CERAMIC MATERIAL PROPERTIES

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OXIDES

NON-OXIDES

Properties		Temp.	Units	Test	Aluminas Al_2O_3				ZrO_2		ZTA	TiO_2	AlN			Si_3N_4	SiC		
Material Name					KMT-97	KMT-998	K1	KMT-999	KMT-ZrO_2 (YTZP)	KMT-ZrO_2 (YTZP-MS)	KMT-ZTA85	KMT-TiO	KMT-AlN (A1)	KMT-AlN180 (T)	KMT-AlN (P1)	KMT-SiN	KMT-SSiC	KMT-SSiC (P)	KMT-SiSiC
Primary Material Content			weight %	GDMS	>96% Al_2O_3	>99.8% Al_2O_3	>99.8% Al_2O_3	>99.9% Al_2O_3	>95% ZrO_2	>95% ZrO_2	>85% Al_2O_3	>99.9 TiO_2	>96% AlN	>96% AlN	>99.5% AlN	>90% SiN	>99.9% SiC	>99.96% SiC	—
Characteristics					Metallizable, wear resistance.	Excellent wear and heat resistance. Good electrical insulation and dielectric strength, low dielectric loss. High corrosion and plasma resistance.			Excellent mechanical strength and fracture toughness. Good wear and heat resistance.	Best mechanical strength and toughness. Good wear and corrosion resistance. Good resistance to thermal shock.	Enhanced fracture toughness, good mechanical strength, wear and corrosion resistance.	High purity, good electrostatic dissipation.	Optimal thermal conductivity. Excellent thermal shock and plasma resistance. High electrical resistivity. Good thermal and electrical stability.			Lightweight, high wear resistance, and high heat resistance.	High thermal strength, good thermal conductivity, high chemical resistance.	Higher purity, thermal conductivity, and volume resistivity. High corrosion resistance.	Excellent corrosion and abrasion resistance.
Applications					Electrical insulators, metallized ceramic parts	Semiconductor, FPD equipment components, wear and corrosion components. Telecommunications, laser, fluid handling, and powder processing.			Bearings, medical components, wear and heat-resistant components, valves, wire manufacturing, tooling, oil & gas, oxygen sensors		Wear and heat resistant components where mechanical strength is needed at high operating temperatures	Electrostatic dissipative material.	Semiconductor manufacturing equipment, heat dissipating components, plasma resistant components, electrical insulators, substrates			Heat, wear, and corrosion resistant components, bearings, seals, focus rings, valves.	Semiconductor equipment components.	Semiconductor equipment, sealing, and anti-heat components.	Abrasive and corrosion resistant components, automotive.
Bulk Density			g/cc	ASTM-C20	3.70	3.92	3.92	3.95	6.02	6.06	4.16	4.20	3.30	3.30	3.26	3.262	3.14	3.15	3.02
Water Absorption			%	ASTM-C373	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mechanical	Vickers Hardness (Load 500g)		GPa	ASTM-C1327	>16	>17	>16	>19	>12	>12	>17	>8	>10	>9	>10	>15	>25	>26	>20
	Flexural Strength		MPa	ASTM-C1161	350	370	380	400	760	1286	434	150	468	405	384	—	360	400	250
	Compressive Strength		MPa	ASTM-C773	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Young's Modulus of Elasticity		GPa	ASTM-C848	330	386	390	390	330	—	315	—	—	327	—	314	400 (ASTM-C1198)	400 (ASTM-C1198)	330 ASTM-C1198)
	Poisson's Ratio		—	ASTM-C848	0.23	0.23	0.24	0.25	—	—	0.25	—	—	0.23	—	0.28	—	—	—
	Fracture Toughness		MPa • m^{12}	ASTM-C1421	3.0	4.0— 5.0	4.0 — 5.0	4.0 — 5.0	11.5	11.8	6.2	2.7	4.0	4.2	3.5	6.9	—	—	—
Thermal	Coefficient of Linear Thermal Expansion	25 - 400°C	x 10^{-6}/°C	ASTM-C372	7.10	7.10	7.36	7.48	10.81	—	—	—	4.68	4.82	4.51	—	—	—	—
		25 - 800°C	x 10^{-6}/°C	ASTM-C372	—	—	8.15	8.22	—	—	—	—	5.34	5.58	5.25	3.30	—	—	—
	Thermal Conductivity	25°C	W/(m • K)	ASTM-E1461	25	34	32	31	3	—	21	6	178	181	84	34	140 (ASTM-C408)	170 (ASTM-C408)	45 (ASTM-C408)
	Specific Heat		J/(Kg•K) x10^3	ASTM-E1269	0.78	0.82	0.79	0.76	0.35	—	0.69	0.66	0.76	0.72	0.65	0.66	—	—	—
	Thermal Shock Resistance		°C	Note 1	200	220	220	220	—	350	—	—	—	—	—	550	—	—	—
Electrical	Volume Resistivity	25°C	Ω • cm	ASTM-D257	> 10^{14}	> 10^{14}	> 10^{14}	> 10^{14}	>10^{12}	—	> 10^{14}	1.5	≥10^{14}	≥10^{13}	≥10^{11}	≥ 10^{14}	10^6 — 10^8	≥10^8	—
	Dielectric Strength		KV/mm	ASTM-D149	16	16	16	16	14	—	—	—	17.56	16.80	21.79	34	—	—	—
	Dielectric Constant		—	ASTM-D150	9.0	8.0	10.7	10.4	29	—	—	—	8.7	8.8	8.9	—	—	—	—
	Dielectric Loss		13.56 MHz	ASTM-D150	—	3x10^{-3}	2.8x10^{-3}	≤5.0x10^{-4}	2.9x10^{-3}	—	—	—	5x10^{-4}	4x10^{-4}	1.7x10^{-4}	—	—	—	—

NOTE: This chart illustrates typical properties. Data may vary with size of part, shape of part, and the manufacturing method employed. Data contained herein is not to be construed as absolute and does not constitute a representation or warranty for which KemaTek assumes legal responsibility.