

散热有机硅橡胶加工品

Thermal Interface Silicone Rubber

High-hardness Thermal Interface Silicone Rubber



Thermal Interface
Silicone Soft Pads



Thermal Interface
Silicone Ultra Soft Pads



Double Sided
Thermal Interface Silicone Tapes



Thermal Interface
Phase Change Materials



Electromagnetic Noise Suppression and
Thermal Interface Silicone Rubber Sheets

支持电子设备的“散热设计”。

Shin-Etsu products – Effective tools in the quest for cool.

产品一览



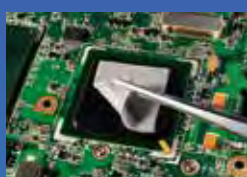
高硬度散热有机硅橡胶加工品
High-hardness Thermal Interface Silicone Rubber

▶ P6-11



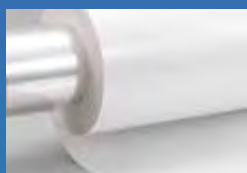
低硬度散热有机硅胶垫
Thermal Interface Silicone Soft Pads

▶ P12-19



超低硬度散热有机硅胶垫
Thermal Interface Silicone Ultra Soft Pads

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导热性双面粘着有机硅胶带
Double Sided Thermal Interface Silicone Tapes

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相变材料
Thermal Interface Phase Change Materials

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抑制电磁波噪声导热性有机硅橡胶片
Electromagnetic Noise Suppression and Thermal Interface Silicone Rubber Sheets

▶ P30

TC产品型号查看方法 How to Read Model Numbers of TC Series

厚度 Thickness

表示有机硅橡胶加工产品的厚度。以厚度的100倍表示。

The thickness of the TC Series product is specified by a two digit code corresponding to the thickness in millimeters multiplied by 100.

例 Example	50 : 厚度 Thickness	0.5mm
	100 : 厚度 Thickness	1mm

类型 Grade

表示有机硅橡胶加工品按特性分类的类型。

The grade of the TC Series product is classified according to the physical properties of the silicone rubber.

高硬度散热有机硅橡胶加工品 High-hardness Thermal Interface Silicone Rubber			
例 Example	A	: A型	A type
	EG	: EG型	EG type

低硬度/超低硬度散热有机硅胶垫 Thermal Interface Silicone Soft Pads/Ultra Soft Pads

例 Example	HS-1.4 : HS-1.4型 HS-1.4 type
	TXS : TXS型 TXS type

TC-XX ΔΔ (XX XXX)

厚度 Thickness

类型 Grade

加工品的形状 Form

加工品的形状 Form

表示散热有机硅橡胶加工产品的形状。

The form of the TC Series product is shown at the end.

TO-XXX	: 标准冲裁产品 Cut sheet models
CP-TO-XXX	: 帽状产品 Cap type molded models
KT-XXX	: 管状产品 Tube type molded models

* 如果是定制的产品, 将写上用户的图纸号码、尺寸等。
For custom-order models, the customer's order number and dimensions can be added.

高硬度散热有机硅橡胶加工品 High-hardness Thermal Interface Silicone Rubber

- 具有电绝缘性能等优异的电性能。
 - 有的产品使用玻璃布和聚酰亚胺薄膜进行了加固。
 - 不仅有片状，还有帽状和筒状产品，有助于缩小晶体管等的沿面距离。
 - 几乎所有产品都是UL标准认证的产品，表现出优异的阻燃性。
 - 可在很宽的温度范围内使用（-40℃~180℃）。
- These products have fine electrical properties (electric non-conductivity, etc.)
 - There is a reinforcement type with the Fiberglass or Polyimide film.
 - Not only sheet, but also Cap or Tube shapes. These products can even meet the needs for reduction of the creeping distance of transistors.
 - Nearly all products are UL-certified for flame-retardancy.
 - Can be used in a wide temperature (-40°C to +180°C).

低硬度散热有机硅胶垫 Thermal Interface Silicone Soft Pads

- 弹性优异，密切接触发热部分，可发挥很高的散热效果。
 - 对于发热部分可简单地安装和拆卸，也可很容易地临时固定，操作性优异。
 - 几乎所有产品都是UL标准认证的产品，表现出优异的阻燃性。
 - 可在很宽的温度范围内使用（-40℃~180℃）。
- *使用过程中切片中的有机硅油有时会流到表面上来。
- These products are pliable and capable of close conformity to irregular or complex surfaces.
 - They are easy to apply and remove, and can be used for temporary attachment.
 - Nearly all products are UL-certified for flame-retardancy.
 - Can be used in a wide temperature (-40°C to +180°C).
- *Silicone oil contained in the sheet may come to the surface when the sheet is used.

超低硬度散热有机硅胶垫 Thermal Interface Silicone Ultra Soft Pads

- 实现了高性价比和热导率。
 - 由于材料非常柔软，因此具有良好的压缩性和应力松弛性能。
 - 几乎所有产品都是UL标准认证的产品，表现出优异的阻燃性。
 - 低比重。
 - 可在很宽的温度范围内使用（TC-SP-1.7、TC-SPA-3.0、TC-CAS/CAB系列：-40℃~150℃。TC-CAD/CAT-20系列：-40℃~180℃）。
- *使用过程中切片中的有机硅油有时会流到表面上来。
- Excellent cost performance and high thermal conductivity.
 - Ultra soft-hardness that makes for good compressibility and a stress-relaxation property that can reduce stress to heat moulds.
 - Nearly all products are UL-certified for flame-retardancy.
 - Low specific gravity.
 - Can be used in a wide temperature (TC-SP-1.7, TC-SPA-3.0, TC-CAS/CAB series: -40°C to +150°C. TC-CAD/CAT-20 series: -40°C to +180°C).
- *Silicone oil contained in the sheet may come to the surface when the sheet is used.

导热性双面粘着有机硅胶带 Double Sided Thermal Interface Silicone Tapes

- 通过强有力的稳定的粘着力实现了无螺钉化。
 - 热阻可在很宽的温度范围内保持稳定。
 - 可实现大面积的良好的作业性。
- Strong and stable adhesive strength without screws.
 - Thermal resistance is stable across a wide temperature range.
 - Can be applied to wide areas using automated equipment.

相变材料 Thermal Interface Phase Change Materials

- 相变材料是一种通过吸热而软化的高性能散热片。因为可吸热软化提高粘着性，因此可降低热阻抗，发挥优异的散热性。
 - 因为是由有机硅树脂制成，所以长期可靠性优异。
 - 因为是片状，所以操作性优异。
 - 再加工性优异。
- Phase change materials are high-performance thermal interface sheets that soften with heat. Heat softens the sheet for a better conforming fit, which reduces thermal resistance. The result is superior dissipation of heat.
 - Made of silicone, so they provide long-lasting, dependable performance.
 - Sheets are easy to handle.
 - Reworkable.

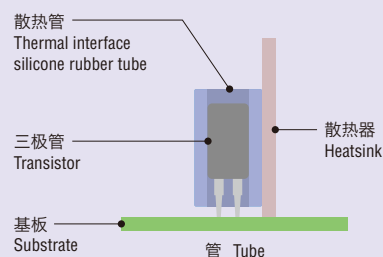
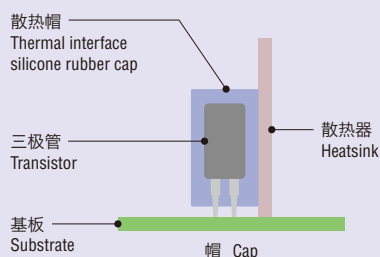
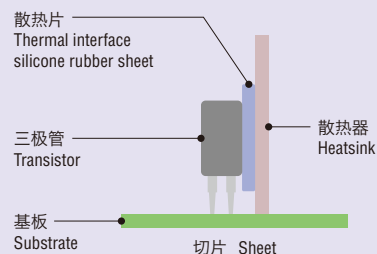
抑制电磁波噪声导热性有机硅橡胶片 Electromagnetic Noise Suppression and Thermal Interface Silicone Rubber Sheets

- 这是一种兼具抑制高频噪声效果和高导热性的产品。
 - 耐热性与阻燃性优异。
 - 柔软，加工性、作业性优异。
 - 无卤素，环保性优异。
 - 可在很宽的温度范围内使用（-40℃~150℃）。
- *使用过程中切片中的有机硅油有时会流到表面上来。
- Thermal interface sheets which also shield high frequency noise.
 - Excellent heat resistance and flame retardancy.
 - Excellent workability. The sheets are flexible and easy to cut to shape.
 - Halogen-free, making these sheets eco-friendly.
 - Can be used in a wide temperature range (-40 to +150°C).
- *Silicone oil contained in the sheet may come to the surface when the sheet is used.

高硬度散热有机硅橡胶加工品 High-hardness Thermal Interface Silicone Rubber

●晶体管散热

Heat dissipation of transistors

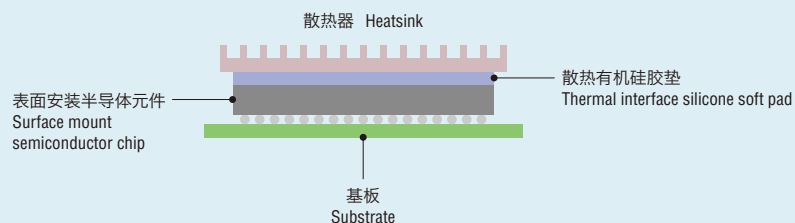


低硬度散热有机硅胶垫 Thermal Interface Silicone Soft Pads

超低硬度散热有机硅胶垫 Thermal Interface Silicone Ultra Soft Pads

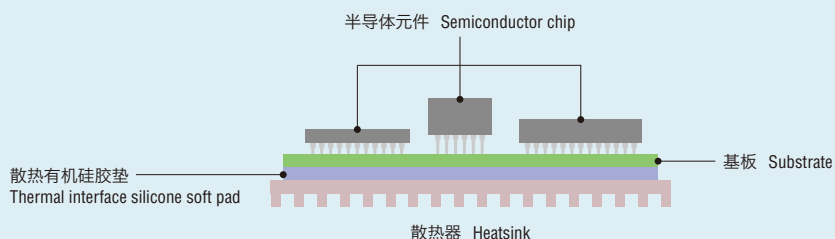
●表面安装半导体元件的散热

Heat dissipation of surface mount semiconductor chip



●整个基板的散热

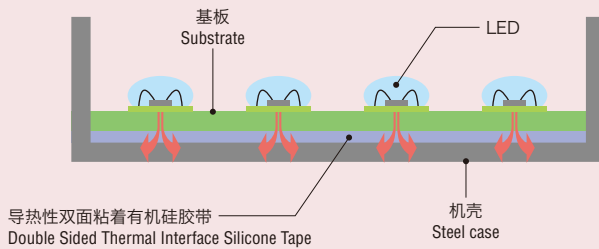
Heat dissipation of substrate



导热性双面粘着有机硅胶带 Double Sided Thermal Interface Silicone Tapes

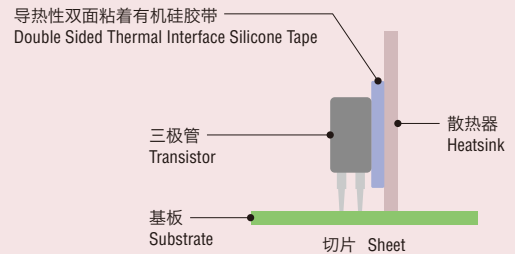
●LED基板的散热

Heat dissipation of LED substrate



●功率晶体管的固定及散热

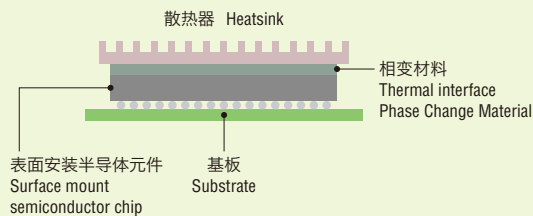
Heat dissipation and fixing of transistor



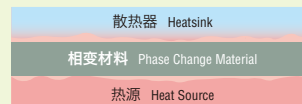
相变材料 Thermal Interface Phase Change Materials

●表面安装半导体元件的散热

Heat dissipation of surface mount semiconductor chip



软化之前 Before Phase-change



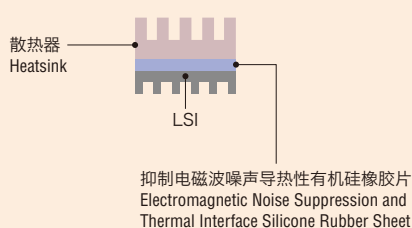
软化后 After Phase-change



抑制电磁波噪声导热性有机硅橡胶片 Electromagnetic Noise Suppression and Thermal Interface Silicone Rubber Sheets

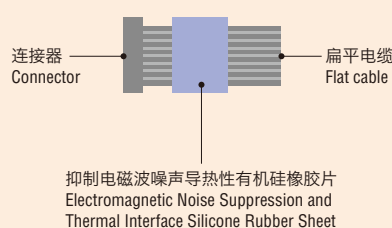
●LSI噪声对策与散热

Electromagnetic noise suppression and heat conduction for LSI



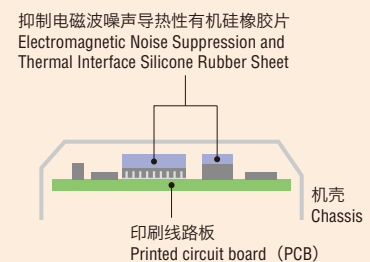
●扁平电缆的噪声对策与和散热

Electromagnetic noise suppression and heat conduction for flat cable



●抑制机壳内元件的相互电磁干扰

Suppression of electromagnetic interference between devices within chassis



切片型 Sheet Type

一般特性 General Properties

测定方法 Test Method		产品名称 Grade	TC-A系列				TC-CG系列				TC-FG系列			
			TC-20A	TC-30A	TC-45A	TC-80A	TC-20CG	TC-30CG	TC-45CG	TC-80CG	TC-20FG	TC-30FG	TC-45FG	
项目 Parameter														
颜色 Color		—	深蓝色 Dark blue				浅红褐色 Light reddish brown				浅蓝 Light blue			
厚度 Thickness	mm	—	0.20±0.05	0.30 ^{+0.10} ₋₀	0.45±0.05	0.80 ^{+0.10} ₋₀	0.20±0.05	0.30 ^{+0.10} ₋₀	0.45±0.05	0.80 ^{+0.10} ₋₀	0.20±0.05	0.30 ^{+0.10} ₋₀	0.45±0.05	
特点 Features		—	普通型 General purpose				普通型 General purpose				中导热型 Medium thermal conductivity			
导热率 Thermal Conductivity	W/m·K	ISO 22007-2	0.8				1.7				2.5			
		ASTM E1530	1.1				1.9				3.3*3			
加固层 Reinforced layer		—	无 None				玻璃布 Fiberglass				玻璃布 Fiberglass			
密度 Density at 23°C	g/cm³	JIS K 6249	2.2				2.5				3.0			
硬度 Hardness Durometer A		JIS K 6249	80				90				90			
拉伸强度 Tensile Strength	MPa	JIS K 6249	5.7				25.9	24.1	20.4	9.3	18.0	17.0	15.0	
拉裂强度 Tear Strength	kN/m	JIS K 6249	8.0				70	81	70	24	70	50	55	
拉伸 Elongation	%	—	110				—				—			
击穿绝缘电压 Dielectric Breakdown Voltage*1	kV	JIS K 6249	9	12	15	20	5	7	10	19	4	7	8	
耐电压 Dielectric Strength*1	kV	JIS C 2110	5	7	9	13	2	3	5	10	2	5	6	
体积电阻率 Volume Resistivity	TΩ·m	JIS K 6249	1.0				1.8		1.2	1.0	25	10	19	
介电常数 Dielectric Constant (ε)	50Hz	JIS K 6249	4.8				3.8	4.2	4.3		6.1			
	1kHz		4.8				3.8	4.2	4.3		6.1			
	1MHz		4.7				3.8	4.2	4.3		6.0			
介电损耗角正切 Dielectric Dissipation Factor (tan δ)	50Hz	JIS K 6249	5×10 ⁻³				7×10 ⁻³	6×10 ⁻³	5×10 ⁻³		3×10 ⁻³			
	1kHz		4×10 ⁻³				4×10 ⁻³	3×10 ⁻³			6×10 ⁻³			
	1MHz		2×10 ⁻³				4×10 ⁻³	3×10 ⁻³			5×10 ⁻³			
热阻 Thermal Resistance TO-3P	°C/W	本公司测定法*4 Shin-Etsu Method	0.75	1.20	1.70	2.60	0.48	0.70	1.00	1.30	0.21	0.43	0.53	
阻燃性 Flame-Retardance UL94*2		—	V-0				V-0				V-0			
低分子硅氧烷量 Low-molecular-weight siloxane content	ppm	本公司测定法*5 Shin-Etsu Method	10> (Σ D3-10)				10> (Σ D3-10)				10> (Σ D3-10)			
标准尺寸 Stock Size	切片 Sheet	mm	300×1000				320×1000			300×1000	330×1000			
	滚筒 Roll		—				—			—				

带单面粘合剂型 (AV型) AV Type with adhesive on single-sided

热阻 Thermal Resistance TO-3P	°C/W	本公司测定法*4 Shin-Etsu Method	—	0.93	1.39	1.57	1.92	0.80	0.90	1.20	
阻燃性*2 Flame-Retardance UL94		—	—	V-0				V-0			
标准尺寸 Stock Size	切片 Sheet	mm	—	—	—	—	300×1000	—			
	滚筒 Roll		—	320mm×50m		320mm×25m	—	330mm×50m	330mm×40m	330mm×25m	

*1 切片的厚度即各产品的厚度 Depends on the thickness of each product. *2 UL获得品「文件No.E48923」 Approved products for UL94 [File No.E 48923].
*3 计算值 Calculation value *4 晶体管法: 参照P.33 Transistor method: (P.33) *5 丙酮提取法: Acetone extraction method.

形状 Form

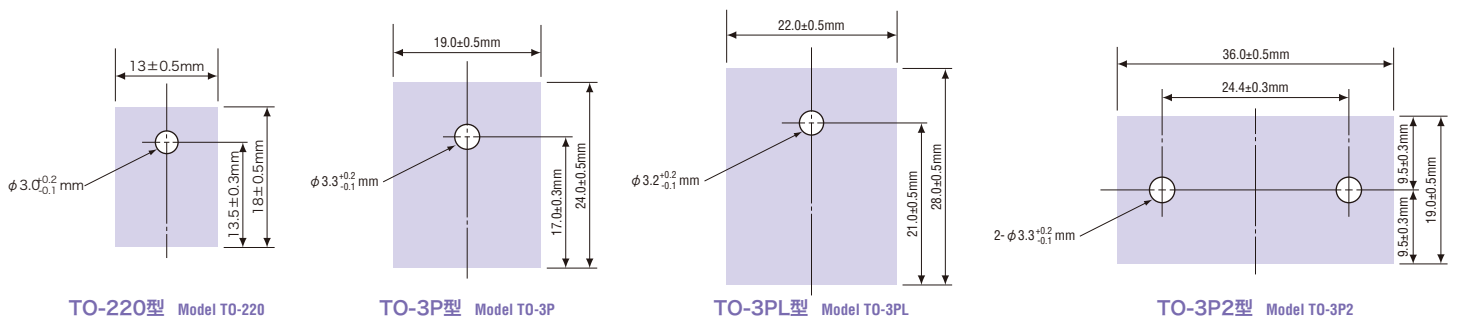
有适合于各种晶体管类型的4种标准品。 The TC Series are available in four standard models tailored for use with a variety of transistor types.
TC系列, 可以加工成各种形状。 TC series products can be manufactured to custom shapes and forms upon special request.
如果想定制产品, 请与我们联系。 Contact your local sales representative for details.

