

## Electrostatic Discharged Protection Devices (ESD) Data Sheet

### Description

Brightking's UDT23AXXL02 series are ultra low capacitance TVS arrays designed to protect high speed data interfaces. This series has been specifically designed to protect sensitive components which are connected to high-speed data and transmission lines from overvoltage caused by electrostatic discharge (ESD), cable discharge events(CDE) and electrical fast transients(EFT).The series has a typical capacitance of only 0.8pF. This means it can be used on circuits operating in excess of 3GHz without signal attenuation.

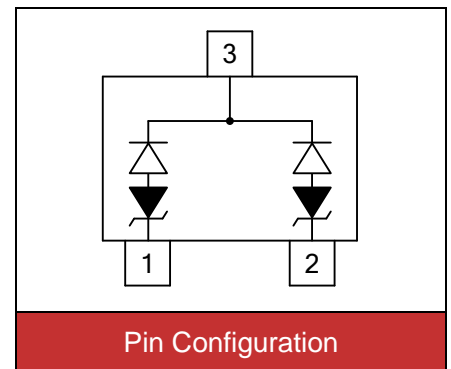


Contact : ±30kV  
Air : ±30kV



### Features

- IEC61000-4-2 ESD 30KV Air, 30KV contact compliance
- SOT-23 surface mount package
- Protects two high speed data line
- Peak power dissipation of 400W under 8/20µs waveform
- Working voltage: 3.3V, 5V, 12V, 15V and 24V
- Low leakage current
- Ultra low capacitance and clamping voltage
- Solid-state silicon avalanche technology
- Lead Free/RoHS compliant
- Solder reflow temperature: Pure Tin-Sn, 260~270°C
- Flammability rating UL 94V-0
- Meets MSL level 1, per J-STD-020



### Applications

- HDMI interface protection
- Mobile display digital interface
- RF/Antenna circuits
- USB 2.0 & Firewire ports
- GaAs photodetector protection
- HBT power Amp protection
- Infiniband transceiver protection

### Maximum Ratings

| Rating                                | Symbol                           | Value    | Unit |
|---------------------------------------|----------------------------------|----------|------|
| Peak pulse power (tp=8/20µs waveform) | P <sub>PP</sub>                  | 400      | W    |
| ESD voltage (Contact discharge)       | V <sub>ESD</sub>                 | ±30      | kV   |
| ESD voltage (Air discharge)           |                                  | ±30      |      |
| Storage & operating temperature range | T <sub>STG</sub> ,T <sub>J</sub> | -55~+150 | °C   |

**Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ )**
**UDT23A03L02 (Marking: B LSC)**

| Parameter                                    | Symbol    | Condition   | Min. | Typ. | Max. | Unit          |
|--|-----------|---|------|------|------|---------------|
| Reverse stand-off voltage                    | $V_{RWM}$ |   |      |      | 3.3  | V             |
| Reverse breakdown voltage                    | $V_{BR}$  | $I_{BR}=1\text{mA}$                               | 4    |      |      | V             |
| Reverse leakage current                      | $I_R$     | $V_R=3.3\text{V}$<br>each I/O pin                 |      |      | 20   | $\mu\text{A}$ |
| Clamping voltage ( $t_p=8/20\mu\text{s}$ )   | $V_C$     | $I_{PP}=1\text{A}$                                |      |      | 10   | V             |
| Peak Pulse Current ( $t_p=8/20\mu\text{s}$ ) | $I_{PP}$  |   |      |      | 19   | A             |
| Off state junction capacitance               | $C_J$     | 0Vdc, $f=1\text{MHz}$<br>Between I/O pins and GND |      | 1.5  |      | pF            |

**UDT23A05L02 (Marking: B LTC)**

| Parameter                                    | Symbol    | Condition   | Min. | Typ. | Max. | Unit          |
|--|-----------|---|------|------|------|---------------|
| Reverse stand-off voltage                    | $V_{RWM}$ |   |      |      | 5    | V             |
| Reverse breakdown voltage                    | $V_{BR}$  | $I_{BR}=1\text{mA}$                               | 6    |      |      | V             |
| Reverse leakage current                      | $I_R$     | $V_R=5\text{V}$<br>each I/O pin                   |      |      | 5    | $\mu\text{A}$ |
| Clamping voltage ( $t_p=8/20\mu\text{s}$ )   | $V_C$     | $I_{PP}=1\text{A}$                                |      |      | 12   | V             |
| Peak Pulse Current ( $t_p=8/20\mu\text{s}$ ) | $I_{PP}$  |   |      |      | 17   | A             |
| Off state junction capacitance               | $C_J$     | 0Vdc, $f=1\text{MHz}$<br>Between I/O pins and GND |      | 0.8  |      | pF            |

