



SKYWORKS®



Technical Ceramics
Antenna Solutions • Specialty Materials

Billions of Connections, One Solution

Skyworks has been enabling wireless connectivity for over a decade. However, given growing consumer demand for wireless ubiquity and the desire for anytime, anywhere access, there are billions of connections yet to be made.

With our high-performance analog semiconductors, Skyworks is linking people, places, and things across a growing number of markets and applications – bringing everyone closer to vital information wherever it is needed.

Skyworks is a global company with engineering, marketing, operations, sales and support facilities located throughout Asia, Europe and North America. For more information, please visit Skyworks' website at www.skyworksinc.com.



| A Leader in Advanced Technical Ceramics

Skyworks Solutions, through its wholly-owned subsidiary Trans-Tech, is the industry leader in technical ceramics. With over 60 years of experience, we offer a wide variety of materials available for antenna applications. These include our entire suite of dielectric materials (D-125, D-73XX, D-9000 and the MCT series), as well as hexagonal ferrites for high frequency magneto-dielectric antennas. We can also deliver an enhanced Co_2Z material when higher Q values for the 300-700 MHz range are required.

Specialty Materials

| Dielectrics

Materials

- D-125
- D-73XX
- D-88XX
- D-9000
- MCT Series

Advantages

- Best miniaturization factor
- Good combination of miniaturization factor and Q
- Good Q (low loss)
- Permittivities extend to above RF
- Best above 1 GHz
- Long production history

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| Magnetics (Magneto-Dielectric)

Materials

- Z-Phase Hexaferrites ($\text{Ba}_3\text{M}^{\text{II}}_2\text{Fe}_{24}\text{O}_{41}$)
where $\text{M}^{\text{II}} = \text{Mn, Mg, Zn, Co, Ni or Cu}$
- Y Type Hexaferrites ($\text{Ba}_2\text{M}^{\text{II}}_2\text{Fe}_{12}\text{O}_{22}$)
where $\text{M}^{\text{II}} = \text{Mn, Mg, Zn, Co, Ni or Cu}$
- Enhanced Co_2Z : (TTZ-500 materials)
- Submicron to 100 mesh (powder form) or sintered

Advantages

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

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Hexagonal Ferrites

Applications

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

Features

- $(\text{Zn,Co})_2\text{Z}$ (TTZ-100)
 - Designed for 100 MHz antenna applications
- $\text{Co}_2\text{Z}:\text{K}$ (TTZ-500)
 - Highest frequency resonance of any Z-phase material in the market
 - Designed for 500 MHz antenna applications
- $(\text{Sr-Co}_2\text{Y})$ (TTZ-1000)
 - Designed for up to 1 GHz antenna applications
- TTZ-133
 - Optimized for 13.56 MHz medical RFID frequency

TTZ-100 and TTZ-500

The TTZ-100 is a composition based on the Z-type hexagonal ferrite material with permeability (μ') >13 and a magnetic Q factor (Q) (μ''/μ') >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 x 4 inch squares.

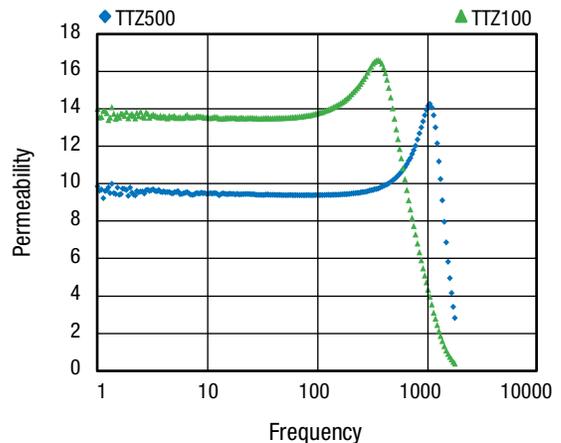
The TTZ-500 is a composition based on the Z-type hexagonal ferrite material with permeability (μ') >7 and a magnetic Q (μ''/μ') >15 (at 500 MHz) that is specifically designed for antenna applications around 500 MHz. The TTZ-500 may be supplied either in powder form with custom particle sizes, or as a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

