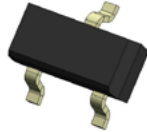


STS23 2XXXBXXX

TVS Diode array ESD suppressor



Product features

- 350 Watts peak pulse power per line ($t_p = 8/20 \mu s$)
- Protects two I/O lines with uni-directional
- Low clamping voltage
- Low leakage current
- Meets moisture sensitivity level (MSL) 3
- Molding compound flammability rating: UL 94V-0
- Termination finish: Tin

Applications

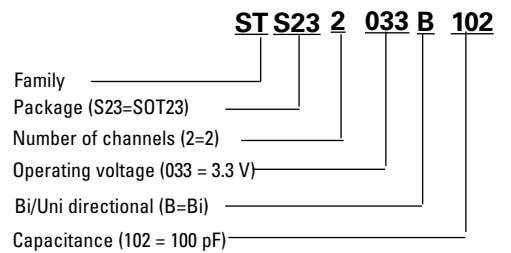
- RS-232, RS-422 & RS-485
- Servers, notebook, and desktop
- Cellular handsets and accessories
- Control & monitoring systems
- Portable electronics
- Wireless bus protection
- Set-top box

Environmental compliance and general specifications

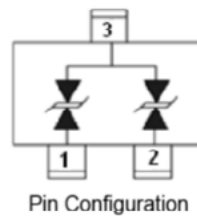
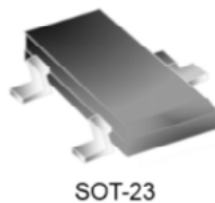
- IEC61000-4-2 (ESD)
 - Up to ± 30 kV (air)
 - Up to ± 30 kV (contact)
- IEC61000-4-5 (Lightning) Up to 20 A (8/20 μs)



Ordering part number



Pin out/functional diagram



Absolute maximum ratings

(+25 °C, RH=45%-75%, unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|--|-----------|---|---------------|
| | | STS232033B102, STS232050B751, STS232120B301, STS232150B251, STS232360B151 | STS232240B151 |
| Peak pulse power dissipation on 8/20 μs waveform | P_{pp} | 350 | W |
| ESD per IEC 61000-4-2 (Air) | V_{ESD} | +/-15 | kV |
| ESD per IEC 61000-4-2 (Contact) | | +/-8 | +/-30 |
| Lead soldering temperature | T_L | +260 (10 seconds) | °C |
| Operating junction temperature range | T_J | -55 to +125 | °C |
| Storage temperature range | T_{STG} | -55 to +150 | °C |

Electrical characteristics

(+25 °C)

STS232033B102

| Parameter | Test condition | Minimum | Typical | Maximum | Symbol (Units) |
|---------------------------|------------------------------------|-------------------------------------|---------|---------|----------------|
| Reverse working voltage | - | - | - | 3.3 | V_{RWM} (V) |
| Reverse breakdown voltage | $I_r = 1$ mA | 3.6 | - | - | V_{BR} (V) |
| Reverse leakage current | $V_{RWM} = 3.3$ V | - | - | 1 | I_r (μA) |
| Clamping voltage | $I_{pp} = 1$ A, $t_p = 8/20$ μs | - | - | 8 | V_c (V) |
| | | $I_{pp} = 20$ A, $t_p = 8/20$ μs | - | - | 26 |
| Junction capacitance* | $V_{RWM} = 0$ V, $f = 1$ MHz | - | 100 | - | C_J (pF) |

STS232050B751

| Parameter | Test condition | Minimum | Typical | Maximum | Symbol (Units) |
|---------------------------|------------------------------------|-------------------------------------|---------|---------|----------------|
| Reverse working voltage | - | - | - | 5.0 | V_{RWM} (V) |
| Reverse breakdown voltage | $I_r = 1$ mA | 5.5 | - | - | V_{BR} (V) |
| Reverse leakage current | $V_{RWM} = 5$ V | - | - | 1 | I_r (μA) |
| Clamping voltage | $I_{pp} = 1$ A, $t_p = 8/20$ μs | - | - | 9.8 | V_c (V) |
| | | $I_{pp} = 18$ A, $t_p = 8/20$ μs | - | - | 16.7 |
| Junction capacitance* | $V_{RWM} = 0$ V, $f = 1$ MHz | - | 75 | - | C_J (pF) |

