

## Technical Information

### ■ Special features of Denka Thermally Conductive Sheet

- for its flexibility, the sheet can be stuck to the mating surface with no use of heat-dissipating grease. Moreover, cracks are difficult to appear in comparison with mica, ceramics and the similar interfaces, giving the final assembly long-term reliability characteristics.
- thanks to its excellent thermal conductivity, the thermal resistance is extremely low, thus contributing to product miniaturisation.
- some types of Thermally Conductive Sheets are reinforced with fiberglass, in order to remarkably improve the mechanical and dielectric strength.
- with no use of heat-dissipation grease, the sheet can save the process of grease coating, this preventing from contamination.
- stabilised thermal dissipation properties can be obtained with a lower clamping force.
- the dielectric constant is approximately one half of that of mica interfaces.

### ■ LF and LR

LF type is a general purpose type insulating sheet with good thermal and electrical characteristics. Adhesive type is available for both the materials (LF-AD and LR-AD).

LR has excellent thermal conduction and electrical insulation properties, so that it can be said to be ideal for heat dissipation material used with semiconductors such as transistors, diodes, and so on. The production format of LR is roll and it is easy to handle. Adhesive type is available (LR-AD).

table: general properties of LF and LR types

Item	test method	unit	LF30	LF45	LR20	LR20AD
<b>Appearance</b>						
Color	visual	-	grey			
Thickness	-	mm	0.30	0.45	0.23 ± 0.05	[0.23+0.02] ± 0.05
Specific gravity	-	g / cm <sup>3</sup>	1.8	1.8	-	-
Hardness	JIS K6253	Shore A	90	90	74	74
Tensile strength	(X), (O)	MPa	18 (X)	16 (X)	16 (O)	16 (O)
Tear strength	(X), (OO)	KN / m	78 (X)	69 (X)	74 (OO)	74 (OO)
Foldability (*)	-	∅ mm	1.2	1.5	-	-
Water absorption (1 day)	-	µg / mm <sup>2</sup>	1.20	1.8	-	-
Reinforcement layer	-	-	fiberglass			
Flammability	UL94	-	V-O (file no. E49895)			
<b>Properties</b>						
TO-3 R <sub>th</sub> thermal resistance	Denka	°C / W	0.40	0.50	0.30	-
TO-3 R <sub>th</sub> (adhesive type)	Denka	°C / W	-	-	-	0.35
TO-3P R <sub>th</sub> thermal resistance	Denka	°C / W	0.80	0.90	-	-
Thermal conductivity	Denka	W / (m·K)	2.3	2.3	2.3	2.3
Dielectric withstand voltage	JEM 1021	KV <sub>AC</sub>	3.0	4.0	1.2	1.2
Dielectric breakdown voltage	JIS C2110	KV <sub>AC</sub>	8.8	> 10	2.0	2.0
Volume resistivity	JIS C2123	10 <sup>15</sup> Ω·cm	3.4	3.2	2.0	-
Dielectric constant	@ 1 Mhz	-	3.8	3.8	-	-

(\*) diameter of the smallest metal column around which the sheet has no crack when entwined around

(X) JIS K6301 test method

(O) JIS K6251 test method

(OO) JIS K6252 test method