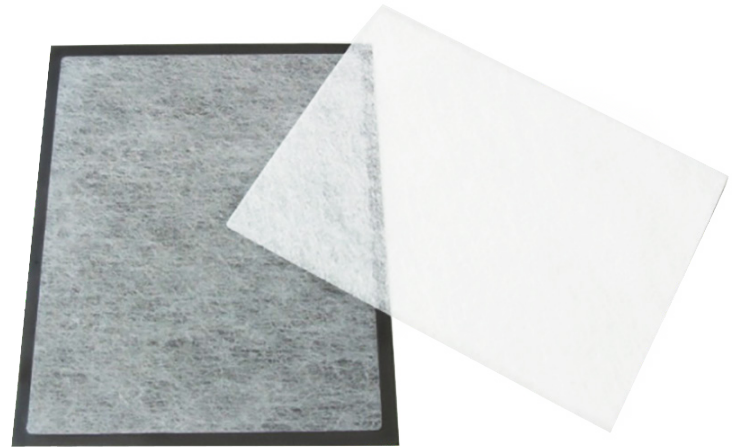


New “NASBIS” Insulating Sheets From Panasonic

Stacking The Deck For Significantly Improved Thermal Management



Panasonic’s new thermal management material, “NASBIS” is a flexible heat Insulating Sheet, composed of proprietary silica aerogel and fiber. Structured into nanoscale hollow particles, this highly-porous sheet has a thermal conductivity of roughly 0.02 W/m-K, making it an excellent insulator. The thermal conductivity of NASBIS is lower than that of air, which means it provides high heat insulation. NASBIS sheets are extremely thin and flexible, so they can be bent and used in narrow spaces. Applications include wearable devices, smartphones and many other small electronic devices. NASBIS Insulating Sheets reduce the temperature of the case of a unit and give protection to thermally-weak products from heat.

NASBIS Sheets can provide various countermeasures against heat when combined with other thermal management products, especially Panasonic’s Pyrolytic Graphite Sheet or PGS. The properties of the resulting composite product restrains and reduces the temperature of hot spots of a heat source. As a result, the surface temperature of an electronic device can see great temperature reductions.

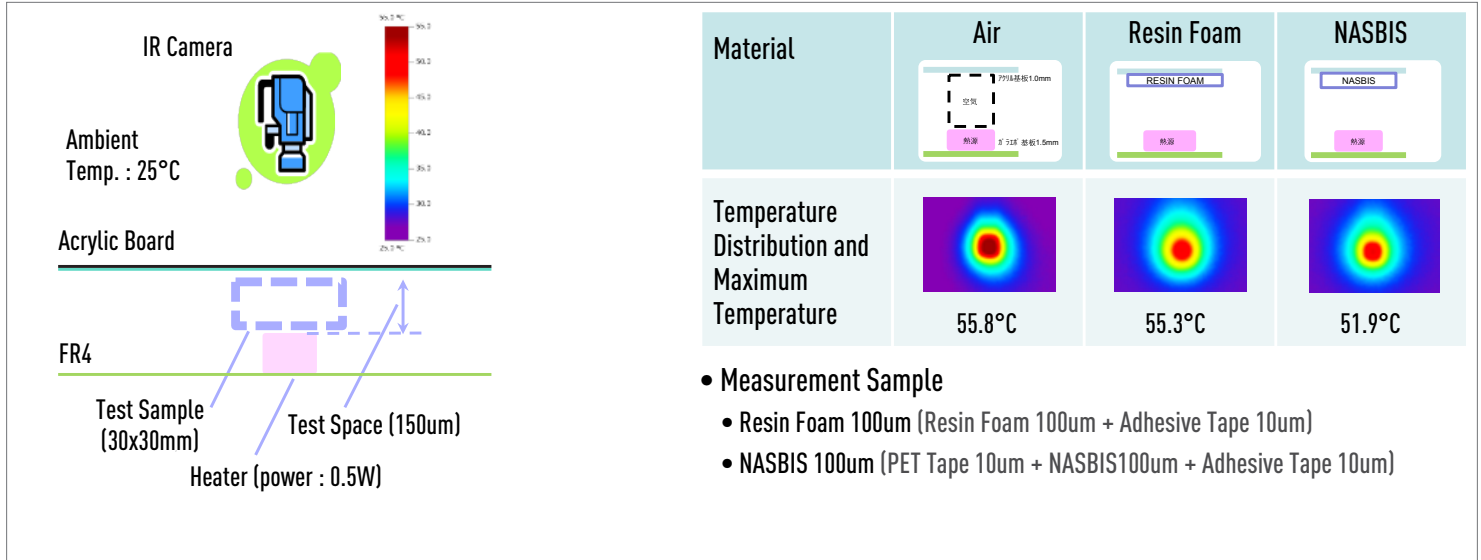
The range of NASBIS sheet thicknesses is 100µm to 1,000µm. The typical characteristic values of NASBIS sheets are shown in Table 1.

