



## Band Pass and Band Reject

## Fixed Frequency 4-Pole Pair Filters

### Description:

The D68BP and D68BR Series of small 4-pole-pair fixed-frequency, precision band-pass and band-reject (notch) active filters that provide high performance in a compact 32-pin DIP package, with a broad range of fixed center frequencies (fo) from 1 Hz to 100 kHz. Each filter type features a near theoretical amplitude/phase response along with low output voltage noise enabling these filters to achieve a 10,000:1 or better dynamic signal range.

Pretuned to within ±2% of the fixed, user specified center frequency, D68BP band-pass filters pass all frequencies lying between the upper and lower -3dB points of the amplitude response curve, while D68BR band-reject (notch) filters sharply attenuate those frequencies that are bound and defined by the bottom of the notch. Available Q's for D68 BP models are 1, 2, 5, or 10 and D68BR filters are 3 or 10.

### Features/Benefits:

- Compact 32-pin footprint minimizes board space requirements.
- Plug-in ready-to-use, reducing engineering design and manufacturing cycle time.
- Factory tuned, no external clocks or adjustments needed
- Broad range of center frequencies to meet a wide range of applications.

### Applications

- Power line interference rejection
- Transducer output filtering
- Production test instrumentation
- Medical electronics equipment and research
- Comb filtering and equalization
- Noise and harmonic analysis
- RMS measurements
- Frequency spectrum analysis



U.S. Selling Price (1-9)	\$270.00 ea.
Orders for Export	U.S. Selling Price + 20%
Minimum Order Value \$150.00	F.O.B. Haverhill, MA
Lead-Time: 2-4 weeks A.R.O.	Accept Visa, Mcard, Amex

<b>Available Band-Pass Models:</b>	Page
<b>D68BP4</b> 4 pole pair .....	.2

<b>Available Band-Reject Models:</b>	
<b>D68BR4</b> 4-pole pair .....	.2

<b>General Specifications:</b>	
Ordering Information .....	.3
Pin-Out/Package Data .....	.3



## Band-Pass & Band-Reject

## Fixed Frequency 4-Pole Pair Filters

Model	D68BP4	Model	D68BR4
<b>Product Specifications</b>	Band-Pass	<b>Product Specifications</b>	Band-Reject
<b>Size</b>	1.8" x 0.8" x 0.3"	<b>Size</b>	1.8" x 0.8" x 0.3"
<b>Range <math>f_o</math></b>	1 Hz to 100 kHz	<b>Range <math>f_o</math></b>	1 Hz to 100 kHz
<b>Available "Q's"<sup>1</sup></b>	1, 2, 5, 10	<b>Available "Q's"<sup>1</sup></b>	3, 10
<b>"Q" Accuracy</b>	±10 %	<b>"Q" Accuracy</b>	±10 %
<b>Theoretical Transfer Characteristics</b>	Appendix A Pages 41 & 42	<b>Theoretical Transfer Characteristics</b>	Appendix A Pages 43
<b>Pass-Band Gain</b> (non-inverting)	0 ± 0.2 dB typ. 0 ± 0.4 dB max.	<b>Notch Attenuation</b>	45 db typ.
<b>Attenuation Rate</b>	24 dB/octave	<b>Pass-Band Gain</b> (non-inverting)	0 ± 0.2 dB typ. 0 ± 0.4 dB max.
<b>Center Frequency</b>	$f_o$ ±2% max.	<b>Attenuation Rate</b>	24 dB/octave
<b>Stability</b>	±0.01%/°C	<b>Center Frequency</b>	$f_o$ ±2% max.
<b>Filter Mounting Assembly</b>	FMA-01A	<b>Stability</b>	±0.01%/°C
		<b>Filter Mounting Assembly</b>	FMA-01A

1. Q – Quality Factor for band-pass and band-reject filters.  $Q = f_o / (f_H - f_L)$        $f_o = \sqrt{f_H f_L}$



## Specification (25°C and Vs ±15Vdc)

## Pin-Out and Package Data Ordering Information

### Analog Input Characteristics<sup>1</sup>

Impedance	10 k Ω min.
Voltage Range	± 10 Vpeak
Max. Safe Voltage	±Vs

### Analog Output Characteristics

Impedance (Closed Loop)	1 Ω typ. 10 Ω max.
Linear Operating Range	±10V
Maximum Current <sup>2</sup>	±2 mA
Offset Voltage <sup>3</sup>	2 mV typ. 20 mV max.
Offset Temp. Coeff.	50 μV/°C

