

FUJIPOLY[®]

SARCON[®] GR-m Series.

High Heat Conductive (6.0Watt/m-K) Silicone Gap Filler Pad.

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FUJIPOLY DATA SHEET NUMBER FPDS 01-36 / Version 5

Fuji Polymer Industries Co.,Ltd. (Overseas office)

JAPAN

7F, Kanda KYYBldg, 1-9-4, Kaji-cho, Chiyoda-ku Tokyo Japan, 101-0044

[Phone] +81-3-5207-6113 [Facsimile] +81-3-5207-6114

[E-mail] fujipoly@mx.fujipoly.co.jp or fujipoly@mx.mesh.ne.jp

ISO9001

Fuji Polymer Industries Co.,Ltd. (Taipei liaison office)

TAIWAN

Room B,7F.,No.59,Tiansiang Rd.,Jhongsan Distric,Taipei City,10452,Taiwan

[Phone] +886-2-2586-5771 [Facsimile] +886-2-2586-5745

[E-mail] fujipolytw@fujipoly.com.tw

Fujipoly America Corporation.

USA

900 Milik Street P.O. Box 119 Carteret, NJ 07008-0119

[Phone] +1-732-969-0100 [Facsimile] +1-732-969-3311

[E-mail] info@fujipoly.com [web site] www.fujipoly.com

QS9000 / ISO9001

Fujipoly Europe Ltd.

ENGLAND

Avant Business Centre, Unit 17, Third Avenue, Bletchley Milton Keynes, MK1 1DR England

[Phone] +44-1908-277800 [Facsimile] +44-1908-379916 [E-mail] fujipoly@btconnect.com

Fujipoly Singapore PTE Ltd.

SINGAPORE

Blk 71 Ayer Rajah Crescent #04-03/06 Singapore 139951

[Phone] +65-773-3466 [Facsimile] +65-773-2234 [E-mail] fujipoly@mbox5.singnet.com.sg

ISO9001

Fujipoly (Thailand) Co.,Ltd.

THAILAND

55/8 Moo 13 Navanakorn Industrial Estate Phase 4 Phaholyothin Road.

Klong Nueng,Klong Luang,Pathumthanee 12120, Thailand

[Phone] +66-2-529-2732 [Facsimile] +66-2-529-2223 [E-mail] marketing@fujipoly.co.th

ISO9001 / ISO14001

Fujipoly-Apcom Ltd.

HONG KONG

Workshop (F&J), Block 1, 4/F,Kwai Tak Industrial Centre Kwai Tak Street, Kwai Chung, N.t.,Hong Kong.

[Phone] +852-2428-3770 [Facsimile] +852-2489-9637 [E-mail] fujipoly@netvigator.com

Fujipoly China Ltd., China Factory

CHINA

1/F., JiaLongDa Bldg., Changlang Road, Jinmei Estate, Changping, Dongguan, GuangDong China 523579

[Phone] +86-769-83989660 [Facsimile] +86-769-83989662 [E-mail] chinafujipoly-00@sohu.com

ISO9001

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FUJIPOLY[®] DATA SHEET FPDS 01-36 (Version 5)

1] Product Name :

Sarcon[®] GR-m
Sarcon[®] GR-Hm

2] Features. :

Sarcon[®] GR-m is a highly conformable, thermally conductive 6.0watt/m-k (No electricity conductive) in areas where space between surfaces are uneven and surface textures vary. Sarcon[®] GR-m material conforms to irregular surfaces and fills air gaps.

Applications include.

- 1) Between a chassis wall and other surface.
- 2) Between a “CPU” and heat sinks.
- 3) Between a semiconductors and heat sinks.
- 4) Areas where heat needs to be transferred to some type of heat spreader.

3] Variety of Sarcon[®] GR-m products.

Table - 1

Series	Construction	Application Guidelines
Sarcon[®] GR-m	Silicone compound	Between a chassis wall and other surface. Between CPU and heat sink. Between a semiconductor and heat sink.
Sarcon[®] GR-Hm	Silicone compound with hardened top surface	Same as above, except hardened top surface facilitates handling and installation during complex assemblies.

*Available in thicknesses for 0.50mm to 2.00mm.

*Can be designed for custom applications. (Cutting. Punching)

*Flame retardant silicone polymer filled with an special organic substance.

4] Types and Configuration.

