

# CHO-THERM®

## High Power Thermally Conductive Electrical Insulator Pads

### Description

CHO-THERM® HIGH-POWER THERMAL INSULATOR PADS are thermally conductive materials designed for use where the highest possible thermal, dielectric, and mechanical properties are required.

Fiberglass cloth reinforcement strengthens CHO-THERM® pads against tear, cut-through and punctures.

These materials are available in sheet form and die-cut

configurations. An optional acrylic adhesive layer (with PSA) is available on one or two sides. With a proven track record spanning several decades in multiple applications, these products are the first choice for high-end power supplies, industrial, aerospace, and military/avionics applications.

Available in several different forms to suit various applications.

### Features / Benefits

- Excellent thermal properties

- High dielectric strength
- Excellent mechanical strength and puncture resistance
- 100% inspected for dielectric properties on every sheet
- Acrylic PSA attachment option available
- UL recognized flammability ratings
- Meets RoHS specifications
- Extremely low NASA outgassing
- Proven through decades of use in demanding military and aerospace applications

CHO-THERM® High Power Insulator Pads					
Typical Properties		T500	1678	1671	Method
Physical	Color	Green	Pink	White	Visual
	Reinforcement Carrier	Fiberglass	Fiberglass	Fiberglass	--
	Thickness, inch (mm)	0.010 (0.25)	0.010 (0.25)	0.015 (0.38)*	ASTM D374
	Thickness Tolerance, inch (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)	--
Thermal	Thermal Impedance, °C-in <sup>2</sup> /W [°C-cm <sup>2</sup> / W] @ 300 psi**	0.19 (1.2)	0.20 (1.26)	0.23 (1.48)	ASTM D5470
	Thermal Conductivity, W/m-K	2.1	2.0	2.6	ASTM D5470
	Heat Capacity (J/g-°C)	1.0	1.0	1.0	ASTM E1269
	Coefficient of Thermal Expansion (ppm/K)	250	250	250	ASTM E831
Electrical	Voltage Breakdown Dry, (Vac)	4,000	2,500	4,000	ASTM D149
	Volume Resistivity Dry, (ohm-cm)	10 <sup>16</sup>	10 <sup>16</sup>	10 <sup>16</sup>	ASTM D149
	Dielectric Constant at 1,000 kHz	3.5	3.6	3.6	ASTM D150
	Dissipation Factor at 1,000 kHz	0.003	0.007	0.007	Chomerics Test
Mechanical	Tensile Strength, psi (Mpa)	3,000 (20.7)	3,000 (20.7)	3,000 (20.7)	Chomerics
	Tear Strength, lb/in (kN/m)	400 (70)	200 (35)	400 (70)	Chomerics
	Elongation, %	20	20	15	Chomerics
	Hardness, Shore A	80	80	80	ASTM D2240
	Specific Gravity	1.60	1.55	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)	0.40 (0.10)	0.55 (0.12)	0.76 (0.07)	ASTM E595
	Shelf-Life, months from shipment, Dry Pad (with PSA)	indefinite (18)	indefinite (18)	indefinite (18)	Chomerics

\* 1671 material is available in custom thicknesses.

\*\* Tested without PSA. PSA typically adds 0.05 °C-in<sup>2</sup>/W (0.30 °C-cm<sup>2</sup>/W)

## CHO-THERM® High Power Thermal Insulator Pads

### Typical Applications

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

### Product Attributes

#### T500

- Best thermal performance
- Excellent dielectric properties

#### 1671

- Highest reliability in rigorous applications
- Proven in aerospace/defense applications

#### 1678

- Economically-priced
- Low thermal impedance

### Handling Information

These products are defined by 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 Chomerics to require an MSDS. For further questions, please contact Chomerics at 781-935-4850..

## Ordering Information

Thermal insulator pads are available in the following formats.

Contact Chomerics for custom widths, part sizes, etc.

Sheets 8” X 8” or 8” X 10”

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

Part Number: **6W** — **XX** — **YYYY** — **ZZZZ**

W	XX	YYYY	ZZZZ
W = 0 Standard die-cut part	11 = without PSA 12 = with PSA one side 13 = PSA 2 Sides	YYYY = Custom 4- part alpha/numeric part number. See pages 37 to 39 or contact Chomerics.	ZZZZ = Material class (T500, 1671, or 1678)
W = 1 Sheet stock W = 2 Sheet stock with PSA 1 Side W = 3 Sheet stock with PSA 2 Sides	XX = material thickness in mils (1671 material available up to 60 mils)	0808 = 8” X 8” Sheet 0810 = 8” X 10” Sheet	
W = 9 Custom die-cut part	11 = without PSA 12 = with PSA one side 13 = with PSA both sides	YYYYY = Custom Part Number. Contact Chomerics	

# How to Order Die-Cut CHO-THERM® Insulators

Standard die-cut parts are ordered using the following part number system. For custom parts, contact Chomerics.

