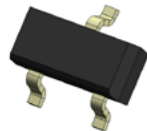


# STS232050UL40

## TVS Diode array ESD suppressor



### Product features

- 60 watts peak pulse power per line ( $t_p=8/20 \mu s$ )
- Protects two I/O lines with uni-directional
- Low clamping voltage
- Ultra-low capacitance:  $C_J=0.4 \text{ pF}$  typical
- Working voltage: 5 V
- Low leakage current
- Meets moisture sensitivity level (MSL) 3
- Molding compound flammability rating: UL 94V-0
- Termination finish: Tin

### Applications

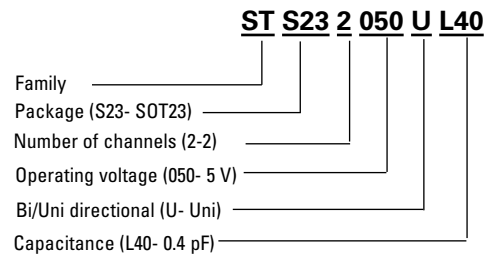
- USB 2.0 and USB 3.0
- HDMI 1.3 and HDMI 1.4
- SATA and eSATA
- DVI PCI Express
- Portable Electronics
- IEEE 1394

### Environmental compliance and general specifications

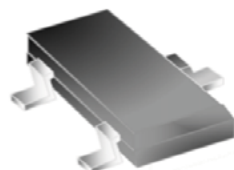
- IEC61000-4-2 (ESD)
  - $\pm 20 \text{ kV}$  (air)
  - $\pm 20 \text{ kV}$  (contact)
- IEC61000-4-5 (Lightning) 4 A (8/20  $\mu s$ )



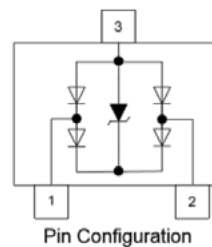
### Ordering part number



### Pin out/functional diagram



SOT-23



### Absolute maximum ratings

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

#### STS232050UL40

Parameter	Symbol	Value	Unit
Peak pulse power dissipation on 8/20 $\mu$ s waveform	$P_{PP}$	60	W
ESD per IEC 61000-4-2 (Air)	$V_{ESD}$	+/-20	kV
ESD per IEC 61000-4-2 (Contact)		+/-20	
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

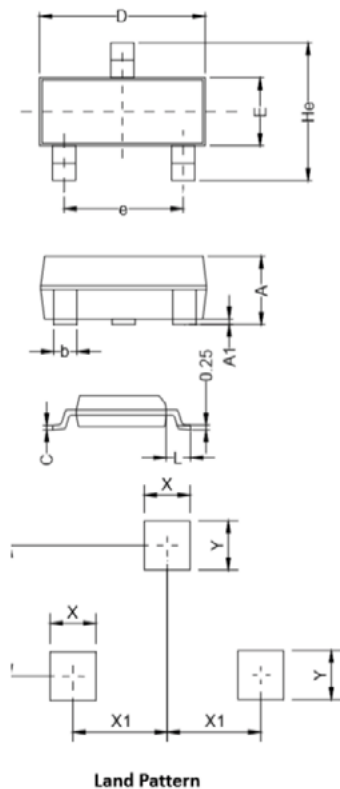
### Electrical characteristics

(+25 °C)

#### STS232050UL40

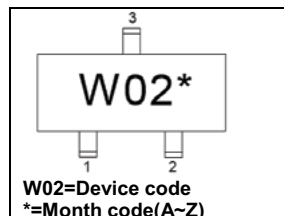
Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	5.0	$V_{RWM}$ (V)
Reverse breakdown voltage	$I_r = 1$ mA	7.0	8.0	9.0	$V_{BR}$ (V)
Reverse leakage current	$V_{RWM} = 5$ V	-	-	100	$I_R$ ( $\mu$ A)
Clamping voltage	$I_{PP} = 1$ A, $t_p = 8/20$ $\mu$ s	-	-	11	$V_C$ (V)
	$I_{PP} = 4$ A, $t_p = 8/20$ $\mu$ s	-	-	15	$V_C$ (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz Any I/O pin to GND	-	0.4	0.65	$C_J$ (pF)
	$V_{RWM} = 0$ V, $f = 1$ MHz Between any I/O pin	-	0.25	0.40	$C_J$ (pF)