Table 1: Characteristics of NASBIS Insulating Sheets

Item		Test Method	Characteristic Value		
Thickness (mm)		Digital Indicator	100um	500um	1000um
Operating Temperature Limit			-20° to 100°C		
Thermal Conductivity (W/m-K)		(ASTM D5470/100um) (ASTN C 518.500um, 1000um)	0.018 to 0.026		
Specific Heat (J/kg•K)			900		
Density (kg/m3)		(JIS K 7112)	250		
Trust Performance	Damp Heat Test	Test Temperature: 85°C Relative Humidity: 85% RH Test Period: 1000 Hours	To satisfy the appearance properties and thermal conductivity. (Thermal conductivity: 0.018 to 0.026W/m-K)h		
	Temperature Cycle	Temperature from -20° to 85°C for the period Test Period: 1000 cycles continuously			
	High Temperature Resistance	Test Temperature: 100°C Test Period: 1000 hours			
	Low Temperature Resistance	Test Temperature: -20°C Test Period: 1000 hours			

Figure 1 illustrates the thermal insulation performance of Panasonic's NASBIS Insulating Sheets. Compared to air and resin foam, NASBIS can restrain a temperature rise of about 3 to 4°C.

Figure 1: NASBIS Thermal Insulation Performance Comparison



The typical structure of NASBIS is shown in Figure 2. The shape of NASBIS is formed using a punching die and then the product is pouched using PET tape and adhesive tape (double-sided). This structure enables the product to be attached to small electronic devices, such as cases for example, using adhesive tape. The thickness and form of NASBIS can be selected based on the target temperature, form of product or available board space.

