

FUJIPOLY[®]

SARCON[®] GR-i Series.

**High Heat Conductive (5.8Watt/m•K)
Silicone Gap Filler Pad.**

(FUJIPOLY[®] and SARCON[®], are registered Trademarks of Fujipoly Group)

FUJIPOLY DATA SHEET NUMBER : FPDS 2K-29 (Version 2)

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

JAPAN

3F, Kanda YK Bldg. 3-9 Iwamoto-cho, 1-chome, Chiyoda-ku Tokyo 101-0032, Japan
Phone:+81-3-5821-3105 / Facsimile:+81-3-5821-3108
E-mail:fujipoly@mxd.mesh.ne.jp

Fujipoly America Corporation

USA

365 Carnegie Avenue P.O.Box 679 Kenilworth, New Jersey 07033-0679 U.S.A.
Phone:+1-908-298-3850 / Facsimile:+1-908-298-1232
E-mail:FUJIPOLY@aol.com. WEBSITE:www.FUJIPOLY.COM

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

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:fptlszk@loxinfo.co.th

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:fpapcom@fujipoly-apcom.com.hk

FUJIPOLY[®] DATA SHEET FPDS 2K-29 (Version 2)

1] Product Name :

- Sarcon[®] GR-i
- Sarcon[®] GR-Hi

2] Features. :

Sarcon GR-i is a highly conformable, thermally conductive 5.8watt/m²•k (No electric conductive) in areas where space between surfaces are uneven and surface textures vary. Sarcon GR-i 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-i products.

Table - 1

Series	Construction	Application Guidelines
Sarcon GR-i	Silicone compound	Between a chassis wall and other surface. Between CPU and heat sink. Between a semiconductor and heat sink.
Sarcon GR-Hi	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 3.00mm.

*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-i	Sarcon 50G-i		0.50mm ± 0.1mm
	Sarcon 100G-i	Usable size 280mm x 180mm (11" x 7.1")	1.0mm ± 0.2mm
	Sarcon 150G-i		1.5mm ± 0.2mm
	Sarcon 200G-i	Actual size 300mm x 200mm (11.8" x 7.8")	2.0mm ± 0.3mm
	Sarcon 250G-i		2.5mm ± 0.3mm
	Sarcon 300G-i		3.0mm ± 0.3mm
Sarcon GR-Hi	Sarcon 50G-Hi		0.50mm ± 0.1mm
	Sarcon 100G-Hi	Usable size 280mm x 180mm (11" x 7.1")	1.0mm ± 0.2mm
	Sarcon 150G-Hi		1.5mm ± 0.2mm
	Sarcon 200G-Hi	Actual size 300mm x 200mm (11.8" x 7.8")	2.0mm ± 0.3mm
	Sarcon 250G-Hi		2.5mm ± 0.3mm
	Sarcon 300G-Hi		3.0mm ± 0.3mm

Notice.

1) Standard Product Form.

Sarcon GR-i 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-i	GR-Hi		Test Method (Based on)	Specimen
Color	—	Gray	Gray		Visual	—
Operating Temp. range	°C	-60 ~ +200	-60 ~ +200		—	—
Specific Gravity	gr/cm ³	3.1	3.1		JIS-K-6220 ASTM D-792	—
Hardness	ASKER-C	36	36		SRISO101	B
	Shore 00	36	36		ASTM D-2240	B
Tensile Strength	(Mpa)	0.4	0.4		JIS-K-6251 (#2 Die) ASTM D-412	A
Elongation	%	30	30		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)	1.2 x 10 ⁴	8.1 x 10 ³		JIS-K-6249 ASTM D-257	C
Break Down Voltage	(Kv/mm)	18	18		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-i	GR-Hi
0.5mm	0.07	0.09
1.0mm	0.18	0.27
1.5mm	0.35	0.42
2.0mm	0.50	0.56
2.5mm	0.66	0.71
3.0mm	0.77	0.85

Test Method : Transistor : TO-3 at 20 Watts of 5 minutes.

Weight : 2Kg.

Test Method of Thermal Resistance.(12] -1)

2) Thermal Conductivity.

Table - 5

	Unit	GR-i	GR-Hi
Thermal Conductivity	watt / m-k	5.8	5.8

Test Method : JIS R 2618

7] Heat Aging Test.