**UDT23A12L02 (Marking: B LUC)**

| Parameter                                    | Symbol    | Condition   | Min. | Typ. | Max. | Unit          |
|--|-----------|---|------|------|------|---------------|
| Reverse stand-off voltage                    | $V_{RWM}$ |   |      |      | 12   | V             |
| Reverse breakdown voltage                    | $V_{BR}$  | $I_{BR}=1\text{mA}$                               | 13.3 |      |      | V             |
| Reverse leakage current                      | $I_R$     | $V_R=12\text{V}$<br>each I/O pin                  |      |      | 1    | $\mu\text{A}$ |
| Clamping voltage ( $t_p=8/20\mu\text{s}$ )   | $V_C$     | $I_{PP}=1\text{A}$                                |      |      | 25   | V             |
| Peak Pulse Current ( $t_p=8/20\mu\text{s}$ ) | $I_{PP}$  |   |      |      | 10   | A             |
| Off state junction capacitance               | $C_J$     | 0Vdc, $f=1\text{MHz}$<br>Between I/O pins and GND |      | 0.8  |      | pF            |

**UDT23A15L02 (Marking: B LWC)**

| Parameter                                    | Symbol    | Condition   | Min. | Typ. | Max. | Unit          |
|--|-----------|---|------|------|------|---------------|
| Reverse stand-off voltage                    | $V_{RWM}$ |   |      |      | 15   | V             |
| Reverse breakdown voltage                    | $V_{BR}$  | $I_{BR}=1\text{mA}$                               | 16.7 |      |      | V             |
| Reverse leakage current                      | $I_R$     | $V_R=15\text{V}$<br>each I/O pin                  |      |      | 1    | $\mu\text{A}$ |
| Clamping voltage ( $t_p=8/20\mu\text{s}$ )   | $V_C$     | $I_{PP}=1\text{A}$                                |      |      | 30   | V             |
| Peak Pulse Current ( $t_p=8/20\mu\text{s}$ ) | $I_{PP}$  |   |      |      | 8    | A             |
| Off state junction capacitance               | $C_J$     | 0Vdc, $f=1\text{MHz}$<br>Between I/O pins and GND |      | 0.8  |      | pF            |

**Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ )**

UDT23A24L02 (Marking: B LXC)

| Parameter                                    | Symbol    | Condition   | Min. | Typ. | Max. | Unit          |
|--|-----------|---|------|------|------|---------------|
| Reverse stand-off voltage                    | $V_{RWM}$ |   |      |      | 24   | V             |
| Reverse breakdown voltage                    | $V_{BR}$  | $I_{BR}=1\text{mA}$                               | 26.7 |      |      | V             |
| Reverse leakage current                      | $I_R$     | $V_R=24\text{V}$<br>each I/O pin                  |      |      | 1    | $\mu\text{A}$ |
| Clamping voltage ( $t_p=8/20\mu\text{s}$ )   | $V_C$     | $I_{PP}=1\text{A}$                                |      |      | 48   | V             |
| Peak Pulse Current ( $t_p=8/20\mu\text{s}$ ) | $I_{PP}$  |   |      |      | 6    | A             |
| Off state junction capacitance               | $C_J$     | 0Vdc, $f=1\text{MHz}$<br>Between I/O pins and GND |      | 0.8  |      | pF            |