STS232120B301

| Parameter | Test condition | Minimum | Typical | Maximum | Symbol (Units) |
|---------------------------|--|---------|---------|---------|------------------|
| Reverse working voltage | - | - | - | 12 | V_{RWM} (V) |
| Reverse breakdown voltage | $I_T = 1$ mA | 13.3 | - | - | V_{BR} (V) |
| Reverse leakage current | $V_{RWM} = 12$ V | - | - | 1 | I_R (μ A) |
| Clamping voltage | $I_{pp} = 1$ A, $t_p = 8/20$ μ s | - | - | 19 | V_C (V) |
| | $I_{pp} = 12$ A, $t_p = 8/20$ μ s | - | - | 25 | V_C (V) |
| Junction capacitance* | $V_{RWM} = 0$ V, $f = 1$ MHz | - | 30 | - | C_J (pF) |

STS232150B251

| Parameter | Test condition | Minimum | Typical | Maximum | Symbol (Units) |
|---------------------------|--|---------|---------|---------|------------------|
| Reverse working voltage | - | - | - | 15 | V_{RWM} (V) |
| Reverse breakdown voltage | $I_T = 1$ mA | 16.7 | - | - | V_{BR} (V) |
| Reverse leakage current | $V_{RWM} = 15$ V | - | - | 1 | I_R (μ A) |
| Clamping voltage | $I_{pp} = 1$ A, $t_p = 8/20$ μ s | - | - | 24 | V_C (V) |
| | $I_{pp} = 10$ A, $t_p = 8/20$ μ s | - | - | 35 | V_C (V) |
| Junction capacitance* | $V_{RWM} = 0$ V, $f = 1$ MHz | - | 25 | - | C_J (pF) |

STS232240B151

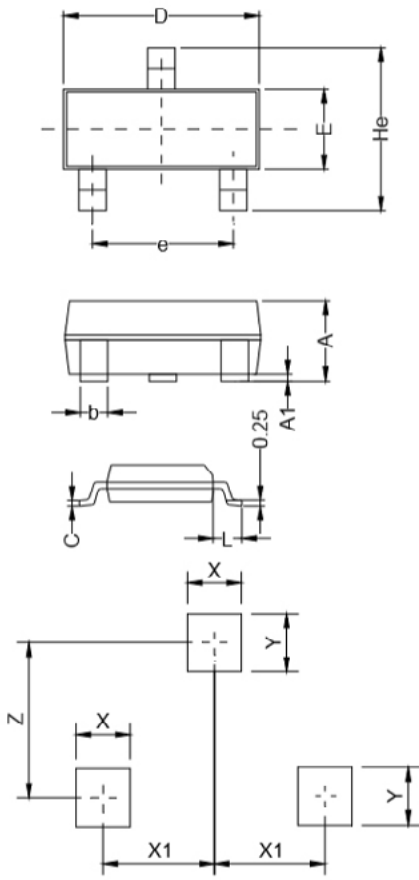
| Parameter | Test condition | Minimum | Typical | Maximum | Symbol (Units) |
|---------------------------|---|---------|---------|---------|------------------|
| Reverse working voltage | - | - | - | 24 | V_{RWM} (V) |
| Reverse breakdown voltage | $I_T = 1$ mA | 26.7 | - | - | V_{BR} (V) |
| Reverse leakage current | $V_{RWM} = 24$ V | - | - | 1 | I_R (μ A) |
| Clamping voltage | $I_{pp} = 1$ A, $t_p = 8/20$ μ s | - | - | 43 | V_C (V) |
| | $I_{pp} = 6$ A, $t_p = 8/20$ μ s | - | - | 60 | V_C (V) |
| Junction capacitance* | $V_{RWM} = 0$ V, $f = 1$ MHz | - | 15 | - | C_J (pF) |

