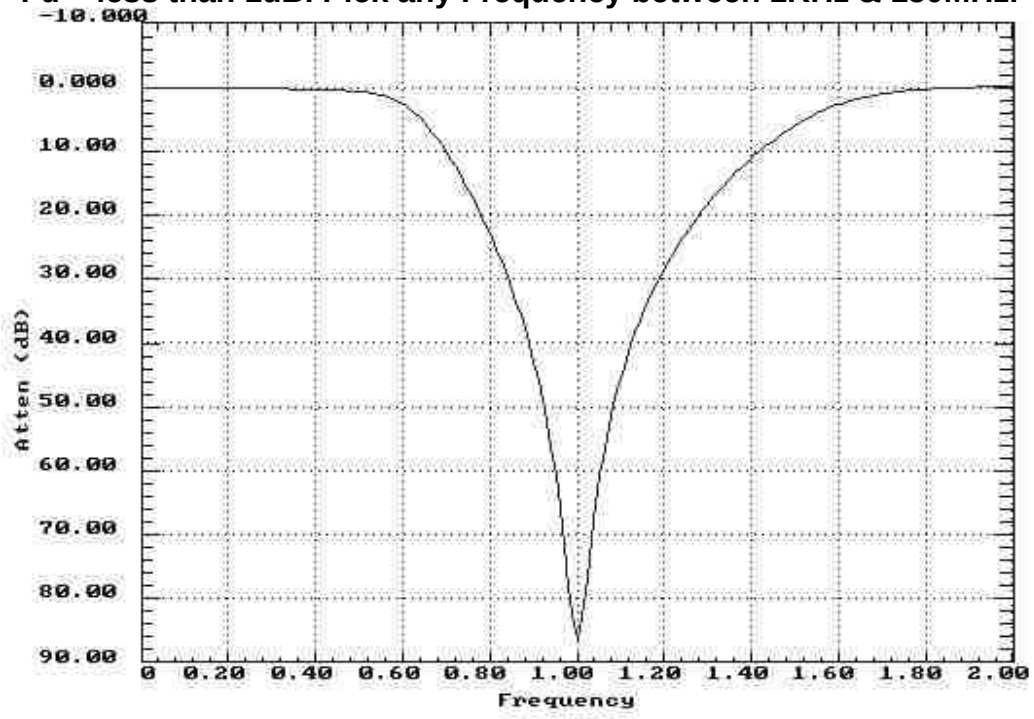


Some of the Precision Testing Filters (Lowpass, Highpass, Bandpass, Notch) up to 50MHz can also be supplied in Differential configurations. Diplexers are only supplied unbalanced. See ordering information for how to order filters tailored to your application.

FUNDAMENTAL FREQUENCY (Fd)	SIZE
1 KHz	6 X 3 X 1¼
2 KHz	6 X 3 X 1¼
3 KHz	6 X 3 X 1¼
4 KHz	6 X 3 X 1¼
5 KHz	6 X 3 X 1¼
7.5 KHz	6 X 3 X 1¼
10 KHz	6 X 3 X 1¼
20 KHz	6 X 3 X 1¼
30 KHz	6 X 3 X 1¼
40 KHz	6 X 3 X 1¼
50 KHz	6 X 2 X 1¼
75 KHz	6 X 2 X 1¼
100 KHz	6 X 2 X 1¼
200 KHz	6 X 2 X 1¼
300 KHz	6 X 2 X 1¼
400 KHz	6 X 2 X 1¼
500 KHz	6 X 2 X 1¼
750 KHz	6 X 2 X 1¼
1.0 MHz	6 X 1½ X 1¼
2.0 MHz	6 X 1½ X 1¼
3.0 MHz	6 X 1½ X 1¼
4.0 MHz	6 X 1½ X 1¼
5.0 MHz	6 X 1½ X 1¼
6.0 MHz	6 X 1½ X 1¼
7.0 MHz	6 X 1½ X 1¼
8.0 MHz	6 X 1½ X 1¼
9.0 MHz	6 X 1½ X 1¼
10.0 MHz	6 X 1½ X 1¼
20.0 MHz	6 X 1½ X 1¼
30.0 MHz	6 X 1½ X 1¼
40.0 MHz	6X 1½ X 1¼
50.0 MHz	6 X 1½ X 1¼
60.0 MHz	5 X 1½ X 1¼
70.0 MHz	5 X 1½ X 1¼
80.0 MHz	5 X 1½ X 1¼
90.0 MHz	5 X 1½ X 1¼
100 MHz	5 X 1½ X 1¼
200 MHz	5 X 1½ X 1¼
300 MHz	5 X 1½ X 1¼
400 MHz	5 X 1½ X 1¼
500 MHz	5 X 1½ X 1¼