Part Number:

**60**

**XX**

**YYYY**

**ZZZZ**

60 = standard die cut part

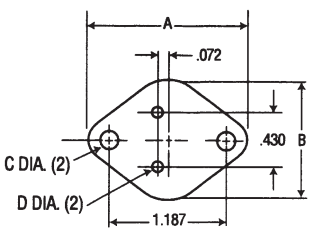
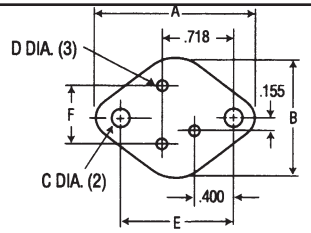
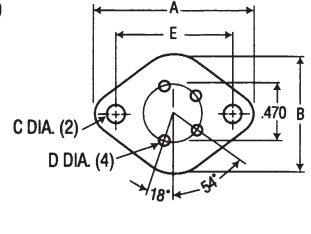
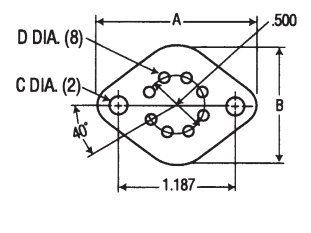
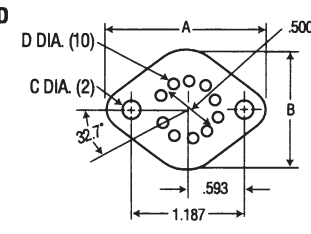
11 = No PSA

12 = PSA one side

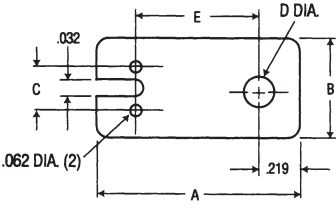
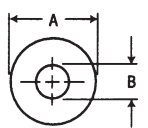

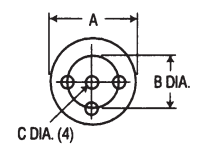
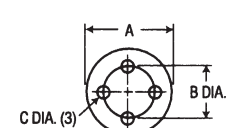
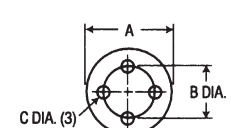
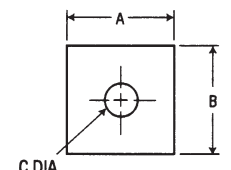
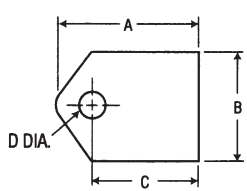
13 = PSA both sides

Standard Configuration  
Drawing Number

CHO-THERM® Material  
Example: 1671, T500, etc.

Recommended Screw Torque	Configuration	Dimensions (inches)							Ordering Number
		A	B	C	D	E	F	G	
#4-40 5 in-lb #6-32 6 in-lb	<b>T0-3</b> 	1.563	1.050	0.140	0.080				WW-XX-D065-ZZZZ WW-XX-4305-ZZZZ WW-XX-4511-ZZZZ WW-XX-D370-ZZZZ WW-XX-D371-ZZZZ WW-XX-6875-ZZZZ WW-XX-D372-ZZZZ WW-XX-D373-ZZZZ WW-XX-D374-ZZZZ - WW-XX-4996-ZZZZ WW-XX-5442-ZZZZ WW-XX-D375-ZZZZ WW-XX-D376-ZZZZ WW-XX-D377-ZZZZ WW-XX-D378-ZZZZ
		1.563	1.050	0.140	0.140				
		1.593	1.100	0.156	0.070				
		1.650	1.065	0.140	0.046				
		1.650	1.140	0.122	0.062				
		1.650	1.140	0.140	0.093				
		1.650	1.140	0.165	0.062				
		1.650	1.140	0.140	0.046				
		1.650	1.140	0.165	-				
		1.700	1.187	0.156	0.062				
		1.730	1.250	0.156	0.062				
		1.780	1.250	0.140	0.093				
		1.780	1.250	0.165	0.094				
		1.780	1.250	0.140	0.046				
		2.07	1.56	0.122	0.062				
#4-40 5 in-lb #6-32 6 in-lb	<b>3 LEAD T0-3</b> 	1.65	1.140	0.140	0.093	1.187	0.430		WW-XX-D379-ZZZZ
#4-40 5 in-lb #6-32 6 in-lb	<b>4 LEAD T0-3</b> 	1.560	1.050	0.158	0.080	1.170		WW-XX-D380-ZZZZ WW-XX-D381-ZZZZ	
		1.563	1.050	0.156	0.063	1.187			
#4-40 5 in-lb #6-32 6 in-lb	<b>8 LEAD T0-3</b> 	1.650	1.187	0.156	0.60				WW-XX-D382-ZZZZ
#4-40 5 in-lb #6-32 6 in-lb	<b>10 LEAD T0-3</b> 	1.650	1.140	0.165	0.040				WW-XX-D383-ZZZZ