STS232360B151

| Parameter | Test condition | Minimum | Typical | Maximum | Symbol (Units) |
|---------------------------|---|---------|---------|---------|------------------|
| Reverse working voltage | - | - | - | 36 | V_{RWM} (V) |
| Reverse breakdown voltage | $I_T = 1$ mA | 40 | - | - | V_{BR} (V) |
| Reverse leakage current | $V_{RWM} = 36$ V | - | - | 1 | I_R (μ A) |
| Clamping voltage | $I_{pp} = 1$ A, $t_p = 8/20$ μ s | - | - | 60 | V_C (V) |
| | $I_{pp} = 6$ A, $t_p = 8/20$ μ s | - | - | 90 | V_C (V) |
| Junction capacitance* | $V_{RWM} = 0$ V, $f = 1$ MHz | - | 15 | - | C_J (pF) |

* C_J measured @ $V_{RWM}=0$ V, $f = 1$ MHz (pin 1 to pin3, pin 2 to pin3)

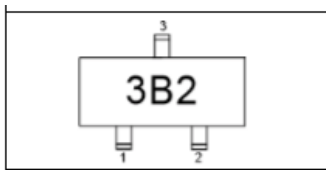
Mechanical parameters, pad layout- mm/inches



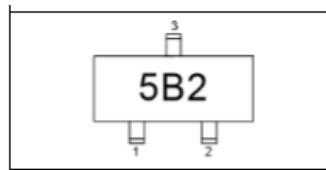
Land Pattern

| Dimension | Millimeters | | Inches | |
|-----------|-------------|---------|------------|---------|
| | Minimum | Maximum | Minimum | Maximum |
| A | 0.90 | 1.15 | 0.035 | 0.045 |
| A1 | 0.00 | 0.10 | 0.000 | 0.004 |
| b | 0.25 | 0.325 | 0.010 | 0.013 |
| C | 0.22 | 0.25 | 0.009 | 0.010 |
| D | 2.80 | 3.00 | 0.110 | 0.118 |
| e | 1.80 | 1.90 | 0.071 | 0.075 |
| E | 1.20 | 1.40 | 0.047 | 0.055 |
| L | 0.30 | 0.50 | 0.012 | 0.020 |
| He | 2.25 | 2.55 | 0.089 | 0.100 |
| X | 0.80 Typ. | | 0.031 Typ. | |
| X1 | 0.95 Typ. | | 0.037 Typ. | |
| Y | 0.80 Typ. | | 0.031 Typ. | |
| Z | 2.02 Typ. | | 0.080 Typ. | |

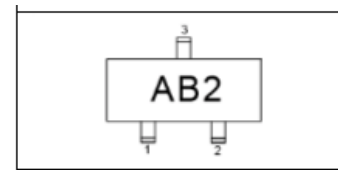
Part marking



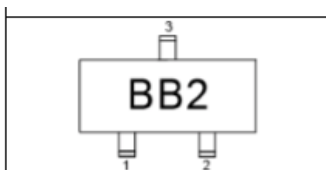
(STS232033B102)



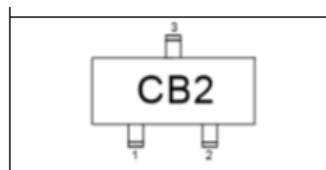
(STS232050B751)



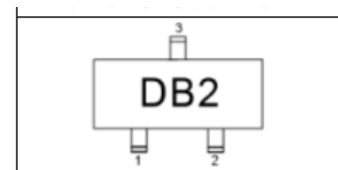
(STS232120B301)



(STS232150B251)



(STS232240B151)

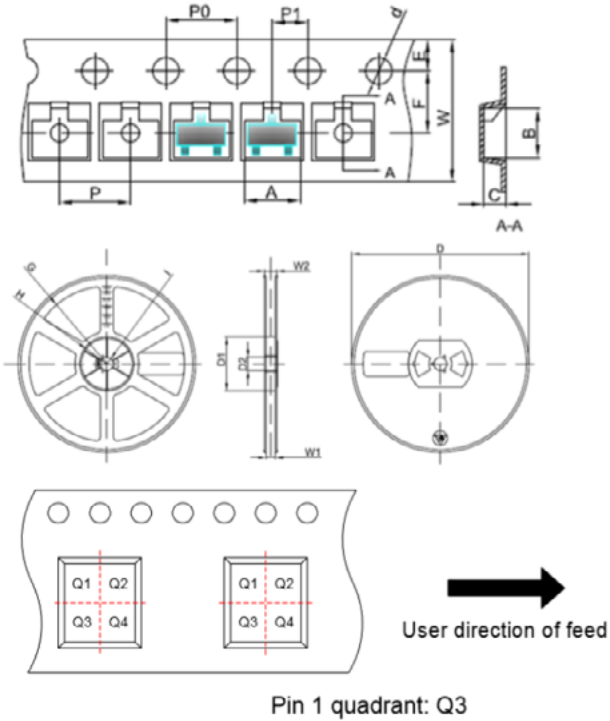


(STS232360B151)

Packaging information mm/inches

Drawing not to scale.

