



ESDHLC3V301D3 THRU ESDHLC3601D3

Uni-directional TVS Diode for ESD Protection

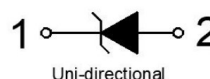
1. Features

- 350 Watts peak pulse power per line ($t_p=8/20\mu s$)
- Protects one uni-directional I/O line
- Low clamping voltage
- Working voltage: 3.3V 12V 24V 36V
- Low leakage current
- RoHS compliant
- IEC61000-4-2 (ESD) $\pm 30kV$ (air), $\pm 30kV$ (contact)

2. Mechanical Data

- Case: Molded Plastic, SOD323.
- Epoxy: UL 94V-0 rate flame retardant.
- Mounting Position : Any.

SOD323



Maximum Ratings and Electrical Characteristics

| ESDHLC3V301D3 | | | |
|------------------------------------|-----------|-------------|-------------|
| Parameter | Symbol | Value | Unit |
| Peak Pulse Power (8/20 μs) | P_{pp} | 350 | W |
| Peak Pulse Current (8/20 μs) | I_{pp} | 20 | A |
| ESD per IEC 61000-4-2 (Air) | VESD | ± 30 | kV |
| ESD per IEC 61000-4-2 (Contact) | | ± 30 | |
| Operating Temperature Range | T_J | -55 to +125 | $^{\circ}C$ |
| Storage Temperature Range | T_{stg} | -55 to +150 | $^{\circ}C$ |
| ESDHLC1201D3 | | | |
| Parameter | Symbol | Value | Unit |
| Peak Pulse Power (8/20 μs) | P_{pp} | 350 | W |
| Peak Pulse Current (8/20 μs) | I_{pp} | 11 | A |
| ESD per IEC 61000-4-2 (Air) | VESD | ± 30 | kV |
| ESD per IEC 61000-4-2 (Contact) | | ± 30 | |
| Operating Temperature Range | T_J | -55 to +125 | $^{\circ}C$ |
| Storage Temperature Range | T_{stg} | -55 to +150 | $^{\circ}C$ |



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Maximum Ratings and Electrical Characteristics

| ESDHLC2401D3 | | | |
|-----------------------------------|------------------|--------------|--------------|
| Parameter | Symbol | Value | Unit |
| Peak Pulse Power (8/20 μ s) | P _{pp} | 350 | W |
| Peak Pulse Current (8/20 μ s) | I _{pp} | 7 | A |
| ESD per IEC 61000-4-2 (Air) | V _{ESD} | \pm 30 | kV |
| ESD per IEC 61000-4-2 (Contact) | | \pm 30 | |
| Operating Temperature Range | T _J | -55 to +125 | $^{\circ}$ C |
| Storage Temperature Range | T _{stg} | -55 to +150 | $^{\circ}$ C |
| ESDHLC3601D3 | | | |
| Parameter | Symbol | Value | Unit |
| Peak Pulse Power (8/20 μ s) | P _{pp} | 350 | W |
| Peak Pulse Current (8/20 μ s) | I _{pp} | 5 | A |
| ESD per IEC 61000-4-2 (Air) | V _{ESD} | \pm 30 | kV |
| ESD per IEC 61000-4-2 (Contact) | | \pm 30 | |
| Operating Temperature Range | T _J | -55 to +125 | $^{\circ}$ C |
| Storage Temperature Range | T _{stg} | -55 to +150 | $^{\circ}$ C |

Electrical Characteristics (TA=25 $^{\circ}$ C unless otherwise noted)

| ESDHLC3V301D3 | | | | | | |
|-------------------------|------------------|------------|------------|------------|-------------|--|
| Parameter | Symbol | Min | Typ | Max | Unit | Test Condition |
| Reverse Working Voltage | V _{RWM} | | | 3.3 | V | |
| Breakdown Voltage | V _{BR} | 4.0 | | | V | I _T = 1mA |
| Reverse Leakage Current | I _R | | | 40 | μ A | V _{RWM} = 3.3V |
| Clamping Voltage | V _C | | 6.5 | | V | I _{PP} = 1A (8 x 20 μ s pulse) |
| Clamping Voltage | V _C | | | 10.5 | V | I _{PP} = 20A (8 x 20 μ s pulse) |
| Junction Capacitance | C _J | | 450 | | pF | V _R = 0V, f = 1MHz |



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Electrical Characteristics (TA=25°C unless otherwise noted)