Recommended Screw Torque	Configuration	Dimensions (inches)							Ordering Number
		A	B	C	D	E	F	G	
#4-40 3 in-lb #6-32 4 in-lb	<b>TO-66</b> 	1.250	0.700	0.140	0.062				WW-XX-4353-ZZZZ WW-XX-5527-ZZZZ WW-XX-4997-ZZZZ WW-XX-D384-ZZZZ
		1.312	0.762	0.140	0.062				
		1.375	0.825	0.140	0.062				
		1.440	1.000	0.140	0.075				
#4-40 3 in-lb #6-32 4 in-lb	<b>3 LEAD TO-66</b> 	1.275	0.750	0.156	0.100	0.960			WW-XX-D385-ZZZZ
#4-40 3 in-lb #6-32 4 in-lb	<b>4 LEAD TO-66</b> 	1.312	0.762	0.140	0.062	0.960	0.200	0.100	WW-XX-D386-ZZZZ
#4-40 3 in-lb #6-32 4 in-lb	<b>9 LEAD TO-66</b> 	1.440	1.000	0.140	0.055	0.960	0.480	0.325	WW-XX-D387-ZZZZ
#4-40 3 in-lb #6-32 4 in-lb	<b>MULTI LEAD TO-66</b> 	1.35	0.800	0.140	0.400				WW-XX-D388-ZZZZ
#4-40 2 in-lb	<b>TO-220</b> 	0.437	0.312	0.140	0.093				WW-XX-D389-ZZZZ WW-XX-D390-ZZZZ WW-XX-D391-ZZZZ WW-XX-D392-ZZZZ WW-XX-5791-ZZZZ WW-XX-8302-ZZZZ WW-XX-D393-ZZZZ WW-XX-8531-ZZZZ WW-XX-6956-ZZZZ WW-XX-D394-ZZZZ WW-XX-D395-ZZZZ WW-XX-D396-ZZZZ WW-XX-D397-ZZZZ WW-XX-D398-ZZZZ WW-XX-D399-ZZZZ WW-XX-D400-ZZZZ WW-XX-D401-ZZZZ
		0.437	0.312	0.140	0.122				
		0.500	0.385	0.170	0.120				
		0.610	0.560	0.245	0.125				
		0.687	0.562	0.218	0.125				
		0.710	0.500	0.160	0.141				
		0.750	0.410	0.225	0.156				
		0.750	0.500	---	---				
		0.750	0.500	0.187	0.147				
		0.750	0.500	0.187	0.125				
		0.750	0.600	0.240	0.150				
		0.750	0.600	0.240	0.115				
		0.855	0.562	0.218	0.125				
		0.855	0.630	0.230	0.093				
		0.860	0.740	0.200	0.160				
		1.125	0.625	0.200	0.145				
		1.410	0.810	0.355	0.147				
#4-40 2 in-lb		0.910	0.500	0.200	0.125	0.580	0.046	0.265	WW-XX-D402-ZZZZ WW-XX-D403-ZZZZ
		0.983	0.750	0.432	0.156	0.665	0.101	0.217	

Recommended Screw Torque	Configuration	Dimensions (inches)						Ordering Number	
		A	B	C	D	E	F		G
#4-40 2 in-lb	<b>TYPE II TO-220</b> 	1.00	0.500	0.200	0.141	0.626			WW-XX-4969-ZZZZ
#10-32 2 in-lb #25-28 7 in-lb	DIODE WASHERS  DO-4   DO-5 	0.360 0.510 0.510 0.512 0.625	0.260 0.140 0.200 0.161 0.195						WW-XX-D404-ZZZZ WW-XX-D405-ZZZZ WW-XX-D406-ZZZZ WW-XX-D407-ZZZZ WW-XX-4659-ZZZZ  WW-XX-D408-ZZZZ WW-XX-D409-ZZZZ WW-XX-D410-ZZZZ WW-XX-D411-ZZZZ WW-XX-D412-ZZZZ WW-XX-D413-ZZZZ WW-XX-D414-ZZZZ WW-XX-4661-ZZZZ WW-XX-D415-ZZZZ WW-XX-D416-ZZZZ WW-XX-D417-ZZZZ WW-XX-D418-ZZZZ
	TO-36 	1.063	0.690	0.200					WW-XX-4306-ZZZZ
	TO-5 and TO-18 3 holes   4 holes 	0.250 0.360 0.390	0.100 0.200 0.200	0.036 0.040 0.040					WW-XX-D419-ZZZZ WW-XX-4374-ZZZZ WW-XX-D420-ZZZZ  WW-XX-D421-ZZZZ WW-XX-D422-ZZZZ WW-XX-D423-ZZZZ
#4-40 2 in-lb	RECTIFIER 	1.000 1.125 1.250	1.000 1.125 1.250	0.187 0.140 0.200					WW-XX-D424-ZZZZ WW-XX-D425-ZZZZ WW-XX-D426-ZZZZ
#4-40 2 in-lb	TIP PACKAGE 	0.865 0.865 0.984 0.984 1.260	0.650 0.650 0.787 0.787 0.787	0.650 0.650 --- 0.780 0.984	0.140 0.140 --- 0.142 0.142				WW-XX-5792-ZZZZ WW-XX-D427-ZZZZ WW-XX-D428-ZZZZ WW-XX-D429-ZZZZ WW-XX-D430-ZZZZ

(1 in-lb = 1.152 kg-cm)