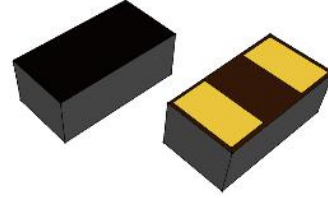


## 1. Features

- Ultra-Low capacitance:0.05pF(typ.)
- Low leakage current(<10nA)
- Fast response time(<1ns)
- Bi-directional, single line protection
- IEC 61000-4-2 (ESD Air): 15kV
- IEC 61000-4-2 (ESD Contact): 8kV

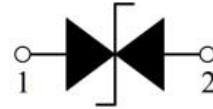
## 2. Pin Description



## 3. Applications

- USB 3.0/3.1
- HDMI 1.3/1.4/2.0
- RF Antenna
- SATA and eSATA Interface

## 4. Schematic Diagram



## 5. Order Information

| Type        | Package | Size (mm)      | Delivery Form | Delivery Quantity |
|-------------|---------|----------------|---------------|-------------------|
| SCP0402MS24 | 0402    | 1.00x0.52x0.38 | 7" T&R        | 10,000            |

## 6. Limiting Values( $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

| Symbol    | Parameter                       | Conditions                       | Min | Max | Unit               |
|-----------|---------------------------------|----------------------------------|-----|-----|--------------------|
| $V_{ESD}$ | Electrostatic Discharge Voltage | IEC 61000-4-2; Contact Discharge | -   | 8   | kV                 |
|           |                                 | IEC 61000-4-2; Air Discharge     | -   | 15  | kV                 |
| $T_A$     | Operating Temperature Range     | -                                | -55 | 125 | $^{\circ}\text{C}$ |
| $T_{stg}$ | Storage Temperature Range       | -                                | -40 | 85  | $^{\circ}\text{C}$ |

## 7. Electrical Characteristics( $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

| Symbol   | Parameter                    | Conditions                           | Min | Typ. | Max  | Unit |
|----------|------------------------------|--------------------------------------|-----|------|------|------|
| $V_{DC}$ | Continuous Operating Voltage | -                                    | -   | -    | 24.0 | V    |
| $V_T$    | Trigger Voltage              | IEC61000-4-2 8kV contact discharge   | -   | 450  | -    | V    |
| $V_C$    | Clamping Voltage             | IEC61000-4-2 24kV contact discharge  | -   | 40   | -    | V    |
| $I_L$    | Leakage Current              | DC 24V shall be applied on component | -   | -    | 10   | nA   |
| $C_J$    | Capacitance                  | Measured at 10MHz                    | -   | 0.05 | -    | pF   |

## 8. Typical Characteristics

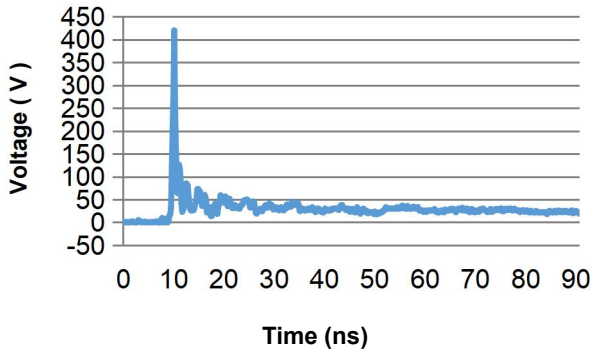


Fig.1 Typical ESD Response  
(IEC 61000-4-2, 8kV contact discharge)

