MINIATURE BANDPASS FILTERS

■ MINIATURE SIZE ■ 40 TO 1000 MHz ■ CONVENIENT PACKAGING ■ PRINTED CIRCUIT BOARD APPLICATIONS

DESCRIPTION

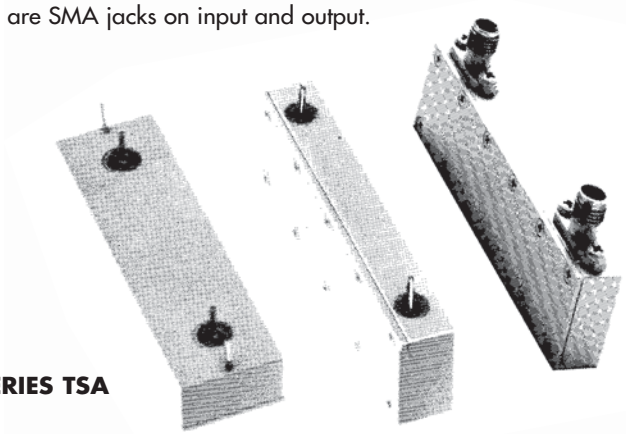
Telonic Series TSA and TSC Miniature Bandpass Filters employ a unique helical resonator design to achieve "state-of-the-art" performance. These small, 0.1 dB Chebyschev Filters are packaged for maximum convenience.

TSA and TSC Filters can be supplied with a wide variety of standard co-axial connectors, or flexible or semi-rigid cable of any length. The filters can also be supplied with pins for direct attachment to a printed circuit board. All connectors can be on any set of the narrower faces of the filter.

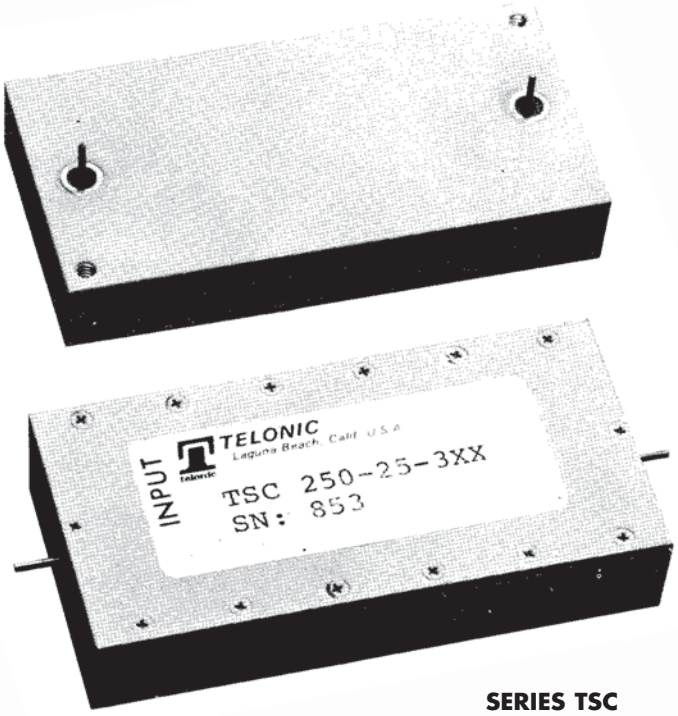
The specifications for the example shown here are as follows: Series TSC filter, nominal center frequency of 300 MHz, 3 dB relative bandwidth of 30 MHz and has 5 sections. Connectors are SMA jacks on input and output.

TSC 300 — 30 — 5 S S □

- Series
- Nominal Center Frequency in MHz
- Minimum 3 db Relative Bandwidth in MHz
- Number of Sections
- Connector Code – (Input Connector) (Output Connector) (See table no. 2, page 28)
- Suffix to be assigned by the Factory to Identify the Specific Customer and Application.



