

Materials for Specialty Antenna Applications



Trans-Tech Advanced Materials

Trans-Tech (a wholly owned subsidiary of Skyworks Solutions, Inc.) has a wide variety of materials available for antenna applications. These include our entire suite of dielectric materials (for example D-73XX and the MCT series) as well as hexagonal ferrites for high frequency magneto-dielectric antennas. There is an enhanced Co_2Z material available when higher Q values are required in the 300–700 MHz range.

Dielectric Materials

Advantages

Good miniaturizing factors
Good combination of miniaturization factor and Q
Good Q (low loss)
Permittivities extend to above RF
Best above 1 GHz

Materials

MCT Series
D-73XX
D-88XX

Magnetic Materials (Magneto-Dielectric)

Advantages

Good miniaturizing factors = $(\mu^* \epsilon)^{1/2}$
Reducing field concentration
Better impedance match ($\mu/\epsilon = 1$)
Better in 100 MHz – 1 GHz range

Materials

Z-Phase Hexaferrites ($\text{Ba}_3\text{M}^{\text{II}}\text{Fe}_{24}\text{O}_{41}$)
where $\text{M}^{\text{II}} = \text{Mn, Mg, Zn, Co, Ni or Cu}$
Y Type Hexaferrites ($\text{Ba}_2\text{M}^{\text{II}}\text{Fe}_{12}\text{O}_{22}$)
where $\text{M}^{\text{II}} = \text{Mn, Mg, Zn, Co, Ni or Cu}$
Enhanced Co_2Z : (TTZ-500 materials)
for high frequency applications
Sizes range from submicron to 100 mesh

Contact us today and find out how we can work together to provide you with high-performance solutions designed to meet your particular specifications.



 **Trans-Tech**[™]
Ceramics and Advanced Materials

5520 Adamstown Road, Adamstown, MD 21710
Phone: (301) 695-9400 • Fax: (301) 695-7065
Email: transtech@skyworksinc.com • www.trans-techinc.com

Hexagonal Ferrites



Applications

Antenna, absorber, and inductor applications for military and commercial markets

Features

- $\text{Co}_2\text{Z}:\text{K}$ (TTZ-500)
 - Highest frequency resonance of any Z-phase material in the market
 - Designed for 500 MHz antenna applications
- $(\text{Zn},\text{Co})_2\text{Z}$ (TTZ-100)
 - Designed for 100 MHz antenna applications

TTZ-500 and TTZ-100

The TTZ-100 is a composition based on the Z-type hexagonal ferrite material with permeability (μ') >13 and a magnetic Q factor (Q) ($\mu'\mu''$) >30 (at 100 MHz) that is specifically designed for antenna applications around 100 MHz. The TTZ-100 may be supplied either in powder form with custom particle sizes, or as a sintered ceramic product with dimensions up to 4-inch x 4-inch squares.

The TTZ-500 is a composition based on the Z-type hexagonal ferrite material with permeability (μ') >7 and a magnetic Q ($\mu'\mu''$) >15 (at 500 MHz) that is specifically designed for antenna applications around 500 MHz. The TTZ-500 may be supplied either in powder form with custom particle sizes, or as a sintered ceramic product in shapes with dimensions up to 4-inch x 4-inch squares.

Blends of the TTZ-100 and TTZ-500 are also available for applications in the intermediate frequency range. Although the TTZ-500 may be used for applications up to 800 MHz, the magnetic Q decreases with frequency. For applications below 100 MHz, the TT1 and TT2 series of spinels would be most suitable.

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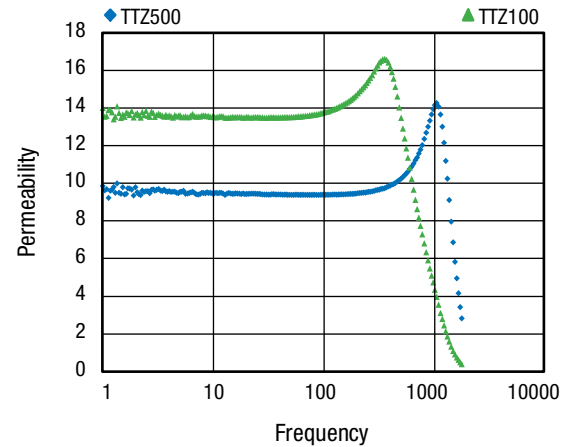