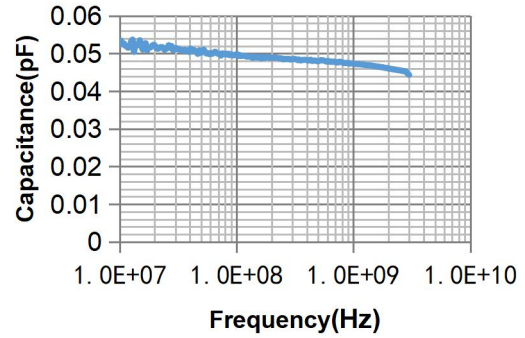


Fig.2 Typical Device Capacitance VS. Frequency

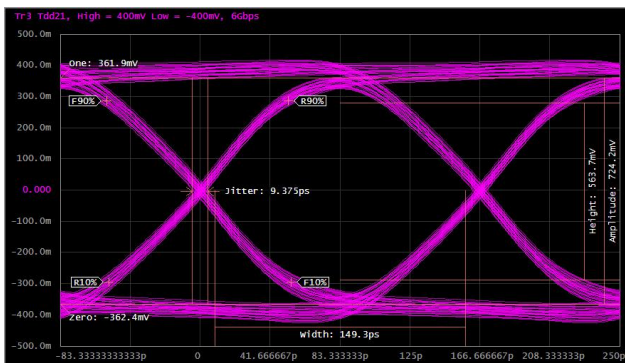
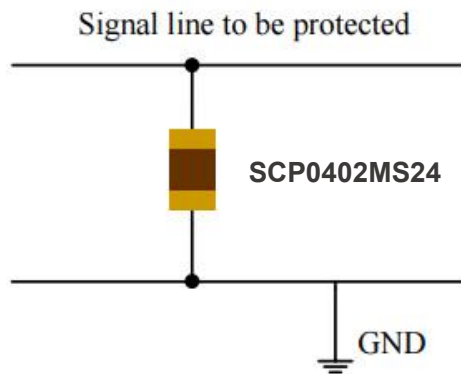
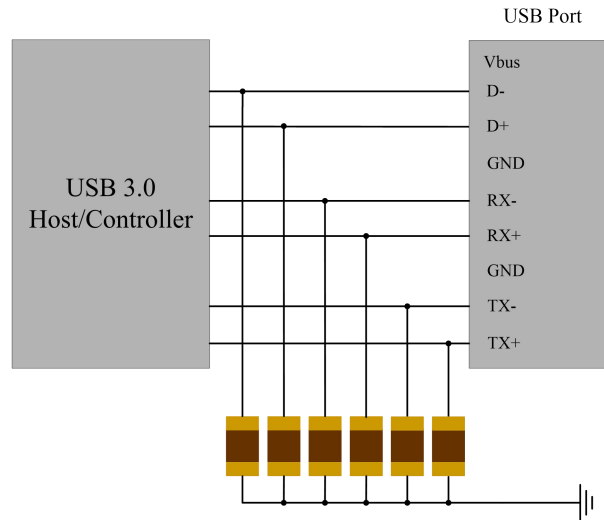


Fig.3 HDMI 2.0 Mask at 6.0 Gbps

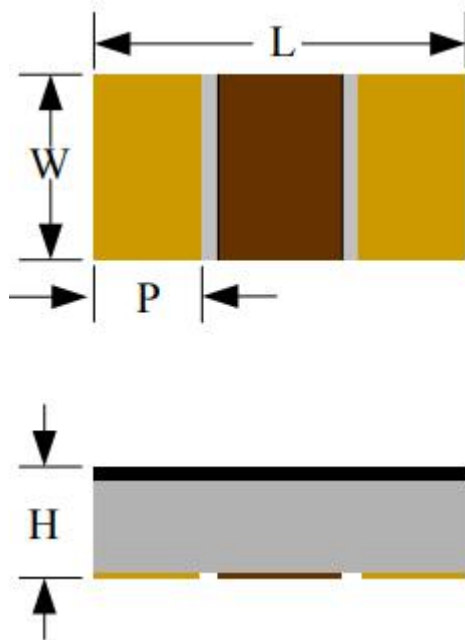
## 9. ESD Protection for Signal Line

The SCP is designed for the protection of one bidirectional data line from ESD damage.

