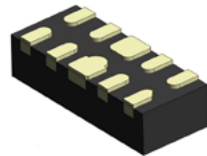


# STN254033UL33 and STN254033UL50

## TVS Diode array ESD suppressor



### Product features

- Solid-state silicon-avalanche technology
- Up to four I/O lines of protection
- Low operating and clamping voltage
- Ultra low capacitance
- Low leakage current
- Moisture sensitivity level (MSL): 3
- Molding compound flammability rating: UL 94V-0
- Termination finish: Ni/Pd/Au

### Applications

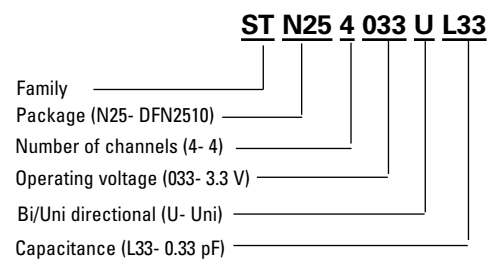
- Serial ATA
- PCI express
- Desktops, servers and notebooks
- MDDI ports
- USB 2.0, 3.0 and 3.1
- Display ports
- HDMI 1.3, 1.4 and 2.0
- Digital visual interfaces (DVI)

### Environmental compliance and general specifications

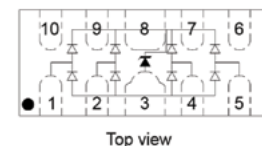
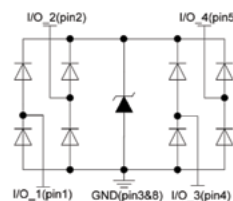
- IEC61000-4-2 (ESD)
  - Up to ±15 kV (air)
  - Up to ±15 kV (contact)
- IEC61000-4-5 (Lightning) Up to 7 A (8/20 μs)



### Ordering part number



### Pin out/functional diagram



### Absolute maximum ratings

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

Parameter	Symbol	Value		Unit
		STN254033UL33	STN254033UL50	
Peak pulse power dissipation on 8/20 $\mu$ s waveform	P <sub>pp</sub>	30	70	W
ESD per IEC 61000-4-2 (Air)	V <sub>ESD</sub>	+/-15	+/-15	kV
ESD per IEC 61000-4-2 (Contact)		+/-8	+/-15	
Lead soldering temperature	T <sub>L</sub>	+260 (10 seconds)	+260 (10 seconds)	°C
Operating junction temperature range	T <sub>J</sub>	-55 to +125	-55 to +125	°C
Storage temperature range	T <sub>STG</sub>	-55 to +150	-55 to +150	°C

### Electrical characteristics

(+25 °C)

