

CERAMIC MATERIAL PROPERTIES

Properties	Units	Test	Aluminas Al ₂ O ₃				ZrO ₂		ZTA	AlN			Si ₃ N ₄ *	SiC*	Machinable Ceramics*		
			KMT-97	KMT-998	KI-A	KMT-999	KMT-ZrO ₂ Y	KMT-ZrO ₂ Mg	KMT-ZTA85	KMT-AN180	KMT-AN200	KMT-AN220	KMT-SiN	KMT-SSiC	KMT-SiSiC	KMT-MC	
Material Name			KMT-97	KMT-998	KI-A	KMT-999	KMT-ZrO ₂ Y	KMT-ZrO ₂ Mg	KMT-ZTA85	KMT-AN180	KMT-AN200	KMT-AN220	KMT-SiN	KMT-SSiC	KMT-SiSiC	KMT-MC	
Color			White	Ivory	Ivory	Ivory	White	Yellow/White	White	Gray	Gray	Beige	Black	Black	Black	White	
Primary Material Content			97% Al ₂ O ₃	99.8% Al ₂ O ₃	99.8% Al ₂ O ₃	99.9% Al ₂ O ₃	95% ZrO ₂	96.5% ZrO ₂	85% Al ₂ O ₃	96% AlN	96% AlN	97% AlN	—	—	—	—	
Characteristics			Metallization, Wear Resistance	Excellent anti-plasma properties, high wear resistance			High mechanical strength, good wear and heat resistance	High mechanical strength and toughness, good wear and corrosion resistance. Good thermal shock resistance	Enhanced fracture toughness, good mechanical strength, wear and corrosion resistance	High thermal conductivity, excellent thermal shock and plasma resistance			Lightweight, high wear resistance, and high heat resistance	High temperature strength, high chemical resistance, good thermal conductivity	Good chemical and abrasion resistance	Precision machinability, excellent electrical and heat insulative properties	
Applications			IC packaging, electronic components, mechanical parts	Semiconductor equipment components, wear and corrosion components			Wear and heat-resistant components		Wear and heat resistant components where mechanical strength is needed at high operating temperatures	Heat dissipating components, plasma resistant components			Heat, wear, and corrosion resistant components	Semiconductor equipment, sealing, and anti-heat components	Abrasive and corrosion resistant components	Electrical and heat insulation components	
Bulk Density	g/cc	ASTM-C20	3.70	3.92	3.92	3.95	6.02	5.72	4.15	3.30	3.30	3.28	3.20	3.15	3.02	2.52	
Water Absorption	%	ASTM-C373	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Mechanical	Vickers Hardness (Load 500g)	GPa	ASTM-C1327-03	13.8	17.3	18.0	18.5	13.0	12.0	16.0	10.0	9.5	9.0	13.9	28.0	20.0	—
	Flexural Strength	MPa	ASTM-C1161-02c	350	350	350	350	1250	900	500	≥350	≥325	≥280	610	380	250	94
	Compressive Strength	MPa	ASTM-C773	2250	2450	2500	2600	5690	1900	2580	2500	2500	—	3850	3900	—	345
	Young's Modulus of Elasticity	GPa	ASTM-C1198-01	330	360	365	380	210	200	337	320	320	320	290	410	330	25.5
	Poisson's Ratio	—	ASTM-C1198-01	0.23	0.23	0.22	0.23	0.31	0.30	0.23	0.24	0.24	0.24	0.28	0.14	—	0.29
Fracture Toughness	MPa • m ^{1/2}	ASTM-C1421-01b (Kevron notched beam)	3	4 – 5	4 – 5	4 – 5	6 – 7	9 – 10	—	—	—	—	5	4	—	—	
Thermal	Coefficient of Linear Thermal Expansion, 40-400°C	x 10 ⁻⁶ /°C	ASTM-C372-94	7.1	8.2	8.1	8.2	10.0	9.0	7.0	4.8	4.6	4.5	2.6	4.0	4.5	9.0
	Thermal Conductivity, 20°C	W/(m • K)	ASTM-C408-88	25	30	32	32	3	3	24	180	200	220	23	120	45	1.46
	Specific Heat	J/(Kg•K) x10 ³	ASTM-E1269	0.78	0.80	0.80	0.78	0.46	0.47	—	0.74	0.74	0.76	0.66	0.65	—	0.79
	Thermal Shock Resistance	°C	Note 1	200	220	220	220	—	350	—	—	—	—	550	—	—	—
Electrical	Volume Resistivity, 20°C	Ω • cm	ASTM-D257-99	> 10 ¹⁴	> 10 ¹⁵	> 10 ¹⁵	> 10 ¹⁵	—	> 10 ¹¹	—	≥ 10 ¹⁴	≥ 10 ¹⁴	≥ 10 ¹³	≥ 10 ¹⁴	10 ² – 10 ⁶	—	≥ 10 ¹⁷
	Dielectric Strength	KV/mm	ASTM-D149-97	16	17	17	17	—	—	—	≥ 15	≥ 15	≥ 15	13	—	—	45
	Dielectric Constant, 1 MHz	—	ASTM-D150-98 (1 MHz)	9.0	9.8	9.8	9.7	—	—	—	9.0	8.8	8.6	—	—	—	6.01
	Loss Tangent	(x 10 ⁻⁴)	ASTM-D150-98 (1 MHz)	3.0	1.0	1.0	1.0	—	—	—	5.0	5.0	3.0	—	—	—	4.0
Chemical	Nitric Acid 60%, 90°C	WT Loss (mg/cm ² /day)	—	< 0.12	< 0.05	—	—	0.0	—	—	—	—	—	< 1.0	—	—	—
	Sulphuric Acid 95%, 95°C	—	—	< 0.30	< 0.23	—	—	< 0.04	—	—	—	—	—	< 0.40	—	—	—
	Caustic Soda 30%, 80°C	—	—	< 0.90	< 0.04	—	—	< 0.08	—	—	—	—	—	< 0.36	—	—	—