**Typical Characteristics Curves**

Figure 1. Power Derating Curve

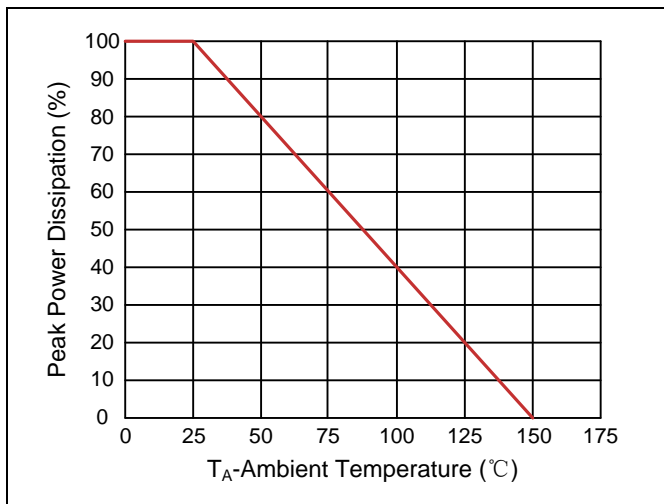


Figure 2. Pulse Waveforms

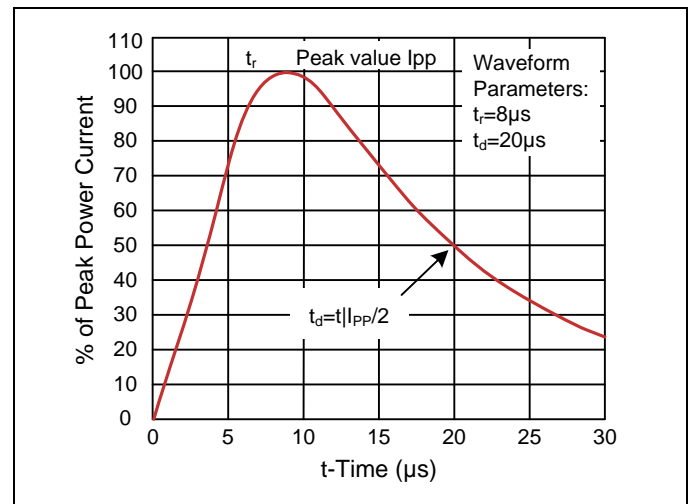


Figure 3. Non-Repetitive Peak Pulse vs. Pulse Time

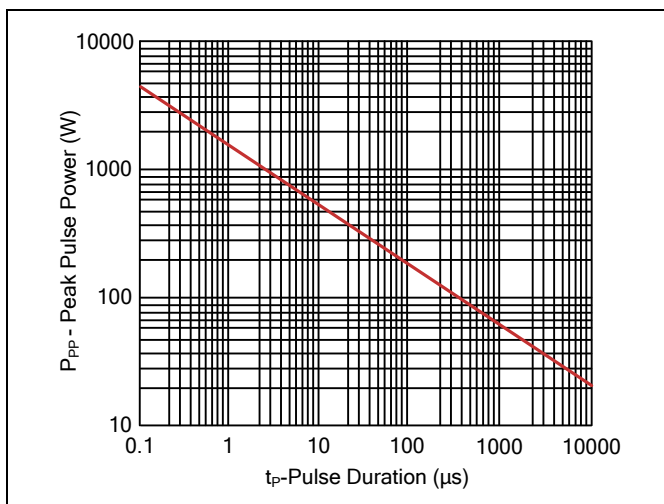
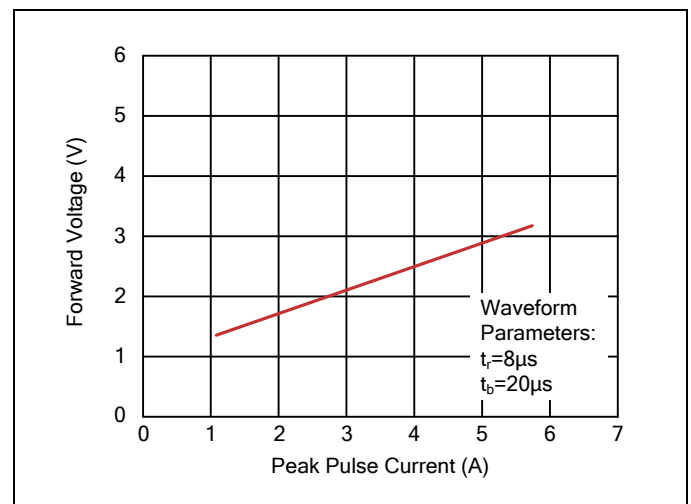
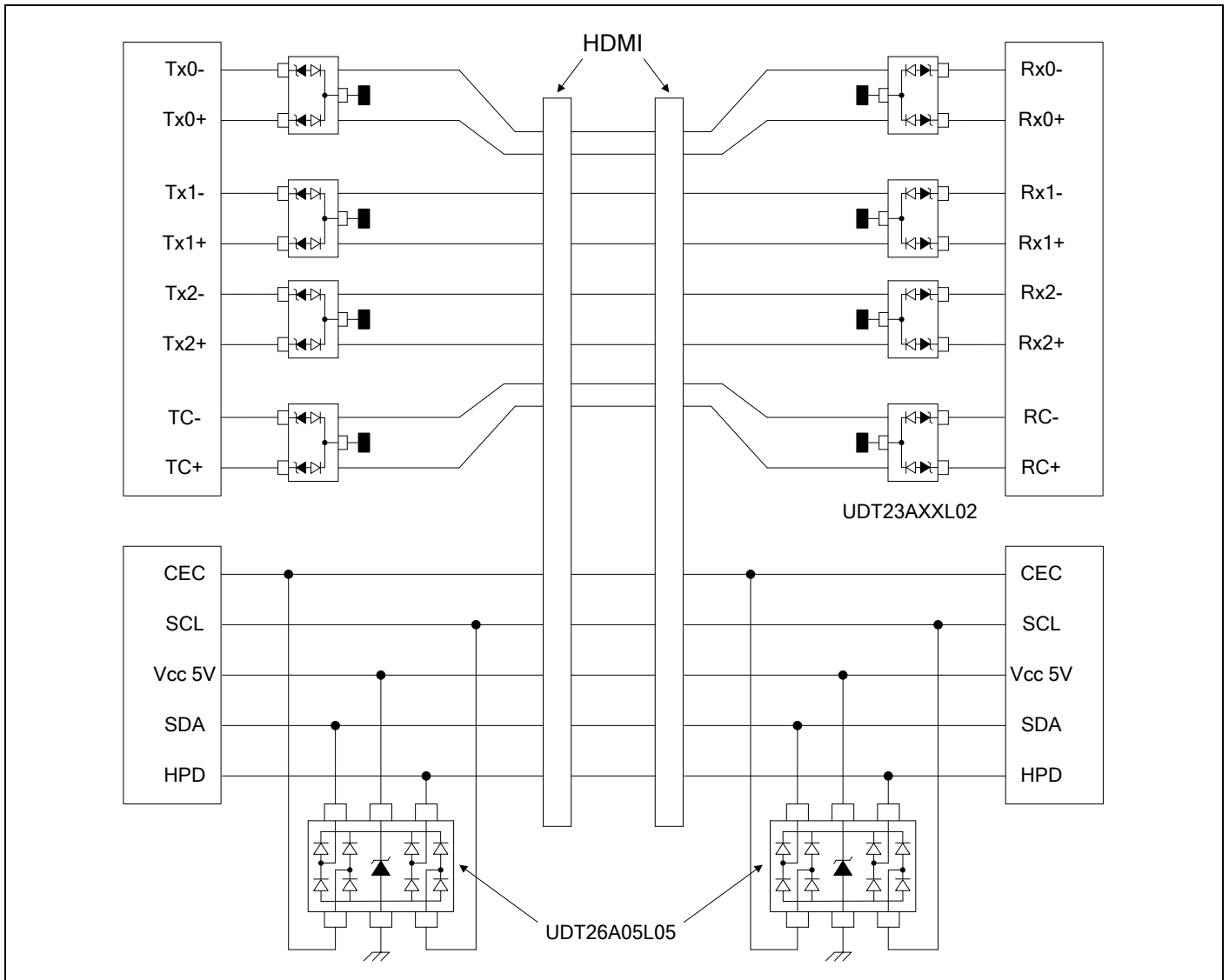