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

Sarcon® GR-i

Table - 6

Property	Unit	Initial	100Hrs	250Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	—	3.1	3.1	3.1	3.1	3.1	JIS-K-6220	—
Hardness	ASKER-C	40	40	39	39	40	SRIS-0101	B
Tensile Strength	Mpa	0.4	0.4	0.4	0.3	0.3	JIS-K-6251 (#2Die)	A
Elongation	%	30	40	40	40	40	JIS-K-6251 (#2Die)	A
Tear Resistance	Kgf/cm	1	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	Mohms-m	1.2 x 10 ⁴	1.2 x 10 ⁴	1.3 x 10 ⁴	1.3 x 10 ⁴	1.3 x 10 ⁴	JIS-K-6249	C
Break Down Voltage	Kv/mm	18	18	18	18	18	JIS-K-6249	C
Thermal Conductivity	w/m-k	5.8	5.8	5.8	5.8	5.8	ASTM-D2326	C

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

Sarcon GR-i

Table - 7

Property	Unit	Initial	100Hrs	250Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	—	3.1	3.1	3.1	3.1	3.1	JIS-K-6220	—
Hardness	ASKER-C	40	47	50	56	65	SRIS-0101	B
Tensile Strength	Mpa	0.4	0.3	0.2	0.2	0.2	JIS-K-6251 (#2Die)	A
Elongation	%	30	30	15	15	10	JIS-K-6251 (#2Die)	A
Tear Resistance	Kgf/cm	1	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	Mohms-m	1.2 x 10 ⁴	2.3 x 10 ⁵	1.1 x 10 ⁶	1.5 x 10 ⁶	2.3 x 10 ⁶	JIS-K-6249	C
Break Down Voltage	Kv/mm	18	18	18	18	18	JIS-K-6249	C
Thermal Conductivity	w/m-k	5.8	5.8	5.8	5.8	5.8	ASTM-D2326	C

8] Humidity Test.

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

Sarcon GR-i

Table - 8

Property	Unit	Initial	100Hrs	250Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	—	3.1	3.1	3.1	3.1	3.1	JIS-K-6220	—
Hardness	ASKER-C	40	40	38	37	39	SRIS-0101	B
Tensile Strength	Mpa	0.4	0.3	0.3	0.3	0.2	JIS-K-6251 (#2Die)	A
Elongation	%	30	50	50	50	50	JIS-K-6251 (#2Die)	A
Tear Resistance	Kgf/cm	1	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	M ohms-m	1.2 x 10 ⁴	3.3 x 10 ³	3.3 x 10 ³	3.8 x 10 ³	5.8 x 10 ³	JIS-K-6249	C
Break Down Voltage	Kv/mm	18	18	18	18	18	JIS-K-6249	C
Thermal Conductivity	w/m-k	5.8	5.8	5.8	5.8	5.8	ASTM-D2326	C

Remarks / Specimen A : 2.0mm Thickness.

Specimen B : 60.0mm Width x 120mm Length x 20.0mm Thickness. (GR-i 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-Hi

Table - 9

Property	Unit	Initial	100Hrs	250Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	—	3.1	3.1	3.1	3.1	3.1	JIS-K-6220	—
Hardness	ASKER-C	40	40	40	40	40	SRIS-0101	B
Tensile Strength	Mpa	0.4	0.4	0.4	0.3	0.3	JIS-K-6251 (#2Die)	A
Elongation	%	30	30	25	25	25	JIS-K-6251 (#2Die)	A
Tear Resistance	Kgf/cm	1	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	Mohms-m	8.1 x 10 ³	1.2 x 10 ⁴	1.4 x 10 ⁴	3.2 x 10 ⁴	2.9 x 10 ⁴	JIS-K-6249	C
Break Down Voltage	Kv/mm	18	18	18	18	18	JIS-K-6249	C
Thermal Conductivity	w/m-k	5.8	5.8	5.8	5.8	5.8	ASTM-D2326	C

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

Sarcon GR-Hi

Table - 10

Property	Unit	Initial	100Hrs	250Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	—	3.1	3.1	3.1	3.1	3.1	JIS-K-6220	—
Hardness	ASKER-C	40	47	50	56	65	SRIS-0101	B
Tensile Strength	Mpa	0.4	0.4	0.3	0.3	0.3	JIS-K-6251 (#2Die)	A
Elongation	%	30	15	15	15	10	JIS-K-6251 (#2Die)	A
Tear Resistance	Kgf/cm	1	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	Mohms-m	8.1 x 10 ³	2.9 x 10 ⁵	5.6 x 10 ⁵	5.3 x 10 ⁵	1.5 x 10 ⁶	JIS-K-6249	C
Break Down Voltage	Kv/mm	18	18	18	18	18	JIS-K-6249	C
Thermal Conductivity	w/m-k	5.8	5.8	5.8	5.8	5.8	ASTM-D2326	C

