

MINIATURE COMBLINE BANDPASS FILTERS

- WIDE RANGE 1.4 TO 10 GHz (TSJ)
- MINIATURE SIZE
- LIGHT WEIGHT
- MINIMUM INSERTION LOSS
- HIGH REJECTION WIDE STOPBAND

DESCRIPTION

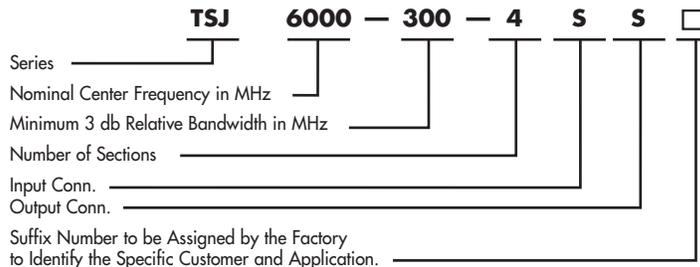
The Telonic Series TSJ Miniature Comblime Bandpass Filters are designed for compact size and provide the lowest possible passband insertion loss consistent with their size. They offer wide stopband rejection extending up to 28 GHz, and 3 dB bandwidths varying from 1 to 15%. Because these filters are extremely small and light weight, they are well suited for use in aircraft, missile, and satellite transceivers and receivers.

These filters are of the 0.1 dB Chebyshev comblime design and are available with three to eight sections. Measuring 1/2 inch thick the TSJ filters provide compactness with exceptional mechanical rigidity. Several styles of miniature connectors are available.

Customer requirements can be used to design a standard filter as shown below.



SERIES TSJ



Connector Code

S — SMA Jack T — SMA Plug
Other connector types are available. Contact factory.

VSWR Bandwidth

NO. OF SECTIONS	2	3	4	5	6 OR MORE
VSWR Bandwidth Min. 3 db Bandwidth	0.4	0.7	0.8	0.85	0.9

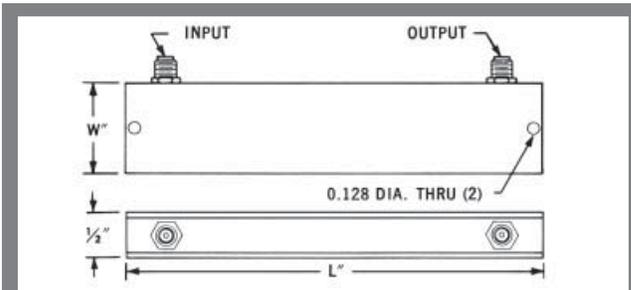
ELECTRICAL SPECIFICATIONS

Center Frequency Range	Normal Spec. Limit	1.4 to 10 GHz
	*Areas of Interest	0.5 to 12 GHz
Minimum 3 db Relative Bandwidth (in % of center frequency)	Normal Spec. Limit	1.0% to 15%
Other Relative Bandwidths	*Areas of Interest	See note 1
Maximum insertion loss At Center Frequency	Normal Spec. Limit	See insertion loss curves
	*Areas of Interest	Spl. Requirements
Nominal Impedance (in and out)	Normal Spec. Limit	50 ohms
	*Areas of Interest	50 to 100 ohms
Maximum VSWR at Center Frequency	Normal Spec. Limit	1.5
	*Areas of Interest	1.2
Minimum VSWR Bandwidth	Normal Spec. Limit	See Table 3
	*Areas of Interest	Spl. Requirements
Stopband Attenuation	Normal Spec. Limit	See attenuation curves
	*Areas of Interest	Spl. Requirements
Number of Sections	Normal Spec. Limit	3 to 8
	*Areas of Interest	2 to 15
Average Input Power (watts max. to 10,000 ft.)	Normal Spec. Limit	See peak input power
	*Areas of Interest	(100 x 3 dB BW) ÷ Fc
Peak Input Power (watts max. to 10,000 ft.)	Normal Spec. Limit	1000 (3 dB rel BW MHz) ÷ Fc MHz
	*Areas of Interest	20 to 100 watts

