

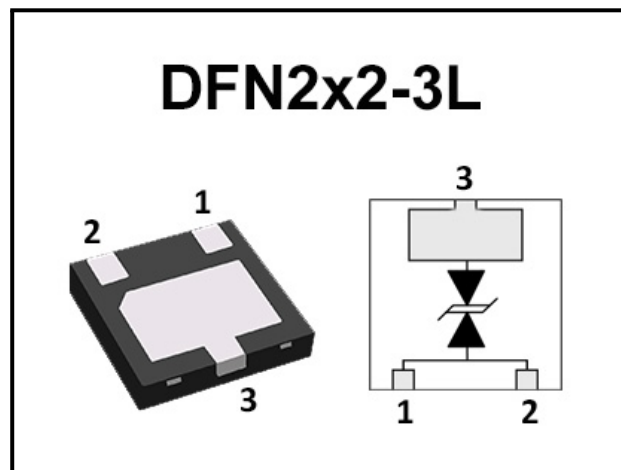
# BES4.5NLC1

ESD Protection Diode

## Features

- 4320Watts peak pulse power ( $t_p = 8/20\mu s$ )
- Bidirectional configurationss
- Solid-state silicon-avalanche technology
- Low clamping Voltage
- Low leakage current
- Protection one power line
- IEC 61000-4-2  $\pm 30kV$  contact ;  $\pm 30kV$  air
- IEC 61000-4-4 (EFT) 40A (5/50ns)
- IEC 61000-4-5 (Lightning) 240A (8/20 $\mu s$ )

## Package



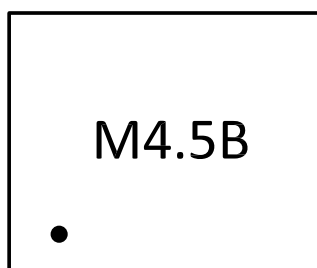
## Applications

- USB Vbus
- Power Line
- Power management

## Mechanical Data

- DFN2×2-3L package
- Molding compound flammability rating: UL 94V-0
- Packaging: Tape and Reel
- RoHS/WEEE Compliant

## Marking



## Ordering information

| Order code | Package   | Base qty | Delivery mode |
|------------|-----------|----------|---------------|
| BES4.5NLC1 | DFN2X2-3L | 3k       | Tape and reel |

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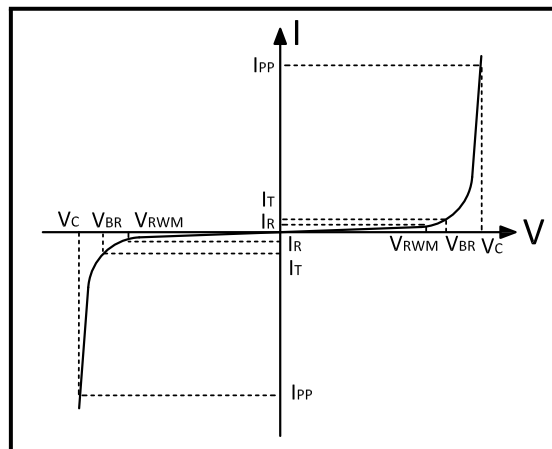
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ESD Protection Diode

## Electrical Parameters ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| Symbol    | Parameter                           |
|-----------|-------------------------------------|
| $I_{PP}$  | Maximum Reverse Peak Pulse Current  |
| $V_C$     | Clamping Voltage @ $I_{PP}$         |
| $V_{RWM}$ | Peak Reverse Working Voltage        |
| $I_R$     | Reverse Leakage Current @ $V_{RWM}$ |
| $V_{BR}$  | Breakdown Voltage @ $I_T$           |
| $I_T$     | Test Current                        |
|           |                                     |
|           |                                     |
|           |                                     |

Note: 8/20us pulse Waveform.



