



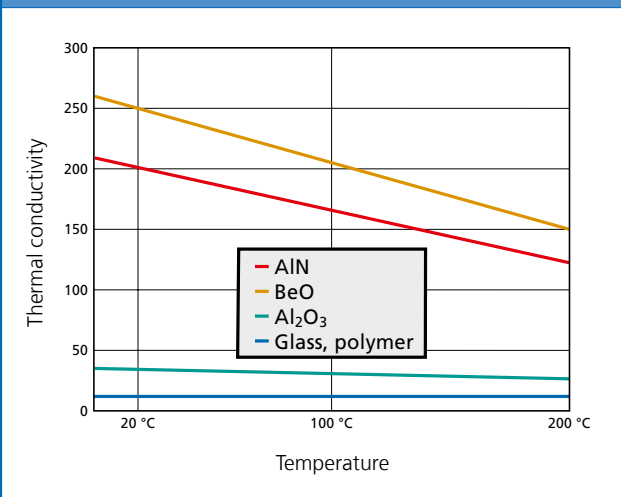
Alunit® – The Cool Solution for Electronic Power

Extracting maximum power from minimum space inevitably means that the electronic componentry develops higher and higher temperatures. To protect these components, heat needs to be dissipated quickly and reliably. This is where aluminum nitride ceramic Alunit® sets new standards.

With its outstanding power insulating properties and extremely high heat conductivity (170 W/mK), Alunit® is perfect for higher-power electronic applications. Alunit® allows the assembly of compact and cost-effective components and hybrids with high integration density. Excellent mechanical strength and a low thermal coefficient of expansion permit problem-free systems integration.

CeramTec manufactures substrates and other components in two surface finishes: Ground and polished – each and every one well suited for thin-film and thick-film applications. Dedicated manufacturing technologies assure maximum quality.

**Thermal conductivity comparison:
Plastics, Al₂O₃ and AlN.**



MANUFACTURING TECHNOLOGIES

- Tape Casting
- Dry Pressing
- Extrusion
- Lasering
- Metallizing

APPLICATIONS

- Power Electronics
- IGBT Modules
- Telecommunications
- Cooling Devices
- Passive Components
- DCB (Direct Copper Bonding)
- LEDs

Alunit® – Advanced ceramics for power electronics

Property	Testing Method	Unit		Alunit AIN 170 C	Alunit AIN 170 D	Alunit AIN 200 C
Surface roughness Ra	@ as fired surface	[µm]	≤	0,60	0,80	0,60
Bending strength DR sigma 0	double ring method @ 0,63 mm substrate @ rings 6 / 12 mm	[MPa]	≥	320	–	300
Bending strength DR sigma 0	double ring method @ 1,00 mm substrate @ rings 7 / 14 mm	[MPa]	≥	–	280	–
Coefficient of thermal expansion (CTE)	@ 100°C bis 200°C	[10 ⁻⁶ /K]	+/-	3,70 - 5,70	3,70 - 5,70	3,70 - 5,70
Coefficient of thermal expansion (CTE)	@ 100°C bis 300°C	[10 ⁻⁶ /K]	+/-	3,70 - 5,70	3,70 - 5,70	3,70 - 5,70
Coefficient of thermal expansion (CTE)	@ 100°C bis 600°C	[10 ⁻⁶ /K]	+/-	4,50 - 5,90	4,50 - 5,90	4,50 - 5,90
Coefficient of thermal expansion (CTE)	@ 100°C bis 800°C	[10 ⁻⁶ /K]	+/-	4,80 - 6,20	4,80 - 6,20	4,80 - 6,20
Density		[g/cm ³]	≥	3,23	3,20	3,23
Dielectric constant	@ 1 GHz @ 2mm thickness @ Ra ≤ 0,4µm	-/-	+/-	7,2 - 9,8	7,2 - 9,8	7,2 - 9,8
Dielectric constant	@ 10 MHz @ 2mm thickness @ Ra ≤ 0,4µm	-/-	+/-	7,2 - 9,8	7,2 - 9,8	7,2 - 9,8
Dielectric constant	@ 100 MHz @ 2mm thickness @ Ra ≤ 0,4µm	-/-	+/-	7,2 - 9,8	7,2 - 9,8	7,2 - 9,8
Dielectric loss factor	@ 1 GHz @ 2mm thickness @ Ra ≤ 0,4µm	[10 ⁻³]	≤	5,0	5,0	5,0
Dielectric loss factor	@ 10 MHz @ 2mm thickness @ Ra ≤ 0,4µm	[10 ⁻³]	≤	5,0	5,0	5,0
Dielectric loss factor	@ 100 MHz @ 2mm thickness @ Ra ≤ 0,4µm	[10 ⁻³]	≤	5,0	5,0	5,0
Dielectric strength	@ 0,635 mm thickness	[kV/mm]	≥	15,0	–	15,0
Material class according DIN EN 60672		-/-		C 910	C 910	C 910
Modules of elasticity		[GPa]	≥	320	320	320
Specific heat capacity	@ 100°C	[J/kg K]	≥	0,72	0,72	0,72
Specific heat capacity	@ 20°C	[J/kg K]	≥	0,60	0,60	0,60
Thermal conductivity	@ 20°C	[W/mK]	≥	170	170	200
Volume resistivity	@ 20°C	[Ohm x cm]	≥	1,0E+14	1,0E+14	1,0E+14
Volume resistivity	@ 200°C	[Ohm x cm]	≥	1,0E+13	1,0E+13	1,0E+13
Volume resistivity	@ 400°C	[Ohm x cm]	≥	1,0E+12	1,0E+12	1,0E+12
Volume resistivity	@ 600°C	[Ohm x cm]	≥	1,0E+9	1,0E+9	1,0E+9
Water absorption		[wt-%]	≤	0,1	0,1	0,1
Comments		-/-		Note: The precision of thermal conductivity measurement is +/- 10% The precision of water absorption measurement is +/- 0,15% AIN 170 C + 200 C: C = Casting AIN 170 D: D = Dry Pressing		

Unrivaled: Largest Dimensions		
Width	Length	Thickness
5.5 inch 138 mm	7.5 inch 190.5 mm	0.010–0.060 inch 0.25 to 1.5 mm
New: X-Large substrates available, e.g. 145 x 290 mm or wafer up to 12 inch!		
Thicknesses of up to 40 mm possible for dimensions of 115 x 115 mm.		



The measured values mentioned before were determined for test samples and are applicable as standard values. The values were determined on the basis of DIN-/DIN-VDE standards and if these were not available, on the basis of CeramTec standards. The values indicated must not be transferred to arbitrary formats, components or parts featuring different surface qualities. They do not constitute a guarantee for certain properties. We expressly reserve the right to make technical changes.

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