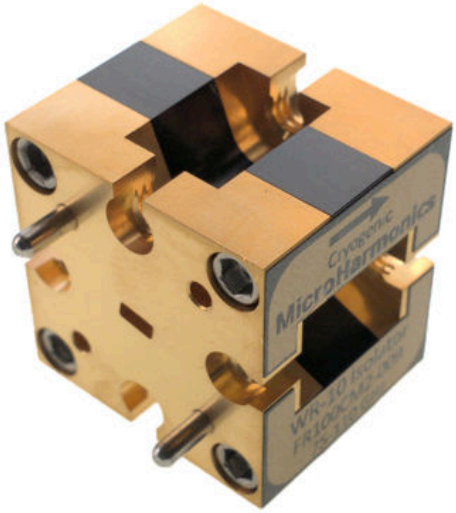
MicroHarmonics
Superior mm-Wave Components

Unique Solutions

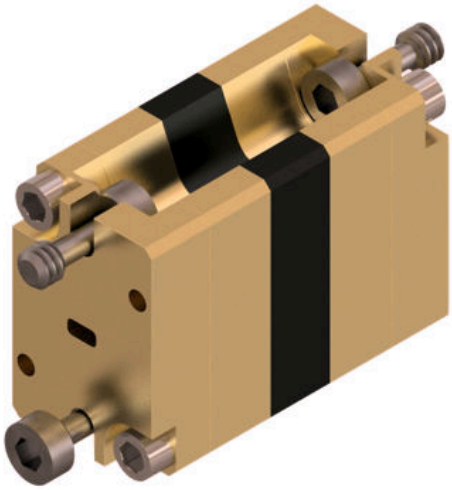
At Micro Harmonics, we are committed to listening to our customers, learning about their needs, and designing innovative solutions. One customer asked if it was possible to make our compact cryogenic WR-10 isolator even smaller. They wanted to use the isolator in an array configuration with multiple isolators stacked side-by-side.

This presented several challenges. First, the width of a standard WR-10 waveguide flange was too large. We solved this by removing two of the four flange screws on each flange. Our standard WR-10 cryogenic isolator, model FR100CM2, is shown below along with a sketch of the isolator designed for the cryogenic array, model FR100CM1.

Cryogenic isolators webpage



FR100CM2



FR100CM1

Stray magnetic fields white paper.

Most Faraday rotation isolators cannot be operated in close proximity to each other. Many have a warning label to this effect. The problem is that the magnetic field bias fields from two isolators in close proximity interact with each other. This interaction changes the net magnetic bias in the ferrite rods and can severely degrade the isolator performance.

The magnetic field issue was never a problem for Micro Harmonics because our isolators are insensitive to stray magnetic fields. We bias our isolators strongly into magnetic saturation. Only a very strong stray magnetic field can alter the bias point enough to change the performance. This has been verified in laboratory measurements. The phenomenon is explained in more detail in a white paper that was recently published in the April 2021 edition of the Microwave Journal.

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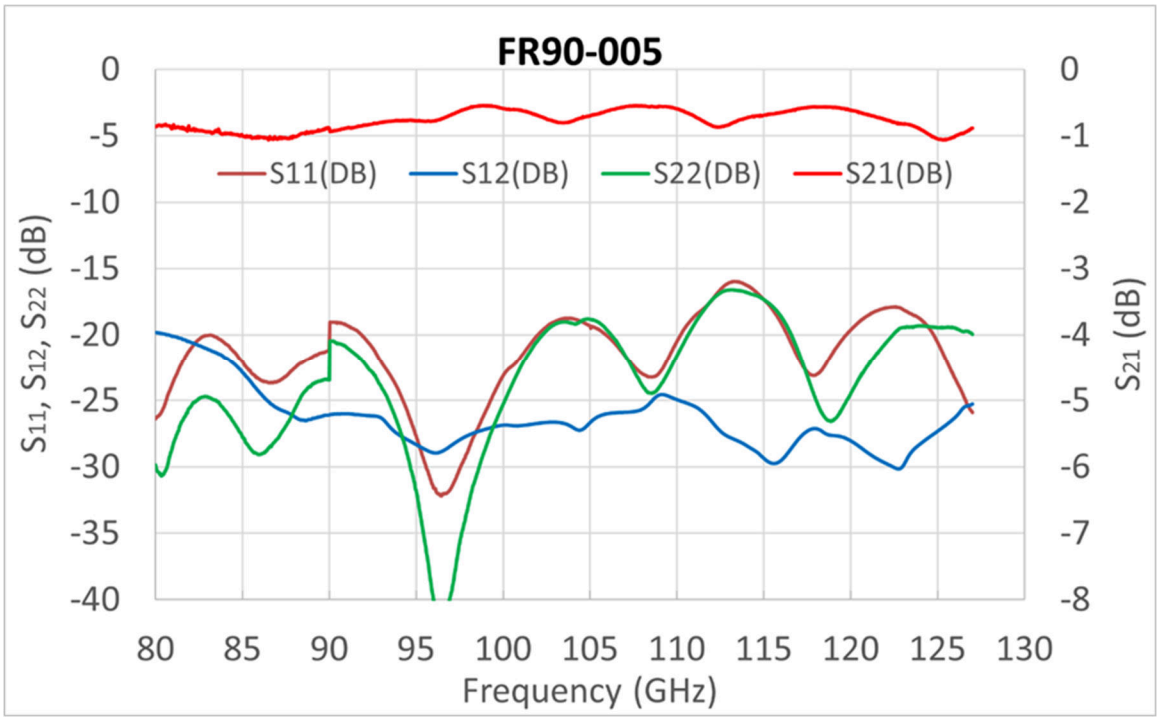
Unique Solutions – Targeting THz Systems

Frequency multiplier chains are often used to generate signals in terahertz systems. Small reflections between the multipliers can negatively impact their performance. These systems require isolators in non-standard waveguide bands. For example, here are three multiplier chains that could make use of an isolator in the non-standard WR-9 band covering 82-125 GHz:

Output Band	Frequency (GHz)	Frequency Multipliers	Input (GHz)
WR-2.2	330-500	X2X2 = X4	82 - 125
WR-1.5	500-750	X2X3 = X6	83 – 125
WR-1.0	750-1100	X3X3 = X9	83 - 122

At a customer's request, we designed a WR-9 isolator that operates in the band 82-125 GHz. Test data is shown in the graph. The small discontinuity at 90 GHz is a relic of testing in two bands, WR10 and WR-8. We also have a cryogenic version of this isolator that is currently being used in sensitive radioastronomy instruments to study black holes.



Micro Harmonics specializes in ferrite components for mm-wave and terahertz systems. Our goal is to provide the best possible component technology to enable this vital and growing market. Please don't hesitate to contact us to discuss your specific requirements. We typically do not charge a design fee (NRE). Join the growing number of engineers around the world who are using Micro Harmonics components to improve the performance of their mm-wave and terahertz systems.

FR90 web page

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