## Absolute Maximum Rating

| Rating                                         | Symler    | Value          | Units            |
|------------------------------------------------|-----------|----------------|------------------|
| Peak Pulse Power ( $t_p = 8/20\mu\text{s}$ )   | $P_{PP}$  | 4320           | Watts            |
| Peak Pulse Current ( $t_p = 8/20\mu\text{s}$ ) | $I_{PP}$  | 240            | A                |
| ESD per IEC 61000-4-2 (Air)                    | $V_{ESD}$ | 30             | KV               |
| ESD per IEC 61000-4-2 (Contact)                |           | 30             |                  |
| Lead Soldering Temperature                     | $T_L$     | 260(10seconds) | $^\circ\text{C}$ |
| Junction Temperature                           | $T_J$     | -55 to + 150   | $^\circ\text{C}$ |
| Storage Temperature                            | $T_{stg}$ | -55 to + 150   | $^\circ\text{C}$ |

## Electrical Characteristics

| Parameter                 | Symler    | Conditions                                    | Min | Typical | Max | Units         |
|---------------------------|-----------|-----------------------------------------------|-----|---------|-----|---------------|
| Reverse Stand-Off Voltage | $V_{RWM}$ | —                                             | —   | —       | 4.5 | V             |
| Reverse Breakdown Voltage | $V_{BR}$  | $I_T = 1\text{mA}$                            | 4.7 | 5.0     | 8.0 | V             |
| Reverse Leakage Current   | $I_R$     | $V_{RWM} = 4.5\text{V}, T = 25^\circ\text{C}$ | —   | —       | 0.5 | $\mu\text{A}$ |
| Clamping Voltage          | $V_C$     | $I_{PP} = 240\text{A}, t_p = 8/20\mu\text{s}$ | —   | 16      | 18  | V             |
| Junction Capacitance      | $C_j$     | $V_R = 0\text{V}, f = 1\text{MHz}$            | —   | 300     | 400 | pF            |



