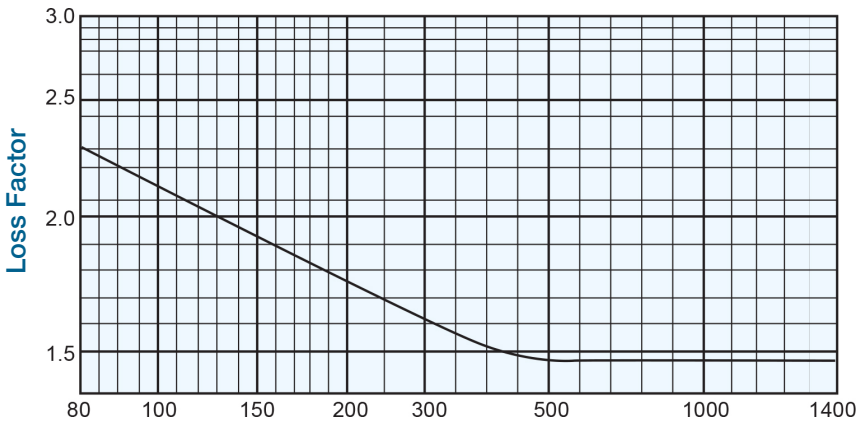
Benchmark
lark technology

Bandpass
HQ Series
100-1000 MHz

No. of Sections	2	3	4	5	6 or more
1.5/1 VSWR BW MIN 3 dB BW	0.4	0.7	0.8	0.85	0.9

Specification	Standard	*Special
Electrical		
Center Frequency (Fc)	100 to 1000 MHz	80 to 1400 MHz
3dB Relative Bandwidth (% of Fc)	4 to 40	4 to 50
Number of Sections Available	3 to 8	2 to 10
Nominal Impedance	50Ω	50Ω to 75Ω
Maximum Insertion Loss	See Curve	See Curve
Maximum VSWR	1.5/1	1.3/1
Attenuation in the Stopband	See Page 50	See Page 50
Maximum Input Power (Average) (Watts to 10,000 ft.)	$\frac{500 \times 3dB\ BW\ (MHz)}{(LOSS\ FACTOR)(Fc\ MHz)}$	See Standards
Maximum Input Power (Peak) (Watts to 10,000 ft.)	$\frac{300 \times 3dB\ BW\ (MHz)}{Fc\ (MHz)}$	2,000
Environmental		
Shock	15 G's	25 G's
Vibration	5 G's	10 G's
Humidity	90% relative	100% relative
Altitude	Unlimited	Unlimited
Temperature Range (Operating)	- 25°C to + 50°C	- 54°C to + 85°C
Temperature (Non-Operating)	- 54°C to + 70°C	- 54°C to + 100°C
Mechanical		
Approximate Weight	0.75 oz. per inch	0.75 oz. per inch
Mounting Provisions	See Page 53	See Page 53

*Contact Benchmark Lark Engineering for Special Configurations



Insertion Loss:

The maximum Insertion Loss at center frequency is equal to:

$$\frac{LF \times (N=0.5)}{\%\ 3\ dB\ BW} + 0.2$$

Where:

LF = Loss Factor N = Number of Sections

% 3dB BW:

$$\frac{3dB\ BW\ (MHz) \times 100}{Center\ Frequency\ (MHz)}$$

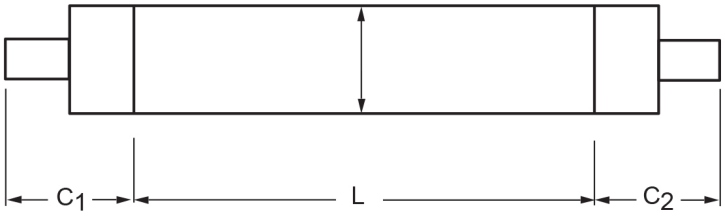
Example:

