

FEATURES

- Cutoff frequency is tuned by external voltage
- Wide range of control frequency
- Small in hybrid

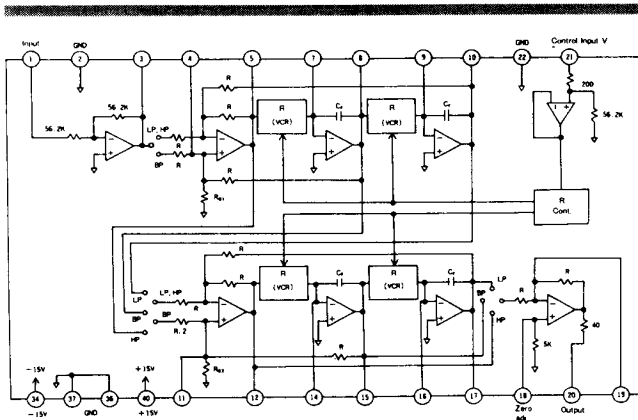
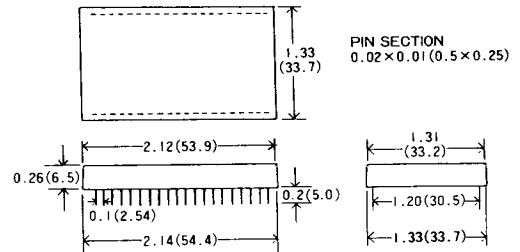
GENERAL DESCRIPTION

FLJ-V Series filters cutoff frequency or center frequency can be set with an external control voltage.

Hybrid construction has made it possible to build highly reliable, high performance filters in small size at low cost.

FLJ-VL is a lowpass filter and FLJ-VH is a highpass filter. Both filters have 24dB/oct of rolloff characteristics. FLJ-VB is a bandpass filter which has 12dB/octBW at Q=5.

MECHANICAL DIMENSIONS INCHES(mm)



PIN CONNECTIONS

PIN	FUNCTION	PIN	FUNCTION
1	INPUT	21	CONTROL V. INPUT
2	GND	22	GND
4	Rq1	34	-Vcc (-15V)
7	Cext1-1	36	GND
8	Rq1, Cext1-1	37	GND
9	Cext1-2	40	+Vcc (+15V)
10	Cext1-2		
11	Rq2		
14	Cext2-1		
15	Rq2, Cext2-1		
16	Cext2-2		
17	Cext2-2		
18	ZERO ADJ		
20	OUTPUT		

DO NOT CONNECT UNUSED PINS TO OTHERS.

SPECIFICATIONS

Typical values at 25°C with ±15V supply, 10V control voltage, ±1V rated input unless otherwise specified.

	FLJ-VL (Lowpass Filter)	FLJ-VB (Bandpass Filter)	FLJ-VH (Highpass Filter)
ABSOLUTE MAXIMUM			
Power Supply Voltage	±18V	* "Same as FLJ-VL"	* "Same as FLJ-VL"
Input Voltage	±Vcc	* "Same as FLJ-VL"	* "Same as FLJ-VL"
Control Input Voltage	±Vcc	* "Same as FLJ-VL"	* "Same as FLJ-VL"
FILTER CHARACTERISTICS			
Frequency Set Range	100Hz ~ 100KHz	200Hz ~ 20KHz	20Hz ~ 20KHz
Frequency Set Accuracy	± (3%+0.01% F.S.) max.	*	*
Control Input Voltage Range	+10mV ~ +10V	+100mV ~ +10V	+10mV ~ +10V
Control Input Impedance	50 Kohm min.	*	*
Characteristic	4 pole Butterworth	2 pole pair Butterworth	4 pole Butterworth
Rolloff	24dB/oct	12dB/oct BW(Q=5)	24dB/oct
Pass Gain vs. Control Input V.	±0.5dB	±1dB	±0.5dB
Distortion	0.1% max.	*	*
Frequency Set T.C.	±0.03%/ °C	*	*
AMPLIFIER CHARACTERISTICS			
Input Voltage	±10V min.	±2V min.	±10V min.
Rated Input Voltage	±1V	*	*
Input Impedance	50 Kohm min.	*	*
Offset Voltage	±10mV Zero Adjustable	*	*
Offset V. Variance vs. Control V.	±20mV max.	*	*
Temperature Drift	300µV/ °C	*	*
Noise ①	800µVrms max. @10Hz ~ 300KHz	*	*
Output Voltage/Current	±10V/5mA min.	±2V/5mA min.	±10V/5mA min.
Output Impedance	50ohm max.	*	*
Load Resistance	10Kohm min.	*	*
Small Signal BW	DC ~ fc	-	fc ~ 300KHz
POWER REQUIREMENTS & ENVIRONMENT			
Power Supply Voltage	±15V, +10%, -5%	*	*
Current	±36mA	*	*
Operating Temperature Range	-20 °C ~ +70 °C	*	*
Operating Humidity Range	10% ~ 95%RH	*	*
Storage Temperature Range	-30 °C ~ +80 °C	*	*
Storage Humidity Range	10% ~ 80%RH	*	*

① Typically <300 µVrms for the FLJ-VH. The FLJ-VL/VB are typically <300 µVrms for control voltages up to 2V and <500 µVrms for control voltages from 2 to 10 Volts.

