

# STS142XXXUXXX

## TVS Diode array ESD suppressor



### Product features

- Protects two I/O lines
- Low clamping voltage
- Low operating voltage
- Low capacitance
- Meets moisture sensitivity level (MSL) 3
- Molding compound flammability rating: UL 94V-0
- Termination finish: Tin

### Applications

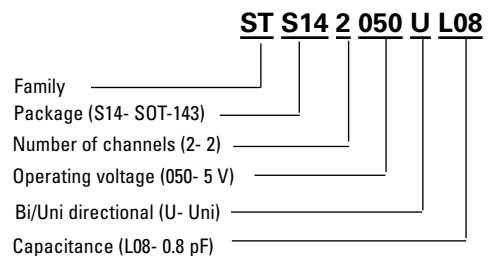
- ADSL lines
- I<sup>2</sup>C bus protection
- ISDN S/T interface
- Portable electronics
- WAN/LAN equipment
- Video line protection
- Microcontroller input protection
- T1/E1 secondary IC side protection
- Fire wire & USB
- Sensitive analog inputs
- Power over Ethernet

### 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 10 A (8/20 μs)



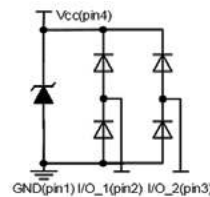
### Ordering part number



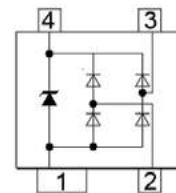
### Pin out/functional diagram



SOT-143



Pin configuration



Top view

### Absolute maximum ratings

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

Parameter	Symbol	Value		Unit
		STS142050UL08	STS142700UL55	
Peak pulse power dissipation on 8/20 μs waveform	$P_{pp}$	60	150	W
ESD per IEC 61000-4-2 (Air)	$V_{ESD}$	+/-20	+/-30	kV
ESD per IEC 61000-4-2 (Contact)		+/-20	+/-30	
Lead soldering temperature	$T_L$	+260 (10 seconds)	+260 (10 seconds)	°C
Operating junction temperature range	$T_J$	-55 to +125	-55 to +125	°C
Storage temperature range	$T_{STG}$	-55 to +150	-55 to +150	°C

### Electrical characteristics

(+25 °C)

#### STS142050UL08

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	5	$V_{RWM}$ (V)
Reverse breakdown voltage	$I_T = 1\text{ mA}$	6.0	7.2	-	$V_{BR}$ (V)
Reverse leakage current*	$V_{RWM} = 5\text{ V}$	-	-	1	$I_R$ (μA)
Clamping voltage (I/O pin to Ground)	$I_{pp} = 1\text{ A}$ , $t_p = 8/20\ \mu\text{s}$	-	9.5	10.5	$V_F$ (V)
	$I_{pp} = 4.5\text{ A}$ , $t_p = 8/20\ \mu\text{s}$	-	13	15	$I_{pp}$ (A)
Clamping voltage ( $V_{CC}$ to Ground)	$I_{pp} = 8\text{ A}$ , $t_p = 8/20\ \mu\text{s}$	-	12	15	$V_C$ (V)
	$I_{pp} = 17\text{ A}$ , $t_p = 8/20\ \mu\text{s}$	-	16.5	20	$V_C$ (V)
Junction capacitance	$V_{RWM} = 0\text{ V}$ , $f = 1\text{ MHz}$ Any I/O pin to GND	-	0.8	1.0	$C_J$ (pF)
	$V_{RWM} = 0\text{ V}$ , $f = 1\text{ MHz}$ Between I/O pins	-	0.4	0.6	$C_J$ (pF)