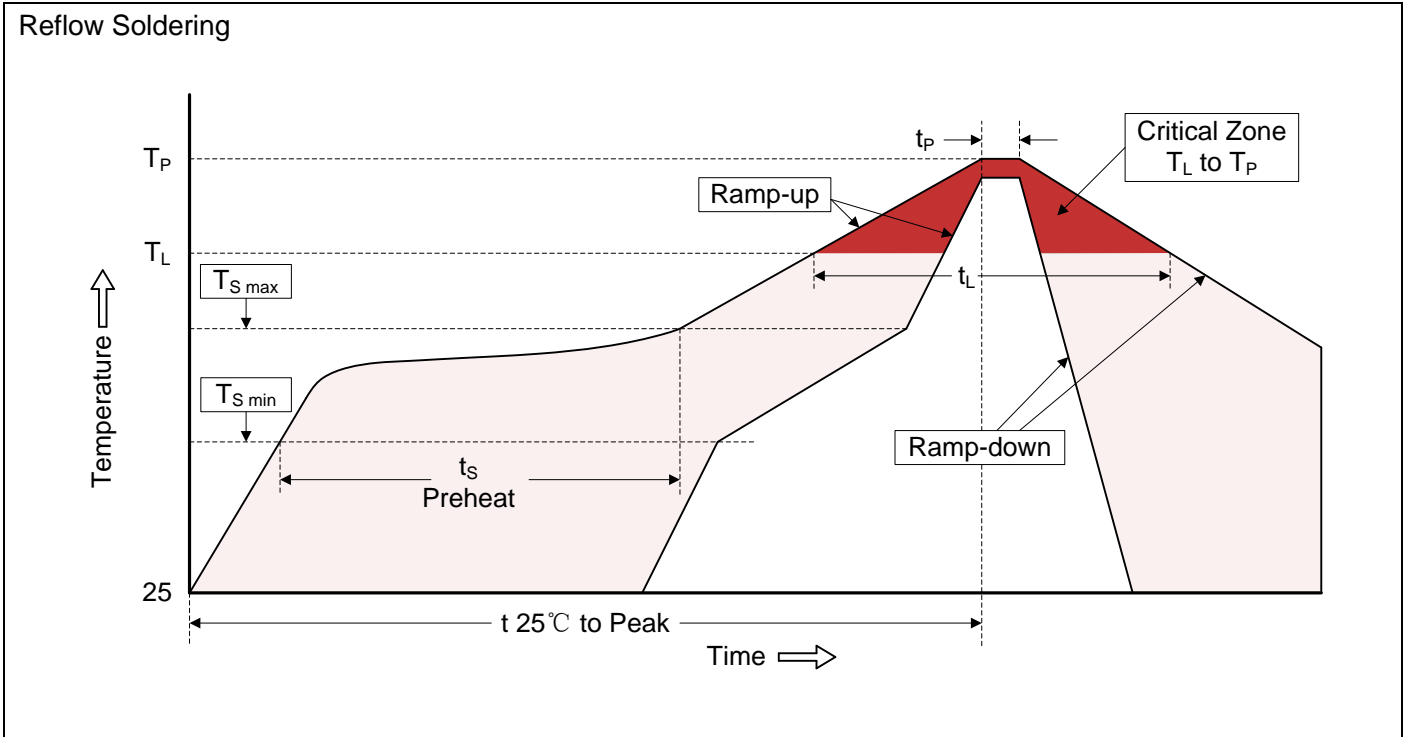
Figure 4. Forward Voltage vs. Forward Current