TECHNICAL NOTES

- The rated input voltage is ±1V. The maximum performance is obtained if input voltage does not exceed this range.
- These filters are 4pole Butterworth(2pole pair)filters. Cutoff frequency is controlled by external voltage. The relationship between control voltage and cutoff frequency is linear (=proportional). Cutoff frequency ranges can be shifted toward lower frequency region if four external capacitors are added. See Figure 3.
FLJ-VL:

$$C_{ext1}, C_{ext2} = \frac{1}{f_c(\max) \times 2\pi \times 6.36 \times 10^3} - 250 \times 10^{-12}$$
 FLJ-VB, VH:

$$C_{ext1}, C_{ext2} = \frac{1}{f_c(\max) \times 2\pi \times 6.36 \times 10^3} - 1250 \times 10^{-12}$$
 Cext1, Cext2 : F (Farad)
 fc(max) : -3dB frequency at 10V control voltage.
- Zero offset adjustment range is approximately ±50mV.
- Control input voltage signal has approximately 10KHz of frequency response. However, it takes long time before the output DC offset (=approx. 10mV) settles under the new fc

set. It is not recommended to use alternating signals for the control input, depending on applications. The cutoff frequency shall be affected by unstable control voltage if it is small signal, even if it is DC.

- FLJ-VL can be used as Bessel filter. Connect Rq1 = 95.3KΩ and Rq2 = 9.53KΩ as shown Figure 3. External capacitors should be:

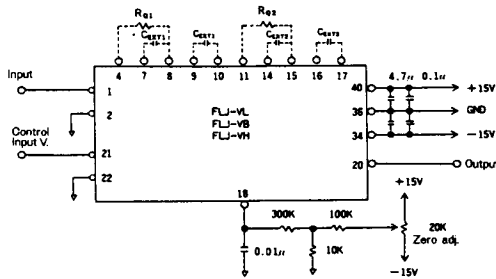
$$C_{ext1} = 250 \left(\frac{100}{f_c(\max) \text{ (KHz)} \times 1.43241} - 1 \right)$$

$$C_{ext2} = 250 \left(\frac{100}{f_c(\max) \text{ (KHz)} \times 1.60594} - 1 \right)$$

fc(max) ≅ 62.2KHz, -3dB frequency at 10V control input voltage.

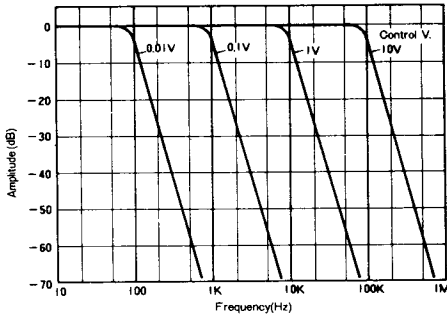
Cext1, Cext2 : pF (pico Farad)

TYPICAL CONNECTION (Fig. 3)

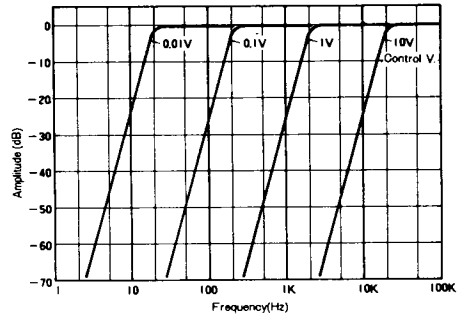


AMPLITUDE VS. FREQUENCY (Fig. 4)

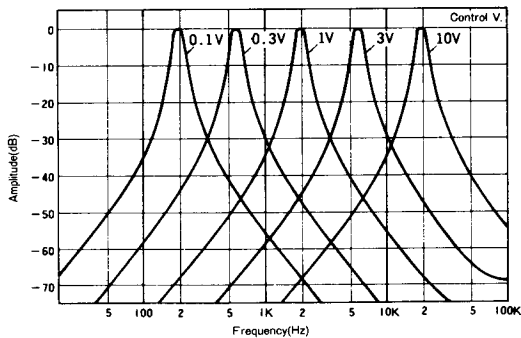
FLJ-VL (Fig. 4-1)



FLJ-VH (Fig. 4-2)



FLJ-VB (Fig. 4-3)



ORDERING INFORMATION

MODEL NO.	DESCRIPTION
FLJ-VL	Low-pass filter Butterworth 4 pole
FLJ-VB	Band-pass filter Butterworth 4 pole
FLJ-VH	High-pass filter Butterworth 4 pole