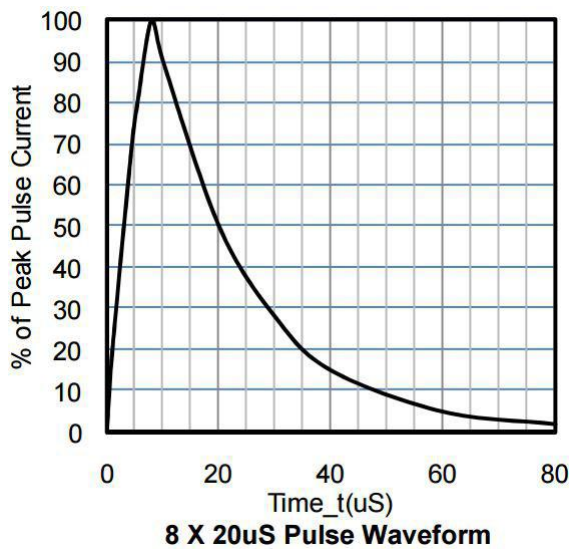
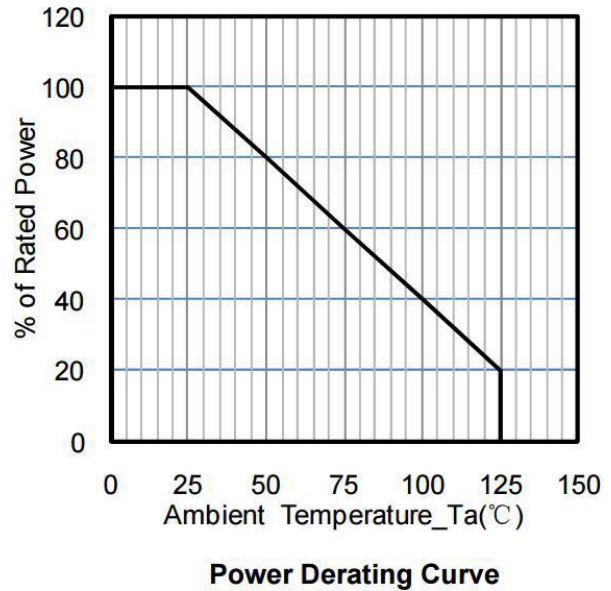
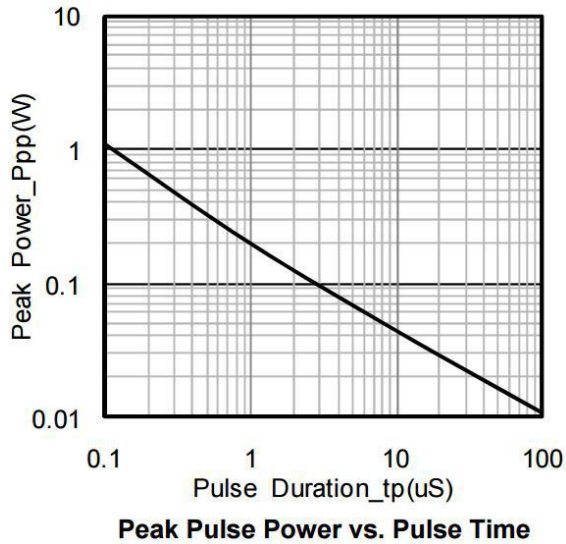
| ESDHLC1201D3 | | | | | | |
|-------------------------|------------------|------|-----|-----|------|----------------------------|
| Parameter | Symbol | Min | Typ | Max | Unit | Test Condition |
| Reverse Working Voltage | V _{RWM} | | | 12 | V | |
| Breakdown Voltage | V _{BR} | 13.3 | | | V | IT = 1mA |
| Reverse Leakage Current | I _R | | | 1 | uA | VRWM = 12V |
| Clamping Voltage | V _C | | 19 | | V | IPP = 1A (8 x 20uS pulse) |
| Clamping Voltage | V _C | | | 32 | V | IPP = 11A (8 x 20uS pulse) |
| Junction Capacitance | C _J | | 130 | | pF | VR = 0V, f = 1MHz |
| ESDHLC2401D3 | | | | | | |
| Parameter | Symbol | Min | Typ | Max | Unit | Test Condition |
| Reverse Working Voltage | V _{RWM} | | | 24 | V | |
| Breakdown Voltage | V _{BR} | 26.7 | | | V | IT = 1mA |
| Reverse Leakage Current | I _R | | | 1 | uA | VRWM = 24V |
| Clamping Voltage | V _C | | 43 | | V | IPP = 1A (8 x 20uS pulse) |
| Clamping Voltage | V _C | | | 52 | V | IPP = 7A (8 x 20uS pulse) |
| Junction Capacitance | C _J | | 80 | | pF | VR = 0V, f = 1MHz |
| ESDHLC3601D3 | | | | | | |
| Parameter | Symbol | Min | Typ | Max | Unit | Test Condition |
| Reverse Working Voltage | V _{RWM} | | | 36 | V | |
| Breakdown Voltage | V _{BR} | 40 | | | V | IT = 1mA |
| Reverse Leakage Current | I _R | | | 1 | uA | VRWM = 40V |
| Clamping Voltage | V _C | | 60 | | V | IPP = 1A (8 x 20uS pulse) |
| Clamping Voltage | V _C | | | 52 | V | IPP = 5A (8 x 20uS pulse) |
| Junction Capacitance | C _J | | 60 | | pF | VR = 0V, f = 1MHz |



