

## Electrostatic Discharged Protection Devices (ESD) Data Sheet

### Description

Brightking's SJD16AXXL01 series are designed to protect power port and the chip Vbus interfaces. It has been specifically designed to protect sensitive components which are connected to power lines from overvoltage caused by electrostatic discharge (ESD), cable discharge events (CDE) and lightning.

These devices integrate a high power transient voltage suppressor(TVS) and small package. It features solid-state silicon-avalanche technology for unmatched transient protection without device degradation. It offers superior electrical characteristics including fast response time, low clamping voltage and no device degradation. This allows the designer maximum flexibility and reduces parts count.

The series devices may be used to meet the immunity requirements of IEC61000-4-2 (ESD), IEC61000-4-4 (EFT) , IEC61000-4-5 (Surge).

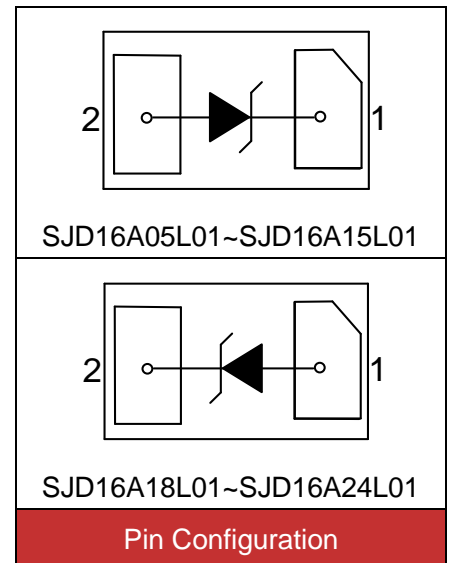


Contact : ±30kV  
Air : ±30kV



### Features

- IEC61000-4-2 ESD 30KV Air, 30KV contact compliance
- DFN1610 surface mount package
- Protects power line
- Working voltage: .5V,7V,10V,12V,15V,18V,24V
- SJD16A05L01~SJD16A15L01, Cathode rays on the Pin1
- SJD16A18L01~SJD16A24L01, Cathode rays on the Pin2
- Low leakage current
- Low clamping voltage
- Solid-state silicon avalanche technology
- 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

- Power port
- I<sup>2</sup>C bus protection

## Maximum Ratings

| Rating  | Symbol                           | Value    | Unit |
|---|----------------------------------|----------|------|
| Peak pulse power (tp=10/1000μs waveform)                        | Ppp                              | 120      | W    |
| Peak pulse power(tp=8/20μs waveform)<br>SJD16A05L01~SJD16A15L01 | Ppp                              | 2000     | W    |
| Peak pulse power(tp=8/20μs waveform)<br>SJD16A18L01~SJD16A24L01 | Ppp                              | 1000     | 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<sub>J</sub>=25°C)

SJD16A05L01(Marking: J05)

| Parameter                      | Symbol           | Condition                                  | Min. | Typ. | Max. | Unit |
|--------------------------------|------------------|--|------|------|------|------|
| Reverse stand-off voltage      | V <sub>RWM</sub> |  |      |      | 5    | V    |
| Reverse breakdown voltage      | V <sub>BR</sub>  | I <sub>BR</sub> =1.0mA                     | 6    |      |      | V    |
| Reverse leakage current        | I <sub>R</sub>   | V <sub>R</sub> =5.0V                       |      |      | 1.0  | μA   |
| Clamping voltage (tp=8/20μs)   | V <sub>C</sub>   | I <sub>PP</sub> =100A                      |      | 25   |      | V    |
| Peak Pulse Current(tp=8/20μs)  | I <sub>PP</sub>  |  |      |      | 100  | A    |
| Off state junction capacitance | C <sub>J</sub>   | 0Vdc,f=1MHz<br>Between I/O<br>pins and GND |      | 300  |      | pF   |

