

ZEBRA® Elastomeric Connectors

ZEBRA® CARBON and LOW TEMPERATURE CARBON CONNECTORS

FUJIPOLY ZEBRA® connectors (see figure 1) have alternating layers of conductive carbon-filled and non-conductive silicone rubber. They make reliable connections by being deflected between contacting surfaces. ZEBRA® connectors are used for connecting any LCD from small displays for watches to large area displays for instruments. Table A shows the different types of ZEBRA® connectors available. Table C shows performance characteristics.

Figure 1 shows the three dimensions of the ZEBRA® connector. When ordering, the three dimensions should be specified within the limits shown in table B.

For best overall performance, ZEBRA® connectors must be ordered and used with a ratio of H/W equal to or greater than 1.5.

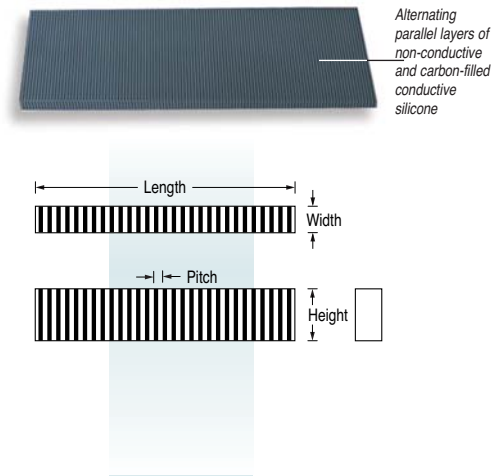


Figure 1

Series	LCD Contact Spacing Center-to-Center		Pitch: Sum of the Thickness of an Adjacent Conductive and Non-conductive Layer		Conductive Layers per inch	Individual Conductive and Insulating Layer Thickness		Available Lengths Maximum
	Minimum	Maximum	Nominal	Maximum		Minimum	Maximum	
1002 (CZ410/CZ710)	0.015 in. 0.38 mm	0.006 in. 0.15 mm	0.004 in. 0.10 mm	0.006 in. 0.15 mm	240	0.001 in. 0.025 mm	0.004 in. 0.10 mm	9.0 in. 230 mm
2004 (CZ418)	0.020 in. 0.50 mm	0.010 in. 0.25 mm	0.007 in. 0.18mm	0.010 in. 0.25 mm	140	0.002 in. 0.050 mm	0.006 in. 0.15 mm	9.0 in. 230 mm
2005 (CZ405/CZ705)	0.010 in. 0.25 mm	0.004 in. 0.10 mm	0.002 in. 0.050 mm	0.004 in. 0.10 mm	500	0.0004 in. 0.010 mm	0.0024 in. 0.060 mm	9.0 in. 230 mm
LT 200 (CZ610)	0.015 in. 0.38 mm	0.006 in. 0.15 mm	0.004 in. 0.10 mm	0.006 in. 0.15 mm	240	0.001 in. 0.025 mm	0.004 in. 0.10 mm	5.0 in. 127 mm

TABLE A

Measurement

Tolerance (inches/mm)

Length=L	0.157 in. to 2.40 in. — ± 0.008 in. /..... 2.410 in. to 6.00 in. — ± 0.015 in. /..... 6.010 in. to 7.87 in. — ± 0.020 in. /..... 7.880 in. to 9.00 in. — ± 0.039 in. /.....	4.00 mm to 61.00 mm — ± 0.20 mm 61.2 mm to 152.4 mm — ± 0.38 mm 152.6 mm to 200.0 mm — ± 0.50 mm 200.1 mm to 230.0 mm — ± 1.00 mm
Height=H	0.020 in. to 0.750 in. ± 0.005 in. /..... above 0.750 in./19.0 mm consult factory	0.50 mm to 19mm ± 0.127 mm
Width=W	0.015 in. to 0.039 in. — ± 0.002 in. /..... 0.040 in. to 0.079 in. — ± 0.003 in. /..... 0.080 in. to 0.118 in. — ± 0.005 in. /..... above 0.118 in./3.00 mm consult factory.	0.38 mm to 1.0 mm — ± 0.050 mm 1.01 mm to 2.0 mm — ± 0.076 mm 2.01 mm to 3.0 mm — ± 0.127 mm

