

# Technical Data Sheet

## Non-Silicone type Thermally Conductive Compound TG200 series

### Main Features

<b>Silicone Free</b>	Failure of electrical content fault to occur by reason of contain no any silicones such as low-molecular-weight siloxane.
<b>Electric Insulation</b>	No short-circuit for metallic powder free.
<b>High Reliability</b>	Excellent non pump-out performance for the good properties of cracks, voids and oil-bleeding.

**TG221** is able to reduce thickness with good workability and spreading.

**TG240** and **TG260** have high thermal conductivity. These products able to keep thermal resistance lower even thick BLT.

### Typical Applications

**TG200 series** are very useful for thermal management of semiconductor devices such as CPUs, Power devices, LEDs and more.



### General properties

Item	TG221	TG240	TG260	Test method
Appearance	White	Ivory	Ivory	-
Specific Gravity	2.9	3.4	3.6	-
Viscosity at 25 deg C (Pa·s)	110	180	280	Type E Cone/Plate type(3rpm)
Penetration rate at 25 deg C	300	280	210	JIS K 2220
Thermal Conductivity (W/m·K)	2	4	6	Steady State Method
Thinnest Thickness (um)	8	29	30	Compressed Load 500kPa
Thermal Resistance (deg C/W)	0.07	0.11	0.11	
Volatile content (%)	0.5	0.5	0.5	150 deg C / 24h
Volume resistivity (ohm-cm)	>10 <sup>12</sup>	>10 <sup>12</sup>	>10 <sup>12</sup>	JIS C 2101
Dielectric breakdown (kV/mm)	21	7	7	JIS C 2101
Operating temperature range (deg C)	-40 to 125	-40 to 120	-40 to 120	-

For Thermal Management of Devices

“TG221”

# Thermally Conductive Compound

## Main Features

### Silicone Free

Containing no low-molecular-weight siloxane or any other silicones to be free from electrical contact fault.

### High Thermal Conductivity

Capable to form thinner films and reduce the thermal contact resistance significantly.

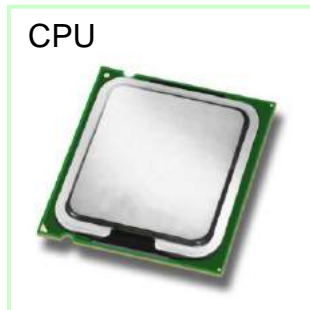
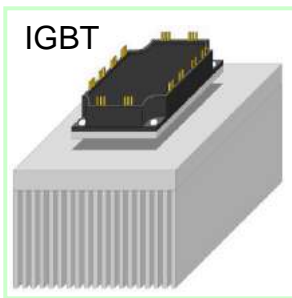
### High Reliability

Superior resistance against pump-out, cracks, voids and oil-bleeding.