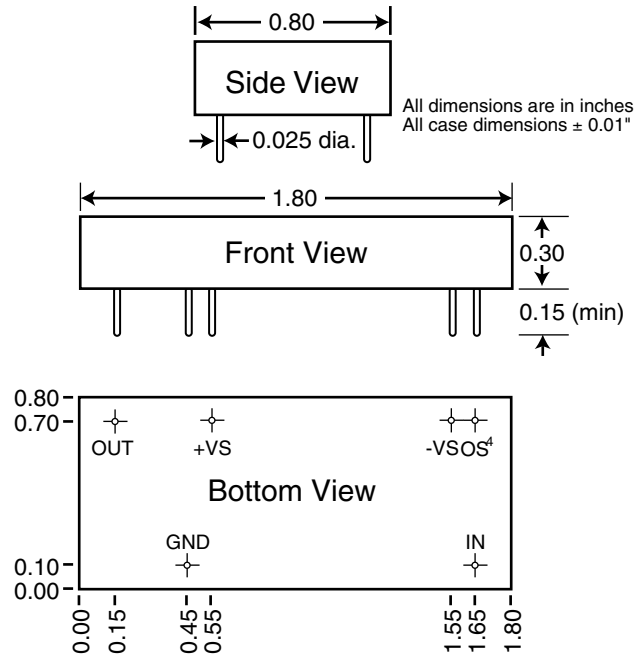
### Power Supply (±V)

Rated Voltage	±15 Vdc
Operating Range	±5 to ±18 Vdc
Maximum Safe Voltage	±18 Vdc
Quiescent Current	±25 mA typ. ±40 mA max.

### Temperature

Operating	0 to +70°C
Storage	-25 to +85°C

### Pin-Out & Package Data



### Ordering Information

#### Filter Type

BP - Band Pass  
BR - Band Reject

## D68BP4/10-849 Hz

“Q”

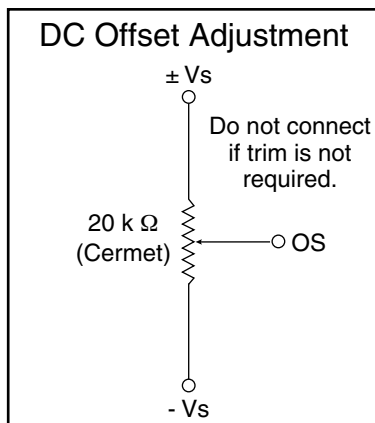
BP - 1, 2, 5, 10  
BR - 3, 10

(fo) Center Frequency<sup>5</sup>

e.g., 849 Hz  
2.50 kHz  
33.3 kHz

#### Notes:

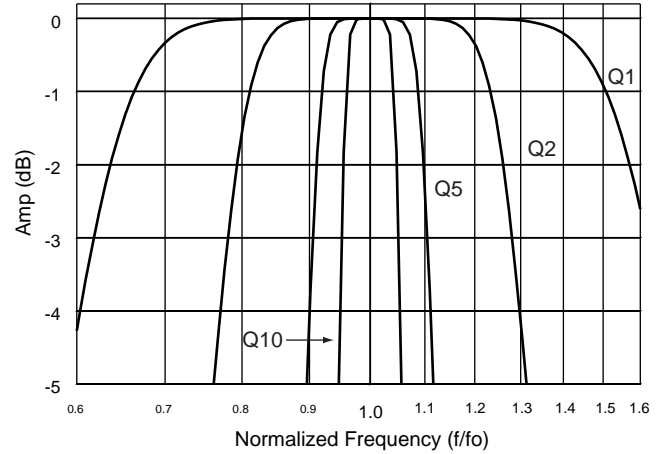
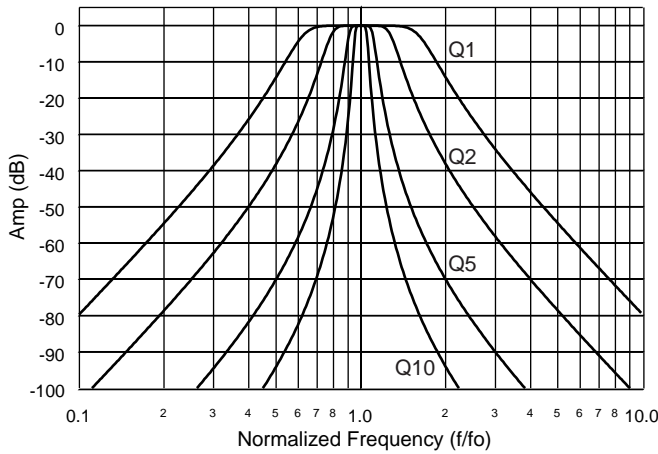
1. Input and output signal voltage referenced to supply common.
2. Output is short circuit protected to common. DO NOT CONNECT TO ±Vs.
3. Adjustable to zero.
4. Units operate with or without offset pin connected.
5. How to Specify Center Frequency:  
Center frequencies are specified by attaching a three digit frequency designator to the basic model number. Center frequencies can range from 1.00 Hz to 100 kHz.