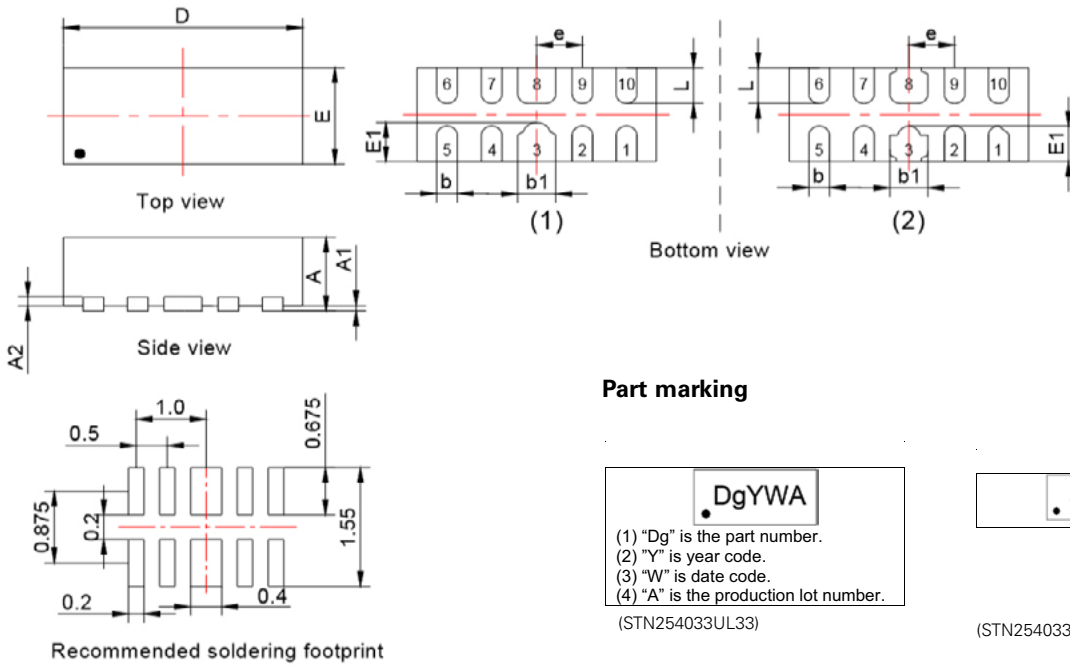
#### STN254033UL33

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	I/O to GND	-	-	3.3	V <sub>RWM</sub> (V)
Reverse leakage current	I/O to GND V <sub>RWM</sub> = 3.3 V	-	0.1	1.0	I <sub>R</sub> ( $\mu$ A)
Reverse triggering voltage	I/O to GND I <sub>ti</sub> = 1 $\mu$ A	3.8		-	V <sub>ti</sub> (V)
Reverse holding voltage	I/O to GND I <sub>hi</sub> = 50 mA	3.5	5.5	-	V <sub>h</sub> (V)
Clamping voltage	I <sub>pp</sub> = 1 A, t <sub>p</sub> = 8/20 $\mu$ s	-	8	9	V <sub>C</sub> (V)
		I <sub>pp</sub> = 3 A, t <sub>p</sub> = 8/20 $\mu$ s	-	10	11
Junction capacitance	V <sub>RWM</sub> = 3.3 V, f = 1 MHz I/O pin to GND	-	0.33	0.39	C <sub>J</sub> (pF)
	V <sub>RWM</sub> = 3.3 V, f = 1 MHz Between I/O pins	-	0.2	0.3	C <sub>J</sub> (pF)

#### STN254033UL50

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)	
Reverse working voltage	I/O to GND	-	-	3.3	V <sub>RWM</sub> (V)	
Reverse leakage current	I/O to GND V <sub>RWM</sub> = 3.3 V	0.1	-	-	I <sub>R</sub> ( $\mu$ A)	
Reverse breakdown voltage	I/O to GND I <sub>t</sub> = 1 mA	4.0		10	V <sub>BR</sub> (V)	
Clamping voltage	I <sub>pp</sub> = 1 A, t <sub>p</sub> = 8/20 $\mu$ s	-	5.5	6.5	V <sub>C</sub> (V)	
		I <sub>pp</sub> = 5.0 A, t <sub>p</sub> = 8/20 $\mu$ s	-	7.5	8.5	V <sub>C</sub> (V)
		I <sub>pp</sub> = 7.0 A, t <sub>p</sub> = 8/20 $\mu$ s	-	9	10.5	V <sub>C</sub> (V)
Junction capacitance	V <sub>RWM</sub> = 0 V, f = 1 MHz I/O pin to GND	-	0.5	0.6	C <sub>J</sub> (pF)	
	V <sub>RWM</sub> = 0 V, f = 1 MHz Between I/O pins	-	0.25	0.35	C <sub>J</sub> (pF)	