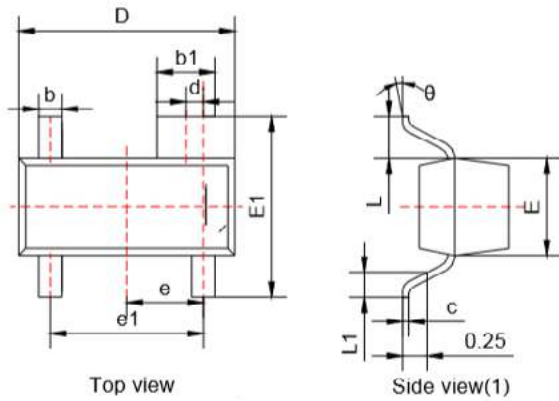
\*I/O to GND for STS142050UL0

#### STS142700UL55

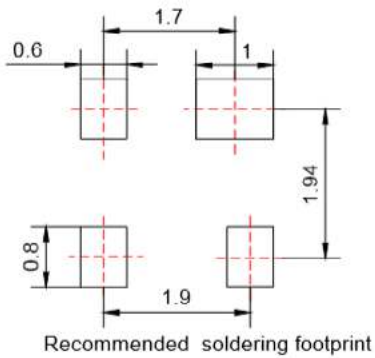
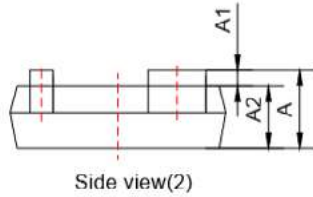
Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	70	$V_{RWM}$ (V)
Reverse breakdown voltage	$I_T = 50\ \mu\text{A}$	85	-	-	$V_{BR}$ (V)
Reverse leakage current	$V_{RWM} = 70\text{ V}$	-	-	1	$I_R$ (μA)
Clamping voltage** (I/O pin to Ground)	$I_{pp} = 1\text{ A}$ , $t_p = 8/20\ \mu\text{s}$	-	1.0	1.5	$V_F$ (V)
	$I_{pp} = 10\text{ A}$ , $t_p = 8/20\ \mu\text{s}$	-	3.0	4.0	$I_{pp}$ (A)
	$I_{pp} = 24\text{ A}$ , $t_p = 8/20\ \mu\text{s}$	-	7.0	9.0	-
Junction capacitance	$V_{RWM} = 0\text{ V}$ , $f = 1\text{ MHz}$ Any I/O pin to GND	-	0.55	1.5	$C_J$ (pF)
	$V_{RWM} = 0\text{ V}$ , $f = 1\text{ MHz}$ Between I/O pins	-	0.4	0.75	

\*\* Forward Clamping voltage for STS142700UL55

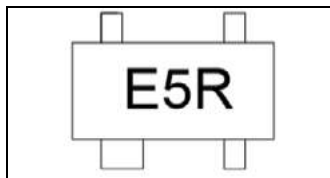
Mechanical parameters, pad layout- mm/inches



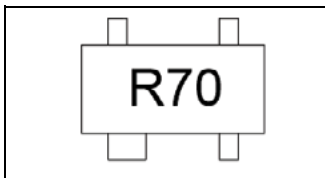
Dimension	Millimeters		Inches	
	Minimum	Maximum	Minimum	Maximum
A	0.90	1.15	0.035	0.045
A1	0.00	0.10	0.000	0.004
A2	0.90	1.05	0.035	0.041
b	0.30	0.50	0.012	0.020
b1	0.75	0.90	0.030	0.035
c	0.08	0.15	0.003	0.006
D	2.80	3.00	0.110	0.118
d	0.20 Typ.		0.008 Typ.	
E	1.20	1.40	0.047	0.055
E1	2.25	2.55	0.089	0.100
e	0.95 Typ.		0.037Typ.	
e1	1.80	2.00	0.071	0.079
L	0.55 Typ.		0.022 Typ.	
L1	0.30	0.50	0.012	0.020
e	0°	8°	0°	8°



Part marking



(STS142050UL08)

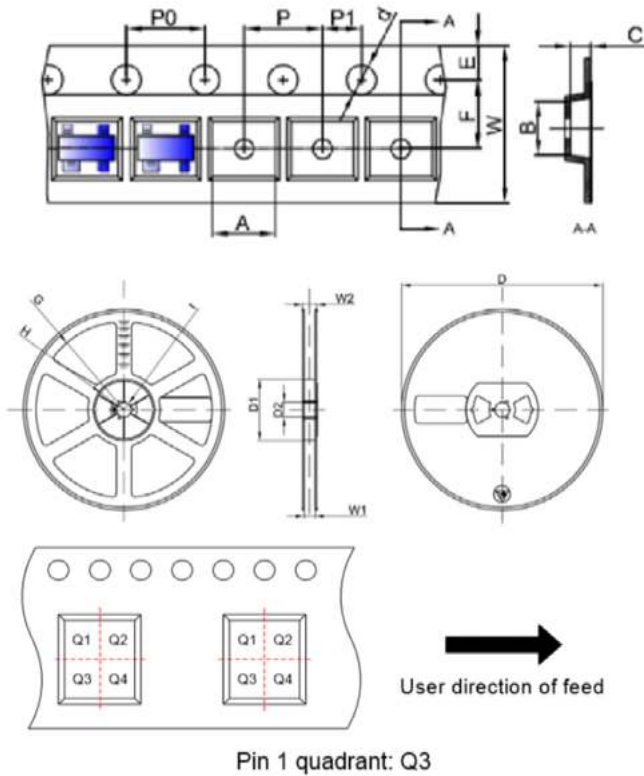


(STS142700UL55)

**Packaging information mm/inches**

Drawing not to scale.