SJD16A07L01(Marking: J07)

| Parameter                      | Symbol           | Condition                                  | Min. | Typ. | Max. | Unit |
|--------------------------------|------------------|--|------|------|------|------|
| Reverse stand-off voltage      | V <sub>RWM</sub> |  |      |      | 7    | V    |
| Reverse breakdown voltage      | V <sub>BR</sub>  | I <sub>BR</sub> =1.0mA                     | 7.3  |      |      | V    |
| Reverse leakage current        | I <sub>R</sub>   | V <sub>R</sub> =7.0V                       |      |      | 1.0  | μA   |
| Clamping voltage (tp=8/20μs)   | V <sub>C</sub>   | I <sub>PP</sub> =80A                       |      | 30   |      | V    |
| Peak Pulse Current(tp=8/20μs)  | I <sub>PP</sub>  |  |      |      | 80   | A    |
| Off state junction capacitance | C <sub>J</sub>   | 0Vdc,f=1MHz<br>Between I/O<br>pins and GND |      | 650  |      | pF   |

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

SJD16A10L01(Marking: J10)

| Parameter                                   | Symbol    | Condition                                   | Min. | Typ. | Max. | Unit          |
|---|-----------|---|------|------|------|---------------|
| Reverse stand-off voltage                   | $V_{RWM}$ |   |      |      | 10   | V             |
| Reverse breakdown voltage                   | $V_{BR}$  | $I_{BR}=1.0\text{mA}$                       | 11   |      |      | V             |
| Reverse leakage current                     | $I_R$     | $V_R=10\text{V}$                            |      |      | 1.0  | $\mu\text{A}$ |
| Clamping voltage ( $t_p=8/20\mu\text{s}$ )  | $V_C$     | $I_{PP}=60\text{A}$                         |      | 35   |      | V             |
| Peak Pulse Current( $t_p=8/20\mu\text{s}$ ) | $I_{PP}$  |   |      |      | 60   | A             |
| Off state junction capacitance              | $C_J$     | 0Vdc, f=1MHz<br>Between I/O<br>pins and GND |      | 400  |      | pF            |

SJD16A12L01 (Marking: J12)

| Parameter                                   | Symbol    | Condition                                   | Min. | Typ. | Max. | Unit          |
|---|-----------|---|------|------|------|---------------|
| Reverse stand-off voltage                   | $V_{RWM}$ |   |      |      | 12   | V             |
| Reverse breakdown voltage                   | $V_{BR}$  | $I_{BR}=1.0\text{mA}$                       | 13   |      |      | V             |
| Reverse leakage current                     | $I_R$     | $V_R=12\text{V}$                            |      |      | 1.0  | $\mu\text{A}$ |
| Clamping voltage ( $t_p=8/20\mu\text{s}$ )  | $V_C$     | $I_{PP}=47\text{A}$                         |      | 43   |      | V             |
| Peak Pulse Current( $t_p=8/20\mu\text{s}$ ) | $I_{PP}$  |   |      |      | 47   | A             |
| Off state junction capacitance              | $C_J$     | 0Vdc, f=1MHz<br>Between I/O<br>pins and GND |      | 365  |      | pF            |

SJD16A15L01(Marking: J15)

| Parameter                                   | Symbol    | Condition                                   | Min. | Typ. | Max. | Unit          |
|---|-----------|---|------|------|------|---------------|
| Reverse stand-off voltage                   | $V_{RWM}$ |   |      |      | 15   | V             |
| Reverse breakdown voltage                   | $V_{BR}$  | $I_{BR}=1.0\text{mA}$                       | 16   |      |      | V             |
| Reverse leakage current                     | $I_R$     | $V_R=15\text{V}$                            |      |      | 1.0  | $\mu\text{A}$ |
| Clamping voltage ( $t_p=8/20\mu\text{s}$ )  | $V_C$     | $I_{PP}=45\text{A}$                         |      | 45   |      | V             |
| Peak Pulse Current( $t_p=8/20\mu\text{s}$ ) | $I_{PP}$  |   |      |      | 45   | A             |
| Off state junction capacitance              | $C_J$     | 0Vdc, f=1MHz<br>Between I/O<br>pins and GND |      | 300  |      | pF            |

