FREQUENCY DEVICES™, INC.

1.0 kHz to 500 kHz Low Noise Fixed Frequency 4- and 8- Pole High-Pass Filters

Description:
D101H Series are low noise 4- and 8-pole, Butterworth fixed frequency high-pass filters. These filters feature near theoretical low noise performance, by providing typically -110 dB noise floors (19-Bit). D101H's take advantage of FDI's design expertise utilizing high performance amplifiers and surface-mount technology to provide design engineers with precision signal conditioning solutions in a compact package. These fully self-contained units require no external components or adjustments. Each D101H comes factory tuned to a user specified corner frequency between 1.0 kHz to 500 kHz and operate over an input voltage range to ±10 V.

Available High-Pass Models: **Page**

Model	Description	Page
D101H4B	4-Pole Butterworth	2
D101H8B	8-Pole Butterworth	2

General Specifications:
Pin-out/package data & order information 3

Features/Benefits:
- Small 32-pin DIP (1.8"L x 0.8"W) 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 corner frequencies to meet a wide range of applications.

Applications:

- Transducer output filtering:
- Production test instrumentation
- Medical electronics equipment and research
- Noise and harmonic analysis
- Frequency spectrum analysis

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FREQUENCY DEVICES™, INC.

1.0 kHz to 500 kHz Low Noise Fixed Frequency

4- and 8- Pole High-Pass Filters

Model	D101H4B	D101H8B
Product Specifications		
Transfer Function	4-Pole Butterworth	8-Pole Butterworth
Size	1.8” x 0.8” x 0.3”	1.8” x 0.8” x 0.3”
Range f_c	1.0 kHz to 500 kHz	1.0 kHz to 500 kHz
Theoretical Transfer Characteristics	Appendix A Page 27	Appendix A Page 29
Passband Ripple (theoretical)	0.0 dB	0.0 dB
DC Voltage Gain @ 5 MHz 5 Vpeak (non-inverting)	0 ± 0.2 dB typ. 0 ± 0.4 dB max.	0 ± 0.2 dB typ. 0 ± 0.4 dB max.
Stopband Attenuation Rate	24 dB/octave	48 dB/octave
Cutoff Frequency	f_c ± 1% max.	f_c ± 1% max.
Stability	± 0.01%/°C	± 0.01%/°C
Amplitude	-3 dB	-3 dB
Phase	-180°	-360°
Filter Attenuation (theoretical)	40 dB 0.31 f_c 30 dB 0.42 f_c 3.01 dB 1.00 f_c 0.02 dB 2.00 f_c	80 dB 0.31 f_c 60 dB 0.42 f_c 3.01 dB 1.00 f_c 0.00 dB 2.00 f_c
Power Bandwidth	5 MHz max	5 MHz max
Wide Band Noise To 10 MHz	< 130 μVrms	< 130 μVrms
(Noise Density (Out of Band)	<50 nV/$\sqrt{Hz}$	<50 nV/$\sqrt{Hz}$
Narrow Band Noise @ f_c & 10V p-p	<300 nV/$\sqrt{Hz}$	<300 nV/$\sqrt{Hz}$
Filter Mounting Assembly[1]	FMA-01S	FMA-01S

1. Use I/O jumpers to bypass input and output buffers, for low noise operation.
With FMA-01S, D101H distortion specs above 100kHz will degrade.

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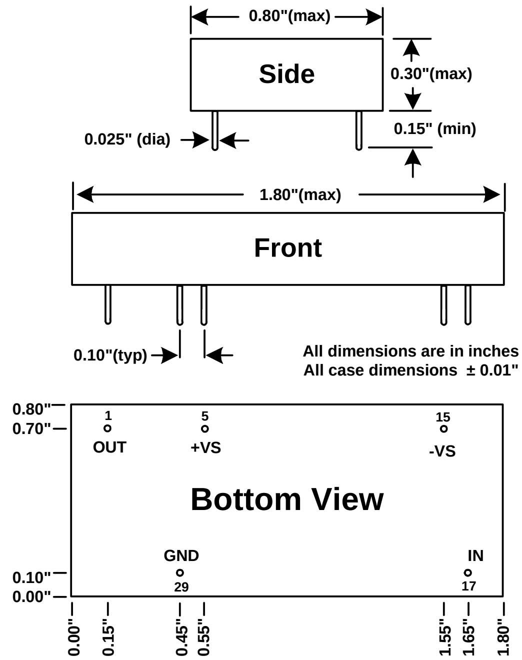
Specifications
(25ºC and Vs ± 15 Vdc)

Pin-Out and Package Data
Ordering Information

Analog Input Characteristics[1]		
Impedance		1.0 kΩ min.
Voltage Range		±10 V_{peak}
Max. Safe Voltage		± Vs
Analog Output Characteristics		
Load impedance		2k Ω min.
Linear Operating Range for THD		± 5V
Operating Range for low Noise		± 10V
Current[2] @ (Vs @ ±15V)		5.0 mA max.
Offset Voltage		10 mV typ. 20 mV max.
Offset Temp. Coefficient		50 µV/ºC.
Power Supply (±V_S)		
Rated Voltage		±15V
Operating Range		±5V min. ±18V max.
Quiescent Current	D101H4B	20 mA typ. 30 mA max.
	D101H8B	40 mA typ. 60 mA max.
Temperature Range		
Operating		0ºC to +70ºC
Storage		-25ºC to +85ºC

Notes:
1. Input and output signal voltage referenced to supply common.
2. Output is short circuit protected to common. DO NOT CONNECT TO ±Vs.



