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## Insulators

Aluminum Oxide [Ceramic RoHS Compliant](#)  
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### Aluminum Oxide Ceramic

Aluminum oxide insulating washers have a dielectric strength of approximately  $21.7 \times 10^3$  volts/mm for .76mm material (550 volts/mil for 0.030 inch material) and  $16.9 \times 10^3$  volts/mm for 1.57mm material (430 volts/mil for 0.062 inch material). The thermal conductivity of aluminum oxide is 15.06 W/mK at 75° (167° F) [8.71 BTU/hr-ft° F].

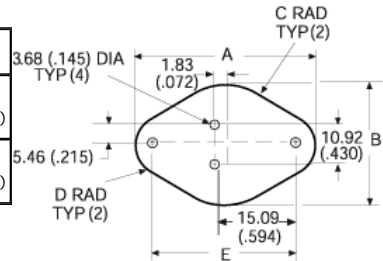
Aluminum oxide has unique thermal conductivity qualities and features low loss factors at high frequencies. It has high compressive strengths, high volume resistivity, low thermal expansion and it resists radiation.

Note: Hole diameters are +/- .13mm (.500"), angularity is +/- 1° and flatness is .05mm (.002") TIR unless otherwise specified.

#### For TO-3

Part Number	RoHS	PCN	A	B	C	D	E
4103G*	<a href="#">RoHS Compliant</a>	<a href="#">Product Change Notice</a>	39.70 (1.563)	26.67 (1.050)	13.34 (.525)	4.75 (.187)	30.40 (1.197)
4104*	<a href="#">RoHS Compliant</a>	N/A	44.45 (1.750)	31.75 (1.250)	15.88 (0.625)	7.16 (0.282)	30.15 (1.187)

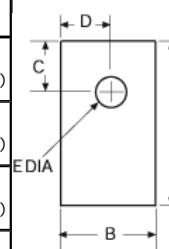
\*Thickness:  
 4103: 1.78 (0.070) to 2.03 (.080)  
 4104: 1.52 (0.060) to 2.03 (0.080)



#### For TO-220

Part Number	RoHS	PCN	A	B	C	D	E
4169G*	<a href="#">RoHS Compliant</a>	<a href="#">Product Change Notice</a>	19.30 (0.760)	13.97 (0.550)	4.78 (0.188)	6.98 (0.275)	3.68 (0.145)
4170G**	<a href="#">RoHS Compliant</a>	<a href="#">Product Change Notice</a>	19.30 (0.760)	13.97 (0.550)	4.78 (0.188)	6.98 (0.275)	3.68 (0.145)
4171G**	<a href="#">RoHS Compliant</a>	<a href="#">Product Change Notice</a>	16.51 (0.650)	12.70 (0.500)	4.32 (0.170)	6.35 (0.250)	3.81 (0.150)
4177G**	<a href="#">RoHS Compliant</a>	<a href="#">Product Change Notice</a>	17.45 (0.687)	14.27 (0.562)	5.54 (0.218)	7.14 (0.281)	3.18 (0.125)

\*Thickness 1.57mm +/- 0.08 (0.062" +/- 0.003"); surface flatness is 0.10mm (0.004") TIR  
 \*\*Thickness 1.78mm +/- 0.25 (0.070" +/- 0.010")



#### For TO-218, TO-247, and TO-3P

Part Number	RoHS	PCN	A	B	C	D	E
4180*	<a href="#">RoHS Compliant</a>	<a href="#">Product Change Notice</a>	23.24 (0.915)	18.80 (0.740)	6.98 (0.275)	9.40 (0.370)	3.96 (0.156)

\*Thickness: 2.03mm +/- .25 (.080" +/- .010")

## Insulating Covers

TO-3 Insulating Covers are designed to provide protection from accidental shock during field service or repair.

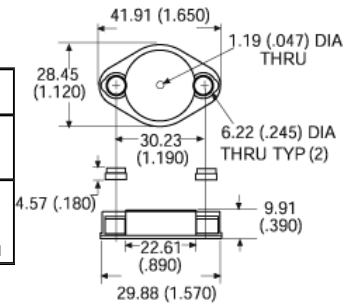
**8903 Screw Mounted Cover**

Pan head screws not provided - MS 51957-30 or equivalent recommended - secure the cover to the TO-3. At the typical mounting screw torque of .68 - .90 Nm (6-8 inch pounds), the TO-3 cover material cold-flows around the screw head to securely fasten the cover.