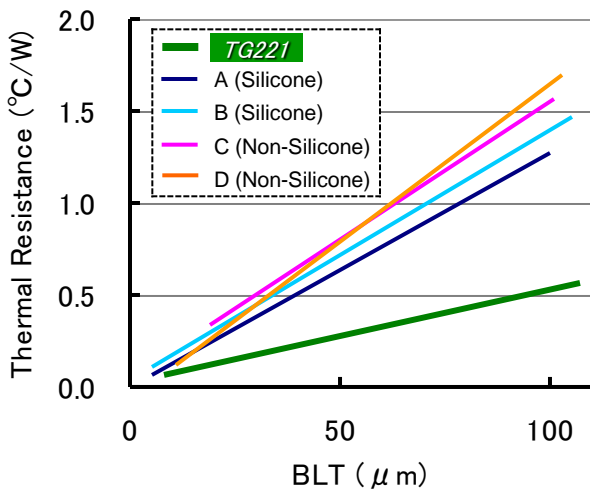
## Typical Applications

### Thermal Connection for

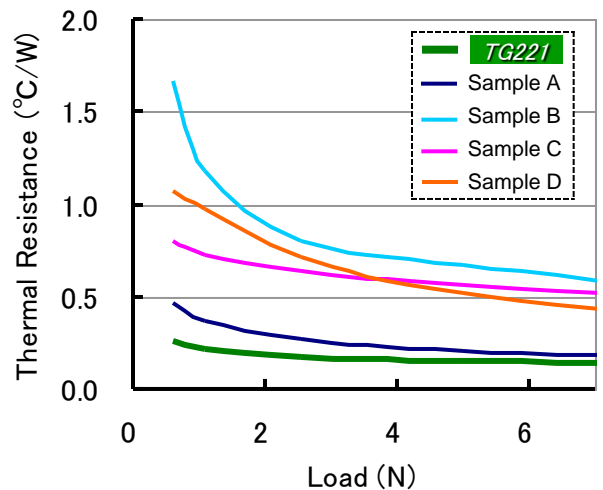


... and more

### ● Low Thermal Resistance



### ● High Spreading Property at Low Compression

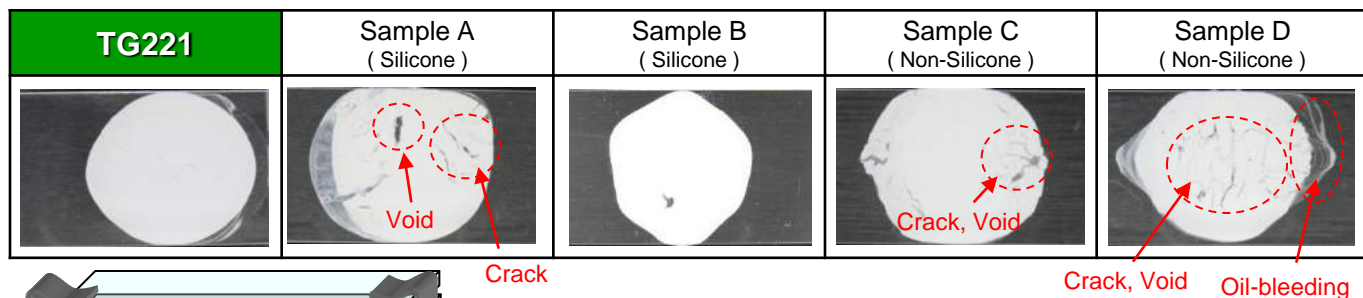


•Grease : 0.01ml

TG221 is capable to form thinner films less than 10μm bond line thickness (BLT) and achieve lower thermal resistance even at higher BLT in comparison with other greases.

TG221 features higher spreading properties even at low compression in comparison with other greases.

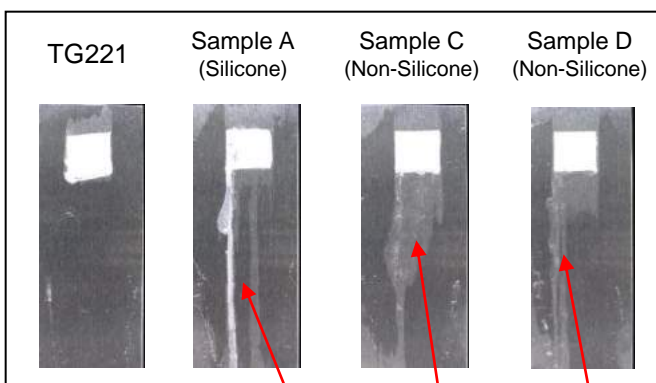
● Superior Resistance against Pump-out, Cracks, Voids and Oil-bleeding



Sample A to D, other greases cause cracks, voids and oil-bleedings as a result of repeated thermal expansion cycles. TG221 is remarkably flexible with expansion and contraction of the objects such as devices and heat sinks without occurring any defects as shown in the left picture.

