FREQUENCY DEVICES™, INC.

D68BP & D68BR Series

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

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

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

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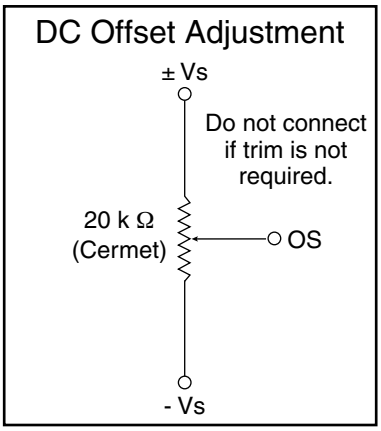
Specification

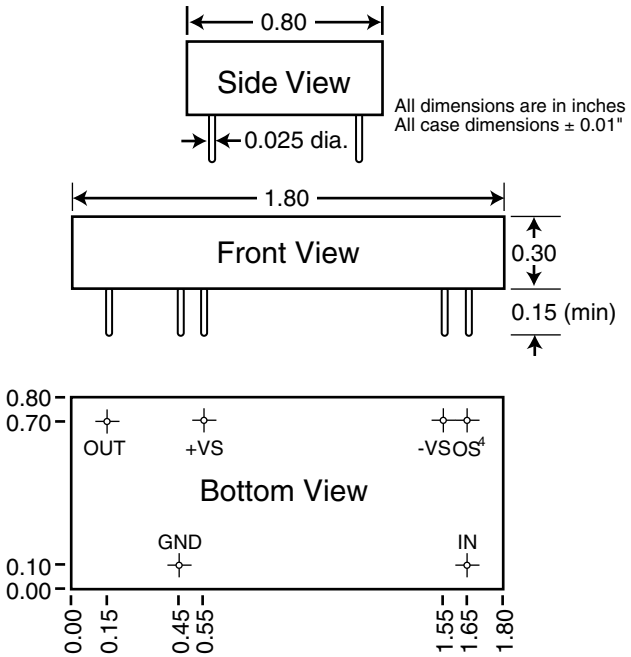
(25°C and Vs ±15Vdc)

Analog Input Characteristics[1]	
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[2]	±2 mA
Offset Voltage[3]	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 and Package Data Ordering Information

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[5]
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 with out 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.

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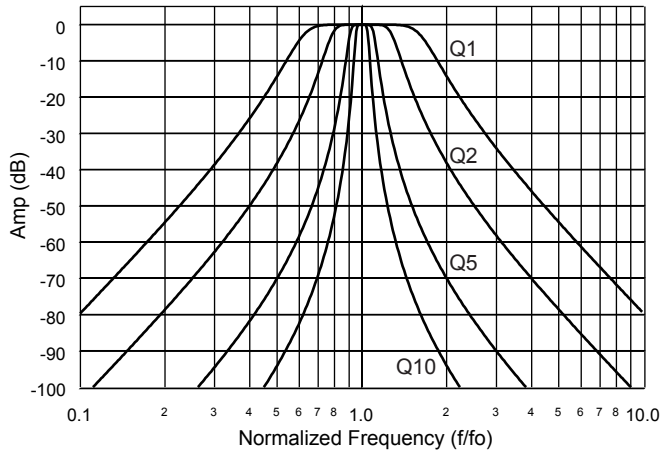
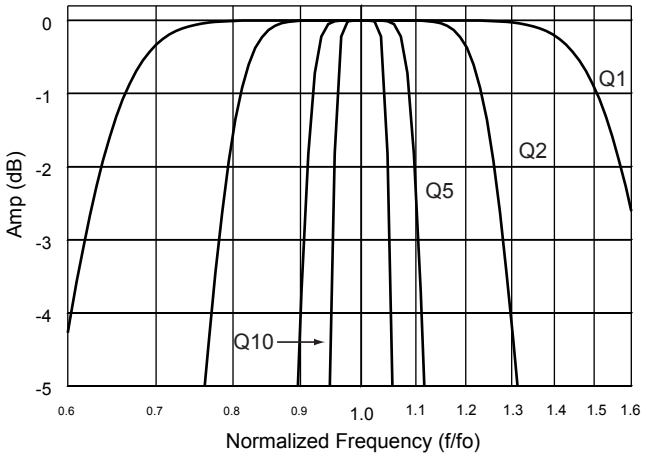
Appendix A

