



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 |

| | |
|------------------------------------|------|
| Available Band-Pass Models: | Page |
| D68BP4 4 pole pair | .2 |

| | |
|--------------------------------------|----|
| Available Band-Reject Models: | |
| D68BR4 4-pole pair | .2 |

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Band-Pass & Band-Reject

Fixed Frequency 4-Pole Pair Filters

| 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 |
| Pass-Band Gain (non-inverting) | 0 ± 0.2 dB typ. 0 ± 0.4 dB max. | Notch Attenuation | 45 db typ. |
| Attenuation Rate | 24 dB/octave | Pass-Band Gain (non-inverting) | 0 ± 0.2 dB typ. 0 ± 0.4 dB max. |
| Center Frequency | f _o ±2% max. | Attenuation Rate | 24 dB/octave |
| Stability | ±0.01%/°C | Center Frequency | f _o ±2% max. |
| Filter Mounting Assembly | FMA-01A | Stability | ±0.01%/°C |
| | | Filter Mounting Assembly | FMA-01A |

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



Specification (25°C and Vs ±15Vdc)

Pin-Out and Package Data Ordering Information

Analog Input Characteristics¹

| | |
|-------------------|-------------|
| 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 |

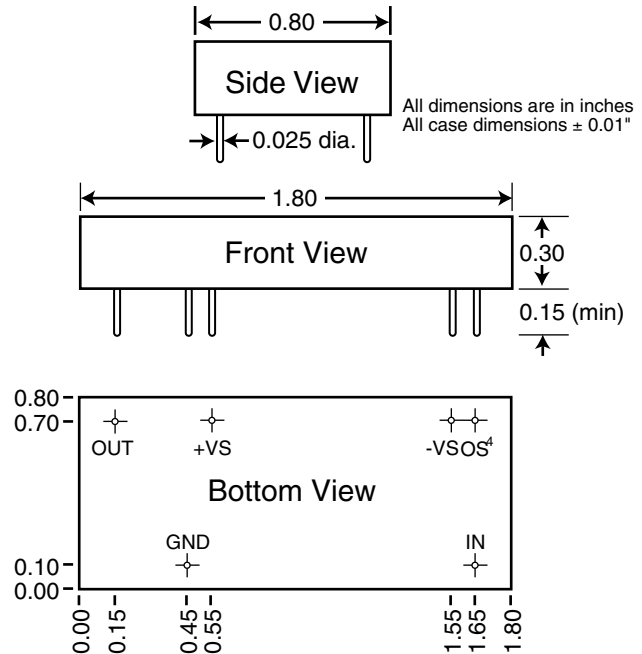
Power Supply (±V)

| | |
|----------------------|----------------------------|
| 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 & Package Data



Ordering Information

Filter Type

BP - Band Pass
BR - Band Reject

D68BP4/10-849 Hz

"Q"

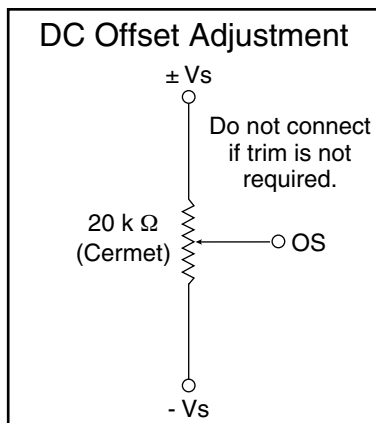
BP - 1, 2, 5, 10
BR - 3, 10

(fo) Center Frequency⁵

e.g., 849 Hz
2.50 kHz
33.3 kHz

Notes:

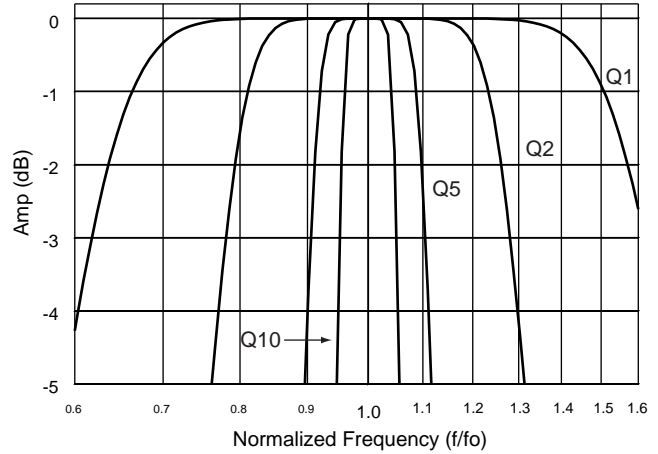
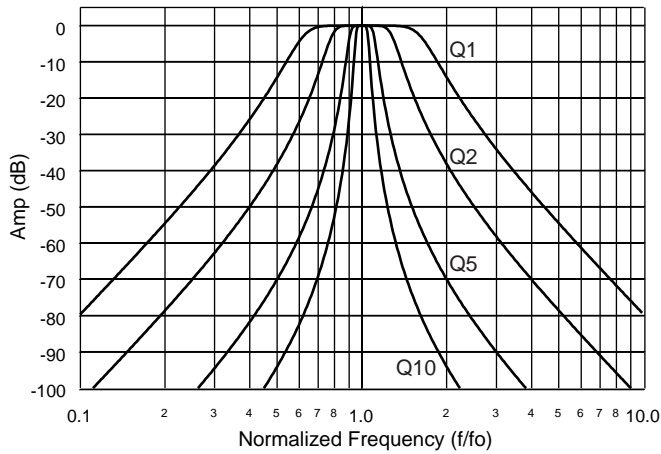
1. Input and output signal voltage referenced to supply common.
2. Output is short circuit protected to common. DO NOT CONNECT TO ±Vs.
3. Adjustable to zero.
4. Units operate with or without offset pin connected.
5. How to Specify Center Frequency:
Center frequencies are specified by attaching a three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