• -20°C ⇔ 125°C, 100cycle

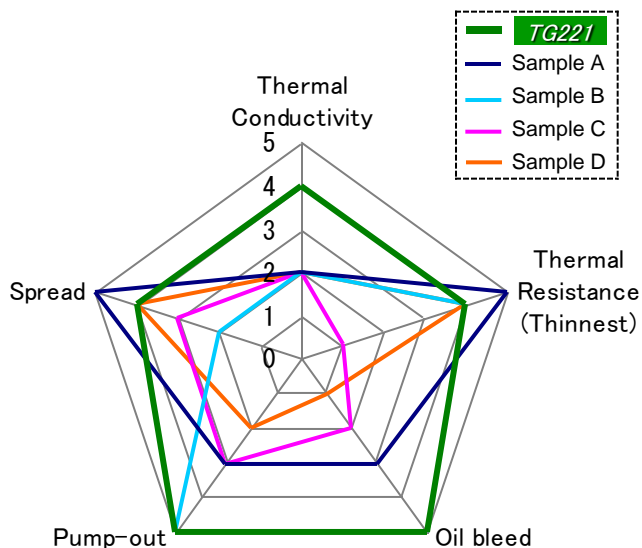
● No leaking even at vertical position



• -40°C ⇔ 125°C, 100cycle

TG221 hardly leaks even at the vertical position due to stable adhesive property. The applied area gets hardly out of position even after repeated thermal expansion cycles.

● Superior Performance in Various Factors



TG221 Typical Properties

Item	Representative Value	Test method
Appearance	White	-
Specific Gravity	2.9	-
Thermal Conductivity (W/m·K)	2	Steady State Method
Viscosity at 25°C (Pa·s)	110	Type E Cone/Plate type(3rpm)
Penetration rate 25°C	300	*JIS K 2220
Thinnest Thickness (micron meters)	8	Compressed Load 500kPa
Thermal Resistance (°C/W)	0.07	

\*JIS: Japanese Industrial Standards.

•Descriptions subject to change without notice.

Distributed by :



**Fuji Electric Europe GmbH**  
 Goethering 58  
 D-63067 Offenbach am Main  
 www.fujielectric.de  
 Phone: +49 69 66 90 29 - 0



## MATERIAL SAFETY DATA SHEET

### 1. Product and Company Identification

Product Name : TG221 (Thermally Conductive Grease)  
Manufacturer : NIHON DATA MATERIAL Co., Ltd  
Address : 82-1 Anesakikaigan, Ichihara-City, Chiba 299-0107, Japan  
Contact : Quality Assurance Department, Development Department  
Telephone/Fax  
Head Office : TEL: +81-436-60-7801, FAX: +81-436-60-7808  
QA Dept : TEL: +81-436-60-7801, FAX: +81-436-60-7808  
Development Dept : TEL: +81-436-60-7803, FAX: +81-436-60-7805  
MSDS No : TG221 E02

### 2. Hazards Identification

GHS classification : Skin corrosion/irritation :  
Category 3  
Specific target organ systemic toxicity (single exposure) :  
Category 3 (Respiratory organs)  
Specific target organ systemic toxicity (repeated exposure) :  
Category 1 (Respiratory organs)

GHS label elements :



Danger

Maybe harmful in contact with skin

May cause Damage to respiratory organs

Cause damage to respiratory organs through prolonged or repeated exposure

Prevention

: Do not breathe dust/mist/gas.  
Wash hands thoroughly after handling.  
Do not eat, drink or smoke when using this product.  
Avoid release to the environment.  
Use only in a well-ventilated area. In case of inadequate ventilation, wear respiratory protection.

Response

: IF SWALLOWED: Immediately rinse mouth. Call POISON CENTER or doctor/physician.  
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.  
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
IF ON SKIN OR HAIR: Remove/take off immediately all contaminated clothing. Wash with plenty of soap and water.

- Call a POISON CENTER or doctor/physician if you feel unwell.  
Collect spillage.
- Storage : Store in closed container at well-ventilated place.  
Store locked up.
- Disposal : Dispose of contacts/container in accordance with local regulation.

### 3. Information on Ingredients

Single Component or : Mixture

Mixture

Components and CAS Number

<u>Component Name</u>	<u>CAS Number</u>	<u>Content, %</u>
Organic oil	listed	5 - 20
Alumina (powder)	1344-28-1	80 - 95

### 4. First Aid Measures

- Inhalation : Remove person to fresh air and let him gargle enough. Seek medical attention if abnormalities are observed.
- Skin Contact : Remove stains with cloth or tissue and wash well with plenty of water and soap.
- Eye Contact : Flush with plenty of water. Wash well up to the backside of eyelids and seek immediate medical attention.
- Ingestion : Wash the mouth well with water and seek immediate medical care.

