

# STS232712B451

## TVS Diode array ESD suppressor



### Product features

- 400 watts peak pulse power per line ( $t_p = 8/20 \mu s$ )
- Protects two 7 V to 12 V lines
- Low clamping voltage
- Low capacitance
- Solid-state silicon avalanche technology
- Meets moisture sensitivity level (MSL) 3
- Molding compound flammability rating: UL 94V-0
- Termination finish: Tin

### Applications

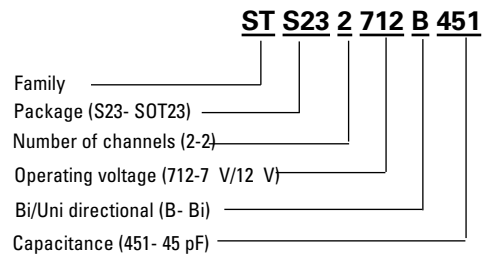
- Protection of RS-485 transceivers with extended common-mode range
- Security systems
- Automatic teller machines
- HFC systems
- Networks

### Environmental compliance and general specifications

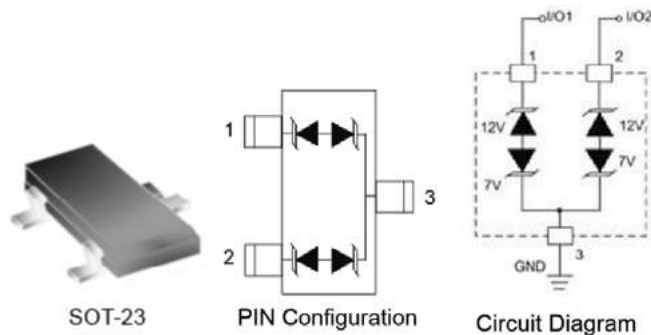
- IEC61000-4-2 (ESD)
  - $\pm 15$  kV (air)
  - $\pm 8$  kV (contact)
- IEC61000-4-5 (Lightning) 12 A (8/20  $\mu s$ )



### Ordering part number



### Pin out/functional diagram



### Absolute maximum ratings

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

#### STS232712B451

Parameter	Symbol	Value	Unit
Peak pulse power dissipation on 8/20 μs waveform	$P_{PP}$	400	W
ESD per IEC 61000-4-2 (Air)	$V_{ESD}$	+/-15	kV
ESD per IEC 61000-4-2 (Contact)		+/-8	
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)

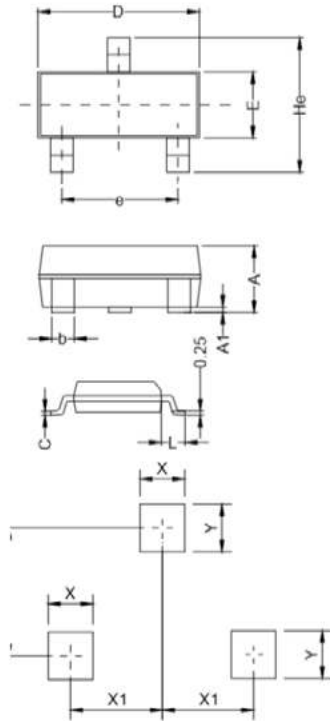
#### Pins 1, Pin 2 to Pin 3 (12 V TVS)

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse stand-off voltage	-	-	-	12	$V_{RWM}$ (V)
Reverse breakdown voltage	$I_T = 1$ mA	13.3	-	-	$V_{BR}$ (V)
Reverse leakage current	$V_R = V_{RWM}$	-	-	1	$I_R$ (μA)
Clamping voltage	$I_{PP} = 5$ A, $t_p = 8/20$ μs	-	20	23	$V_C$ (V)
		$I_{PP} = 12$ A, $t_p = 8/20$ μs	-	23	
Junction capacitance	$V_R = 0$ V, $f = 1$ MHz	-	-	75	$C_J$ (pF)
	$V_R = V_{RWM}$ , $f = 1$ MHz	-	45	-	

#### Pins 3, Pin 1 to Pin 2 (7 V TVS)

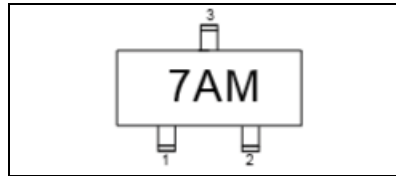
Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse stand-off voltage	-	-	-	7	$V_{RWM}$ (V)
Reverse breakdown voltage	$I_T = 1$ mA	7.5	-	-	$V_{BR}$ (V)
Reverse leakage current	$V_R = V_{RWM}$	-	-	1	$I_R$ (μA)
Clamping voltage	$I_{PP} = 5$ A, $t_p = 8/20$ μs	-	12	15	$V_C$ (V)
		$I_{PP} = 12$ A, $t_p = 8/20$ μs	-	15	
Junction capacitance	$V_R = 0$ V, $f = 1$ MHz	-	-	75	$C_J$ (pF)
	$V_R = V_{RWM}$ , $f = 1$ MHz	-	45	-	

