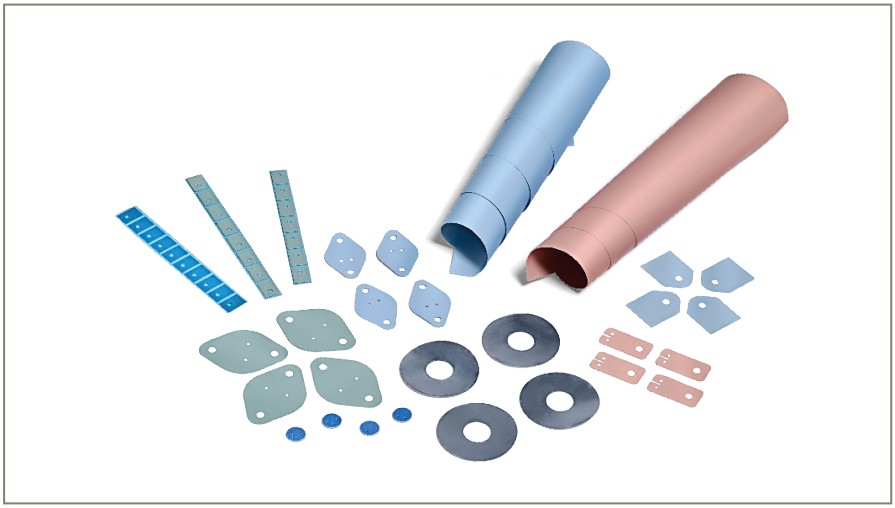
CHO-THERM®

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 acrylic adhesive (PSA) layer for attachment.



FEATURES / BENEFITS

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

COMMERCIAL GRADE

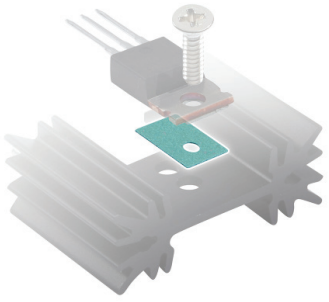
- Good thermal properties
- Good to excellent dielectric strength
- Available on continuous rolls for easy peel and stick application

HIGH POWER

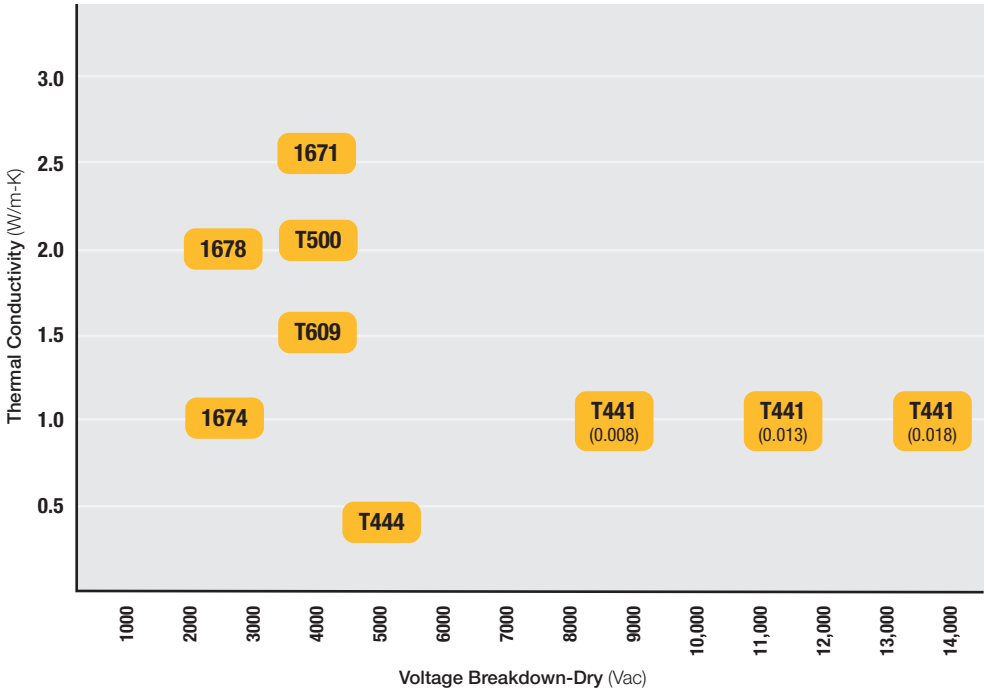
- Excellent thermal properties
- High dielectric strength
- 100% inspected for dielectric properties on every sheet
- Extremely low NASA outgassing
- Proven through decades of use in demanding military and aerospace applications