**Mechanical parameters, pad layout- mm**

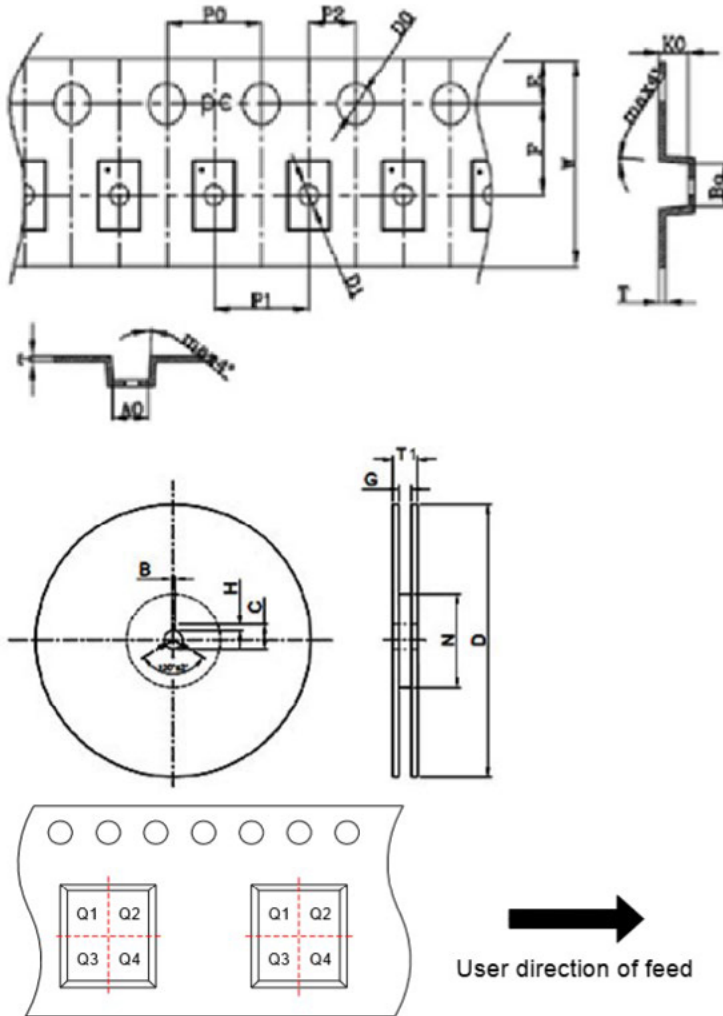


Dimension	Millimeters			Inches		
	Minimum	Typical	Maximum	Minimum	Typical	Maximum
A	0.45	-	0.65	0.018	-	0.026
A1	0.00	-	0.05	0.000	-	0.002
A2		0.15 REF			0.006 REF	
b	0.15	0.20	0.25	0.006	0.008	0.010
b1	0.35	0.40	0.45	0.014	0.016	0.018
D	2.45	2.50	2.55	0.096	0.098	0.100
E	0.95	1.00	1.05	0.037	0.039	0.041
E1	0.30	0.455	0.61	0.012	0.018	0.024
e		0.50 BSC			0.020 BSC	
L	0.33	-	0.45	0.013	-	0.018

**Packaging information mm/inches**

Drawing not to scale.

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

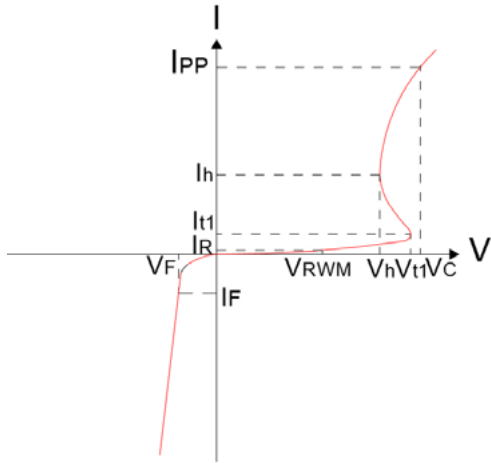


Pin 1 quadrant: Q1

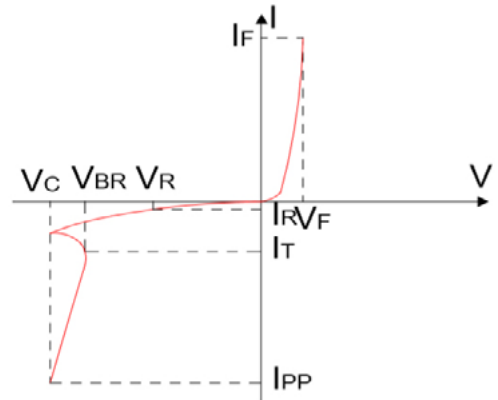
Symbol	Dimensions	
	Millimeters	Inches
A0	1.15±0.05	0.045±0.002
B0	2.70±0.05	0.106±0.002
K0	0.59±0.05	0.023±0.002
P0	4.00±0.10	0.157±0.004
P1	4.00±0.10	0.157±0.004
P2	2.00±0.05	0.079±0.002
T	0.20±0.02	0.008±0.001
E	1.75±0.10	0.069±0.004
F	3.50±0.05	0.138±0.002
D0	1.55±0.05	0.061±0.002
D1	0.60±0.10	0.024±0.004
W	8.0±0.10	0.315±0.004
B	2.0±0.5	0.079±0.020
H	4.0±0.5	0.157±0.020
C	13.0±0.5	0.512±0.020
G	8.4±1.5	0.331±0.059
T1	14.9(max)	0.587(max)
N	60	2.362
D	178±2.0	7±0.079