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

SJD16A18L01(Marking: J18)

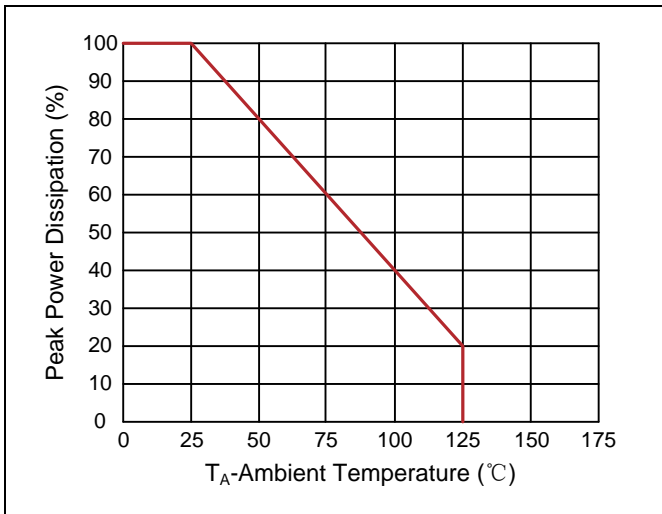
| Parameter                                   | Symbol    | Condition                                   | Min. | Typ. | Max. | Unit          |
|---|-----------|---|------|------|------|---------------|
| Reverse stand-off voltage                   | $V_{RWM}$ |   |      |      | 18   | V             |
| Reverse breakdown voltage                   | $V_{BR}$  | $I_{BR}=1.0\text{mA}$                       | 19   |      |      | V             |
| Reverse leakage current                     | $I_R$     | $V_R=18\text{V}$                            |      |      | 1.0  | $\mu\text{A}$ |
| Clamping voltage ( $t_p=8/20\mu\text{s}$ )  | $V_C$     | $I_{PP}=25\text{A}$                         |      | 50   |      | V             |
| Peak Pulse Current( $t_p=8/20\mu\text{s}$ ) | $I_{PP}$  |   |      |      | 25   | A             |
| Off state junction capacitance              | $C_J$     | 0Vdc, f=1MHz<br>Between I/O<br>pins and GND |      | 220  |      | pF            |

SJD16A24L01(Marking: J24)

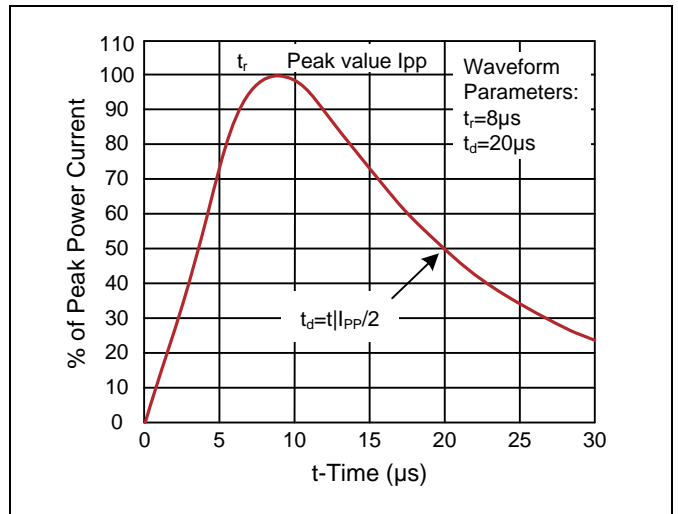
| Parameter                                   | Symbol    | Condition                                   | Min. | Typ. | Max. | Unit          |
|---|-----------|---|------|------|------|---------------|
| Reverse stand-off voltage                   | $V_{RWM}$ |   |      |      | 24   | V             |
| Reverse breakdown voltage                   | $V_{BR}$  | $I_{BR}=1.0\text{mA}$                       | 25   |      |      | V             |
| Reverse leakage current                     | $I_R$     | $V_R=24\text{V}$                            |      |      | 1.0  | $\mu\text{A}$ |
| Clamping voltage ( $t_p=8/20\mu\text{s}$ )  | $V_C$     | $I_{PP}=20\text{A}$                         |      | 55   |      | V             |
| Peak Pulse Current( $t_p=8/20\mu\text{s}$ ) | $I_{PP}$  |   |      |      | 20   | A             |
| Off state junction capacitance              | $C_J$     | 0Vdc, f=1MHz<br>Between I/O<br>pins and GND |      | 180  |      | pF            |