Typical Characteristics

Figure 1: Peak Pulse Power vs. Pulse Time

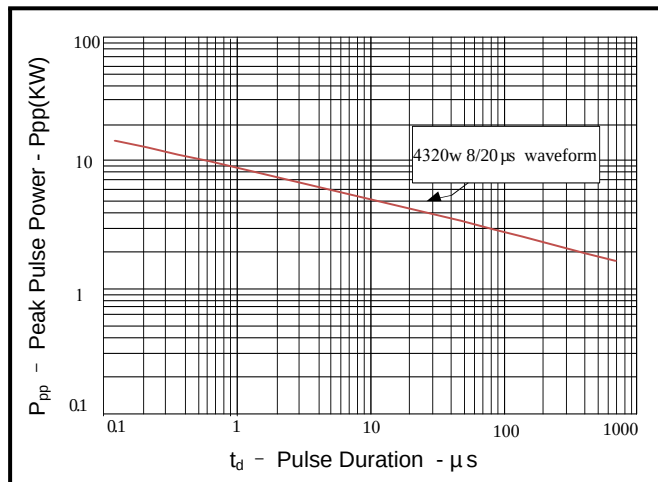


Figure 2: Power Derating Curve

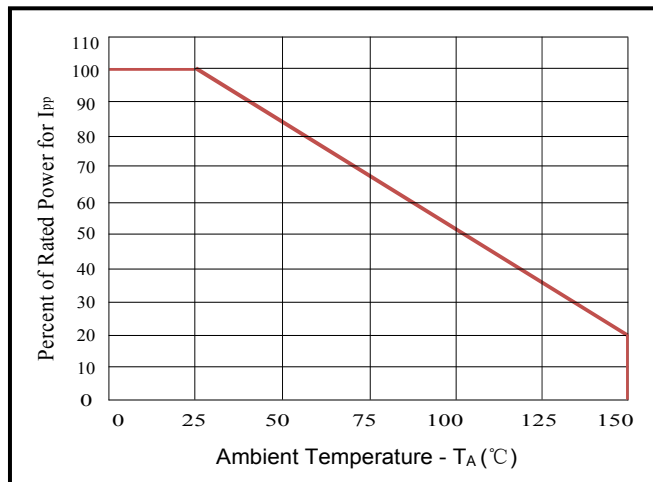


Figure 3: Pulse Waveform

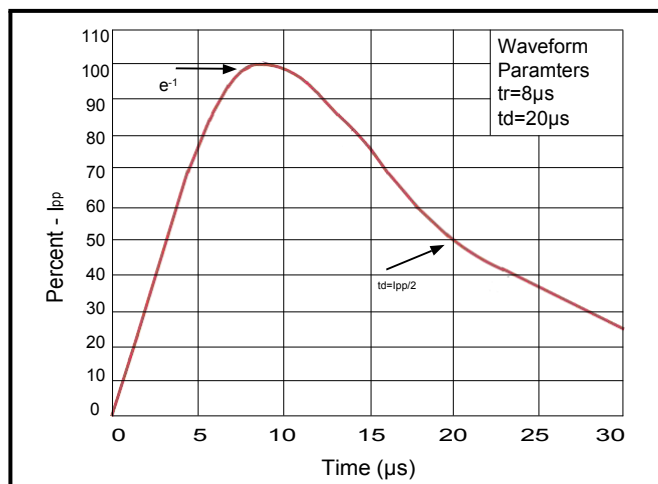
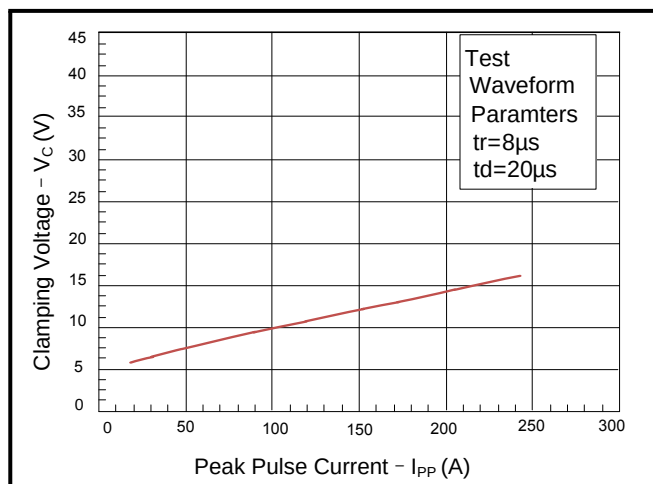


