**Description**

The SRV05-4HTG-D integrates low capacitance rail-to-rail diodes with an additional zener diode to protect each I/O pin against ESD and high surge events. This robust device can safely absorb 10A surge current per IEC 61000-4-5 (t_p=8/20μs) without performance degradation and a minimum ±30kV ESD per IEC 61000-4-2. Their very low loading capacitance also makes them ideal for protecting high speed signal pins.

**Features**

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC61000-4-4, 40A (5/50ns)
- Lightning, 10A (8/20μs as defined in IEC 61000-4-5 2nd Edition)
- Low capacitance of 1pF (TYP) per I/O
- Low leakage current of 0.5μA (MAX) at 5V
- Small SOT23-6 (JEDEC MO-178) packaging
- Halogen free, lead free and RoHS compliant
- Moisture Sensitivity Level (MSL -1)

**Applications**

- LCD/PDP TVs
- Monitors
- Notebooks
- 10/100/1000 Ethernet
- Firewire
- Set Top Boxes
- Flat Panel Displays
- Portable Medical

**Application Examples**

**USB Dual Port Protection**

**10/100/1000 Ethernet Protection**

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**Life Support Note:**

*Not Intended for Use in Life Support or Life Saving Applications*

The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.
TVS Diode Array (SPA® Diodes)
Low Capacitance ESD Protection - SRV05-4HTG-D

Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_{pp}$</td>
<td>Peak Current ($t_p=8/20μs$)</td>
<td>10</td>
<td>A</td>
</tr>
<tr>
<td>$P_{pp}$</td>
<td>Peak Pulse Power ($t_p=8/20μs$)</td>
<td>150</td>
<td>W</td>
</tr>
<tr>
<td>$T_{OP}$</td>
<td>Operating Temperature</td>
<td>-40 to 125</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{STOR}$</td>
<td>Storage Temperature</td>
<td>-55 to 150</td>
<td>°C</td>
</tr>
</tbody>
</table>

CAUTION: Stresses above those listed in “Absolute Maximum Ratings” may cause permanent damage to the component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Electrical Characteristics ($T_{OP}=25$ °C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse Standoff Voltage</td>
<td>$V_{BM}$</td>
<td>$I_i = 1μA$, I/O to GND</td>
<td>6</td>
<td>8.5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Breakdown Voltage</td>
<td>$V_{BR}$</td>
<td>$I_i = 1mA$, I/O to GND</td>
<td>1.1</td>
<td>1.4</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Reverse Leakage Current</td>
<td>$I_{LEAK}$</td>
<td>$V_i=5V$, I/O to GND</td>
<td>0.1</td>
<td>0.5</td>
<td>μA</td>
<td></td>
</tr>
<tr>
<td>Clamp Voltage$^1$</td>
<td>$V_C$</td>
<td>$I_{op}=6A$, $t_p=8/20μs$, I/O to GND</td>
<td>11.7</td>
<td>13</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{op}=8A$, $t_p=8/20μs$, I/O to GND</td>
<td>12.5</td>
<td>14</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{op}=10A$, $t_p=8/20μs$, I/O to GND</td>
<td>13.2</td>
<td>15</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Dynamic Resistance$^2$</td>
<td>$R_{DYN}$</td>
<td>TLP $t_1=100ns$, I/O to GND</td>
<td>0.28</td>
<td></td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td>ESD Withstand Voltage$^3$</td>
<td>$V_{ESD}$</td>
<td>IEC 61000-4-2 (Contact Discharge)</td>
<td>±30</td>
<td></td>
<td>kV</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>IEC 61000-4-2 (Air Discharge)</td>
<td>±30</td>
<td></td>
<td>kV</td>
<td></td>
</tr>
<tr>
<td>Diode Capacitance$^1$</td>
<td>$C_{IO-GND}$</td>
<td>Reverse Bias=0V, f=1MHz, I/O to GND</td>
<td>1</td>
<td>3</td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$C_{IO-I/O}$</td>
<td>Reverse Bias=0V, f=1MHz, I/O to I/O</td>
<td>0.5</td>
<td></td>
<td>pF</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Parameter is guaranteed by design and/or component characterization.
2. Transmission Line Pulse (TLP) test setting : Std.TDR(50Ω), $t_r=0.2ns$ / TLP and VTLP averaging window: start $t_1=70ns$ to end $t_2=80ns$