TYPICAL APPLICATIONS

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



PERFORMANCE GUIDE



CHO-THERM® Thermal Insulator Pads

	Typical Properties†	T444	1674	T441			T609	Test Method
Physical	Color	Beige	Blue	Pink			Lt. Green	Visual
	Material	Non-Silicone	Silicone	Silicone			Silicone	--
	Reinforcement Carrier	Filled Polyimide	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)	± 0.002 (0.050)	± 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)	--
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 E1296
	Coefficient of Thermal Expansion, ppm/°C	400	300	300	300	300	150	ASTM E831
Electrical	Voltage Breakdown Dry, Vac	5,000	2,500	8,700	11,400	13,800	4,000	ASTM D149
	Voltage Breakdown Wet, Vac	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)	Not Tested	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)

CHO-THERM® Thermal Insulator Pads

	Typical Properties†	1678	T500	1671	Test Method
Physical	Color	Pink	Green	White	Visual
	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)	--
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 E1296
	Coefficient of Thermal Expansion, ppm/K	250	250	250	ASTM E831
Electrical	Voltage Breakdown Dry, Vac	2,500	4,000	4,000	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	Chomerics
Mechanical	Tensile Strength, psi (Mpa)	3,000 (20.7)	3,000 (20.7)	3,000 (20.7)	Chomerics
	Tear Strength, lb/in (kN/m)	200 (35)	400 (70)	400 (70)	Chomerics
	Elongation, %	20	20	15	Chomerics
	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).

Ordering Information

CHO-THERM® Thermal Insulator Pads

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

Standard Die-Cut Parts

PART NUMBER: 60 — XX — YYYY — ZZZZ

Adhesive Code
11 = No PSA
12 = PSA one side

Die-Cut Parts
For standard die-cut parts, please see tables on pages 6 to 8.

Material Type
1674
T441
T444
T609

Roll Stock

PART NUMBER: 6W — XX — YYYY — ZZZZ

Format
4 = No Pressure Sensitive Adhesive (PSA)
6 = With Pressure Sensitive Adhesive (PSA)

Roll Length (ft)
10 = 100 ft
40 = 400 ft

Roll Width (in)
0075 = 0.75 in
0100 = 1.00 in
0150 = 1.50 in
0200 = 2.00 in
0800 = 8.00 in
1100 = 11.00 in
1150 = 11.50 in
1600 = 16.00 in*
2200 = 22.00 in**
2400 = 24.00 in†

Material Type
1674
T441
T444
T609

Ordering Information: Custom Configurations

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

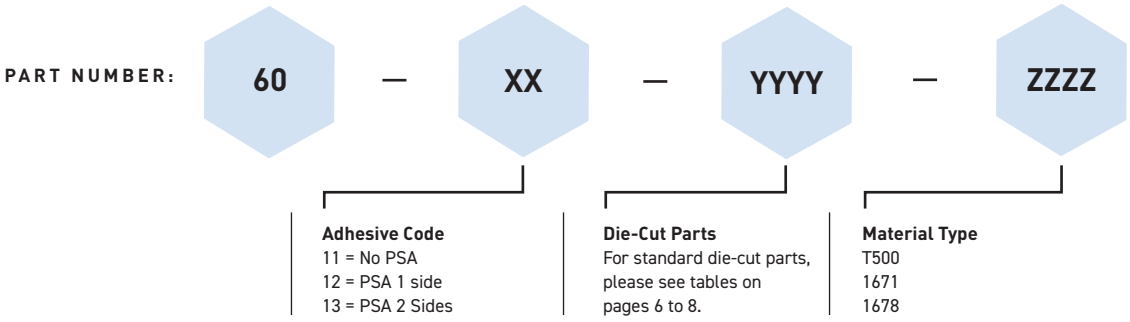
Available options include:
- Custom die-cut parts on sheets, or as individual parts