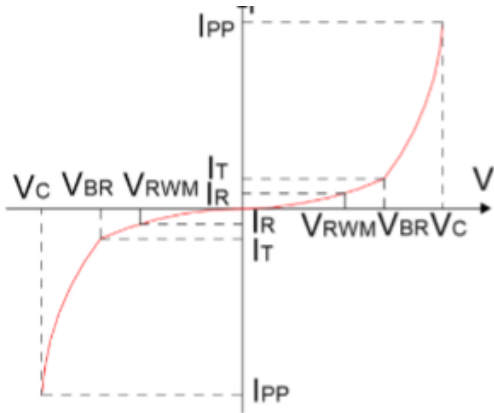
Supplied in tape and reel packaging, 3,000 parts per 7" diameter reel (EIA-481)



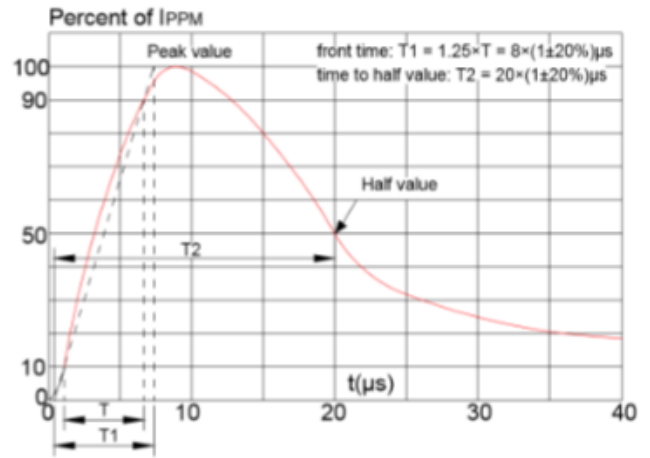
| Symbol | Millimeters | Inches |
|--------|-------------|--------|
| | Typ. | Typ. |
| A | 3.15 | 0.124 |
| B | 2.77 | 0.109 |
| C | 1.22 | 0.048 |
| d | Φ1.50 | Φ0.059 |
| E | 1.75 | 0.069 |
| F | 3.50 | 0.138 |
| P0 | 4.00 | 0.157 |
| P | 4.00 | 0.157 |
| P1 | 2.00 | 0.079 |
| W | 8.00 | 0.315 |
| D | Φ178 | Φ7.008 |
| D1 | 54.40 | 2.142 |
| D2 | 13.00 | 0.512 |
| G | R78.00 | R3.071 |
| H | R25.60 | R1.008 |
| I | R6.50 | R0.256 |
| W1 | 9.50 | 0.374 |
| W2 | 12.30 | 0.484 |

Ratings and V-I characteristic curves (+25 °C unless otherwise noted)

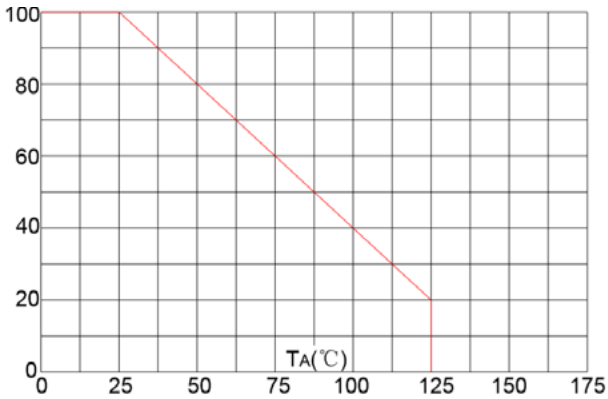
V- I curve characteristics (Bi-directional)



