Advancing RF Filtering Technology

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SUMMARY

WCM's patent-pending technology improves RF filtering technology by improving impedance characteristics, space efficiency, power handling, and temperature stability compared to LC parallel filters. Advancement include:

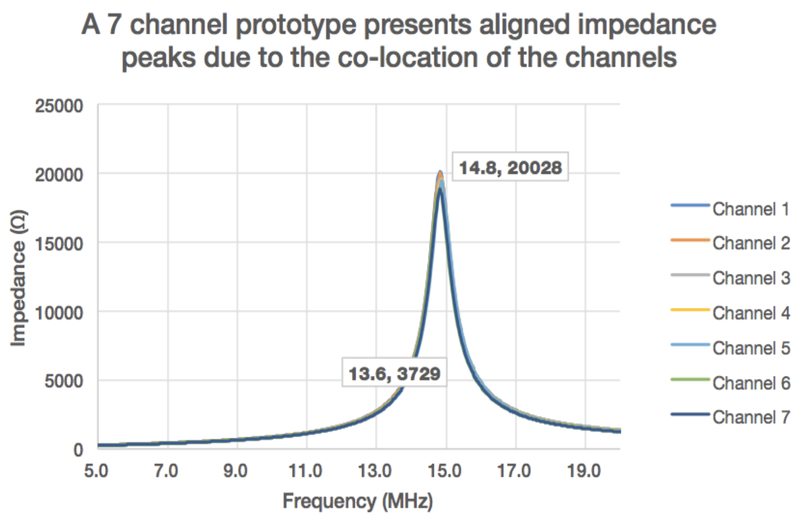
- Novel technique for making highly compact, narrow band, high impedance filters tunable for frequencies from 1 MHz to 50 MHz
- Supports high power applications
- Coils can be placed in series to permit independent filtering at multiple frequencies
- Technology enables multiple parallel independent filter channels into a single filter coil

SINGLE-COMPONENT DESIGN

WCM's technology, rather than combatting parasitic effects, takes advantage of them. The parasitic capacitance becomes the resonating capacitance for the turns of copper comprising the inductor. The designer is no longer concerned with sourcing the correct capacitor and inductor (specifying individual components). The designer can instead use a single WCM multi-channel filter (Figure 1) and be assured their parallel LC circuit will have high impedance, without any subcomponent tuning.

FIGURE 1: *Multi-Channel RF filter.*

7-channel RF filter with channels tuned to the same frequency demonstrates aligned, high impedance peaks in each channel in a single device.



ADVANCED COMPACT COPPER FOIL TECHNOLOGY

WCM's new technology is more space efficient compared to a parallel LC filter. As mentioned, parallel LC filters are not located, which requires more space allocated to the filter.

WCM's filter places multiple channels in nearly identical locations (Figure 2), conserving space in constrained systems.

The copper foil used in WCM's filter efficiently uses space compared to round magnet wire, which is subject to the skin effect at radio frequencies.

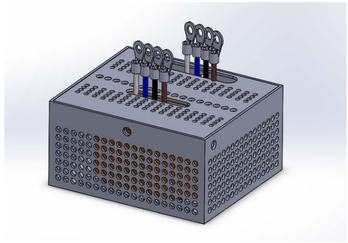


FIGURE 2: *Compact RF filter design.* Independent channels are separated by thin yet resilient insulation, allowing for channels to operate simultaneously

CONTINUOUSLY TUNABLE

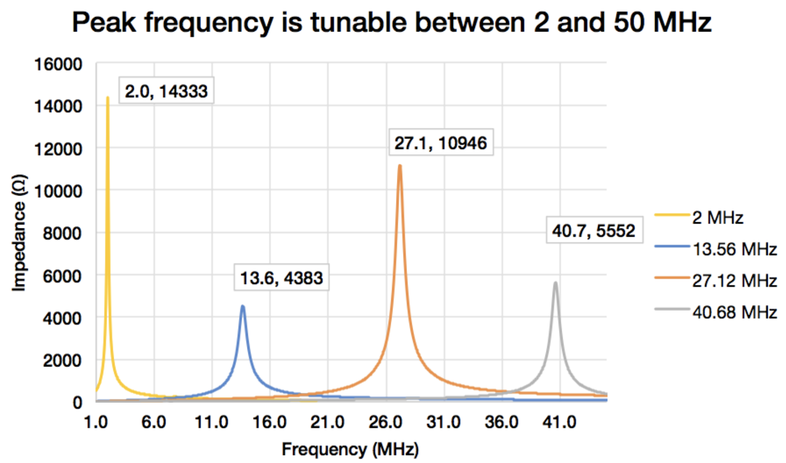
The nature of the device allows the frequency to be continuously tunable in the range of 2 to 50 MHz (Figure 3). The designer can specify the desired frequency, and WCM can create a unit with high impedance at that frequency. The unit can have its impedance maximum nearly at, or exactly at, the target frequency.

WCM technology can easily accommodate multiple channels. Previous LC filters, due to their size, required separate inductors and capacitors for each channel; these channels are not necessarily aligned due to the non-co-location of the parts relative to other components.

Because each channel of the WCM filter is on a common core, the alignment of the channels is much improved.

FIGURE 3: *Single channel in an RF filter turned to different frequencies.*

Impedance curves for prototype foil wound RF filter tuned to a) 2 MHz; b) 13.6 MHz; c) 27.1 mHz; d) 40.7 MHz



For more information request Bulletin WCM700, WCM700-4, or visit wcmagnetics.com