Appendix A

**Amplitude Response Curves**

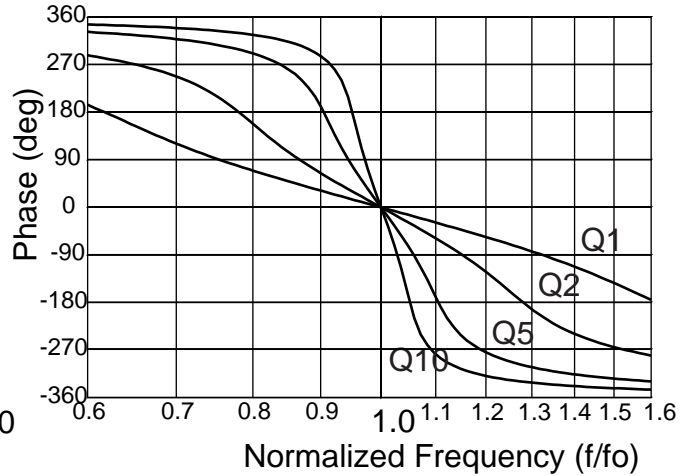
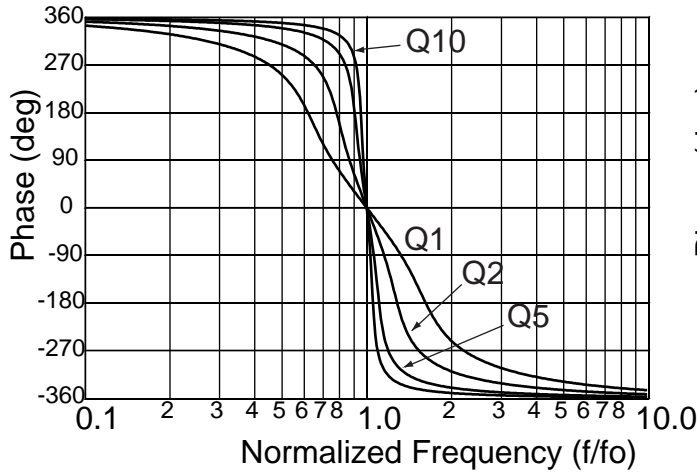


**Normalized Theoretical Amplitude Data**

Amp (dB)	Q = 1		Q = 2		Q = 5		Q = 10	
	$f_L < f_o < f_H$		$f_L < f_o < f_H$		$f_L < f_o < f_H$		$f_L < f_o < f_H$	
	$f/f_o$	$f/f_o$	$f/f_o$	$f/f_o$	$f/f_o$	$f/f_o$	$f/f_o$	$f/f_o$
-0.10	0.735	1.360	0.856	1.168	0.939	1.064	0.969	1.032
-0.25	0.709	1.411	0.840	1.191	0.932	1.073	0.965	1.036
-0.50	0.687	1.456	0.826	1.211	0.926	1.080	0.962	1.039
-1.00	0.663	1.508	0.811	1.233	0.919	1.088	0.959	1.043
-1.50	0.648	1.543	0.801	1.249	0.914	1.094	0.956	1.046
-2.00	0.636	1.571	0.793	1.261	0.911	1.098	0.954	1.048
-2.50	0.627	1.596	0.787	1.271	0.908	1.102	0.953	1.050
-3.00	0.618	1.618	0.781	1.281	0.905	1.105	0.951	1.051
-5.00	0.591	1.692	0.762	1.313	0.896	1.116	0.946	1.057
-10.00	0.539	1.855	0.724	1.382	0.877	1.140	0.936	1.068
-15.00	0.493	2.027	0.688	1.454	0.858	1.165	0.926	1.080
-20.00	0.449	2.225	0.650	1.538	0.838	1.193	0.915	1.093
-25.00	0.407	2.459	0.611	1.637	0.816	1.226	0.903	1.108
-30.00	0.365	2.737	0.570	1.755	0.791	1.265	0.888	1.126
-35.00	0.326	3.065	0.527	1.896	0.763	1.311	0.872	1.146
-40.00	0.290	3.452	0.484	2.065	0.733	1.365	0.854	1.171
-45.00	0.256	3.908	0.441	2.267	0.699	1.430	0.834	1.199
-50.00	0.225	4.442	0.399	2.507	0.664	1.507	0.811	1.233
-55.00	0.197	5.067	0.358	2.793	0.625	1.599	0.786	1.273
-60.00	0.173	5.796	0.319	3.131	0.585	1.710	0.758	1.320
-65.00	0.151	6.644	0.283	3.530	0.543	1.842	0.727	1.376
-70.00	0.131	7.630	0.250	4.000	0.500	2.000	0.693	1.443
-75.00	0.114	8.774	0.220	4.550	0.457	2.189	0.657	1.523
-80.00	0.099	10.01	0.193	5.193	0.414	2.414	0.618	1.618