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

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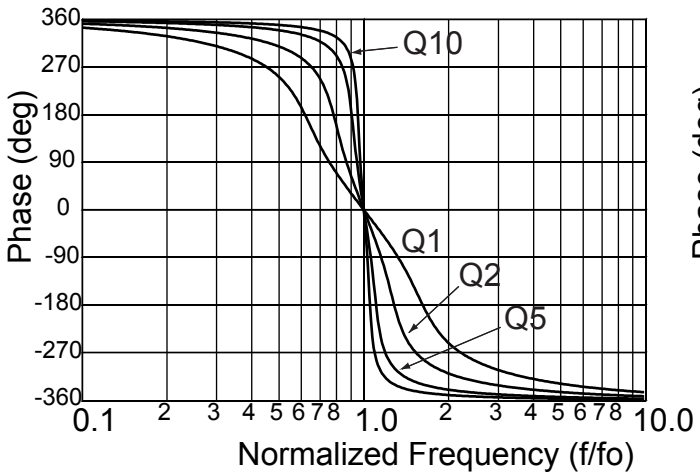
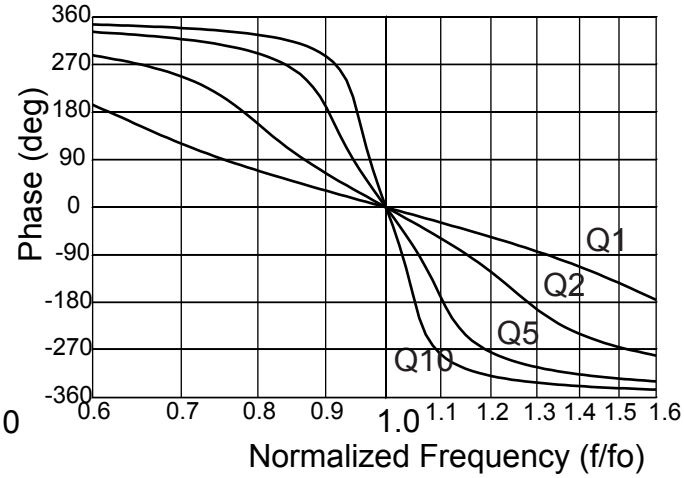
Phase Response Curves





Normalized Theoretical Phase Data

Phase Mag (deg)	Q = 1		Q = 2		Q = 5		Q = 10	
	(+)	(-)	(+)	(-)	(+)	(-)	(+)	(-)
	f/f_o	f/f_o	f/f_o	f/f_o	f/f_o	f/f_o	f/f_o	f/f_o
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

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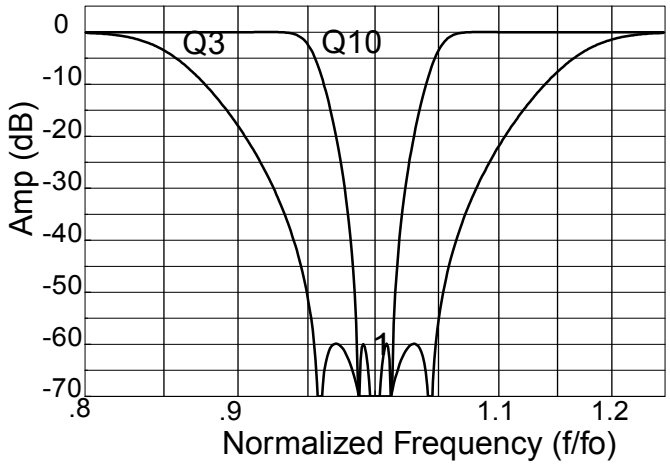
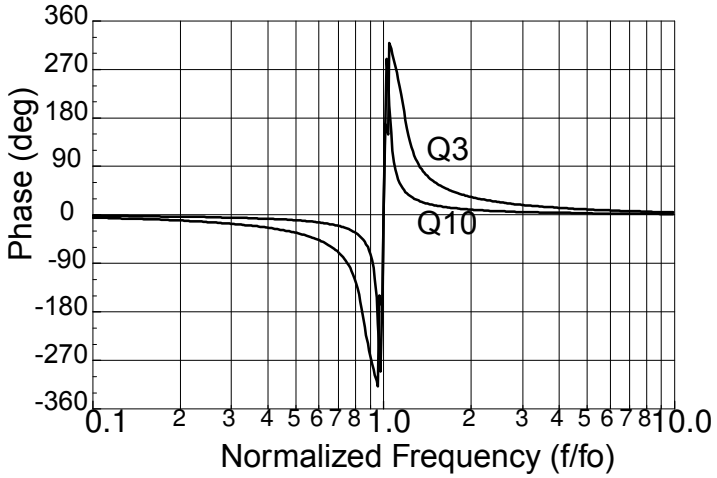


Phase Response Curves



Normalized Theoretical Amplitude Data

Amp (dB)	Q = 3 $f_L<f_O<f_H$		Q = 10 $f_L<f_O<f_H$	
	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

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