**Mechanical parameters, pad layout- mm/inches**



Dimension	Millimeters		Inches	
	Minimum	Maximum	Minimum	Maximum
A	0.9	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	0.01
D	2.8	3.0	0.11	0.118
e	1.8	1.9	0.071	0.075
E	1.2	1.4	0.047	0.055
L	0.30	0.50	0.012	0.02
He	2.25	2.55	0.089	0.1
X	0.8		0.0315	
X1	0.95		0.037	
Y	0.80		0.0315	
Z	2.02		0.0795	

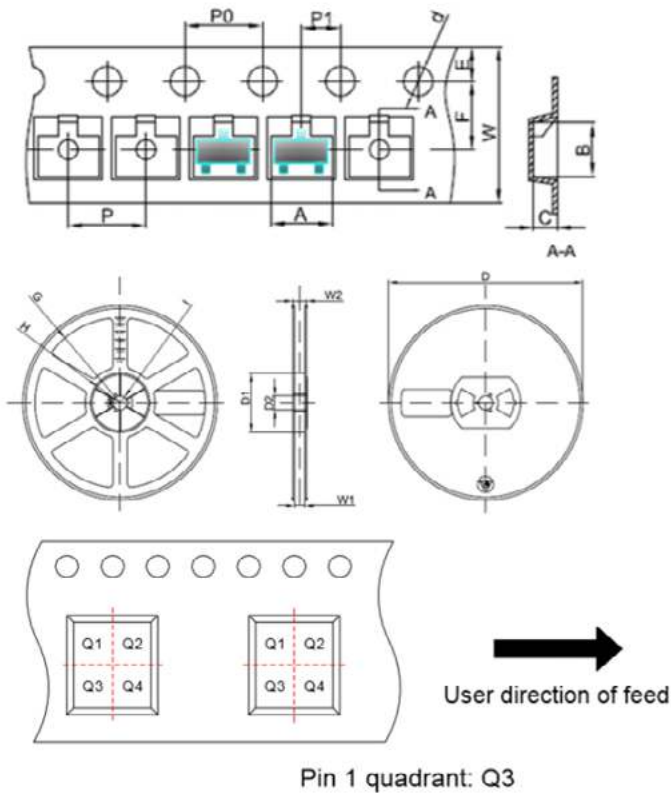
**Part marking**



**Packaging information mm/inches**

Drawing not to scale.

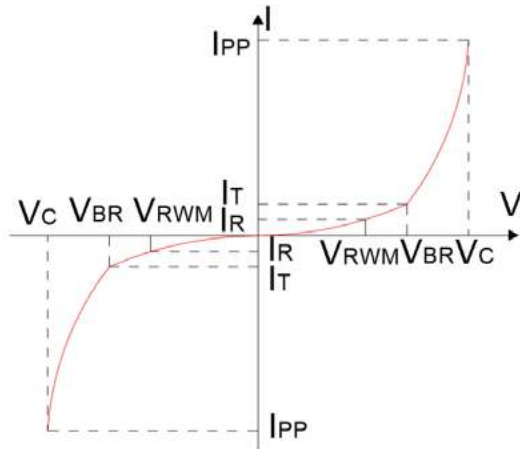
Supplied in tape and reel packaging, 3,000 parts per 7" diameter reel (EIA-481 compliant)



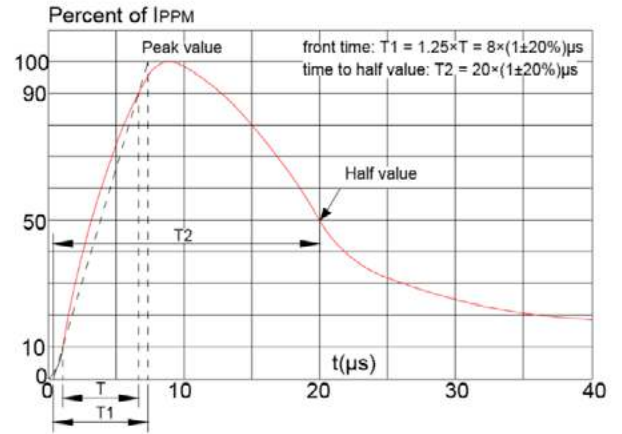
Symbol	Millimeter	Inches
	Typ.	Typ.
A	3.15	0.124
B	2.77	0.109
C	1.22	0.048
d	Φ1.50	Φ0.059
E	1.75	0.069
F	3.50	0.138
P0	4.00	0.157
P	4.00	0.157
P1	2.00	0.079
W	8.00	0.315
D	Φ178	Φ7.008
D1	54.40	2.142
D2	13.00	0.512
G	R78.00	R3.071
H	R25.60	R1.008
I	R6.50	R0.256
W1	9.50	0.374
W2	12.30	0.484