Table - 2

Series	Product Description	Width x Length	Thickness
Sarcon® GR-m	Sarcon® 50G-m	Usable size 280mm x 180mm (11" x 7.1")	0.50mm ± 0.1mm
	Sarcon® 100G-m		1.0mm ± 0.2mm
	Sarcon® 150G-m	Actual size 300mm x 200mm (11.8" x 7.8")	1.5mm ± 0.2mm
	Sarcon® 200G-m		2.0mm ± 0.3mm
Sarcon® GR-Hm	Sarcon® 50G-Hm	Usable size 280mm x 180mm (11" x 7.1")	0.50mm ± 0.1mm
	Sarcon® 100G-Hm		1.0mm ± 0.2mm
	Sarcon® 150G-Hm	Actual size 300mm x 200mm (11.8" x 7.8")	1.5mm ± 0.2mm
	Sarcon® 200G-Hm		2.0mm ± 0.3mm

Notice.

1) Standard Product Form.

Sarcon® GR-m series is placed between PET (polyester) Film and special polyethylene Film, Kiss cut into the required shape.

5] Typical Properties.

Table - 3

Property	Unit	GR-m	GR-Hm	Test Method (Based on)	Specimen
Color	—	Dark Reddish Gray	Dark Reddish Gray	Visual	—
Operating Temp. range	°C	-60 ~ +200	-60 ~ +200	—	—
Specific Gravity	gr/cm ³	3.2	3.2	JIS-K-6220 ASTM D-792	—
Hardness	ASKER-C	26	26	JIS-K-7312	B
	Shore 00	52	52	ASTM D-2240	—
Tensile Strength	(MPa)	0.3	0.3	JIS-K-6251 (#2 Die) ASTM D-412	A
Elongation	%	80	80	JIS-K-6251 (#2 Die) ASTM D-412	A
Tear Resistance	(KN/m)	1.0	1.0	JIS-K-6252 (Angle) ASTM D-624	A
Volume Resistivity	(Mohms·m)	1.3 x 10 ⁶	1.0 x 10 ⁵	JIS-K-6249 ASTM D-257	C
Breakdown Voltage	(KV/mm)	18	19	JIS-K-6249 ASTM D-149	C
Withstand Voltage	(KV/mm)	13	13	JIS-K-6249 ASTM D-149	C

Remarks / Specimen A : 2.0mm Thickness.

Specimen B : 60mm Width x 120mm Length x 20mm Thickness.

Specimen C : 120mm Width x 120mm Length x 1.0mm Thickness.

6] Thermal Properties.

1) Thermal Resistance.

(Unit : °C·inch² / watt) Table - 4

Thickness	GR-m	GR-Hm
0.5mm	0.21	0.27
1.0mm	0.32	0.45
1.5mm	0.48	0.58
2.0mm	0.64	0.75

Test Method : Fujipoly test method FTM P-3020 which gives ASTM D5470 equivalent value.

2) Thermal Conductivity.

Table - 5

	Unit	GR-m	GR-Hm
Thermal Conductivity	watt / m·k	6.0	6.0

Test Method : Fujipoly test method FTM P-1620 (JIS R2618 / ASTM D2326 equivalent)

7] Heat Aging Test.

-1) Test Condition : 70°C (158°F) x 1,000hrs (42 days)

Sarcon® GR-m

Table - 6

Property	Unit	Initial	100Hrs	250Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	—	3.2	3.2	3.2	3.2	3.2	JIS-K-6220	—
Hardness	ASKER-C	26	32	35	40	42	JIS-K-7312	B
Tensile Strength	MPa	0.3	0.4	0.3	0.3	0.3	JIS-K-6251 (#2Die)	A
Elongation	%	80	50	40	30	20	JIS-K-6251 (#2Die)	A
Tear Resistance	KN/m	1	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	Mohms-m	1.3 x 10 ⁶	9.2 x 10 ⁴	8.7 x 10 ⁴	5.4 x 10 ⁵	1.1 x 10 ⁵	JIS-K-6249	C
Breakdown Voltage	KV/mm	18	19	19	19	18	JIS-K-6249	C
Thermal Conductivity	W/m-k	6.0	6.0	6.0	6.0	6.0	JIS-R-2618 equivalent	C

-2) Test Condition : 120°C (250°F) x 1,000hrs(42 days)

