

Variable Slope, Multi-Octave Radio Frequency Filters

Current radio frequency filters cannot provide arbitrary slope over multiple octaves

Producing lab simulations of observed radio frequency (RF) phenomenon requires fabrication of RF filters that support variable per-decade slopes rather than multiples of 10 dB over a multi-octave frequency range. Existing technology supports intermediate-value slopes but only over a small fraction of an octave.

Photonics technology enables a multi-octave, continuously variable slope filter

This technology uses photonic components to create a variable slope, multi-octave low-pass/high-pass filter that could be used to modify an RF signal to remove noise, minimize distortion, or enhance signal quality for high-frequency communications. The system filters multi-octave RF signals using a photonics up-converter that can operate on an RF signal that spans a fractional octave in relation to the optical carrier. The slope can be continuously varied before the RF signal is extracted from the combined signal.

Summary Bullets

- **Customizable:** The combined signal may be applied to a standard low-pass, band pass, or high-pass optical filter. The filter can be implemented with any number of poles for a maximum defined-slope, and the choice of pass type may be made according to the desired slope direction.
- **Variable:** By moving the optical carrier up and down in frequency through the transition band, the slope of the RF signal can be continuously varied.
- **Versatile:** The technology can be used as is or it can augment existing RF lab equipment.

Solution Advantages

- **Customizable:** The combined signal may be applied to a standard low-pass, band pass, or high-pass optical filter. The filter can be implemented with any number of poles for a maximum defined-slope, and the choice of pass type may be made according to the desired slope direction.
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Potential Commercial Applications

Potential uses include:

- Two-way encrypted radio products
- Military radios/telephones that require voice-recognition quality audio
- Encoding/decoding voice signals in telephony-related Bluetooth devices such as wireless headsets and mobile phones
- Simulating observed RF transmission or RF coupling phenomenon that requires an unusual spectrum shaping

Inventors

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Publications

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Images

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