**Typical Characteristics Curves**

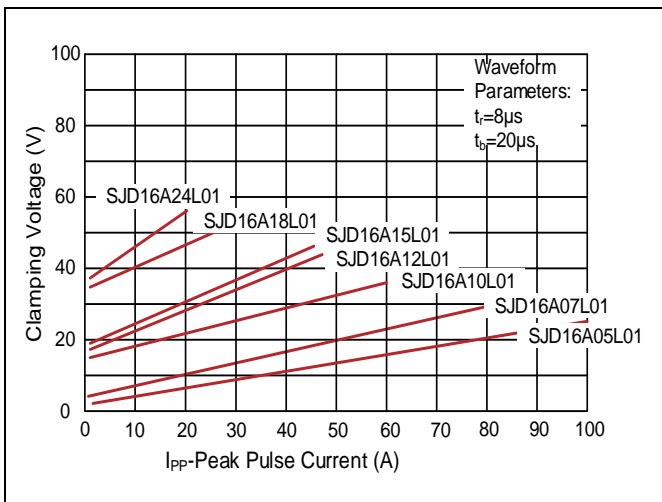
**Figure 1. Power Derating Curve**



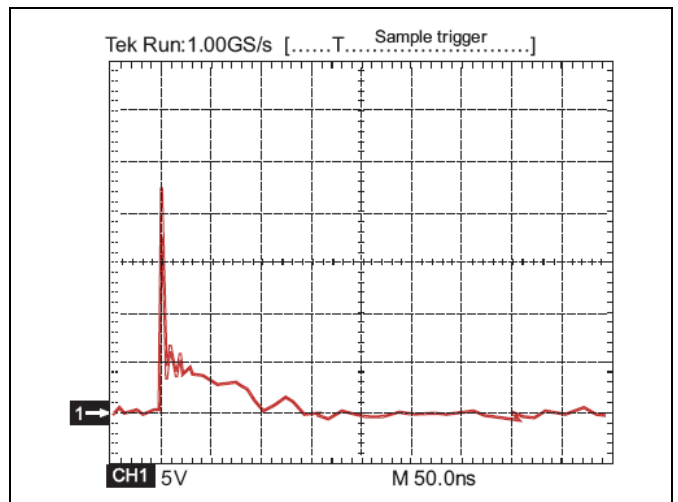
**Figure 2. 8/20µs Pulse Waveforms**



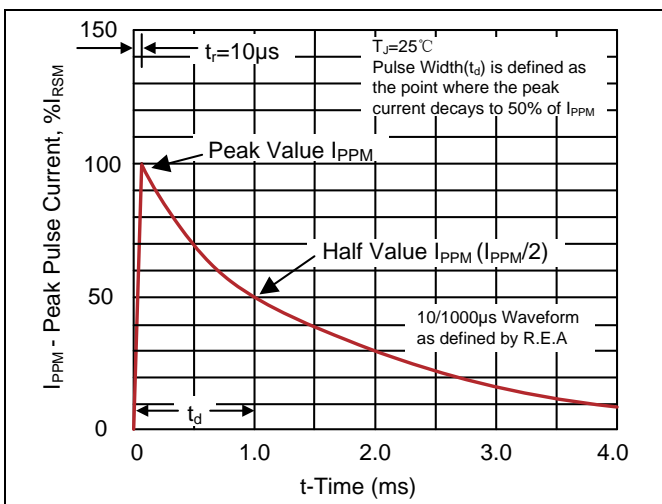
**Figure 3. Clamping Voltage vs. Peak Pulse Current**