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

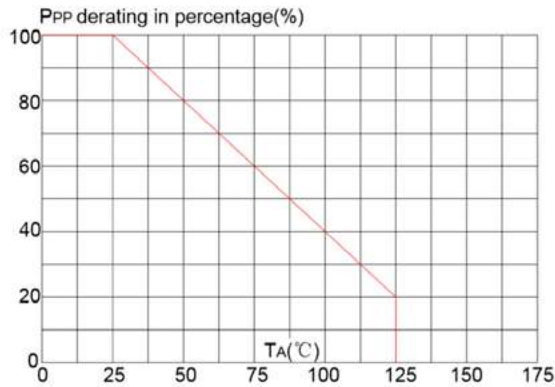
**V- I curve characteristics (Bi-directional)**



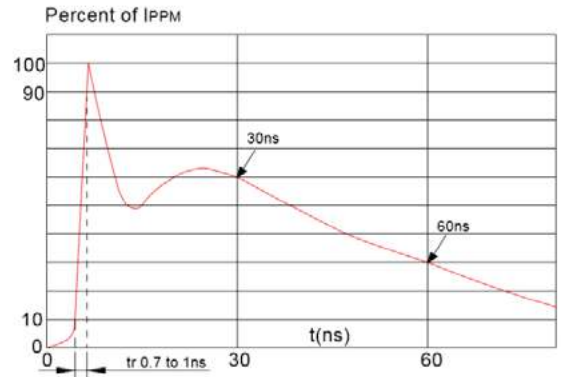
**Pulse waveform (8/20 μs)**



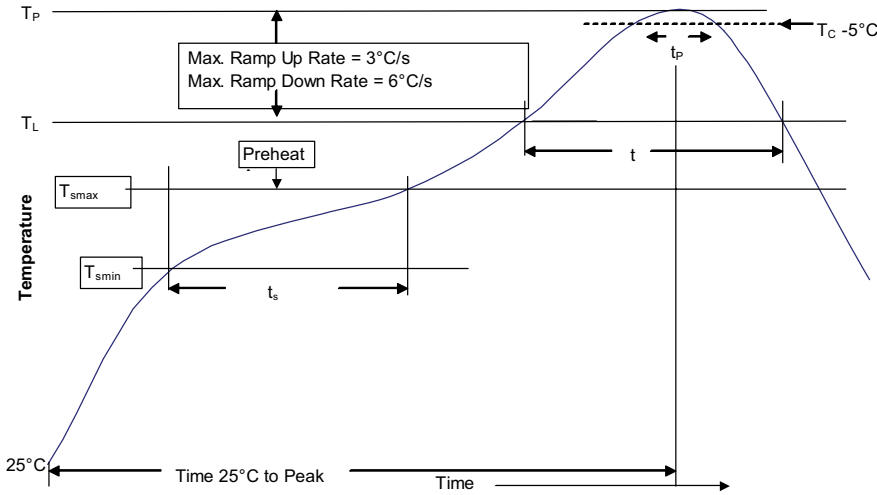
**Pulse derating curve**



**ESD waveform**



**Solder reflow profile**



**Table 1 - Standard SnPb solder ( $T_C$ )**

Package thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥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 <sup>3</sup> <350	Volume mm <sup>3</sup> 350 - 2000	Volume mm <sup>3</sup> >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	<ul style="list-style-type: none"> <li>Temperature min. (<math>T_{smin}</math>)</li> <li>Temperature max. (<math>T_{smax}</math>)</li> <li>Time (<math>T_{smin}</math> to <math>T_{smax}</math>) (<math>t_s</math>)</li> </ul>	<ul style="list-style-type: none"> <li>100 °C</li> <li>150 °C</li> <li>60-120 seconds</li> </ul>
Ramp up rate $T_L$ to $T_p$	3 °C/ second max.	3 °C/ second max.
Liquidous temperature ( $T_L$ ) Time ( $t_L$ ) maintained above $T_L$	<ul style="list-style-type: none"> <li>183 °C</li> <li>60-150 seconds</li> </ul>	<ul style="list-style-type: none"> <li>217 °C</li> <li>60-150 seconds</li> </ul>
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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