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THE CERAMIC EXPERTS

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MATERIAL DATA



E L E C T R O N I C S

Material properties of Rubalit[®],
Alunit[®], Zirkolit[®] and Sinalit[®]

Advanced Ceramics for Electronic Applications

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T H E C E R A M I C E X P E R T S

Material Properties of Rubalit®, Alunit®, Zirkolit® and Sinalit®



Property	Definition Property	Unit	Range	Rubalit® 708 D**	Rubalit® 708S C***	Rubalit® 708 HP C***	Rubalit® 710F C***	Rubalit® ZTA***	Thomit® 600 D**	Alunit® AlN 170 C***	Alunit® AlN 170 D**	Alunit® AlN HP***	Sinalit® Si ₃ N ₄ *** Launch in 2024	Zirkolit® ZrO ₂ 5Y C***	
Al ₂ O ₃ content		[wt-%]	≥	95.8	96.0	96.0	+/- 99.6	90 +/- 1.2	45.0						
Surface roughness R _a	@ as fired surface	[µm]	≤	0.8	0.6	0.6	0.12	0.4	0.9	0.6	1.0	0.4	0.5	0.2	
Density		[g/cm ³]	≥	3.73	3.73	3.73	3.80	3.95		3.26	3.28	3.34	3.2	5.7	
Bending strength DR sigma 0 (double ring method)	0.32 mm; thickness @ rings 6 / 12 mm 0.50 mm; thickness @ rings 6 / 12 mm 0.63 mm; thickness @ rings 6 / 12 mm 1.00 mm; thickness @ rings 6 / 12 mm 1.00 mm; thickness @ rings 7 / 14 mm 1.50 mm; thickness @ rings 6 / 12 mm	[MPa] [MPa] [MPa] [MPa] [MPa] [MPa]	≥ ≥ ≥ ≥ ≥ ≥	300 300	450	450	420 420	625	130	320 320		450	450	700	800
Coefficient of thermal expansion (CTE)	@ 100°C – 200°C	[10 ⁻⁶ /K]	+/-		6.0 – 8.0	6.0 – 8.0	6.0 – 8.0		5.0 – 7.0	3.7 – 5.7	3.5 – 5.5	3.7 – 5.7	2.3	9 – 12	
	@ 100°C – 300°C	[10 ⁻⁶ /K]	+/-		6.0 – 8.0	6.0 – 8.0	6.0 – 8.0	6.3 – 8.5	5.0 – 7.0	3.7 – 5.7	4.0 – 6.0	3.7 – 5.7	2.5	9 – 12	
	@ 100°C – 600°C	[10 ⁻⁶ /K]	+/-		6.7 – 8.7	6.7 – 8.7	6.7 – 8.7	6.4 – 8.6	5.5 – 7.5	4.5 – 5.9	4.5 – 6.5	4.5 – 5.9	3.1	9 – 12	
	@ 100°C – 800°C	[10 ⁻⁶ /K]	+/-		7.0 – 9.0	7.0 – 9.0	7.0 – 9.0	6.9 – 10.3	5.5 – 7.5	4.8 – 6.2	4.6 – 6.7	4.8 – 6.2	3.3	9 – 12	
Dielectric constant (@ Ra ≤ 0.4 µm)	@ 1 GHz @ 2mm thickness	-/-	+/-	8.3 – 11.3	8.3 – 11.3	8.3 – 11.3	8.5 – 11.5	10.5 (@1 Mhz)		7.2 – 9.8		8.5 (@1 MHz)	8.3 (@1 MHz)		
	@ 10 MHz @ 2mm thickness	-/-	+/-	8.3 – 11.3	8.3 – 11.3	8.3 – 11.3	8.5 – 11.5			7.2 – 9.8					
	@ 100 MHz @ 2mm thickness	-/-	+/-	8.3 – 11.3	8.3 – 11.3	8.3 – 11.3	8.5 – 11.5			7.2 – 9.8					
Dielectric loss factor (@ Ra ≤ 0.4 µm)	@ 1 GHz @ 2mm thickness	[10 ⁻³]	≤	10	10			5 (@1 Mhz)		10		10 (@1 MHz)	3 (@1 MHz)		
	@ 10 MHz @ 2mm thickness	[10 ⁻³]	≤	10	10					10					
	@ 100 MHz @ 2mm thickness	[10 ⁻³]	≤	10	10					10					
Dielectric strength	@ 0.320 mm thickness	[kV/mm]	≥					25					25		
	@ 0.500 mm thickness	[kV/mm]	≥							15					
	@ 0.635 mm thickness	[kV/mm]	≥		15	15	15			15		15		10	
