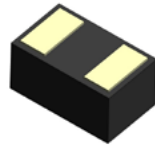


# STN161XXXUXXX

## TVS Diode ESD suppressor



### Product features

- Protects one I/O or power line
- Low clamping voltage
- Low leakage current
- Meets moisture sensitivity level (MSL) 3
- Molding compound flammability rating: UL 94V-0
- Termination finish: Tin

### Applications

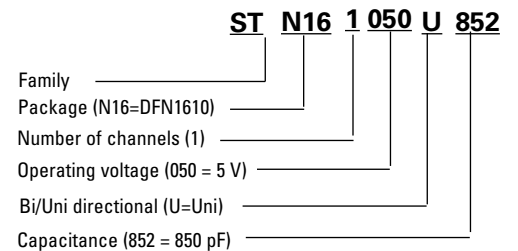
- Cellular phones
- Wearables
- Portable electronics
- Laptop/notebook computers
- Digital cameras

### Environmental compliance and general specifications

- IEC61000-4-2 (ESD)
  - Up to  $\pm 30$  kV (air)
  - Up to  $\pm 30$  kV (contact)
- IEC61000-4-5 (Lightning) Up to 110 A (8/20  $\mu$ s)



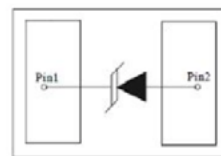
### Ordering part number



### Pin out/functional diagram



DFN1610-2L



PIN Configuration

### Absolute maximum ratings

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

Parameter	Symbol	Value	Unit
STN161XXXUXXX			
Peak pulse power dissipation on 8/20 μs waveform	$P_{pp}$	2000	W
ESD per IEC 61000-4-2 (Air)	$V_{ESD}$	+/-30	kV
ESD per IEC 61000-4-2 (Contact)		+/-30	
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)

#### STN161050U852

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	5.0	$V_{RWM}$ (V)
Reverse breakdown voltage	$I_T = 1$ mA	6	7	8	$V_{BR}$ (V)
Reverse leakage current	$V_{RWM} = 5$ V	-	-	1	$I_R$ (μA)
Peak pulse current	$t_p = 8/20$ μs	-	-	110	$I_{pp}$ (A)
Clamping voltage	$I_{pp} = 50$ A, $t_p = 8/20$ μs	-	11	14	$V_C$ (V)
	$I_{pp} = 80$ A, $t_p = 8/20$ μs	-	13	15	$V_C$ (V)
	$I_{pp} = 110$ A, $t_p = 8/20$ μs	-	14	17	$V_C$ (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	850	1050	$C_J$ (pF)

#### STN161070U722

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	7.0	$V_{RWM}$ (V)
Reverse breakdown voltage	$I_T = 1$ mA	7.5	8	9	$V_{BR}$ (V)
Reverse leakage current	$V_{RWM} = 7$ V	-	-	1	$I_R$ (μA)
Forward voltage	$I_F = 10$ mA	0.6	-	1	$V_F$
Peak pulse current	$t_p = 8/20$ μs	-	-	100	$I_{pp}$ (A)
Clamping voltage	$I_{pp} = 50$ A, $t_p = 8/20$ μs	-	12	15	$V_C$ (V)
	$I_{pp} = 10$ A, $t_p = 8/20$ μs	-	15	18	$V_C$ (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	720	900	$C_J$ (pF)

**STN161090U602**

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	9.0	$V_{RWM}$ (V)
Reverse breakdown voltage	$I_T = 1$ mA	9.5	10.5	12.5	$V_{BR}$ (V)
Reverse leakage current	$V_{RWM} = 9$ V	-	-	1	$I_R$ ( $\mu$ A)
Forward voltage	$I_T = 10$ mA	0.6	-	1.0	$V_F$
Peak pulse current	$t_p = 8/20$ $\mu$ s	-	-	90	$I_{pp}$ (A)
Clamping voltage	$I_{pp} = 40$ A, $t_p = 8/20$ $\mu$ s	-	14	17	$V_C$ (V)
	$I_{pp} = 50$ A, $t_p = 8/20$ $\mu$ s	-	15	19	$V_C$ (V)
	$I_{pp} = 90$ A, $t_p = 8/20$ $\mu$ s	-	18	22	$V_C$ (V)
	$I_{pp} = 90$ A, $t_p = 8/20$ $\mu$ s	-	18	22	$V_C$ (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	600	750	$C_J$ (pF)