TABLE B

ZEBRA® Connectors	Temperature Range		Current Carrying Capacity 0.040" x 0.040" pad	Resistance Between Layers
	Minimum	Maximum		
Carbon	-40°F -40°C	212°F 100°C	0.005 amps	10 ¹² ohms
Low Temperature LT 200	-85°F -65°C	260°F 125°C	0.005 amps	10 ¹² ohms

TABLE C

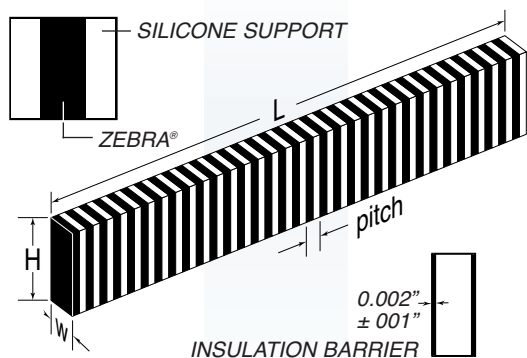


Figure 2 Recommended Height (H) should be 1.5 x Width (W) dimension for minimum force deflection. Maximum Skewness 2% of Height.

ZEBRA® CONNECTOR DIMENSIONS

Figure 2 shows the three dimensions of the ZEBRA® connector. When ordering, the three dimensions should be specified within the limits shown in Table B. For best overall performance, ZEBRA® connectors must be ordered and used with a ratio of H/W equal to or greater than 1.5. Details show silicone support (left) and insulation barrier (right). Each is available on one or both sides. Configurations may also include support on one side and insulation on the other.

ZEBRA® CONNECTOR INSULATING BARRIER

Description	Insulating Barrier
Color (one only)	White
Hardness, Durometer A	30
Dielectric Strength volts/mil.	500
Resistance, ohms	10 ¹²
Insulating Barrier Width (B) in.*	0.002 ± 0.001
(B) mm	0.050 ± 0.025

TABLE D *The tolerance of W_i is equal to the sum of the tolerances of W.

NOMINAL RESISTANCE CALCULATION

To calculate the resistance of the ZEBRA® connector use the following formulas:

Where: C_w = Contact pad width in inches
 H = ZEBRA® connector height in inches
 W = ZEBRA® connector width in inches

Metric:

$$R = \frac{60 \times H}{E_w \times W}$$

Inches:

$$R = \frac{2.37 \times H}{E_w \times W}$$

Where:

R = Resistance (Ω)
 E_w = Electrode Pad width (mm or inches)
 W = Connector width (mm or inches)
 H = Connector height (mm or inches)

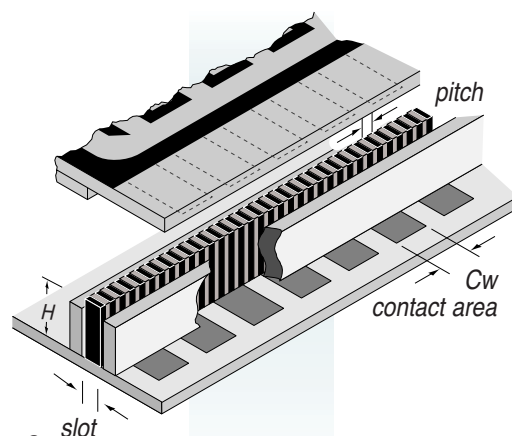


Figure 3

NOMINAL FORCE DEFLECTION - PLAIN ZEBRA® OR INSULATION BARRIER TYPE

ZEBRA® connectors should be deflected 5% to 25% of H. To calculate F-Force for deflection, use the following formula:

Where:

$$F = \text{Force (N)}$$

$$D = \frac{H - H_1}{H} \times 100 (\%)$$

H = Height of connector (mm or inches)
 H₁ = Deflected height of connector (mm or inches)
 W = Width of connector (mm or inches)
 W₁ = Width of ZEBRA portion (mm or inches)
 L = Length of connector (mm or inches)

Metric:

$$F(N) = 9 \times D \times W \times L \times 9.8 \times 10^3$$

Inches:

$$F(N) = 5806 \times D \times W \times L \times 9.8 \times 10^3$$

NOMINAL FORCE DEFLECTION - SILICONE SUPPORT TYPE

Metric:

$$F(N) = [(9 \times D \times W_1 \times L) + \{2.2 \times D \times (W - W_1) \times L\}] \times 9.8 \times 10^3$$

Inches:

$$F(N) = [(5806 \times D \times W_1 \times L) + \{1419 \times D \times (W - W_1) \times L\}] \times 9.8 \times 10^3$$