NOTCH SERIES

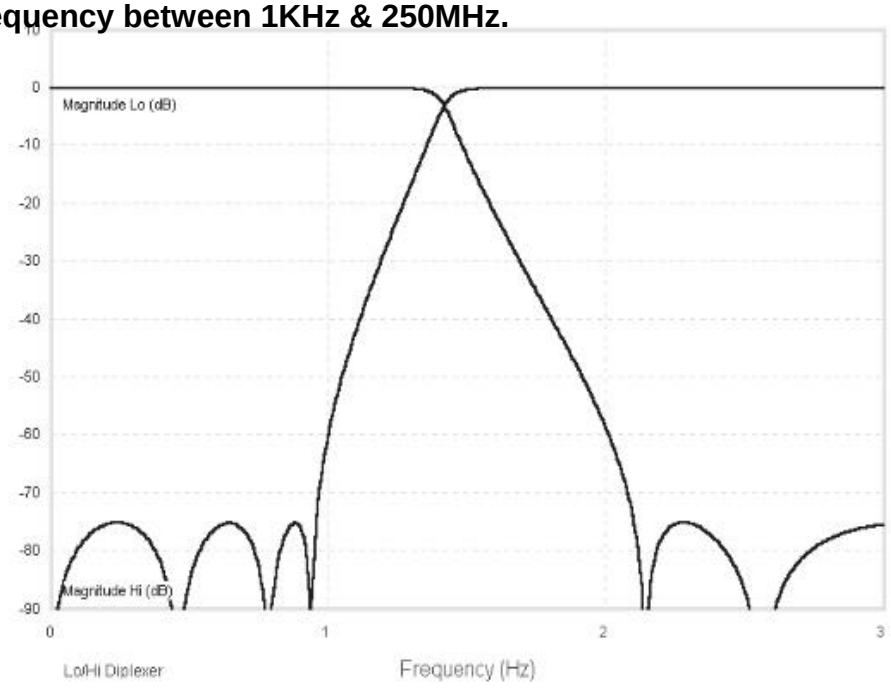
Designed to remove the Fundamental test frequency and improve the dynamic range of any Spectrum Analyzer. Notch Series: Fundamental Frequency (Fd) attenuated 60dB or more. 2X Fd to 5X Fd = less than 1dB. Pick any Frequency between 1KHz & 150MHz.



FUNDAMENTAL FREQUENCY (Fd)	SIZE
1 KHz	5 X 2 X 1¼
2 KHz	5 X 2 X 1¼
5 KHz	5 X 2 X 1¼
10 KHz	5 X 2 X 1¼
20 KHz	5 X 2 X 1¼
50 KHz	5 X 2 X 1¼
100 KHz	5 X 2 X 1¼
200 KHz	5 X 2 X 1¼
500 KHz	5 X 2 X 1¼
1.0 MHz	4 X 1½ X 1¼
2.0 MHz	4 X 1½ X 1¼
5.0 MHz	4 X 1½ X 1¼
7.5 MHz	4 X 1½ X 1¼
10.0 MHz	4 X 1½ X 1¼
20.0 MHz	4 X 1½ X 1¼
50.0 MHz	4 X 1½ X 1¼
75.0 MHz	4 X 1½ X 1¼
100 MHz	4 X 1½ X 1¼
150 MHz	4 X 1½ X 1¼

DIPLEXER SERIES

Diplexers provide two outputs for spectrum measurements. The lowpass port passes the Fundamental frequency and attenuates the harmonics over 50dB. The highpass port passes all harmonics and provides a good 50 ohm match for the test generator. Pick any Frequency between 1KHz & 250MHz.