ENVIRONMENTAL SPECIFICATIONS

OPERATING	Shock	Normal Spec. Limit	25G
		*Areas of Interest	50G
	Vibration	Normal Spec. Limit	10G, 5 to 500 Hz
		*Areas of Interest	20G, 5 to 500 Hz
STORAGE	Humidity	Normal Spec. Limit	up to 90%
		*Areas of Interest	Up to 100% with Condensation
	Altitude	Normal Spec. Limit	Unlimited
		*Areas of Interest	_____
STORAGE	Temp. Range	Normal Spec. Limit	0°C to 50°C
		*Areas of Interest	-54°C to +125°C
	Shock	Normal Spec. Limit	30G
		*Areas of Interest	70G
STORAGE	Vibration	Normal Spec. Limit	15G, 5 to 500 Hz
		*Areas of Interest	20G, 5 to 500 Hz
	Temp. Range	Normal Spec. Limit	-54°C to +71°C
		*Areas of Interest	-62°C to +150°C

OUTLINE DRAWINGS



FREQUENCY RANGE	DIMENSION W
1.4 to 2.0 GHz	1.40 in.
2.0 to 3.0 GHz	1.25 in.
3.0 to 4.0 GHz	1.1 in.
4.0 to 7.0 GHz	0.8 in.
7.0 to 10.0 GHz	0.7 in.

MECHANICAL SPECIFICATIONS

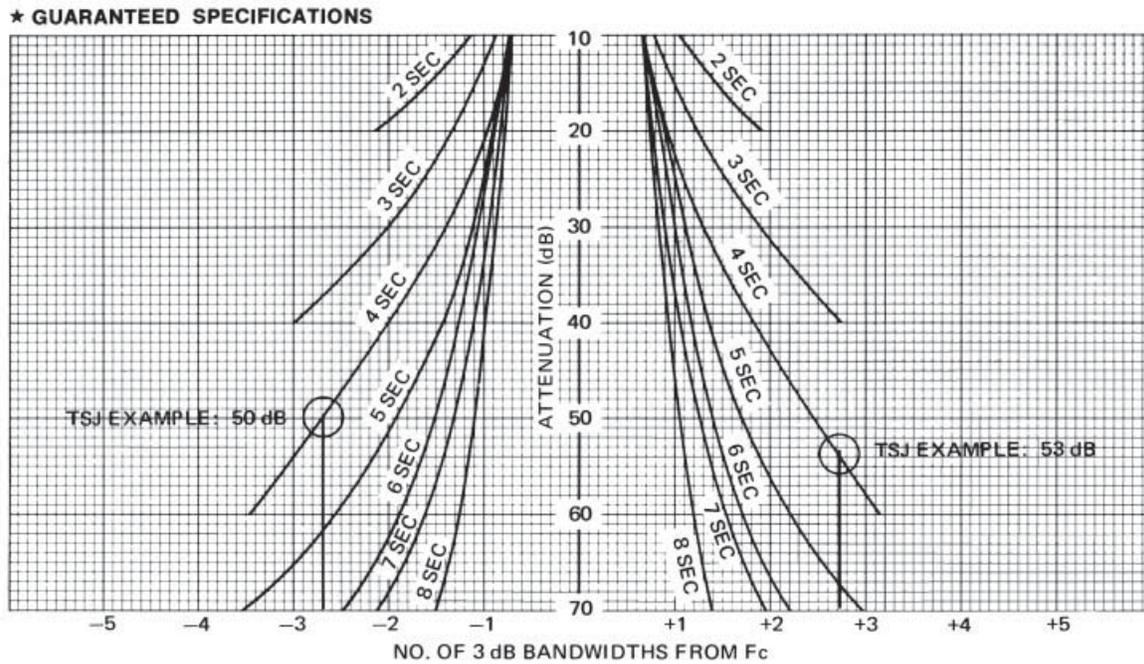
Approx. Weight in oz.	2/3 LW (Also see note 2)
"L" Dimension	2" + 0.5 (No. Sections) (Also see note 2)
Thickness	1/2"
"W" Dimension	See outline drawing
Connectors	See code above.
Finish	Light blue paint or lacquer, color 25526. Fed. Std. 595.

* Submit specific requirements.

1. For information regarding relative bandwidths other than 3 dB and other VSWR levels, refer to page 7.
2. Dimensions and weight vary according to frequency and bandwidth, and therefore should be quoted from factory when critical.
3. "L" dimensions, see specifications.

ATTENUATION CURVES

Figure 1. TSJ Attenuation Curves



STOP BAND ATTENUATION:

This graph shows the minimum stop band attenuation in db for Telonic combine bandpass filters. The rejection frequency is plotted in "3 db bandwidths from center frequency." The exact relationships are:

(I) 3 db bandwidths from Fc

$$= \frac{\text{Rej. freq. MHz} - F_c \text{ MHz}}{\text{Min. 3 db BW MHz}}$$

or (II) Min. 3 db bandwidth in MHz

$$= \frac{\text{Rej. freq. MHz} - F_c \text{ MHz}}{3 \text{ db BWs from Fc}}$$

Any one of the following parameters may be identified if the other three and the center frequency are known.