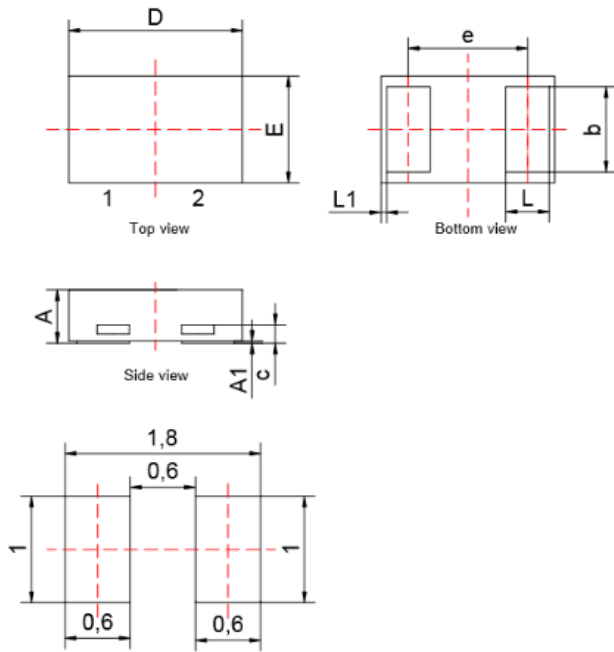
**STN161120U372**

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	12	$V_{RWM}$ (V)
Reverse breakdown voltage	$I_T = 1$ mA	13.3	14.4	17	$V_{BR}$ (V)
Reverse leakage current	$V_{RWM} = 12$ V	-	-	1	$I_R$ ( $\mu$ A)
Peak pulse current	$t_p = 8/20$ $\mu$ s	-	-	70	$I_{pp}$ (A)
Clamping voltage	$I_{pp} = 20$ A, $t_p = 8/20$ $\mu$ s	-	16	19	$V_C$ (V)
	$I_{pp} = 40$ A, $t_p = 8/20$ $\mu$ s	-	20	24	$V_C$ (V)
	$I_{pp} = 70$ A, $t_p = 8/20$ $\mu$ s	-	22	28	$V_C$ (V)
	$I_{pp} = 70$ A, $t_p = 8/20$ $\mu$ s	-	22	28	$V_C$ (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	370	450	$C_J$ (pF)

**STN161150U332**

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Reverse working voltage	-	-	-	15	$V_{RWM}$ (V)
Reverse breakdown voltage	$I_T = 1$ mA	16	17.2	20	$V_{BR}$ (V)
Reverse leakage current	$V_{RWM} = 12$ V	-	-	1	$I_R$ ( $\mu$ A)
Peak pulse current	$t_p = 8/20$ $\mu$ s	-	-	55	$I_{pp}$ (A)
Clamping voltage	$I_{pp} = 25$ A, $t_p = 8/20$ $\mu$ s	-	22	25	$V_C$ (V)
	$I_{pp} = 50$ A, $t_p = 8/20$ $\mu$ s	-	26	28	$V_C$ (V)
	$I_{pp} = 55$ A, $t_p = 8/20$ $\mu$ s	-	27	30	$V_C$ (V)
	$I_{pp} = 55$ A, $t_p = 8/20$ $\mu$ s	-	27	30	$V_C$ (V)
Junction capacitance	$V_{RWM} = 0$ V, $f = 1$ MHz	-	330	450	$C_J$ (pF)

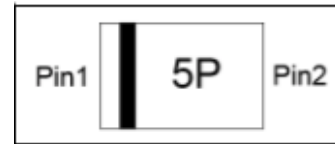
**Mechanical parameters, pad layout- mm**



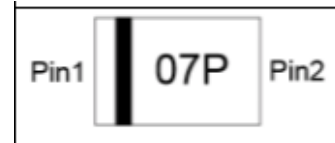
Recommended Soldering Footprint

Dimension	Minimum	Typical	Maximum
A	0.45	0.50	0.55
A1	0	0.02	0.05
b	0.85	0.90	0.95
c	0.08	0.12	0.18
D	1.55	1.60	1.65
e		1.1 BSC	
E	0.95	1.00	1.05
L	0.35	0.40	0.45
L1		0.06 BSC	

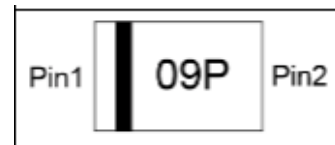
**Part marking**



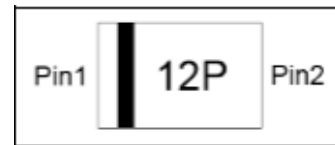
(STN161050U852)