Appendix A

Amplitude Response Curves

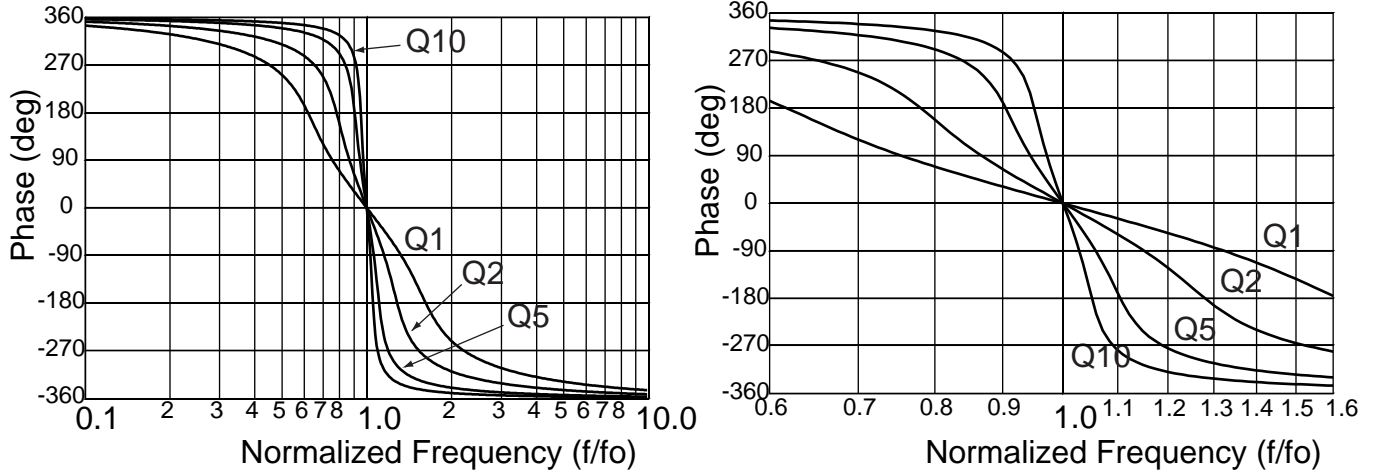


Normalized Theoretical Amplitude Data

| 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



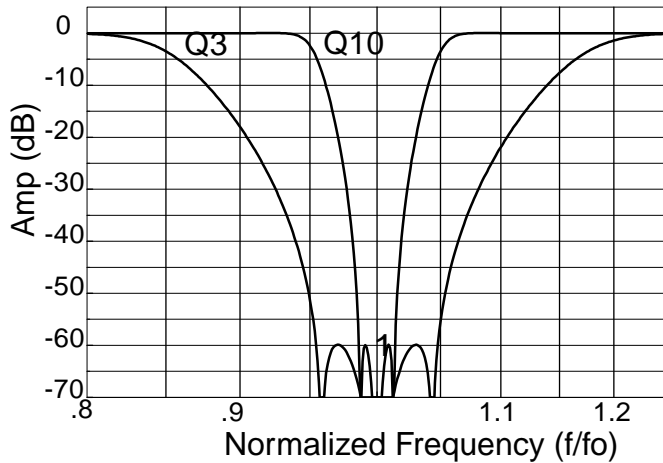
Normalized Theoretical Phase Data

| Phase Mag (deg) | Q = 1 | | Q = 2 | | Q = 5 | | Q = 10 | |
|-----------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| | (+) | (-) | (+) | (-) | (+) | (-) | (+) | (-) |
| | f/f_0 | f/f_0 | f/f_0 | f/f_0 | f/f_0 | f/f_0 | f/f_0 | f/f_0 |
| 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 |

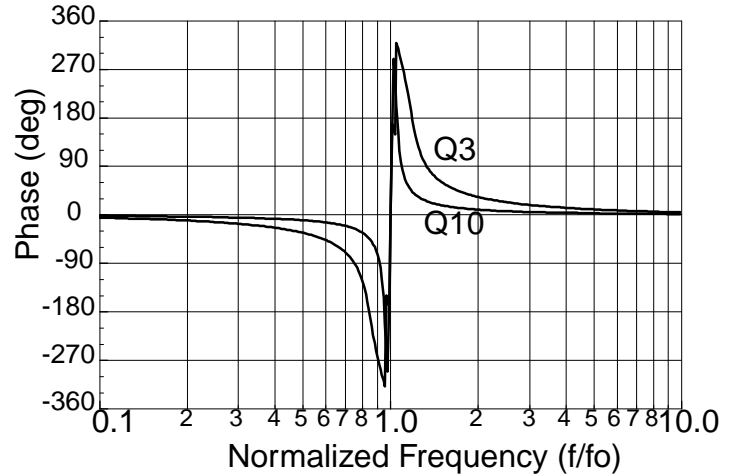


Appendix A

Amplitude Response Curves



Phase Response Curves



Normalized Theoretical Amplitude Data

| Amp (dB) | Q = 3 | | Q = 10 | |
|-------------|-----------------|---------|-----------------|---------|
| | $f_L < f < f_H$ | | $f_L < f < f_H$ | |
| | f/f_0 | f/f_0 | f/f_0 | f/f_0 |
| -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_0 | f/f_0 | f/f_0 | f/f_0 |
| 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 |