**Phase Response Curves**



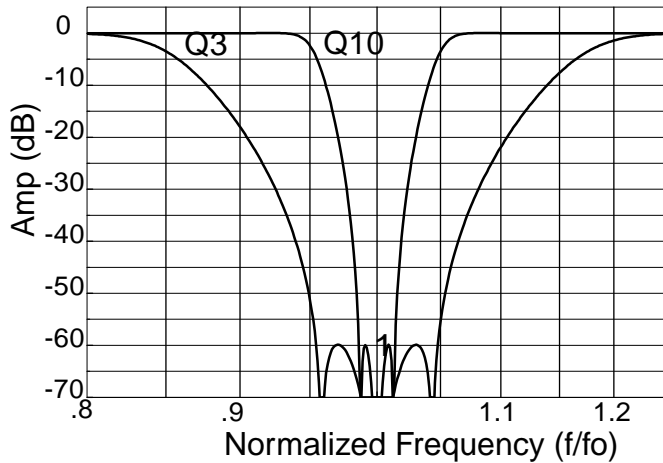
**Normalized Theoretical Phase Data**

Phase Mag (deg)	Q = 1		Q = 2		Q = 5		Q = 10	
	(+)	(-)	(+)	(-)	(+)	(-)	(+)	(-)
	f/f <sub>0</sub>	f/f <sub>0</sub>	f/f <sub>0</sub>	f/f <sub>0</sub>	f/f <sub>0</sub>	f/f <sub>0</sub>	f/f <sub>0</sub>	f/f <sub>0</sub>
1.0	0.997	1.003	0.998	1.002	0.999	1.001	1.000	1.000
2.5	0.992	1.008	0.996	1.004	0.998	1.002	0.999	1.001
5.0	0.983	1.017	0.992	1.008	0.997	1.003	0.998	1.002
10.0	0.967	1.034	0.983	1.017	0.993	1.007	0.997	1.003
15.0	0.951	1.051	0.975	1.025	0.990	1.010	0.995	1.005
20.0	0.936	1.069	0.967	1.034	0.987	1.013	0.993	1.007
25.0	0.920	1.087	0.959	1.042	0.984	1.017	0.992	1.008
30.0	0.905	1.105	0.951	1.051	0.980	1.020	0.990	1.010
35.0	0.891	1.123	0.944	1.060	0.977	1.023	0.988	1.012
40.0	0.876	1.141	0.936	1.068	0.974	1.027	0.987	1.013
45.0	0.863	1.159	0.929	1.077	0.971	1.030	0.985	1.015
50.0	0.849	1.178	0.921	1.086	0.968	1.033	0.984	1.017
60.0	0.823	1.215	0.907	1.103	0.962	1.040	0.981	1.020
70.0	0.799	1.252	0.893	1.120	0.956	1.046	0.978	1.023
80.0	0.776	1.288	0.880	1.136	0.950	1.052	0.975	1.026
90.0	0.755	1.324	0.868	1.152	0.945	1.058	0.972	1.029
120.0	0.701	1.426	0.835	1.198	0.930	1.075	0.964	1.037
150.0	0.657	1.521	0.807	1.239	0.917	1.090	0.958	1.044
180.0	0.618	1.618	0.781	1.281	0.905	1.105	0.951	1.051
210.0	0.577	1.734	0.752	1.330	0.891	1.122	0.944	1.060
240.0	0.525	1.904	0.713	1.403	0.872	1.147	0.933	1.071
270.0	0.452	2.210	0.653	1.532	0.840	1.191	0.916	1.092
300.0	0.345	2.899	0.548	1.825	0.777	1.288	0.880	1.136
330.0	0.192	5.211	0.350	2.859	0.617	1.621	0.780	1.282