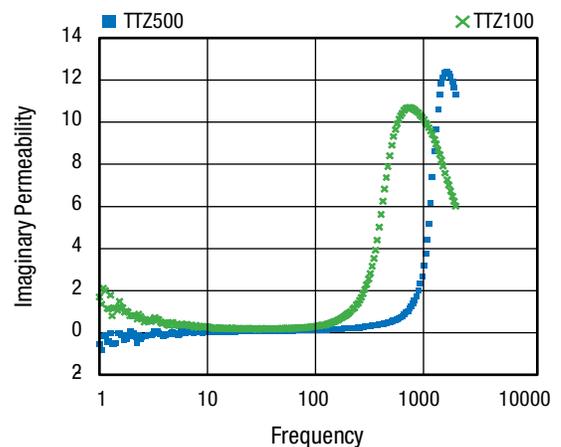
TTZ-1000

TTZ-1000 is a composition designed to provide greater magnetic Q at frequencies up to 1 GHz (Q > 20).

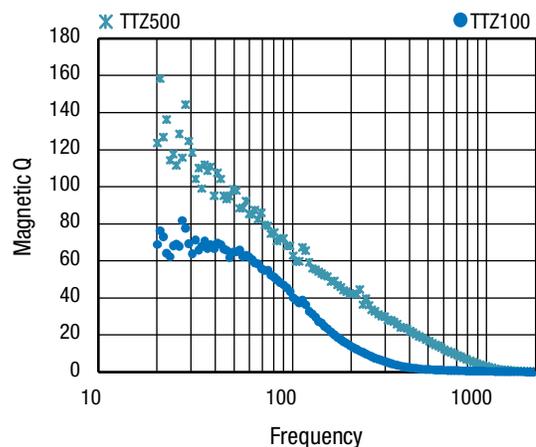
TTZ-1000 is specifically designed for military and aircraft antenna applications with a high miniaturization factor and large bandwidth.



Permeability Spectra for TTZ-100 and TTZ-500 Materials



Imaginary Permeability for TTZ-100 and TTZ-500 Materials



Magnetic Q for Typical TTZ-100 and TTZ-500 Materials

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Microwave Absorbers

We offer 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.

Spinel

- **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 for applications below 2 GHz

Hexagonal Ferrites

- **Co₂Z:** Excellent absorber in the 1–5 GHz range
- **Substituted M Type Ferrites:**
 $BaFe_{12-2x}M^II_xTi_xO_{19}$ (M^{II} = Mn or Co)
Select frequency bands in the 10–50 GHz range
- **Custom Hexagonal Compositions Available**

Y Type: $Ba_2M^II_2Fe_{12}O_{22}$

Z Type: $Ba_3M^II_2Fe_{24}O_{41}$

W Type: $BaM^II_{12}Fe_{16}O_{27}$

M^{II} = Mn, Mg, Zn, Co, Ni or Cu

Contact Us

Find out how we can work together to provide you with high-performance solutions designed to meet your particular specifications by contacting us at rfceramics@skyworksinc.com

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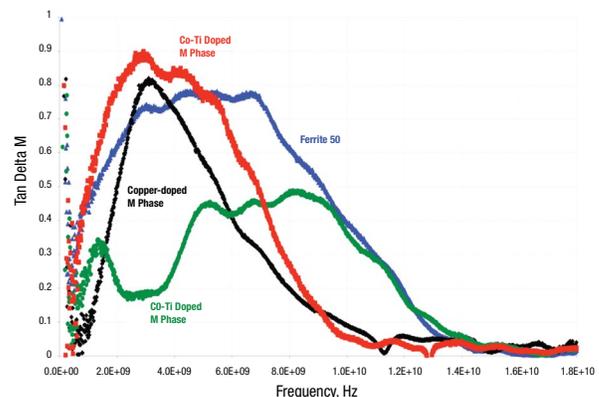
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Hexagonal Ferrite-based Absorbers

- Broadband absorption due to high-loss resonance peaks
- Can adjust resonant frequency (range of absorption frequencies) with different chemistry
 - Co₂Z (1–10 GHz)
 - BaFe₁₁Mn₅Ti₅O₁₉ M phase (>10 GHz)

High Temperature Dielectric Absorber

- Now available



Properties of Currently Available RF Magnetic Absorbers

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