

Advanced Ceramic Material Properties for the Electronics Industry

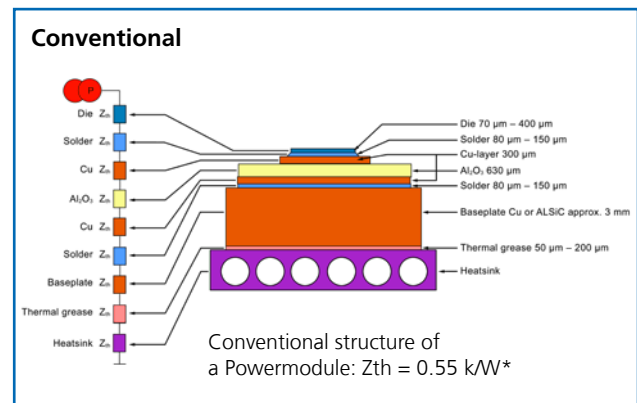
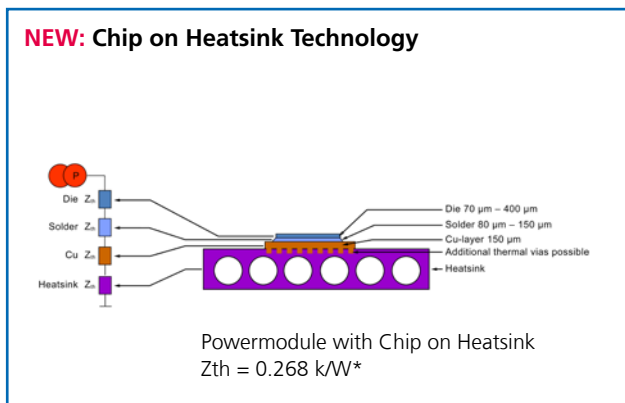


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THE CERAMIC EXPERTS

Ceramic base materials for the electronics industry

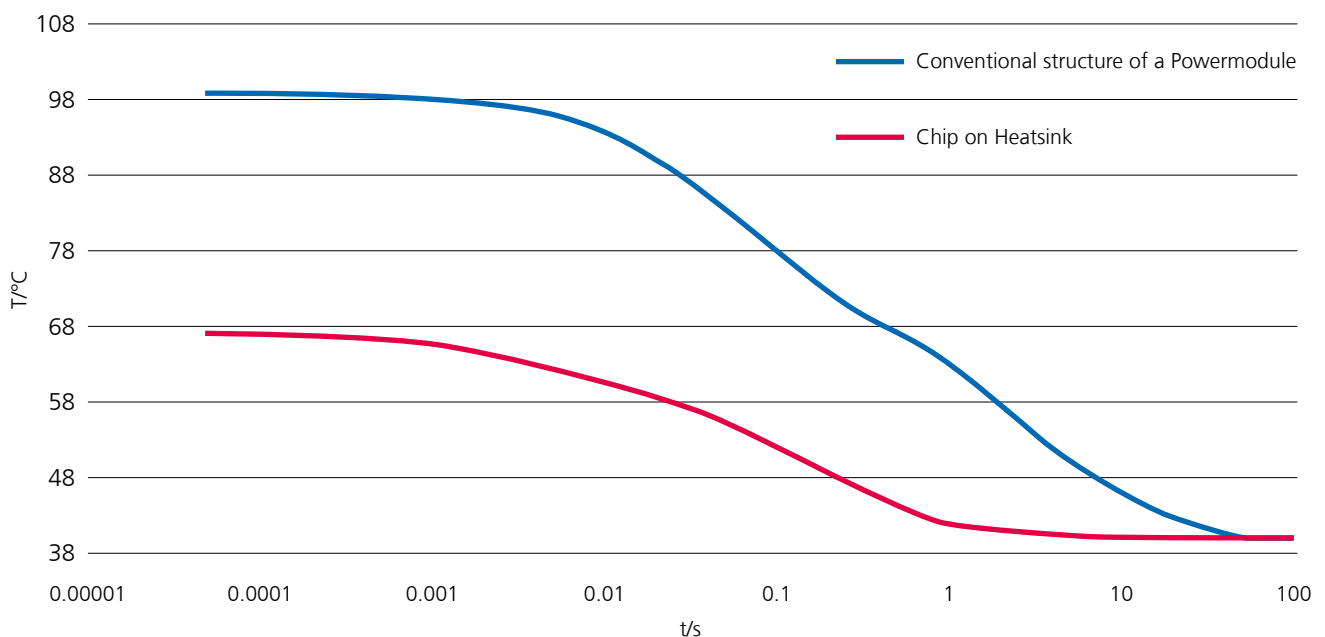
We offer the full range of ceramic base materials for the electronic manufacturers:

- **96% Alumina – Rubalit®7085**
For thick- and standard thinfilm applications
- **96% Alumina – Rubalit®HP**
For high thermal cycling performance
- **99% Alumina – Rubalit®710**
For highest quality thinfilm applications
- **Aluminiumnitride – Alunit®**
For high thermal power applications
- **Alumina with Zirkonia – Rubalit®HSS 25%**
For high mechanical strength applications
- **Zirkonit**
For extremely high mechanical strength requirements
- **Metallized ceramics**
Wide range of possibilities:
W – Ni – Au – Ag – Cu etc.
- **50%, 85%, 96%, 99% Alumina – Rubalit®600, 702, 708 and 710**
For cylindrical resistor cores



* Examination done by Fraunhofer IISB, Nuremberg

Comparison: Chip on Heatsink / Conventional structure of a Powermodule ($P_{in} = 100 \text{ W}$)



Functional Surfaces

Structured Copper Technology

1D, 2D and 3D metallization Materials

Rubalit® 708, Rubalit® 708S, Rubalit® 708HP, Rubalit® HSS, Alunit®

Materials and surface quality

Basic metallization	Metal plating Electroless	
Cu	Ni ($\geq 2 \mu\text{m} - 8 \mu\text{m}$)	Au flash (approx. $0.1 \mu\text{m}$), Pd Au
Cu	Ag	
W $\geq 6 \mu\text{m}$	Ni ($\geq 2 \mu\text{m} - 8 \mu\text{m}$)	Au flash (approx. $0.1 \mu\text{m}$), Pd Au
Ag $\geq 6 \mu\text{m}$	-	-
Au $\geq 6 \mu\text{m}$	-	-
Al $\geq 6 \mu\text{m}$	-	-
Other metallization on demand		

Property	Values
Options	Double side metallization; vias viafilling and dielectric layer on demand
Metallization Adhesion	$\geq 25 \text{ N/mm}^2$
Solder wettability	$\geq 95\%$
Solder mask	Available, on demand

Substrates

Materials and surface quality

	Typical R_a Value as fired	Content
Rubalit® 708 S	$< 0.6 \mu\text{m}$	$> 96\% \text{ Al}_2\text{O}_3$
Rubalit® 708 HP	$< 0.6 \mu\text{m}$	$> 96\% \text{ Al}_2\text{O}_3$
Alunit®	$\leq 0.8 \mu\text{m}$	AlN

Dimensions and tolerances

Property	Values
Dimensions	115.0 mm x 115.0 mm 115.0 mm x 165.0 mm 127.0 mm x 165.0 mm 138.0 mm x 190.5 mm 185.0 mm x 230.0 mm
Length and with (as fired) tolerance	$\pm 1.5\%$
Thickness	0.25 mm, 0.38 mm 0.50 mm, 0.63 mm 0.76 mm, 0.89 mm 1.00 mm, 1.27 mm
Thickness tolerance	$\pm 10\%$
Special thicknesses	from 0.1 mm up to 1.5 mm

Property	Values
Standard ceramic materials	Al_2O_3 (0.38 mm/0.5 mm/ 0.63 mm/1.0 mm) AlN (0.63 mm/1.0 mm) Others thicknesses on demand
Standard dimension of Mastercard	As fired 138.0 mm x 190.5 mm ($\pm 1.5\%$)
Standard usable design area	127.0 mm x 178.0 mm ($\pm 0.05\text{mm}$)
Cu layer thicknesses	17 μm up to 300 μm Layout related Other thicknesses on demand
Pitch	Min. 200 μm (copper thickness and layout related)
Flatness	Layout and material combination related
Plating	Ni (2 – 8 μm) NiAu (Au 0.03 – 0.15 μm) NiPdAu (Pd 0.05 – 0.1 μm) Ag
Cu surface	$R_t: \leq 50 \mu\text{m}$, $R_a: \leq 2 \mu\text{m}$ Lower roughness on demand
Lifetime (shock testing -55°C up to 150°C)	Al_2O_3 (0.32 mm – 0,38 mm) $> 1,000$ cycles AlN (0.63 mm) > 900 cycles
Solder wettability on Cu surface	SnAg preform, SnCuIn preform $\geq 95\%$ wetting
Thick wire bondability	300 μm Alumina wire AIH11 $> 1,000$ cN Shear force
Thin wire bondability (on NiPdAu surface)	25 μm Au wire > 30 cN Shear force
Vias and through connections	Possible, on demand
Multilayer	Up to 4 Layers
Printed resistors	Possible
Copperfree perimeter around holes	$A \geq 0.2 \text{ mm}$
Copperfree perimeter around single parts	$A \geq 0.25 \text{ mm}$
Peel strength	Min. 25 N/mm ²
Solderstop width	Min. 0.4 mm +/- 0.2 mm
Missmatch between solder mask and copper	+/- 0.2 mm
Delivery form	Mastercards or single pieces (min. dimension 15 mm edge length)
Tolerance of total thickness	+7%/-10%
Application temperature	-55°C/700°C