Sarcon® GR-m

Table - 7

Property	Unit	Initial	100Hrs	250Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	—	3.2	3.2	3.2	3.2	3.2	JIS-K-6220	—
Hardness	ASKER-C	26	42	46	57	62	JIS-K-7312	B
Tensile Strength	MPa	0.3	0.3	0.3	0.3	0.4	JIS-K-6251 (#2Die)	A
Elongation	%	80	40	40	35	25	JIS-K-6251 (#2Die)	A
Tear Resistance	KN/m	1	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	Mohms-m	1.3 x 10 ⁶	8.0 x 10 ³	9.5 x 10 ³	1.3 x 10 ⁴	2.1 x 10 ⁴	JIS-K-6249	C
Breakdown Voltage	KV/mm	18	18	18	18	19	JIS-K-6249	C
Thermal Conductivity	W/m-k	6.0	6.0	6.0	6.0	6.0	JIS-R-2618 equivalent	C

-3) Test Condition : 150°C (300°F) x 1,000hrs (42 days)

Sarcon® GR-m

Table - 8

Property	Unit	Initial	100Hrs	250Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	—	3.2	3.2	3.2	3.2	3.2	JIS-K-6220	—
Hardness	ASKER-C	26	50	57	65	75	JIS-K-7312	B
Tensile Strength	MPa	0.3	0.3	0.4	0.5	0.5	JIS-K-6251 (#2Die)	A
Elongation	%	80	40	30	15	5	JIS-K-6251 (#2Die)	A
Tear Resistance	KN/m	1	1	1	2	2	JIS-K-6252 (Angle)	A
Volume Resistivity	Mohms-m	1.3 x 10 ⁶	1.5 x 10 ⁵	5.1 x 10 ⁵	4.9 x 10 ⁵	5.8x 10 ⁵	JIS-K-6249	C
Breakdown Voltage	KV/mm	18	19	18	18	18	JIS-K-6249	C
Thermal Conductivity	W/m-k	6.0	6.0	6.0	6.0	6.0	JIS-R-2618 equivalent	C

Remarks / Specimen A : 2.0mm Thickness.

Specimen B : 60.0mm Width x 120mm Length x 20.0mm Thickness. (GR-m for all products)

Specimen C : 120.0mm Width x 120mm Length x 1.0mm Thickness.

7] -1) Test Condition : 70°C (158°F) x 1,000hrs (42 days)

Sarcon® GR-Hm

Table - 9

Property	Unit	Initial	100Hrs	250Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	—	3.2	3.2	3.2	3.2	3.2	JIS-K-6220	—
Hardness	ASKER-C	26	32	35	40	42	JIS-K-7312	B
Tensile Strength	MPa	0.3	0.3	0.3	0.4	0.4	JIS-K-6251 (#2Die)	A
Elongation	%	80	50	40	35	30	JIS-K-6251 (#2Die)	A
Tear Resistance	KN/m	1	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	Mohms-m	1.0 x 10 ⁵	9.8 x 10 ⁴	1.0 x 10 ⁵	1.3 x 10 ⁵	4.9 x 10 ⁴	JIS-K-6249	C
Breakdown Voltage	KV/mm	19	18	18	19	17	JIS-K-6249	C
Thermal Conductivity	W/m-k	6.0	6.0	6.0	6.0	6.0	JIS-R-2618 equivalent	C

-2) Test Condition : 120°C (250°F) x 1,000hrs(42 days)

Sarcon® GR-Hm

Table - 10

Property	Unit	Initial	100Hrs	250Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	—	3.2	3.2	3.2	3.2	3.2	JIS-K-6220	—
Hardness	ASKER-C	26	42	46	57	62	JIS-K-7312	B
Tensile Strength	MPa	0.3	0.5	0.5	0.5	0.4	JIS-K-6251 (#2Die)	A
Elongation	%	80	30	25	15	10	JIS-K-6251 (#2Die)	A
Tear Resistance	KN/m	1	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	Mohms-m	1.0 x 10 ⁵	6.9 x 10 ³	1.3 x 10 ⁴	1.8 x 10 ⁴	2.8 x 10 ⁴	JIS-K-6249	C
Breakdown Voltage	KV/mm	19	19	18	17	19	JIS-K-6249	C
Thermal Conductivity	W/m-k	6.0	6.0	6.0	6.0	6.0	JIS-R-2618 equivalent	C

-3) Test Condition : 150°C (300°F) x 1,000hrs(42 days)