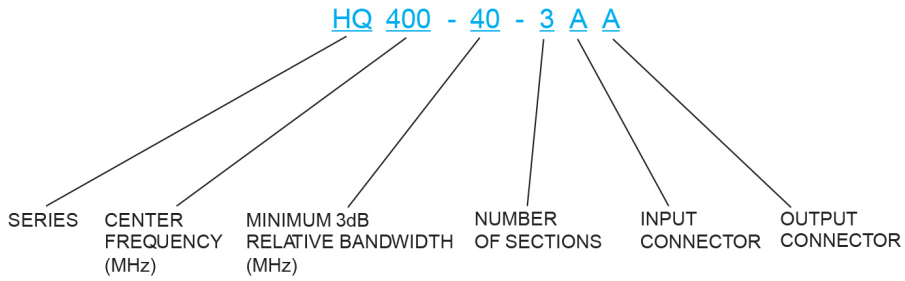
A 3 section HQ with a center frequency of 400 MHz and a 3dB BW of 40 MHz would have,

$$\frac{1.5 \times 3.5}{10} = \frac{5.25}{10} = .525$$

.525 + 0.2 = 0.8dB

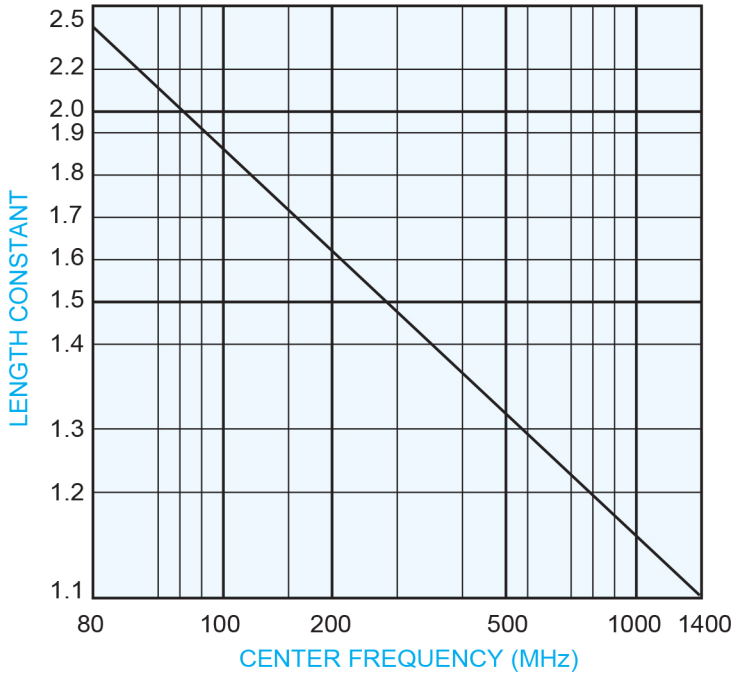
3/4 inch DIA.
(19.05mm)





CONNECTORS AVAILABLE ON HQ SERIES:

LARK CODE	TYPE	C DIM. INCHES	C DIM. MM	LARK CODE	TYPE	C DIM. INCHES	C DIM. MM
A	SMA JACK	.800	20.3	G	N JACK	1.625	41.3
B	SMA PLUG	.885	22.5	H	N PLUG	1.585	40.3
C	TNC JACK	1.350	34.3	*L	SOLDER PIN AXIAL	.625	15.9
D	TNC PLUG	1.280	32.5	*M	SOLDER PIN RADIAL	.625	15.9
E	BNC JACK	1.350	34.3	S	SPECIAL		
F	BNC PLUG	1.280	32.5				



LENGTH:

The approximate length of a Lark HQ series filter can be determined by the formula:

$$\frac{(0.5\,N + 2) \times LC = L}{\%\ BW}$$

Where N is the number of sections used, % BW is:

$$\frac{3dB\ BW\ (MHz) \times 100}{CENTER\ FREQUENCY\ (MHz)}$$

LC is the length constant at the specified center frequency, L is the dimension between the connectors; C_1 and C_2 are the connector lengths as shown above. All of the length information given here is approximate. Exact length specifications must be quoted by the factory. If a special length is needed, please submit all of your requirements - both electrical and mechanical. This will enable Lark Engineering to quote the optimum design for your application.