Figure 1. Permeability Spectra for TTZ-100 and TTZ-500 Materials

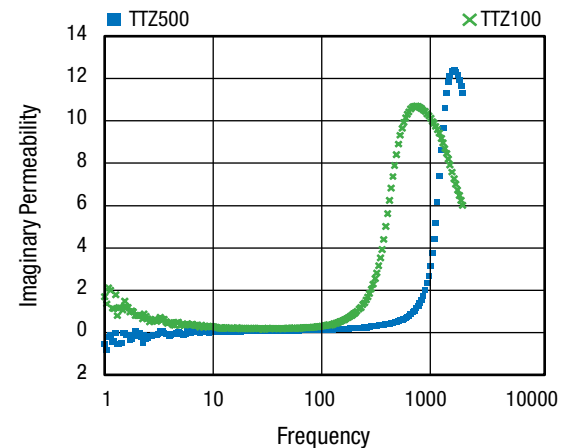


Figure 2. Imaginary Permeability for TTZ-100 and TTZ-500 Materials

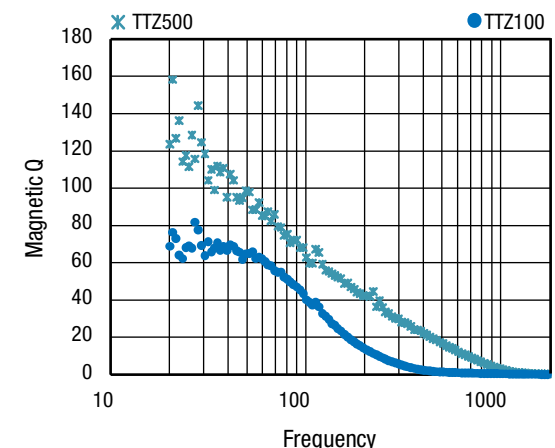


Figure 3. Magnetic Q for Typical TTZ-500 and TTZ-100 Materials



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Microwave Absorbers



SKYWORKS®

Trans-Tech Advanced Materials

Our in-house manufacturing capability enables us to deliver materials ranging from custom particle size distributions for thermal barrier coatings and fuel cells, to machined precision components. Because we are an independent material supplier, our customers can rest assured that their proprietary material compositions will be kept confidential.

Absorber Materials

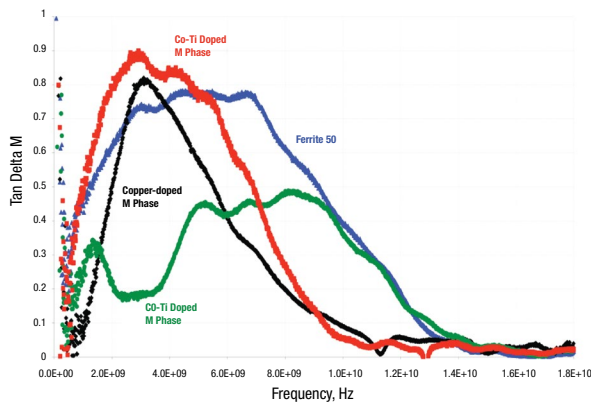
Trans-Tech has a number of oxide based materials available for RF absorbers over a range of frequencies and temperatures. These materials are available as formed and fired ceramics, powders suitable for plasma spraying as well as powders suitable for blending with polymeric materials. Among the materials offered are the following:

Spinels

- **TT2-111R:** Suitable for broadband absorption below 500 MHz
- **Ferrite 50:** Suitable for broadband absorption from 800 MHz to 12 GHz
- **Custom Ferrites:** Narrow band materials may be fabricated for applications below 2 GHz

Hexagonal Ferrite-based Absorbers

- Broadband absorption due to high-loss resonance peaks
- Can adjust resonant frequency (range of absorption frequencies) with different chemistry
 - Co_2Z (1–10 GHz)
 - $\text{BaFe}_{11}\text{Mn}_5\text{Ti}_5\text{O}_{19}$ M phase (>10 GHz)



Properties of Currently Available RF Magnetic Absorbers

Contact us today and find out how we can work together to provide you with high-performance, solutions designed to meet your particular specifications.

Hexagonal Ferrites

- **Co_2Z :** Excellent absorber in the 1–5 GHz range
- **Substituted M Type Ferrites:** $\text{BaFe}_{12-2x}\text{M}^{\text{II}}_x\text{Ti}_x\text{O}_{19}$ ($\text{M}^{\text{II}} = \text{Mn}$ or Co) Select frequency bands in the 10–50 GHz range
- **Custom Hexagonal Compositions Available**
 - Y Type: $\text{Ba}_2\text{M}^{\text{II}}_2\text{Fe}_{12}\text{O}_{22}$
 - Z Type: $\text{Ba}_3\text{M}^{\text{II}}_2\text{Fe}_{24}\text{O}_{41}$
 - W Type: $\text{BaM}^{\text{II}}_{12}\text{Fe}_{16}\text{O}_{27}$
 - $\text{M}^{\text{II}} = \text{Mn}, \text{Mg}, \text{Zn}, \text{Co}, \text{Ni}$ or Cu

High Temperature Dielectric Absorber

- Now available



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