

STS23 2XXXUXXX

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

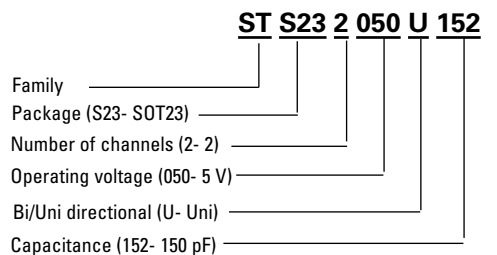
- RS-232, RS-422 & RS-485
- Servers, notebook, and desktop
- Cellular handsets and accessories
- Control & monitoring systems
- Portable electronics
- Wireless bus protection
- Set-top box

Environmental compliance and general specifications

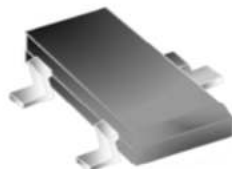
- IEC61000-4-2 (ESD)
 - Up to ± 15 kV (air)
 - Up to ± 8 kV (contact)
- IEC61000-4-5 (Lightning) Up to 180 A (8/20 μs)



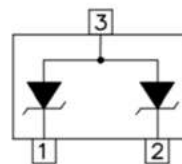
Ordering part number



Pin out/functional diagram



SOT-23



Pin Configuration

Absolute maximum ratings

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

Parameter	Symbol	Value	Unit
Peak pulse power dissipation on 8/20 μ s waveform	P_{pp}	350	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)

STS232050U152

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	5.0	V_{RWM} (V)
Reverse breakdown voltage	$I_T = 1$ mA	6.0	-	-	V_{BR} (V)
Reverse leakage current	$V_{RWM} = 5$ V	-	-	1	I_R (μ A)
Clamping voltage	$I_{pp} = 1$ A, $t_p = 8/20$ μ s	-	-	9.8	V_C (V)
	$I_{pp} = 18$ A, $t_p = 8/20$ μ s	-	-	16.7	V_C (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	150	180	C_J (pF)

STS232120U581

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	-	58	70	C_J (pF)

STS232150U451

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	-	45	-	C_J (pF)

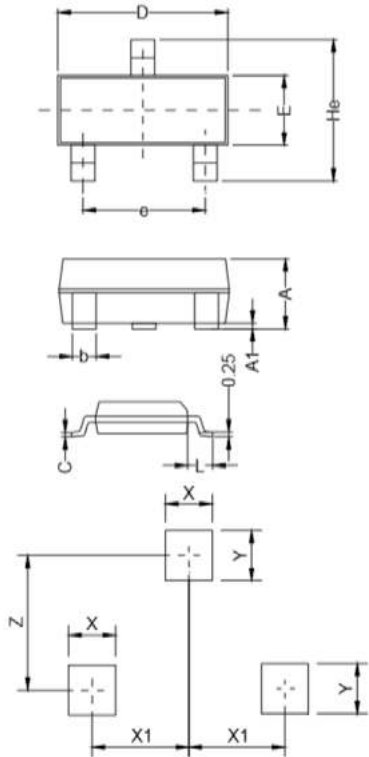
STS232240U301

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)
	$I_{PP} = 5$ A, $t_p = 8/20$ μ s	-	-	55	V_C (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	30	-	C_J (pF)

STS232360U261

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)
	$I_{PP} = 4$ A, $t_p = 8/20$ μ s	-	-	75	V_C (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	26	-	C_J (pF)

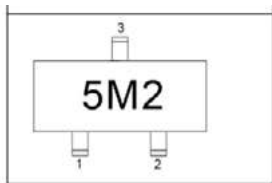
Mechanical parameters, pad layout- mm/inches



