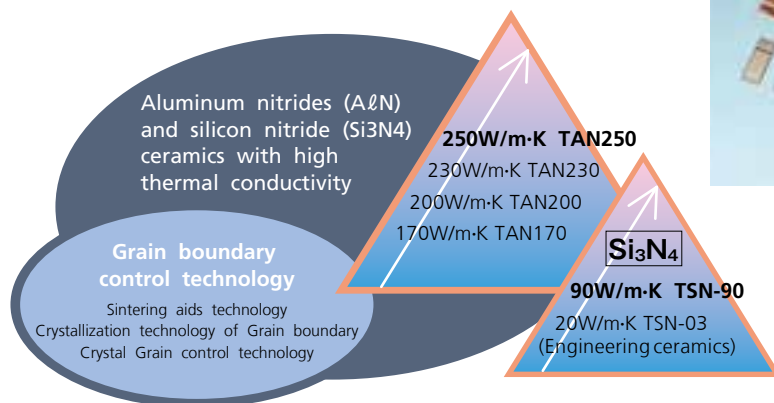
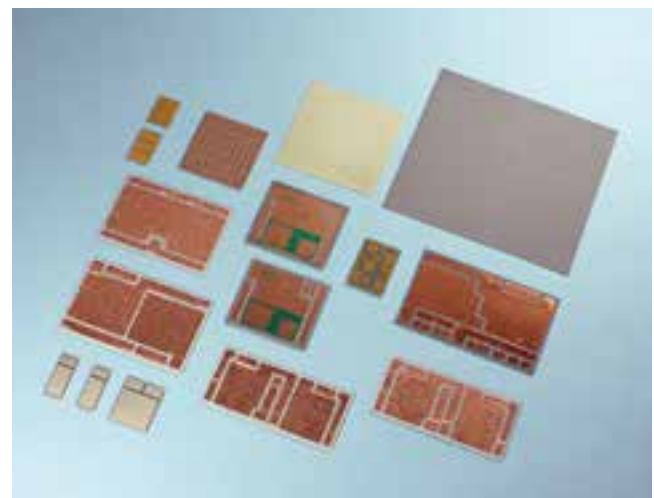


Fine Ceramics for Electronics

Aluminum nitride (AlN),
Silicon nitride (Si₃N₄) ceramics

Fine ceramic substrates with high thermal conductivity are becoming indispensable components under the circumstances needs for high power, high integration, slim and lightweight, high frequency and environmental friendliness prevail. We take advantage of one of our core technologies, the grain boundary control of ceramic microstructure, to produce the aluminum nitride (AlN) and the silicon nitride (Si₃N₄) substrates with the world highest thermal conductivity on a commercial basis.



Typical values for properties of fine ceramics for electronics

Item	Unit	Aluminum nitride (AlN)				Si ₃ N ₄		
		TAN-170	TAN-200	TAN-230	TAN-250	TSN-90		
Density	Mg/m ³	3.3				3.2		
Water absorption	%	0.00				0.00		
Color		White				Gray		
Thermal properties	Specific heat		J/kg·K				740	
	Thermal conductivity		160-180	190-210	220-235	240-255	85-95	
	Coefficient of thermal expansion	RT-500°C	x10 ⁻⁶ /K				4.6	2.6
	Critical diff. temperature	(ΔT _c)	°C				600	800
Electrical properties	Dielectric strength	50Hz	kV/mm				15	15
	Volume resistivity	25°C	Ω·m				>10 ¹²	>10 ¹²
	Dielectric constant	1MHz					8.8	8.1
	Dielectric factor	1MHz	tanδx10 ⁻⁴				5.0	3.0
Mechanical properties	Hardness	HV(0.5kgf)					1,000	1,500
	Bending strength		MPa				>300	600-700
	Fracture toughness	at RT	MPa·m ^{1/2}				2.5-3.5	6-7
	Young's modulus	at RT	GPa				330	317
	Poisson's ratio						0.24	0.27
Chemical resistance	Acid					Excellent	Excellent	
	Alkali					Good	Excellent	
Features		High thermal conductivity Low loss at high frequency				High thermal conductivity High strength		
Main applications		Substrates for semiconductor assembly Radiator plates Heat sinks				Substrates for semiconductor assembly Radiator plates (for compression force) Heat sinks		