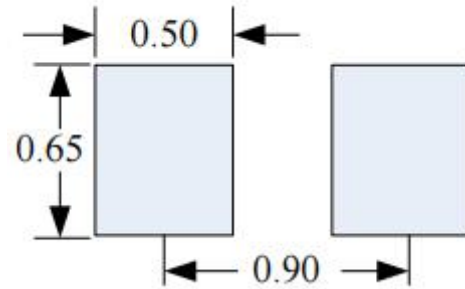
- Place the SCP as close to the input terminal or connector as possible.
- Minimize the path length between the SCP and the protected signal line.
- Use ground planes whenever possible.



## 10. Package Dimension



### Recommended Solder Pad Footprint



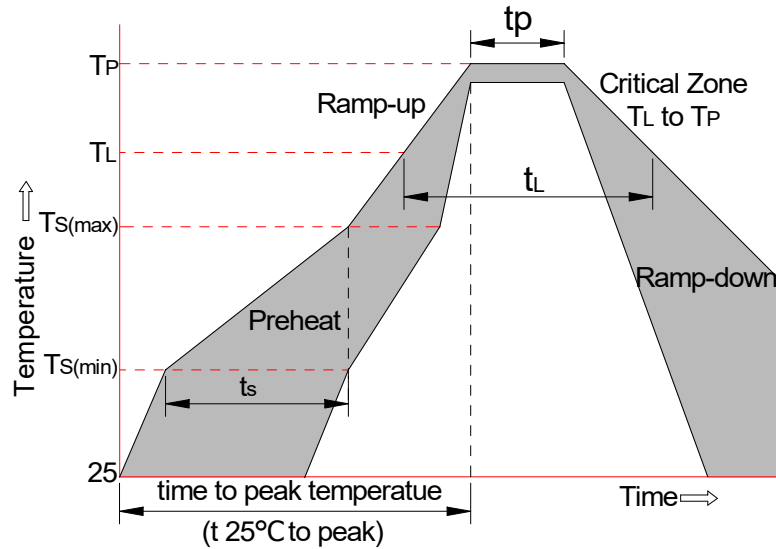
**\*Sizes in mm**

Notes:

This solder pad layout is for reference purposes only.

| Dimension | Unit: Millimeters |      |
|-----------|-------------------|------|
|           | Min.              | Max. |
| L         | 0.90              | 1.10 |
| W         | 0.42              | 0.62 |
| P         | 0.15              | 0.35 |
| H         | 0.25              | 0.45 |

## 11. Soldering Parameters



| Reflow Condition  |                                   | Pb-Free Assembly |
|---|-----------------------------------|------------------|
| Pre-heat  | -Temperature Min ( $T_{s(min)}$ ) | +150°C           |
|   | -Temperature Max( $T_{s(max)}$ )  | +200°C           |
|   | -Time (Min to Max) ( $t_s$ )      | 60-180 secs.     |
| Average ramp up rate (Liquid us Temp ( $T_L$ ) to peak) |                                   | 3°C/sec. Max     |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                    |                                   | 3°C/sec. Max     |
| Reflow  | -Temperature( $T_L$ )(Liquid us)  | +217°C           |
|   | -Temperature( $t_L$ )             | 60-150 secs.     |
| Peak Temp ( $T_p$ )                                     |                                   | +260(+0/-5)°C    |
| Time within 5°C of actual Peak Temp ( $t_p$ )           |                                   | 30 secs. Max     |
| Ramp-down Rate  |                                   | 6°C/sec. Max     |
| xTime 25°C to Peak Temp ( $T_p$ )                       |                                   | 8 min. Max       |
| Do not exceed   |                                   | +260°C           |

## 12. Contact Information

Buy our products or get free samples, for further information and requests,

e-mail us at: [evan@howetim.com](mailto:evan@howetim.com)

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## 14. Reversion History

| Document ID | Release Date | Sheet Status       | Change Notice | Supersedes |
|-------------|--------------|--------------------|---------------|------------|
| 0.1         | 08-Mar-2018  | Product data sheet | -             | -          |