

## Low-Capacitance ESD Protection Diode Arrays

**Features:**

- Small package saves board space
- Protects 4, 6 & 8 I/O lines
- ESD protection to over **8kV contact discharge** per IEC-61000
- Low capacitance: **1.5pF**
- Low clamping voltage
- Can handle multiple ESD strikes
- Full RoHS compliance

**Applications:**

- USB 2.0 Power & Data Line Protection
- DVI & HDMI Port Protection
- Serial ATA Port Protection
- Mobile Handsets
- Digital Cameras and camcorders
- PDA & MP3 Players
- Digital TV and Set-top Boxes
- Other Portable Electronic Components

**Product Description**

The ESD2050 provides a high level of protection for sensitive parts that may be subjected to over-voltage caused by electrostatic discharge (ESD). Key attribute is the low-capacitance of 1.5pF which is ideally suited for high speed data ports. This product is offered in 4, 6 and 8 channels of ESD protection. Each channel consists of a pair of diodes in series which steer the positive and negative ESD current pulse to either the positive ( $V_P$ ) or negative ( $V_N$ ) supply rail. A Zener (TVS) diode is embedded between  $V_P$  and  $V_N$  to protect the  $V_{CC}$  rail against ESD strikes and eliminates the need for a bypass capacitor (which would otherwise be needed for absorbing positive ESD strikes to ground). The TVS diode prevents over-voltage on the power line, protecting any down stream components.

| <b>ELECTRICAL OPERATING CHARACTERISTICS</b>  |            |            |            |              |
|--|------------|------------|------------|--------------|
| <b>Electrical Specifications</b>   | <b>MIN</b> | <b>TYP</b> | <b>MAX</b> | <b>UNITS</b> |
| Operating Supply Voltage ( $V_P$ )   |            | 3.3        | 5.5        | V            |
| Operating Supply Current ( $I_P$ ); $V_P=3.3V$   |            |            | 8          | uA           |
| Diode Forward Voltage ( $I_F= 8mA$ , @ 25°C)   |            |            |            |              |
| Top Diode  | 0.6        | 0.8        | 0.95       | V            |
| Bottom Diode   | 0.6        | 0.8        | 0.95       | V            |
| Leakage current at $V_P=5V$ , 25°C   | -          | ±0.1       | ±1         | uA           |
| Signal Clamp Voltage at 25°C @ 10mA  | 8          | 10         | 12         | V            |
| ESD Protection   | ± 8        | -          | -          | kV           |
| Contact discharge per IEC 61000-4-2 standard   |            |            |            |              |
| Clamping voltage during ESD discharge MIL-STD-883D (Method 3015), 4kV                                    |            |            |            |              |
| Positive Transient   | -          | 9          | -          | V            |
| Negative Transient   | -          | -1.5       | -          | V            |
| <b>Input Capacitance(@; <math>V_P = 3.3V</math>; <math>V_{Channel} = 1.65V</math>; frequency = 1MHz)</b> | <b>1.3</b> | <b>1.5</b> | <b>1.7</b> | <b>pF</b>    |
| Temperature Range:   |            |            |            |              |
| Operating  | -40        | -          | 85         | °C           |
| Storage  | -55        |            | 150        | °C           |