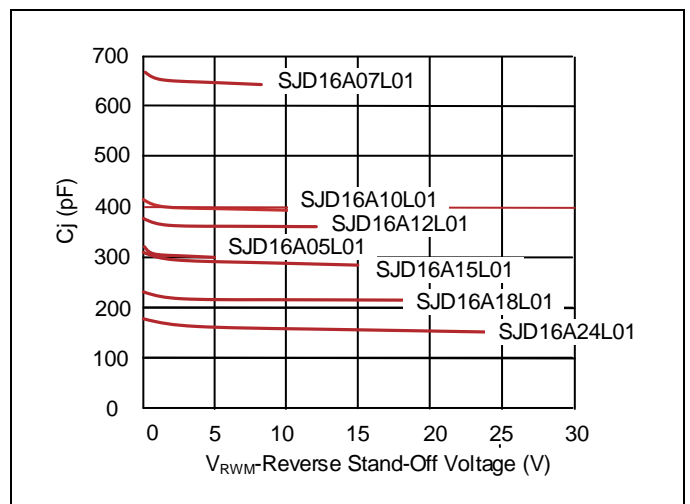
**Figure 4. ESD Clamping (8kV Contact IEC61000-4-2)**



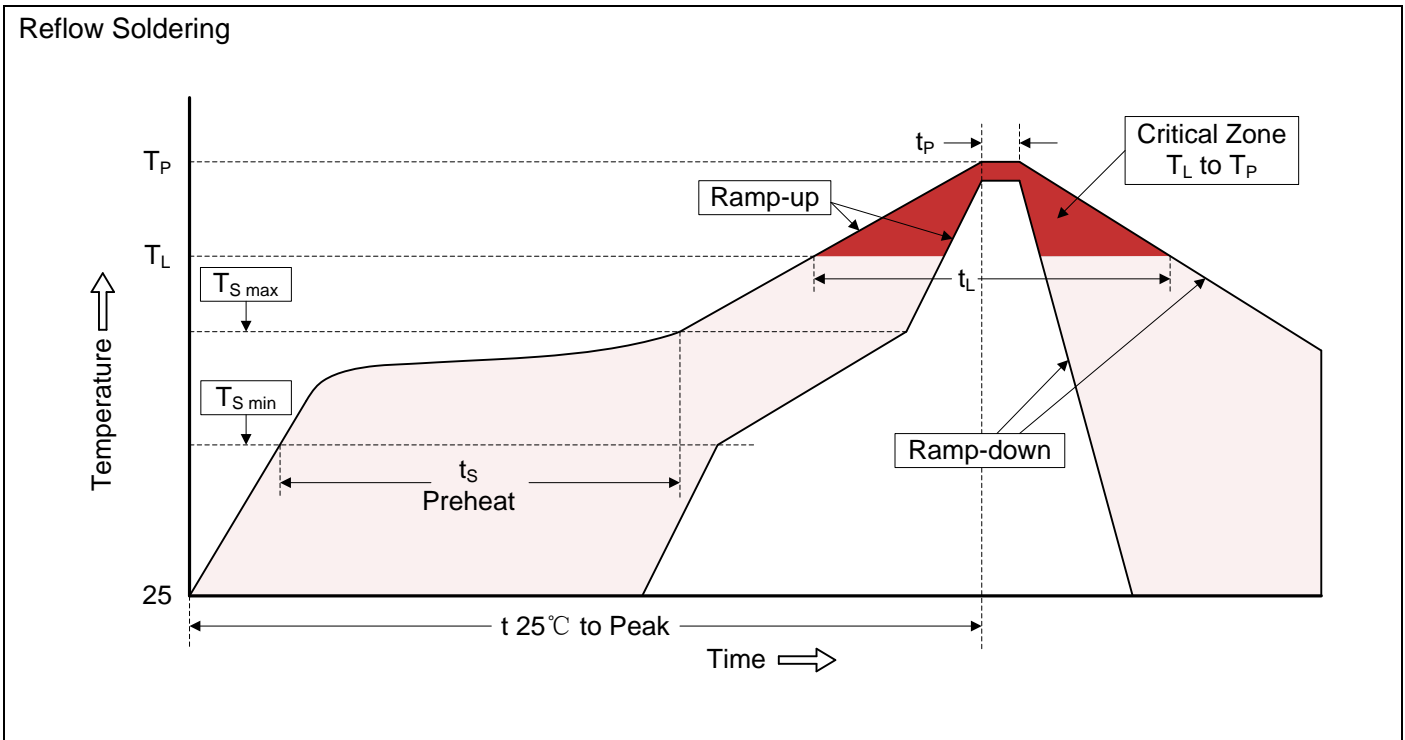
**Figure 5. 10/1000µs Pulse Waveform**



**Figure 6. Typical