SKYWORKS®

DATA SHEET

Basic Dielectric Materials

Bulk Microwave Dielectrics

Trans-Tech offers a broad range of ceramic materials that are not characterized for resonator applications, but for bulk, miscellaneous shapes, or substrates. Typical applications include patch antenna substrates, matching structures for circulators and isolators, and miscellaneous support structures. Because such applications are non-resonant, temperature coefficient of resonant frequency does not apply. We list the temperature-dependent coefficients of dielectric constant and linear expansion.

The Magnesium Aluminum Titanate (SMAT) and Magnesium Calcium Titanate (MCT) series are notably easier to machine than most microwave ceramics, and may be more suitable for applications requiring precision machining.

D-4, or Corderite, is a very hard ceramic noted for its low temperature coefficient of expansion which approaches the metal alloy Invar. It is not suitable for substrates. It is occasionally used for dielectric resonator supports due to its low dielectric constant and/or low thermal expansion rate.

Temperature Stable Dielectrics can be found in the *Temperature Stable Materials* catalog. Please call a Trans-Tech sales representative for a catalog.

Bars and rods are available for all material types. contact the factory for custom sizes and shapes.

Basic Dielectrics

Composition and Type Number	Dielectric Constant (ε')	Dielectric Loss Tangent (E'/ε")	Temperature Coefficient Dielectric Constant ($°C^{-1}$) (Nominal Value)	Temperature Coefficient of Thermal Expansion ($°C^{-1}$) (Nominal Value)	Thermal Conductivity ($Cal/cm^2/cm/sec/°C$) ($°C^{-1}$) (Nominal Value)	Density (G/cm^3) (Nominal Value)	Water Absorption (%) (Nominal Value)
D-4 Cordierite	4.5 ± 0.2 @ 9.4 GHz	< 0.0002	$+55 \times 10^{-6}$	2.00×10^{-6}	0.007	2.45	–
DS-6 Forsterite	6.3 ± 0.3 @ 9.4 GHz	< 0.0002	$+107 \times 10^{-6}$	10.00×10^{-6}	0.009	2.89	0.6
D-15 Mg-Ti	15.0 ± 0.5 @ 9.4 GHz	< 0.0002	$+98 \times 10^{-6}$	7.50×10^{-6}	0	3.5	–
D-16 Mg-Ti	16.0 ± 0.5 @ 9.4 GHz	< 0.0002	$+98 \times 10^{-6}$	7.50×10^{-6}	0.01	3.6	0
D-38 Ba-Ti	37.0 ± 5% @ 6.0 GHz	< 0.0005	-25×10^{-6}	9.40×10^{-6}	0.01	4.4	0.3
D-50 Ba-Ti	50.0 ± 5% @ 6.0 GHz	< 0.0005	-250×10^{-6}	7.50×10^{-6}	0.01	4.35	–
D-100 Titania	100.0 ± 5% @ 6.0 GHz	< 0.0010	-575×10^{-6}	7.50×10^{-6}	0.01	3.9	0.1

Magnesium Aluminum Titanate

Composition and Type Number	Dielectric Constant (ε')	Dielectric Loss Tangent (E'/ε")	Temperature Coefficient Dielectric Constant ($°C^{-1}$) (Nominal Value)	Temperature Coefficient of Thermal Expansion ($°C^{-1}$) (Nominal Value)	Thermal Conductivity ($Cal/cm^2/cm/sec/°C$) ($°C^{-1}$) (Nominal Value)	Density (G/cm^3) (Nominal Value)	Water Absorption (%) (Nominal Value)
SMAT-9	9.0 ± 0.3 @ 9.4 GHz	<.00015	$+100 \times 10^{-6}$	7.5×10^{-6}	0.025	3.46	0.1
SMAT-9.5	9.5 ± 0.3 @ 9.4 GHz	<.00015	$+100 \times 10^{-6}$	7.5×10^{-6}	0.025	3.46	0.1
SMAT-10	10.0 ± 0.5 @ 9.4 GHz	<.00015	$+100 \times 10^{-6}$	7.5×10^{-6}	0.025	3.46	0.1
SMAT-11	11.0 ± 0.5 @ 9.4 GHz	<.00015	$+100 \times 10^{-6}$	7.5×10^{-6}	0.025	3.46	0.1
SMAT-12	12.0 ± 0.5 @ 9.4 GHz	<.00015	$+100 \times 10^{-6}$	7.5×10^{-6}	0.025	3.46	0.1
SMAT-13	13.0 ± 0.5 @ 9.4 GHz	<.00015	$+100 \times 10^{-6}$	7.5×10^{-6}	0.025	3.46	0.1
SMAT-14	14.0 ± 0.5 @ 9.4 GHz	<.00015	$+100 \times 10^{-6}$	7.5×10^{-6}	0.025	3.46	0.1

Trans-Tech™
Ceramics and Advanced Materials

Magnesium Calcium Titanate

Composition and Type Number	Dielectric Constant (ε')	Dielectric Loss Tangent (E'/ε")	Temperature Coefficient Dielectric Constant ($°C^{-1}$) (Nominal Value)	Temperature Coefficient of Thermal Expansion ($°C^{-1}$) (Nominal Value)	Thermal Conductivity ($Cal/cm^2/cm/sec/°C$) ($°C^{-1}$) (Nominal Value)	Density (G/cm^3) (Nominal Value)	Water Absorption (%) (Nominal Value)
MCT-18	18.0 ± 3% @ 9.4 GHz	<.0015	-70×10^{-6}	8.40×10^{-6}	0.01	3.47	0.1
MCT-20	20.0 ± 5% @ 9.4 GHz	≤.00004	-130×10^{-6}	8.60×10^{-6}	0.01	3.5	0.1
MCT-25	25.0 ± 5% @ 9.4 GHz	<.00015	-245×10^{-6}	8.90×10^{-6}	0.01	3.54	0.1
MCT-30	30.0 ± 5% @ 9.4 GHz	≤.001	-370×10^{-6}	9.20×10^{-5}	0.01	3.59	0.1
MCT-40	40.0 ± 5% @ 6.0 GHz	<.0015	-580×10^{-6}	9.50×10^{-6}	0.01	3.62	0.1
MCT-50	50.0 ± 5% @ 6.0 GHz	<.0015	-730×10^{-6}	9.70×10^{-6}	0.01	3.65	0.1
MCT-55	55.0 ± 5% @ 6.0 GHz	<.0015	-800×10^{-6}	9.80×10^{-6}	0.01	3.68	0.1
MCT-70	70.0 ± 5% @ 6.0 GHz	<.0015	-960×10^{-6}	10.0×10^{-6}	0.01	3.7	0.1
MCT-85	85.0 ± 5% @ 6.0 GHz	<.0015	-1070×10^{-6}	10.1×10^{-6}	0.01	3.75	0.1
MCT-100	100.0 ± 5% @ 6.0 GHz	<.0015	-1120×10^{-6}	10.3×10^{-6}	0.01	3.78	0.1
MCT-115	125.0 ± 5% @ 6.0 GHz	<.0015	-1120×10^{-6}	10.4×10^{-6}	0.01	3.8	0.1
MCT-125	125.0 ± 5% @ 6.0 GHz	<.0015	-1200×10^{-6}	10.7×10^{-6}	0.01	3.85	0.1
MCT-140	140.0 ± 10% @ 6.0 GHz	<.0015	$+1180 \times 10^{-6}$	10.5×10^{-6}	0.01	3.83	0.1

Contact and Ordering Information

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