* Minimum width in 1674
** Minimum width in T441
† Minimum width in T444

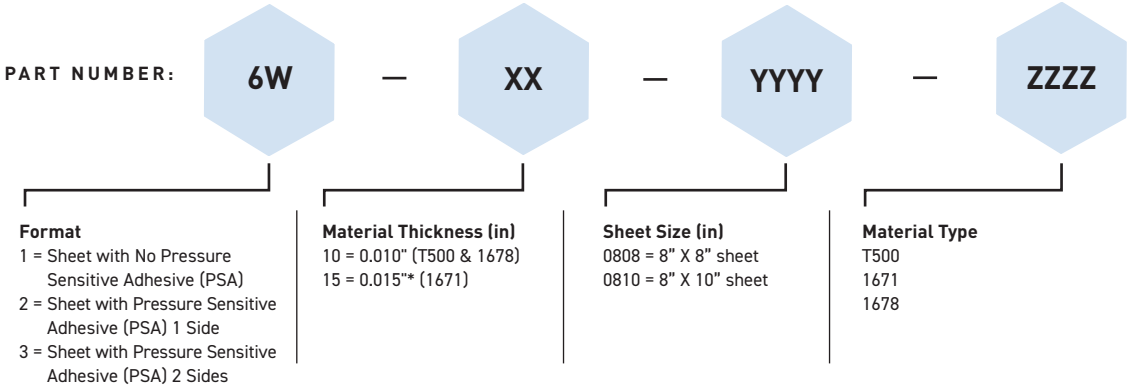
Ordering Information

CHO-THERM® Thermal Insulator Pads

Standard Die-Cut Parts



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



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

* 1671 is available in custom thicknesses up to 0.060" in increments of .005".

HANDLING INFORMATION

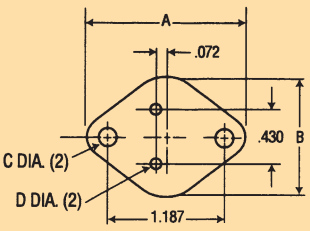
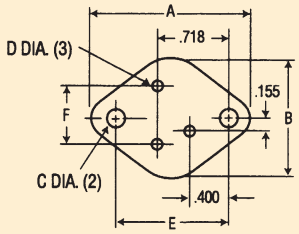
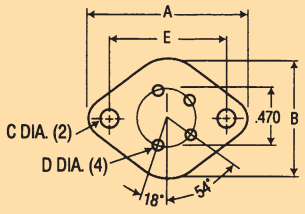
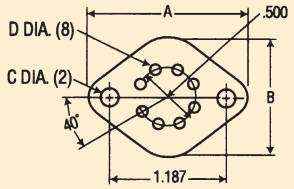
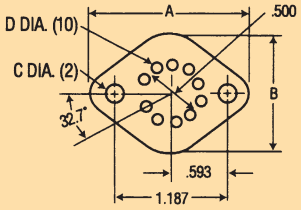
These products are defined by Parker Chomerics as "articles" according to the following generally recognized regulatory definition for articles:

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."

