

# **FUJIPOLY<sup>®</sup>**

## **Carbon ZEBRA<sup>®</sup> Connector**

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**FUJIPOLY DATA SHEET NUMBER FPDS 2K-31 / Version 4**

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# FUJIPOLY<sup>®</sup> DATA SHEET FPDS 2K- 31 (Version 4)

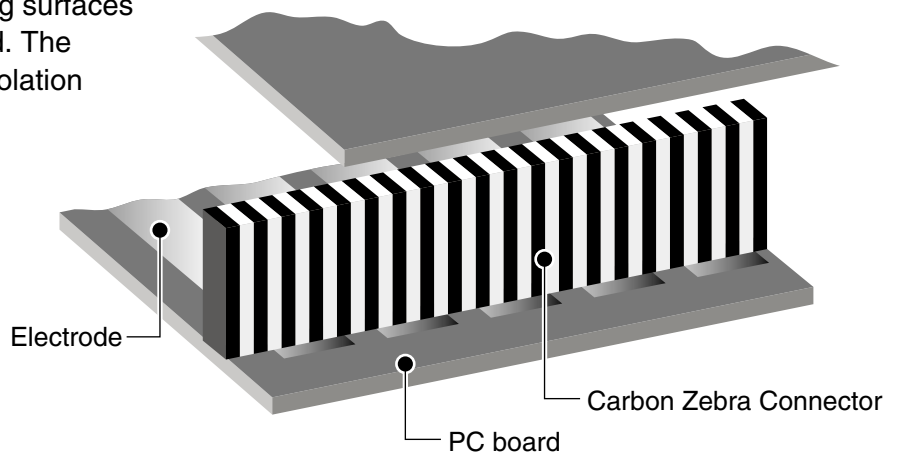
## 1] Product Name :

Carbon ZEBRA<sup>®</sup> Connector.

Low Temperature Carbon ZEBRA<sup>®</sup> Connector

## 2] Features :

Fujipoly Carbon Zebra Connectors and Low Temperature Carbon Zebra Connectors consist of alternating layers of conductive carbon filled and non-conductive silicone rubber. Contact density of the carbon Zebra Connector is greater than the contact pad density of either LCD (Liquid Crystal Display) or PCB (Printed Circuit Board). At least one conductive layer will connect when the two mating surfaces are aligned and compressed. The insulation layer will insure isolation from adjacent circuits.



### -1) SOLDERLESS CONNECTIONS

Pressure type contact eliminates lead straightening, hole drilling and soldering.

### -2) NONABRASIVE CONTACTS (ZERO INSERTION FORCE)

Contact to the LCD is made by deflecting the Carbon Zebra connector between the LCD and PC board. Carbon Zebra connectors are nonabrasive and will not damage indium oxide contact pads on the LCD. Repeated assembly and disassembly of package components will not affect performance.

### -3) ENVIRONMENTAL RELIABILITY

The LCD, when mounted with a Carbon Zebra rubber connector, creates a gas tight seal at the contact interface. Assures contact in chemically corrosive atmospheres while at the same time protecting the glass display from shock and vibration.

### -4) SMALL GLASS OVERHANG

With a Carbon Zebra connector, LCD terminal overhangs can be as narrow as 0.030"/0.80mm permitting more efficient use of glass size related to character height. (Metal pins normally require a 0.150"/3.8mm glass overhang, reducing character height by as much as 0.240"/6.1mm for a dual in-line LCD.)

### -5) HIGH DENSITY CONTACT

Carbon Zebra connectors are available in a variety of contact densities. The most dense allows contact pad spacing as close as 0.010"/0.25mm center-to-center. This spacing can be compared to 0.050"/1.3mm minimum for pins, allowing for increased capacity of LCD formats.