**Applications Information**



**Recommended Soldering Conditions**



**Recommended Conditions**

| Profile Feature   | Pb-Free Assembly                 |
|---|----------------------------------|
| Average ramp-up rate ( $T_L$ to $T_P$ )   | 3°C/second max.                  |
| Preheat<br>-Temperature Min ( $T_{S\ min}$ )<br>-Temperature Max ( $T_{S\ max}$ )<br>-Time (min to max) ( $t_s$ ) | 150°C<br>200°C<br>60-180 seconds |
| $T_{S\ max}$ to $T_L$<br>-Ramp-up Rate  | 3°C/second max.                  |
| Time maintained above:<br>-Temperature ( $T_L$ )<br>-Time ( $t_L$ )   | 217°C<br>60-150 seconds          |
| Peak Temperature ( $T_P$ )  | 260°C                            |
| Time within 5°C of actual Peak Temperature ( $t_P$ )  | 20-40 seconds                    |
| Ramp-down Rate  | 6°C/second max.                  |
| Time 25°C to Peak Temperature   | 8 minutes max.                   |

**Dimensions (SOT-23)**

| Symbol | Dimension   |      |        |       |
|--------|-------------|------|--------|-------|
|        | Millimeters |      | Inches |       |
|        | Min.        | Max. | Min.   | Max.  |
| A      | 0.08        | 0.18 | 0.003  | 0.007 |
| B      | 0.15        | -    | 0.006  | -     |
| C      | -           | 0.13 | -      | 0.005 |
| D      | 0.89        | 1.09 | 0.035  | 0.043 |
| E      | 2.80        | 3.05 | 0.110  | 0.120 |
| F      | 1.90        |      | 0.075  |       |
| G      | 0.95        |      | 0.037  |       |
| H      | 1.19        | 1.40 | 0.047  | 0.055 |
| I      | 2.10        | 2.49 | 0.083  | 0.098 |
| J      | 0.35        | 0.50 | 0.014  | 0.020 |

Recommended Soldering Pad Layout

**Packaging**

| Tape | Symbol     | Dimension (mm)    |
|------|------------|-------------------|
|      | W          | 8.00±0.30         |
| P0   | 4.00±0.10  |                   |
| P1   | 4.00±0.10  |                   |
| P2   | 2.00±0.10  |                   |
| D0   | Φ1.55±0.10 |                   |
| D1   | Φ1.00±0.05 |                   |
| E    | 1.75±0.10  |                   |
| F    | 3.50±0.10  |                   |
| A    | 3.10±0.10  |                   |
| A0   | 2.10±0.10  |                   |
| B    | 2.75±0.10  |                   |
| B0   | 0.65±0.10  |                   |
| K    | 1.10±0.10  |                   |
| t    | 0.20±0.05  |                   |
| Reel | D          | Φ178.0±2.0        |
|      | D2         | Φ13.0             |
|      | W1         | 9.5               |
|      |            | Quantity: 3000PCS |