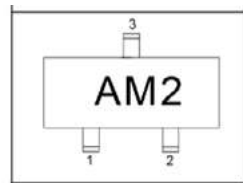
Land Pattern

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	

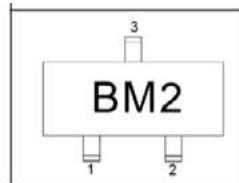
Part marking



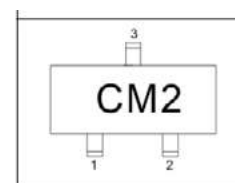
(STS232050U152)



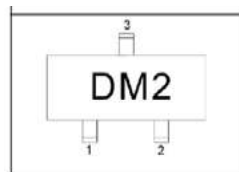
(STS232120U581)



(STS232150U451)



(STS232240U301)

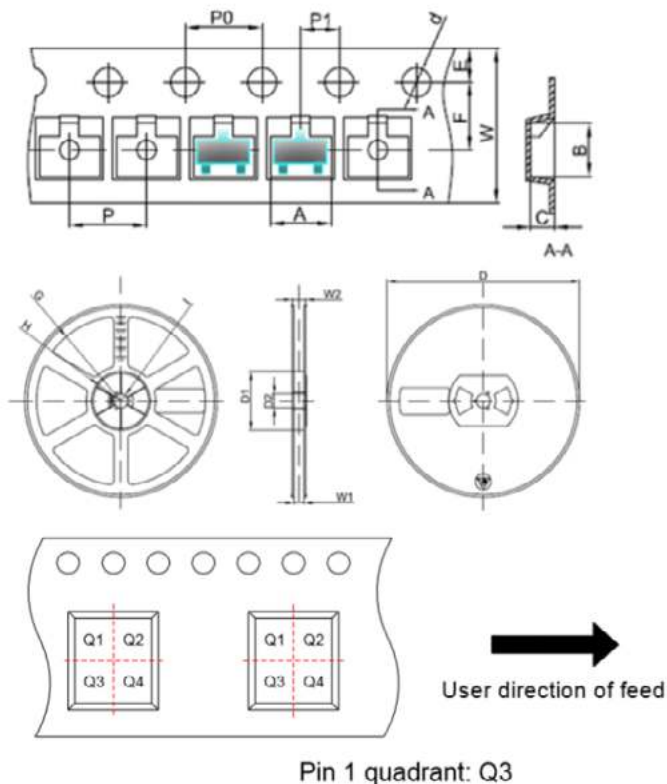


(STS232360U261)

Packaging information mm/inches

Drawing not to scale.

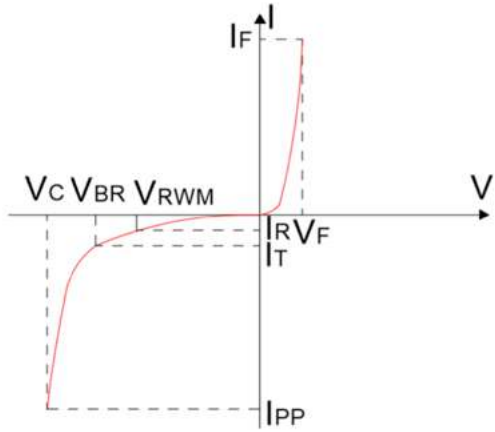
Supplied in tape and reel packaging, 3,000 parts per 7" diameter reel (EIA-481 compliant)



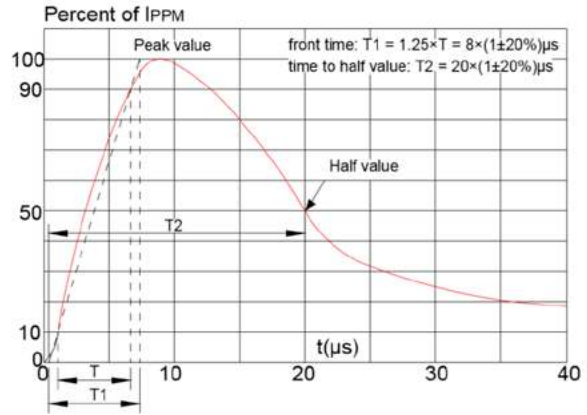
Symbol	Millimeters	Inches
	Typ.	Typ.
A	3.15	0.124
B	2.77	0.109
C	1.22	0.048
d	Φ1.50	Φ0.059
E	1.75	0.069
F	3.50	0.138
P0	4.00	0.157
P	4.00	0.157
P1	2.00	0.079
W	8.00	0.315
D	Φ178	Φ7.008
D1	54.40	2.142
D2	13.00	0.512
G	R78.00	R3.071
H	R25.60	R1.008
I	R6.50	R0.256
W1	9.50	0.374
W2	12.30	0.484

