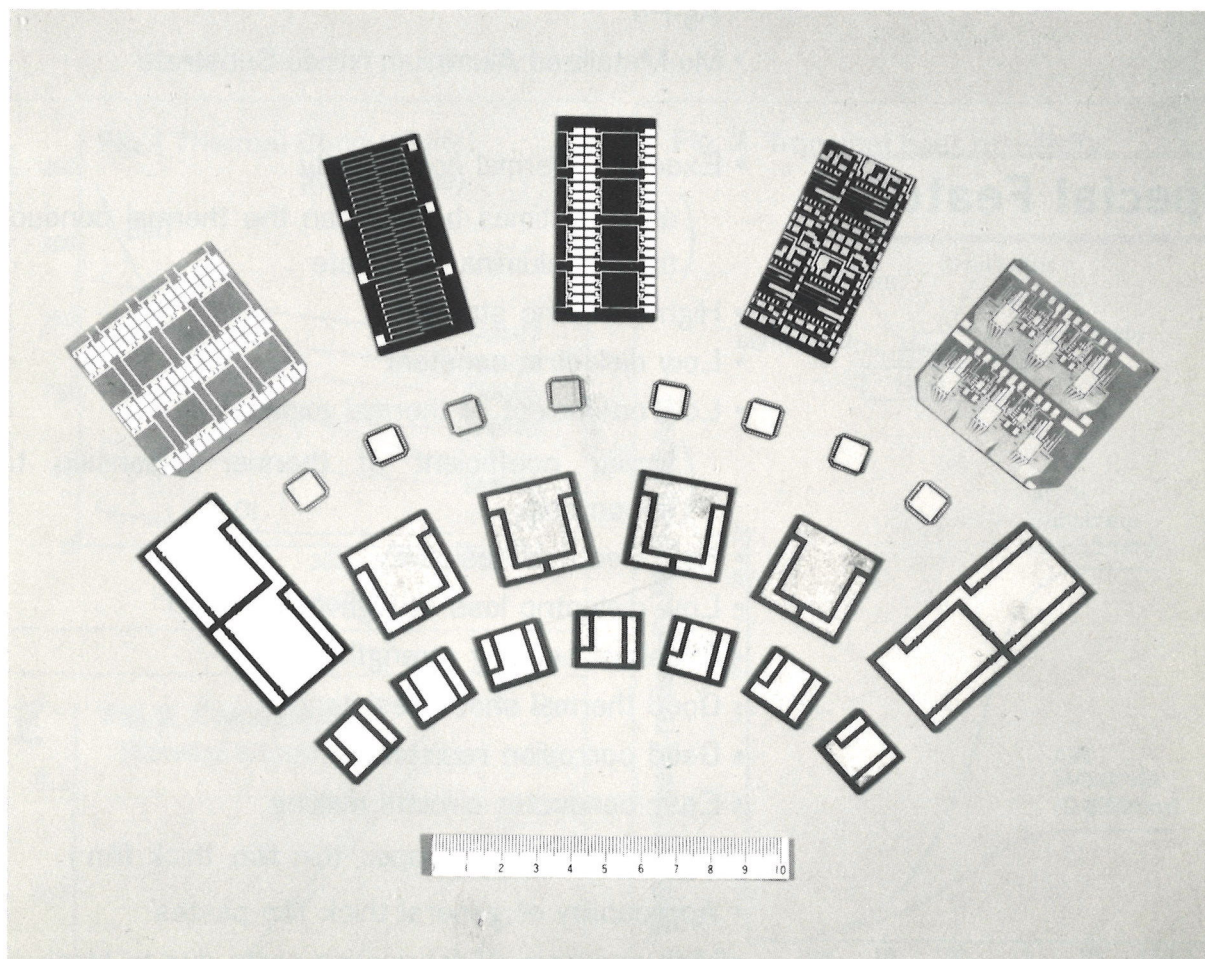


TOSHIBA ALUMINIUM NITRIDE SUBSTRATE FOR SEMICONDUCTOR



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TOSHIBA ALUMINIUM NITRIDE SUBSTRATE is a new developed ceramic substrate designed for use of semiconductor.