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

Sarcon GR-Hi

Table - 11

Property	Unit	Initial	100Hrs	250Hrs	500Hrs	1,000Hrs	Test Method	Specimen
Specific Gravity	—	3.1	3.1	3.1	3.1	3.1	JIS-K-6220	—
Hardness	ASKER-C	40	40	38	37	39	SRIS-0101	B
Tensile Strength	Mpa	0.4	0.3	0.3	0.3	0.2	JIS-K-6251 (#2Die)	A
Elongation	%	30	30	50	50	50	JIS-K-6251 (#2Die)	A
Tear Resistance	Kgf/cm	1	1	1	1	1	JIS-K-6252 (Angle)	A
Volume Resistivity	ohms-m	8.1 x 10 ³	6.1 x 10 ³	3.5 x 10 ³	3.5 x 10 ³	4.5 x 10 ³	JIS-K-6249	C
Break Down Voltage	Kv/mm	18	18	18	18	18	JIS-K-6249	C
Thermal Conductivity	w/m-k	5.8	5.8	5.8	5.8	5.8	ASTM-D2326	C

Remarks / Specimen A : 2.0mm Thickness.

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

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

9] Mechanical Property / Compression VS Compression Load

Sarcon® GR-i

(Unit : Kgf/inch²) **Table - 12**

Compression rate	50G-i	100G-i	150G-i	200G-i	250G-i	300G-i
10%	10.8	21.5	17.5	12.7	14.6	14.6
20%	34.6	42.5	36.4	23.8	42.1	42.1
30%	57.2	71.5	70.3	69.6	74.7	74.5
40%	80.2	106.3	105.3	105.9	104.5	104.2
50%	106.5	143.4	142.1	141.5	135.6	136.2
Sustain 50% *1	(71.5)	(78.1)	(75.6)	(73.6)	(70.2)	(69.8)

Sarcon® GR-Hi

(Unit : Kgf/inch²) **Table - 13**

Compression rate	50G-Hi	100G-Hi	150G-Hi	200G-Hi	250G-Hi	300G-Hi
10%	9.3	22.8	21.2	16.2	21.2	17.3
20%	35.3	45.9	42.4	39.3	46.7	41.8
30%	61.0	75.4	72.6	69.5	75.5	69.9
40%	85.0	110.2	107.3	106.5	105.4	97.9
50%	110.7	149.6	145.6	143.5	139.3	129.7
Sustain 50% *1	(82.7)	(95.2)	(91.5)	(80.7)	(76.6)	(73.0)

Test Method : Fujipoly Test Method

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

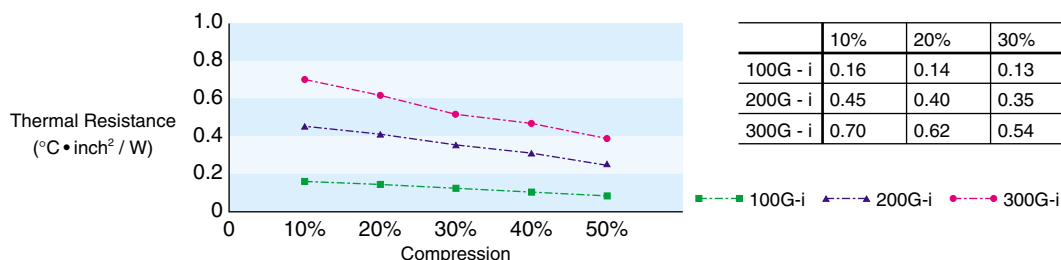
Compression Area : 6.25cm² (25mm x 25mm)

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

10] Thermal Property / Compression VS Thermal Resistance

Table - 14

Unit:(°C•inch² / W)



11] Extractable Volatilise.

Table - 15

D _n	Sarcon GR-i
Total less D ₂₀	Less than 0.0010wt %

Test Method (12] -2) : Gas Chromatographic Analysis by Abstracting Acetone.