SERIES TSA



SERIES TSC

ELECTRICAL SPECIFICATIONS		
Center Frequency Range TSA	Normal Spec. Limit	200 – 600 MHz
	*Areas of Interest	160 – 1000 MHz
Center Frequency Range TSC	Normal Spec. Limit	40 to 500 MHz
	*Areas of Interest	30 to 600 MHz
Minimum 3 db Relative Bandwidth (in % of center frequency)	Normal Spec. Limit	1.0% – 15%
	*Areas of Interest	up to 20%
Maximum insertion loss At Center Frequency	Normal Spec. Limit	See insertion loss curves
	*Areas of Interest	Special Requirements
Nominal Impedance (in and out)	Normal Spec. Limit	50 ohms
	*Areas of Interest	50 – 100 ohms
Maximum VSWR at Center Frequency	Normal Spec. Limit	1.5: 1.0
	*Areas of Interest	1.25 : 1.0
Minimum VSWR Bandwidth	Normal Spec. Limit	See Table 1
	*Areas of Interest	Special Requirements
Stop Band Attenuation	Normal Spec. Limit	See Attenuation curves
	*Areas of Interest	Special Requirements
Number of Sections	Normal Spec. Limit	2 to 6
	*Areas of Interest	Up to 8
Average Input Power (watts max. to 10,000 ft.)	Normal Spec. Limit	115 (3 dB BW MHz) / Loss Constant x Fc MHz
	*Areas of Interest	Special Requirements
Peak Power Input (watts max. to 10,000 ft.)	Normal Spec. Limit	100 (3 dB BW MHz) / Fc MHz
	*Areas of Interest	Special Requirements
OPERATING ENVIRONMENTAL SPECIFICATIONS		
Shock	Normal Spec. Limit	30g. 11 m sec.
	*Areas of Interest	Special Requirements
Vibration	Normal Spec. Limit	10g, 5 to 500 Hz
	*Areas of Interest	Special Requirements
Humidity	Normal Spec. Limit	90% Relative
	*Areas of Interest	100%
Altitude	Normal Spec. Limit	120,000 ft.
	*Areas of Interest	Unlimited
Temperature	Normal Spec. Limit	0°C to 50°C
	*Areas of Interest	−54°C to + 125°C

*** Submit specific requirements.**

ATTENUATION CURVES

These graphs show the minimum stop band attenuation in dB for the TSC Miniature Filters at different bandwidths. Intermediate values may be interpolated.

For Example: TSC 300 - 30 - 5SS

$$\text{3 dB Bandwidths from Center Frequency} = \frac{\text{Rejection freq. MHz} - \text{Fc MHz}}{\text{Minimum 3 db Bandwidth MHz}}$$

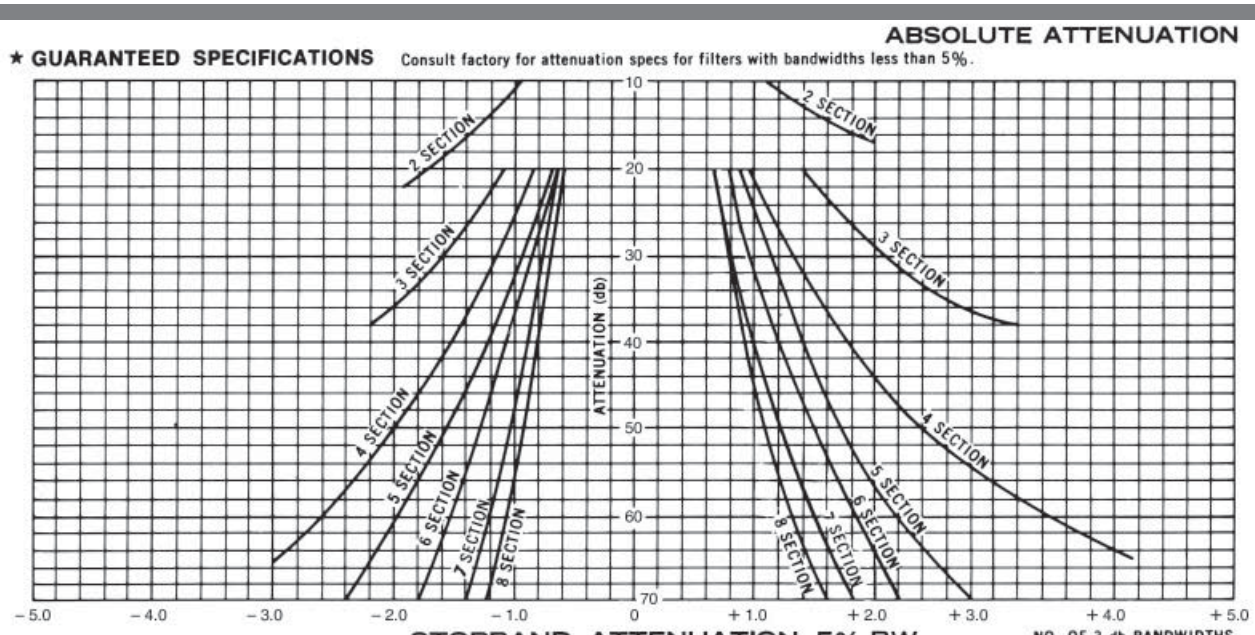
To determine the frequencies corresponding to 40 dB attenuation, read from stop band attenuation 10% bandwidth the number of 3 dB bandwidths away from center frequency corresponding to 40 dB level. On the lower frequency side, it is −1.2, and 1.5 on the higher frequency side.

