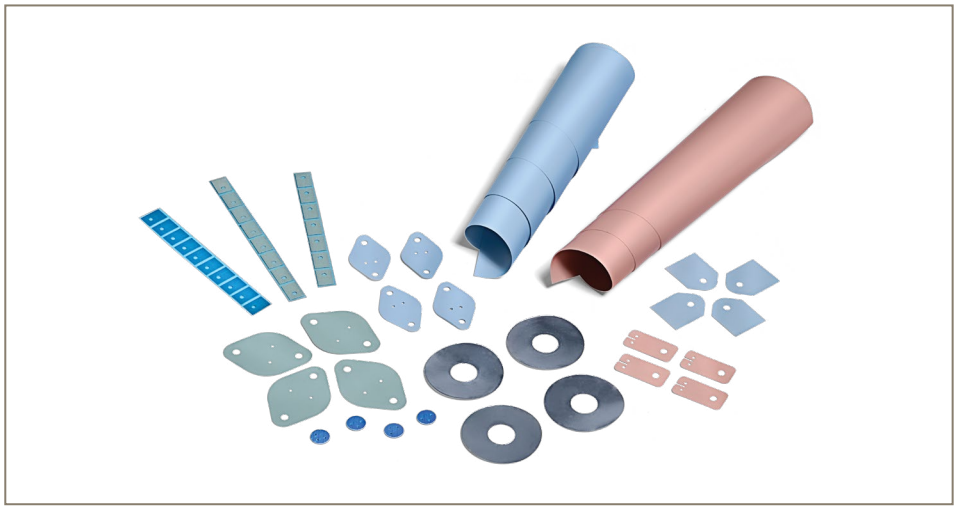
CHO-THERM® & CHO-THERM® HV

Thermally Conductive Electrical Insulator Pads

CHO-THERM® Thermal Insulator Pads are designed for use as alternatives to greased mica insulators between discrete power devices and heat sinks. These products are offered as dry pads, or with an optional pressure-sensitive acrylic adhesive (PSA) layer for ease of installation.



FEATURES / BENEFITS

- Excellent mechanical strength and puncture resistance
- Available with & without acrylic PSA
- UL recognized V-0 flammability rating

COMMERCIAL GRADE

- Good thermal properties
- Good to excellent dielectric strength
- Available on continuous rolls for easy peel and stick application

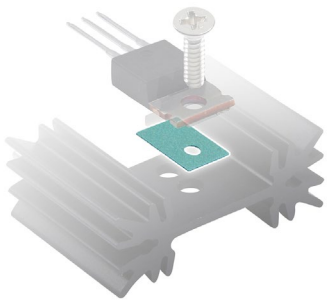
HIGH POWER

- Excellent thermal properties
- High dielectric strength
- 100% inspected for dielectric properties on every sheet
- Extremely low NASA outgassing
- Proven through decades of use in demanding military and aerospace applications