	TC-EG系列			TC-BG系列				TC-15CG-5HSV	TC-15TCP	TC-15TCI	TC-11KI
	TC-20EG	TC-30EG	TC-45EG	TC-20BG	TC-30BG	TC-45BG	TC-80BG				
	浅蓝 Light blue			白色 White				浅红褐色/灰色 Right reddish brown / Gray	粉红色 Pink	粉红色 Pink	灰色 Gray
	0.20±0.05	0.30 ^{+0.10} ₀	0.45±0.05	0.20±0.05	0.30 ^{+0.10} ₀	0.45±0.05	0.80 ^{+0.10} ₀	0.2	0.15±0.03	0.15±0.03	0.11±0.02
	高导热型 High thermal conductivity			高导热型 High thermal conductivity				—	高耐压 High insulation	高耐压 High insulation	高耐压, 低热阻 High insulation, low thermal resistance
	3.1			7.3				1.5	0.6*3	0.6*3	
	4.5			5.0				—	1.2*3	1.2*3	
	玻璃布 Fiberglass			玻璃布 Fiberglass				—	聚萘二甲酸级薄膜 PEN	聚酰亚胺薄膜 Polyimide film	高导热性的特殊聚酰亚胺薄膜 High thermal conductivity special polyimide film
	3.1			1.5				2.6	2.1	2.2	2.2
	95			90				90	—	—	—
	22.0	16.8	14.9	51.0		49.0	14.0	27	51	46	40
	76	53	59	197	223	209	54	113	84	60	80
	—			—				—	47	50	100
	4	7	8	7	12	16	21	7	13	12	10
	2	5	6	2	5	7	12	—	10	10	7
	25	10	19	8	10	9	11	—	—	—	—
	6.5			3.0	3.1	2.9		因为是薄膜不能测量 Not applicable for thin film.			
	6.5			3.0	3.1	2.9					
	6.4			3.0	3.1	2.9					
	4×10 ⁻³			3×10 ⁻³	5×10 ⁻³		9×10 ⁻³				
	7×10 ⁻³			2×10 ⁻³			5×10 ⁻³				
	5×10 ⁻³			2×10 ⁻³							
	0.15	0.30	0.45	0.11	0.26	0.35	0.46	0.37	0.65	0.64	0.35
	V-0			V-0				相当于V-0 V-0 equivalent	V-0	V-0	V-0
	10> (Σ D3-10)			10> (Σ D3-10)				—	10> (Σ D3-10)		10> (Σ D3-10)
	300×400			210×270				320×1000	300×1000		320×1000
	—			—				—	300mm×60m		320mm×50m

(非规格值 Not specified values)

	—	0.49	0.73	0.85	0.92	—	—	1.08	—
	—	V-0				—	—	—	—
	—	200×260				—	—	—	—
	—	—				—	—	300mm×50m	—

(非规格值 Not specified values)



有加工性优异的帽式 Cap Type

■一般特性 General Properties

测定方法 Test Method		产品名称 Grade	TC-A-CP系列			TC-C-CP系列			TC-S2-CP系列		
			TC-30A	TC-45A	TC-80A	TC-30C	TC-45C	TC-80C	TC-30S2	TC-45S2	TC-80S2
颜色 Color		—	深蓝色 Dark blue			浅红褐色 Light reddish brown			茶色 Brown		
厚度 Wall Thickness	mm	—	$0.30^{+0.15}_{-0}$	$0.45^{+0.10}_{-0.05}$	$0.80^{+0.15}_{-0}$	$0.30^{+0.15}_{-0}$	$0.45^{+0.10}_{-0.05}$	$0.80^{+0.15}_{-0}$	$0.30^{+0.15}_{-0}$	$0.45^{+0.10}_{-0.05}$	$0.80^{+0.15}_{-0}$
特点 Features		—	通用型 General purpose			中导热型 Medium thermal conductivity			高导热型 High thermal conductivity		
导热率 Thermal Conductivity	W/m·K	ISO 22007-2	0.8			1.8			2.0		
		ASTM E1530	1.1			1.5			2.0		
密度 Density at 23°C	g/cm ³	JIS K 6249	2.2			2.6			2.9		
硬度 Hardness Durometer A		JIS K 6249	80			88			75		
抗伸强度 Tensile Strength	MPa	JIS K 6249	5.7			3.2			3.0		
拉裂强度 Tear Strength	kN/m	JIS K 6249	8.0			9.8			6.0		
拉伸 Elongation	%	JIS K 6249	110			100			100		
击穿绝缘电压 Dielectric Breakdown Voltage*1	kV	JIS K 6249	12	15	20	12	15	22	6	9	14
耐电压 Dielectric Strength*1	kV	JIS C 2110	7	9	13	10	13	18	5	7	12
体积电阻率 Volume Resistivity	TΩ·m	JIS K 6249	1.0			3.2			35		
介电常数 Dielectric Constant (ε)	50Hz	JIS K 6249	4.8			6.0			6.4		
	1kHz		4.8			6.0			6.3		
	1MHz		4.7			6.0			6.2		
介电损耗角正切 Dielectric Dissipation Factor (tan δ)	50Hz	JIS K 6249	5×10^{-3}			6×10^{-3}			4×10^{-3}		
	1kHz		4×10^{-3}			3×10^{-3}			1×10^{-3}		
	1MHz		2×10^{-3}			2×10^{-3}			4×10^{-4}		
热阻 Thermal Resistance T0-3P	°C/W	本公司测定法*3 Shin-Etsu Method	1.20	1.70	2.60	0.68	0.95	1.6	0.4	0.6	1.1
阻燃性 Flame-Retardance UL94*2		—	V-0			V-0			V-0		
低分子硅氧烷量 Low-molecular-weight siloxane content	ppm	本公司测定法*4 Shin-Etsu Method	10> (Σ D3-10)			10> (Σ D3-10)			10> (Σ D3-10)		

*1 厚度即各产品的厚度 Depends on the thickness of each product.

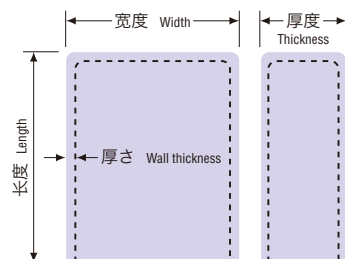
(非规格值 Not specified values)

*2 UL获得品「文件No.E 48923」 Approved products for UL94 [File No.E 48923].

*3 晶体管法: 参照P.33 Transistor method: (P.33) *4 丙酮提取法 Acetone extraction method.

■形状 Form

已登记实用新设计专利No.第1962645号
The cap type products are registered
under Japanese Patent No. 1962645.



TC系列, 可以加工成各种形状。
如果想定制产品, 请与我们联系。

TC series products can be manufactured to custom shapes
and forms upon special request.
Contact your local sales representative for details.

■尺寸 Dimensions

项目 Parameter		尺寸 Outside dimensions			厚度 Wall thickness (mm)
		宽度 Width (mm)	长度 Length (mm)	厚度 Thickness (mm)	
TC-30A TC-30C TC-30S2	(CP-T0-220)	11.4±0.5	21.5±1.0	5.8±0.3	$0.30^{+0.15}_{-0}$
	(CP-T0-3P)	17.5±0.5	28.5±1.0		
TC-45A TC-45C TC-45S2	(CP-T0-220)	11.4±0.5	21.5±1.0	5.8±0.3	$0.45^{+0.10}_{-0.05}$
	(CP-T0-3P)	17.5±0.5	28.5±1.0	5.9±0.3	
TC-80A TC-80C TC-80S2	(CP-T0-220)	12.1±0.5	21.8±1.0	6.5±0.3	$0.80^{+0.15}_{-0}$
	(CP-T0-3P)	18.2±0.5	28.8±1.0	6.6±0.3	

有加工性优异的管式 Tube Type

■一般特性 General Properties

项目 Parameter		测定方法 Test Method	产品名称 Grade	TC-A-KT系列		
				TC-30A	TC-45A	TC-80A
颜色 Color			—	深蓝色 Dark blue		
厚度 Wall Thickness	mm		—	$0.30^{+0.10}_{-0}$	0.45 ± 0.05	$0.80^{+0.10}_{-0}$
特点 Features			—	通用型 General purpose		
导热率 Thermal Conductivity	W/m·K	ISO 22007-2		0.8		
		ASTM E1530		1.1		
密度 Density at 23°C	g/cm ³	JIS K 6249		2.2		
硬度 Hardness Durometer A		JIS K 6249*3		80		
抗伸强度 Tensile Strength	MPa	JIS K 6249*3		5.7		
拉裂强度 Tear Strength	kN/m	JIS K 6249*3		8.0		
拉伸 Elongation	%	JIS K 6249*3		110		
击穿绝缘电压 Dielectric Breakdown Voltage*1	kV	JIS K 6249		12	15	20
耐电压 Dielectric Strength*1	kV	JIS C 2110		7	9	13
体积电阻率 Volume Resistivity	TΩ·m	JIS K 6249		1.0		
介电常数 Dielectric Constant (ε)	50Hz	JIS K 6249		4.8		
	1kHz			4.8		
	1MHz			4.7		
介电损耗角正切 Dielectric Dissipation Factor (tan δ)	50Hz	JIS K 6249		5×10^{-3}		
	1kHz			4×10^{-3}		
	1MHz			2×10^{-3}		
热阻 Thermal Resistance T0-3P	°C/W	本公司测定法*4 Shin-Etsu Method		1.20	1.70	2.60
阻燃性 Flame-Retardance UL94*2		—		V-0		
低分子硅氧烷量 Low-molecular-weight siloxane content	ppm	本公司测定法*5 Shin-Etsu Method		10> (Σ D3-10)		

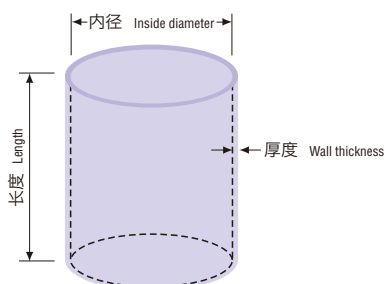
*1 厚度即各产品的厚度 Depends on the thickness of each product. *2 UL获得品「文件No.E 48923」 Approved products for UL94 [File No.E 48923]. (非规格值 Not specified values)

*3 在2号哑铃测量 Test piece: Dumbbell shaped test piece 2. *4 晶体管法: P33参照 Transistor method: (P.33) *5 丙酮提取法 Acetone extraction method.

■尺寸 Dimensions

产品名称 Grade		项目 Parameter	内径 Inside diameter (mm)	长度 Length (mm)	厚度 Wall thickness (mm)
TC-30A	(KT-95) 25L		$\phi 9.5 \pm 1.0$	25±1	$0.30^{+0.10}_{-0}$
	(KT-95) 30L			30±1	
	(KT-107) 25L		$\phi 10.7 \pm 1.0$	25±1	
	(KT-107) 30L			30±1	
	(KT-135) 25L		$\phi 13.5 \pm 1.0$	25±1	
	(KT-135) 30L			30±1	
TC-45A	(KT-107) 25L		$\phi 10.7 \pm 1.0$	25±1	0.45 ± 0.05
	(KT-107) 30L			30±1	
	(KT-135) 25L		$\phi 13.5 \pm 1.0$	25±1	
	(KT-135) 30L			30±1	
	(KT-170) 35L		$\phi 17.0 \pm 1.0$	35±1	
TC-80A	(KT-107) 25L		$\phi 10.7 \pm 1.0$	25±1	$0.80^{+0.10}_{-0}$
	(KT-107) 30L			30±1	
	(KT-135) 25L		$\phi 13.5 \pm 1.0$	25±1	
	(KT-135) 30L			30±1	
	(KT-170) 35L		$\phi 17.0 \pm 1.0$	35±1	

■形状 Form



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TC series products can be manufactured to custom shapes
and forms upon special request.

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■150℃温度下进行耐力测试的结果 Test condition: 150℃

类型 Type	项目 Parameter	状态值 Status Value	200h	500h	1000h
TC-45A	硬度 硬度计A Hardness Durometer A	80	86	90	93
	热阻 Thermal Resistance	℃/W	1.70	1.70	1.80
	耐电压 Dielectric Strength	kV	9.0	8.0	8.0
	击穿绝缘电压 Dielectric Breakdown Voltage	kV	15.0	15.0	15.0
	拉伸强度 Tensile Strength	MPa	6.8	6.9	7.6
TC-45CG	硬度 硬度计A Hardness Durometer A	90	90	91	92
	热阻 Thermal Resistance	℃/W	1.00	1.09	1.20
	耐电压 Dielectric Strength	kV	5.0	5.0	5.0
	击穿绝缘电压 Dielectric Breakdown Voltage	kV	10.0	11.0	12.0
	拉伸强度 Tensile Strength	MPa	20	22	21
TC-45FG	硬度 硬度计A Hardness Durometer A	90	91	90	92
	热阻 Thermal Resistance	℃/W	0.53	0.56	0.65
	耐电压 Dielectric Strength	kV	6.0	6.0	6.0
	击穿绝缘电压 Dielectric Breakdown Voltage	kV	8.0	8.0	7.0
	拉伸强度 Tensile Strength	MPa	15.0	14.0	14.0
TC-45EG	硬度 硬度计A Hardness Durometer A	95	94	95	95
	热阻 Thermal Resistance	℃/W	0.45	0.49	0.58
	耐电压 Dielectric Strength	kV	6.0	6.0	6.0
	击穿绝缘电压 Dielectric Breakdown Voltage	kV	8.0	8.0	7.0
	拉伸强度 Tensile Strength	MPa	14.9	13.0	14.8
TC-45BG	硬度 硬度计A Hardness Durometer A	90	90	92	94
	热阻 Thermal Resistance	℃/W	0.35	0.40	0.45
	耐电压 Dielectric Strength	kV	7.0	7.0	7.0
	击穿绝缘电压 Dielectric Breakdown Voltage	kV	16.0	17.0	16.0
	拉伸强度 Tensile Strength	MPa	49.0	49.0	49.0

(非规格值 Not specified values)

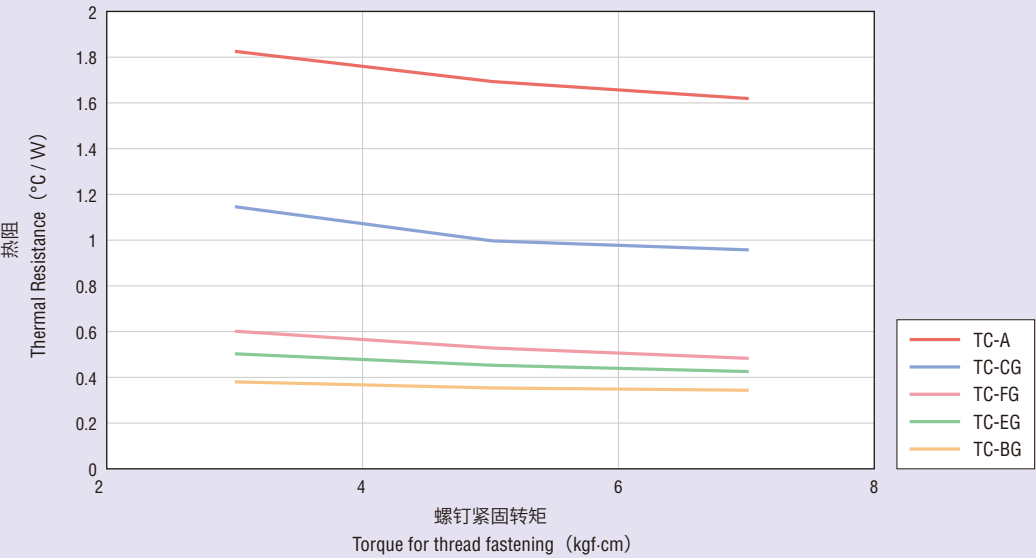
■耐溶剂性（重量变化率） Solvent Resistance (Weight change)

(%)

类型 Type	TC-45A	TC-45CG	TC-45FG	TC-45EG	TC-45BG
溶剂 Solvents					
纯净水 Pure water	0.2	0.3	0.3	0.2	0.4
乙醇 Ethanol	1.7	1.6	1.4	1.3	2.1
丙酮 Acetone	1.2	1.2	0.8	1.3	2.2
甲苯 Toluene	2.3	2.1	0.8	0.9	2.0

[测定方法]测试样本: 20mm×30mm, 将样本在各溶液中浸渍10分钟, 放置在室温下放置20分钟后测定。
[Test conditions] Test piece: 20 mm × 30 mm, Immersion time: 10 min. in each solvent, Exposure time: 20 min. at room temperature

■螺钉紧固转矩和热阻 Torque for thread fastening vs. Thermal Resistance



三极管 Transistor: T0-3P
外加电力 Applied power: 5 V × 2 A
样本厚度 Thickness of test piece: 0.45 mm

■一般特性 General Properties

测定方法 Test Method		产品名称 Grade	TC-100HSV-1.4 (100: 表示厚度1.0mm) "100" shows 1.0 mm in thickness.	TC-100THS (100: 表示厚度1.0mm) "100" shows 1.0 mm in thickness.	
项目 Parameter					
颜色 Color		—	灰色 Gray	浅红紫色 Light reddish purple	
标准尺寸 Size	mm	—	300×400	300×400	
结构 Structure		—	单层 Single layer	单层 Single layer	
厚度 Thickness	mm	—	1.0	1.0	
密度 Density at 23°C	g/cm ³	JIS K 6249	2.5	2.9	
硬度 Hardness Asker C*1		—	25	30	
击穿绝缘电压 Dielectric Breakdown Voltage	kV	JIS K 6249	23	20	
耐电压 Dielectric Strength	kV	JIS C 2110	18	15	
比热容 Specific Heat	J/g·K	计算值 Calculated Value	0.89	0.85	
导热率 Thermal Conductivity	W/m·K	ISO 22007-2	1.2	2.1	
		ASTM E1530	1.4	2.5	
热阻 Thermal Resistance	°C/W	本公司测定法*2 Shin-Etsu Method	1.08	0.63	
阻燃性 Flame-Retardance UL94		—	V-0	V-0	
低分子硅氧烷量 Low-molecular-weight siloxane content	ppm	本公司测定法*3 Shin-Etsu Method	260 (Σ D3-10)	660 (Σ D3-10)	

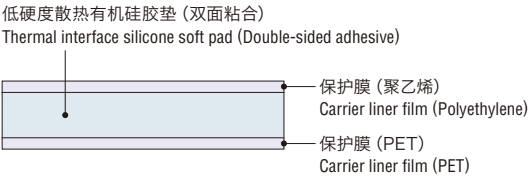
*1 硬度: 通过重叠两片厚度为6mm的低硬度散热有机硅垫测定。 Hardness (Asker C): Measured using 2 overlapping thermal interface silicone soft pads (thickness: 6mm).
*2 标本加热器法: 参照P.33 Model heater method: (P.33) *3 丙酮提取法 Acetone extraction method.