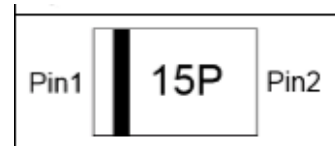
(STN161070U722)



(STN161090U602)



(STN161120U372)

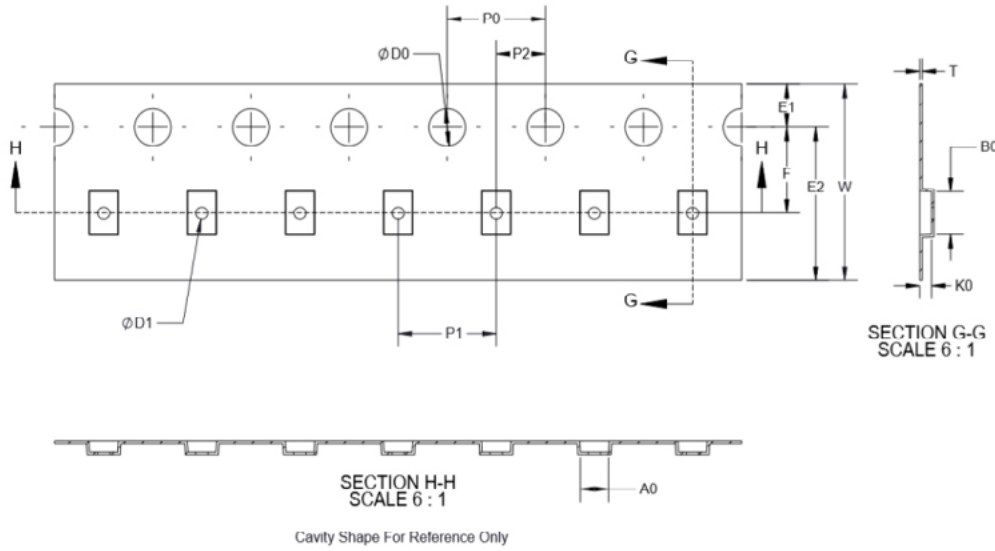


(STN161150U332)

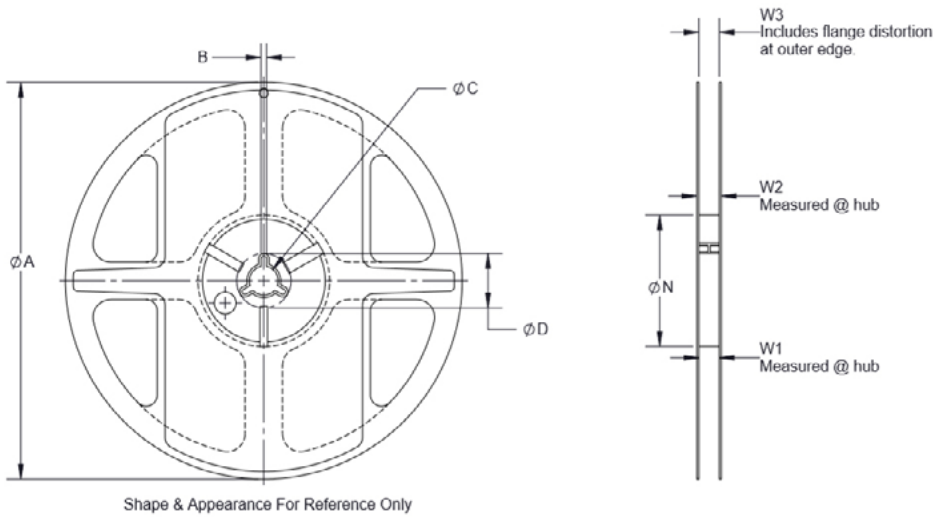
**Packaging information mm/inches**

Drawing not to scale.