Example:
A 3 section HQ with a center frequency of 400 MHz a 3dB BW of 40 MHz and SMA jack input and output connectors would be:

$$(1.5 + 0.2) \times 1.38 = 2.35 + C_1 + C_2$$

In most cases, the L dimension is rounded to the nearest 1/4 inch which in this instance would be 2.25 inches and the O.A.L. is:

$$2.25 + .800 + .800 = 3.85 \text{ inches.}$$

To convert inches to millimeters multiply x 25.40.

Stopband Attenuation

The graphs on the following pages define the normal specification limits on attenuation for Lark bandpass filter series HP, HQ, SF, and SM. The minimum level of attenuation in dB is shown as a “number of 3dB bandwidths from center frequency”.

Since the frequency characteristics vary for differing bandwidths, it is necessary to establish specifications for each bandwidth of filter. The different graphs represent various 3dB percentage bandwidths. Intermediate values should be interpolated.
The 3dB percentage bandwidth is defined as follows:

$$\frac{\text{3dB Bandwidth (MHz)} \times 100}{\text{Center Frequency (MHz)}}$$

The exact relationship is as follows:

1. 3dB Bandwidths From Center Frequency =

$$\frac{\text{Rejection Frequency (MHz)} - \text{Center Frequency (MHz)}}{\text{3dB Bandwidth (MHz)}}$$

Example:

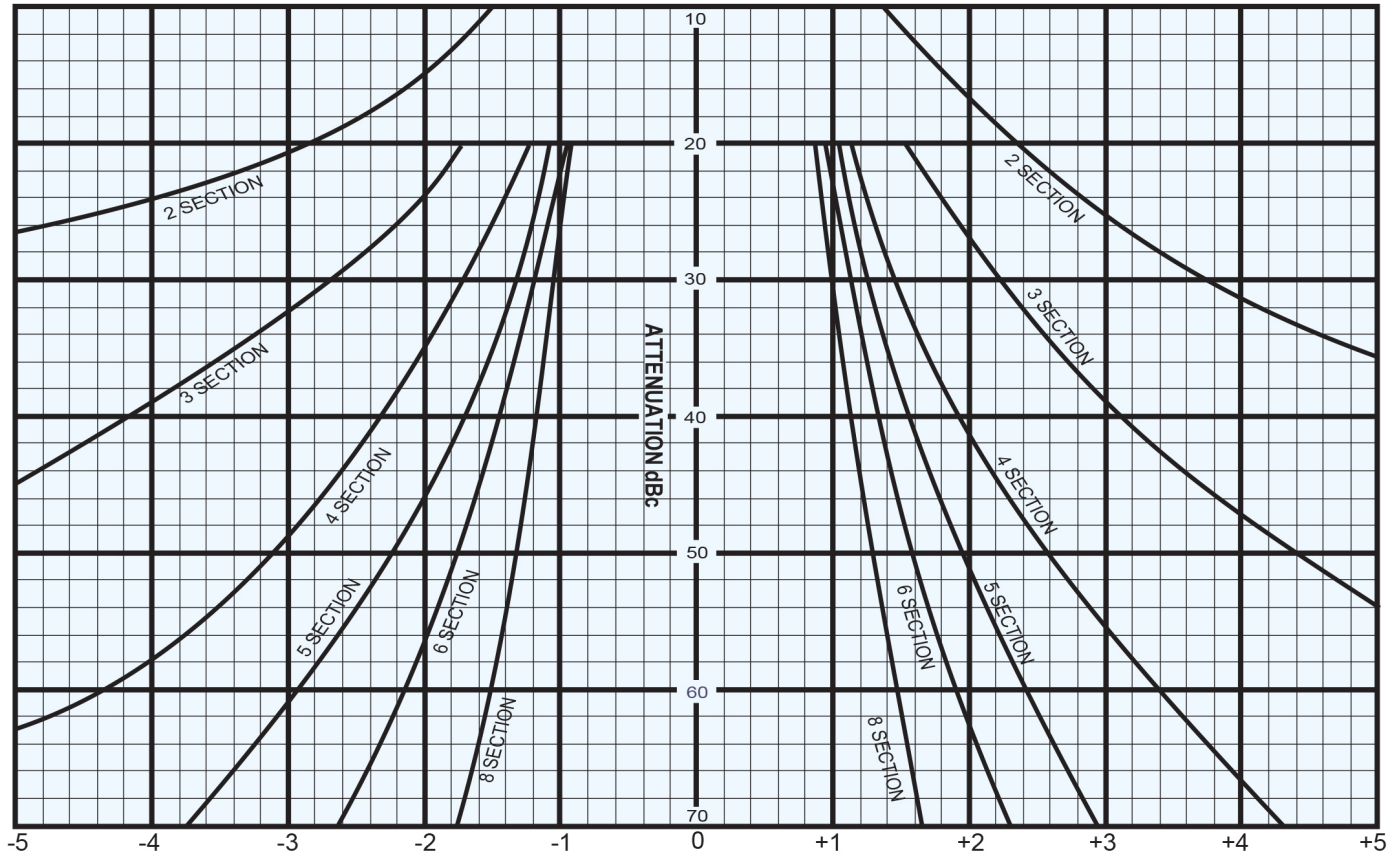
2. Center Frequency = 300 MHz
   Minimum 3dB Bandwidth = 30 MHz
   Number of Sections = 5
   Find: Minimum attenuation levels at 255 MHz and 348 MHz.