Sarcon® GR-Hm

Table - 11

Property	Unit	Initial	100Hrs	250Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	—	3.2	3.2	3.2	3.2	3.2	JIS-K-6220	—
Hardness	ASKER-C	26	50	57	65	75	JIS-K-7312	B
Tensile Strength	MPa	0.3	0.4	0.5	0.5	0.7	JIS-K-6251 (#2Die)	A
Elongation	%	80	25	20	10	5	JIS-K-6251 (#2Die)	A
Tear Resistance	KN/m	1	1	2	2	2	JIS-K-6252 (Angle)	A
Volume Resistivity	Mohms-m	1.0 x 10 ⁵	2.2 x 10 ⁵	2.0 x 10 ⁵	1.9 x 10 ⁵	5.8 x 10 ⁵	JIS-K-6249	C
Breakdown Voltage	KV/mm	19	20	17	18	20	JIS-K-6249	C
Thermal Conductivity	W/m-k	6.0	6.0	6.0	6.0	6.0	JIS-R-2618 equivalent	C

Remarks / Specimen A : 2.0mm Thickness.

Specimen B : 60.0mm Width x 120mm Length x 20.0mm Thickness. (GR-m for all products)

Specimen C : 120.0mm Width x 120mm Length x 1.0mm Thickness.

8] Humidity Test.

Test Condition : 60°C(140°F) x 1,000hrs (42 days) x 90%RH

Sarcon® GR-m

Table - 12

Property	Unit	Initial	100Hrs	250Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	—	3.2	3.2	3.2	3.2	3.2	JIS-K-6220	—
Hardness	ASKER-C	26	27	27	28	30	JIS-K-7312	B
Tensile Strength	MPa	0.3	0.2	0.3	0.2	0.2	JIS-K-6251 (#2Die)	A
Elongation	%	80	70	50	50	50	JIS-K-6251 (#2Die)	A
Tear Resistance	KN/m	1	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	Mohms-m	1.3 x 10 ⁶	4.9 x 10 ⁴	6.7 x 10 ⁴	7.8 x 10 ⁴	7.9 x 10 ⁴	JIS-K-6249	C
Breakdown Voltage	KV/mm	18	18	18	17	19	JIS-K-6249	C
Thermal Conductivity	W/m-k	6.0	6.0	6.0	6.0	6.0	JIS-R-2618 equivalent	C

Sarcon® GR-Hm

Table - 13

Property	Unit	Initial	100Hrs	250Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	—	3.2	3.2	3.2	3.2	3.2	JIS-K-6220	—
Hardness	ASKER-C	26	27	27	28	30	JIS-K-7312	B
Tensile Strength	MPa	0.3	0.3	0.3	0.3	0.3	JIS-K-6251 (#2Die)	A
Elongation	%	80	50	40	40	40	JIS-K-6251 (#2Die)	A
Tear Resistance	KN/m	1	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	Mohms-m	1.0 x 10 ⁵	3.8 x 10 ⁴	7.8 x 10 ⁴	9.4 x 10 ⁴	9.2 x 10 ⁴	JIS-K-6249	C
Breakdown Voltage	KV/mm	19	17	18	19	18	JIS-K-6249	C
Thermal Conductivity	W/m-k	6.0	6.0	6.0	6.0	6.0	JIS-R-2618 equivalent	C

Remarks / Specimen A : 2.0mm Thickness.

Specimen B : 60.0mm Width x 120mm Length x 20.0mm Thickness. (GR-m for all products)

Specimen C : 120.0mm Width x 120mm Length x 1.0mm Thickness.

9] Mechanical Property / Compression VS Compression Load

Sarcon® GR-m

(Unit : Kgf/inch²) **Table - 14**

Compression rate	50G-m	100G-m	150G-m	200G-m
10%	8.5	10.7	8.4	8.1
20%	28.4	22.5	21.9	34.3
30%	45.7	42.4	49.3	42.2
40%	65.3	64.0	62.6	54.8
50%	90.5	87.3	84.1	76.8
Sustain 50% *1	(53.7)	(50.6)	(46.5)	(39.5)

Sarcon® GR-Hm

(Unit : Kgf/inch²) **Table - 15**

Compression rate	50G-Hm	100G-Hm	150G-Hm	200G-Hm
10%	13.9	15.6	14.6	9.3
20%	38.4	36.4	31.9	38.5
30%	59.2	56.1	53.7	49.8
40%	80.8	81.5	79.3	68.4
50%	104.3	103.2	97.3	85.4
Sustain 50% *1	(76.6)	(74.8)	(68.8)	(54.2)

Test Method : Fujipoly Test Method

Compression Velocity : 5.0mm / minute with 200Kgf load Cell

Compression Area : 6.25cm² (25mm x 25mm)

*1 Sustain 50% at One (1) minute after

10] Extractable Volatiles.