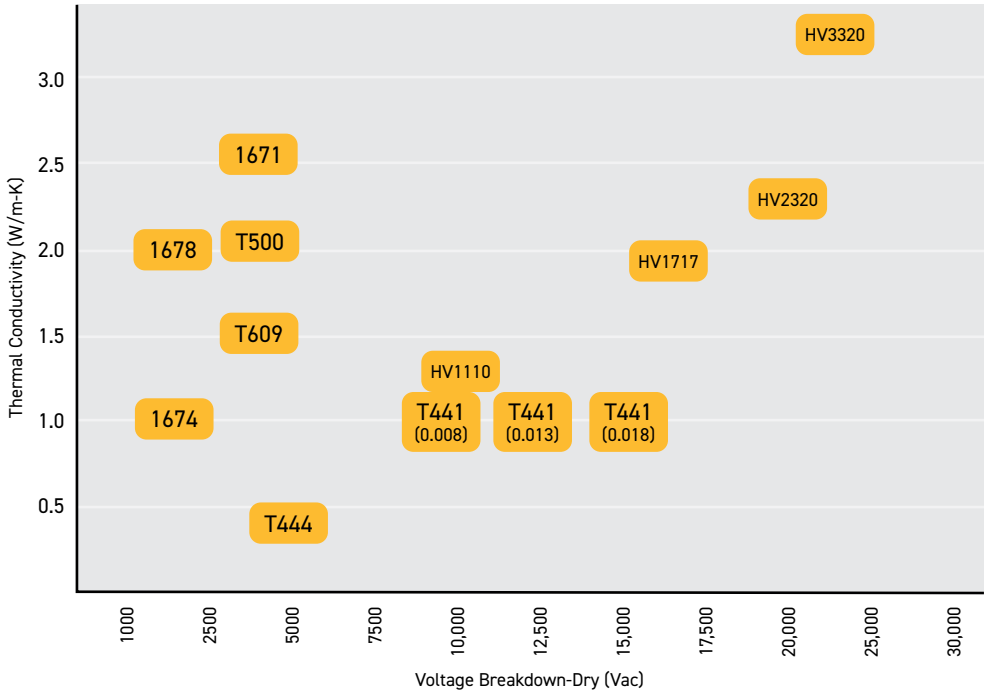
RoHS compliant

TYPICAL APPLICATIONS

- Power conversion equipment
- Power supplies & UPS
- Power semiconductors
- Automotive electronics
- Motor and engine controllers
- Televisions and consumer electronics



PERFORMANCE GUIDE



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CHO-THERM PRODUCT INFORMATION

	Typical Properties†	T444	1674	T441			T609	Test Method
Physical	Color	Beige	Blue	Pink			Gray	Visual
	Material	Non-Silicone	Silicone	Silicone			Silicone	--
	Reinforcement Carrier	Filled Polyimide with PSA	Fiberglass	Fiberglass			Fiberglass	Visual
	Thickness, in (mm)	0.003 (0.08)	0.010 (0.25)	0.008 (0.20)	0.013 (0.33)	0.018 (0.46)	0.010 (0.25)	ASTM D374
	Thickness Tolerance, in (mm)	0.0005 (± 0.013)	0.001 (± 0.025)	0.001 (± 0.025)	0.001 (± 0.025)	0.001 (± 0.025)	0.001 (± 0.025)	--
	Operating Temperature Range, °F (°C)	-40 to 392 (-40 to 200)	-40 to 392 (-40 to 200)	-40 to 392 (-40 to 200)	-40 to 392 (-40 to 200)	-40 to 392 (-40 to 200)	-40 to 392 (-40 to 200)	Chomerics
Thermal	Thermal Impedance, °C-in²/W (°C-cm²/W) @ 300 psi*	0.37 (2.4)	0.41 (2.6)	0.41 (2.6)	0.56 (3.6)	0.64 (4.1)	0.33 (2.1)	ASTM D5470
	Thermal Conductivity, W/m-K	0.4	1.0	1.1	1.1	1.1	1.5	ASTM D5470
	Heat Capacity, J/g-°C	1	1	1	1	1	1	ASTM E1269
	Coefficient of Thermal Expansion, ppm/°C	400	300	300	300	300	150	ASTM E831
Electrical	Voltage Breakdown Dry, Vac/mil (kVac/mm)	5,000 (200)	2,500 (100)	8,700 (350)	11,400 (450)	13,800 (550)	4,000 (150)	ASTM D149
	Voltage Breakdown Wet, Vac/mil (kVac/mm)	Not Tested	Not Tested	8,100	10,500	12,900	Not Tested	ASTM D149
	Volume Resistivity Dry, ohm-cm	10^{14}	10^{14}	10^{14}	10^{14}	10^{14}	10^{14}	ASTM D257
	Volume Resistivity Wet, ohm-cm	Not Tested	Not Tested	10^{14}	10^{14}	10^{14}	Not Tested	ASTM D257
Mechanical	Tensile Strength, psi (Mpa)	3,000 (20.7)	1,500 (10.3)	2,800 (19.3)	2,500 (17.3)	2,000 (13.8)	3,900 (26.9)	ASTM D412
	Tear Strength, lb/in (kN/m)	150 (26.3)	100 (17.5)	135 (23.6)	110 (19.3)	70 (12.25)	300 (52.5)	ASTM D642
	Elongation, %	N/A	2	40	40	40	30	ASTM D412
	Hardness, Shore A	90	85	80	80	80	70	ASTM D2240
	Specific Gravity	1.70	2.45	2.45	2.45	2.45	2.10	ASTM D792
Regulatory	Flammability Rating (See UL File E140244)	V-0	Not Tested	V-0	V-0	V-0	V-0	UL 94
	RoHS Compliant	Yes	Yes	Yes	Yes	Yes	Yes	Chomerics Certification
	Outgassing, % TML (% CVCM)	0.53 (0.00)	0.45 (0.20)	Not Tested	Not Tested	Not Tested	Not Tested	ASTM E595
	Shelf Life, months from shipment, dry pad (with PSA)	(12)	Indefinite (12)	Indefinite (12)	Indefinite (12)	Indefinite (12)	Indefinite (6)	Chomerics
	Storage Conditions, °F (°C) @ 50% Relative Humidity	50 to 90 (10 to 32)	50 to 90 (10 to 32)	50 to 90 (10 to 32)	50 to 90 (10 to 32)	50 to 90 (10 to 32)	50 to 90 (10 to 32)	Chomerics