3D Products

Materials and surface quality

	Typical R _a Value as fired	Content
Rubalit® 708	≤ 0.8 μm	> 96% Al ₂ O ₃
Rubalit® 710	≤ 0.55 μm	> 99% Al ₂ O ₃
Alunit®	≤ 0.6 μm	
ZrO ₂	≤ 0.45 μm	

Parameters and tolerances

	Standard tolerances	Special tolerances
Length and width (as fired)	± 1% ¹	± 0.7% ²
Thickness	± 10%	± 7%
Hole diameter < 2 mm	± 0.05 mm	± 0.05 mm
Hole diameter 2 – 10 mm	± 0.10 mm	± 0.076 mm
Hole diameter > 10 mm	± 1%	± 0.7 mm
Distance between holes (center distance)	± 1% ¹	± 0.7% ²
Overall camber	0.4% of length	0.3% of length
Perpendicularity	± 0.5% ¹	
Parallelism	Quoted upon request	
Radii and corners	≤ 0.2%	

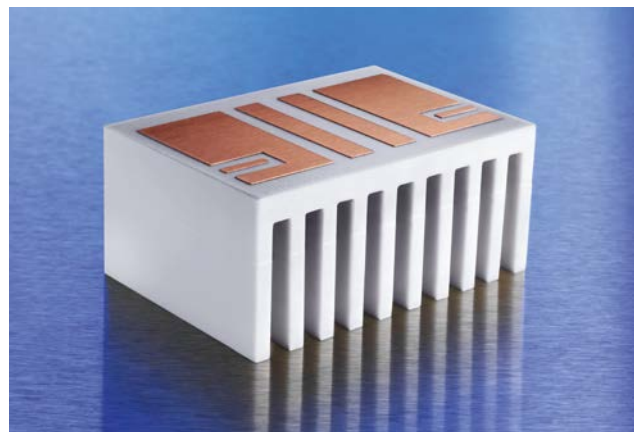
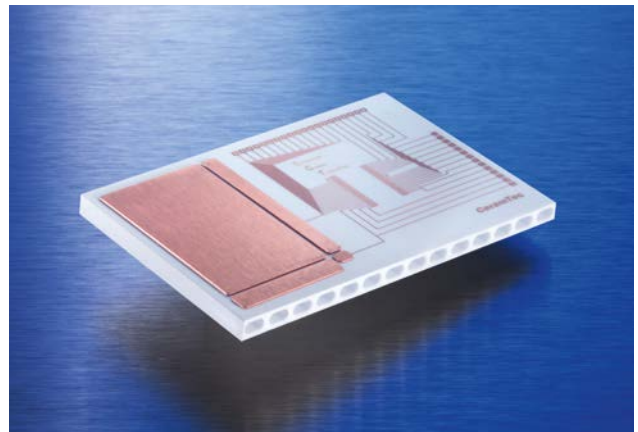
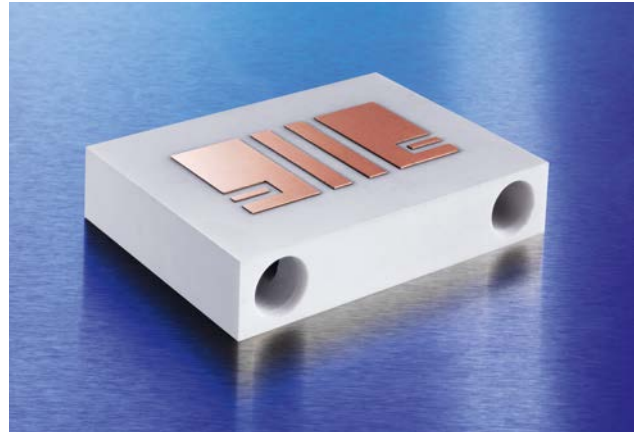
¹ but not less than +/- 0.1 mm

² but not less than +/- 0.05 mm

³ but not less than +/- 0.076 mm

Please see our data sheets for further information

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.



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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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