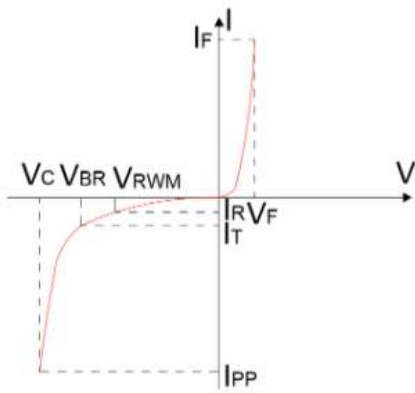
Supplied in tape and reel packaging, 3,000 parts per 7" diameter reel (EIA-481 compliant)



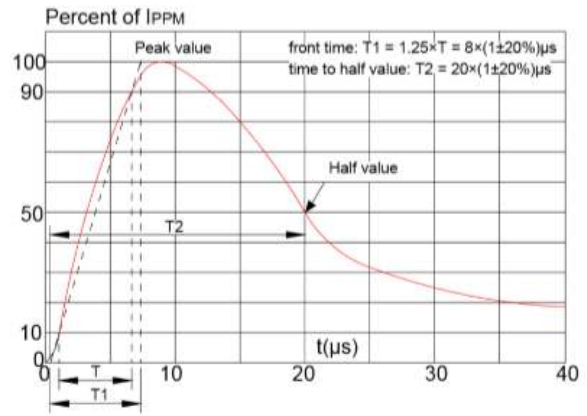
Symbol	Millimeters	Inches
A	3.19±0.1	0.126±0.004
B	2.80±0.1	0.110±0.004
C	1.31±0.1	0.052±0.004
d	Φ1.50±0.1	Φ0.059±0.004
E	1.75±0.1	0.069±0.004
F	3.50±0.1	0.138±0.004
P0	4.00±0.1	0.157±0.004
P	4.00±0.1	0.157±0.004
P1	2.00±0.1	0.079±0.004
W	8.00±0.1	0.315±0.004
D	Φ178±2	7.008±0.079
D1	54.40±1	2.142±0.039
D2	13.00±1	0.512±0.039
G	R78.00±1	3.071±0.039
H	R25.60±1	1.008±0.039
I	R6.50±1	0.256±0.039
W1	9.50±1	0.374±0.039
W2	12.30±1	0.484±0.039

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

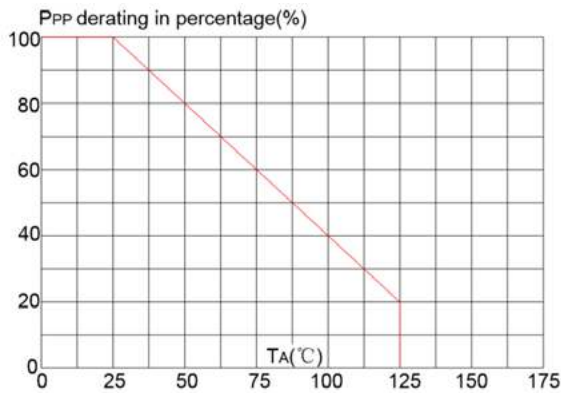
**V- I curve characteristics (Uni-directional)**



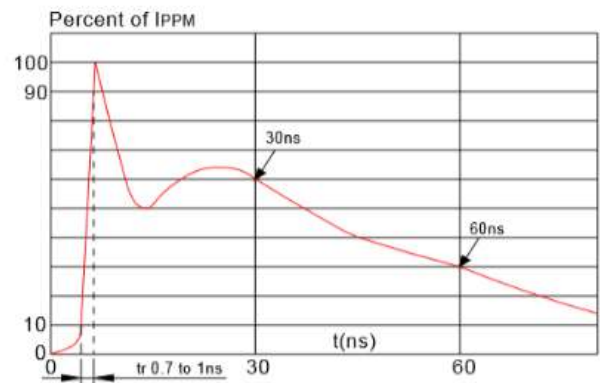
**Pulse waveform (8/20 μs)**



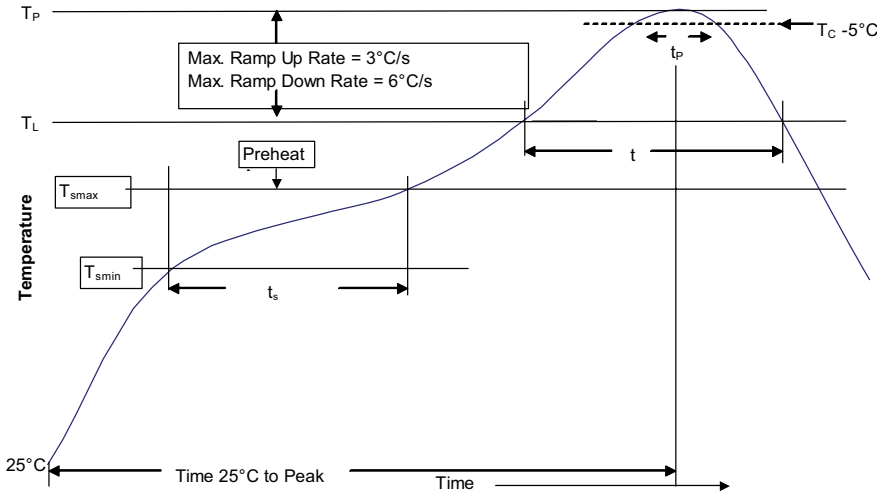
**Pulse derating curve**



**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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