

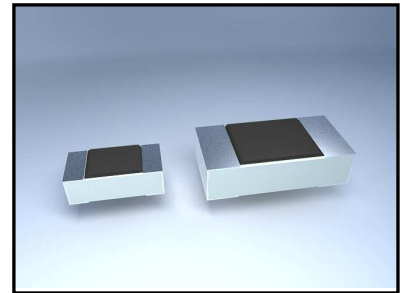
# ESD Protector : LCP Series

Ultra-Low Capacitance ESD Suppressor for High-Speed Application



## ■ Features

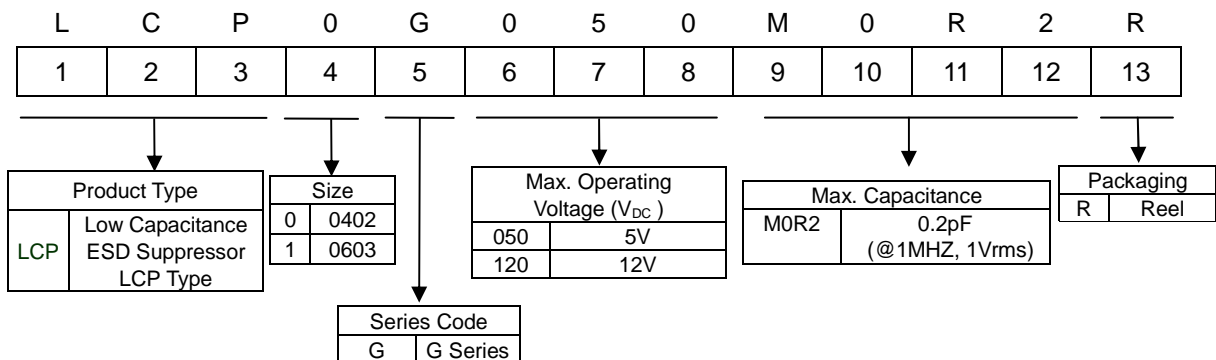
1. RoHS compliant and lead-free
2. EIA size 0402, 0603
3. Ultra-low capacitance (<math><0.2\text{pF}</math>) and low leakage current (<math><0.05\mu\text{A}</math>)
4. Fast response time (<math><1\text{ns}</math>)
5. Single-line, bi-directional device
6. Rate for ESD protection and pass IEC 61000-4-2 level 4 test



## ■ Recommended Applications

1. High-Speed Data Lines (HDMI, Serial ATA, USB, IEEE1394)
2. Antenna Circuit (Cellular phone, GPS...)
3. Digital Cameras
4. Set-Top Boxes
5. Printer Ports

## ■ Part Number Code

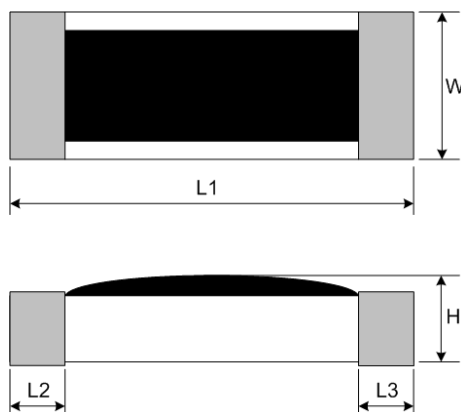


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## ■ Structure and Dimensions



(Unit : mm)

| Part No. | Size (EIA) | L1          | W           | H           | L2 and L3   |
|----------|------------|-------------|-------------|-------------|-------------|
| LCP0G    | 0402       | 1.00 ± 0.15 | 0.50 ± 0.10 | 0.35 ± 0.1  | 0.20 ± 0.10 |
| LCP1G    | 0603       | 1.60 ± 0.15 | 0.80 ± 0.15 | 0.50 ± 0.15 | 0.35 ± 0.15 |