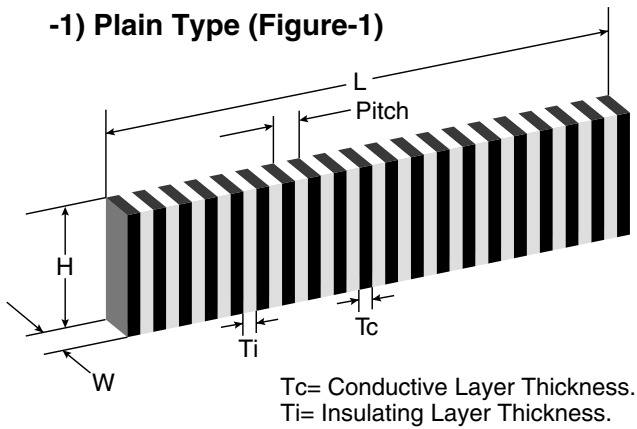
### -6) LABOR SAVING EASE OF ASSEMBLY

### 3] Variety of Carbon Zebra Connector.

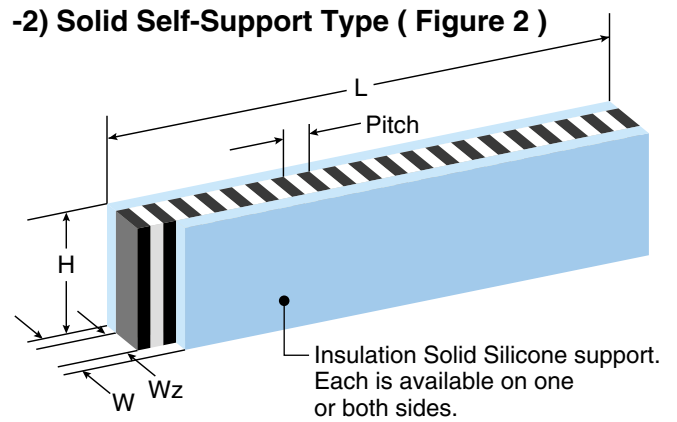
Table - 1

Type of Zebra	Series	LCD Contact Spacing Center-to-Center Minimum	Figure-1	Figure-2	Figure-3	Figure-4
			Plain - Type	Insulation Barrier - Type	Solid Self-Support - Type	Sponge Self-Support - Type
Carbon Connector (Standard)	1002	0.010"(0.25mm)	Available	Available	Available	Available
	2004	0.020"(0.50mm)	Available	Available	Available	Available
	2005	0.006"(0.15mm)	Available	Available	Available	Available
Low Temperature Cobon Connector	LT200	0.010"(0.25mm)	Available	Available	Available	Not Available

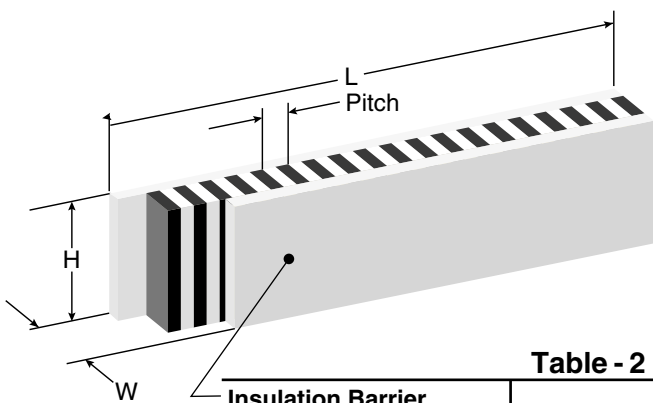
-1) Plain Type (Figure-1)



-2) Solid Self-Support Type ( Figure 2 )



-3) Insulation Barrier Type (Figure-3)



-4) Sponge Self-Support Type ( Figure 4 )