# OBJECTIVE DATA SHEET

# OnChip

# ESD2050

## MAXIMUM RATINGS @ 25°C Unless Otherwise Specified

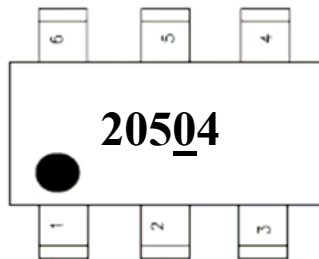
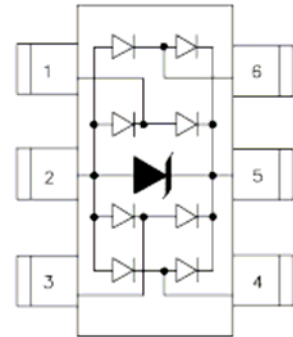
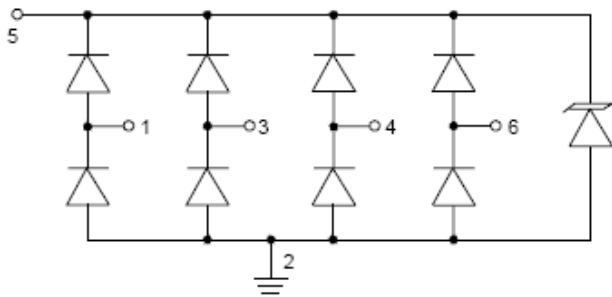
| PARAMETER                            | VALUE          | UNITS |
|--------------------------------------|----------------|-------|
| Operating Temperature                | -40°C to 85°C  | °C    |
| Storage Temperature                  | -55°C to 150°C | °C    |
| Soldering Temperature for 10 seconds | 265            | °C    |

## Ordering Part Number

| PART NUMBER  | NUMBER OF ESD CHANNELS | PACKAGE | DEVICE MARKING CODE |
|--------------|------------------------|---------|---------------------|
| ESD2050-04TR | 4-Channels             | SOT23-6 | 20504               |
| ESD2050-06MR | 6-Channels             | MSOP-8  | 20506M              |
| ESD2050-08MR | 8-Channels             | MSOP-10 | 20508M              |

## Schematic and Pin Configuration

### 4-channel in a SOT23-6 Package

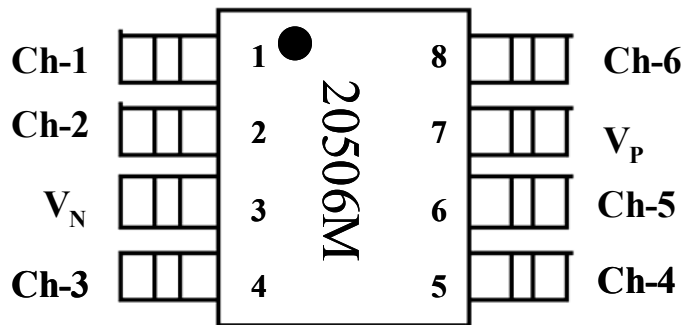
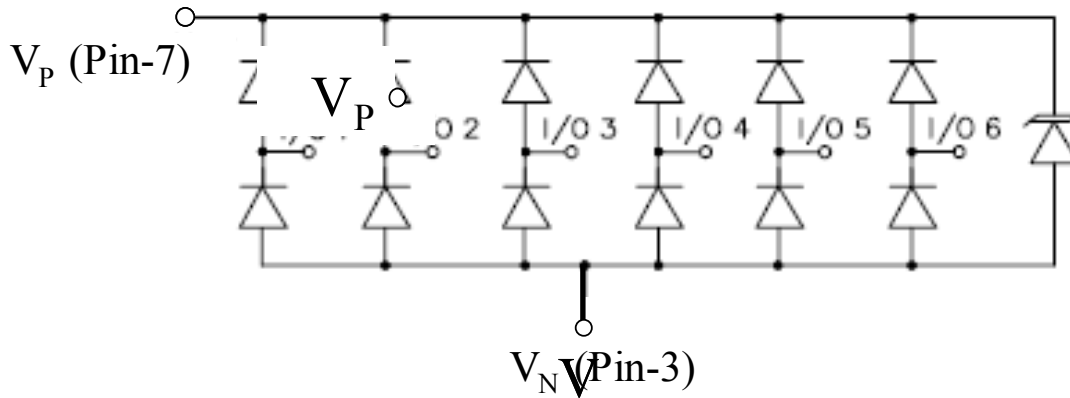


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## 6-channel in a MSOP-8 Package



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## 8-channel in a MSOP-10 Package