## ■ Electrical Characteristics

| Part No.      | Size | Max. Operating Voltage | Typical Trigger Voltage | Max. Capacitance @1MHZ, 1Vrms | Clamping Voltage @8KV, 30ns (*1) |      | Max. Leakage Current @V <sub>DC</sub> | Min. ESD Pulse Withstand | Insulation Resistance | Operating Temperature Range |
|---------------|------|------------------------|-------------------------|-------------------------------|----------------------------------|------|---------------------------------------|--------------------------|-----------------------|-----------------------------|
|               |      | V <sub>DC</sub> (V)    | V <sub>T</sub> (V)      | C (pF)                        | V <sub>c</sub> (V)               |      | I <sub>L</sub> (μA)                   | Times                    | R(MΩ)                 | (°C)                        |
|               |      |                        |                         |                               | Typical                          | Max. |                                       |                          |                       |                             |
| LCP0G050M0R2R | 0402 | 5                      | 300                     | 0.2                           | 30                               | 100  | 0.05                                  | 1000                     | >100                  | -40 ~ +85                   |
| LCP1G050M0R2R | 0603 |                        |                         |                               |                                  |      |                                       |                          |                       |                             |
| LCP0G120M0R2  | 0402 | 12                     | 360                     |                               |                                  |      |                                       |                          |                       |                             |
| LCP1G120M0R2  | 0603 |                        |                         |                               |                                  |      |                                       |                          |                       |                             |

**Note \*1:** The clamping voltage follows IEC 61000-4-2, level4 8 kV contact discharge and shall be measured at 30 ns after initiation of pulse.

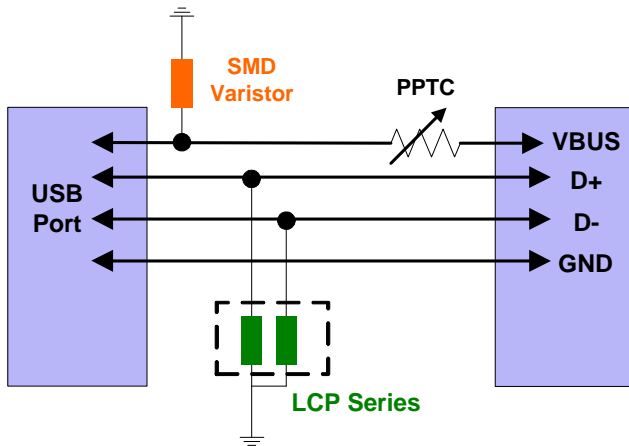
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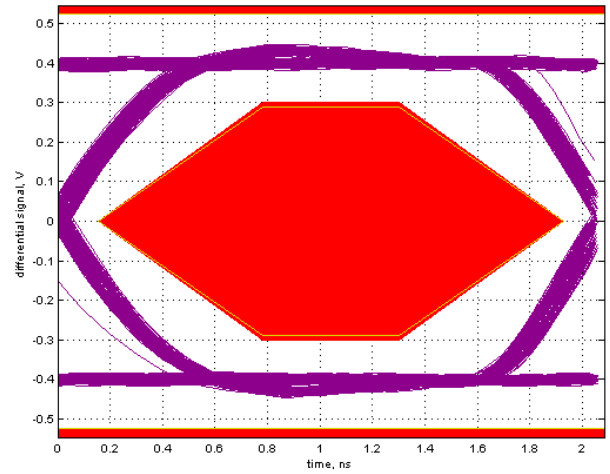
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## Typical Application Circuit