12] Flame Retardancy. / UL File Number : E58126

Table - 16

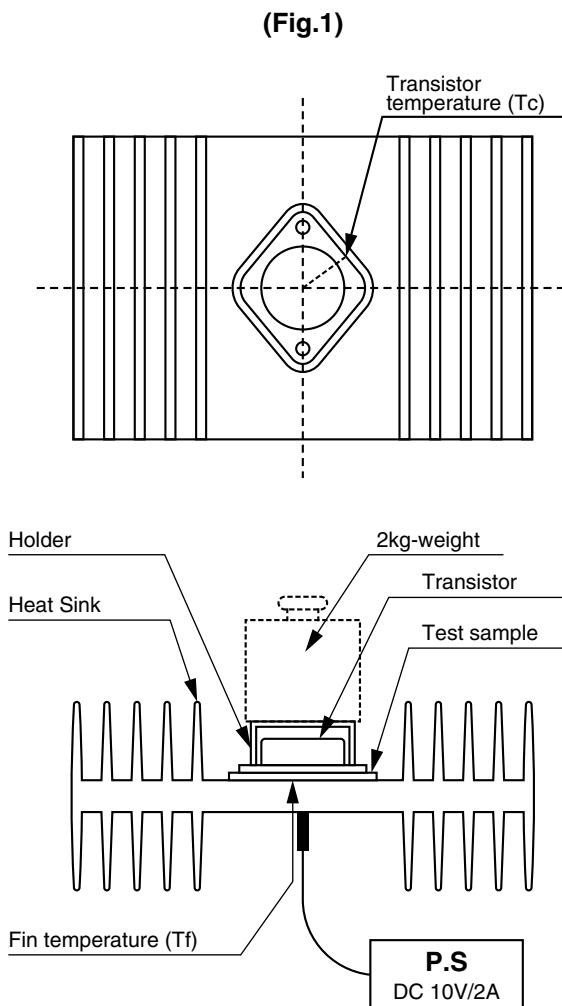
Series	Product Description	Class	Series	Product Description	Class
Sarcon GR-i	Sarcon 50G-i	94V - 0	Sarcon GR-Hi	Sarcon 50G-Hi	94V - 0
	Sarcon 100G-i	94V - 0		Sarcon 100G-Hi	94V - 0
	Sarcon 150G-i	94V - 0		Sarcon 150G-Hi	94V - 0
	Sarcon 200G-i	94V - 0		Sarcon 200G-Hi	94V - 0
	Sarcon 250G-i	94V - 0		Sarcon 250G-Hi	94V - 0
	Sarcon 300G-i	94V - 0		Sarcon 300G-Hi	94V - 0

13] Test Method for Sarcon® GR-i products.

1) Test method of thermal resistance.

[Test method]

- 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) The thermal resistance is determined by formula from the transistor and heat sink temperatures measured three minutes later.



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 calculating the Thermal Resistance

$$\text{Thermal Resistance} = \frac{(T_c - T_f)}{P_c} \text{ } ^\circ\text{C/watt}$$

T_c : Transistor temperature °C
 T_f : Heat sink temperature °C
 P_c : Power applied to transistor
 (DC10V x 2A)

12] -2) The gas chromatography method by the carbon.

[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 method.

[The measurement condition]

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

detector: FID (The hydrogen flame ionisation detector.)

column: OV-17 (3m)

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

vintage temperature: 280°C

carrier gas flow rate: 40ml / min

inculcating quantity: 2μl

13] Others Technical Informations and Design Guide.

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

December.11.2000 version 2
ISSUED : July.21.2000 version 1

STATEMENT OF LIEU OF WARRANTY: All technical information and data in this document is based on tests and is believed to be accurate and reliable. Nevertheless, since the products described herein are not provided to conform with mutually accepted specifications and the use thereof is unknown, the manufacturer and seller of the product do not guarantee results, freedom from patent infringement, or suitability of the product for any application thereof. The manufacturer and seller of the product, described in this document will provide all possible technical assistance and will replace any products proven defective. No statement or recommendation made by the manufacturer or seller, not contained herein, shall have any force of effect unless in conformity with an agreement signed by an officer of the seller or manufacturer. Product testing by the purchaser is recommended in order to confirm expected results.

Copyright© 1996 Fujipoly.

*Sarcon[®], is registered Trademark of Fujipoly.