Included are No.6 split washers as inserts to provide electrical connection of mounting screws to the TO-3 collector and an insulating snap-in cover for the screw heads. A test probe hole is provided in the top of the cover.

The 8903VB is made from thermoplastic polyester that meets the requirements of UL Bulletin 94 V-0. In addition to its excellent flammability rating, thermoplastic polyester offers resistance to most chemical environments, heat deflection temperature to 215.6°C (420°F) and UL continuous use temperature of 130 °C (266 °F).

Part Number	RoHS	PCN	Material	Color	Flammability Standards
8903NWX	RoHS Compliant	 Product Change Notice	Nylon	White	Self-extinguishing UL 94 V-2
8903VBG	RoHS Compliant	 Product Change Notice	Thermoplastic Polyester	Black	Self-extinguishing UL 94 V-0 UL 492 Type 1



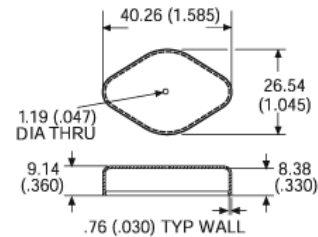
**8909 Snap on Cover**

Designed to prevent accidental electrical shock, the 8909 fits TO-3 case styles. A test probe hole in top eliminates the need to remove cover for testing. Recommended for low vibration applications. A precise friction fit is required for proper assembly. Please read the [engineering information release](#) for more details on the fit problems that can arise.

[engineering information release](#)

The 8903 cover shown above is recommended for most applications due to the typical size variation of the TO-3 package.

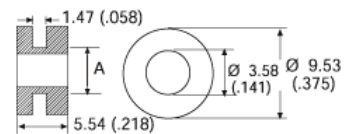
Part Number	RoHS	PCN	Material	Color	Flammability Standards
8909NBG	RoHS Compliant	 Product Change Notice	Nylon	Black	UL 94 V-2



**Bushings**

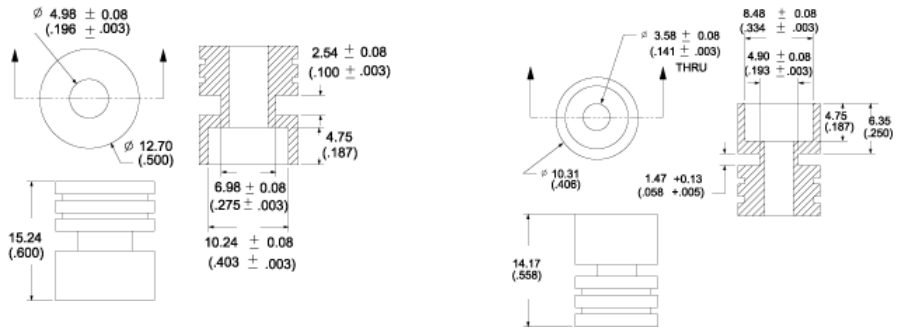
**Teflon-Filled Acetal Insulators**

Part Number	RoHS	PCN	FITS Notch	A Dim
103G	RoHS Compliant	 Product Change Notice	4.83 (0.190)	4.90 (0.193)
109G	RoHS Compliant	 Product Change Notice	6.35 (0.250)	6.35 (0.250)



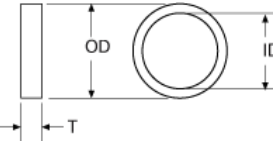
Part Number: 110500F00000

Part Number: 110700F00000



Teflon-Filled Acetal Bushings

Part Number	RoHS	PCN	I.D.	O.D.	T
110G	RoHS  Compliant	Product Change Notice	5.08 / 5.21 (0.198 / 0.205)	6.86 / 6.98 (0.268 / 0.275)	1.57 / 1.40 (0.062 / 0.055)
113G	RoHS  Compliant	Product Change Notice	6.48 / 6.60 (0.253 / 0.260)	7.87 / 8.00 (0.308 / 0.315)	1.57 / 1.40 (0.062 / 0.055)



Nylon Bushings - Material is Nylon type 6

Part Number	A	B	C
114*	4.50 / 4.63 (0.177 / 0.182)	3.56 / 3.81 (0.140 / 0.150)	1.40 / 1.66 (0.055 / 0.065)
116**	9.19 / 9.45 (0.362 / 0.372)	6.71 / 6.96 (0.264 / 0.274)	1.45 / 1.70 (0.057 / 0.067)

\*Formerly Motorola Part Number B51547F002  
 \*\*Formerly Motorola Part Number B51547F013