Junction Capacitance**



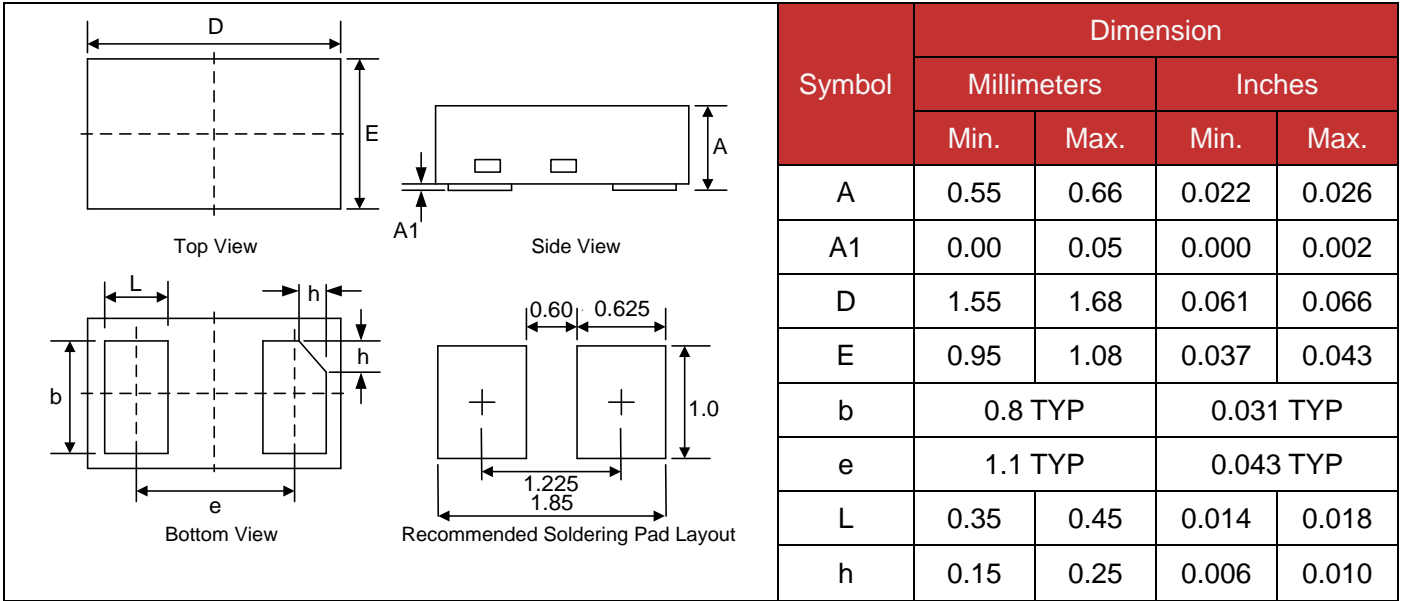
**Recommended Soldering Conditions**



**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 (DFN1610)**



**Packaging**

