Advancing Multi-Band, Multi-Mode Radio Frequency (RF) Technology (#2888)

A highly versatile method for designing and fabricating optimized telecommunications devices

This technology is a unique method of fabricating a multi-band, multi-mode integrated RF transceiver with organic substrates that can be reused at different frequency ranges. It is designed to reduce the number of components required for an RF device to support a variety of wireless standards and applications. The Georgia Tech research team used on-chip active components and in-package high-performance passive components, which are embedded in organic substrates that can be reused at different frequency ranges. Specifically, this innovative RF transceiver includes two unique mechanisms—voltage-controlled oscillators and low-noise amplifiers—that can be formed using organic substrates, such as liquid crystalline polymer. Reuse of the substrates helps to overcome power consumption, compatibility, interference, and integration challenges of other multi-band and multi-mode devices.

Benefits/Advantages

- **Efficient:** Increases transceiver capabilities while maintaining economical power consumption through reusable organic substrates
- **Adaptable:** Grants access to multiple frequency ranges in the same device
- **Easily integrated:** Offers implementation in small form factor module with less than 1.1-millimeter thickness

Potential Commercial Applications

This multi-band RF transceiver may have important communications applications, including in technology such as:

- Cellular and wireless devices
- Satellite and digital television
- Ultra-wideband devices
- Local multi-point/multi-channel distribution services

Background/Context for This Invention

With the rapid advancement of wireless communications technology, RF devices that can support operation at various frequencies are necessary. For example, most mobile phones today must have capabilities in voice, video, and data in the same device. The Georgia Tech research team developed this technology to

meet the demand for RF front-ends and interfaces that support multiple bands and multiple protocols, especially as multiple-input and multiple-output (MIMO) technology advances.

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More Information

U.S. Patent Issued - 7,489,914

Publications

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/advancing-multi-band-multi-mode-radio-frequency-rf-technology

Images:

The automated sequential delivery of multiple fluids. A varying number of delay gates imprinted in the branches are shown in the figure.

COVID-19 and flu saliva test on paper: (A) The automatic sequential delivery of multiple reagents required for virus test; (B) Water pouring into the device triggers the virus assay, allowing the presence of SARS-CoV-2 and influenza A & B viruses to be visually identified by the color changes in the corresponding detection spot