Products

- Direct bonded copper substrate with aluminium nitride
- Thick film aluminium nitride substrate with Cu, Au or Ag-Pd
- Mo-Metallized Aluminium nitride Substrate

Special Features

- Excellent thermal conductivity
(about 5 times better than the thermal conductivity of alumina substrate)
- High dielectric strength
- Low dielectric constant
- Low coefficient of thermal expansion
(similar coefficient of thermal expansion to silicon chip)
- High electrical resistivity
- Low dielectric loss at high frequency
- Excellent bending strength
- Good thermal shock resistance
- Good corrosion resistance
- Easy conductor circuits making
(direct bonding copper, thin film, thick film)
- Applicability of general thick film pastes
- High accuracy of fabricating parts due to black color

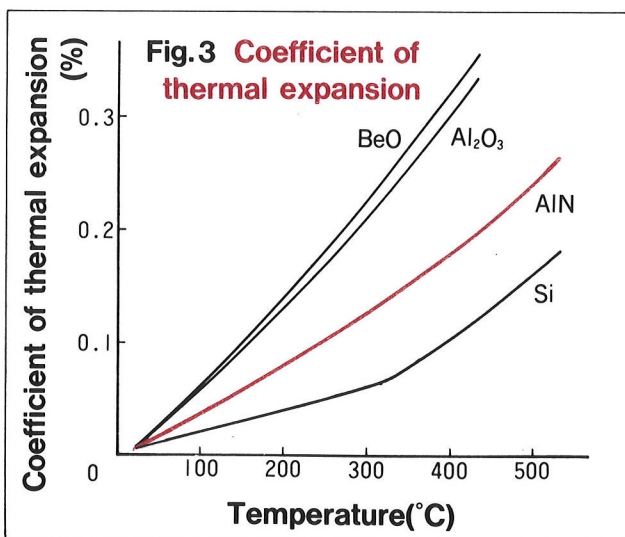
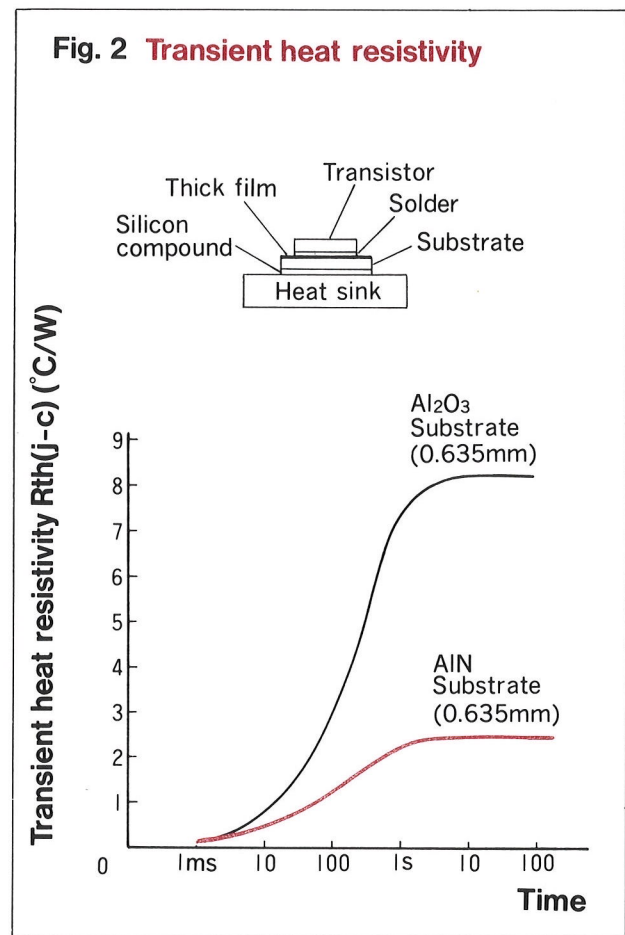
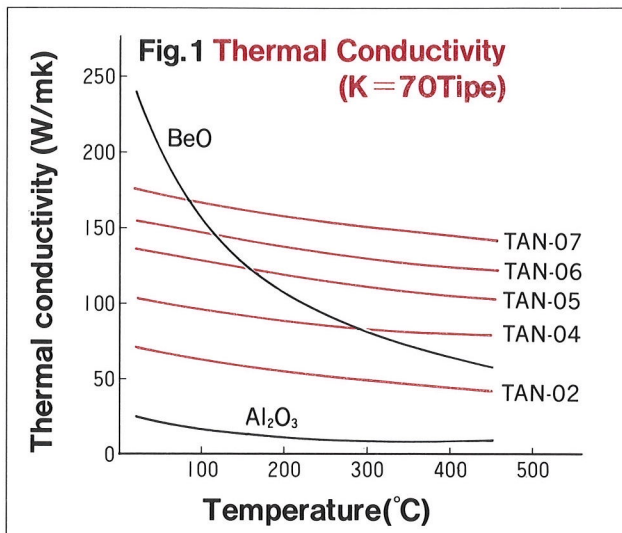
Suggested applications