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



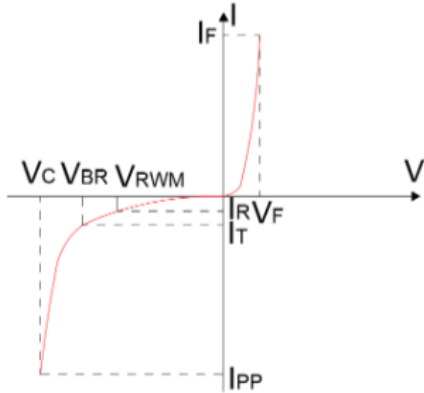
W	8 +0.2/-0.1
F	3.5±0.05
E1	1.75±0.10
E2	N/A
P0	4±0.10
P1	4±0.10
P2	2±0.05
ØD0	1.55±0.10
ØD1	0.6 +0.10/-0
A0	1.15±0.05
B0	1.75±0.05
K0	0.63±0.05
T	0.2±0.03



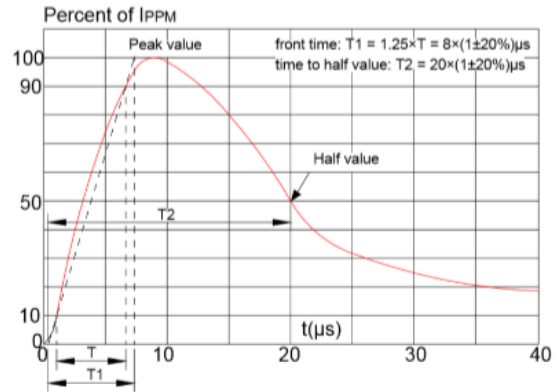
A	178
B	N/A
C	13
D	N/A
N	54.40
W1	9.50
W2	12.30
W3	N/A

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

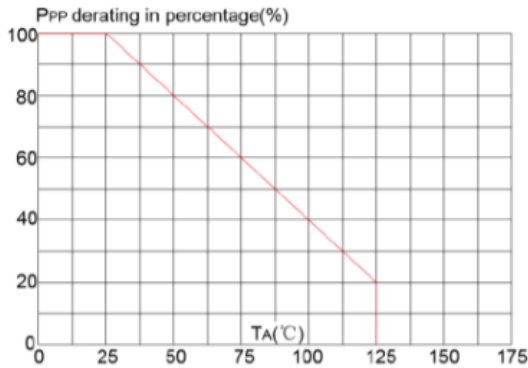
**V- I curve characteristics (uni-directional)**



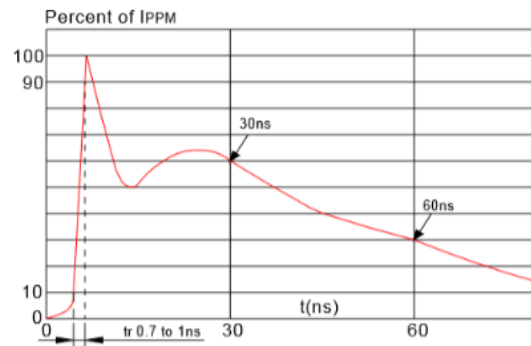
**Pulse waveform (8/20 μs)**



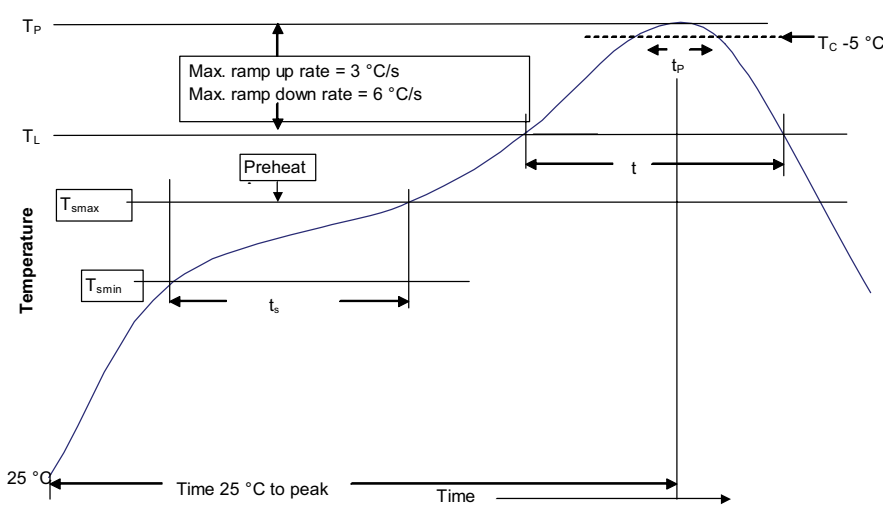
**Pulse derating curve**



**ESD waveform**



**Solder reflow profile**



**Table 1 - Standard SnPb solder (T<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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