Table - 16

D _n	Sarcon® GR-m
Total D ₂₀ or less	0.0031wt %
Test Method (13]) : Gas Chromatographic Analysis.	
Bellcore Test	Passed Bellcore Specification TR-NWT000930

11] Flame Retardancy.

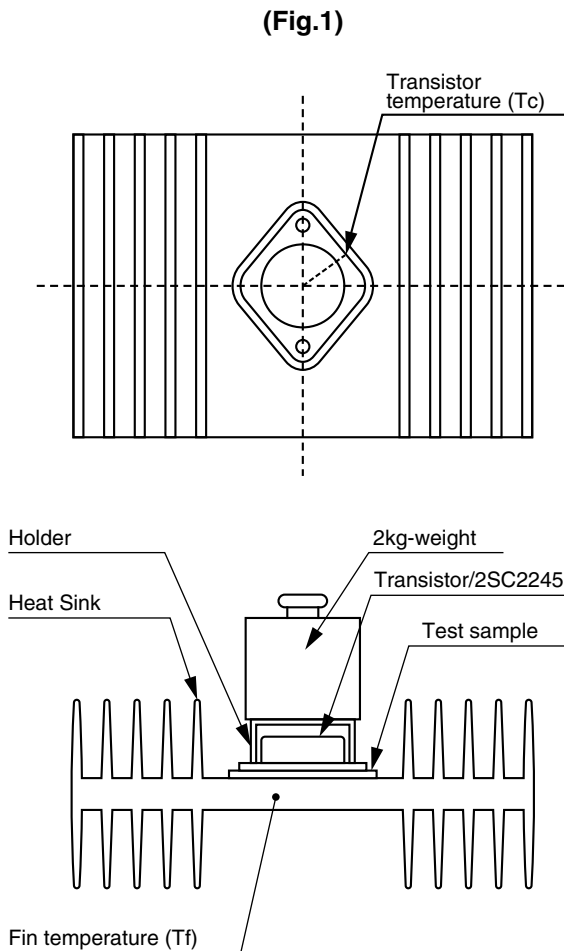
Table - 17

Series	Product Description		Series	Product Description	
Sarcon® GR-m	Sarcon® 50G-m	94V - 0	Sarcon® GR-Hm	Sarcon® 50G-Hm	94V - 0
	Sarcon® 100G-m	94V - 0		Sarcon® 100G-Hm	94V - 0
	Sarcon® 150G-m	94V - 0		Sarcon® 150G-Hm	94V - 0
	Sarcon® 200G-m	94V - 0		Sarcon® 200G-Hm	94V - 0

12] Test Method for thermal resistance.

Test method : Fujipoly test method FTM P-3020 which gives ASTM D5470 equivalent value.

- 1) Punched-out specimen in TO-3 package is located between a transistor and heat sink.
(Fig.1)
- 2) The transistor is covered with resin holder and added 2kg -weight as a load.
- 3) DC 10V, 2A (20W) current is applied to the transistor.
- 4) After three minutes, the thermal resistance is calculated based on the following formula.



Test Apparatus

Transistor : 2SC2245 (To-3 package)

Heat Sink : 40CH104L-90-K
(manufactured by Ryosan Co., Ltd)

Heat Sensor : 2SC1-OHK300 x 532W x JOO2Y
(manufactured by Chino Co., Ltd)

Condition : 25°C 60%RH

Formula for Thermal resistance calculation.

$$R_t = \frac{(T_c - T_f)}{P_c}$$

R_t : Thermal resistance (°C·inch² / watt)

T_c : Transistor temperature °C

T_f : Heat sink temperature °C

P_c : Power applied to transistor
(DC10V x 2A)

13] Test Method for the Low Molecular Siloxane content.

[Test method]

[The preprocessing]

(sample) It measures 1-g weight.

Extraction solvent : Carbon tetrachloride 10ml.
(The inner standard material.)

The immersion and leaving 16Hrs ≤.

It measures extracts by gas chromatography analysis.

[The measurement condition]

model: SHIMAZU SEISAKUSHO Co., Ltd. GC-12A

detector: FID (The hydrogen flame ionization detector.)

column: OV-17 (3m)

column temperature: 60°C·2min→temperature-programed 16°C / min→maintenance 300°C

ventage temperature: 280°C

carrier gas flow rate: 40ml / min

inculcating quantity: 2μl

14] Other Technical Information and Design Guide.

Fuji Poly website <http://www.fujipoly.com>

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: January.31th 2002 version 2
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