标准厚度 Thickness	mm	0.50±0.10, 1.00±0.15, 1.50±0.15 2.00±0.15, 2.50±0.20, 3.00±0.25	0.50±0.15, 1.00±0.15, 1.50±0.15 2.00±0.20, 2.50±0.25, 3.00±0.25	
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产品名称 Grade		TC-xxxHSV-1.4	TC-xxxTHS	
由于厚度而产生的热阻 Thermal Resistance depending on thickness	0.5mm	0.63	0.37	
	1.0mm	1.08	0.63	
	1.5mm	1.49	0.92	
	2.0mm	1.83	1.13	
	2.5mm	2.15	1.22	
	3.0mm	2.59	1.47	
	4.0mm	—	—	
	5.0mm	—	—	

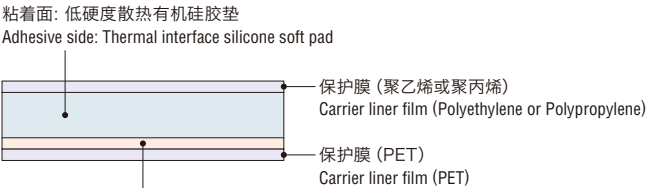
■结构 Structure

●单层型 Single layer type
HSV-1.4 / THS / TXS / TXS2 系列



*请在实际粘贴时揭下保护膜。 Please release the Carrier liner film when using.

●复合型 Composite type
THE / TXE 系列



非粘着侧: 导热性有机硅橡胶
Non adhesive side: Thermal interface silicone rubber

	TC-100THE (100: 表示厚度1.0mm) "100" shows 1.0 mm in thickness.	TC-100TXS (100: 表示厚度1.0mm) "100" shows 1.0 mm in thickness.	TC-100TXS2 (100: 表示厚度1.0mm) "100" shows 1.0 mm in thickness.	TC-100TXE (100: 表示厚度1.0mm) "100" shows 1.0 mm in thickness.
	浅蓝色/浅红紫色 Light blue/Light reddish purple	灰色 Gray	灰色 Gray	浅蓝色/灰色 Light blue/Gray
	300×400	300×400	300×400	300×400
	复合 Composite	单层 Single layer	单层 Single layer	复合 Composite
	1.0	1.0	1.0	1.0
	2.9	3.1	3.1	3.1
	30	45	20	20
	20	20	21	21
	12	18	17	20
	0.85	0.83	0.83	0.83
	2.1	3.3	3.3	3.3
	2.5	5.0	5.0	5.0
	0.66	0.40	0.35	0.48
	V-0	V-0	V-0	V-0
	660 (Σ D3-10)	240 (Σ D3-10)	600 (Σ D3-10)	240 (Σ D3-10)

※一般特征所记载的是代表性产品的资料。 General properties are shown only for the selected representative products.

(非规格值 Not specified values)

	0.50±0.10, 1.00±0.15, 1.50±0.15 2.00±0.20, 2.50±0.25, 3.00±0.25	0.50+0.15/-0.05, 1.00±0.15 1.50±0.15, 2.00±0.20, 2.50±0.20 3.00±0.20, 4.00±0.20, 5.00±0.30	0.50+0.15/-0.05, 1.00±0.15, 1.50±0.15 2.00±0.15, 2.50±0.15, 3.00±0.15 4.00±0.15, 5.00±0.30	0.50+0.15/-0.05, 1.00±0.15 1.50+0.30/-0, 2.00±0.25, 2.50±0.25 3.00±0.25, 4.00±0.25, 5.00±0.30
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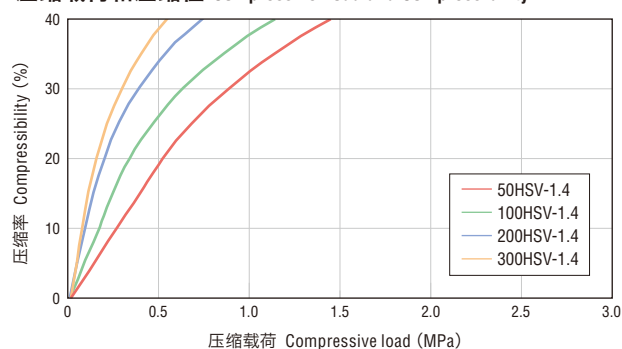
(非规格值 Not specified values)

	TC-xxxTHE	TC-xxxTXS	TC-xxxTXS2	TC-xxxTXE
	0.41	0.25	0.18	0.29
	0.66	0.40	0.37	0.48
	0.97	0.53	0.51	0.54
	1.28	0.67	0.64	0.71
	1.51	0.82	0.73	0.92
	1.62	0.93	0.85	1.00
	—	1.23	1.09	1.26
	—	1.54	1.31	1.55

(非规格值 Not specified values)

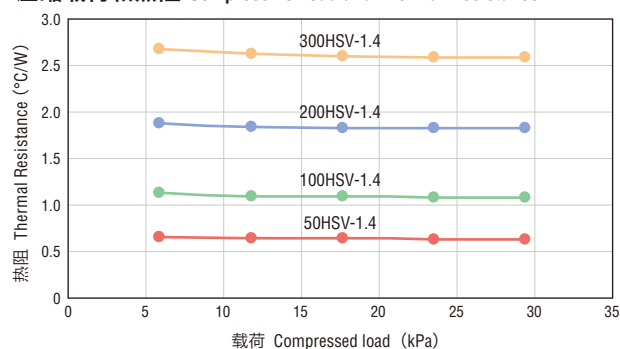
TC-HSV-1.4系列

■ 压缩载荷和压缩性 Compressive Load and Compressibility



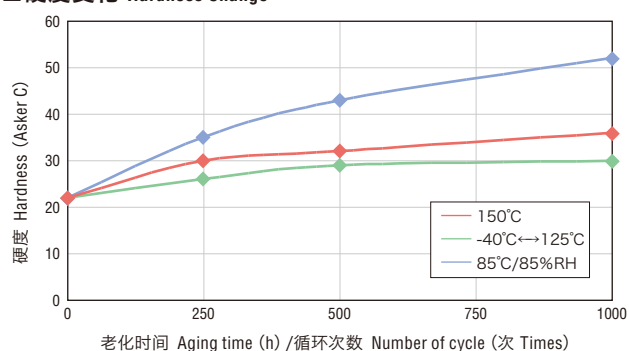
*测定条件 Conditions: 压缩速度 Compression rate 0.5 mm/min.
*试验尺寸 Test Dimensions: 10 × 10 mm

■ 压缩载荷和热阻 Compressive Load and Thermal Resistance



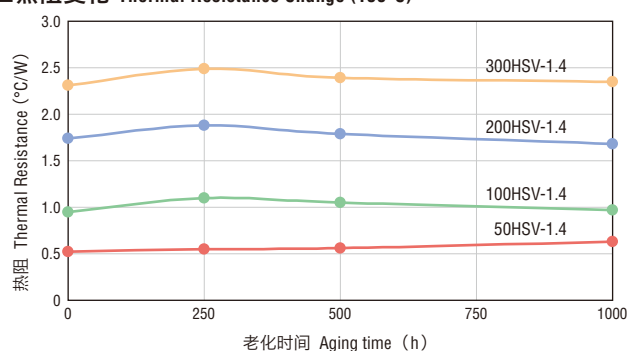
*标本加热器 Model Heater: TO-3P型 外加电力 Applied Power: 28 W
*接触面积 Contact area: 7 cm²

■ 硬度变化 Hardness Change

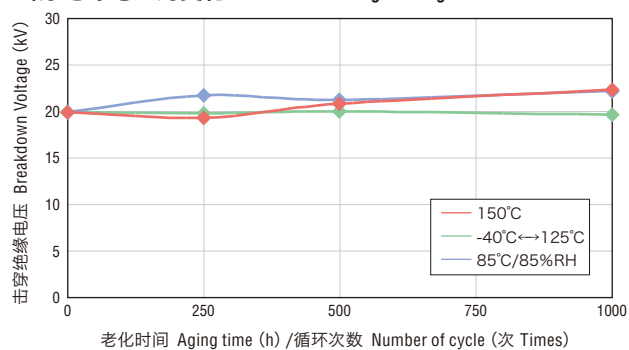


*重叠两片厚度为6mm的胶垫测定 Measured using 2 overlapping pads (Thickness: 6 mm)

■ 热阻变化 Thermal Resistance Change (150°C)

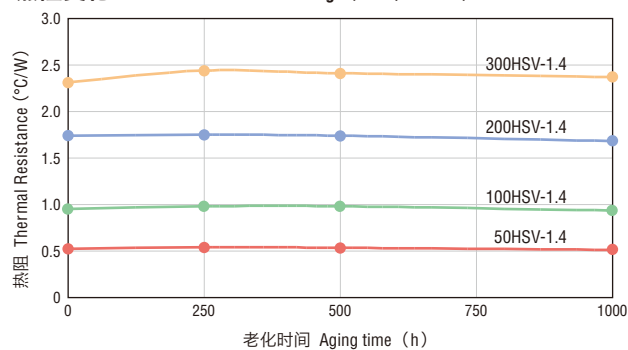


■ 击穿绝缘电压的变化 Breakdown Voltage Change

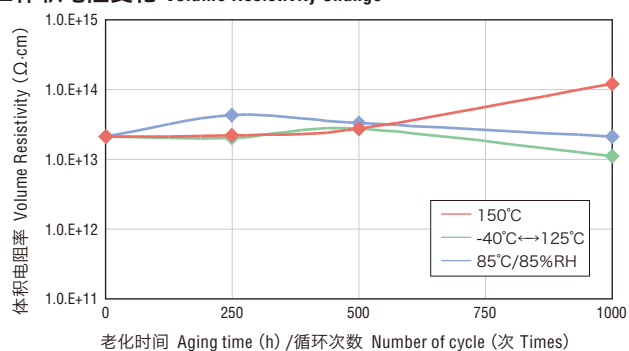


*厚度 Thickness: 1 mm、升压速度 Pressure rising rate: 1 kV/s

■ 热阻变化 Thermal Resistance Change (85°C/85%RH)

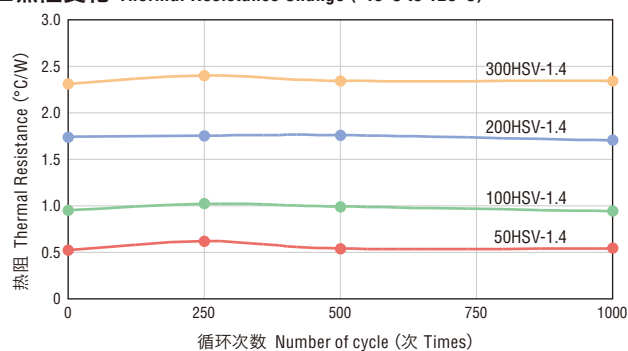


■ 体积电阻变化 Volume Resistivity Change



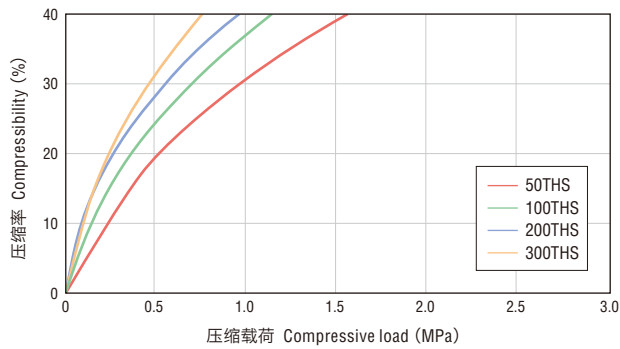
*厚度 Thickness: 1 mm、充电电压 Charging voltage: 500 V

■ 热阻变化 Thermal Resistance Change (-40°C to 125°C)



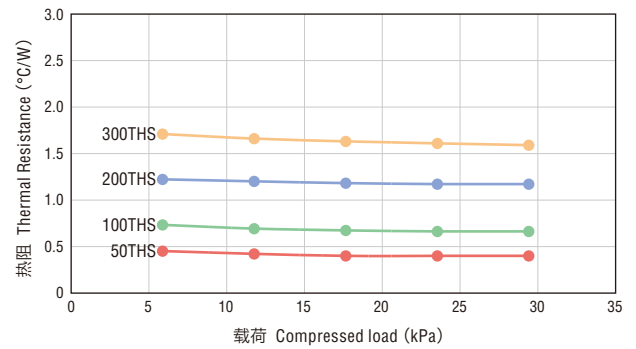
TC-THS系列

■ 压缩载荷和压缩性 Compressive Load and Compressibility



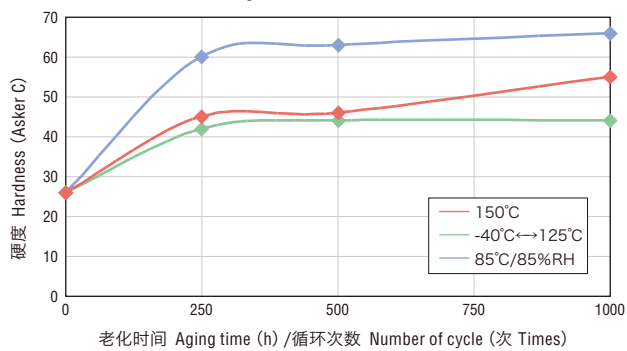
*测定条件 Conditions: 压缩速度 Compression rate 0.5 mm/min.
*试验尺寸 Test Dimensions: 10 × 10 mm

■ 压缩载荷和热阻 Compressive Load and Thermal Resistance



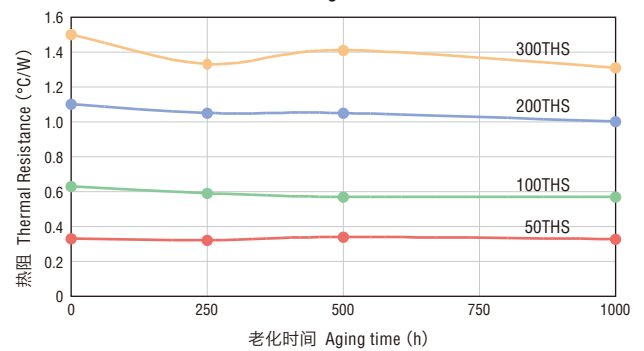
*标本加热器 Model Heater: TO-3P型 外加电力 Applied Power: 28 W
*接触面积 Contact area: 7 cm²

■ 硬度变化 Hardness Change

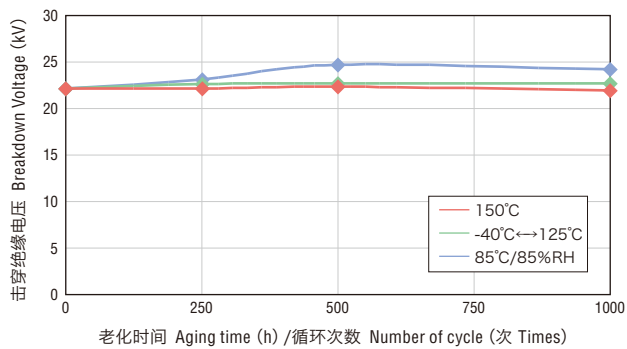


*重叠两片厚度为6mm的胶垫测定 Measured using 2 overlapping pads (Thickness: 6 mm)

■ 热阻变化 Thermal Resistance Change (150°C)

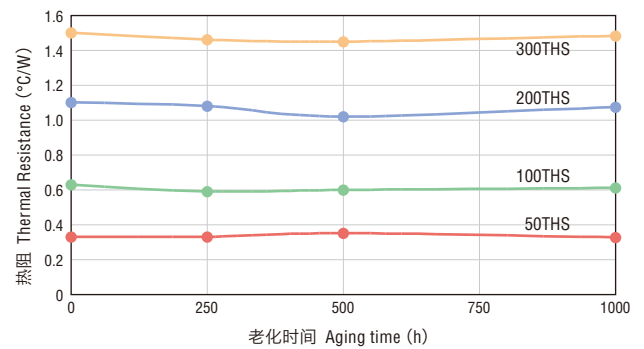


■ 击穿绝缘电压的变化 Breakdown Voltage Change

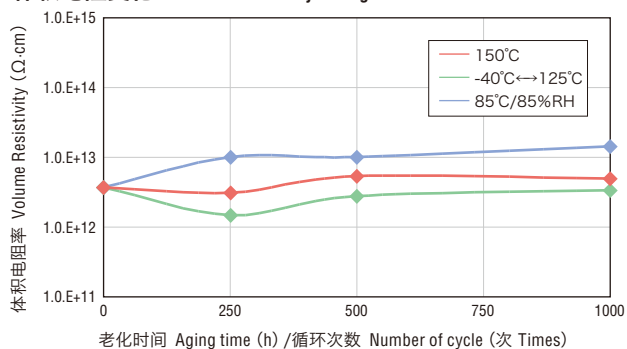


*厚度 Thickness: 1 mm、升压速度 Pressure rising rate: 1 kV/s

■ 热阻变化 Thermal Resistance Change (85°C/85%RH)

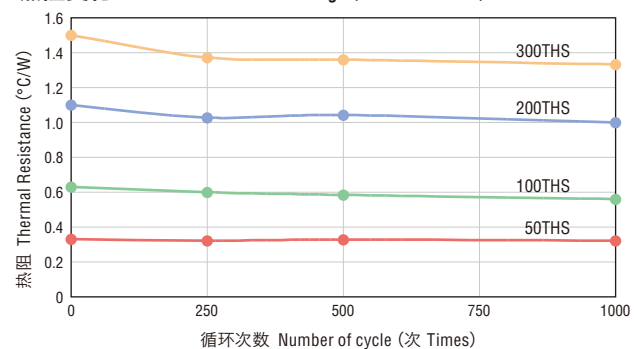


■ 体积电阻变化 Volume Resistivity Change



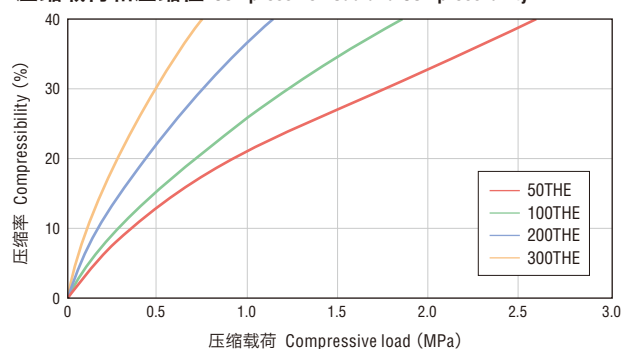
*厚度 Thickness: 1 mm、充电电压 Charging voltage: 500 V

■ 热阻变化 Thermal Resistance Change (-40°C to 125°C)



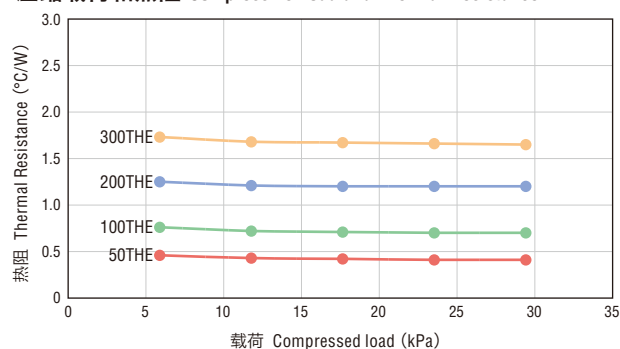
TC-THE系列

■ 压缩载荷和压缩性 Compressive Load and Compressibility



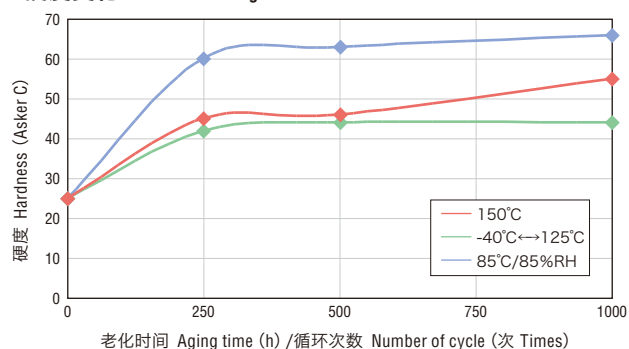
*测定条件 Conditions: 压缩速度 Compression rate 0.5 mm/min.
*试验尺寸 Test Dimensions: 10 × 10 mm