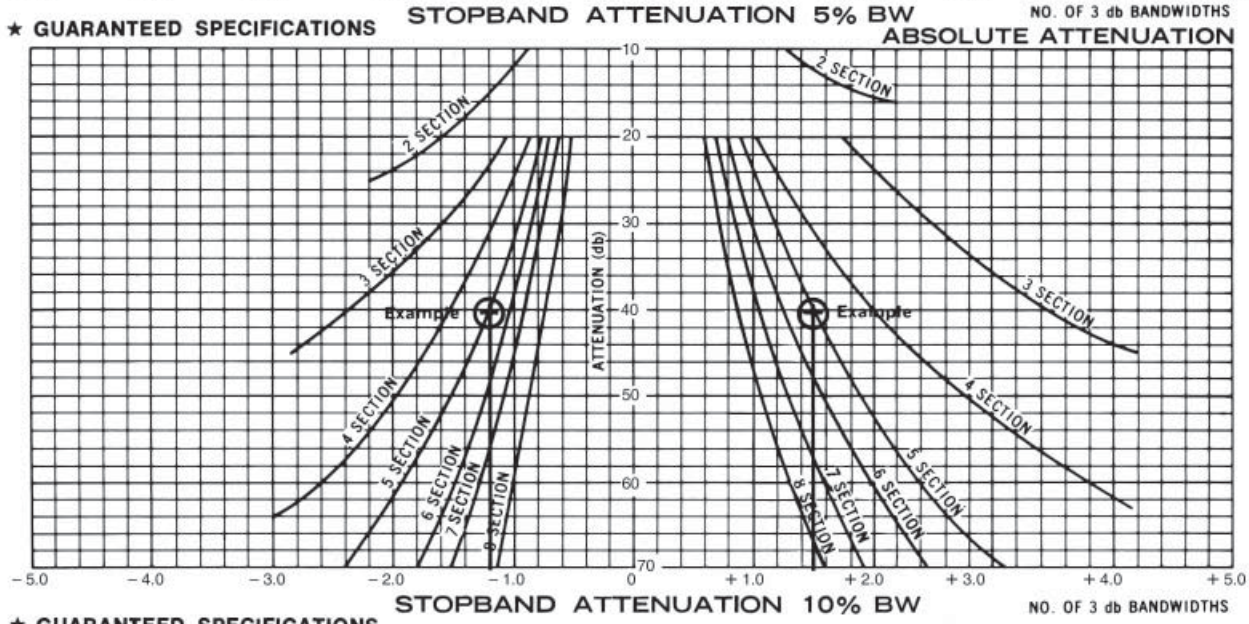
The frequency corresponding to 40 dB on the lower skirt = 300 −1.2 x 30 = 264 MHz. The frequency corresponding to 40 dB on the upper skirt = 300 +1.5 x 30 = 345 MHz. Based on specific requirements:

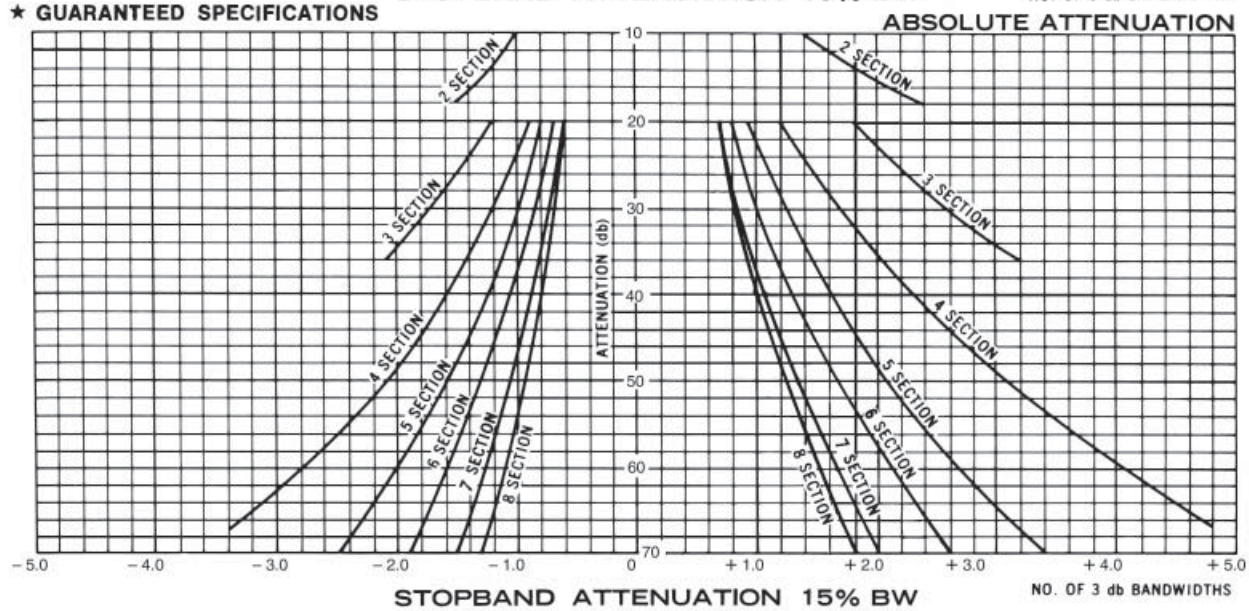
1. If a certain minimum 3 dB bandwidth and definite rejection at specified frequencies are required, the appropriate number of sections can be selected from the attenuation curve. The insertion loss can then be determined from the insertion loss curve.
2. If a certain min. 3 dB bandwidth and a definite insertion loss are required, the maximum number of sections is found by using the insertion loss curves, estimating rejection at specified frequencies, or determining the frequencies corresponding to any attenuation level using the attenuation curves.

In case of special requirements not encompassed in the above data, Telonic Berkeley should be contacted directly.

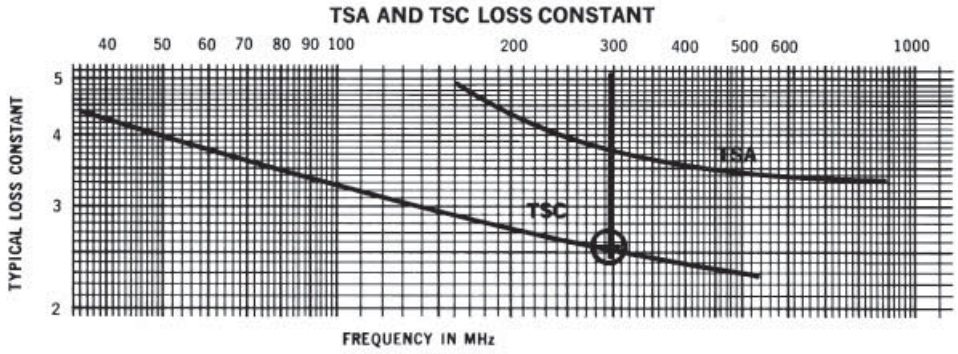
ATTENUATION CURVES







INSERTION LOSS CURVES



INSERTION LOSS:

The approximate value for insertion loss at center frequency is found with the following formula.

$$\text{Insertion loss in db} = \frac{KN}{\%\ BW} + 0.2$$

Where: K = Loss constant
N = Number of sections *

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

The loss constant is read directly from the insertion loss graph at the point which corresponds to the center frequency of the filter.