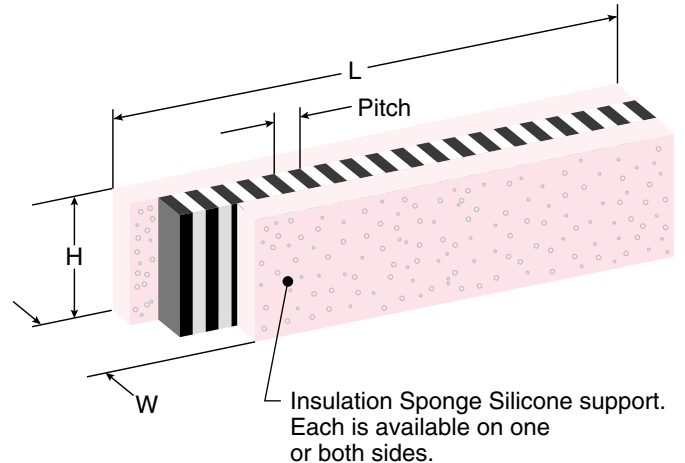


Table - 2

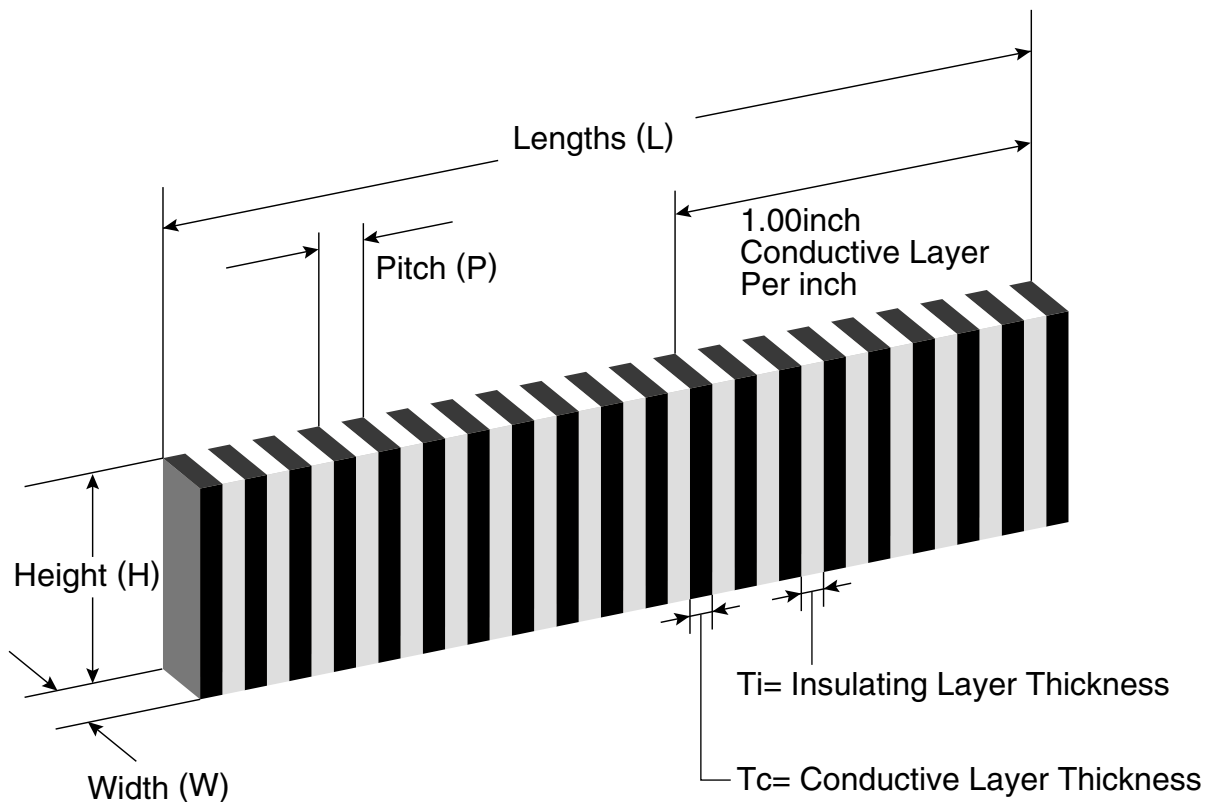
Insulation Barrier	
Color (one only)	White
Thickness	0.002" (0.05mm)
Dielectric Strength	500 volts/mil
Resistance (ohms)	10 <sup>12</sup>