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

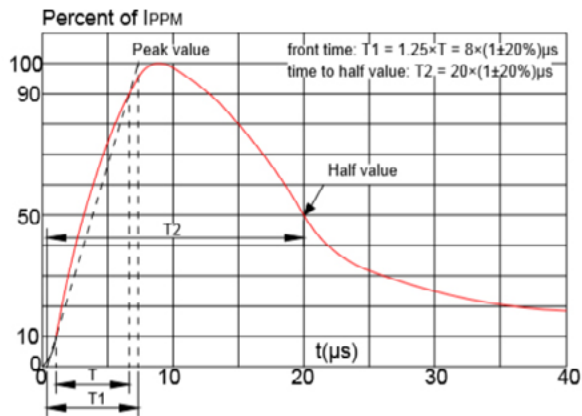
**V- I curve characteristics (Uni-directional)**  
STN254033UL33



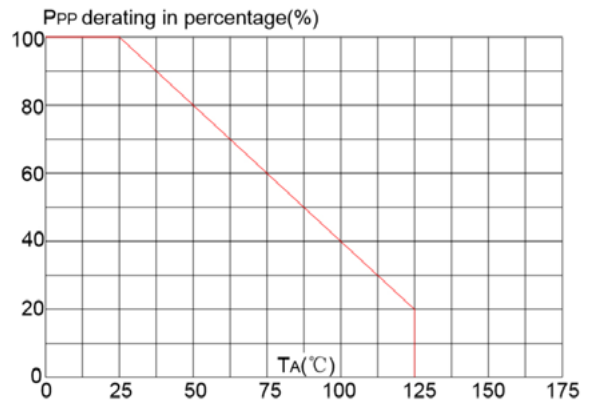
**V- I curve characteristics (Uni-directional)**  
STN254033UL50



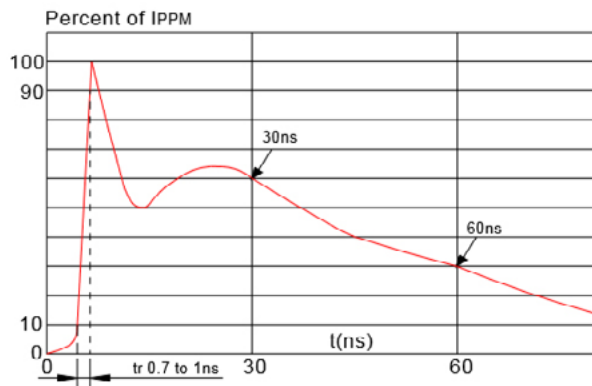
**Pulse waveform (8/20 μs)**



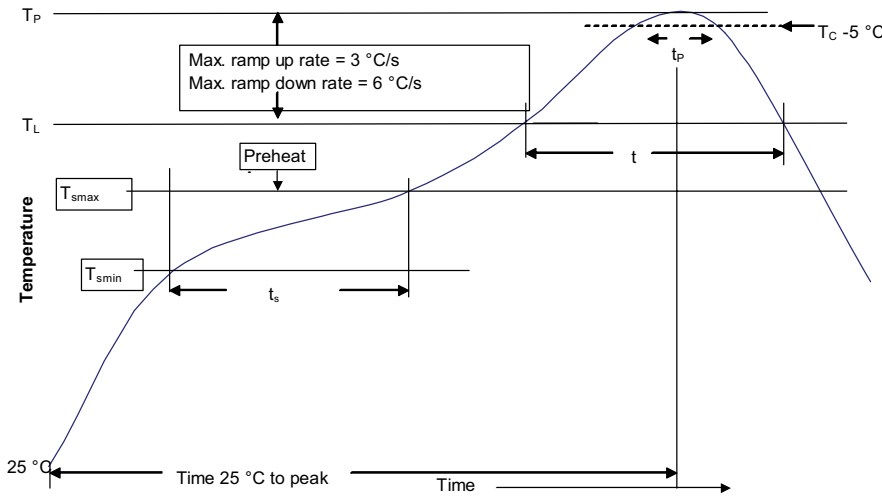
**Pulse derating curve**



**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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