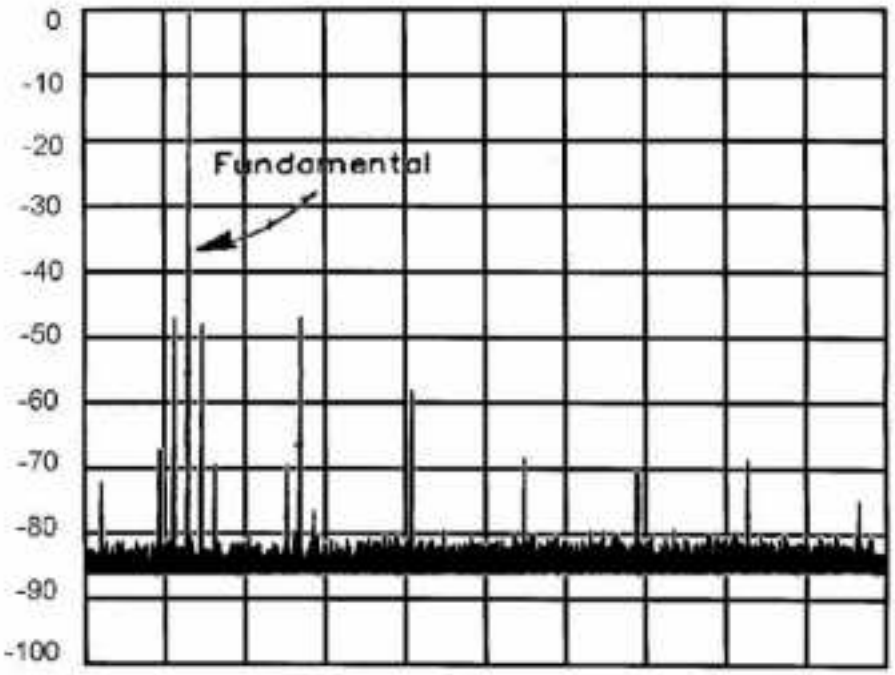


FUNDAMENTAL FREQUENCY (Fd)	SIZE
1 KHz	6 X 3 X 1¼
2 KHz	6 X 3 X 1¼
5 KHz	6 X 3 X 1¼
10 KHz	6 X 3 X 1¼
20 KHz	6 X 3 X 1¼
50 KHz	6 X 3 X 1¼
100 KHz	6 X 3 X 1¼
200 KHz	6 X 3 X 1¼
500 KHz	6 X 3 X 1¼
1.0 MHz	6 X 2 X 1¼
2.0 MHz	6 X 2 X 1¼
5.0 MHz	6 X 2 X 1¼
7.5 MHz	6 X 2 X 1¼
10.0 MHz	6 X 2 X 1¼
20.0 MHz	6 X 2 X 1¼
50.0 MHz	5 X 2 X 1¼
100 MHz	5 X 2 X 1¼
200 MHz	4 X 2 X 1¼
250 MHz	4 X 2 X 1¼

APPLICATIONS

Harmonic Distortion

In many testing applications a clean harmonic free signal is required. One common application for these low harmonic distortion filters is to eliminate any harmonics from test generators. This will improve harmonic distortion measurements of amplifiers and A to D and D to A converters, filters and other devices. For example the testing of a high performance A to D converter requires a clean input signal. To the right is a plot of the harmonic content from a typical high quality frequency source. The frequency output of the generator is set at 1.25MHz and you can see significant second and third harmonic output. Most test generators and frequency synthesizers have harmonics present up to the 6th and7th harmonics. For most serious testing applications this is not acceptable.



Sweep 0 to 10MHz (CF= 5.0MHz)
Res BW 3KHz Sweep time 14 sec

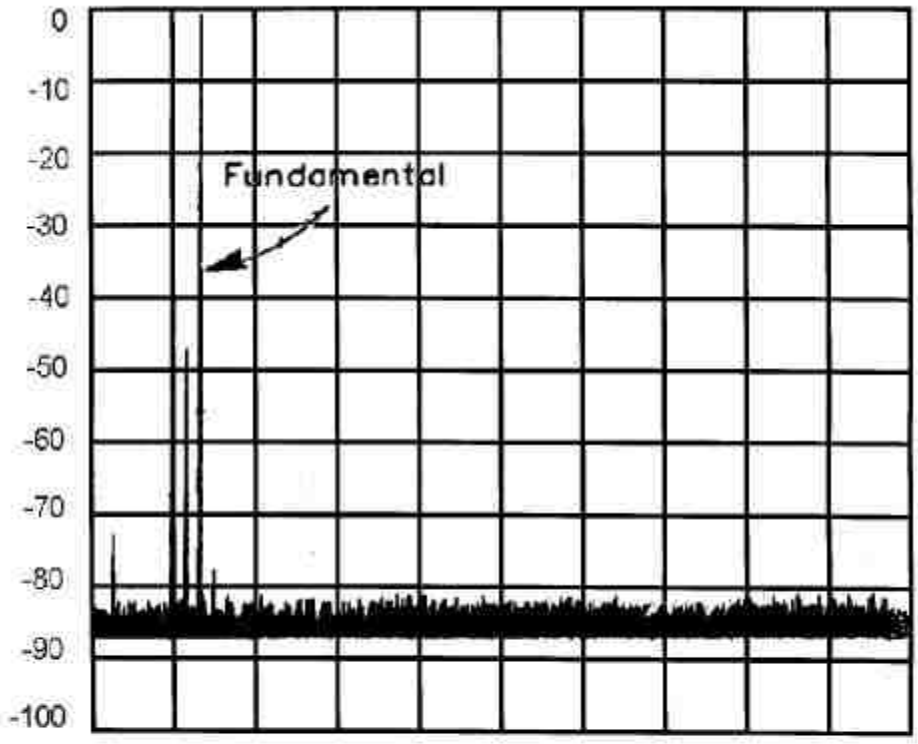
SOURCE

Input signal 1.25 MHz

Input ref 1 volt rms

One simple solution which works well for even 16 Bit applications is to filter the source with filters designed for low harmonic distortion.