	@ 1.000 mm thickness	[kV/mm]	≥						15						
Specific heat capacity	@ 100°C	[J/g K]	≥	0.9	0.7	0.8	0.8			0.7	0.7	0.7	0.7	0.4	
	@ 20°C	[J/g K]	≥	0.7	0.7	0.7	0.7	0.7		0.6	0.6	0.6	0.6	0.3	
Thermal conductivity*	@ 20°C @ Xe-flash @ sample 16*16 mm ² @ material specific thickness ≤ 3.5 mm	[W/mK]		22.0	22.0	22.0	25.0	26.0	2.0	170	170	170	80	1.5	
Volume resistivity	@ 20°C	[Ohm cm]	≥	10 ¹³	10 ¹³	10 ¹³	10 ¹³	10 ¹⁴		10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	
	@ 200°C	[Ohm cm]	≥	10 ¹¹	10 ¹¹	10 ¹¹	10 ¹¹			10 ¹³	10 ¹³	10 ¹¹			
	@ 400°C	[Ohm cm]	≥	10 ⁹	10 ⁹	10 ⁹	10 ⁹			10 ¹²	10 ¹²	10 ⁹			
	@ 600°C	[Ohm cm]	≥	10 ⁷	10 ⁷	10 ⁷	10 ⁷			10 ⁹	10 ⁹	10 ⁹			
	@ 800°C	[Ohm cm]	≥		10 ⁷	10 ⁷	10 ⁷			10 ⁹		10 ⁸			
Chemical composition		-/-		The material main component is Al ₂ O ₃ . Remainer mainly consists of MgO, SiO ₂ and CaO and traces of other elements.	The material main component is Al ₂ O ₃ . Remainer mainly consists of MgO, SiO ₂ and CaO and traces of other elements.	The material main component is Al ₂ O ₃ . Remainer mainly consists of MgO, SiO ₂ and CaO and traces of other elements.	The material main component is Al ₂ O ₃ . Remainer mainly consists of MgO and traces of other elements.	The material main components are Al ₂ O ₃ and ZrO ₂ . Additional component is Y ₂ O ₃ . Remainer mainly consists of MgO, SiO ₂ and CaO and traces of other elements.	The material main components are Al ₂ O ₃ and SiO ₂ . Additional components are BaO and traces of other elements.	The material main component is AlN. Additional components are Y ₂ O ₃ and traces of other elements.	The material main component is AlN. Additional components are Y ₂ O ₃ and traces of other elements.	The material main component is AlN. Additional components are Y ₂ O ₃ and traces of other elements.	The material main component is Si ₃ N ₄ . Additional components are Y ₂ O ₃ , MgO, ZrO ₂ , and traces of other elements.	The material main component is ZrO ₂ . Additional components are Y ₂ O ₃ and traces of other elements.	

* typical value based on a measurement precision of +/- 10%

** Dry pressed

*** Tape casted

Indexes and parameters for ceramic substances

In order to profile ceramic substances certain parameters are indicated. The crystalline nature of these substances, statistical fluctuations in the composition of the substances and in the factors that impact on the production processes indicate that the figures quoted are typically mean values and hence the substance parameters quoted in this brochure are only standard, recommended or guide values that might differ given dissimilar dimensions and production processes.