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Rating And Characteristic Curves



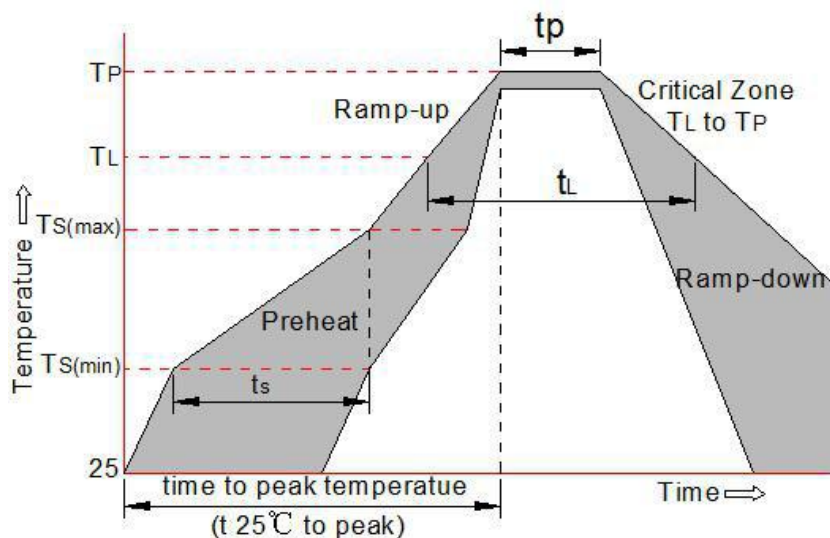


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Soldering Parameters

| | | |
|---|-----------------------------------|-------------------------------------|
| Reflow Condition | | Pb-Free assembly (see as bellow) |
| Pre Heat | -Temperature Min ($T_{s(min)}$) | +150°C |
| | -Temperature Max($T_{s(max)}$) | +200°C |
| | -Time (Min to Max) (t_s) | 60-180 secs. |
| Average ramp up rate (Liquid us Temp (T_L) to peak) | | 3°C/sec. Max |
| $T_{s(max)}$ to T_L - Ramp-up Rate | | 3°C/sec. Max |
| Reflow | -Temperature(T_L) (Liquid us) | +217°C |
| | -Temperature(t_L) | 60-150 secs. |
| Peak Temp (T_p) | | +260(+0/-5)°C |
| Time within 5°C of actual Peak Temp (t_p) | | 30 secs. Max |
| Ramp-down Rate | | 6°C/sec. Max |
| Time 25°C to Peak Temp (T_p) | | 8 min. Max |
| Do not exceed | | +260°C |

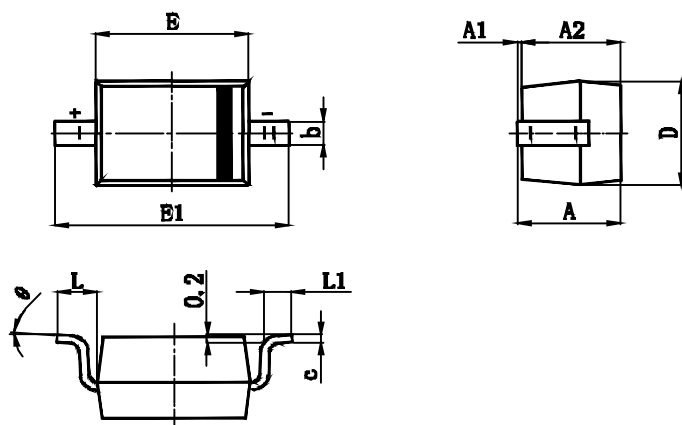




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Package Mechanical Data



| Symbol | Min.(mm) | Max.(mm) |
|----------|----------|----------|
| A | | 1.000 |
| A1 | 0.000 | 0.100 |
| A2 | 0.800 | 0.900 |
| b | 0.250 | 0.350 |
| c | 0.080 | 0.150 |
| D | 1.200 | 1.400 |
| E | 1.600 | 1.800 |
| E1 | 2.500 | 2.700 |
| L | 0.475REF | |
| L1 | 0.250 | 0.400 |
| θ | 0° | 8° |



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