USB 2.0 Protection

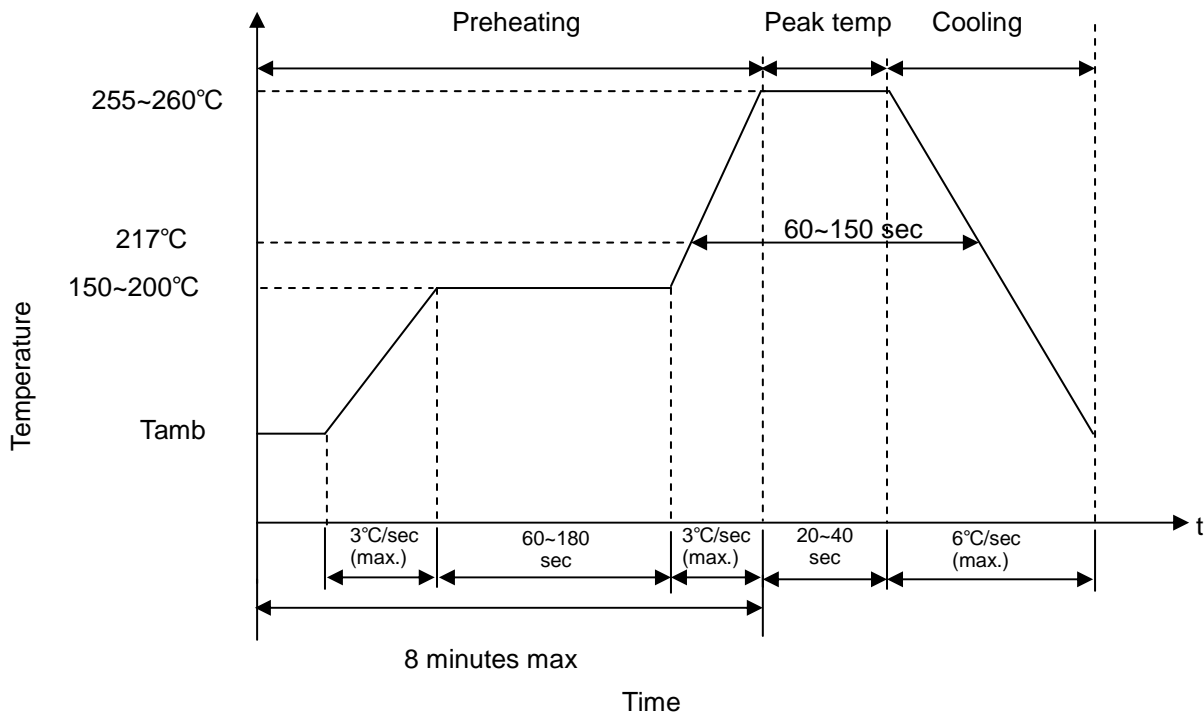


## Eye Diagram



## Soldering Recommendation

### IR-Reflow Soldering Profile



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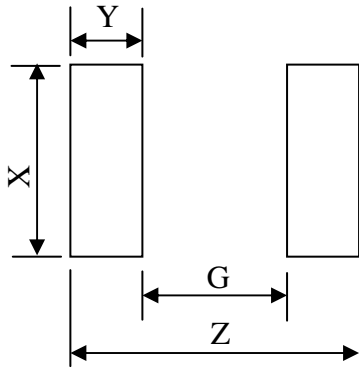
## Ultra-Low Capacitance ESD Suppressor for High-Speed Application

### ■ Recommended Reworking Conditions with Soldering Iron

| Item                              | Conditions     |
|-----------------------------------|----------------|
| Temperature of Soldering Iron-tip | 360°C ( max. ) |
| Soldering Time                    | 3 sec ( max. ) |
| Diameter of Soldering Iron-tip    | Φ3mm ( max. )  |

Caution: Do not touch the component surface with soldering iron directly to prevent it from damage.

### ■ Recommended Soldering Pad Dimensions

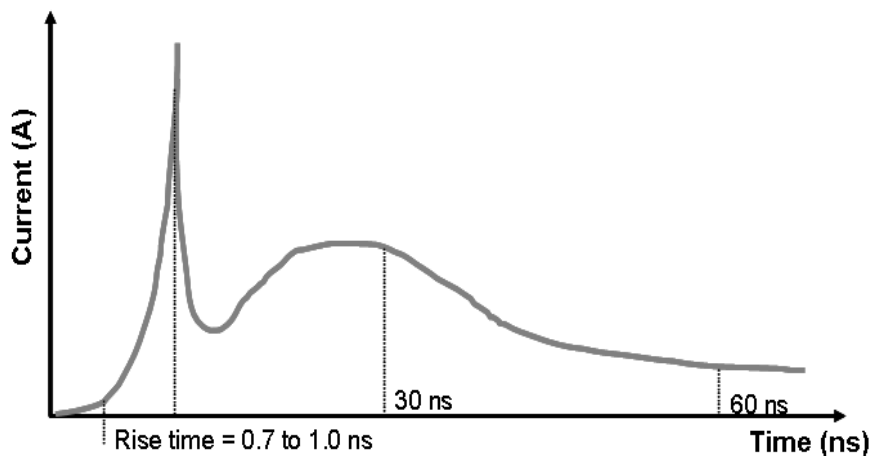


| Size (EIA) | Z (mm) | G (mm) | X (mm) | Y (mm) |
|------------|--------|--------|--------|--------|
| 0402       | 1.7    | 0.5    | 0.6    | 0.6    |
| 0603       | 3.0    | 1.0    | 1.0    | 1.0    |