The plot to the left is the same source after being filtered by a 1.25MHz lowpass filter. All of the higher frequency harmonics have been removed and you have a clean signal available for testing applications. Some frequency synthesizers generate sub-harmonics which are below the fundamental frequency and will be passed by lowpass filters. See above plot. Bandpass filters can be used to remove them if required .

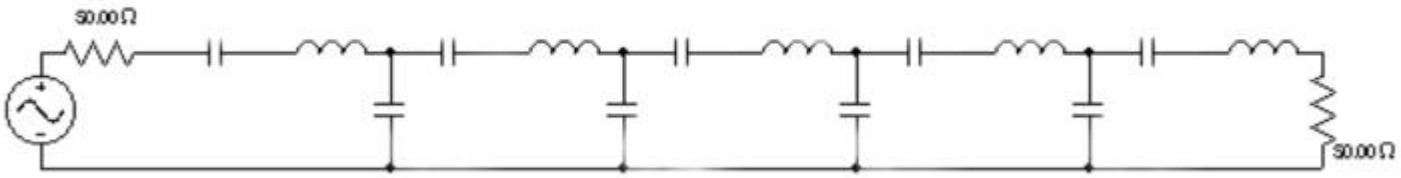


Sweep 0 to 10MHz (CF= 5.0MHz)
Res BW 3KHz Sweep time 14 sec

Output sweep of 1.25MHz lowpass

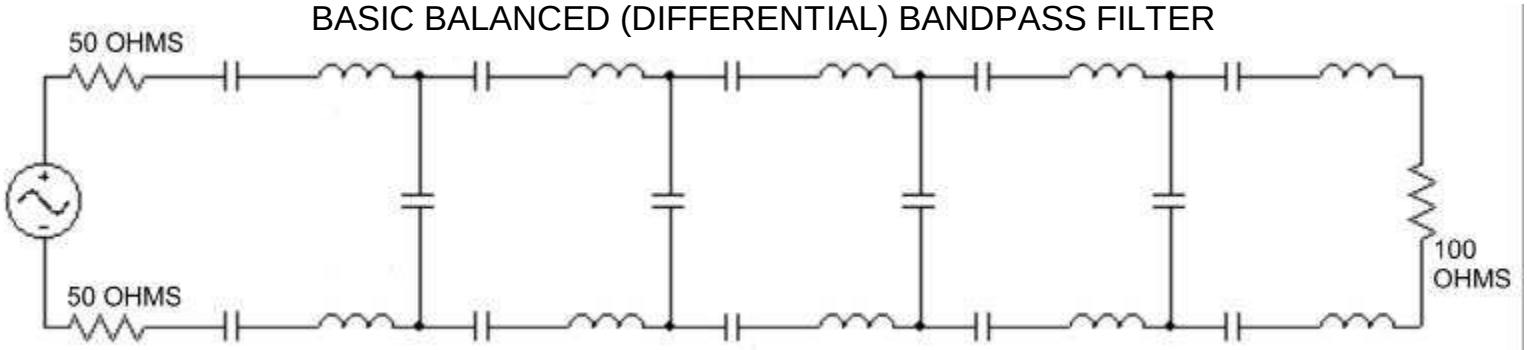
All of the above filters are designed as single ended or unbalanced filters.
See typical bandpass schematic below

BASIC SINGLE ENDED (UNBALANCED) BANDPASS FILTER



Some testing applications require balanced or differential filters. Most of the above filters can be supplied in a balanced configuration. They are more complex and costly but they can be easily integrated into differential testing applications. Contact our technical support department to discuss differential versions of these filters.

BASIC BALANCED (DIFFERENTIAL) BANDPASS FILTER



Even with a clean signal spectrum measurements can be complicated by test equipment. As shown above lowpass filters may not remove sub-harmonics below the fundamental frequency so bandpass filters are required. In addition most spectrum analyzers can generate harmonics internally when strong fundamental signals are present.

On the right is a block diagram of a typical spectrum analyzer. When a strong fundamental signal is present harmonics can be generated in the mixer section. These harmonics of the input signal make measurements difficult. One solution is to use a notch filter after the device under test to reduce the fundamental signal and improve the dynamic range of the analyzer.

Low distortion passive filters find many applications in making low level harmonic measurements and can improve the dynamic range of most analyzers. Standard generators and other low cost signal sources can be cleaned of harmonics and be used to supply harmonic free signals for specialized testing applications.