### 5. Fire Fighting Measures

- Fire Fighting Procedure : Wear suitable protectors such as heat resisting clothes and respiratory protectors. Hurl or spray extinguisher to the fire.
- Extinguishing Media : Carbon dioxide, fire extinguishing powder, chemical foam and dry sand. Avoid to use column water.

### 6. Accidental Leakage Measures

- Personnel precautions : Wear suitable protectors such as protective gloves and goggles.
- Environmental precautions : Do not wash away.
- Method for cleaning up : Collect the leak into container by spatula. Wipe off the residue with dry paper or cloth.

### 7. Handling and Storage

- Handling : Handle the product in a well-ventilated place. Prohibit the use of high temperature material, sparks and fire. Wear protective things on such as gloves and goggles so that the product may not enter the eye.
- Storage : Store the product in a cool and dark place, preferably in refrigerator.

Keep away from oxidizers, acids, and alkalis.

## 8. Exposure Controls / Personal Protection

### Control Parameter

Organic oil	:	Not established
Alumina	:	TLV-TWA 10 mg/m <sup>3</sup> ACGIH(2006)
Facility Control	:	Exhaust ventilation, eye shower and body shower recommended. Anything with high temperature or combustible should not be placed nearby.

### Personal Protection

Inhalation Prevention	:	Respirators with dust-mist-fume filters if large quantity is handled.
Hand Protection	:	Wear gloves made of material that prevents organic solvents and chemicals from going through.
Eye Protection	:	Wear goggles or protective glasses when handling.
Skin and Body Protection	:	Wear long-sleeved work cloth not to expose skin direct. It is desirable that the cloth is made of material that dose not let chemicals pass through.

## 9. Physical and Chemical Properties

Appearance	:	Ivory white or white
Odor	:	Slight odor
pH	:	No data
Melting point	:	No data
Boiling Point	:	No data
Flash Point	:	>200 degrees C
Combustible Limits	:	No data
Vapor Pressure	:	No data
Vapor density	:	No data
Specific Gravity	:	2.5 - 3.5 (at 25 degrees C)
Solubility in Water	:	Not soluble
Auto-ignition Point	:	>250 degrees C
Decomposition temp.	:	No data
Viscosity	:	50 - 170 Pa·s (at 25 degrees C)

## 10. Stability and Reaction

Stability	:	No dangerous reaction below 200 degrees C.
Conditions to be avoided	:	High temperature
Materials to be avoided to contact	:	Oxidizers, acids, and alkalis
Harmful decomposition	:	Carbon monoxide

products

## 11. Toxicological Information

### Acute Toxicity

Organic oil : LD<sub>50</sub> >5,000mg/kg (oral, rat)

Alumina : LD<sub>50</sub> >5,000mg/kg (oral, rat)

Skin corrosion/Irritation : Maybe harmful in contact with skin

Eye damage/irritation : No information

Sensitization-respiratory : No information

### Germ cell mutagenicity

Organic oil : No information

Alumina : Negative on Ames test

### Carcinogenicity

Organic oil : No information

Alumina : Group A4 (ACGIH)

### Toxic to reproduction

Organic oil : No information

Alumina : Negative on Ames test

### Specific target organ systemic toxicity (single exposure)

Organic oil : No information

Alumina : May cause damage to respiratory organs.

### Specific target organ systemic toxicity (repeated exposure)

Organic oil : No information

Alumina : LC50=357mg/m<sup>2</sup> (mouse)

## 12. Ecological Information

Hazardous to the aquatic environment – acute hazard : No information

Hazardous to the aquatic environment – chronic hazard : No information

## 13. Disposal Consideration

Disposal practice must be in compliance with your country, local, state and federal laws and regulations.

## 14. Transportation Information



Follow all regulations in your country. Make sure that the container is not damaged. Avoid transportation at high temperature.

**15. Regulatory Information**

Follow all regulations in your country.

**16. Other Information**

No specific notes.

**Warning:**

The information contained here is based on data available to us at the time of the preparation and is offered solely for purchaser's information, consideration and investigation. Nihon Data Material Co., Ltd. assumes no responsibility as to the accuracy, completeness or suitability of these data for purchaser's use. Every chemical product contains hitherto unknown hazardous nature and purchasers are requested to take every precaution in handling and use of this product. Purchasers are requested to establish in his responsibility the safe condition of use.

(End)