8/20μs Pulse Waveform

Capacitance vs. Reverse Bias
TVS Diode Array
(SPA® Diodes)
Low Capacitance ESD Protection - SRV05-4HTG-D

Positive Transmission Line Pulsing (TLP) Plot

Negative Transmission Line Pulsing (TLP) Plot

Clamping Voltage vs. Peak Pulse Current

IEC 61000-4-2 +8 kV Contact ESD Clamping Voltage

IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage

Specifications are subject to change without notice.
Revised: 09/13/19
**TVS Diode Array (SPA® Diodes)**

Low Capacitance ESD Protection - SRV05-4HTG-D

### Soldering Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflow Condition</td>
<td>Pb – Free assembly</td>
</tr>
<tr>
<td>Pre Heat</td>
<td>- Temperature Min ($T_{min}$) 150°C</td>
</tr>
<tr>
<td></td>
<td>- Temperature Max ($T_{max}$) 200°C</td>
</tr>
<tr>
<td></td>
<td>- Time (min to max) ($t_p$) 60 – 180 secs</td>
</tr>
<tr>
<td>Average ramp up rate (Liquidus) Temp ($T_p$) to peak</td>
<td>3°C/second max</td>
</tr>
<tr>
<td>$T_{min}$ to $T_p$ - Ramp-up Rate</td>
<td>3°C/second max</td>
</tr>
<tr>
<td>Reflow</td>
<td>- Temperature ($T_r$) (Liquidus) 217°C</td>
</tr>
<tr>
<td></td>
<td>- Temperature ($t_r$) 60 – 150 seconds</td>
</tr>
<tr>
<td>Peak Temperature ($T_{p}$)</td>
<td>260–365°C</td>
</tr>
<tr>
<td>Time within 5°C of actual peak Temperature ($t_p$)</td>
<td>20 – 40 seconds</td>
</tr>
<tr>
<td>Ramp-down Rate</td>
<td>6°C/second max</td>
</tr>
<tr>
<td>Time 25°C to peak Temperature ($T_p$)</td>
<td>8 minutes Max.</td>
</tr>
<tr>
<td>Do not exceed</td>
<td>260°C</td>
</tr>
</tbody>
</table>

### Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
<th>Min. Order Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRV05-4HTG-D</td>
<td>SOT23-6</td>
<td>3000</td>
</tr>
</tbody>
</table>

### Product Characteristics

- **Lead Plating**: Matte TIn
- **Lead Material**: Copper Alloy
- **Lead Conpactarity**: 0.004 inches (0.102 mm)
- **Substrate Material**: Silicon
- **Body Material**: Molded Compound
- **Flammability**: UL Recognized compound meeting flammability rating V-0

### Part Marking System

![Part Marking Diagram]

**SRV05**

**Series**

**-4 HTG -D**

**G= Green**

**T= Tape & Reel**

**Package**

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Specifications are subject to change without notice.

Revised: 09/13/19
**Package Dimensions - SOT23-6**

**Symbol** | **Dimensions**
--- | ---
A | Min: - | Nom: - | Max: 1.45
A1 | Min: 0.00 | Nom: 0.15 | Max: 0.006
A2 | Min: 0.30 | Nom: 0.50 | Max: 0.020
\( b \) | Min: 0.30 | Nom: 0.40 | Max: 0.018
\( b_1 \) | Min: 0.30 | Nom: 0.40 | Max: 0.018
\( c \) | Min: 0.08 | Nom: 0.22 | Max: 0.009
\( c_1 \) | Min: 0.08 | Nom: 0.13 | Max: 0.008
D | Min: 2.70 | Nom: 2.90 | Max: 0.120
E | Min: 2.60 | Nom: 2.80 | Max: 0.118
E1 | Min: 1.45 | Nom: 1.60 | Max: 0.069
\( e \) | Min: 0.95 | Nom: 0.037
\( e_1 \) | Min: 1.90 | Nom: 0.075
L | Min: 0.30 | Nom: 0.50 | Max: 0.024
L1 | Min: 0.60 | Nom: 0.024
L2 | Min: 0.25 | Nom: 0.010
\( \theta \) | Min: 0° | Nom: 4° | Max: 8°

**Recommended soldering pad layout (unit: mm)**

**Embossed Carrier Tape & Reel Specification — SOT23-6**

**8mm TAPE AND REEL**

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