

CRYSTAL FILTER DEFINITIONS

INTRODUCTION

BREL Frequency Control's primary area of interest lies in crystal controlled units. Filters are designed with Tchebyscheff or Butterworth responses for utilization as combination sets for radar scanning or random vibration system control, upper and lower sideband filters for communication use, one cycle notch filter, etc.

DEFINITIONS

Critical to the understanding of filter behavior is a definition of the vocabulary of the most frequently used terms and familiarity with the typical filter amplitude frequency response curve, (Figure-1).

- a. Center Frequency(F_0) – The arithmetic mean between the high and low cut off frequencies of a filter.
- b. Bandwidth(BW) – The difference between two cut off frequencies at a specified attenuation level(3dB or 6dB).
- c. Attenuation – Reduction of signal in transmission through a filter.(Attenuation is usually expressed in decibels dB).
- d. Decibel – Unit that expresses the ratio between two powers, two voltages or two currents

$$(10 \text{ Log } \frac{P_1}{P_2}, 20 \text{ Log } \frac{V_1}{V_2} \text{ or } 20 \text{ Log } \frac{I_1}{I_2})$$

- e. Shape Factor – Ratio of bandwidths at two different levels of attenuation.
- f. Ripple – The wavelike response in the pass-band of a filter(expressed in dB). Unless otherwise specified the maximum ripple will be that excursion from the highest peak to the lowest valley.
- g. Insertion Loss – Power loss of the filter in the passband(expressed in dB). Zero dB reference shall be the point of maximum output of the filter unless it is specified otherwise.

$$\text{Insertion Loss} = 10 \text{ Log } \frac{P_{in}}{P_{out}}$$

- h. Source Impedance – (Input termination) – The output impedance of the circuit that drives the filter.
- i. Load Impedance – (Output termination) – The impedance that must be connected to the output terminals of the filter in order to achieve the proper response.
- j. Spurious Mode – Unwanted responses that occur in the filter due to resonant frequencies of the crystal other than the fundamental frequency.

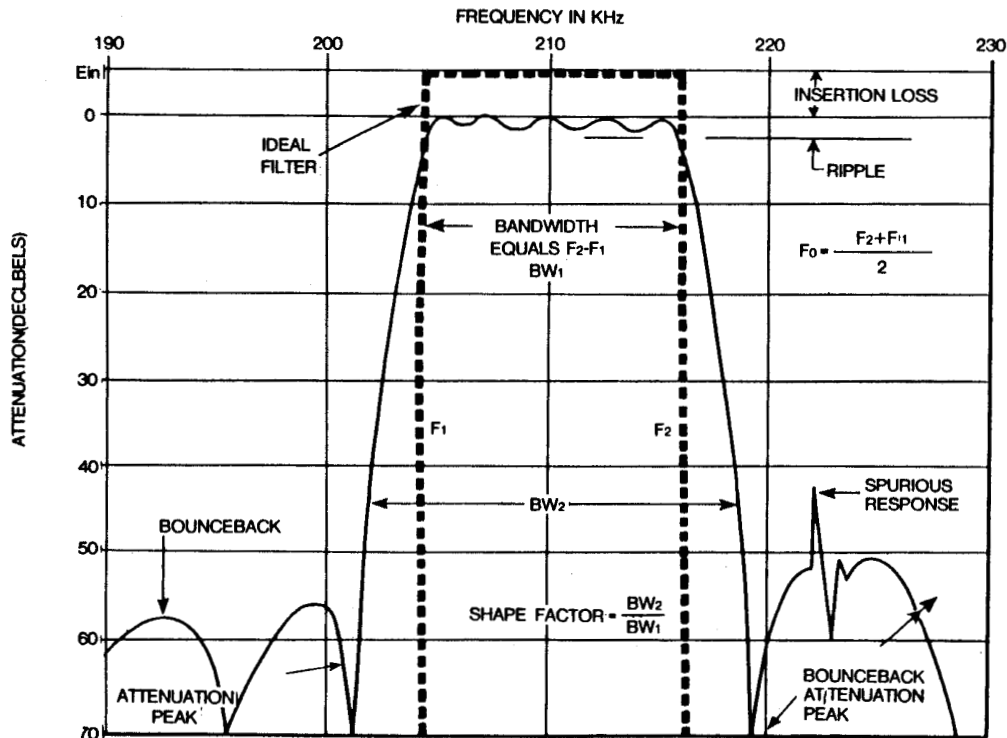


FIGURE 1 TYPICAL FILTER RESPONSE CURVE - BANDPASS FILTER

BREL IS A CUSTOM-FILTER HOUSE MANUFACTURING
 HIGH RELIABILITY, SPECIAL PURPOSE DISCRETE
 COMPONENT CRYSTAL FILTERS TO YOUR EXACT
 SPECIFICATION. SEND US YOUR REQUIREMENTS.

CRYSTAL FILTERS

Crystal filters from 1KHz are manufactured to customer's requirements or to MIL-specifications at BREL.

BREL's computer aided design programs and production techniques provide various precision filters with sharp cut-off characteristics, long term stability, wide temperature range, minimum insertion loss, and high stop-band performance.

FM RECEIVERS OF SINGLE AND DOUBLE SUPER-HETERODYNE IN MOBILE AND OTHER EQUIPMENT
SSB SIGNAL GENERATION
EXTRACTION OR REJECTION OF PILOT SIGNAL
TELEPHONE CHANNEL FILTERING
OTHER FREQUENCY CONTROLS

Examples of filters previously produced for specific applications and band-width information are provided in this leaflet.

CENTER FREQUENCY-BANDWIDTH

The center frequency-bandwidth chart shown here can be used in determining center frequency versus bandwidth characteristics.