† Typical properties: these are not to be construed as specifications.
* Tested without PSA. PSA typically adds 0.05 °C-in²/W (0.30 °C-cm²/W)

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CHO-THERM PRODUCT INFORMATION

	Typical Properties†	1678	T500	1671	Test Method
Physical	Color	Pink	Green	White	Visual
	Material	Silicone	Silicone	Silicone	
	Reinforcement Carrier	Fiberglass	Fiberglass	Fiberglass	--
	Thickness, in (mm)	0.010 (0.25)	0.010 (0.25)	0.015 (0.38)*	ASTM D374
	Thickness Tolerance, in (mm)	± 0.002 (0.050)	± 0.002 (0.050)	± 0.002 (0.050)	--
	Operating Temperature Range, °F (°C)	-76 to 392 (-60 to 200)	-76 to 392 (-60 to 200)	-76 to 392 (-60 to 200)	Chomerics
Thermal	Thermal Impedance, °C-in²/W (°C-cm²/W) @ 300 psi**	0.20 (1.26)	0.19 (1.2)	0.23 (1.48)	ASTM D5470
	Thermal Conductivity, W/m-K	2.0	2.1	2.6	ASTM D5470
	Heat Capacity, J/g-°C	1	1	1	ASTM E1269
	Coefficient of Thermal Expansion, ppm/K	250	250	250	ASTM E831
Electrical	Voltage Breakdown Dry, Vac/mil (kVac/mm)	2,500 (100)	4,000 (150)	4,000 (150)	ASTM D149
	Volume Resistivity Dry, ohm-cm	10^{16}	10^{16}	10^{14}	ASTM D149
	Dielectric Constant at 1,000 kHz	3.6	3.5	3.6	ASTM D150
	Dissipation Factor at 1,000 kHz	0.007	0.003	0.007	CHO-TM-TP13
Mechanical	Tensile Strength, psi (Mpa)	3,000 (20.7)	3,000 (20.7)	3,000 (20.7)	ASTM D412
	Tear Strength, lb/in (kN/m)	200 (35)	400 (70)	400 (70)	ASTM D642
	Elongation, %	20	20	15	ASTM D412
	Hardness, Shore A	80	80	80	ASTM D2240
	Specific Gravity	1.55	1.60	1.55	ASTM D792
Regulatory	Flammability Rating (See UL File E140244)	V-0	V-0	HB	UL 94
	RoHS Compliant	Yes	Yes	Yes	Chomerics Certification
	Outgassing, % TML (% CVCM)	0.55 (0.12)	0.40 (0.10)	0.76 (0.07)	ASTM E595
	Shelf Life, months from shipment, dry pad (with PSA)	Indefinite (18)	Indefinite (18)	Indefinite (18)	Chomerics
	Storage Conditions, °F (°C) @ 50% Relative Humidity	50 to 90 (10 to 32)	50 to 90 (10 to 32)	50 to 90 (10 to 32)	Chomerics

† Typical properties: these are not to be construed as specifications.
* 1671 material is available in custom thicknesses.
** Tested without PSA. PSA typically adds 0.05 °C-in²/W (0.30 °C-cm²/W).