- (1) Min. 3 db bandwidth (in MHz).
- (2) Number of sections.
- (3) Rejection Frequency (in MHz).
- (4) Attenuation Level (in dB).

Always verify that the frequency and bandwidth you have selected are within the limitations shown for that series of filter.

For example (from Table 1):

Given:

Center frequency = 6000 MHz
 Minimum 3 db BW = 300 MHz

Find: Minimum attenuation level at 5190 MHz and 6810 MHz. and No. of sections required.
 From (I) above: 3 db BWs from Fc

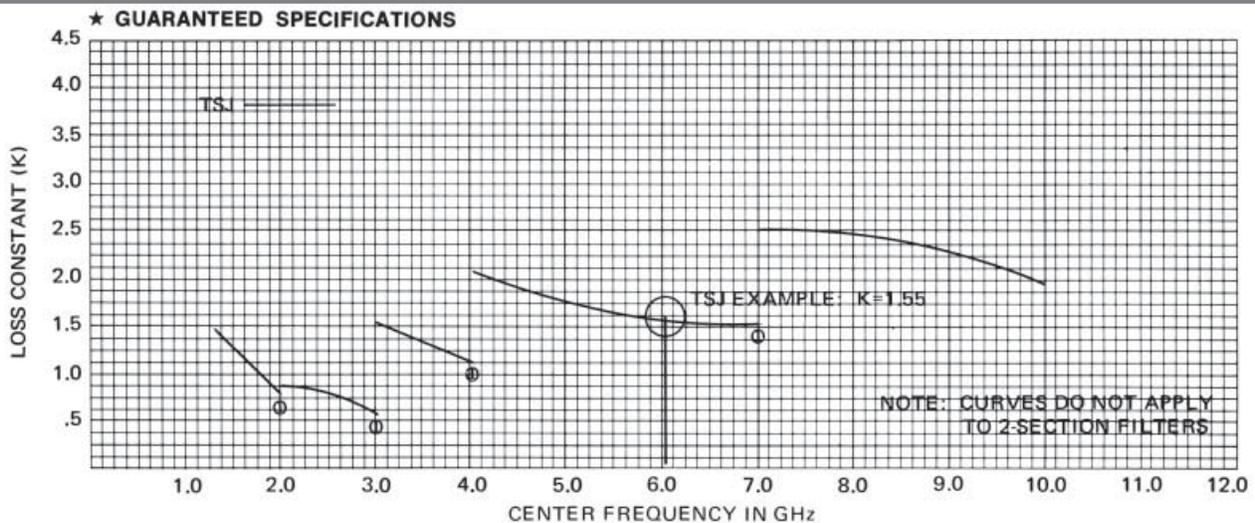
$$= \frac{5190 - 6000}{300} = -2.7$$

$$\text{and } \frac{6810 - 6000}{300} = +2.7$$

Reading directly from the Attenuation curves, points -2.7 and +2.7, we find the minimum attenuation level of 50 dB. and 54dB respectively.

INSERTION LOSS CURVES

Figure 2. Insertion Loss Curves



INSERTION LOSS:

Max. loss at Fc = $\frac{K(N + 0.5)}{\% \text{ BW}} + 0.2 \text{ db}$

Where: K = Loss constant
 N = Number of section

$$\% \text{ BW} = \frac{100 \times \text{min. 3 db BW MHz}}{\text{Nominal Fc MHz}}$$

For example:
TCA 6000 - 300 - 4 - SS
 No. of sections = 4
 Fc = 6000 MHz

$$\% \text{ BW} = \frac{100 \times 300}{6000} = 5$$

K Loss constant = 1.55 (Read directly from the TSJ insertion curve at 6000 GHz.)

Therefore: Max insertion loss at Fc

$$= \frac{1.55(4 + 0.5)}{5} + 0.21 \text{ dB} = 1.6 \text{ db}$$

At border or crossover frequencies (2, 3, 4, and 7 GHz) the loss constant (K) may be specified for either higher stop band limit or lower insertion loss. For example: (1) the higher the loss constant, the greater the upper stop band limit but the higher the insertion loss; (2) the lower the loss constant, the lower the insertion loss but the upper stop band is also slightly decreased (see Table 5).