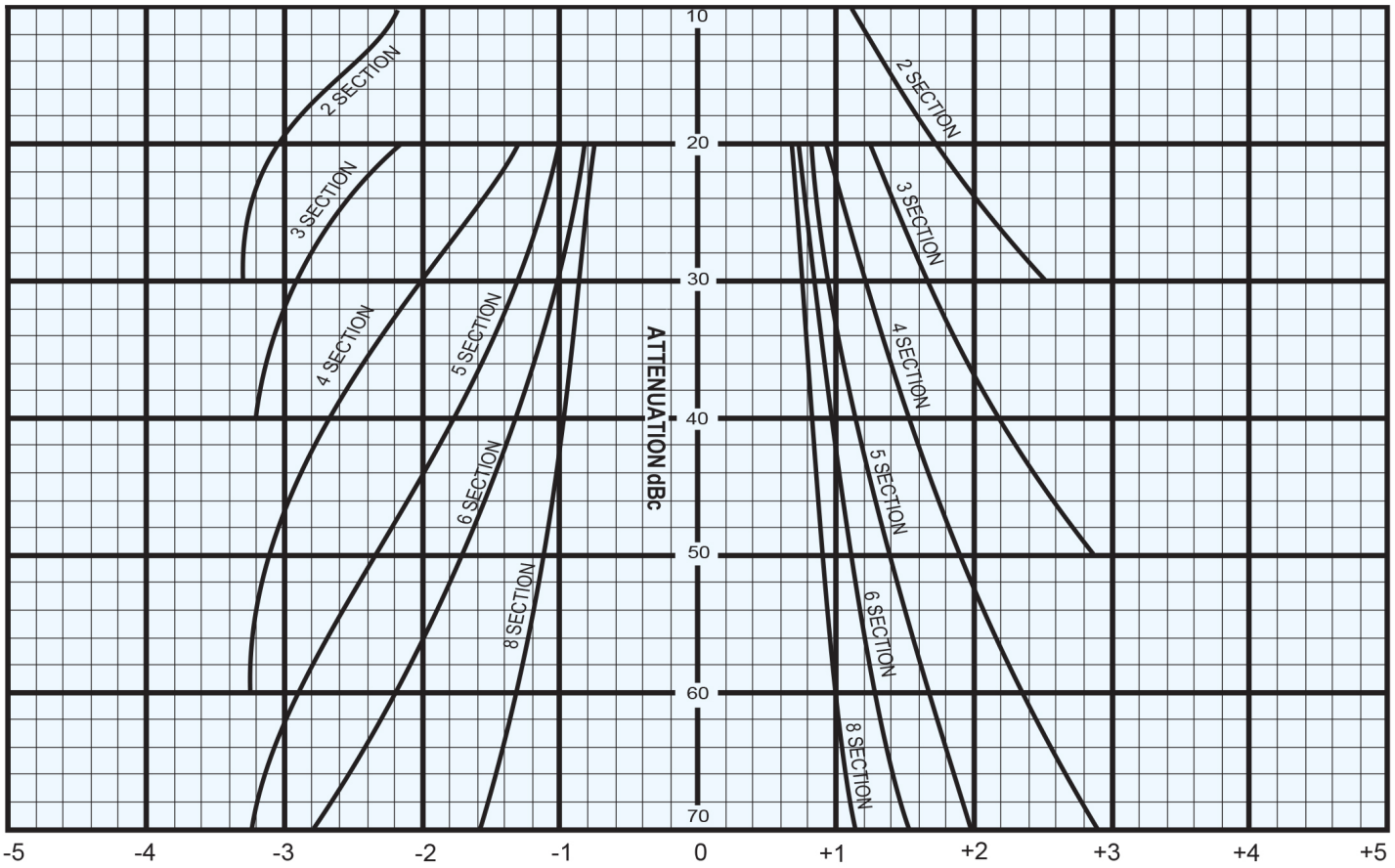
$$\text{3dB BW's from Fc} = \frac{255 - 300}{30} = -1.5$$