#### 4] Series of Carbon Connector (Standard) and Low Temperature Carbon Connector

**Table - 3**

Series	LCD Contact Spacing Center-to-Center	LCD Sum of the Thickness of an Adjacent Conductive and non-Conductive Layer		Conductive Layer per inch	Individual Conductive and Insulating Layer Thickness		Available Lengths
	Minimum	Nominal	Maximum	Minimum	Minimum	Maximum	Maximum
1002	0.010" (0.25 mm)	0.004" (0.10 mm)	0.006" (0.15 mm)	240	0.001" (0.025 mm)	0.004" (0.10 mm)	9.0" (230 mm)
2004	0.020" (0.50 mm)	0.007" (0.18 mm)	0.010" (0.25 mm)	140	0.002" (0.050 mm)	0.006" (0.15 mm)	9.0" (230 mm)
2005	0.006" (0.15 mm)	0.002" (0.050 mm)	0.004" (0.10 mm)	500	0.0004" (0.010 mm)	0.0024" (0.060 mm)	9.0" (230 mm)
LT 200	0.010" (0.25 mm)	0.004" (0.10 mm)	0.006" (0.15 mm)	240	0.001" (0.025 mm)	0.004" (0.10 mm)	5.0" (127 mm)

**Figure - 5**



## 5] Maximum Available Size and Standard Widths.

**Table - 4**

	Series	Available Lengths	Standard Widths
<b>Plain Type</b>	1002 2004 2005	9.00" (230mm)	0.015"~0.118" (0.38mm~3.00mm) above 0.118" Consult factory
	LT200	5.00" (127mm)	
<b>Insulation Barrier Type</b>	1002 2004 2005	9.00" (230mm)	0.015"~0.118" (0.38mm~3.00mm) above 0.118" Consult factory
	LT200	5.00" (127mm)	
<b>Solid Self - Support Type</b>	1002 2004 2005	9.00" (230mm)	0.050" (1.27mm) 0.090" (2.30mm) 0.060" (1.50mm) 0.100" (2.50mm) 0.070" (1.80mm) 0.120" (3.00mm)
	LT200	5.00" (127mm)	0.080" (2.00mm) 0.140" (3.50mm)
<b>Sponge Self - Support Type</b>	1002 2004 2005	9.00" (230mm)	0.060" (1.50mm) 0.087" (2.00mm) 0.118" (3.00mm) 0.063" (1.60mm) 0.091" (2.30mm) 0.126" (3.20mm) 0.067" (1.70mm) 0.100" (2.50mm) 0.138" (3.50mm) 0.070" (1.80mm) 0.102" (2.60mm) 0.150" (3.80mm) 0.075" (1.90mm) 0.106" (2.70mm) 0.157" (4.00mm) 0.079" (2.00mm) 0.110" (2.80mm)

## 6] Tolerance Table.

### -1) Plain type connector / Insulation Barrier Connector.

Table - 5

Measurement	Mark	MM : Size and Tolerance	inch : Size and Tolerance
Length	L	4.00 ~ 61.00 ± 0.20	0.157" ~ 2.400" ± 0.008"
		61.20 ~ 152.40 ± 0.38	2.410" ~ 6.000" ± 0.015"
		152.60 ~ 200.00 ± 0.50	6.010" ~ 7.870" ± 0.020"
		200.10 ~ 230.00 ± 1.00	7.880" ~ 9.000" ± 0.039"
Height	H	0.05 ~ 19.00 ± 1.27 above 19.00 Consult factory	0.200" ~ 0.750" ± 0.005" above 0.750" Consult factory
Width	W	0.38 ~ 1.00 ± 0.05	0.015" ~ 0.390" ± 0.002"
		1.01 ~ 2.00 ± 0.076	0.040" ~ 0.790" ± 0.003"
		2.01 ~ 3.00 ± 0.127	0.080" ~ 0.118" ± 0.005"
		above 3.00 Consult factory	above 0.118" Consult factory

### -2) Solid Self-Support Connector.

Table - 6

Measurement	Mark	MM : Size and Tolerance	inch : Size and Tolerance
Length	L	4.00 ~ 61.00 ± 0.20	0.157" ~ 2.400" ± 0.008"
		61.20 ~ 152.40 ± 0.38	2.410" ~ 6.000" ± 0.015"
		152.60 ~ 200.00 ± 0.50	6.010" ~ 7.870" ± 0.020"
		200.10 ~ 230.00 ± 1.00	7.880" ~ 9.000" ± 0.039"
Height	H	0.05 ~ 19.00 ± 1.27 above 19.00 Consult factory	0.200" ~ 0.750" ± 0.005" above 0.750" Consult factory
Width	W	1.27 ~ 2.00 ± 0.15	0.050" ~ 0.079" ± 0.006"
		2.03 ~ 2.54 ± 0.18	0.080" ~ 0.100" ± 0.007"
		2.55 ~ 3.50 ± 0.20	0.101" ~ 0.140" ± 0.008"
		above 3.50 Consult factory	above 0.140" Consult factory