For example:

A 5 section filter at 300 MHz with a bandwidth of 30 MHz would have an approximate insertion loss of 1.5 db:

$$\text{Ins. Loss} = \frac{2.6 \times 5}{10} + 0.2 = 1.5 \text{ db}$$

* Consult factory for insertion loss when N = 2

Table 1 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

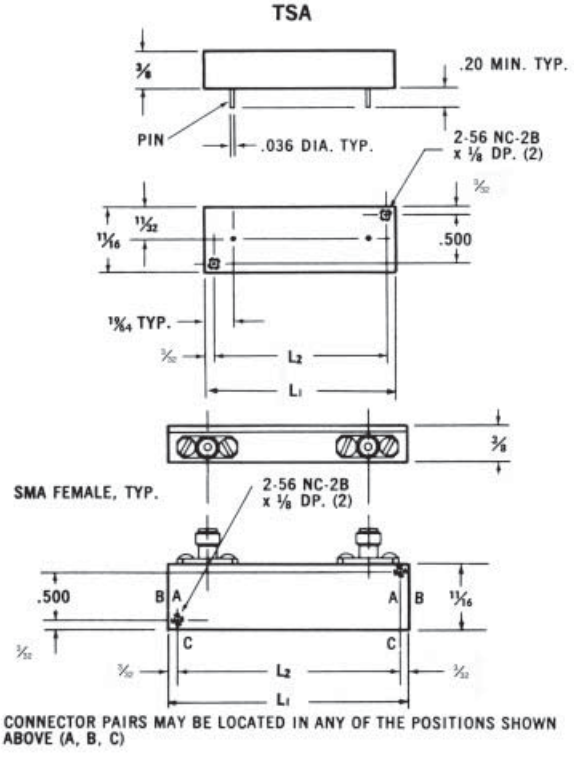
Table 2 CONNECTOR CODE

Standard
P — Pins for printed circuit board
S — SMA Jack
T — SMA Plug

Available
X — All other configurations including semi rigid, RG188, RG196 (Specify requirement).

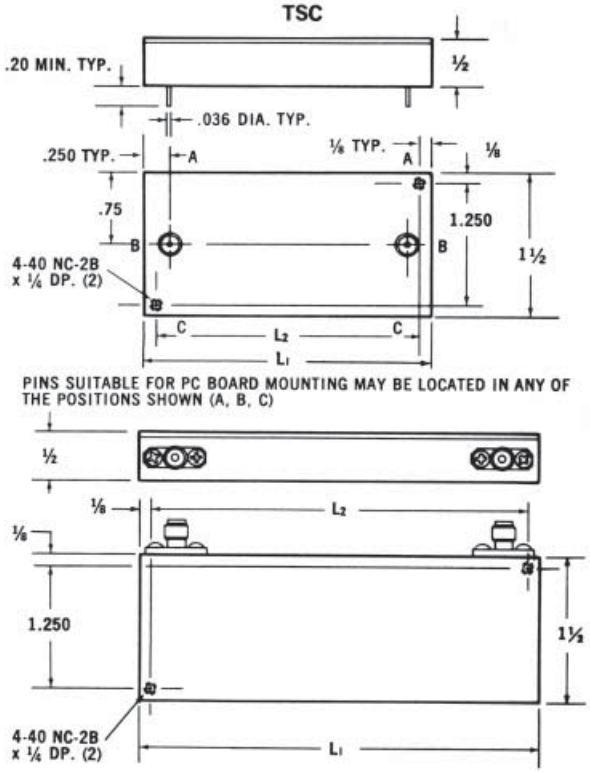
OUTLINE DRAWINGS

TSA



CONNECTOR PAIRS MAY BE LOCATED IN ANY OF THE POSITIONS SHOWN ABOVE (A, B, C)

TSC



PINS SUITABLE FOR PC BOARD MOUNTING MAY BE LOCATED IN ANY OF THE POSITIONS SHOWN (A, B, C)

MECHANICAL SPECIFICATIONS	
Size	$3/8 \times 11/16 \times L_1, L_1 = 1\ 1/2 + \frac{n}{4}$ approx. where n = no. of sections
Weight	Usually less than 1.5 oz. max without connector.

MECHANICAL SPECIFICATIONS	
Size	$1/2 \times 1\ 1/2 \times L_1, L_1 =$ N (1") + 0.5" where N = no. of sections
Weight	Approx. 25 grams / Linear inch