■ 压缩载荷和热阻 Compressive Load and Thermal Resistance



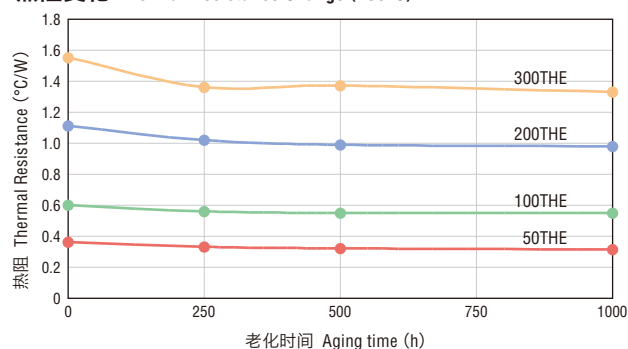
*标本加热器 Model Heater: TO-3P型 外加电力 Applied Power: 28 W
*接触面积 Contact area: 7 cm²

■ 硬度变化 Hardness Change



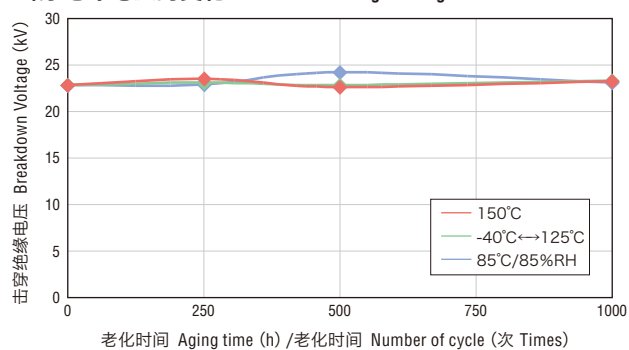
*重叠两片厚度为6mm的胶垫测定 Measured using 2 overlapping pads (Thickness: 6 mm)

■ 热阻变化 Thermal Resistance Change (150°C)



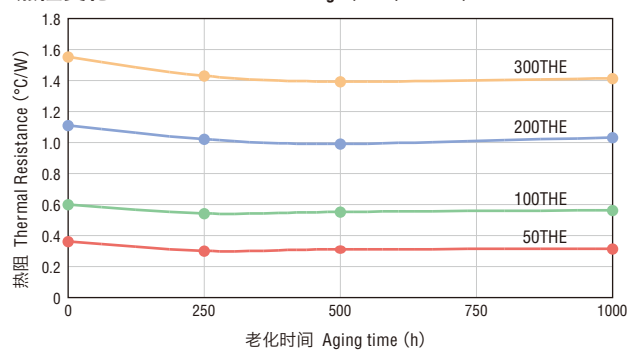
老化时间 Aging time (h)

■ 击穿绝缘电压的变化 Breakdown Voltage Change



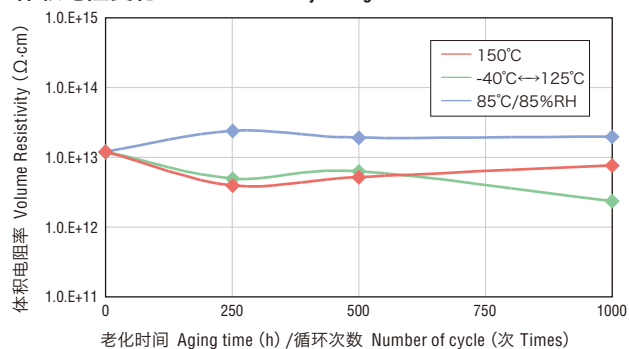
*厚度 Thickness: 1 mm、升压速度 Pressure rising rate: 1 kV/s

■ 热阻变化 Thermal Resistance Change (85°C/85%RH)



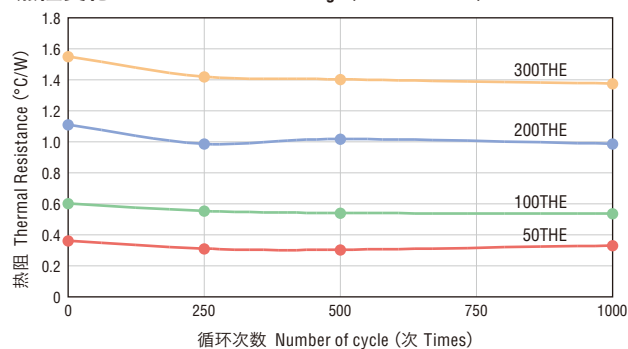
老化时间 Aging time (h)

■ 体积电阻变化 Volume Resistivity Change



*厚度 Thickness: 1 mm、充电电压 Charging voltage: 500 V

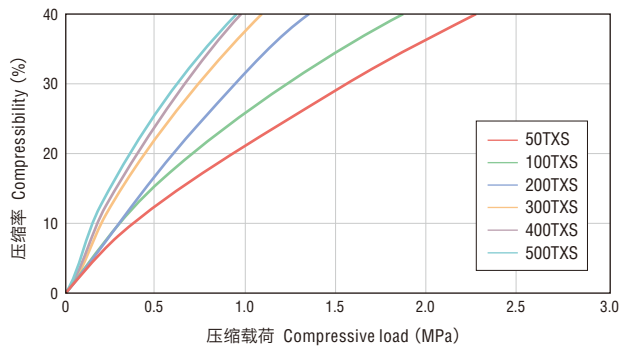
■ 热阻变化 Thermal Resistance Change (-40°C to 125°C)



循环次数 Number of cycle (次 Times)

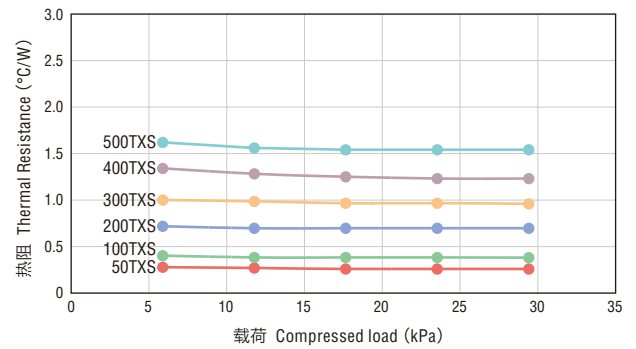
TC-TXS系列

■ 压缩载荷和压缩性 Compressive Load and Compressibility



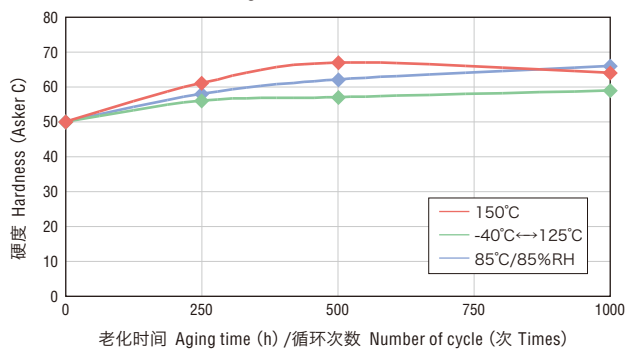
*测定条件 Conditions: 压缩速度 Compression rate 0.5 mm/min.
*试验尺寸 Test Dimensions: 10 × 10 mm

■ 压缩载荷和热阻 Compressive Load and Thermal Resistance



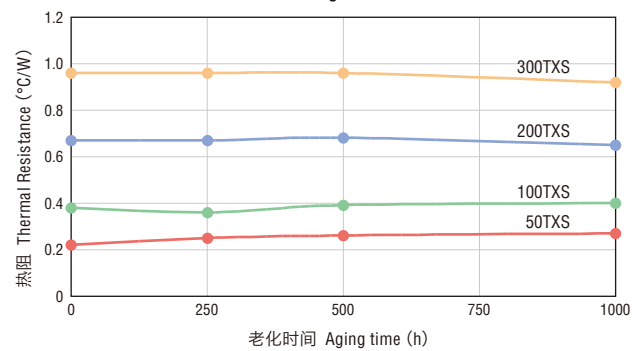
*标本加热器 Model Heater: TO-3P型 外加电力 Applied Power: 28 W
*接触面积 Contact area: 7 cm²

■ 硬度变化 Hardness Change

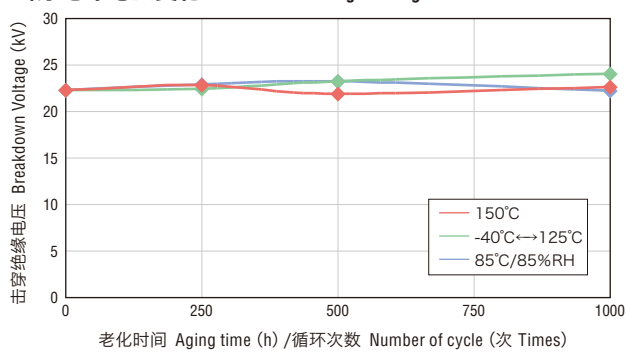


*重叠两片厚度为6mm的胶垫测定 Measured using 2 overlapping pads (Thickness: 6 mm)

■ 热阻变化 Thermal Resistance Change (150°C)

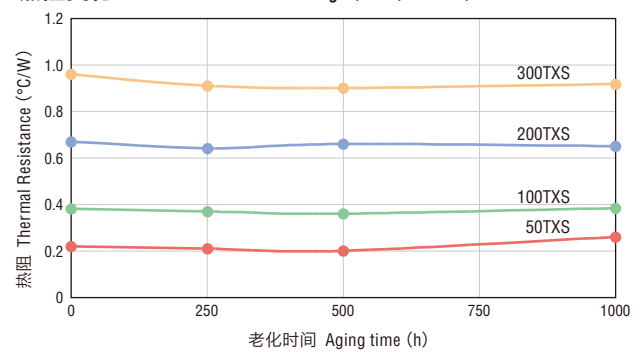


■ 击穿绝缘电压变化 Breakdown Voltage Change

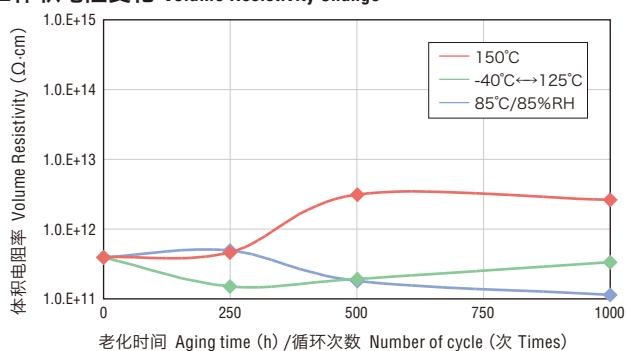


*厚度 Thickness: 1 mm、升压速度 Pressure rising rate: 1 kV/s

■ 热阻变化 Thermal Resistance Change (85°C/85%RH)

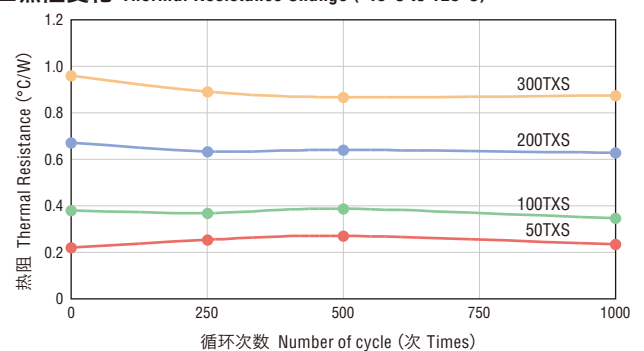


■ 体积电阻变化 Volume Resistivity Change



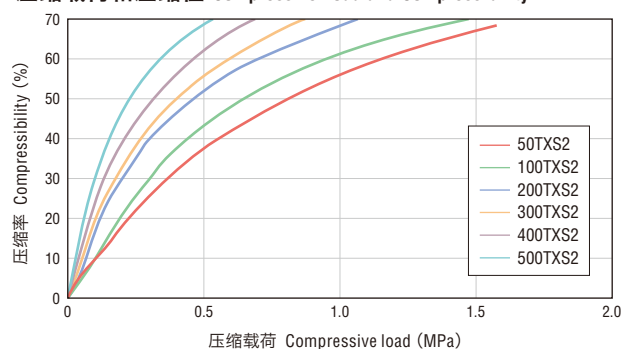
*厚度 Thickness: 1 mm、充电电压 Charging voltage: 500 V

■ 热阻变化 Thermal Resistance Change (-40°C to 125°C)



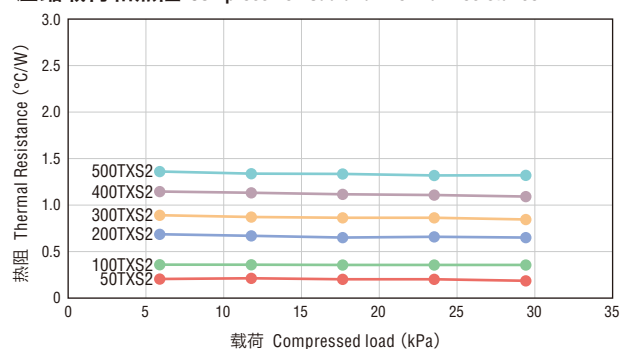
TC-TXS2系列

■ 压缩载荷和压缩性 Compressive Load and Compressibility



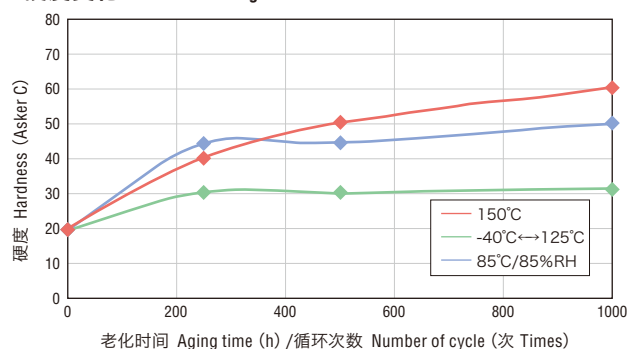
* 测定条件 Conditions: 压缩速度 Compression rate: 0.5 mm/min
* 试验尺寸 Test Dimension: ϕ 12.7 mm

■ 压缩载荷和热阻 Compressive Load and Thermal Resistance



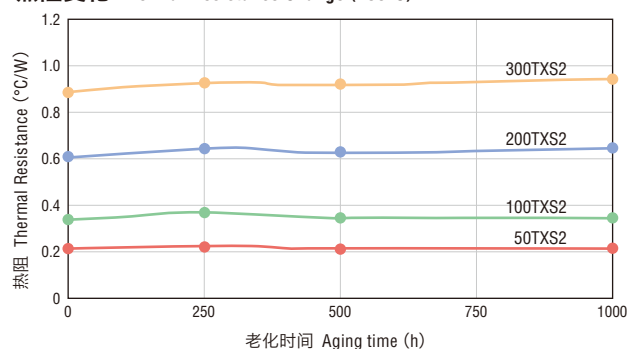
* 标本加热器 Model Heater: TO-3P型 外加电力 Applied Power: 28 W
* 接触面积 Contact area: 7 cm² 载荷 Compressed load: 29.4 kPa (=300 g/cm²)

■ 硬度变化 Hardness Change

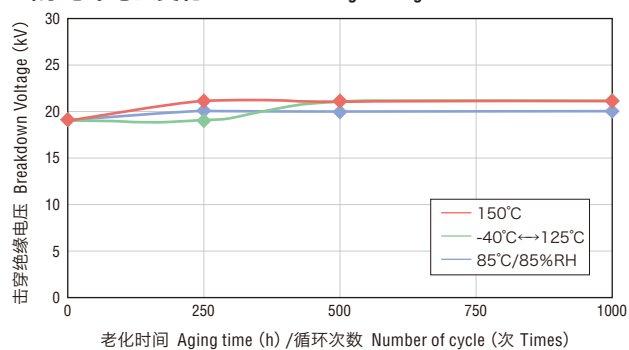


* 重叠两片厚度为6mm的胶垫测定 Measured using 2 overlapping pads (Thickness: 6 mm)

■ 热阻变化 Thermal Resistance Change (150°C)

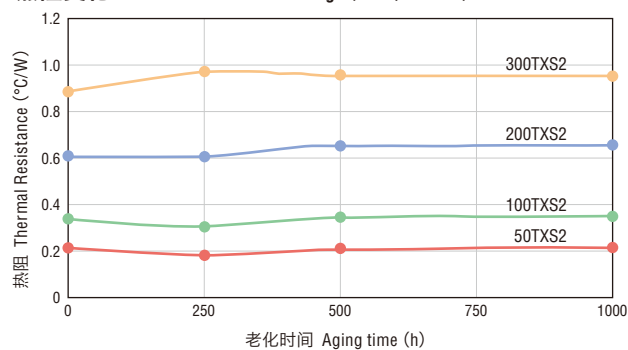


■ 击穿绝缘电压变化 Breakdown Voltage Change

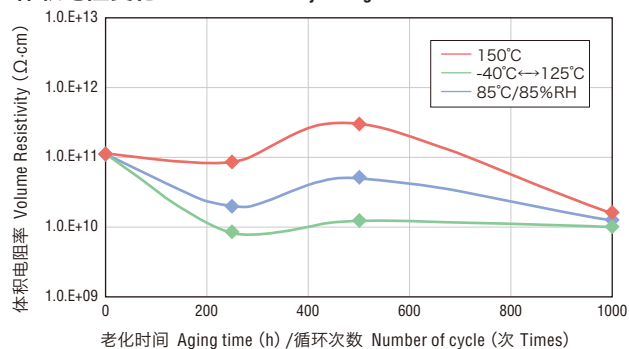


* 厚度 Thickness: 1 mm、升压速度 Pressure rising rate: 1 kV/s

■ 热阻变化 Thermal Resistance Change (85°C/85%RH)

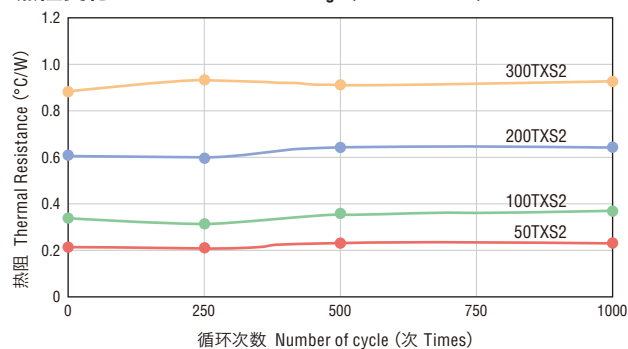


■ 体积电阻变化 Volume Resistivity Change



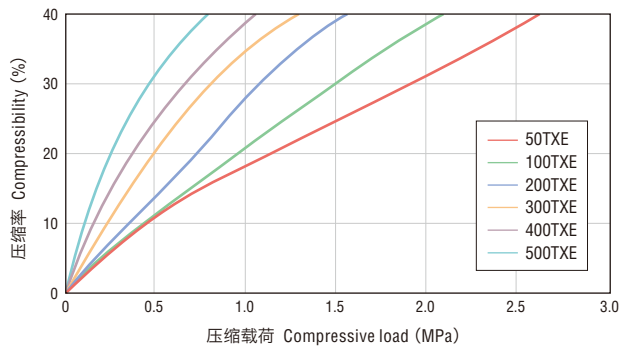
* 厚度 Thickness: 1 mm、充电电压 Charging voltage: 500 V