### -3) Sponge Self-Support Connector.

Table - 7

Measurement	Mark	MM : Size and Tolerance	inch : Size and Tolerance
Length	L	4.00 ~ 61.00 ± 0.20	0.157" ~ 2.400" ± 0.008"
		61.20 ~ 152.40 ± 0.38	2.410" ~ 6.000" ± 0.015"
		152.60 ~ 200.00 ± 0.50	6.010" ~ 7.870" ± 0.020"
Height	H	0.05 ~ 19.00 ± 1.27 above 19.00 Consult factory	0.200" ~ 0.750" ± 0.005" above 0.750" Consult factory
Width	W	1.52 ~ 4.00 ± 0.10 above 4.00 Consult factory	0.060" ~ 0.157" ± 0.004" above 0.157" Consult factory

## 7] Typical Product Properties.

**Table - 8**

<b>Operating Temperature Range</b>	(Standard) Carbon Connector Series : 1002 / 2004 / 2005	-50°F ~ +260°F (-55°C ~ +125°C)	
	Low Temperature Carbon Connector Series : LT200	-85°F ~ +260°F (-65°C ~ +125°C)	
<b>Current Carrying Capacity</b>	(Standard) Carbon Connector Series : 1002 / 2004 / 2005	50mA	0.035" x 0.035" Pad (0.90mm x 0.90mm)
	Low Temperature Carbon Connector Series : LT200	50mA	
<b>Resistance Between Layers</b>	(Standard) Carbon Connector Series : 1002 / 2004 / 2005	10 <sup>12</sup> ohms	
	Low Temperature Carbon Connector Series : LT200	10 <sup>12</sup> ohms	

## 8] Typical Material Properties.

**Table - 9**

Item	Conductive Layer	Insulating Layer	Support Rubber	Support Sponge
<b>material</b>	Carbon Filled Silicone Rubber	Non-conductive Silicone Rubber	Non-conductive Silicone Rubber	Non-conductive Silicone Sponge
<b>Color</b>	Black	Off-white	Light blue	Pink
<b>Hardness Shore A</b>	73	55	25	10
<b>Tensile Strength MPa</b>	5.9	6.9	4.9	2.9
<b>Elongation %</b>	100	250	250	100
<b>Tear Strength KN/m</b>	7	10	10	5
<b>Volume Resistivity MΩ·m</b>	5x10 <sup>-8</sup>	1x10 <sup>6</sup>	1x10 <sup>6</sup>	1x10 <sup>6</sup>

## 9] Calculation of Resistance and Force Deflection.

### -1) Resistance.

For the purpose of calculating the resistance of a Carbon Connector and testing them for compliance, please use the following formula.

**Table - 10**

Inches	Metric
$R = \frac{12 \times H}{Cw \times W} = \text{ohms}$	$R = \frac{30 \times h}{cw \times w}$ Where, cw, and w are in "cm"
Cw = Contact Pad width in inches	cw = Contact Pad width in cm
W = Connector Width (W) in inches	w = Connector Width (W) in cm
H = Connector Height (H) in inches	h = Connector Height (H) in cm

### -2) Force Deflection.

Connector should be deflected 5% to 25% of Height (H) To calculate Force for deflection, use following formula.

**Table - 11**

Inches	Metric
$F \text{ (Lbs)} = 9D \times W \times L$	$F \text{ (kgf)} = 0.63D \times W \times L$
$D = \frac{H - H_1}{H} \times 100\%$ (Deflection in percent)	
H = Height (H) of Connector in inches or cm	
H <sub>1</sub> = Deflected height of Connector in inches or cm	
L = Length (L) of Connector in inches or cm	
W = Width of Connector in inches or cm	

## 10] Others

Fujipoly website <http://www.fujipoly.com>

## 11] Trade Marks.



**ZEBRA**®

January.31th 2002	version 4
January.8th 2001	version 3
December.8th 2000	version 2
ISSUED : July.31th 2000	version 1

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