

SHV coaxial feedthrough RCR filter

This details how to construct an SHV feedthrough filter using two high voltage series resistors and six parallel capacitors to ground. This filter is intended for use biasing germanium detectors for the LEGEND experiment where the load current is expected to be < 1 nA and a large series resistance is acceptable. The final filter characteristics are 100 M Ω input resistance, 100 M Ω output resistance, and 16 nF capacitance to ground. The expected capacitance between input and output is 0.13 pF. The filter is constructed to minimize radiation power transfer by keeping the input on the same axis as the output, having the ground current symmetric about the output axis so grounding bypass capacitor radiation is canceled and is emitted perpendicular to the output axis. The entire filter is contained in a sealed tube that mounts on a front-side nut SHV bulkhead jack, which can be filled with oil.

Parts:

- 1 SHV bulkhead jack, TE Connectivity AMP Connectors 5225059-3
- 1 3/4" OD 0.032" wall copper 101 tube cut to 3.16"
- 6 2.7 nF 6 kV ceramic capacitors, Vishay Vitramon HV2225Y272KX6ATHV
- 1 0.625" OD 0.26" ID copper washer 1
- 1 5.5 mm brass hex standoff cut to 0.25" 1
- 2 100 M Ω 7.5 kV axial lead resistors, Ohmite MOX1125231006FE

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¹Appropriate sizes for some components were unavailable.