



Semiconductor Oxides Material Properties

				High-Purity Aluminas						Other Oxides				
				AD-995-I2	AD-995-LT	AD-995-I4	AD-996-SI	PLASMAPURE™ AD-998-I2	PLASMAPURE-UC™ SA-999-I	SAPPHAL™	STATSAFE™ ADC-92	FUSED QUARTZ	EXYRIA™ BULK YTTRIA	
PROPERTIES*				Nom. 99.5% Al ₂ O ₃	Nom. 99.5% Al ₂ O ₃	Min. 99.5% Al ₂ O ₃	Min. 99.5% Al ₂ O ₃	Min. 99.8% Al ₂ O ₃	Min. 99.9% Al ₂ O ₃	Min. 99.9% Al ₂ O ₃	Nom. 92% Al ₂ O ₃	Min. 99.99% SiO ₂	Min. 99.9% Y ₂ O ₃	
UNITS		TEST												
GENERAL	Bulk Density	g/cm ³	ASTM-C20	3.90	3.90	3.90	3.90	3.92	3.92	3.98	3.85	2.20	4.95	
	Grain Size	Average	ASTM-E112	6	6	6	6	6	3	20	6	NA	30	
Range		μm		0.7 - 35	0.7 - 35	0.5 - 35	0.5 - 35	0.5 - 35	0.4 - 32	2.0 - 50	1.0 - 40	NA	10 - 70	
MECHANICAL	Flexural Strength (MOR)	3-Point	ASTM-C1161	380	380	380	380	390	400	350	300	125	140	
		4-Point		MPa	300	300	320	320	320	360	285	230	104	100
MECHANICAL	Fracture Toughness	K _{IC}	Knoop 1000 g	4 - 5	4 - 5	4 - 5	4 - 5	4 - 5	4 - 5	4 - 5	3 - 4	1	1	
	Hardness (Vickers)	500g	ASTM-C1327	16	16	16	16	18	18	18	12	6	7	
1000g		GPa		16	16	16	16	17	17	17	12	5	6	
MECHANICAL	Elastic Modulus	GPa	ASTM-C848	370	370	380	380	380	386	390	370	72	170	
	Poisson's Ratio	—	ASTM-C848	0.22	0.22	0.22	0.22	0.22	0.22	0.24	0.23	0.16	0.28	
THERMAL	Coefficient of Thermal Expansion	RT-400°C	ASTM-C372	7.4	7.4	7.0	7.0	7.0	6.9	7.0	7.5	0.7	7.0	
		RT-800°C		ppm/°C	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.1	0.5	7.7
		RT-1000°C		8.2	8.2	8.2	8.2	8.2	8.2	8.3	8.3	0.4	7.9	
THERMAL	Thermal Conductivity	25°C	ASTM-C408	30	30	30	30	31	33	35	25	1.3	15	
	Specific Heat	25°C	ASTM-E1269	800	800	800	800	800	800	800	800	750	450	
ELECTRICAL	Dielectric Strength	1mm	ASTM-D116	400	400	400	400	420	470	470	NA	800	420	
	Dielectric Constant	1 MHz	ASTM-D150	9.7	9.8	9.8	9.8	9.8	9.8	10	NA	3.8	11.5	
		5 GHz	TE ₀₁₁ Resonant Mode	9.8	9.8	9.8	9.8	9.8	9.8	10	NA	3.8	11.5	
	Dielectric Loss (tan δ)	1 MHz	ASTM-D150	1 x 10 ⁻⁴	<1 x 10 ⁻⁴	2 x 10 ⁻⁴	<1 x 10 ⁻⁴	<1 x 10 ⁻⁴	<1 x 10 ⁻⁴	1 x 10 ⁻³	NA	<1 x 10 ⁻⁴	<1 x 10 ⁻⁴	
		5 GHz	TE ₀₁₁ Resonant Mode	1 x 10 ⁻⁴	6.5 x 10 ⁻⁵	2 x 10 ⁻⁴	5 x 10 ⁻⁵	2 x 10 ⁻⁵	1 x 10 ⁻⁵	1 x 10 ⁻³	NA	6 x 10 ⁻⁵	1.5 x 10 ⁻⁵	
	Volume Resistivity	25°C	Ω-cm	ASTM-D1829	>10 ¹⁴	>10 ¹⁴	>10 ¹⁴	>10 ¹⁴	>10 ¹⁴	>10 ¹⁵	>10 ¹⁵	1 x 10 ⁸	>10 ¹⁴	>10 ¹⁴
		300°C			2 x 10 ¹²	2 x 10 ¹²	5 x 10 ¹²	5 x 10 ¹²	1 x 10 ¹³	5 x 10 ¹³	1 x 10 ¹³	-	6 x 10 ¹²	1 x 10 ¹²
500°C		2 x 10 ¹⁰			2 x 10 ¹⁰	1 x 10 ¹¹	1 x 10 ¹¹	2 x 10 ¹¹	1 x 10 ¹²	8 x 10 ¹¹	-	3 x 10 ¹¹	1 x 10 ⁹	
600°C		1 x 10 ⁹			1 x 10 ⁹	2 x 10 ⁹	2 x 10 ⁹	1 x 10 ¹⁰	5 x 10 ¹¹	5 x 10 ¹¹	-	1 x 10 ¹¹	1 x 10 ⁷	
1000°C	2 x 10 ⁶	2 x 10 ⁶	1 x 10 ⁷	1 x 10 ⁷	2 x 10 ⁷	2 x 10 ⁷	1 x 10 ⁸	1 x 10 ¹⁰	-	9 x 10 ⁹	4 x 10 ⁵			

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*The chart is intended to illustrate typical properties. Property values vary with method of manufacture, size, and shape of part. Data contained herein is not to be construed as absolute and does not constitute a representation or warranty for which CoorsTek assumes legal responsibility. Close control of values of most properties can be maintained if specified.

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