■ 热阻变化 Thermal Resistance Change (-40°C to 125°C)



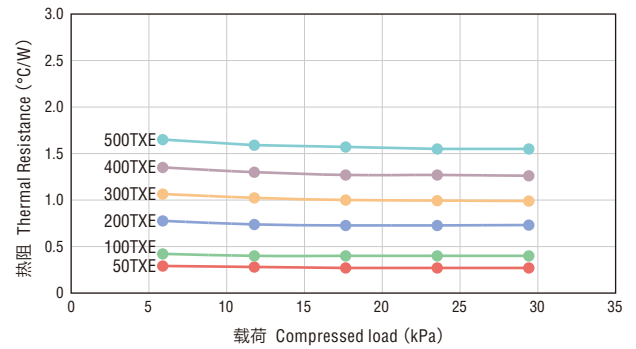
TC-TXE系列

■ 压缩载荷和压缩性 Compressive Load and Compressibility



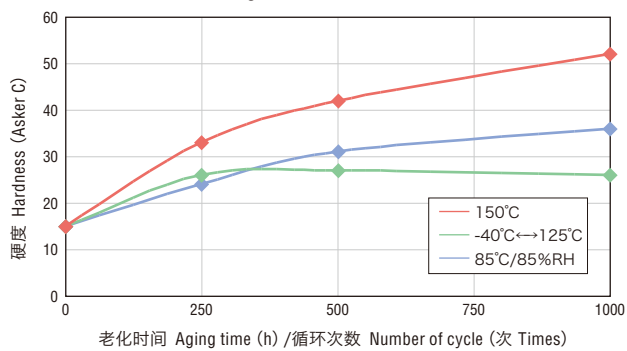
*测定条件 Conditions: 压缩速度 Compression rate 0.5 mm/min.
*试验尺寸 Test Dimensions: 10 × 10 mm

■ 压缩载荷和热阻 Compressive Load and Thermal Resistance



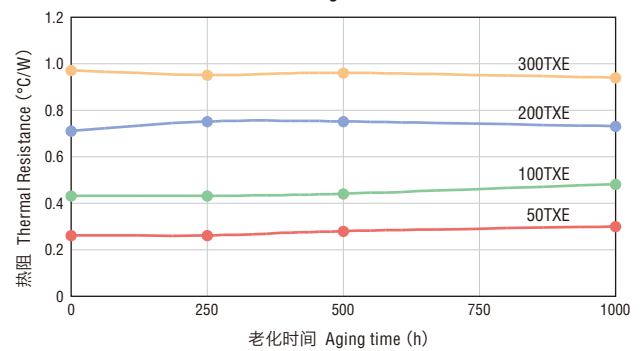
*标本加热器 Model Heater: TO-3P型 外加电力 Applied Power: 28 W
*接触面积 Contact area: 7 cm²

■ 硬度变化 Hardness Change

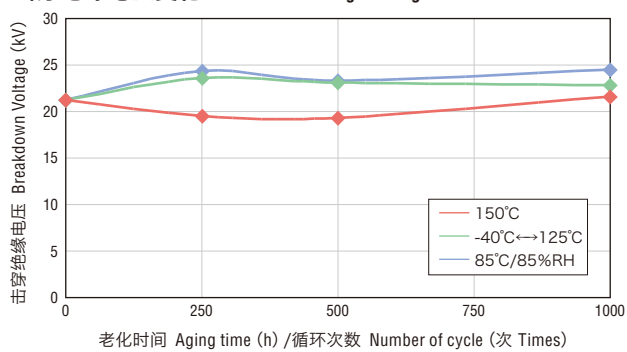


*重叠两片厚度为6mm的胶垫测定 Measured using 2 overlapping pads (Thickness: 6 mm)

■ 热阻变化 Thermal Resistance Change (150°C)

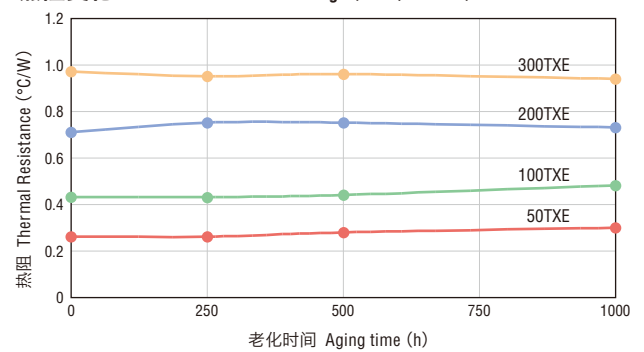


■ 击穿绝缘电压变化 Breakdown Voltage Change

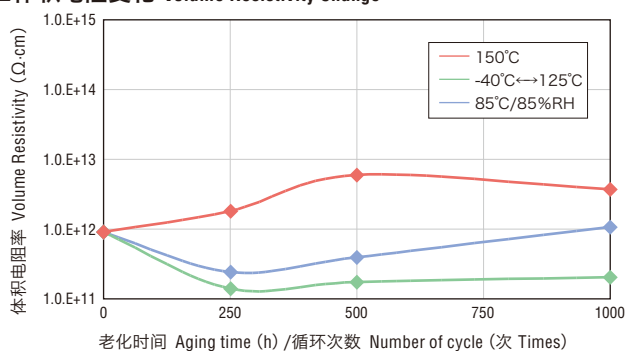


*厚度 Thickness: 1 mm、升压速度 Pressure rising rate: 1 kV/s

■ 热阻变化 Thermal Resistance Change (85°C/85%RH)

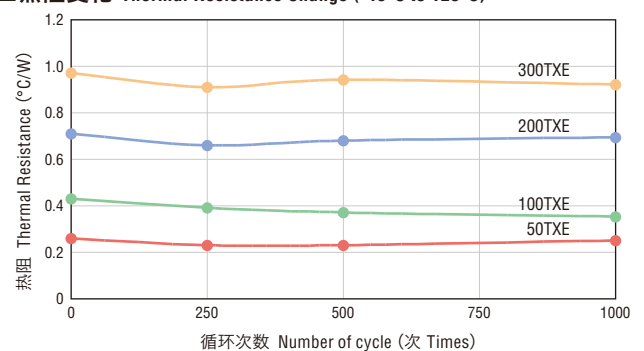


■ 体积电阻变化 Volume Resistivity Change



*厚度 Thickness: 1 mm、充电电压 Charging voltage: 500 V

■ 热阻变化 Thermal Resistance Change (-40°C to 125°C)



■一般特性 General Properties

测定方法 Test Method		产品名称 Grade	TC-100SP-1.7 (100: 表示厚度1.0mm) "100" shows 1.0 mm in thickness.	TC-100SPA-3.0 (100: 表示厚度1.0mm) "100" shows 1.0 mm in thickness.	
项目 Parameter					
颜色 Color		—	灰色/红褐色 Gray/Reddish brown	灰色 Gray	
标准尺寸 Size	mm	—	300×400	300×400	
结构 Structure		—	复合 Composite	单层 Single layer	
厚度 Thickness	mm	—	1.0	1.0	
密度 Density at 23°C	g/cm ³	JIS K 6249	2.3	2.4	
硬度 Hardness Asker C*1		—	2	4	
击穿绝缘电压 Dielectric Breakdown Voltage	kV	JIS K 6249	20	—	
耐电压 Dielectric Strength	kV	JIS C 2110	16	—	
比热容 Specific Heat	J/g·K	计算值 Calculated Value	1.04	0.94	
导热率 Thermal Conductivity	W/m·K	ISO 22007-2	1.5	2.3	
		ASTM E1530	1.7	3.0	
热阻 Thermal Resistance	°C/W	本公司测定法*2 Shin-Etsu Method	1.00	0.42	
阻燃性 Flame-Retardance UL94		—	V-0	V-0	
低分子硅氧烷量 Low-molecular-weight siloxane content	ppm	本公司测定法*3 Shin-Etsu Method	200 (Σ D3-10)	200 (Σ D3-10)	

*1 硬度: 重叠两片厚度为6mm的有机硅胶垫测定 Hardness (Asker C): Measured using 2 overlapping thermal interface silicone ultra soft pads (thickness: 6mm).
*2 标本加热器法: 参照P.33 Model heater method: (P.33) *3 丙酮提取法 Acetone extraction method.

标准厚度 Thickness	mm	0.50±0.10, 1.00±0.15, 1.50±0.20, 2.00±0.25, 2.50±0.25, 3.00±0.25, 4.00±0.25, 5.00±0.30	0.50±0.10, 1.00±0.15, 1.50±0.15, 2.00±0.15, 2.50±0.20, 3.00±0.25	
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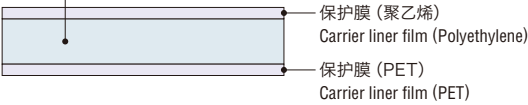
产品名称 Grade		TC-xxxSP-1.7	TC-xxxSPA-3.0	
由于厚度而产生的热阻 Thermal Resistance depending on thickness	0.5mm	0.57	0.26	
	1.0mm	1.00	0.41	
	1.5mm	1.28	0.50	
	2.0mm	1.55	0.65	
	2.5mm	1.82	0.77	
	3.0mm	2.10	0.85	
	4.0mm	2.61	—	
	5.0mm	2.72	—	

■结构 Structure

●单层型 Single layer type

SPA-3.0 / CAS / CAB / CAD / CAT-20 系列

超低硬度散热有机硅胶垫 (双面粘合)
Thermal interface silicone ultra soft pad (Double-sided adhesive)

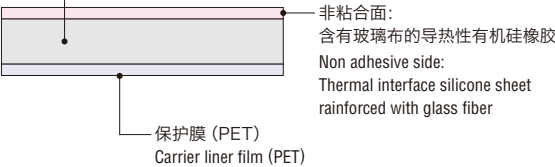


*请在实际粘贴时揭下保护膜。 Please release the Carrier liner film when using.

●复合型 Composite type

SP-1.7 系列

粘着面: 超低硬度散热有机硅胶垫
Adhesive side: Thermal interface silicone ultra soft pad



	TC-100CAS-30 (100: 表示厚度) "100"shows thickness.	TC-200CAS-10 (200: 表示厚度) "200"shows thickness.	TC-100CAB-30 (100: 表示厚度) "100"shows thickness.	TC-200CAB-10 (200: 表示厚度) "200"shows thickness.	TC-100CAD-30 (100: 表示厚度) "100"shows thickness.	TC-200CAD-10 (200: 表示厚度) "200"shows thickness.	TC-100CAT-20 (100: 表示厚度1.0mm) "100" shows 1.0 mm in thickness.
	深灰色 Dark gray		浅红褐色 Pink		浅红紫色 Light reddish purple		灰色 Gray
	300×400		300×400		300×400		300×400
	单层 Single layer		单层 Single layer		单层 Single layer		单层 Single layer
	1.0	≥1.5	1.0	≥1.5	1.0	≥1.5	1.0
	1.9		2.2		3.0		3.2
	30	10	30	10	30	10	20
	22	≥30	22	≥30	15	≥30	15
	10	≥30	11	≥30	11	≥30	11
	1.24		1.13		0.84		0.83
	1.8		2.3		3.2		4.5
	—		—		—		—
	0.87	1.15	0.64	0.88	0.58	0.74	0.32
	V-0	V-0	V-0	V-0	V-0	V-0	V-0
	240 (Σ D3-10)		220 (Σ D3-10)		180 (Σ D3-10)		260 (Σ D3-10)

※一般特征所记载的是代表性产品的资料。 General properties are shown only for the selected representative products. (非规格值 Not specified values)

	0.50±0.10, 1.00±0.15	1.50±0.15, 2.00±0.20, 2.50±0.20, 3.00±0.25, 4.00±0.30, 5.00±0.30, 6.00±0.50, 7.00±0.50, 8.00±0.50, 9.00±0.50, 10.00±0.70	0.50±0.10, 1.00±0.15	1.50±0.15, 2.00±0.20, 2.50±0.20, 3.00±0.25, 4.00±0.30, 5.00±0.30	0.50±0.10, 1.00±0.15	1.50±0.15, 2.00±0.20, 2.50±0.20, 3.00±0.25, 4.00±0.30, 5.00±0.30	0.50±0.10, 1.00±0.15, 1.50±0.15, 2.00±0.20, 2.50±0.20, 3.00±0.25, 4.00±0.30, 5.00±0.30
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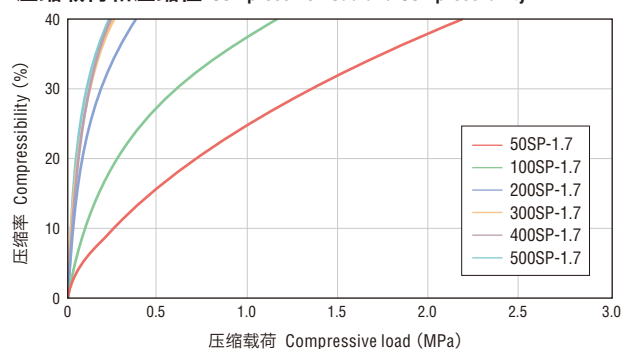
(非规格值 Not specified values)

	TC-xxxCAS-30	TC-xxxCAS-10	TC-xxxCAB-30	TC-xxxCAB-10	TC-xxxCAD-30	TC-xxxCAD-10	TC-xxxCAT-20
	0.51	—	0.43	—	0.34	—	0.22
	0.87	—	0.64	—	0.58	—	0.32
	—	0.93	—	0.73	—	0.61	0.46
	—	1.15	—	0.88	—	0.74	0.58
	—	1.38	—	1.03	—	0.89	0.73
	—	1.55	—	1.20	—	1.05	0.85
	—	1.83	—	1.47	—	1.24	1.09
	—	2.07	—	1.72	—	1.39	1.23

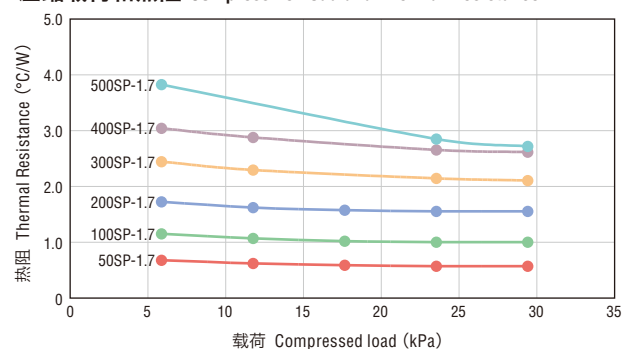
(非规格值 Not specified values)

TC-SP-1.7系列

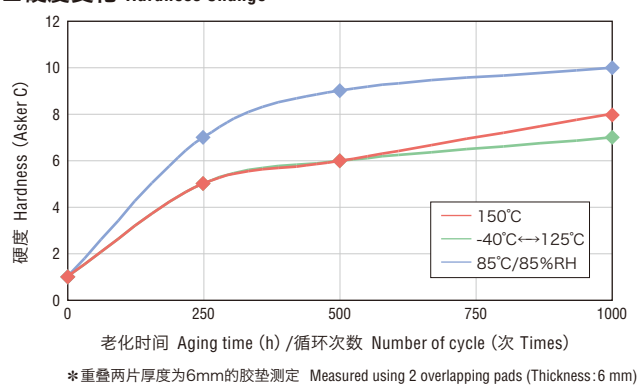
■ 压缩载荷和压缩性 Compressive Load and Compressibility



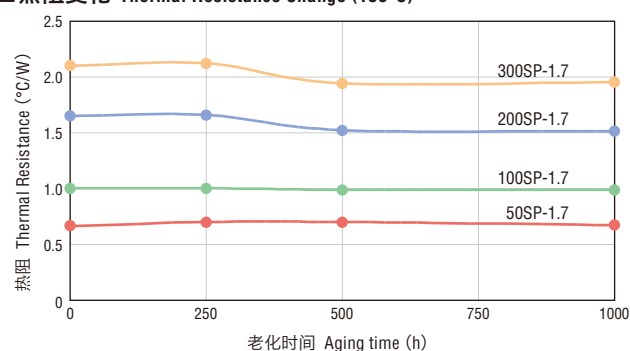
■ 压缩载荷和热阻 Compressive Load and Thermal Resistance



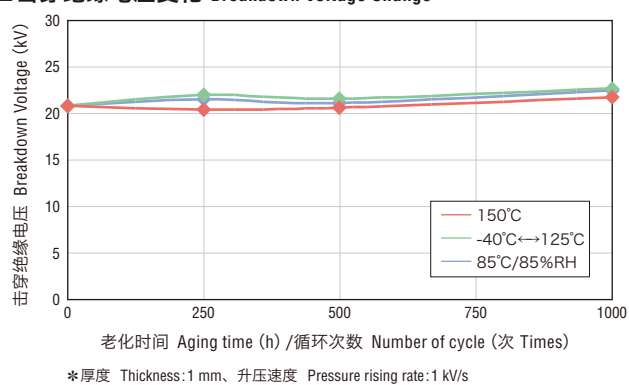
■ 硬度变化 Hardness Change



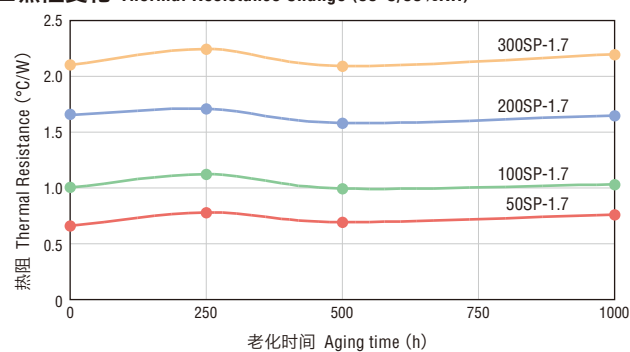
■ 热阻变化 Thermal Resistance Change (150°C)



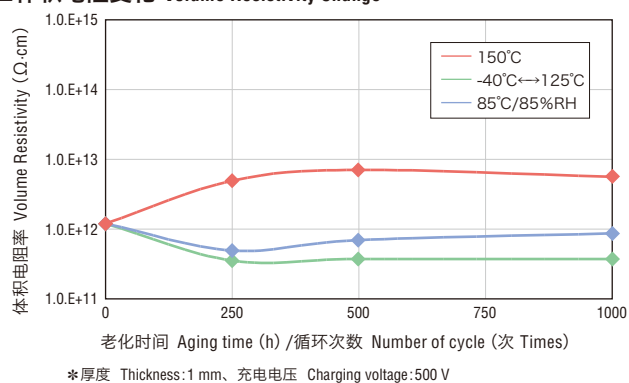
■ 击穿绝缘电压变化 Breakdown Voltage Change



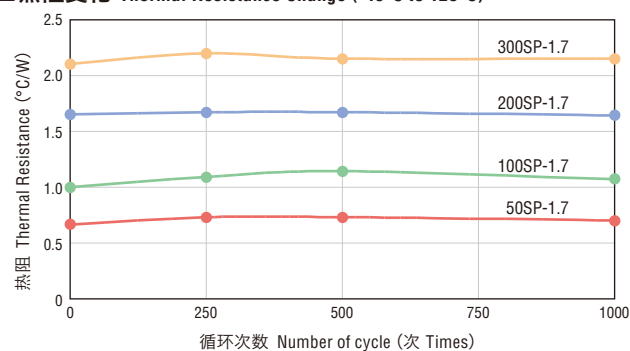
■ 热阻变化 Thermal Resistance Change (85°C/85%RH)