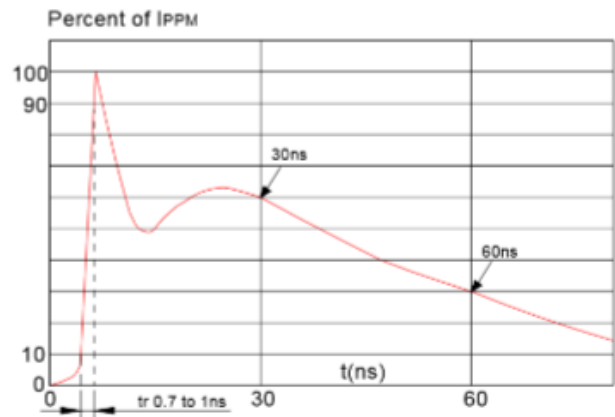
Pulse waveform (8/20 μ s)



Pulse derating curve



ESD waveform



Solder reflow profile

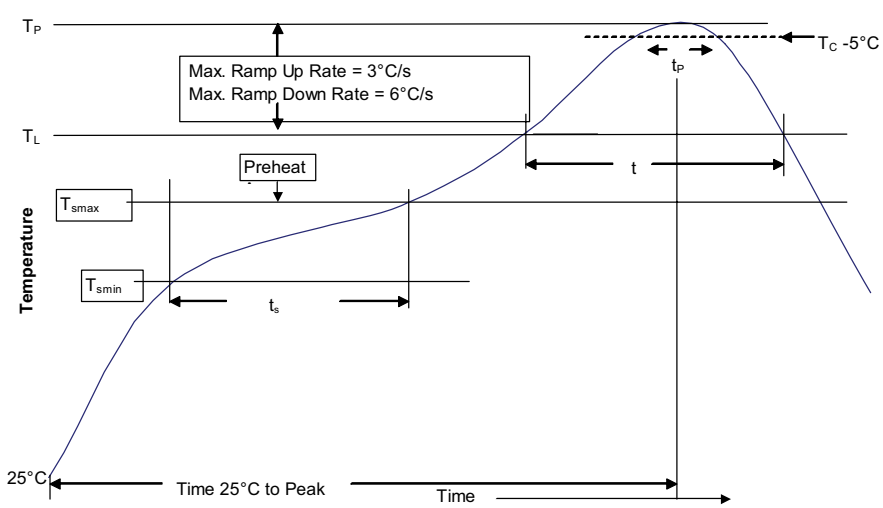


Table 1 - Standard SnPb solder (T_C)

| Package thickness | Volume mm ³ <350 | Volume mm ³ ≥350 |
|-------------------|-----------------------------|-----------------------------|
| <2.5 mm | 235 °C | 220 °C |
| ≥2.5 mm | 220 °C | 220 °C |

Table 2 - Lead (Pb) free solder (T_C)

| Package thickness | Volume mm ³ <350 | Volume mm ³ 350 - 2000 | Volume mm ³ >2000 |
|-------------------|-----------------------------|-----------------------------------|------------------------------|
| <1.6 mm | 260 °C | 260 °C | 260 °C |
| 1.6 – 2.5 mm | 260 °C | 250 °C | 245 °C |
| >2.5 mm | 250 °C | 245 °C | 245 °C |

Reference J-STD-020

| Profile feature | Standard SnPb solder | Lead (Pb) free solder |
|---|----------------------|-----------------------|
| Preheat and soak | | |
| • Temperature min. (T _{smin}) | 100 °C | 150 °C |
| • Temperature max. (T _{smax}) | 150 °C | 200 °C |
| • Time (T _{smin} to T _{smax}) (t _s) | 60-120 seconds | 60-120 seconds |
| Ramp up rate T _L to T _p | 3 °C/ second max. | 3 °C/ second max. |
| Liquidous temperature (T _L) | 183 °C | 217 °C |
| Time (t _L) maintained above T _L | 60-150 seconds | 60-150 seconds |
| Peak package body temperature (T _p)* | Table 1 | Table 2 |
| Time (t _p)* within 5 °C of the specified classification temperature (T _C) | 20 seconds* | 30 seconds* |
| Ramp-down rate (T _p to T _L) | 6 °C/ second max. | 6 °C/ second max. |
| Time 25 °C to peak temperature | 6 minutes max. | 8 minutes max. |

* Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.

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