$$\text{and } \frac{348 - 300}{30} = +1.6$$

As the 3dB bandwidth is exactly 10% of the center frequency, the answer can be read directly from the 10% graph. Using the 5 section curve at the point -1.5 (255 MHz) we find the minimum level of attenuation is 36dB. At +1.6 (348 MHz) the minimum level of attenuation is 48dB.

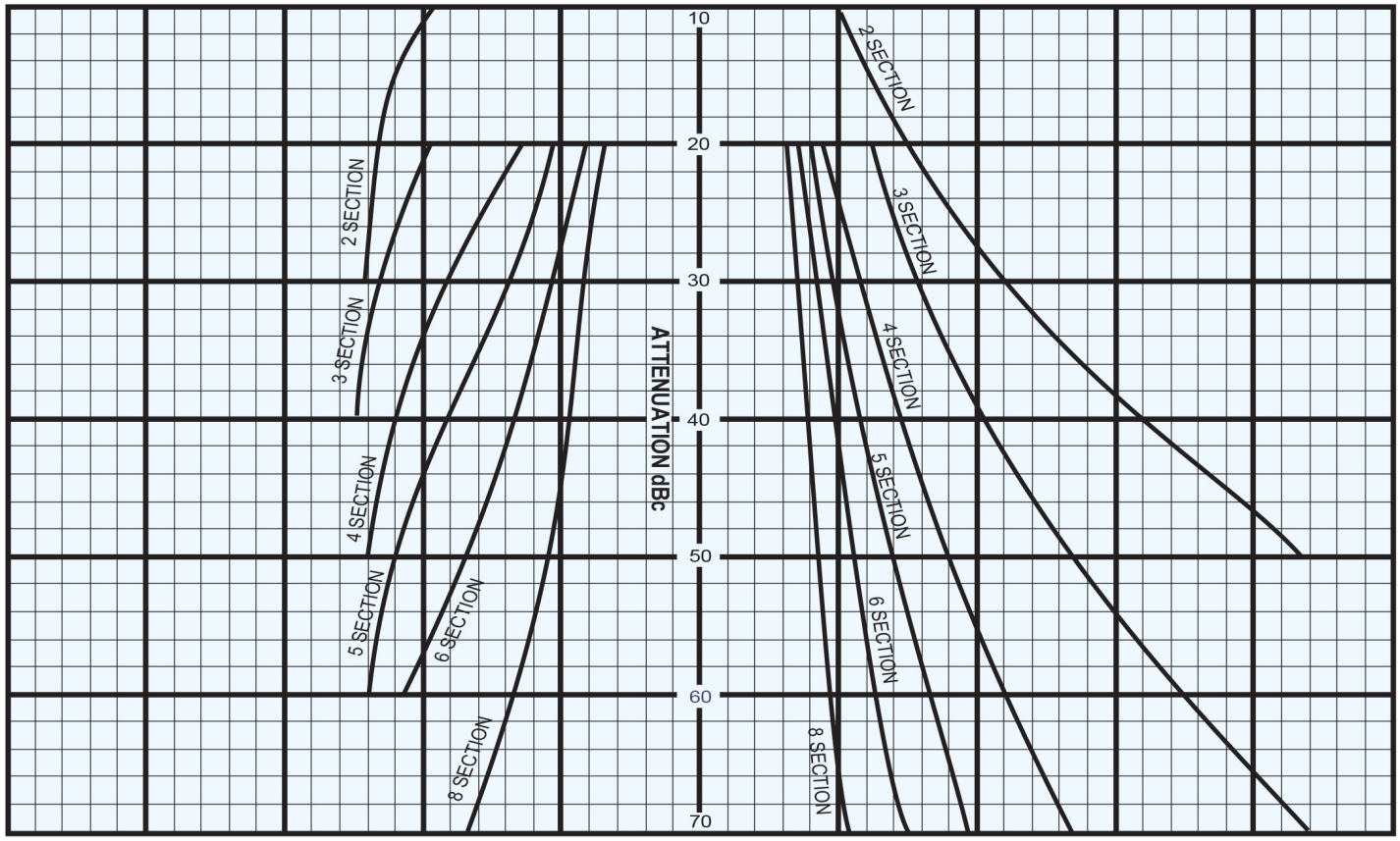
For special requirements, please contact our Application Engineering Department.