■ 体积电阻变化 Volume Resistivity Change

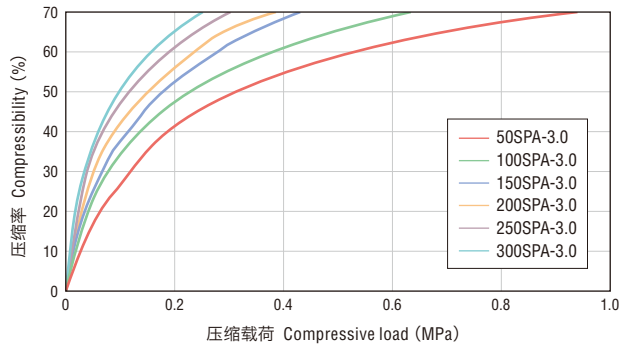


■ 热阻变化 Thermal Resistance Change (-40°C to 125°C)



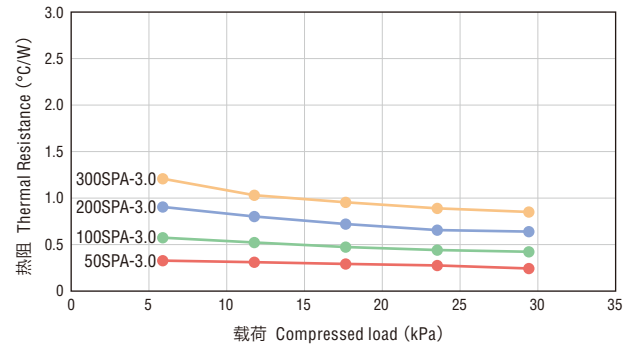
TC-SPA-3.0系列

■ 压缩载荷和压缩性 Compressive Load and Compressibility



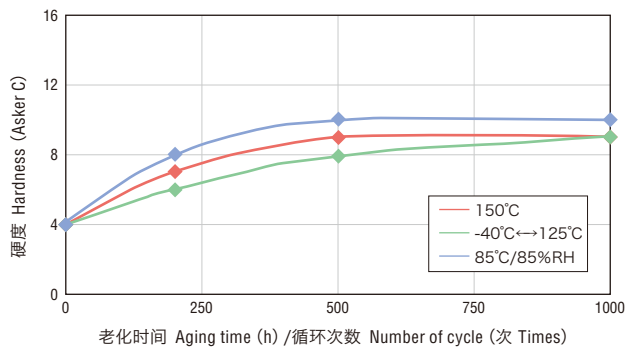
* 测定条件 Conditions: 压缩速度 Compression rate: 0.5 mm/min.
* 试验尺寸 Test Dimensions: $\phi 12.7$ mm

■ 压缩载荷和热阻 Compressive Load and Thermal Resistance



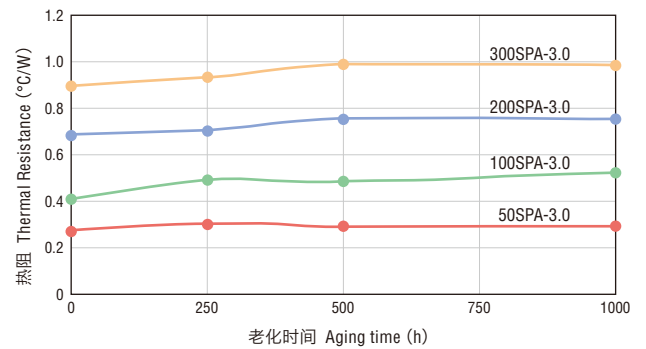
* 标本加热器 Model Heater: TO-3P型 外加电力 Applied Power: 28 W
* 接触面积 Contact area: 7 cm² 载荷 Compressed load: 29.4 kPa (=300 g/cm²)

■ 硬度变化 Hardness Change



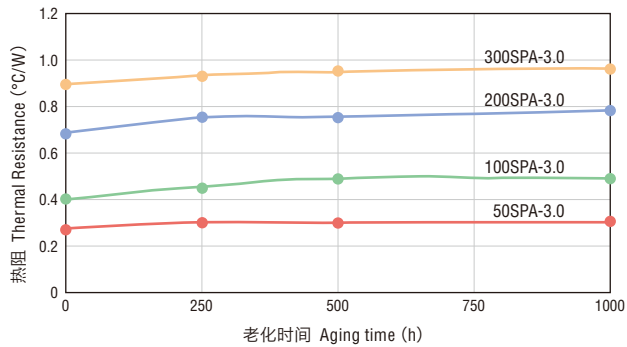
* 重叠两片厚度为6mm的胶垫测定 Measured using 2 overlapping pads (Thickness: 6 mm)

■ 热阻变化 Thermal Resistance Change (150°C)



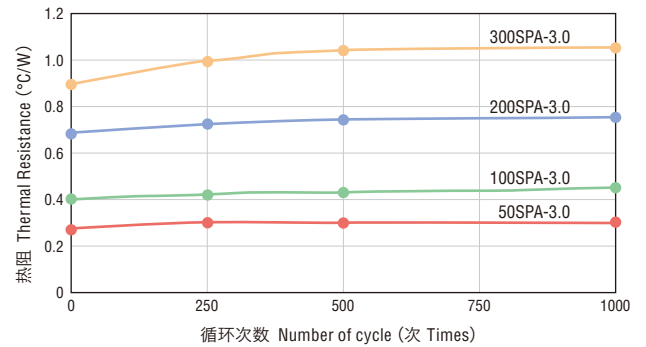
* 标本加热器 Model Heater: TO-3P型 外加电力 Applied Power: 28 W
* 接触面积 Contact area: 7 cm² 载荷 Compressed load: 29.4 kPa (=300 g/cm²)

■ 热阻变化 Thermal Resistance Change (85°C/85%RH)



* 标本加热器 Model Heater: TO-3P型 外加电力 Applied Power: 28 W
* 接触面积 Contact area: 7 cm² 载荷 Compressed load: 29.4 kPa (=300 g/cm²)

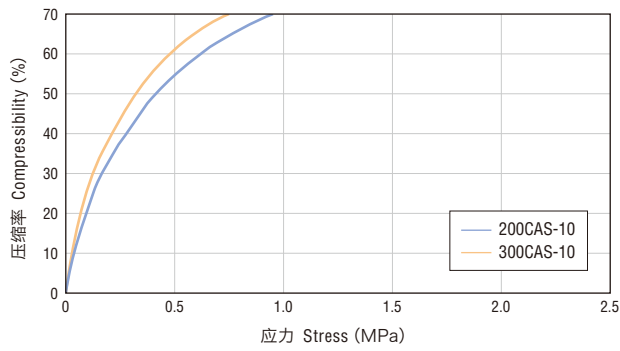
■ 热阻变化 Thermal Resistance Change (-40°C to 125°C)



* 标本加热器 Model Heater: TO-3P型 外加电力 Applied Power: 28 W
* 接触面积 Contact area: 7 cm² 载荷 Compressed load: 29.4 kPa (=300 g/cm²)

TC-CAS-10系列

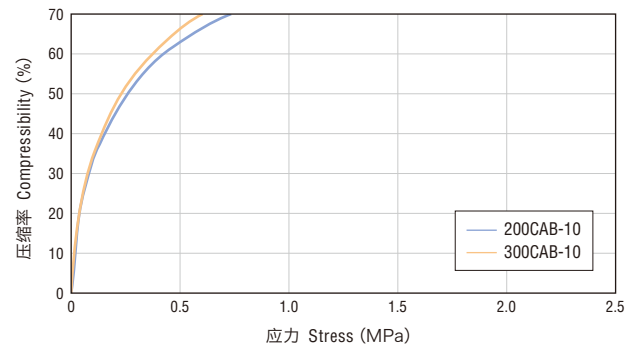
■压缩特性 (TC-CAS-10) Compression Property



* 压缩速度 Rate of compression: 0.5 mm/min.
* 试验尺寸 Test Dimensions: ϕ 12.7 mm

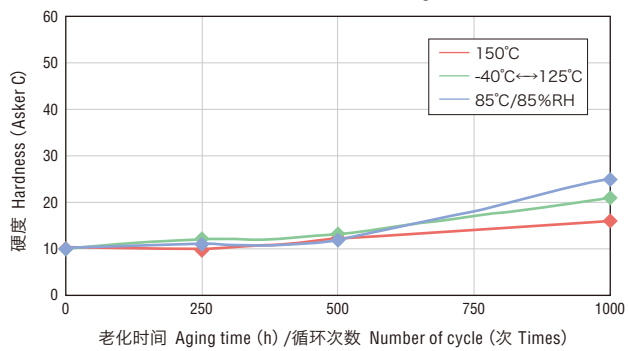
TC-CAB-10系列

■压缩特性 (TC-CAB-10) Compression Property



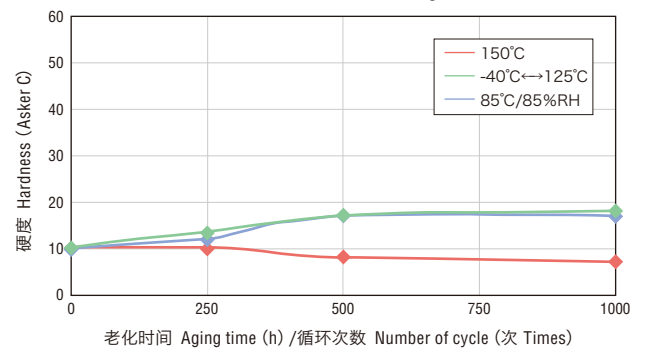
* 压缩速度 Rate of compression: 0.5 mm/min.
* 试验尺寸 Test Dimensions: ϕ 12.7 mm

■硬度变化 (TC-CAS-10) Hardness Change



* 重叠两片厚度为6mm的胶垫测定 Measured using 2 overlapping pads (Thickness: 6 mm)

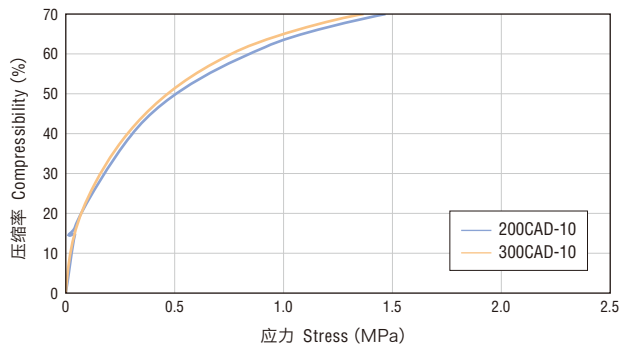
■硬度变化 (TC-CAB-10) Hardness Change



* 重叠两片厚度为6mm的胶垫测定 Measured using 2 overlapping pads (Thickness: 6 mm)

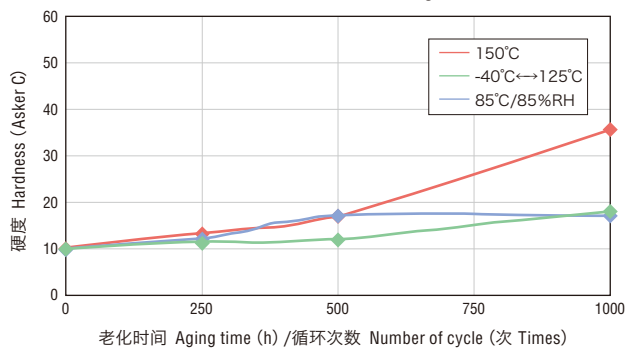
TC-CAD-10系列

■压缩特性 (TC-CAD-10) Compression Property



* 压缩速度 Rate of compression: 0.5 mm/min.
* 试验尺寸 Test Dimensions: ϕ 12.7 mm

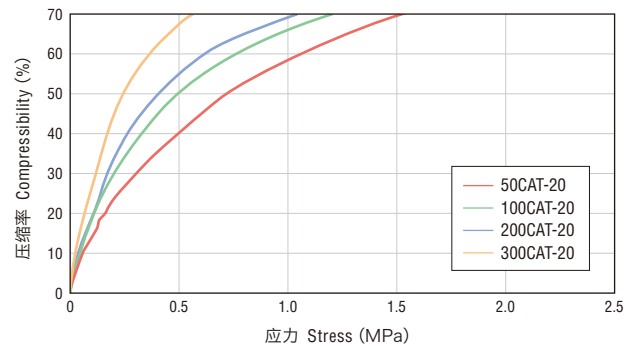
■硬度变化 (TC-CAD-10) Hardness Change



* 重叠两片厚度为6mm的胶垫测定 Measured using 2 overlapping pads (Thickness: 6 mm)

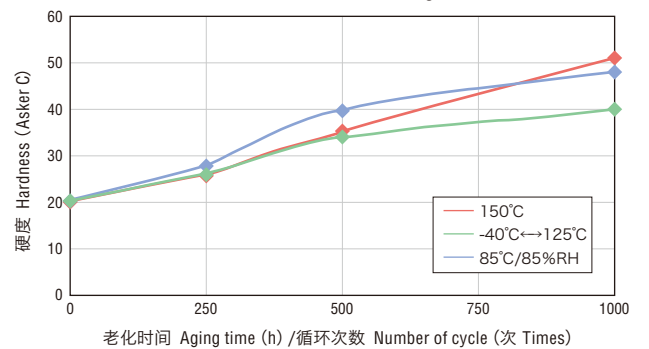
TC-CAT-20系列

■压缩特性 (TC-CAT-20) Compression Property



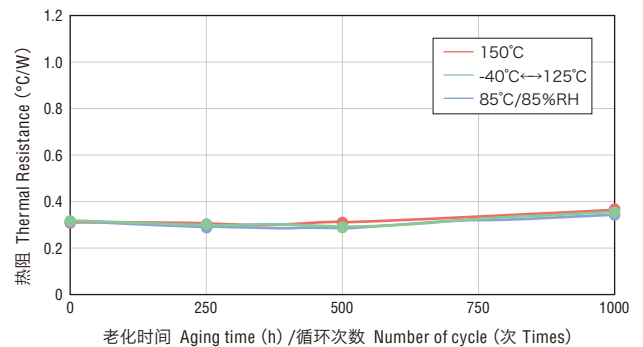
* 压缩速度 Rate of compression: 0.5 mm/min.
* 试验尺寸 Test Dimensions: ϕ 12.7 mm

■硬度变化 (TC-CAT-20) Hardness Change



* 重叠两片厚度为6mm的胶垫测定 Measured using 2 overlapping pads (Thickness: 6 mm)

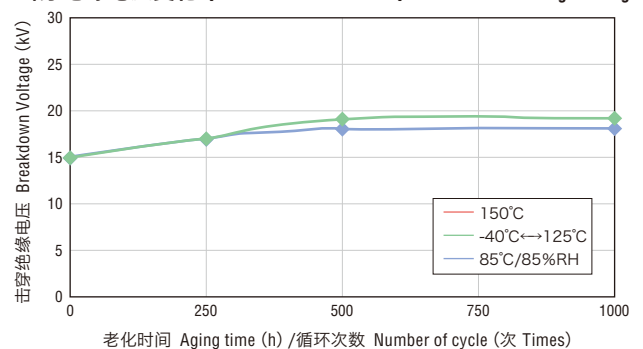
■热阻变化 (TC-100CAT-20) Thermal Resistance Change



* 标本加热器 Model Heater: TO-3P型 外加电力 Applied Power: 28 W

* 接触面积 Contact area: 7 cm² 载荷 Compressed load: 29.4 kPa (=300 g/cm²)

■击穿绝缘电压变化 (TC-100CAT-20) Breakdown Voltage Change



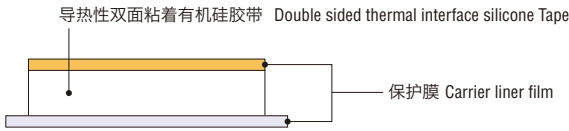
这是只使用粘着层制成的双面粘合散热胶带。
Thermal interface tape: Single layer, double-sided adhesive.

厚度为100 μm、200 μm的产品一览

- 通过强有力的稳定的粘着力实现了无螺钉化。
- 热阻可在很宽的温度范围内保持稳定。
- 可实现在大面积进行的良好作业性。

- New lineup will include 100 μm and 200 μm thicknesses.
- Strong and stable adhesive strength without screws.
 - Thermal resistance is stable across a wide temperature range.
 - Can be applied to wide areas using automated equipment.

■结构 Structure

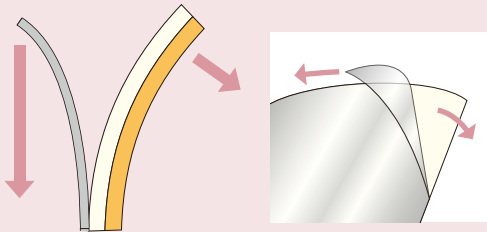


TC-SAS 粘贴步骤及保护膜剥离方法 The way to attach and the way to peel off the film.

1 透明保护膜的剥离方法

The way to peel off the transparent film.

- 1 向橙色保护膜一侧弯曲，让透明薄膜的边缘浮起。
Bend the orange film side, to release the edge of the transparent film.
- 2 握住浮起的部分，把保护膜剥离掉。
Pick up the edge of the transparent film and peel off it.



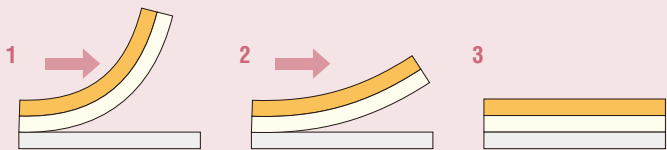
3 简单剥离橙色保护膜的方法

The easy way to peel off the orange film.

- 1 在橙色膜的边缘贴上胶带。
Attach the tape on the edge of the orange film.
- 2 向朝自己的方向拉胶带。
Pull the tape.
- 3 橙色膜的边缘会浮起来。
The edge area of the orange film is removed.
- 4 拉下橙色膜。
Pull the orange film.

2 粘贴步骤

The way to attach.

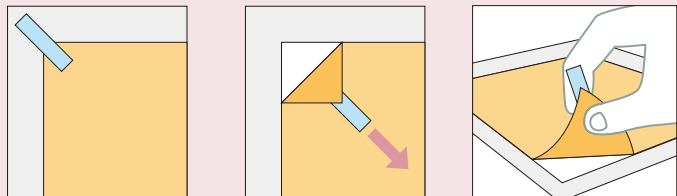


把TC-SAS的一端贴到被粘贴体上，弯曲整个TC-SAS，使其不会整体粘上。
Attach the edge of a TC-SAS on the object. Bend a TC-SAS not to attach on whole surface.

从已经贴上的边缘开始一点一点地粘贴。
Gradually attach a TC-SAS from end to end.

当整个产品粘贴至被粘贴体上时，实用滚筒等对整个TC-SAS进行按压。
After attach TC-SAS to whole surface of the object, equally press whole surface of TC-SAS by a roll.

※请用溶剂等对粘贴的被粘贴反面进行脱脂作业。
Defat surface of object by solvents.