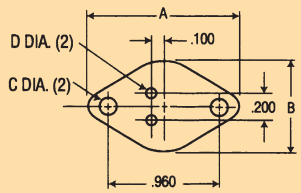
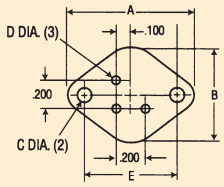
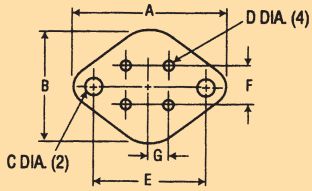
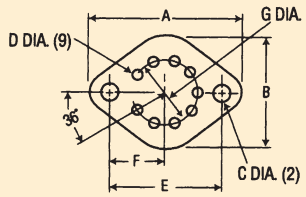
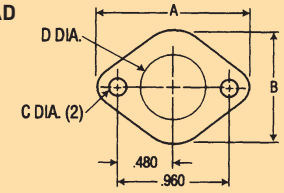
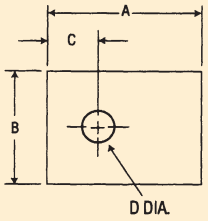
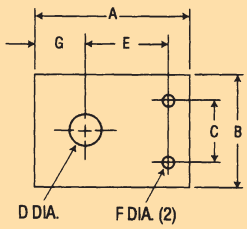
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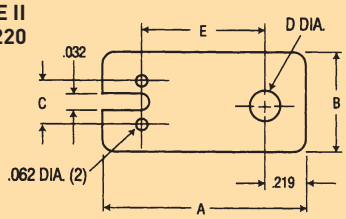
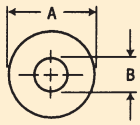
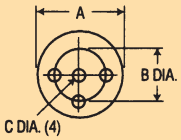
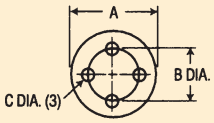
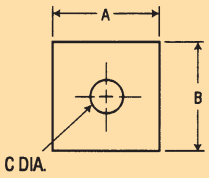
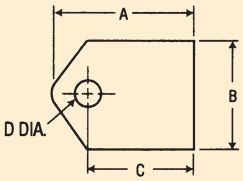
- There is no known or anticipated exposure to hazardous materials/substances during routine and anticipated use of the product.
- The product's shape, surface, and design is more relevant than its chemical composition.

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

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	**TO-3** 	1.563 1.563 1.593 1.650 1.650 1.650 1.650 1.650 1.650 1.700 1.730 1.780 1.780 1.780 2.07	1.050 1.050 1.100 1.065 1.140 1.140 1.140 1.140 1.140 1.187 1.250 1.250 1.250 1.250 1.56	0.140 0.140 0.156 0.140 0.122 0.140 0.165 0.140 0.165 0.156 0.156 0.140 0.165 0.140 0.122	0.080 0.140 0.070 0.046 0.062 0.093 0.062 0.046 - 0.062 0.062 0.093 0.094 0.046 0.062				60-XX-D065-ZZZZ 60-XX-4305-ZZZZ 60-XX-4511-ZZZZ 60-XX-D370-ZZZZ 60-XX-D371-ZZZZ 60-XX-6875-ZZZZ 60-XX-D372-ZZZZ 60-XX-D373-ZZZZ 60-XX-D374-ZZZZ 60-XX-4996-ZZZZ 60-XX-5442-ZZZZ 60-XX-D375-ZZZZ 60-XX-D376-ZZZZ 60-XX-D377-ZZZZ 60-XX-D378-ZZZZ
#4-40 5 in-lb #6-32 6 in-lb	**3 LEAD TO-3** 	1.65	1.140	0.140	0.093	1.187	0.430		60-XX-D379-ZZZZ
#4-40 5 in-lb #6-32 6 in-lb	**4 LEAD TO-3** 	1.560 1.563	1.050 1.050	0.158 0.156	0.080 0.063	1.170 1.187			60-XX-D380-ZZZZ 60-XX-D381-ZZZZ
#4-40 5 in-lb #6-32 6 in-lb	**8 LEAD TO-3** 	1.650	1.187	0.156	0.60				60-XX-D382-ZZZZ
#4-40 5 in-lb #6-32 6 in-lb	**10 LEAD TO-3** 	1.650	1.140	0.165	0.040				60-XX-D383-ZZZZ