Figure 2: NASBIS Material Structure

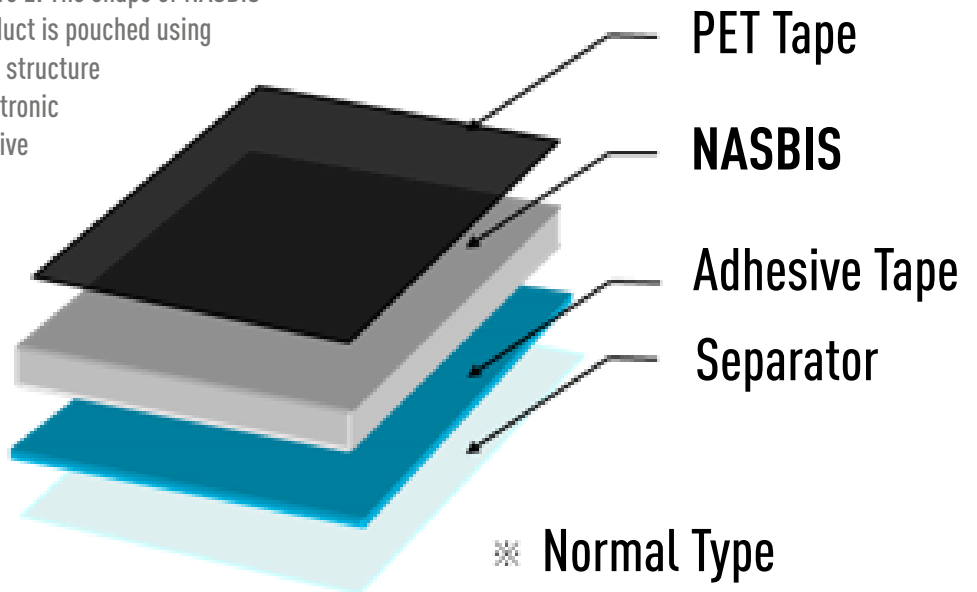
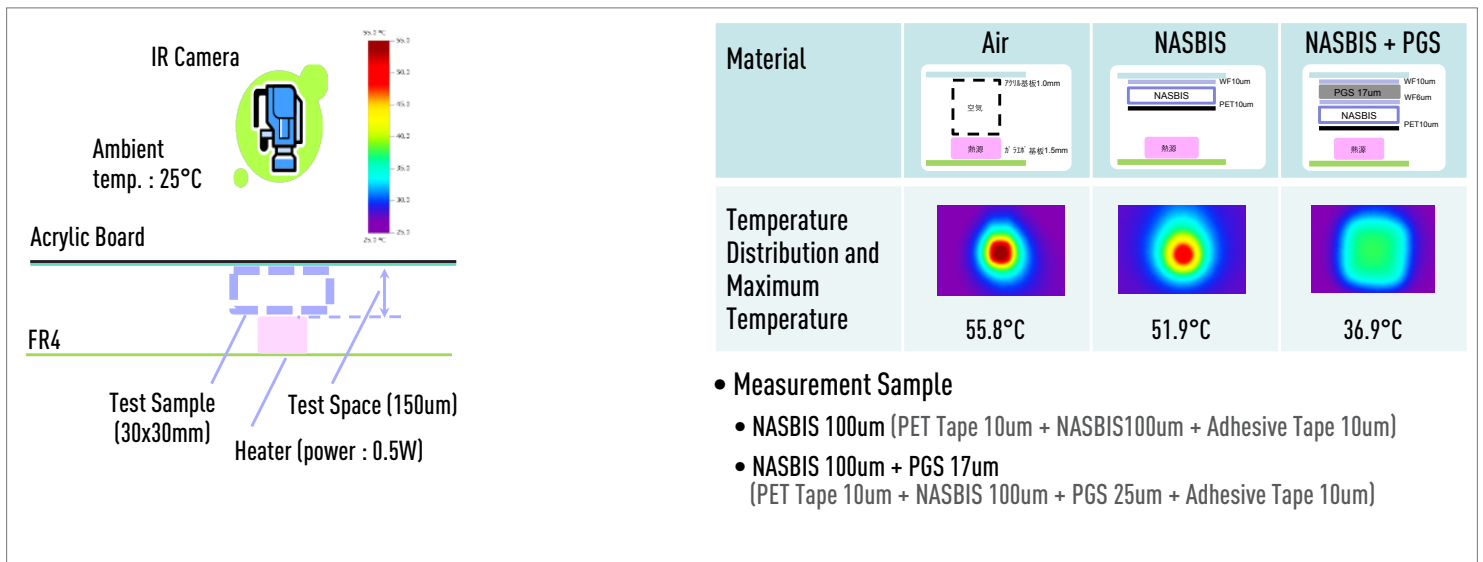


Figure 3 illustrates simulations of thermal insulation performance in a smartphone. In this simulation, the heater is used as a substitution of an IC and the acrylic board is used as a substitution for a smartphone case. Comparisons were made between the thermal insulation performance of the air, NASBIS and NASBIS plus PGS. NASBIS and NASBIS plus PGS are attached to the acrylic boards. The distance between the products and the heater is 150um.

Compared to the one with the air layer only, the temperature of the acrylic boards were decreased by approximately 4°C with NASBIS and about 19°C with NASBIS plus PGS. NASBIS can be applied, which is extremely thin and has low thermal conductivity, as a countermeasure against heat in a narrow space that can be insulated only by the air.

Figure 3: NASBIS Thermal Insulation Performance



For more information on Panasonic's new NASBIS heat insulation technology, visit na.industrial.panasonic.com/PGS