

NEW DESIGN OF WIDEBAND RF AND MICROWAVE CIRCULATOR WITH HIGH POWER HANDLING

CONCORDIA UNIVERSITY, UCON-201



BACKGROUND

Junction circulators were proposed 60 years ago for use in different communication systems in both commercial and defense applications. This type of component is deployed to provide source protection in all systems and double the system capacity by supporting channel duplexing. Since then, they have gone through substantial development, but always based on the original design paradigm.

One major problem with the available designs of the wideband circulators is the dependency on empirical design equations and/or approximated solutions. This leads to production processes that pass through an iterative sequence between the testing laboratory and the machine shop (and other processing stages). In addition, wideband circulators must be tuned in post-fabrication. This problem increases both the production time and cost of the final component.

TECHNOLOGY

A closed form solution for the junction circulator has been developed which provides an accurate and straightforward design procedure. This innovative design method has been developed for stripline and ridge gap waveguide technologies. Both technologies have the advantage of supporting the TEM mode, which is not subjected to signal dispersion. This minimizes the signal distortion and simplifies the signal processing needed to retrieve the transmitted signal over the channel.

The invented procedure and the proposed configuration for the junction circulator have been utilized to create circulators in different frequency bands. The presented circulators have been evaluated through several commercial numerical packages. The simulated results have shown superior response and

exceptional characteristics in terms of the matching level and the covered bandwidth. Moreover, the proposed matching technique can ensure high power handling capability and high frequency compliance.

COMPETITIVE ADVANTAGES

- Ultra-wideband stripline and ridge gap circulators.
- Superior electrical specifications in terms of the deep matching and high isolation level.
- Short production time frame and lower cost for the overall process.
- Smaller footprint and no dependency on non-standard materials.
- High power handling capability for both peak and average power.

APPLICATIONS

- Ultra wideband communication systems.
- Millimeter wave applications such as 5G applications.
- Wideband - high power radar systems.
- Full duplex communication applications.

TECHNOLOGY DEVELOPMENTAL STAGE

- Design software is under development.
- Proof-of-concept prototypes being fabricated.

PATENT STATUS

-Patent pending

BUSINESS OPPORTUNITY

-Licensing/Partnering/Co-development

FOR INFORMATION PLEASE CONTACT:

Nadia Capolla
Director – Business Development
Phone: 514-840-1226 # 3010
Cell: 514-586-1498
E-mail: ncapolla@aligo.ca