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CHO-THERM HV PRODUCT INFORMATION

	Typical Properties†	HV1110	HV1717	HV2320	HV3320	Test Method
Physical	Color	Blue	Blue	Blue	Grey	Visual
	Carrier	Thermally Enhanced Polyimide	Thermally Enhanced Polyimide	Thermally Enhanced Polyimide	Thermally Enhanced Polyimide	
	Thickness*, in. (mm)	0.010 (.25)	0.020 (0.5)	0.040 (1.0)	0.040 (1.0)	ASTM D374
	Specific Gravity	2.9	2.9	2.9	3.4	ASTM D792
	Hardness, Shore 00	30	30	30	35	ASTM D2240
Thermal	Operating Temperature Range, °F (°C)	-67 to 392 (-55 to 200)	-67 to 392 (-55 to 200)	-67 to 392 (-55 to 200)	-67 to 392 (-55 to 200)	Chomerics
	Apparent Thermal Conductivity, W/m-K	1.1	1.7	2.3	3.3	ASTM D5470
	Thermal Impedance, °C-in²/W	0.373	0.448	0.662	0.293	ASTM D5470
	Heat Capacity, J/g-K	1	1	1	1	ASTM E1269
	Coefficient of Thermal Expansion, ppm/K	150	150	150	150	ASTM E831
Electrical	Breakdown Voltage, kV DC (kV AC)	10.4 (5.04)	16.6 (6.52)	20.0 (10.3)	> 20 (7.31)	ASTM D149
	CTI, Material (Carrier)	Class I (Class II)	Class I (Class II)	Class I (Class II)	Class I (Class II)	ASTM D3638
	Through Resistance, ohm	TBD	TBD	TBD	TBD	ASTM D257
	Dielectric Constant @ 1 MHz	0.15	0.29	0.15	-0.05	ASTM D150
	Dissipation Factor @ 1 MHz	2.8	4.8	6.4	23	CHO-TM-TP13
Regulatory	Flammability Rating (See UL File E140244 for Details)	V-0	V-0	V-0	V-0	UL 94
	RoHS Compliant	Yes	Yes	Yes	Yes	Chomerics Certification
	Outgassing, % TML (% CVCM)	0.13 (0.03)	0.13 (0.03)	0.13 (0.03)	0.11 (0.09)	ASTM E595
	Shelf Life, months from date of shipment (w/PSA)	18 (12)	18 (12)	18 (12)	18 (12)	Chomerics
	Storage Conditions, °F (°C) @ 50% Relative Humidity	50 to 90 (10 to 32)	50 to 90 (10 to 32)	50 to 90 (10 to 32)	50 to 90 (10 to 32)	Chomerics

† Typical properties: these are not to be construed as specifications.
* Thickness tolerance, inches (mm) is ±10% of the nominal part thickness.

