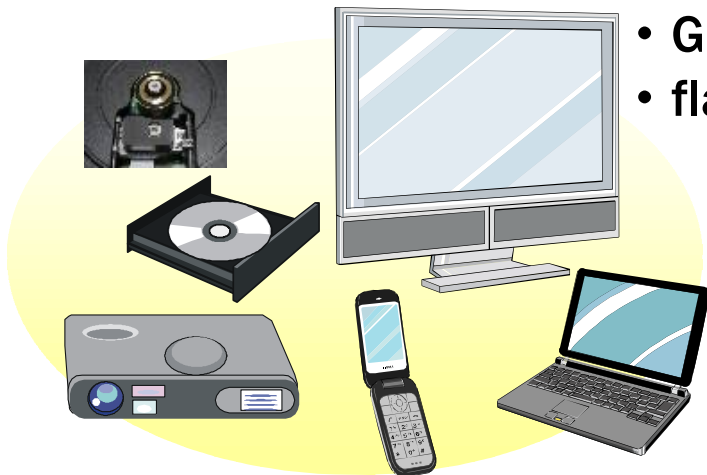# TCC *Thermal Conductive Composite*
Heat Management Composite

〇Our advanced composites consist of ceramics and thermo plastics, such as PPS(Polyphenylene Sulfide) which has excellent thermal and chemical properties.

[Features]

- Good insulation：volume resistivity$\geqq 10^9 \Omega$・cm
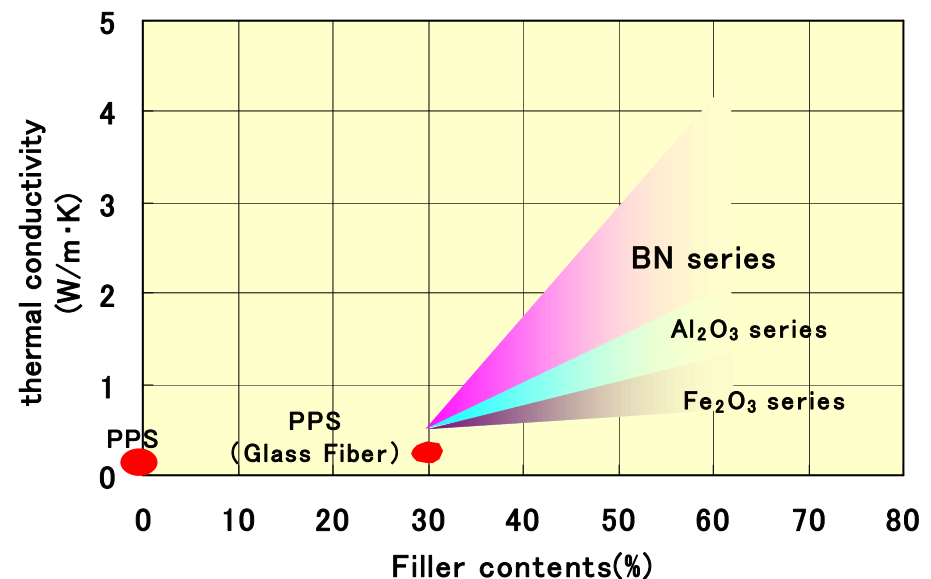- Good thermal property：capable for reflow process
- flame retarcancy：V-0

*pick-up modules(CD,DVDetc)
*projector
*LCD panels   and more!!

BN series

Al$_2$O$_3$ series

Fe$_2$O$_3$ series

PPS

PPS
(Glass Fiber)

thermal conductivity
(W/m・K)
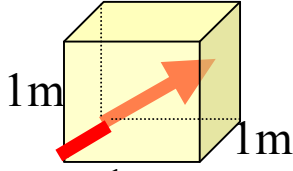
Filler contents(%)

TCC *Thermal Conductive Composite*

What's <u>Thermal Conductivity?</u>

○ Thermal conductivity, **κ** , is the property of a material that indicates its ability to conduct heat.

1m

1m

1m

Unit：W/m・K

thermal conductivity =
  heat flow rate ✕ distance /(area ✕ Δt(temperature difference))

We focus to electric insulating thermal conductive composites with using our unique composite technologies which are accumulated with our other functional composite products.

【Applications】
  Pick-up modules for CD, DVD
  Projectors, Flat Panel Displays
  Motor devices and peripherals etc

TCC *Thermal Conductive Composite*

Various Type of Fillers

Filler Type	Good	Bad
Boron Nitride **(BN series)**	• high thermal conductivity • electric isolation	• very expensive • anisotropic property
Alumina (Al_2O_3 series)	• shape selectivity • electric isolation	• hardness (molding abrasion)
Ferrite (Ni-Zn,Mn-Zn systems)	• cheap • less-wearing	• less thermal • heavy
others	（other ceramics, metals, carbons, Fibers etc）	

Especially, we are concentrating to develop Boron Nitride composite, because of its high thermal conductive property. ⇒10times the Alumina

TCC *Thermal Conductive Composite*

Properties of Our Products

■ Data of Commercial & Trial Products

Items	Unit	method	Ref.	Grade				Trial Grade			
			PPS※1 GF30%	8861A61 ferrite	8865A11 alumina	8885A63 alumina	8871A62 ferrite/almina	Binder：PPS			
								BN	BN	BN	Alumina
MFR	g/10min.	ASTM D1238	–	160*A	60*A	–	100*B	20*A	295*A	20*A	103*A
density	g/cm3	ASTM D792	1.4〜1.6	2.25	2.05	2.81	2.56	1.88	1.80	1.82	2.81
flexural modulus	GPa	ASTM D790	–	12.1	12.0	24.4	16.7	23.3	22.9	24.4	21.0
flexural strength	MPa	ASTM D790	–	162	160	68	148	53	58	88	64
IZOD Impact strength	kJ/m2	ASTM 256(none notch)	–	20.7	25.0	–	14.3	3.0	4.1	6.3	7.1
volume resistance	Ω・cm	※2	–	$\geqq 10^9$	$\geqq 10^9$	$\geqq 10^9$	$\geqq 10^9$	$\geqq 10^9$	$\geqq 10^9$	$\geqq 10^9$	$\geqq 10^9$
thermal conductivity	W/m・K	Laser Flash Analysis※3	0.2	0.4	0.5	1.3	1.0	1.5〜4.3	1.5	2.6	2.0〜2.3

*A 330℃/5kg   *B 310℃/5kg

[Notice] Data in the above table are typical.

※ 1 GlassFiber 30% contented PPS
※ 2 Advantest R8340A with R12702A chamber
※ 3 NETZSCH LFA-457