EMI FILTERS: THE ABSORPTIVE/DISSIPATIVE APPROACH

The heart of the absorptive filter is the dissipative element. This element embodies a temperature resisting resin, optimized as a magnetic lossy core, molded around the conductor and case-shielded. This forms a magnetic trap that absorbs rather than rejects or reflects unwanted energy. No oil is required for cooling, since there is no inductive effect to heat. Practically no reactive current is present because there is little, if any, shunt capacity. Absorptive filters can provide attenuation of 100dB minimum, from 100 kHz up to 45,000 MHz and the attenuation does not fall off with current load. The level of RF attenuation at full load currents is maintained because of freedom from saturation. The electrical characteristics of absorptive filters suppress sine waves per MIL-STD-220, and cause the collapse of transient spikes of all kinds, particularly those with short rise times. These spikes are not reflected or transferred to other conductors, but are dissipated as heat within the lossy element (no ringing effects). A breakaway diagram of the filter is shown in Figure 1.

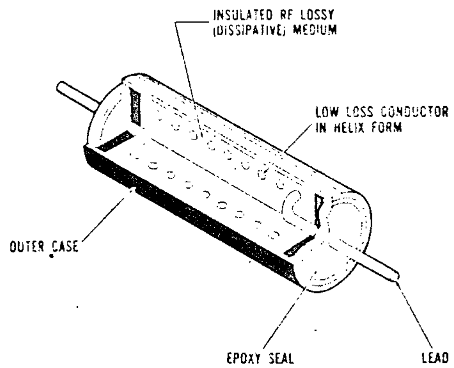

Figure 1. Description of Absorptive Filter

Another type of filter was developed with the purpose to suppress radio interference conducted along all kinds of power or audio signal lines. In this filter, the conventional series inductance, represented by the visual coils wound on toroidal cores, are replaced by a lossy element with its parameters distributed evenly over the length of the filter. By avoiding the disadvantages of lumped parameter circuits, the dissipation of undesired frequencies is smooth over the complete frequency range.

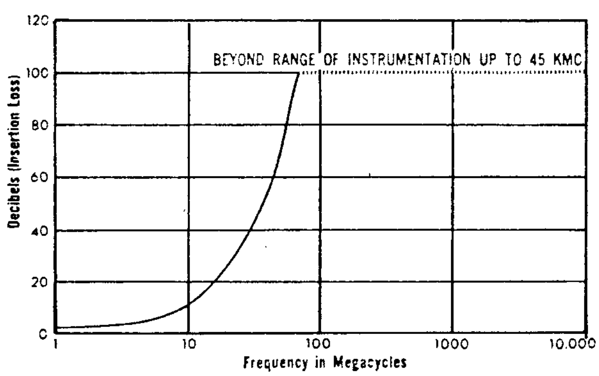

Figure 2. Frequency in Megahertz

A rugged, temperature-resisting resin mold containing an optimized dielectric, magnetic and resistive load is molded around the conductor and shielded outside. The curve on Figure 2 shows a typical characteristic of attenuation versus frequency for a miniaturized element.

Dissipative Element vs. Conventional High Loss UHF Cable

A comparison of the new dissipative element to the conventional high loss UHF cable is illustrated in Figures 3 and 4. Figure 3 shows a conventional high loss UHF cable, characterized by its resistive inner conductor and shield for dissipating power over the whole frequency range, acting as an attenuator with good VSWR characteristics.

Figure 4 shows the dissipative element (LossyLine) with highly conductive inner and outer conductors. The dissipation occurs in the lossy mold between the conductors. Because of the lossy characteristics, this dissipative element acts like a low pass filter (as shown in Figure 1).

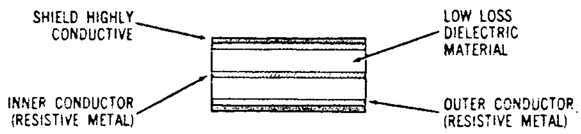

Figure 3. Conventional High Loss UHF Cable

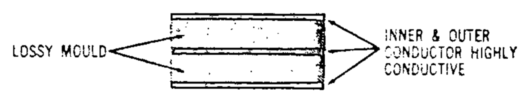

Figure 4. Dissipative Element.

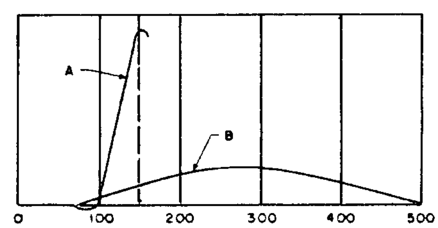

Figure 5. Suppression of Spikes

Figure 5 illustrates the effective dissipation of a 50μ sec. rise time transient. The original transient A extended up to 250 VDC. The same transient is again shown as B after the dissipative element has been inserted in the circuit.

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