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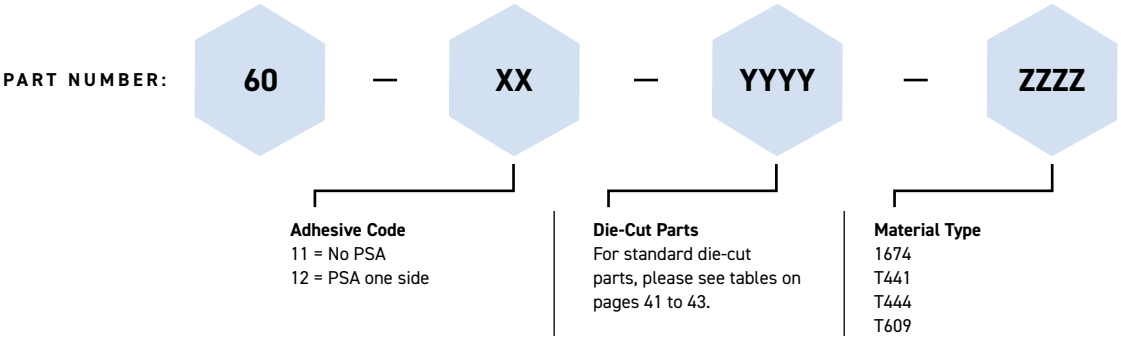
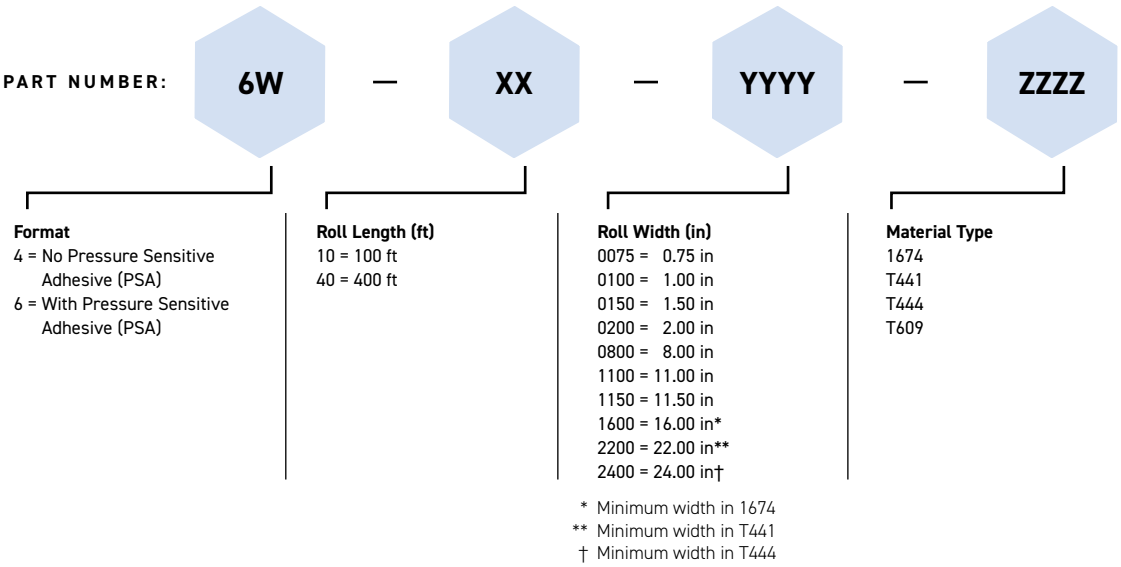
CHO-THERM ORDERING INFORMATION

- Die-cut parts on continuous rolls
- Slit rolls starting at 0.5" wide; maximum width is material specific

Standard Die-Cut Parts



Roll Stock



Ordering Information: Custom Configurations

Please contact Parker Chomerics for a pre-assigned part number, for custom widths, lengths and part sizes, etc.

Available options include:

- Custom die-cut parts on sheets, or as individual parts

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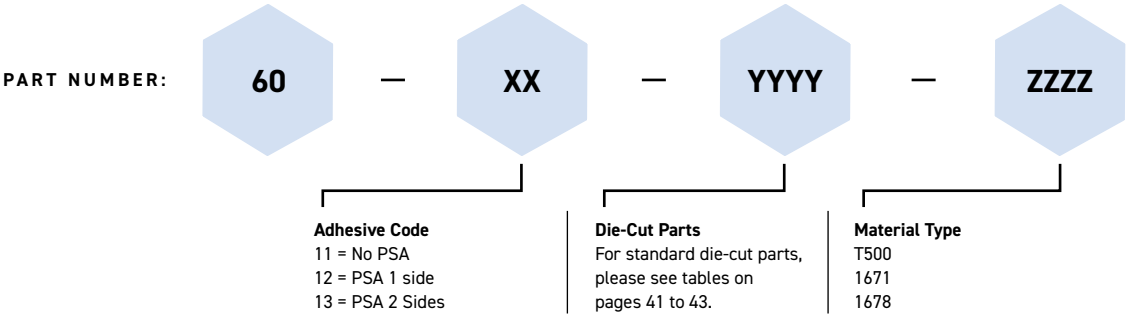
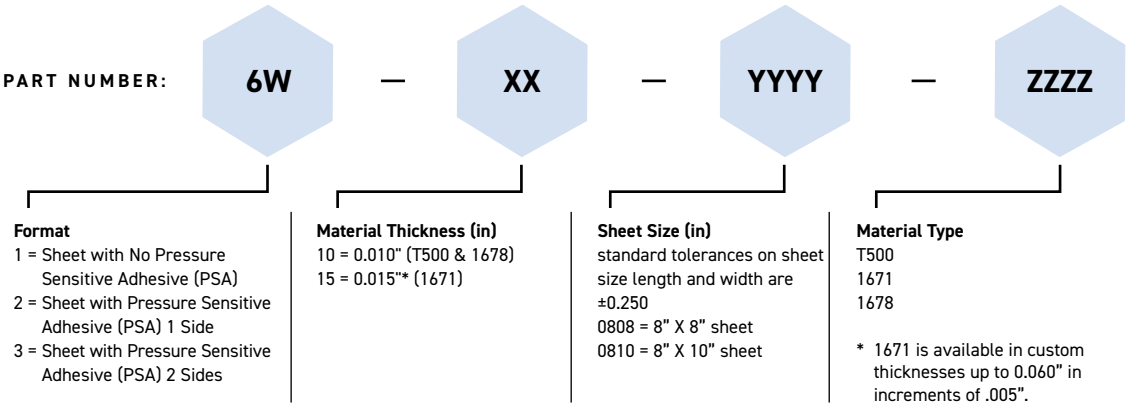
CHO-THERM ORDERING INFORMATION

Standard Die-Cut Parts



8" x 8" or 8" x 10" Sheets



Ordering Information: Custom Configurations

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Available options include:

- Custom die-cut parts on sheets, or as individual parts

HANDLING INFORMATION

These products are defined by Parker Chomerics as "articles" according to the following generally recognized regulatory definition for articles:

An article is a manufactured item "formed to a specific shape or design during manufacturing," which has "end use functions" dependent upon its size and shape during end use and which has generally "no change of chemical composition during its end use."

In addition:

- There is no known or anticipated exposure to hazardous materials/substances during routine and anticipated use of the product.
- The product's shape, surface and design is more relevant than its chemical composition.

These materials are not deemed by Parker Chomerics to require an MSDS. For further questions, please contact Parker Chomerics at 781-935-4850.

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CHO-THERM HV ORDERING INFORMATION

Part Number	PSA	Sheet Size	Material Type
60-11-0909-HV1110	No PSA	9” x 9” (228.6 mm x 228.6 mm)	HV1110
60-12-0909-HV1110	PSA on One Side	9” x 9” (228.6 mm x 228.6 mm)	HV1110
60-11-0909-HV1717	No PSA	9” x 9” (228.6 mm x 228.6 mm)	HV1717
60-12-0909-HV1717	PSA on One Side	9” x 9” (228.6 mm x 228.6 mm)	HV1717
60-11-0909-HV2320	No PSA	9” x 9” (228.6 mm x 228.6 mm)	HV2320
60-12-0909-HV2320	PSA on One Side	9” x 9” (228.6 mm x 228.6 mm)	HV2320
60-11-1015-HV3320	No PSA	10” x 15” (254 mm x 381 mm)	HV3320
60-12-1015-HV3320	PSA on One Side	10” x 15” (254 mm x 381 mm)	HV3320

Ordering Information: Custom Configurations

Please contact Parker Chomerics for a pre-assigned part number, for custom widths, lengths and part sizes; etc.

Available options include custom die-cut parts on sheets or rolls, individual parts.

Handling Information

These products are defined by Parker Chomerics as “articles” according to the following generally recognized regulatory definition for articles:

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CHODS1222 January 2026

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