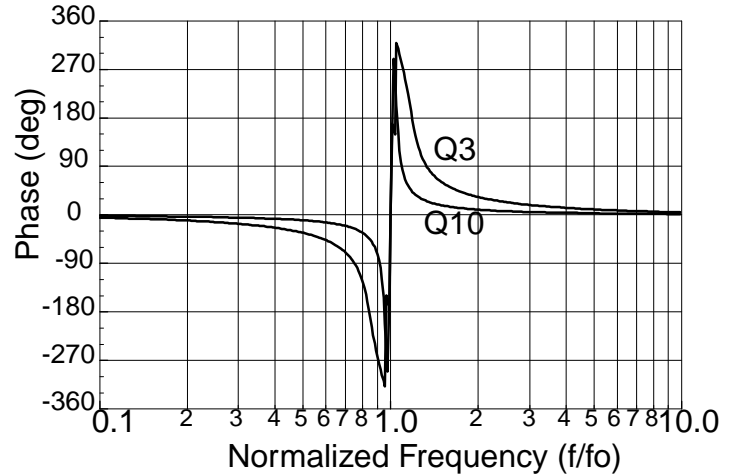


Appendix A

**Amplitude Response Curves**



**Phase Response Curves**



**Normalized Theoretical Amplitude Data**

Amp (dB)	Q = 3		Q = 10	
	$f_L < f_O < f_H$		$f_L < f_O < f_H$	
	$f/f_O$	$f/f_O$	$f/f_O$	$f/f_O$
-0.10	0.799	1.251	0.935	1.069
-0.25	0.809	1.236	0.938	1.066
-0.50	0.818	1.223	0.941	1.062
-1.00	0.828	1.208	0.945	1.059
-1.50	0.835	1.198	0.947	1.056
-2.00	0.839	1.191	0.949	1.054
-2.50	0.844	1.185	0.95	1.053
-3.00	0.847	1.180	0.951	1.051
-5.00	0.858	1.165	0.955	1.047
-10.00	0.877	1.140	0.961	1.040
-15.00	0.892	1.121	0.966	1.035
-20.00	0.905	1.105	0.97	1.030
-25.00	0.916	1.092	0.974	1.027
-30.00	0.925	1.081	0.977	1.024
-35.00	0.933	1.072	0.979	1.021
-40.00	0.939	1.065	0.982	1.019
-45.00	0.945	1.059	0.983	1.017
-50.00	0.949	1.054	0.984	1.016
-55.00	0.952	1.050	0.985	1.015
-60.00	0.954	1.048	0.986	1.014

**Normalized Theoretical Phase Data**

Phase Mag (deg)	Q = 3		Q = 10	
	(-)	(+)	(-)	(+)
	$f/f_O$	$f/f_O$	$f/f_O$	$f/f_O$
1.0	0.020	49.66	0.067	14.88
2.5	0.050	19.91	0.164	6.087
5.0	0.100	10.03	0.306	3.268
10.0	0.194	5.160	0.504	1.985
15.0	0.279	3.590	0.621	1.609
20.0	0.352	2.838	0.696	1.437
25.0	0.416	2.405	0.746	1.340
30.0	0.470	2.129	0.783	1.278
35.0	0.515	1.940	0.810	1.235
40.0	0.555	1.803	0.831	1.204
45.0	0.588	1.700	0.848	1.180
50.0	0.617	1.620	0.861	1.161
60.0	0.664	1.505	0.882	1.133
70.0	0.701	1.427	0.897	1.115
80.0	0.729	1.372	0.909	1.101
90.0	0.752	1.330	0.917	1.090
120.0	0.797	1.255	0.934	1.071
150.0	0.824	1.214	0.943	1.060
180.0	0.844	1.185	0.950	1.052
210.0	0.862	1.160	0.957	1.045