ORDERING INFORMATION

Filter type
H = High Pass

Transfer Function
B= Butterworth

D100H8B-10.0 kHz

 # Poles
4, 8

- 3 dB Corner Frequency[3]
e.g., 8.49 kHz
25.0 kHz
253 kHz

3. How to specify Corner Frequency. Corner frequency is specified by attaching a three-digit frequency designator to the basic model number. Corner frequencies can range from 1.0 kHz to 500 kHz.

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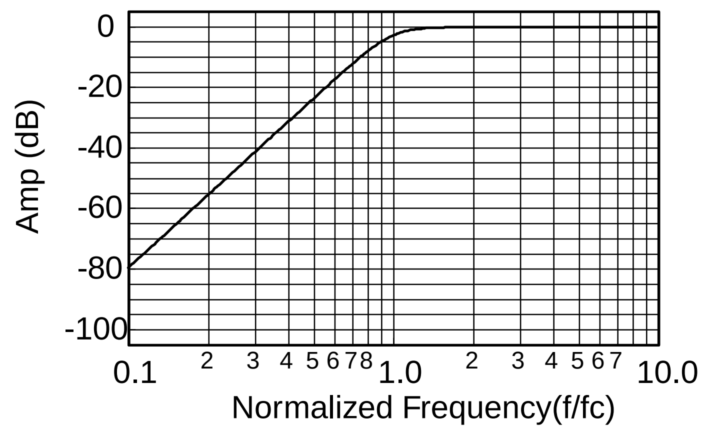
Theoretical Transfer Characteristics

f/fc (Hz)	Amp (dB)	Phase (deg)	Delay[1] (sec)
0.10	-80.0	345	.418
0.20	-55.9	330	.423
0.30	-41.8	314	.433
0.40	-31.8	299	.449
0.50	-24.1	282	.474
0.60	-17.8	264	.511
0.70	-12.6	245	.558
0.80	-8.43	224	.604
0.85	-6.69	213	.619
0.90	-5.22	202	.622
0.95	-3.99	191	.612
1.00	-3.01	180	.588
1.20	-0.908	143	.427
1.40	-0.285	118	.289
1.60	-0.100	100	.204
1.80	-0.039	87.6	.152
2.00	-0.017	78.0	.119
2.50	-0.003	61.4	.072
3.00	-0.001	50.7	.049
4.00	0.00	37.8	.027
5.00	0.00	30.1	.017
6.00	0.00	25.1	.012
7.00	0.00	21.4	.009
8.00	0.00	18.8	.007
9.00	0.00	16.7	.005
10.0	0.00	15.0	.004

Frequency Response



1.**Normalized Group Delay:**
The above delay data is normalized to a corner frequency of 1.0Hz.The actual delay is the normalized delay divided by the actual corner frequency (fc).

$$\text{Actual Delay} = \frac{\text{Normalized Delay}}{\text{Actual Corner Frequency (fc) in Hz}}$$

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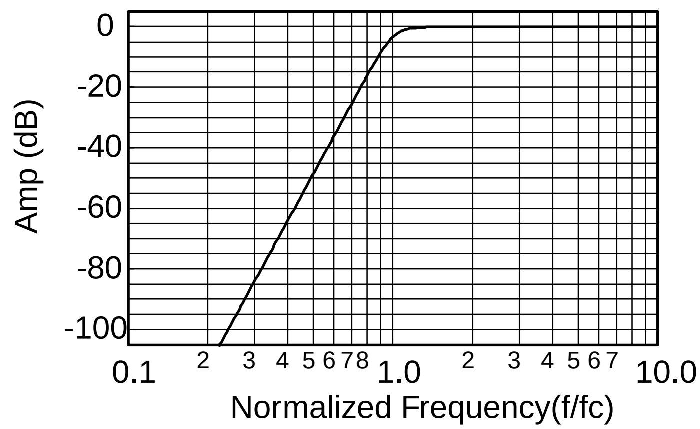
Theoretical Transfer Characteristics

f/fc (Hz)	Amp (dB)	Phase (deg)	Delay[1] (sec)
0.10	-160	691	0.819
0.20	-112	661	0.828
0.30	-83.7	631	0.843
0.40	-63.7	600	0.867
0.50	-48.2	568	0.903
0.60	-35.5	535	.956
0.70	-24.8	499	1.04
0.80	-15.6	459	1.19
0.85	-11.6	437	1.29
0.90	-8.06	413	1.40
0.95	-5.15	386	1.48
1.00	-3.01	360	1.46
1.20	-0.229	275	0.873
1.40	-0.020	226	0.540
1.60	-0.002	194	0.380
1.80	0.00	170	0.287
2.00	0.00	152	0.226
2.50	0.00	120	0.139
3.00	0.00	99.2	0.094
4.00	0.00	74.0	0.052
5.00	0.00	59.0	0.033
6.00	0.00	49.0	0.023
7.00	0.00	42.1	0.017
8.00	0.00	36.8	0.013
9.00	0.00	32.7	0.010
10.0	0.00	29.4	0.008

Frequency Response



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