

## Operation Frequency Band Customizable and Frequency Tunable Filters with EBG substrate

Tech ID: 27146 / UC Case 2015-296-0

### BRIEF DESCRIPTION

The technology relates to cavity resonators and filters for improved processing of electromagnetic signals. Specifically, the invention is a cavity resonator or filter that is constructed on electromagnetic bandgap substrate that includes an external controlling assemble can change the work frequency of the cavity resonator or filter. This enables device access to frequencies with a very broad range.

### FULL DESCRIPTION

Today's technologies such as smart phones and tablets utilize multiple frequency bands for wireless communications. Smart phones use radio frequency (RF) band to cover services such as GSM, GPS, WiFi, Bluetooth, 3G or 4G LTE. In order handle the different types of functions, a compact bandpass RF/microwave filter is needed to cover multiple working frequencies. This is an essential component when creating more integrated solutions for these handheld communication devices.

There has been great interest in the field of wireless communications to find a platform that can enable long-range wireless network that can access frequencies from 2 to 11 GHz. Currently, there are filters that can cover a small range of frequencies including planar microstrip filters that work within frequencies of 1.178-3.6GHz and 4.14-6.26GHz or capacitive-post loaded evanescent mode cavities cover 0.98-3.48GHz and 1.9-5GHz. For these reasons, electromagnetic bandgap filters has emerged as an alternative design due to its high Qu, ease of integration and low costs.

University of CA researchers have created a tunable cavity filter that is able to work with a broad range of frequencies. This electromagnetic bandgap filter is much smaller than traditional filters and can be easily integrated in an industry-standard printed circuit board thereby facilitating high-volume manufacturing and lower cost fabrication. Overall, this technology will improve the wireless communications and specifically the mobile devices that we all use everyday.

### SUGGESTED USES

There are many types of EBG substrates that the filters can be built on such as Silicon, SiGaAs, SI InP, glass or LCP. This ensures high level of RF microelectronics with tunable filters In addition, the filters can also be used in combination with other external components such as inductors, capacitors, varactors, or PIN diodes on the various EBG substrates for tunable filters. Lastly, this technology can be used in collaborations with PCB vendors to develop and include an integrated RT module, which can include filters, transformers, matching network, switches, and passive components.

### ADVANTAGES

- Flexibility in selection of components of the control elements
- The control elements are built in and contain a plurality of tuning components
- 3D evanescent mode filters can be used

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### OTHER INFORMATION

### KEYWORDS

EBG filters, Ultra wide band, Printed circuit board, Surface mount capacitor, Frequency controllable, Tunable filters

### CATEGORIZED AS

- » **Communications**
  - » Wireless
- » **Energy**
  - » Transmission
- » **Engineering**
  - » Engineering
- » **Materials & Chemicals**
  - » Electronics Packaging

- Tuning frequency range of the filter does not rely on the via post size and height, thereby reducing the size of the filter significantly
- Design enables easy integration with other components and allows for increased degrees of freedom
- Able to produce high-volume manufacturing and low cost fabrication
- Retains high Qu of cavity resonators and wide spurious free region
- Free from working frequency band limitation
- Provides ultra wide frequency range

RELATED CASES

2015-296-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,033,084	07/24/2018	2015-296

STATE OF DEVELOPMENT

Experimental stage- directly fabricated elements on EBG substrate and experimenting using PIN diodes or varactor on EBG substrate

OTHER INFORMATION

Potential Licensees: Abracon Corporation, Avago Technolgies US Inc, AVX Corporation, Crystek Corporation, Hittite Microwave Corporation, Johanson Technology Inc, Murata Electronics North America, TKD Corporations, PCB express, Sierra

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