### 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
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		0.031	
X1	0.95		0.037	
Y	0.80		0.031	
Z	2.02		0.080	

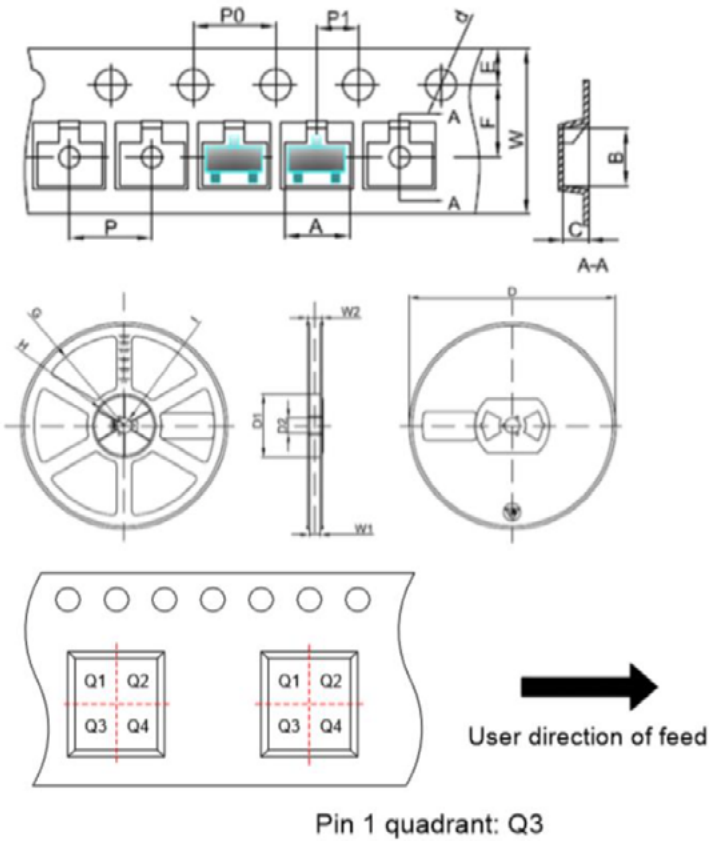
### Part marking



**Packaging information mm/inches**

Drawing not to scale.

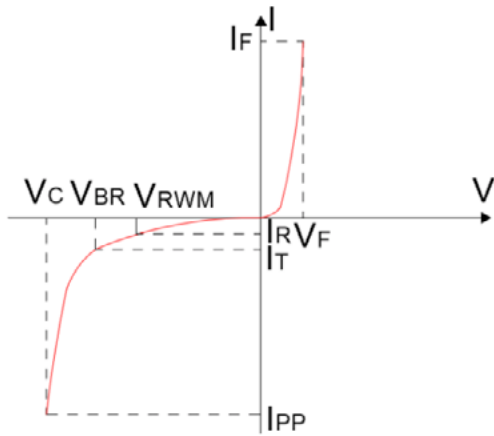
Supplied in tape and reel packaging, 3,000 parts per 7" diameter reel (EIA-481 compliant)



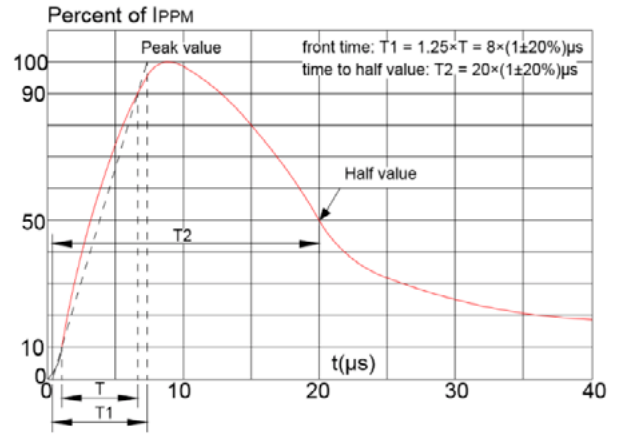
Symbol	Millimeters	Inches
	Typ.	Typ.
A	3.15	0.124
B	2.77	0.109
C	1.22	0.048
d	Φ1.50	Φ0.059
E	1.75	0.069
F	3.50	0.138
P0	4.00	0.157
P	4.00	0.157
P1	2.00	0.079
W	8.00	0.315
D	Φ178	Φ7.008
D1	54.40	2.142
D2	13.00	0.512
G	R78.00	R3.071
H	R25.60	R1.008
I	R6.50	R0.256
W1	9.50	0.374
W2	12.30	0.484