- Power transistor module
- Laser diode heat spreader
- Power hybrid IC substrate
- LSI, VLSI package
- Electrical insulator with high thermal conductivity

PROPERTIES OF ALUMINIUM NITRIDE COMPARED TO OTHER CERAMIC MATERIALS

| Properties | Density (g/cm ³) | Thermal conductivity (W/m·K)* | Coefficient of thermal expansion (×10 ⁻⁶ /°C)(room temp.~400°C) | Dielectric strength (kV/mm)* | Volume resistivity (Ω-cm)* | Dielectric constant (1MHz)* | Dissipation factor (×10 ⁻⁴ ,1MKz)* | Bending Strength (kgf/mm ²) | Modulus of elasticity (×10 ⁴ kgf/mm ²) |
|------------|------------------------------|-------------------------------|--|------------------------------|----------------------------|-----------------------------|---|---|---|
| TAN-02 | 3.28 | 70 | 4.6 | 14 | >10 ¹⁴ | 8.8 | 5~10 | 40 | 3.1 |
| TAN-04 | | 100 | | | | | | | |
| TAN-05 | | 130 | | | | | | | |
| TAN-06 | | 150 | | | | | | | |
| TAN-07 | | 170 | | | | | | | |

* value at room temperature



STANDARD SPECIFICATIONS OF ALUMINIUM NITRIDE SUBSTRATES

| Items | | Standard specifications |
|--------------------------------|-----------------------|---|
| Bare substrate | Outer dimensions | □ 12.7~□ 63.5 ± 1% (Min. ± 0.2)mm [□ 0.5"~□ 2.5" ± 1% (Min. ± 0.008")] |
| | Thickness | 0.635mm (standard) 0.32~0.95 ± 0.05mm is also available [25mil (standard) 12.5~37.5mil ± 2.0mil is also available] |
| | Warping | Max. 0.2/50mm [Max. 0.008"/2.0"] |
| | Surface roughness | 2~6μm Rmax. |
| Direct bonded copper substrate | Thickness of Cu plate | 0.2~0.4mm [0.008"~0.016"] |
| | Allowance of Cu plate | ± 0.3mm [± 0.012"] |
| | Width of Cu plate | Min. 0.5mm [Min. 0.020"] |
| | Gap of Cu pattern | 0.5~2.0mm [0.020"~0.080"] |
| | Warping | Max. 0.2/50mm [Max. 0.008"/2.0"] |
| | Surface roughness | 10μm Rmax. |
| | Peeling strength | Min. 5kgf/cm |
| Thick film substrate | Thick film materials | Au, Cu or Ag-Pd |
| | Width of circuit | Min. 0.25mm [Min. 0.010"] |
| | Gap of circuit | Min. 0.25mm [Min. 0.010"] |
| | Bonding strength | Min. 1.0kgf/mm ² |

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