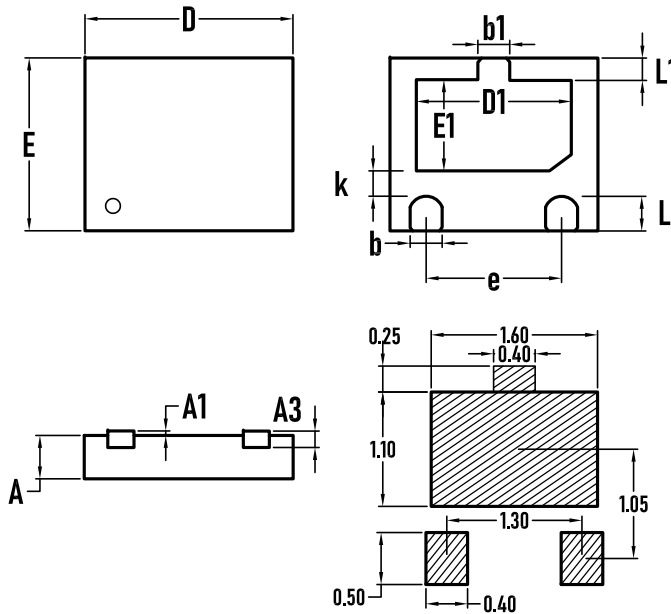
Figure 4: Clamping Voltage vs. I\_PP



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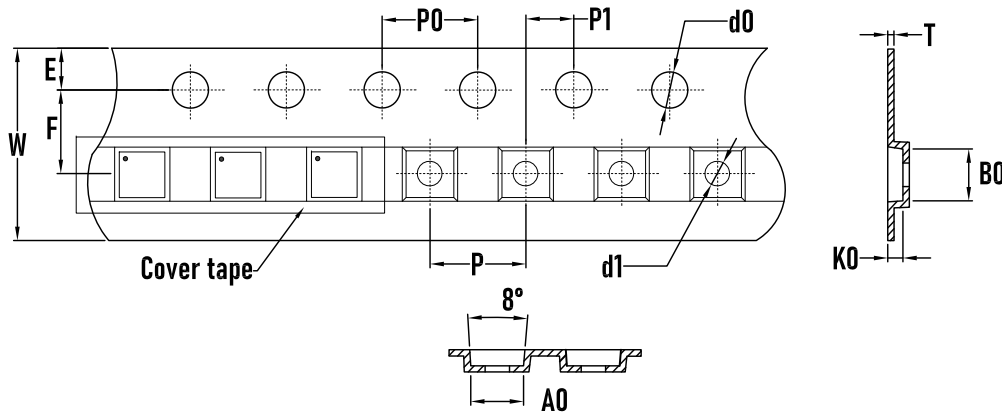
ESD Protection Diode

## Outline Drawing – DFN2X2-3L



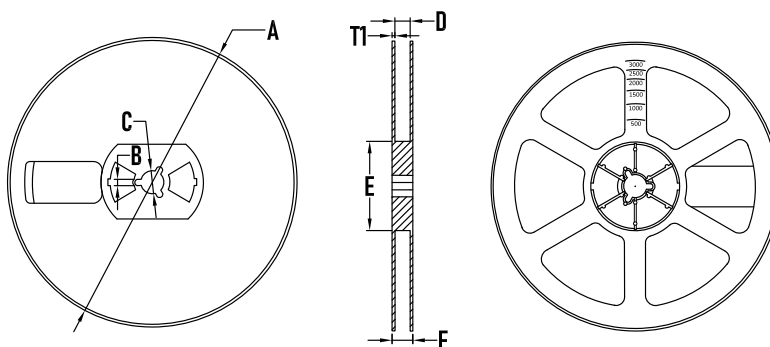
| SYMBOL | MILLIMETER |      |      |
|--------|------------|------|------|
|        | MIN.       | Typ. | MAX. |
| A      | 0.45       | 0.50 | 0.55 |
| A1     | —          | 0.02 | 0.05 |
| A3     | 0.17       | 0.20 | 0.23 |
| D      | 1.95       | 2.00 | 2.05 |
| E      | 1.95       | 2.00 | 2.05 |
| D1     | 1.45       | 1.50 | 1.55 |
| E1     | 1.00       | 1.05 | 1.10 |
| b      | 0.25       | 0.30 | 0.35 |
| b1     | 0.25       | 0.30 | 0.35 |
| K      | 0.25MIN.   |      |      |
| e      | 1.30BSC    |      |      |
| L      | 0.35       | 0.40 | 0.45 |
| L1     | 0.20       | 0.25 | 0.30 |

## Packaging Tape - DFN2X2-3L



| SYMBOL | MILLIMETER                             |
|--------|----------------------------------------|
| A0     | 2.2±0.05                               |
| B0     | 2.2±0.05                               |
| d0     | 1.5 <sup>+0.1</sup> <sub>-0</sub>      |
| d1     | 1.0(MIN)                               |
| E      | 1.75±0.10                              |
| F      | 3.50±0.05                              |
| K0     | 0.65±0.05                              |
| P      | 4.00±0.1                               |
| P0     | 4.00±0.1                               |
| P1     | 2.00±0.05                              |
| W      | 8.00 <sup>+0.03</sup> <sub>-0.01</sub> |
| T      | 0.25±0.05                              |

## Packaging Reel



| SYMBOL   | MILLIMETER                      |
|----------|---------------------------------|
| A        | 178±1                           |
| B        | 3.5±0.2                         |
| C        | 14.3±0.2                        |
| D        | 9.8 <sup>+2</sup> <sub>-1</sub> |
| E        | 54.5±0.5                        |
| F        | 12.4±0.5                        |
| T1       | 1.0±0.2                         |
| Quantity | 3000PCS                         |

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