PRODUCT DATA SHEET

# OnChip ESD0504P

## Low-Capacitance ESD Protection Diode Arrays

**Features:**

- Small package saves board space
- Protects 4 I/O lines
- ESD protection to over **8kV contact discharge** per IEC-61000
- Low capacitance: <3pF
- Low clamping voltage
- Can handle multiple ESD strikes
- Full RoHS compliance

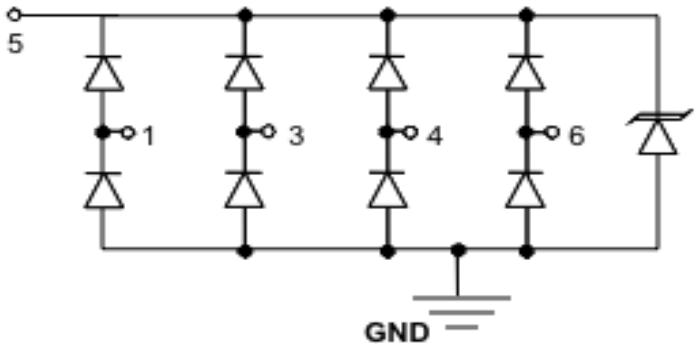
**Applications:**

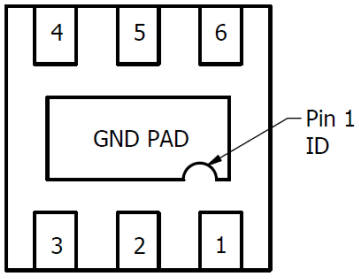
- USB 3.0 Power & Data Line Protection
- DVI & HDMI Port Protection
- VGA & Serial ATA Port Protection
- Mobile Handsets
- Digital Cameras & Camcorders
- PDA & MP3 Players
- Digital TV & Set-top Boxes
- Other Portable Electronic Components

**Product Description**

The ESD0504P provides a high level of protection for sensitive parts that may be subjected to overvoltage caused by electrostatic discharge (ESD). The device is in a 6-pin UDFN lead-free package with dimensions of 1.6mm x 1.6mm x 0.6mm. The ESD0504P features a large intersecting area for conducting high transient currents. Another key attribute is the low-capacitance of less than 3pF, which is ideally suited for protecting up to four high-speed data ports (excess of 3GHz). During transient events, the steering diodes direct transient current to the ground. 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 overvoltage on the power line, protecting any down stream components. It provides superior electrical characteristics such as low clamping voltage and no device degradation when compared to Multilayer Varistors (MLV). This product is designed to safely dissipate ESD strikes of over 8kV, when tested to the stringent standards of IEC-61000, and it is in full RoHS compliance.