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

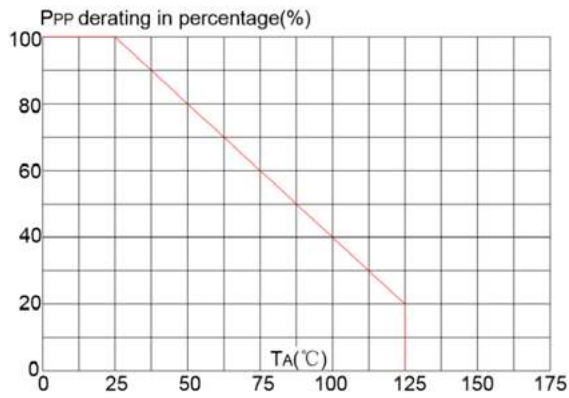
V- I curve characteristics (Uni-directional)



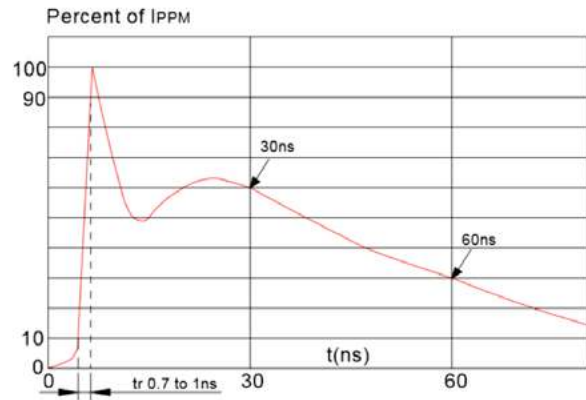
Pulse waveform (8/20 μ s)



Pulse derating curve



ESD waveform



Solder reflow profile

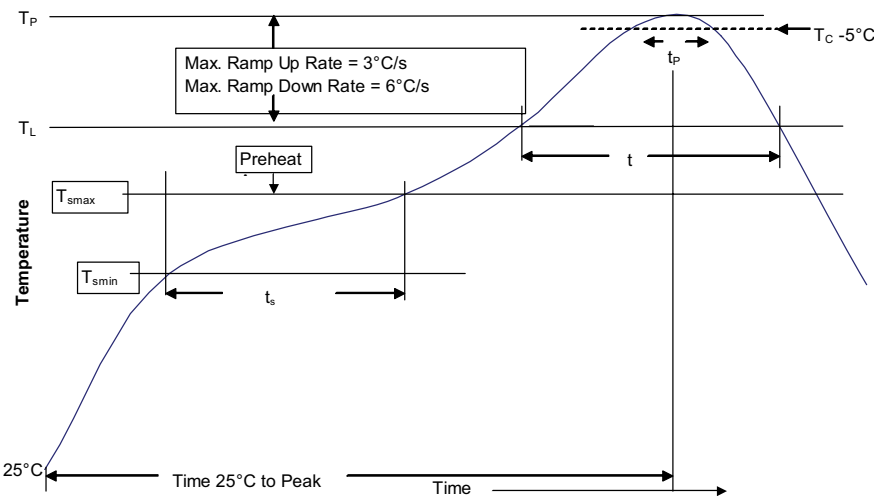


Table 1 - Standard SnPb solder (T_C)

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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