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

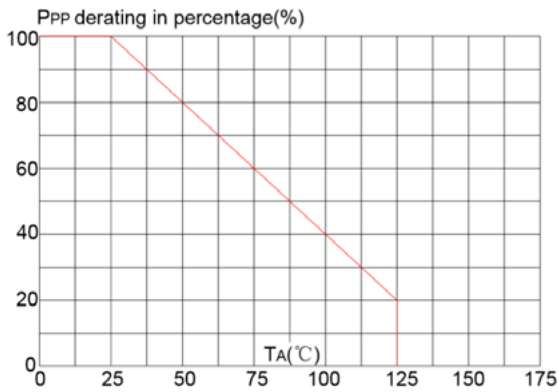
**V- I curve characteristics (Uni-directional)**



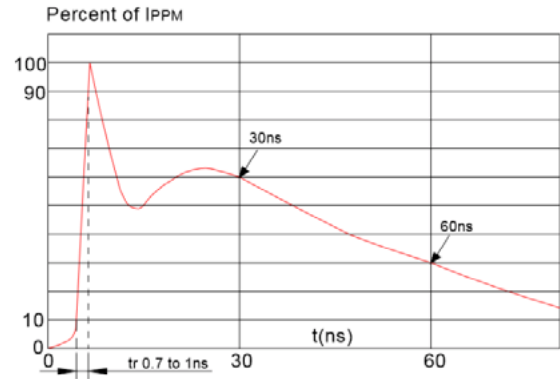
**Pulse waveform (8/20  $\mu$ s)**



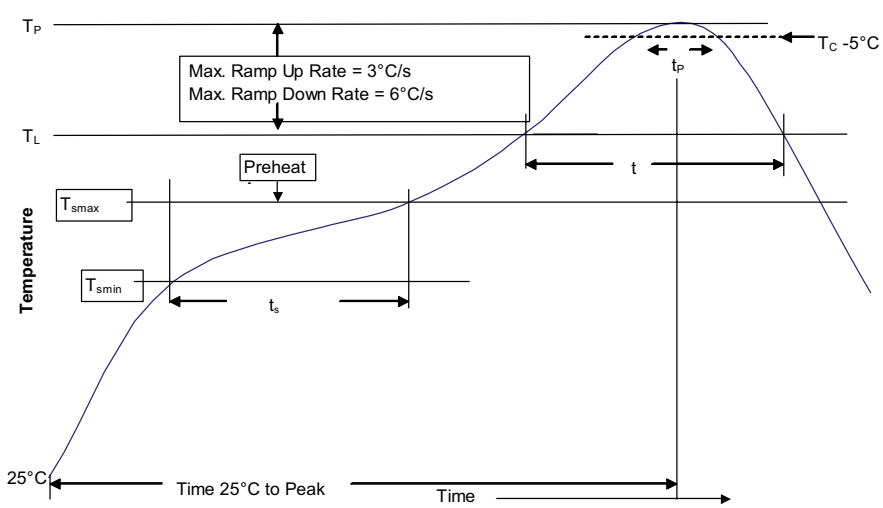
**Pulse derating curve**



**ESD waveform**



**Solder reflow profile**



**Table 1 - Standard SnPb solder (T<sub>C</sub>)**

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<sub>C</sub>)**

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		
• Temperature min. (T <sub>smin</sub> )	100 °C	150 °C
• Temperature max. (T <sub>smax</sub> )	150 °C	200 °C
• Time (T <sub>smin</sub> to T <sub>smax</sub> ) (t <sub>s</sub> )	60-120 seconds	60-120 seconds
Ramp up rate T <sub>L</sub> to T <sub>p</sub>	3 °C/ second max.	3 °C/ second max.
Liquidous temperature (T <sub>L</sub> )	183 °C	217 °C
Time (t <sub>L</sub> ) maintained above T <sub>L</sub>	60-150 seconds	60-150 seconds
Peak package body temperature (T <sub>p</sub> )*	Table 1	Table 2
Time (t <sub>p</sub> )* within 5 °C of the specified classification temperature (T <sub>C</sub> )	20 seconds*	30 seconds*
Ramp-down rate (T <sub>p</sub> to T <sub>L</sub> )	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<sub>p</sub>) is defined as a supplier minimum and a user maximum.

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