RC Filter With Low Distributed Capacitance Provides 60 DB Isolation at 500 MHZ

The problem:
A high input impedance receiver preamplifier located near an rf transmitter must be isolated from the transmitted signal. A conventional inductive-capacitive filter, which has an inherent high shunt capacitance, is not practical since the source impedance (the receiver antenna) is very high, e.g., in the range of $10^5$ to $10^9$ ohms for satellite-borne VLF receivers.

The solution:
A resistance-capacitance RC filter coupled to the preamplifier input provides a signal isolation (attenuation) greater than 60 dB. The high isolation is achieved by minimizing the inductive impedance to ground and using the distributed capacitance of the filter components.

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How it's done:
The distributive RC filter is constructed with four 1/8-watt carbon resistors connected in series with very short lead lengths (see figure). A thin insulating material such as shrinkable tubing is placed over the resistors. The entire assembly is mounted inside a channel that is milled out of the preamplifier housing. For a channel dimension of 0.08-in. diam and 1.25-in. length, the total input shunt capacitance is approximately 5 pF. The cutoff frequency of the RC filter, for these dimensions and with 50 k ohm resistors, begins at 200 kHz. Isolation in excess of 60 dB has been achieved for carrier frequencies of 10 MHz to 500 MHz.

Note:
No additional documentation is available. Specific questions, however, may be directed to:
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No patent action is contemplated by NASA.
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