■一般特性 General Properties

测定方法 Test Method		产品名称 Grade	TC-10SAS	TC-20SAS
项目 Parameter				
颜色 Color		—	白色 White	白色 White
基础聚合物 Matrix		—	有机硅 Silicone	有机硅 Silicone
厚度 Thickness	μm	—	100	200
击穿绝缘电压 Dielectric Breakdown Voltage	kV	JIS K 6249	3.2	6.5
导热率 Thermal Conductivity	W/m·K	ASTM E1461*1	1.0	1.0
剥离粘结强度*1 Peeling Strength	铝 Aluminum	本公司测定法*2 Shin-Etsu Method	6.0	6.4
	SUS	本公司测定法*2 Shin-Etsu Method	7.0	7.6
	环氧玻璃 Glass epoxy	本公司测定法*2 Shin-Etsu Method	7.6	8.1
阻燃性 Flammability	UL94	—	V-0	V-0
低分子硅氧烷量 Low-molecular-weight siloxane content	ppm	本公司测定法*3 Shin-Etsu Method	100> (Σ D3-10)	100> (Σ D3-10)
标准的切片尺寸 Sheet size	mm	—	300×400 (or 300mm×50mm)	300×400 (or 300mm×50mm)

*1 激光闪光法: 参照P.33 Laser flash method: (P.33)

*2 把胶带贴到被粘着物上，用2kg的滚筒往复1次后，使用养护10分钟后的样本测定。

在23℃温度下，向180度的方向拉动剥离，试验速度为300mm/min。

After sticking a tape on a test plate, then pressed down using a 2 kg roller.

After 10 minutes, the tape was then peeled off in the 180-degree direction and measurements taken. (Temp.: 23°C, peeling speed: 300 mm/min)

*3 丙酮提取法 Acetone extraction method.

SAS系列，可以加工成各种形状。如果想定制产品，请与我们联系。

SAS series products can be manufactured to custom shapes and forms upon special request. Contact your local sales representative for details.

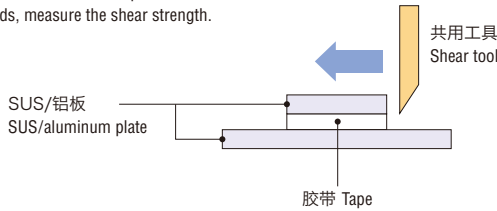
(非规格值 Not specified values)

[粘着力]

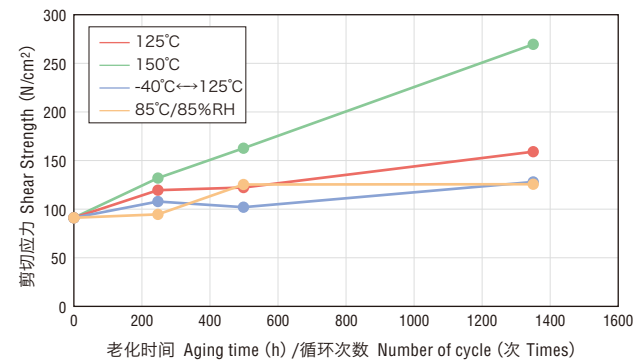
■粘着力压力/时间依存性 Pressure/time dependency of adhesive strength

样本 Sample	尺寸 Size	压力 (载荷条件) Pressure	时间 Time	剪切应力 (N/cm ²) Shear Strength
TC-20SAS	1cm ²	2kg	10sec	27
			1min	45
		4kg	10sec	46
			1min	65

胶带尺寸 Tape size: 1cm² (10mm×10mm)
将TC-20SAS用两片SUS板夹住,
用各种不同压力/时间条件按压粘着后, 测定剪切应力。
Sandwich the TC-20SAS sample with two SUS plates,
and pressurize with various pressure and time.
Afterwards, measure the shear strength.



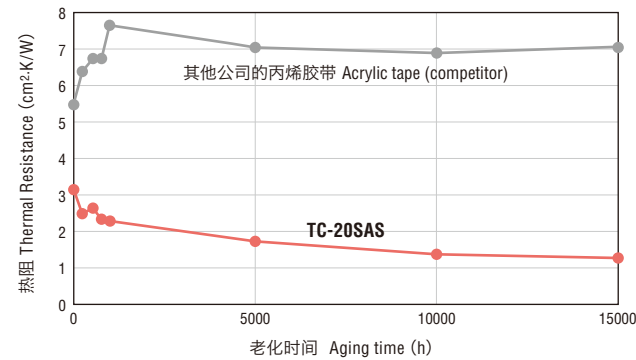
■TC-20SAS 老化后的剪切应力 Shear Strength after aging



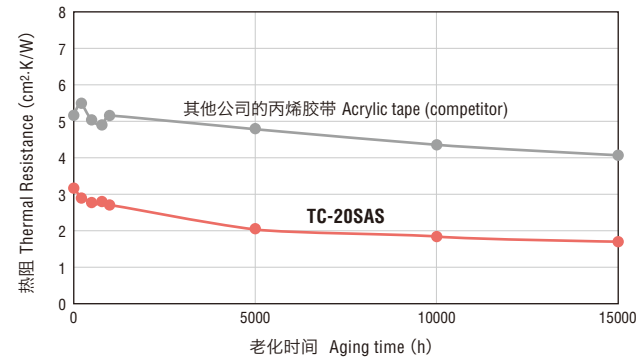
[热阻性]

■老化后的热阻 Thermal Resistance after aging

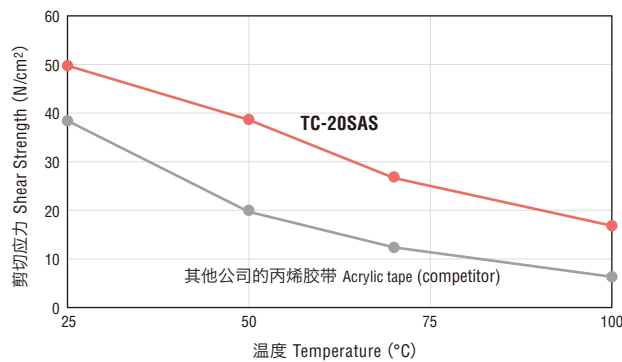
■150°C



■85°C/85%RH



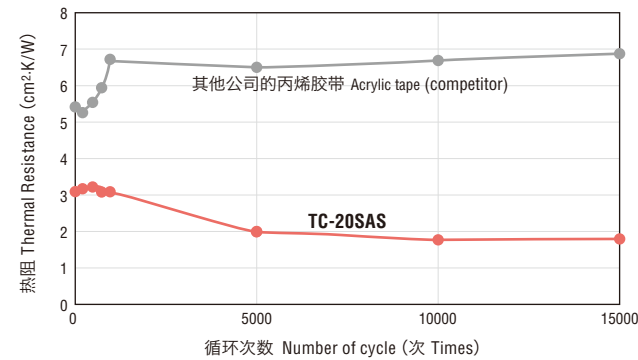
■粘合力的温度依存性 Temperature dependency of adhesive strength



胶带尺寸 Tape size: 0.3cm² (5mm×6mm)
将胶带用两片铝板夹住, 使用2kg的滚筒按压粘着。
养护60分钟后, 在各种不同温度下测定剪切应力。
Sandwich a tape with two aluminum plates, and pressurize using a 2 kg roller.
After 60 minutes, measure the shear strength under several temperature conditions.

1. 把10mm方的TC-20SAS用铝板夹住。
 2. 加上衬垫使压力平均, 用20psi的挤压夹具加压 (加压条件: 25°C/1h)。
 3. 拆掉挤压夹具, 测定剪切应力 (以此作为初始值)。
 4. 把样本不加压投入老化试验箱。
 5. 放置一定时间后, 将样本取出, 测定剪切应力。
1. Sandwich the TC-20SAS sample (10 × 10 mm size) with aluminum plates.
 2. Press the sample with 20 psi clips.
 3. Spacers are inserted to ensure uniform pressure (Press condition: 25°C/1 h).
 3. Remove the spacer and clip, then measure initial shear strength.
 4. Put w/o pressure sample into the aging chamber.
 5. After aging, measure the shear strength.

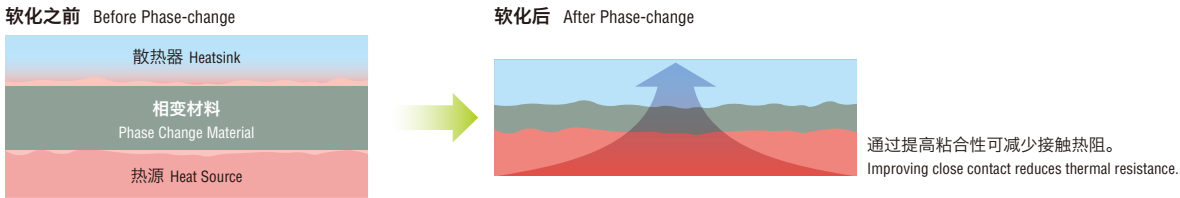
■-40°C to 125°C



1. 把TC-20SAS用两片铝板夹住。
 2. 加上衬垫使压力平均, 用20psi的挤压夹具加压 (加压条件: 25°C/1h)。
 3. 用激光闪光法测定热阻 (以此作为初始值)。
 4. 使用挤压夹具再次对样本加压, 投入老化试验箱中。
 5. 放置一定时间后, 将样本取出, 并通过激光闪光法测定热阻。
1. Sandwich the sample (TC-20SAS) with two pieces of aluminum plates.
 2. Press the sample with 20 psi clips. Spacers are inserted to ensure uniform pressure (Press condition: 25°C/1 h).
 3. Measure the thermal resistance with laser flash method (0 h).
 4. Press the sample with clip again. Put sample into the aging chamber.
 5. After aging, measure the thermal resistance with Laser Flash method.

相变材料因受热软化，可以提高粘着性，因此可以发挥散热性能。
实现了非有机硅相变材料产品所不具有的高温领域的长期可靠性。
Phase change materials are high-performance thermal interface sheets that soften with heat.
Heat softens the sheet for a better conforming fit, which reduces thermal resistance. The result is superior dissipation of heat.
Non-silicone phase-change products can't compete in terms of long-term reliability under high temperature.

- 发挥高散热效果。
 - 初始厚度与压缩后的厚度之间的差异很大，容易压扁，因此可以吸收复数半导体元件的高度差。（对应下一代CPU）
 - 压缩后制成薄膜，会降低热阻值。
- Superior heat-dissipating effect
 - Sheets compress easily to a fraction of their initial thickness, so they act to “level” multiple chips of different heights. (Developed for next-generation CPUs)
 - The layer thins under compression, resulting in lower thermal resistance.



- 因为复制性优异，所以很容易进行粘贴。 Sheets transfer easily, making them easy to stick on.

复制方法 Transfer Method

1



把带标签的PCS-LT放在散热器顶部。
Position a PCS-LT sheet (with tab attached) on top of the heat sink.

2



使用手指和滚筒揉搓整个表面（压力20~30psi）。
Apply pressure over the entire surface using the fingers or a roller (pressure: 20-30 psi).

3



用塑料抹刀等揉搓PCS-LT的左上部分（压力50~100psi）。
Use a spatula or similar tool to smooth down the upper left part of the PCS-LT sheet (pressure: 50-100 psi).

4



一口气将标签剥离。
Pull the tab firmly to remove.

1 psi = 6.895 kPa

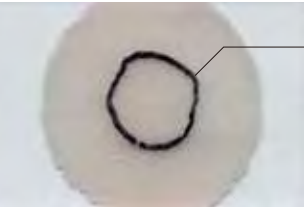
- 耐泵出阻力性优异。 Resists pump-out.

本公司的有机硅PCM（25循环后） Shin-Etsu PCM (after 25 cycles)



打开 进行70℃×1h加热后 热循环试验 25循环
Oven-heated to 70°C for 1 h + 25 cycles

烯烃类 Olefin type



在烤箱 只进行70℃×1h加热
Oven-heated to 70°C for one hour only.

初始的大小 Initial size

一般特性 General Properties

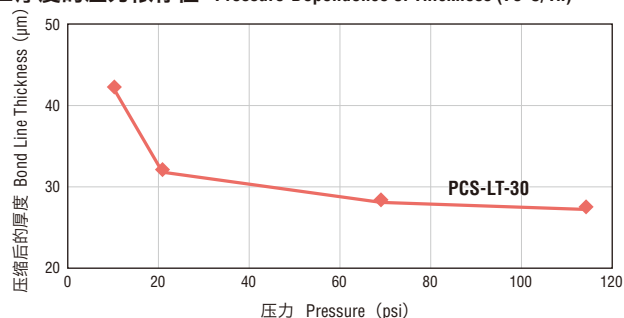
测定方法 Test Method		产品名称 Grade	PCS-LT-30	PCS-CR-10
项目 Parameter				
颜色 Color	—		灰色 Gray	白色 White
初始厚度 Initial Thickness	μm	—	120	200
热压缩厚度 Thickness after heat / compression*1	μm	微米量规 Micro gauge	28	10
密度 Density at 25°C		JIS K 6249	2.4	2.9
击穿绝缘电压 Dielectric Breakdown Voltage	kV/mm	—	—	8.0
软化点 Softening Point	°C	本公司测定法 Shin-Etsu Method	48	48
导热率 Thermal Conductivity	W/m·K	ASTM E1461*2	3.0	2.0
热阻 Thermal Resistance*1	cm²·K/W	ASTM E1461*2	0.11	0.08
标准切片尺寸 Sheet size	mm	—	300×400	300×400

*1 在压力20psi下加热100℃/1h，压缩后 After 1 hour compression, 20 psi/100°C.

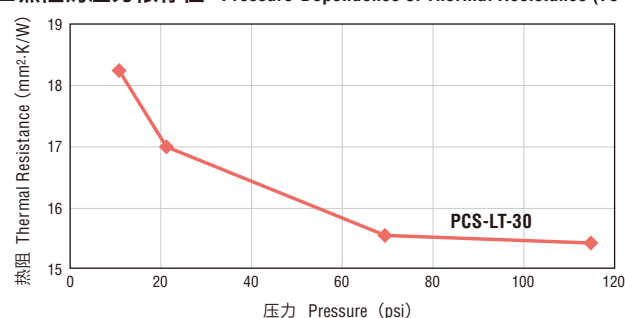
*2 激光闪光法：参照P.33 Laser flash method: (P.33)

(非规格值 Not specified values)

■厚度的压力依存性 Pressure-Dependence of Thickness (70°C/1h)



■热阻的压力依存性 Pressure-Dependence of Thermal Resistance (70°C/1h)



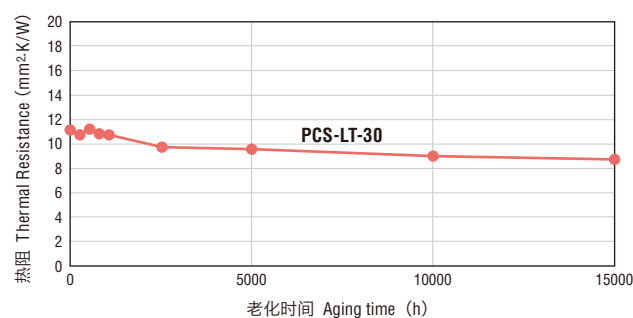
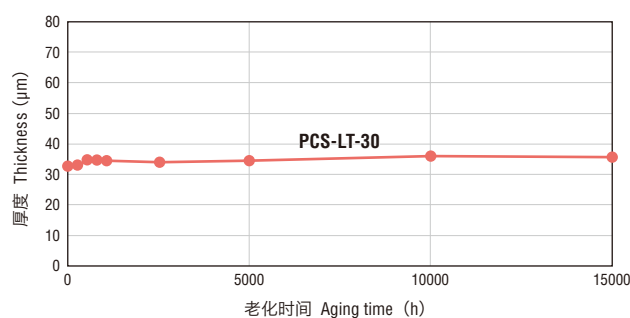
试验方法 Test Method

1. 复制到激光闪光测定用的铝板上。
2. 用另一张铝板把样本夹住，插入衬垫，使得压力均匀。
3. 用挤压夹具加压。
4. 在70°C烤箱中加热1小时。
5. 从烤箱中取出样本，用微量量规测定加压后样本的厚度。此外，用激光闪光法测定热阻。

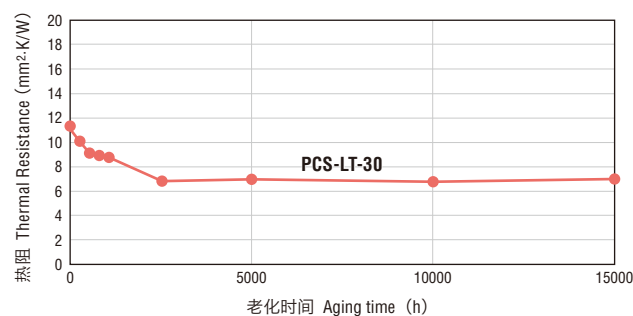
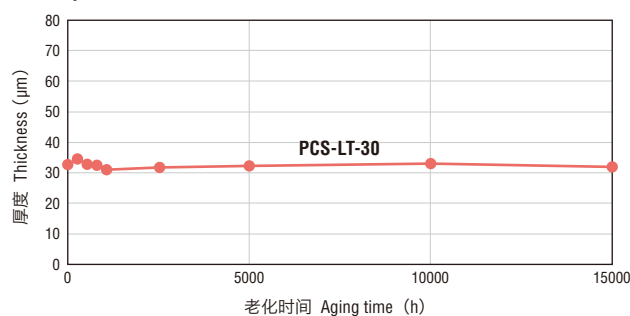
1. The sheet is transferred to an aluminum plate used for the laser flash test.
2. Another aluminum plate is placed on the top, sandwiching the sample. Spacers are inserted to ensure uniform pressure.
3. Pressure is applied with clips.
4. This unit is heated in a 70°C oven for 1 hour.
5. The unit is taken from the oven, and a microgauge used to measure the thickness of the sample after compression. Its thermal resistance is again measured using the laser flash method.

■老化后的厚度和热阻 Thickness / Thermal Resistance after aging

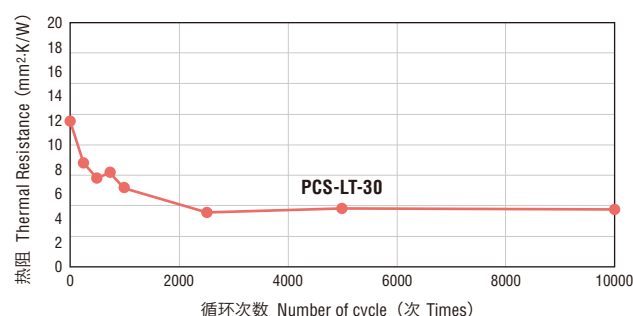
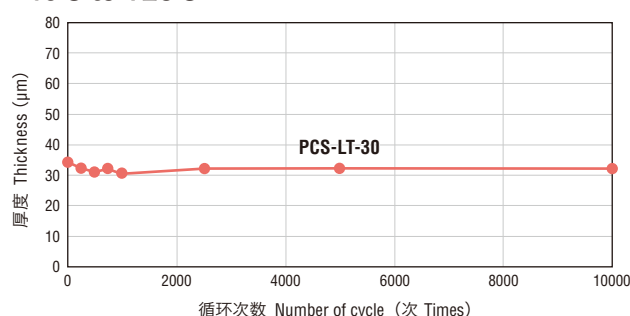
■150°C



■85°C/85%RH



■-40°C to 125°C



总结 Observations

1. PCS-LT系列是一种基于有机硅氧烷的相变片，即使在像150°C/15000h那样极其恶劣的环境条件下，也可以使用而特性不至于劣化。
2. 此外，因为泵出特性优异，即使在-40°C⇔125°C/10000次循环的热循环试验中，也完全看不到热阻上升（散热特性恶化）。
3. 老化后有热阻性降低（散热特性上升）倾向。具推测，这可能是由于PCS-LT与铝板之间的接触随着时间的变化的到改善，降低了接触热阻。

1. PCS-LT series can work without deterioration in extremely severe condition like 150°C/15000 hrs because PCS-LT series are silicone-based phase change material.
2. In addition, PCS-LT series are excellent also in anti pumping-out properties. In a heat cycle condition (-40°C⇔125°C/10000 cycle), the increasing of thermal resistance is not observed at all.
3. The tendency for thermal resistance to decrease after aging was observed. It is surmised that the contact condition of PCS-LT and aluminum plate improved by aging, as a result, thermal resistance could be decreased.