### ■ Electrostatic Discharge-ESD Reliability

| Severity Level | Discharge Voltage | Initial Current | 30 ns Current | 60 ns Current |
|----------------|-------------------|-----------------|---------------|---------------|
| 1              | 2 kV              | 7.5 A           | 4A            | 2A            |
| 2              | 4 kV              | 15.0 A          | 8A            | 4A            |
| 3              | 6 kV              | 22.5 A          | 12A           | 6A            |
| 4              | 8 kV              | 30.0 A          | 16A           | 8A            |

\* Follow IEC61000-4-2



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## ■ Reliability

| Item                         | Standard         | Test conditions / Methods  | Specifications                                |                  |                  |   |             |            |   |                  |           |   |            |            |   |                  |           |   |
|------------------------------|------------------|--|---|------------------|------------------|---|-------------|------------|---|------------------|-----------|---|------------|------------|---|------------------|-----------|---|
| Resistance to Soldering Heat | IEC 60068-2-58   | $260 \pm 5$ °C, $10 \pm 1$ sec   | $I_L \leq 10\mu\text{A}$<br>No visible damage |                  |                  |   |             |            |   |                  |           |   |            |            |   |                  |           |   |
| High Temperature Load        | IEC 1051-1       | $85 \pm 2$ °C, $1000 \pm 24$ hrs at $V_{DC}$   | $I_L \leq 10\mu\text{A}$<br>No visible damage |                  |                  |   |             |            |   |                  |           |   |            |            |   |                  |           |   |
| Damp Heat Load, Steady State | IEC 1051-1       | $40 \pm 2$ °C, 90-95%RH, $1000 \pm 24$ hrs, at $V_{DC}$  | $I_L \leq 10\mu\text{A}$<br>No visible damage |                  |                  |   |             |            |   |                  |           |   |            |            |   |                  |           |   |
| Rapid Change of Temperature  | IEC 1051-1       | The conditions shown below shall be repeated 5 cycles<br><table border="1"><thead><tr><th>Step</th><th>Temperature (°C)</th><th>Period (minutes)</th></tr></thead><tbody><tr><td>1</td><td><math>-40 \pm 5</math></td><td><math>30 \pm 3</math></td></tr><tr><td>2</td><td>Room temperature</td><td><math>5 \pm 3</math></td></tr><tr><td>3</td><td><math>85 \pm 5</math></td><td><math>30 \pm 3</math></td></tr><tr><td>4</td><td>Room temperature</td><td><math>5 \pm 3</math></td></tr></tbody></table> | Step  | Temperature (°C) | Period (minutes) | 1 | $-40 \pm 5$ | $30 \pm 3$ | 2 | Room temperature | $5 \pm 3$ | 3 | $85 \pm 5$ | $30 \pm 3$ | 4 | Room temperature | $5 \pm 3$ | $I_L \leq 10\mu\text{A}$<br>No visible damage |
| Step                         | Temperature (°C) | Period (minutes)   |   |                  |                  |   |             |            |   |                  |           |   |            |            |   |                  |           |   |
| 1                            | $-40 \pm 5$      | $30 \pm 3$   |   |                  |                  |   |             |            |   |                  |           |   |            |            |   |                  |           |   |
| 2                            | Room temperature | $5 \pm 3$  |   |                  |                  |   |             |            |   |                  |           |   |            |            |   |                  |           |   |
| 3                            | $85 \pm 5$       | $30 \pm 3$   |   |                  |                  |   |             |            |   |                  |           |   |            |            |   |                  |           |   |
| 4                            | Room temperature | $5 \pm 3$  |   |                  |                  |   |             |            |   |                  |           |   |            |            |   |                  |           |   |