## Schematic & PIN Configuration



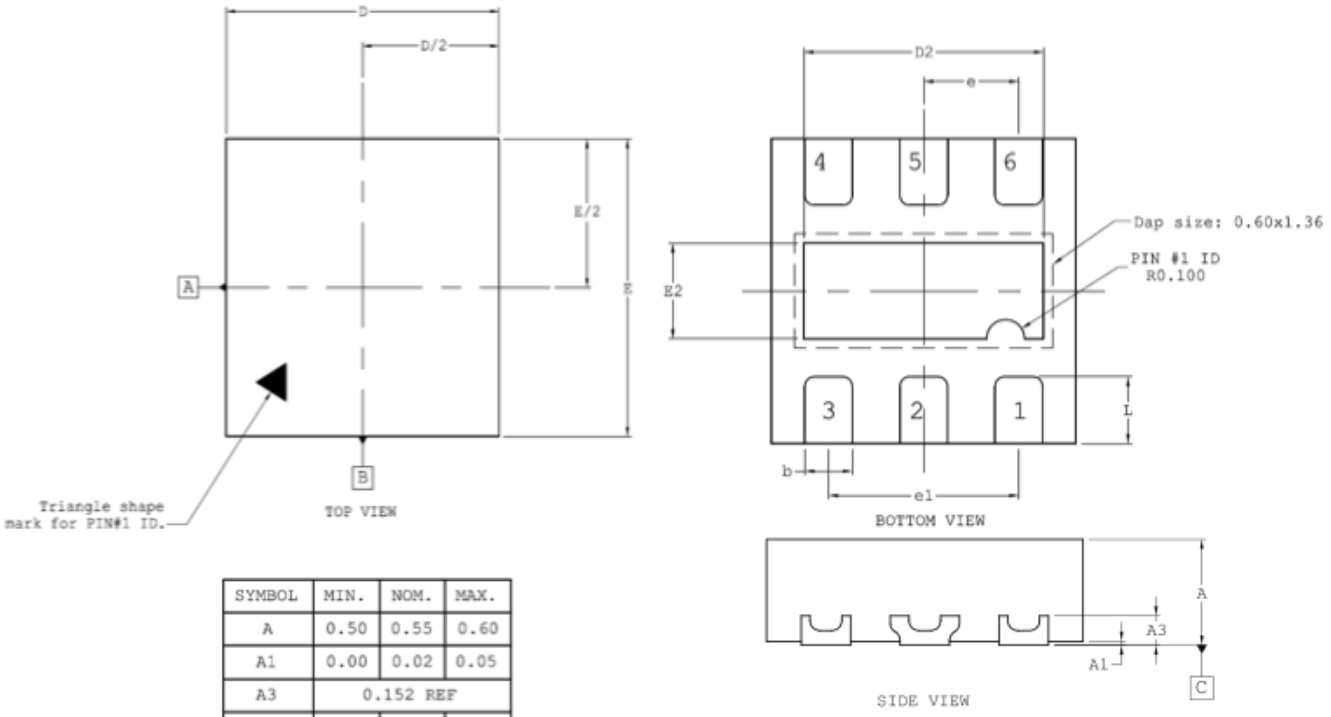

BOTTOM VIEW

| Absolute Maximum Rating | | | |
|---|---|---|---|
| **Rating** | **Symbol** | **Value** | **Units** |
| Peak Pulse Power (tp = 8/20µs) | $P_{PK}$ | 150 | Watts |
| Peak Pulse Current (tp = 8/20µs) | $I_{PP}$ | 6 | A |
| ESD per IEC 61000-4-2 (Air) | $V_{ESD}$ | 15 | kV |
| ESD per IEC 61000-4-2 (Contact) | | 8 | |
| Lead Soldering Temperature | $T_L$ | 260 (10 Sec.) | °C |
| Operating Temperature | $T_J$ | -55 to +125 | °C |
| Storage Temperature | $T_{STG}$ | -55 to +150 | °C |

| Electrical Characteristics (T=25°C) | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Conditions** | **Minimum** | **Typical** | **Maximum** | **Units** |
| Reverse Stand-Off Voltage | $V_{RWM}$ | Pin 5 to GND | | | 5 | V |
| Reverse Breakdown Voltage | $V_{BR}$ | $I_t$ = 1mA; Pin 5 to GND | 6 | | | V |
| Reverse Leakage Current | $I_R$ | $V_{RWM}$ = 5V, T = 25°C; Pin 5 to GND | | | 3 | µA |
| Clamping Voltage | $V_C$ | $I_{PP}$ = 1A, tp = 8/20µs; Any I/O pin to Ground | | | 15 | V |
| | | $I_{PP}$ = 6A, tp = 8/20µs; Any I/O pin to Ground | | | 25 | V |
| | | $I_{PP}$ = 6A, tp = 8/20µs; Pin 5 to Ground | | | 18 | V |
| Junction Capacitance | $C_J$ | $V_R$ = 0V, f = 1MHz; Between I/O pins | | 0.8 | 1 | pF |
| | | $V_R$ = 0V, f = 1MHz; Any I/O pin to ground | | 1.9 | 3 | pF |

| ORDERING PART NUMBER | | | | |
|---|---|---|---|---|
| PART NUMBER | NUMBER OF CHANNELS | PACKAGE TYPE | DEVICE MARKING | ROHS COMPLIANCE |
| ESD0504P | 4 | UDFN-6 | OCESD 0504P | YES |

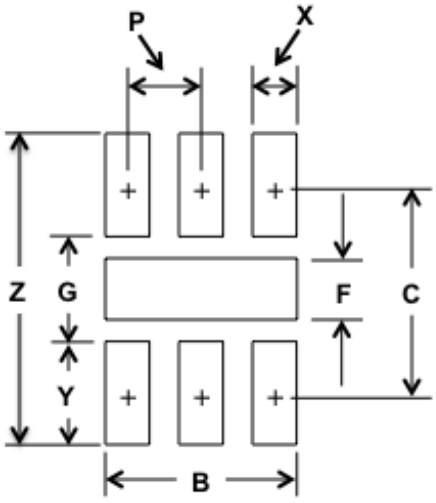
## Package Outline Drawing 6-pin UDFN (1.6x1.6x0.55mm)




| SYMBOL | MIN. | NOM. | MAX. |
|---|---|---|---|
| A | 0.50 | 0.55 | 0.60 |
| A1 | 0.00 | 0.02 | 0.05 |
| A3 | | 0.152 REF | |
| b | 0.20 | 0.25 | 0.30 |
| D | 1.55 | 1.60 | 1.65 |
| D2 | 1.21 | 1.26 | 1.31 |
| E | 1.55 | 1.60 | 1.65 |
| E2 | 0.45 | 0.50 | 0.55 |
| e | | 0.50 BSC | |
| e1 | | 1.00 REF | |
| L | 0.30 | 0.35 | 0.40 |

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETER.
2. MAX. PACKAGE WARPAGE IS 0.05mm.
3. MAXIMUM ALLOWABE BURRS IS 0.076mm IN ALL DIRECTIONS.
4. PIN #1 ID ON TOP WILL BE LASER/INK MARKED.
5. DIMENSION APPLIES TO METALIZED TERMINAL AND IS MEASURED BETWEEN 0.20 AND 0.25mm FROM TERMINAL TIP.
6. APPLIED ONLY FOR TERMINALS.
7. APPLIED FOR EXPOSED PAD AND TERMINALS.

## Land Pattern UDFN 6L




| DIMENSIONS | | |
|---|---|---|
| DIM. | INCHES | MILLIMETERS |
| C | 0.060 | 1.520 |
| G | 0.035 | 0.89 |
| P | 0.020 | 0.50 |
| X | 0.012 | 0.30 |
| X1 | 0.018 | 0.45 |
| Y | 0.025 | 0.63 |
| Y1 | 0.060 | 1.52 |
| Z | 0.085 | 2.15 |