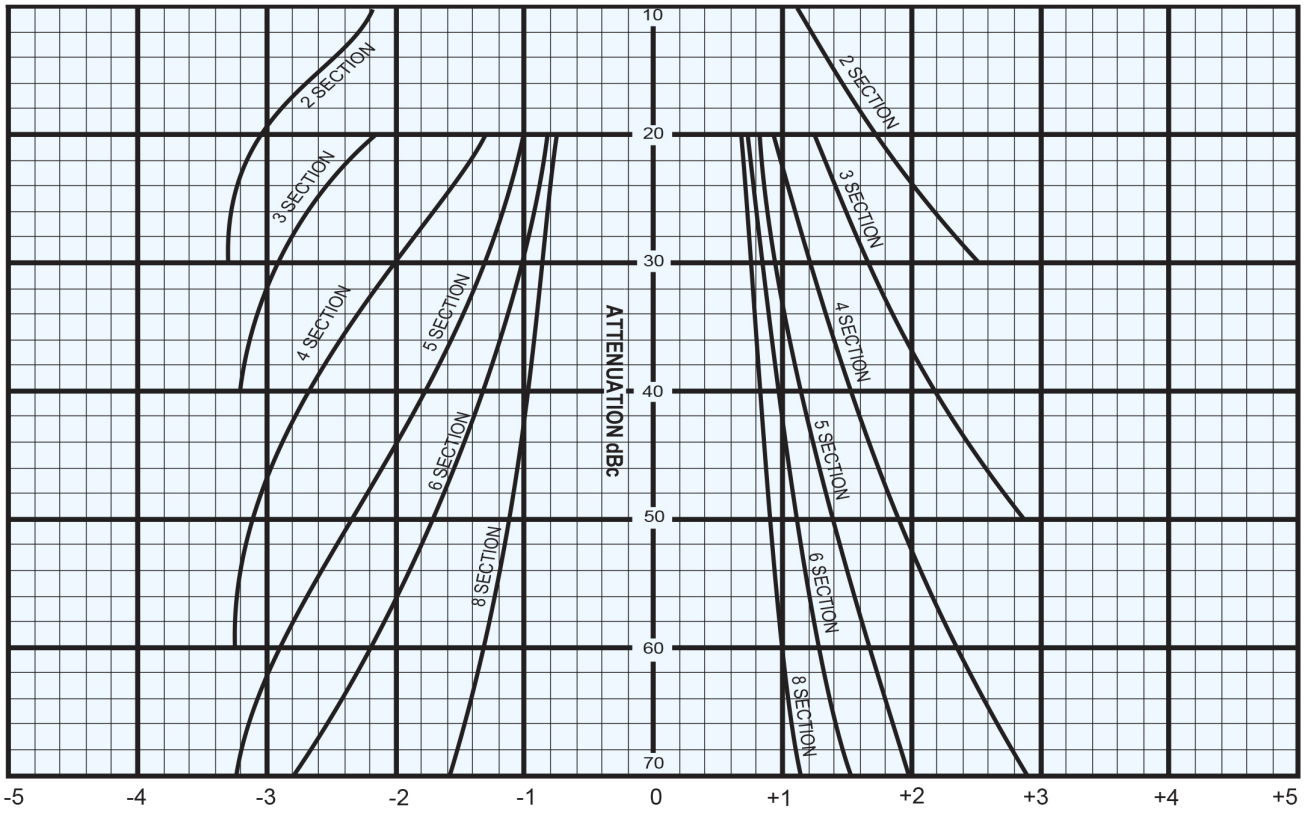
NO. OF 3dB BANDWIDTHS

3dB BANDWIDTH APPROX. 10% OF Fc



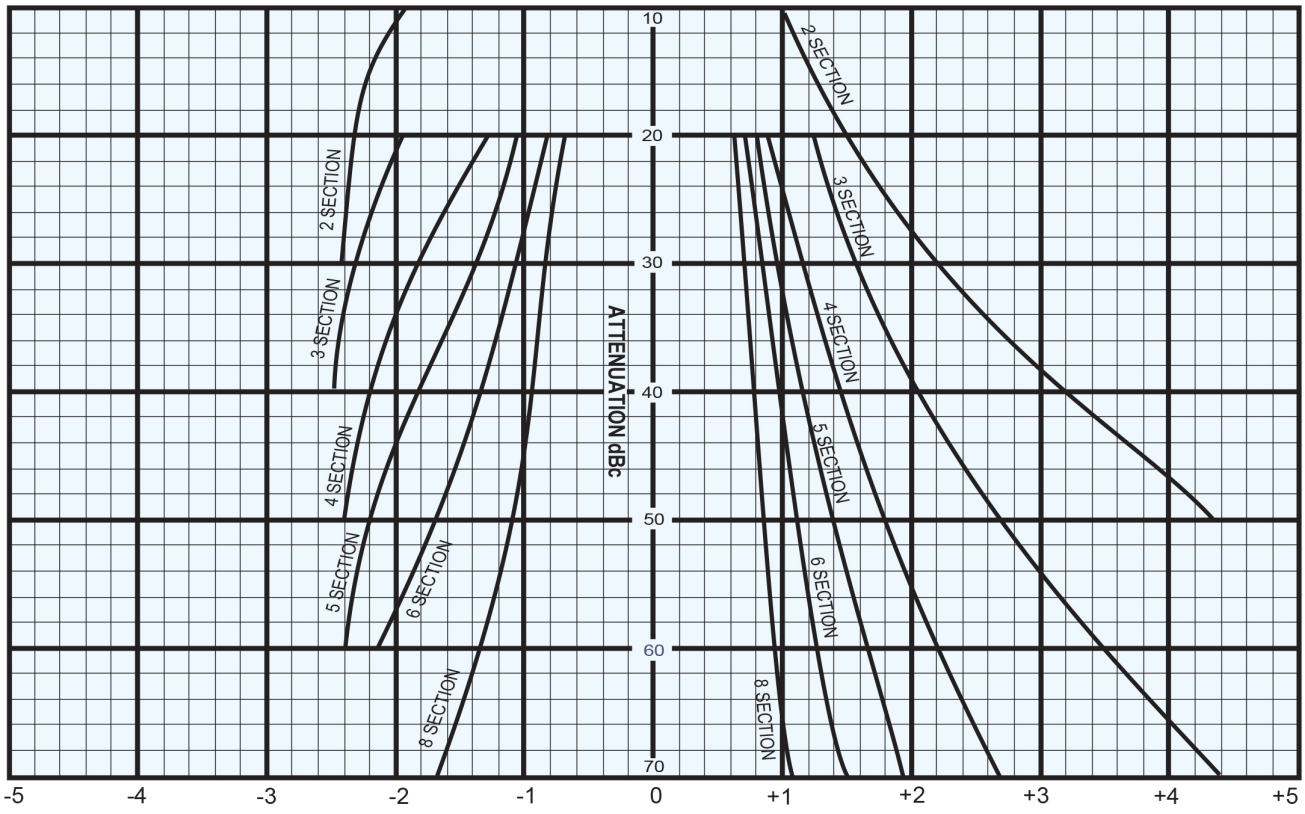
NO. OF 3dB BANDWIDTHS

3dB BANDWIDTH APPROX. 20% OF Fc



NO. OF 3dB BANDWIDTHS

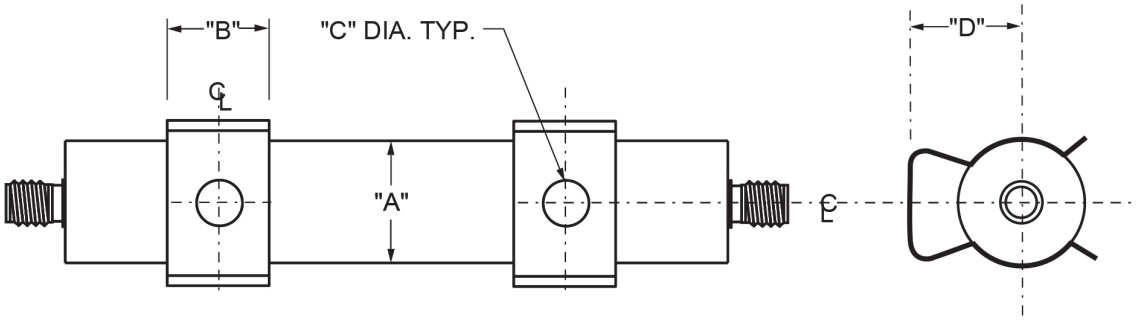
3dB BANDWIDTH APPROX. 30% OF Fc



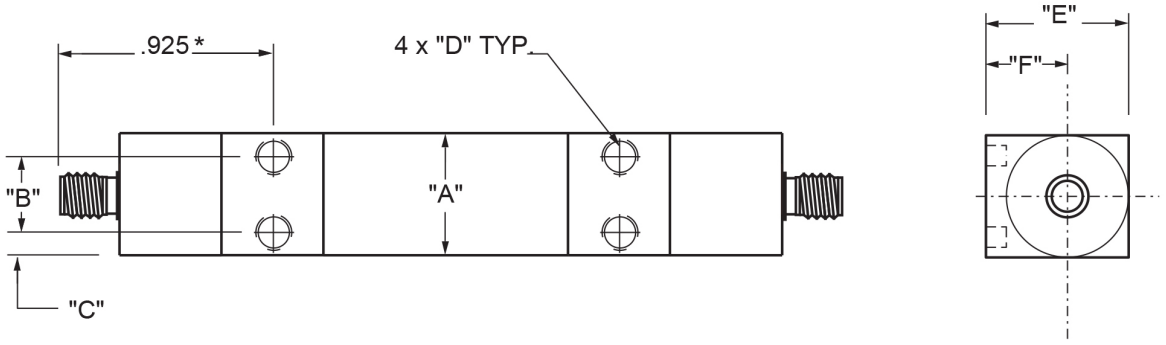
NO. OF 3dB BANDWIDTHS

3dB BANDWIDTH APPROX. 40% OF Fc

Mounting Dimensions
Adjustable Clips



MODEL	"A" DIA.	"B"	"C" DIA	"D"
SM	3/8"	.360	.170	.310
SF	1/2"	.390	.170	.420
HQ	3/4"	.625	.265	.620
HP	1 1/4"	.625	.265	.820



MODEL	"A" DIA.	"B"	"C"	"D"	"E"	"F"
SM	3/8"	.187	.094	2-56 UNC-2B x 3/32 DP	.438	.250
SF	1/2"	.312	.094	4-40 UNC-2B x 3/16 DP	.625	.375
HQ	3/4"	.500	.125	6-32 UNC-2B x 1/4 DP	.875	.500
HP	1 1/4"	1.000	.125	10-32 UNC-2B x 1/4 DP	1.500	.875

*Dimension from connector tip to mounting holes are shown only for SMA jacks. For other connectors, add or subtract the difference of C dimension from connector code.

/M after the part number denotes mounting blocks
/C after part number denotes mounting clips
Refer to page 106 for correct part number sequence and usage.

Benchmark Lark Technology
3201 E Harbour Dr | Phoenix, AZ 85034, USA
833.236.2400 | www.bench.com/lark

Benchmark lark technology