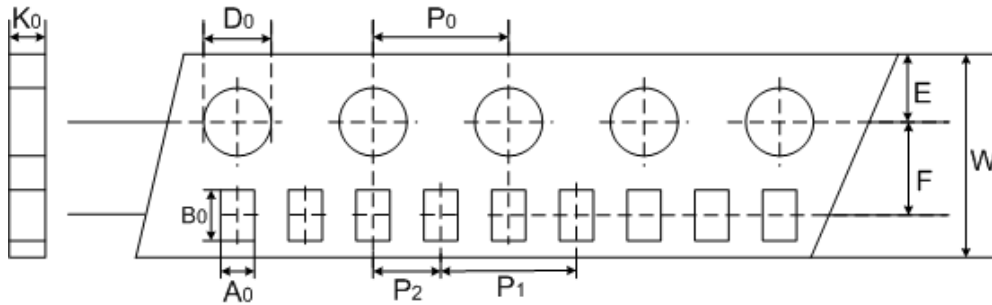
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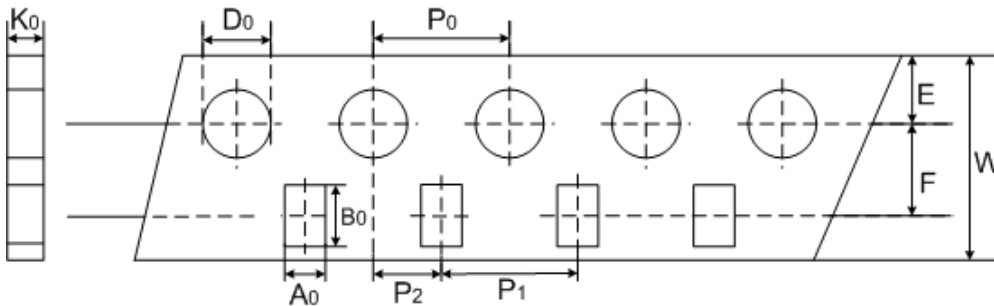
## ■ Packaging

### ● Taping Specification



(Unit : mm)

| Index | $A_0$     | $B_0$      | $W$       | $E$       | $F$        | $P_1$     | $P_2$      | $P_0$     | $D_0$     | $K_0$     |
|-------|-----------|------------|-----------|-----------|------------|-----------|------------|-----------|-----------|-----------|
| Type  | $\pm 0.1$ | $\pm 0.12$ | $\pm 0.2$ | $\pm 0.1$ | $\pm 0.05$ | $\pm 0.1$ | $\pm 0.05$ | $\pm 0.1$ | $\pm 0.1$ | $\pm 0.1$ |
| 0402  | 0.68      | 1.13       | 8         | 1.75      | 3.5        | 4         | 2          | 4         | 1.55      | 0.40      |



(Unit : mm)

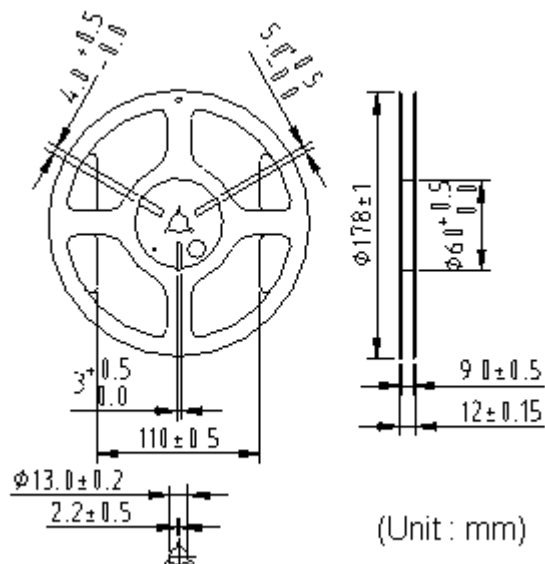
| Index | $A_0$     | $B_0$     | $W$       | $E$       | $F$        | $P_1$     | $P_2$      | $P_0$     | $D_0$     | $K_0$     |
|-------|-----------|-----------|-----------|-----------|------------|-----------|------------|-----------|-----------|-----------|
| Type  | $\pm 0.2$ | $\pm 0.2$ | $\pm 0.2$ | $\pm 0.1$ | $\pm 0.05$ | $\pm 0.1$ | $\pm 0.05$ | $\pm 0.1$ | $\pm 0.1$ | $\pm 0.1$ |
| 0603  | 1.1       | 1.9       | 8         | 1.75      | 3.5        | 4         | 2          | 4         | 1.55      | 0.59      |

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## ■ Quantity



## ● Reel Packing

| Type | Quantity (pcs/reel) |
|------|---------------------|
| 0402 | 10,000              |
| 0603 | 4,000               |

## ■ Storage Conditions of Products

### ● Storage Conditions :

1. Storage Temperature :  $-10^{\circ}\text{C}\sim+40^{\circ}\text{C}$
2. Relative Humidity :  $\leq 75\% \text{RH}$
3. Keep away from corrosive atmosphere and sunlight.

### ● Period of Storage: 1 year.