1 in-lb = 1.152 kg-cm

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	**TO-66** 	1.250 1.312 1.375 1.440	0.700 0.762 0.825 1.000	0.140 0.140 0.140 0.140	0.062 0.062 0.062 0.075				60-XX-4353-ZZZZ 60-XX-5527-ZZZZ 60-XX-4997-ZZZZ 60-XX-D384-ZZZZ
#4-40 3 in-lb #6-32 4 in-lb	**3 LEAD TO-66** 	1.275	0.750	0.156	0.100	0.960			60-XX-D385-ZZZZ
#4-40 3 in-lb #6-32 4 in-lb	**4 LEAD TO-66** 	1.312	0.762	0.140	0.062	0.960	0.200	0.100	60-XX-D386-ZZZZ
#4-40 3 in-lb #6-32 4 in-lb	**9 LEAD TO-66** 	1.440	1.000	0.140	0.055	0.960	0.480	0.325	60-XX-D387-ZZZZ
#4-40 3 in-lb #6-32 4 in-lb	**MULTI LEAD TO-66** 	1.35	0.800	0.140	0.400				60-XX-D388-ZZZZ
#4-40 2 in-lb	**TO-220** 	0.437 0.437 0.500 0.610 0.687 0.710 0.750 0.750 0.750 0.750 0.750 0.750 0.855 0.855 0.860 1.125 1.410	0.312 0.312 0.385 0.560 0.562 0.500 0.410 0.500 0.500 0.500 0.600 0.600 0.562 0.630 0.740 0.625 0.810	0.140 0.140 0.170 0.245 0.218 0.160 0.225 --- 0.187 0.187 0.240 0.240 0.218 0.230 0.200 0.200 0.355	0.093 0.122 0.120 0.125 0.125 0.141 0.156 --- 0.147 0.125 0.150 0.115 0.125 0.093 0.160 0.145 0.147				60-XX-D389-ZZZZ 60-XX-D390-ZZZZ 60-XX-D391-ZZZZ 60-XX-D392-ZZZZ 60-XX-5791-ZZZZ 60-XX-8302-ZZZZ 60-XX-D393-ZZZZ 60-XX-8531-ZZZZ 60-XX-6956-ZZZZ 60-XX-D394-ZZZZ 60-XX-D395-ZZZZ 60-XX-D396-ZZZZ 60-XX-D397-ZZZZ 60-XX-D398-ZZZZ 60-XX-D399-ZZZZ 60-XX-D400-ZZZZ 60-XX-D401-ZZZZ
#4-40 2 in-lb		0.910 0.983	0.500 0.750	0.200 0.432	0.125 0.156	0.580 0.665	0.046 0.101	0.265 0.217	60-XX-D402-ZZZZ 60-XX-D403-ZZZZ

Recommended Screw Torque	Configuration	Dimensions (inches)							Ordering Number
		A	B	C	D	E	F	G	
#4-40 2 in-lb	**TYPE II TO-220** 	1.00	0.500	0.200	0.141	0.626			60-XX-4969-ZZZZ
#10-32 2 in-lb #25-28 7 in-lb	**DIODE WASHERS** **DO-4** 	0.360 0.510 0.510 0.512 0.625	0.260 0.140 0.200 0.161 0.195						60-XX-D404-ZZZZ 60-XX-D405-ZZZZ 60-XX-D406-ZZZZ 60-XX-D407-ZZZZ 60-XX-4659-ZZZZ
	DO-5	0.750 0.800 0.800 0.812 0.812 0.875 1.000 1.000 1.180 1.250 1.500 1.500	0.125 0.190 0.260 0.115 0.145 0.313 0.140 0.255 0.515 0.380 0.200 0.500						60-XX-D408-ZZZZ 60-XX-D409-ZZZZ 60-XX-D410-ZZZZ 60-XX-D411-ZZZZ 60-XX-D412-ZZZZ 60-XX-D413-ZZZZ 60-XX-D414-ZZZZ 60-XX-4661-ZZZZ 60-XX-D415-ZZZZ 60-XX-D416-ZZZZ 60-XX-D417-ZZZZ 60-XX-D418-ZZZZ
	TO-36 	1.063	0.690	0.200					60-XX-4306-ZZZZ
	TO-5 and TO-18 **3 holes** 	0.250 0360 0.390	0.100 0.200 0.200	0.036 0.040 0.040					60-XX-D419-ZZZZ 60-XX-4374-ZZZZ 60-XX-D420-ZZZZ
	4 holes	0.250 0.360 0.390	0.100 0.200 0.200	0.036 0.040 0.040					60-XX-D421-ZZZZ 60-XX-D422-ZZZZ 60-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					60-XX-D424-ZZZZ 60-XX-D425-ZZZZ 60-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				60-XX-5792-ZZZZ 60-XX-D427-ZZZZ 60-XX-D428-ZZZZ 60-XX-D429-ZZZZ 60-XX-D430-ZZZZ

1 in-lb = 1.152 kg-cm