它是兼备抑制高频噪声效果和的热导性两种特点的产品。
Thermal interface sheets which also shield high frequency noise.

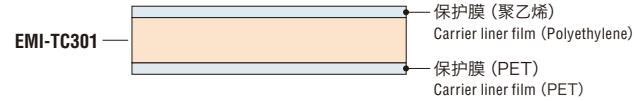
■一般特性 General Properties

项目	Parameter	测定方法	Test Method	产品名称	Grade	EMI-TC301	EMI-TC803
结构	Structure					单层 Single layer	复合 Composite
渗透率 1GHz Magnetic permeability	实部 Real part: μ'	同轴管 Concentric pipe S参数法 S-parameter Method				4.1	4.1
	虚部 Imaginary part: μ''					1.4	1.4
使用温度范围	Temperature Range					-40 to +150	-40 to +150
导热率 Thermal Conductivity	W/m-K	ISO 22007-2				2.5	2.5
		ASTM E1530				3.5	3.5
热阻 Thermal Resistance	$^{\circ}\text{C}/\text{W}$	本公司测定法 Shin-Etsu Method				0.21	—
						0.27	—
						0.48	0.47
						0.90	0.93
硬度 Hardness	Asker C					61	8
密度 Density at 23 $^{\circ}\text{C}$	g/cm^3	JIS K 6249				4.6	4.6
阻燃 Flame-Retardance	UL94					V-0	相当于V-1 V-1 equivalent
标准切片厚度	Thickness					0.3, 0.5, 1.0, 2.0	1.0, 2.0

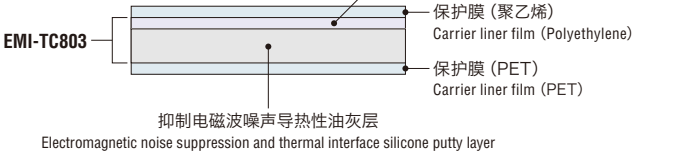
(非规格值 Not specified values)

■结构 Structure

●单层切片 Single layer sheet: EMI-TC301

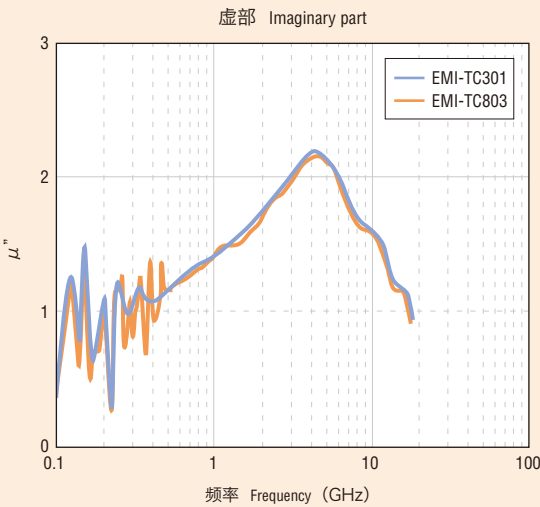
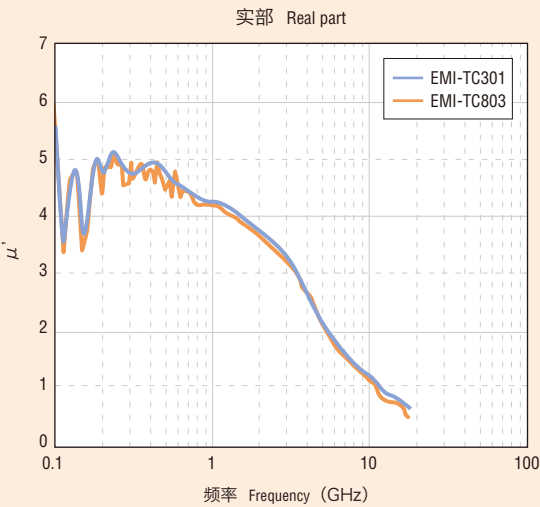


●复合切片 Composite sheet : EMI-TC803



*请在实际粘贴时揭下两侧的保护膜。 Please remove the carrier liner when using.

■渗透性频率特性 (参考值) Magnetic permeability frequency response



*要自日本出口本页所列产品，请联系我公司负责营业部门。
If considering export these products discribed in this page from Japan, first talk to a Shin-Etsu sales representative.

击穿绝缘电压/击穿绝缘强度

在绝缘油中，用直径25mm的电极夹住试验片，外加以1kV/sec的速度定速上升的交流电压，测定出的试验片被击穿绝缘的最小电压为“击穿绝缘电压”。测定厚度为1+0.2-0.1mm的板状试验片的击穿绝缘电压，用试验片的厚度所除的数值为“击穿绝缘强度”。

*根据JIS K 6249测定

$$V_b = V/t$$

V_b: 击穿绝缘强度 (kV/mm) Dielectric breakdown strength (kV/mm)
V: 击穿绝缘电压的测定值 (kV) Dielectric breakdown voltage as measured (kV)
t: 试验片的厚度 (mm) Thickness of test sample (mm)

Dielectric Breakdown Voltage/Dielectric Breakdown Strength

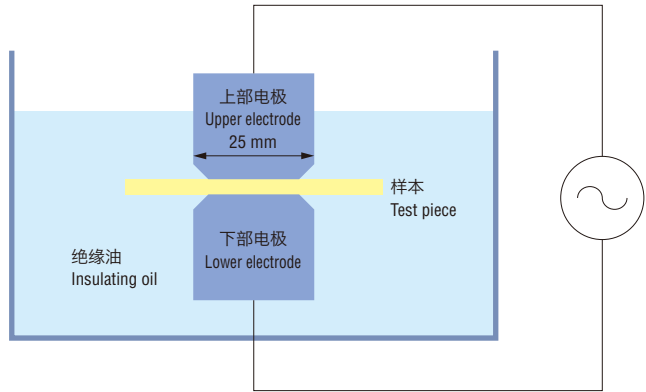
A test sample is inserted between two 25 mm diameter electrodes and immersed in insulating oil. An alternating current is applied, and the voltage is steadily increased at a rate of 1 kV/sec. The minimum voltage necessary to cause dielectric breakdown is measured, and this is considered the dielectric breakdown voltage. The dielectric breakdown voltage of a test sample sheet (thickness: 1^{+0.2}_{-0.1} mm) was measured, and this value divided by the thickness of the sample is considered the dielectric breakdown strength.

*Measured in accordance with JIS K 6249

耐电压

在绝缘油中，用直径25mm的电极夹住试验片，外加一定的电压20秒，测定试验片的击穿绝缘情况。分段提高电压值，测定出绝缘不被击穿的最大电压作为耐电压。

*根据JIS C 2110测定



Dielectric Strength

A test sample is inserted between two 25 mm diameter electrodes and immersed in insulating oil. A constant voltage is applied for 20 seconds to test dielectric breakdown of the test sample. Voltage is increased in stages, and the maximum voltage before dielectric breakdown is measured. This value is considered the dielectric strength.

*Measured in accordance with JIS C 2110.

阻燃性

将宽13mm、长125mm的条状试样片挂起，用长20mm的火苗的中心部分对准下端10秒，拿走火苗测定试验片的燃烧持续时间(t₁)。火熄灭后再次同样地对准火苗，与第一次同样，测定燃烧持续时间(t₂)和烧尽时间(t₃)。

对5张试验片 (1组) 同样进行测定。

标准条件 Criteria Conditions	分类 Classification	UL94 V-0	UL94 V-1
t ₁ 或t ₂ t ₁ or t ₂		≤10 sec	≤30 sec
5样本t ₁ + t ₂ 的总计 Total flame time (t ₁ + t ₂ for the 5 specimens)		≤50 sec	≤250 sec
t ₂ + t ₃		≤30 sec	≤60 sec

Flame-Retardancy

The test piece (width: 13 mm; length: 125 mm) is positioned vertically, and the lower edge is exposed to a 20 mm flame for 10 seconds. The piece is then removed from the flame and afterflame time (t₁) is measured. After burning stops, the flame is applied again, and afterflame time (t₂) plus afterglow time (t₃) is measured again in the same manner. A set of five specimens is to be tested.

t₁: 第1次接触火焰后的续燃时间 Afterflame time after first flame application
t₂: 第2次接触火焰后的续燃时间 Afterflame time after second flame application
t₃: 第2次接触火焰后烧尽的时间 Afterglow time after second flame application

导热率

●ISO22007-2标准

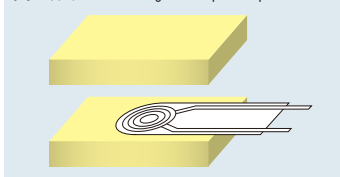
如图1所示, 将60mm×60·厚度为6mm的两片样本夹住传感器, 对传感器加上恒定电流, 使其发出一定的热量, 由传感器的温度上升计算出导热率。

传感器为镍的双螺旋结构, 可以把温度变化作为传感器的电阻变化捕捉到。对传感器施加恒定电流时所得到的传感器信号, 如图2所示。

把图2中温度上升曲线图的横轴(时间与样本的热扩散率 α 的函数)的标度设定为 $D(\tau)$ 的话, 则如图3。

从方程式(1)可以看到, 该直线的斜率与样本的热导率 λ 成反比。

图1 样本的设置 Fig. 1: Sample setup



●Based on ISO 22007-2

A constant current is supplied to a sensor sandwiched between two sheets which measure 60 mm × 60 mm × 6 mm (as shown in Fig. 1). The sensor is heated to a constant temperature, and the thermal conductivity calculated from the temperature increase of the sensor.

The sensor consists of nickel foil in a double spiral pattern, and the temperature change can be measured as the change in electrical resistance of the sensor. Fig. 2 shows the signal obtained from the sensor when constant current is applied. If we scale the horizontal axis (function of time and thermal diffusivity α of the sample) of the temperature increase graph (Fig. 2) with $D(\tau)$, we see the result in Fig. 3.

From equation (1), we know that the slope of this straight line is inversely proportional to the thermal conductivity λ of the sample.

传感器的温度上升 ΔT_{ave} 理论上可用下面的公式表示。

The sensor temperature increase ΔT_{ave} is represented theoretically by the following model.

$$\Delta T_{ave}(\tau) = \frac{Po}{\pi^{\frac{3}{2}} r \lambda} \cdot D(\tau) \cdots (1)$$

Po : 施加到传感器上的全输出 Power applied to the sensor (W)

r : 传感器的半径 Radius of the sensor (m)

λ : 试样的热导率 Thermal conductivity of the sample (W/m·K)

τ : 这是由 $\sqrt{\alpha \cdot t/r^2}$ 定义的无次元参数 Non-dimensional parameter defined by $\sqrt{\alpha \cdot t/r^2}$

α : 样本的热扩散率 Thermal diffusivity of the sample (m^2/s)

t : 测定时间 Measurement time (sec)

$D(\tau)$: 无次元化的 τ 的函数 Function of non-dimensional τ

图2 外加电流与传感器信号的时间变化

Fig. 2: Time change of applied current and sensor signal

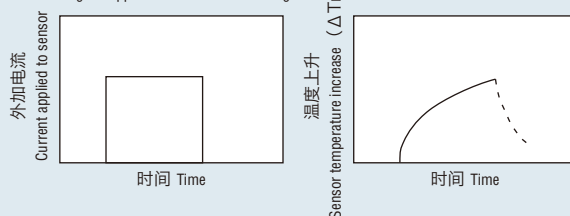
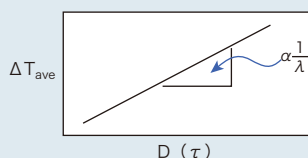

 图3 升温曲线和 $D(\tau)$ 的关系

 Fig. 3: Correlation between temperature increase curve and $D(\tau)$


●ASTM E1530标准

如图所示, 按压直径50mm、厚度9mm的样本。温度达到一定后, 测定散热有机硅橡胶两面之间的温差及热流束, 使用傅立叶定律计算出导热率。

●Based on ASTM E1530

A sample of TC silicone (thickness: 9 mm; diameter: 50 mm) is press-fit as shown in the diagram. When the temperature reaches equilibrium, the difference in temperature between the two sides of the silicone and heat flux are measured.

傅里叶定律 Fourier's Law states that

$$Rs = \left[\frac{(Tu - Tm)}{Q} \right] - R_{int}$$

Rs : 样本的热阻
Thermal resistance

Tu : 上板的表面温度
Temperature of the surface of the upper plate

Tm : 下板的表面温度
Temperature of the surface of the lower plate

Q : 通过样本的热流束
Heat flux passing through the test piece

R_{int} : 样本的和表面板之间的总热阻
Total thermal resistance between the test piece and the surface of the plate

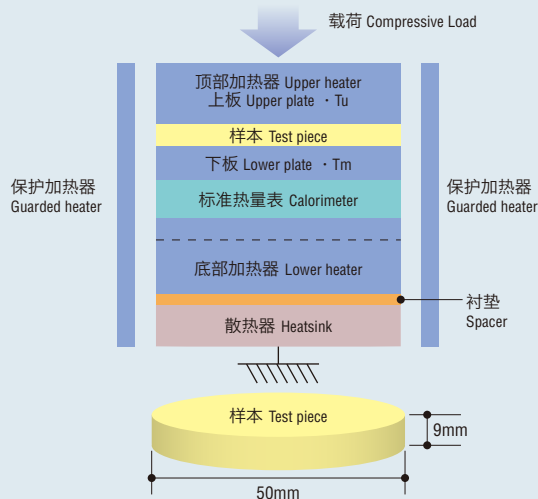
自左式 Therefore

$$\lambda = \frac{d}{Rs}$$

d : 样本厚度
Thickness of the test piece

λ : 导热率
Thermal conductivity

测定装置和试片 Measuring equipment and test piece



热阻

●晶体管法: 高硬度散热有机硅橡胶加工品

把样本 (TO-3P型) 夹在散热器和晶体管之间, 用 $\phi 3.0\text{mm}$ 的螺钉固定后, 给晶体管输电。测定10分钟后晶体管和散热器的温度, 用下列公式计算出热阻。

$$\text{热阻 Thermal Resistance } (^{\circ}\text{C/W}) = \frac{T_1 - T_2}{10}$$

T1: 晶体管的温度 Transistor temperature

T2: 散热器的温度 Heatsink temperature

螺钉紧固强度 Screw Torque: $5 \pm 1\text{kgf}\cdot\text{cm}$

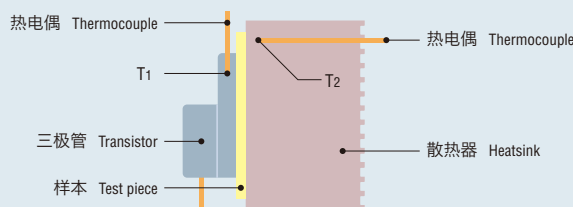
外加电力 Applied power: 10W

接触面积 Contact area: 约 2.8cm^2 about 2.8cm^2

Thermal Resistance

●Transistor method: High-hardness Thermal Interface Silicone Rubber

A TC test piece (Model TO-3P) is inserted between a heatsink and transistor. The transistor is secured to the heatsink with a 3.0 mm diameter screw. Power is applied to the transistor for 10 minutes, then the temperatures of the transistor and heatsink are measured. Thermal resistance is calculated according to the following equation.



●标本加热器方法: 低硬度/超低硬度散热有机硅胶垫

使用在铝制箱体中嵌入了加热器的标本加热器。把样本夹在散热器和标本加热器中间, 加上所定的重量, 对标本加热器输送电力。5分钟后, 测定标本加热器和散热器的温度, 用下列公式计算出热阻。

$$\text{热阻 Thermal Resistance } (^{\circ}\text{C/W}) = \frac{T_1 - T_2}{28}$$

T1: 标本加热器的温度 Model heater temperature

T2: 散热器的温度 Heatsink temperature

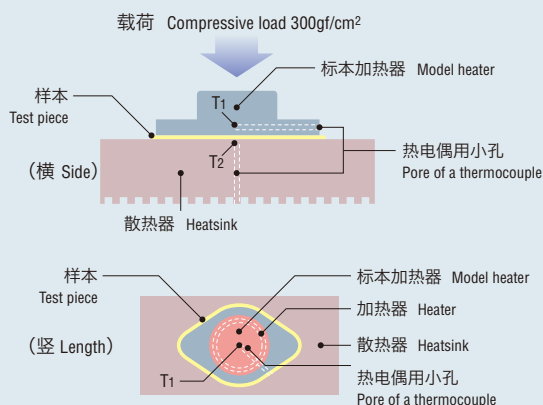
载荷 Compressive load: $300\text{gf}/\text{cm}^2$

外加电力 Applied power: 28W

接触面积 Contact area: 约 7cm^2 about 7cm^2

●Model heater method: Thermal Interface Silicone Soft Pads/Ultra Soft Pads

A model heater (aluminum case with built-in heater) is used. The test piece is inserted between a heatsink and the model heater, and a designated compressive load is applied. Power is applied for 5 minutes, then the temperatures of the heater and heatsink are measured. Thermal resistance is calculated according to the following equation.



导热性双面粘着有机硅胶带

Double Sided Thermal Interface Silicone Tapes

相变材料

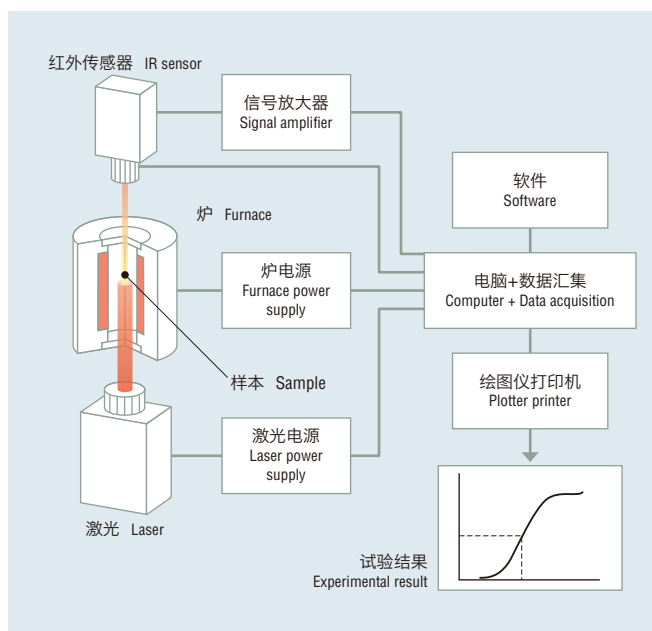
Thermal Interface Phase Change Materials

●激光闪光法 (ASTM E1461标准)

热阻性、热导率用热定数分析法之一的激光闪光法测定。激光闪光法, 通过对样本的一侧照射脉冲激光加热, 对样本的反面的温度上升由红外传感器测定, 可进行非接触测定。

●Laser flash method (Based on ASTM E1461)

Thermal resistance and thermal conductivity were measured by the laser flash method, which is one method of analyzing thermal constants: a pulse laser is used to illuminate and heat one face of the sample. The temperature rise is measured at the opposite face using an infrared sensor, with no contact involved.



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