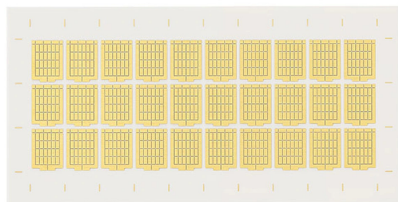


DPC Ceramic Substrates for Thermoelectric Coolers



Product ID / SKU: FWM/CS-DPC-005

Material: Ceramic / Plated Copper System

Product type: Ceramic Substrate

DPC metallized ceramic substrates for thermoelectric cooling-chip circuits and compact heat-management assemblies.

AlN DPC ceramic panel with electrode arrays

96% Alumina Substrate (708 S) Properties

Property	96% Al ₂ O ₃ - 708 S	Test conditions / measurement tolerance ±10%
Density (g/cm ³)	≥3.75	DIN EN 993-1
Bending strength, σ ₀ (MPa)	≥500	-
Young's modulus (GPa)	≥300	-
Thermal conductivity (W/(m·K))	24	Room temperature; DIN EN 821-2
Linear thermal expansion coefficient (10 ⁻⁶ /K)	7-9	100-800°C; DIN 51045-1
Specific heat capacity (J/(g·K))	≥0.75	20°C; DIN EN 821-3 method B
Relative permittivity	~9.8	Room temperature, 1 MHz; Ra ≤0.4 μm
Dielectric loss factor	≤0.005	Room temperature; 1 MHz; Ra ≤0.4 μm
Volume resistivity (Ω·cm)	≥10 ¹⁴	Room temperature; IEC 62631-3
Breakdown strength (kV/mm)	AC≥15; DC≥15	20°C; AC / DC
Fracture toughness (MPa·m ^{1/2})	≥3.0	Indentation-fracture (IF)

99.6% Alumina Substrate (710 C) Properties

Property	99.6% Al ₂ O ₃ - 710 C	Test conditions / measurement tolerance ±10%
Density (g/cm ³)	≥3.80	DIN EN 993-1
Bending strength, σ ₀ (MPa)	≥420	ASTM C1499-08
Young's modulus (GPa)	≥300	-
Thermal conductivity (W/(m·K))	≥25	Room temperature; DIN EN 821-2

Property	99.6% Al ₂ O ₃ - 710 C	Test conditions / measurement tolerance ±10%
Linear thermal expansion coefficient (10 ⁻⁶ /K)	7-9	100-800°C; DIN 51045-1
Specific heat capacity (J/(g·K))	≥0.65	20°C; DIN EN 821-3 method B
Relative permittivity	8.5-11.5	Room temperature, 1 MHz
Dielectric loss factor	≤0.010	Room temperature; 1 MHz; Ra ≤0.4 μm
Volume resistivity (Ω·cm)	≥10 ¹⁴	Room temperature; IEC 62631-3
Breakdown strength (kV/mm)	AC≥15; DC≥15	20°C; AC / DC
Fracture toughness (MPa·m ^{1/2})	≥3.0	Indentation-fracture (IF)

95% AlN Substrate Properties

Property	95% AlN typical value	Condition / method
AlN content (%)	95	-
Density (g/cm ³)	≥3.3	-
Flexural strength (MPa)	≥400	-
Thermal conductivity (W/(m·K))	≥170	Room temperature
Relative permittivity	8-10	1 MHz; room temperature
Dielectric loss tangent	≤0.0003	1 MHz; room temperature
Dielectric strength (kV/mm)	17	-
Volume resistivity (Ω·cm)	≥10 ¹⁴	-

Typical Construction Parameters

Construction item	Typical configuration	Applicable condition
Ceramic base	96% / 99.6% Al ₂ O ₃ or AlN	Surface preparation dependent
Copper thickness	10-130 μm	Plated thickness and pattern evaluated together
Line / space	Layout-dependent	Copper thickness, plating distribution and pattern geometry
Holes / vias	Laser holes and selected plated features	Aspect ratio and registration dependent
Surface finish	Ni/Au, Ni/Pd/Au or Ag examples	Finish stack matched to the attachment process