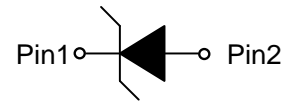


**ESD5681NXX**
**1-Line, Uni-directional, Transient Voltage Suppressor**
<http://www.sh-willsemi.com>
**Descriptions**

The ESD5681NXX is a transient voltage suppressor designed to protect power interfaces. It is suitable to replace multiple discrete components in portable electronics.

The ESD5681NXX is specifically designed to protect USB port. TVS diode with higher surge capability is used to protect USB voltage bus pin.

The ESD5681NXX is available in DFN1006-2L package. Standard products are Pb-free and Halogen-free.


**DFN1006-2L (Bottom View)**

**Circuit diagram**
**Features**

- Reverse stand-off voltage: 7V ~ 15V
- Surge protection according to IEC61000-4-5 see [Table 4](#)
- ESD protection according to IEC61000-4-2 ±30kV (contact and air discharge)
- Low clamping voltage
- Solid-state silicon technology



X = Device code (I,J,W)

\* = Month code

**Marking (Top View)**
**Applications**

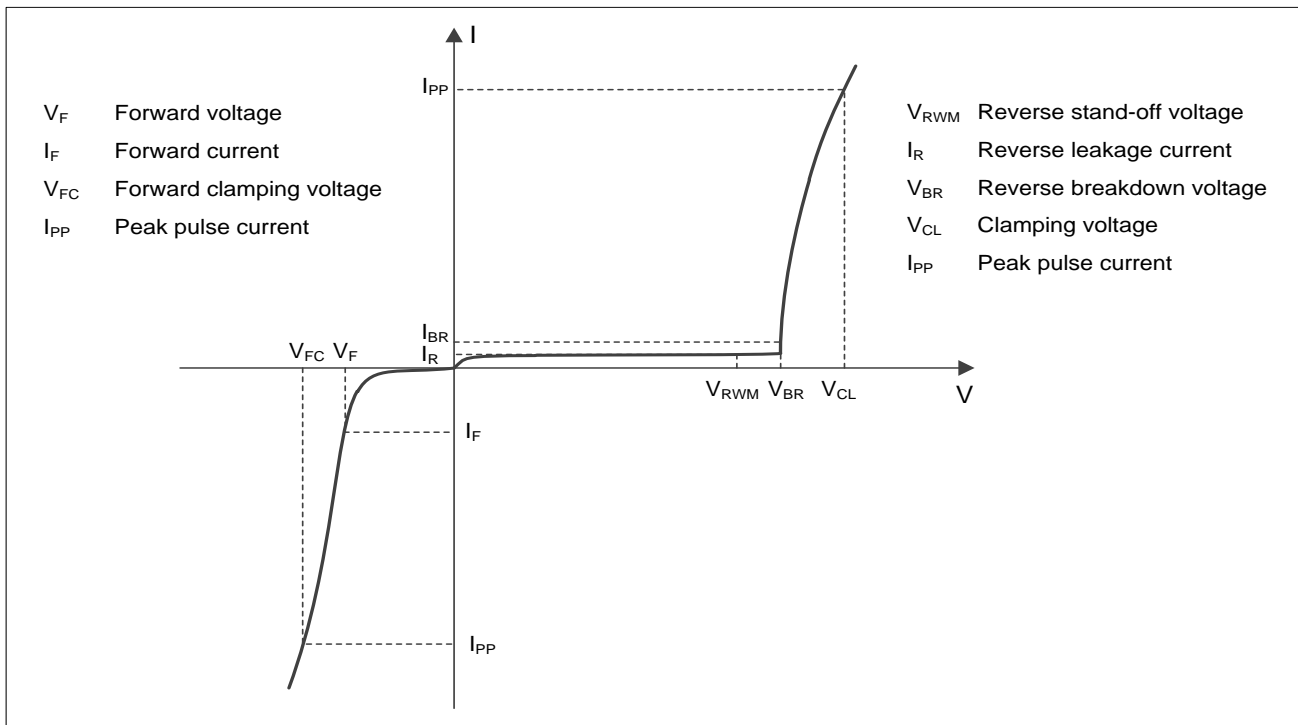
- Power supply protection
- Power management

**Order information**
**Table 1.**

Device	Package	Shipping	Marking
ESD5681N07-2/TR	DFN1006-2L	10000/Tape&Reel	I*
ESD5681N12-2/TR	DFN1006-2L	10000/Tape&Reel	J*
ESD5681N15-2/TR	DFN1006-2L	10000/Tape&Reel	W*

**Absolute maximum ratings**
**Table 2.**

Parameter	Symbol	Rating	Unit
Peak pulse power ( $t_p=8/20\mu s$ )	Ppk	450	W
ESD according to IEC61000-4-2 air discharge	$V_{ESD}$	$\pm 30$	kV
ESD according to IEC61000-4-2 contact discharge		$\pm 30$	
Junction temperature	$T_J$	125	$^{\circ}C$
Operating temperature	$T_{OP}$	-40~85	$^{\circ}C$
Lead temperature	$T_L$	260	$^{\circ}C$
Storage temperature	$T_{STG}$	-55~150	$^{\circ}C$

**Electrical characteristics ( $T_A = 25^{\circ}C$ , unless otherwise noted)**

**Definitions of electrical characteristics**

**Electrical characteristics ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)**
**Table 3.**

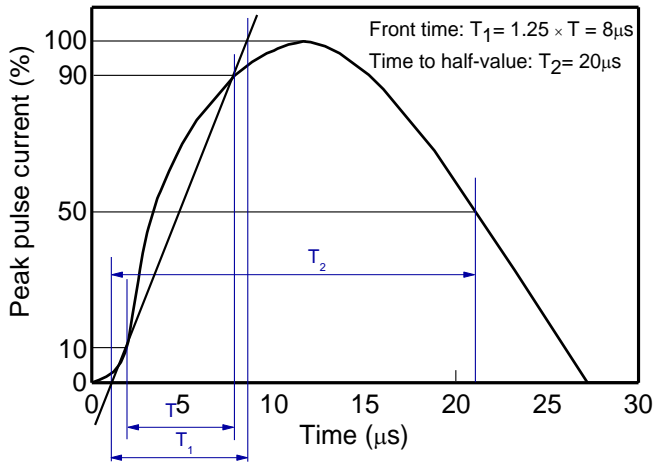
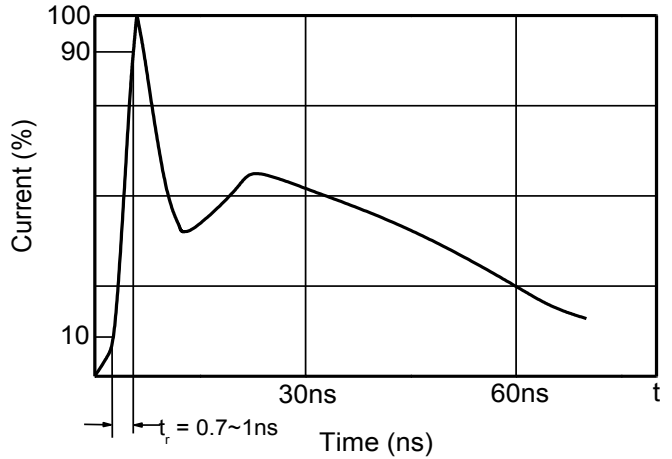
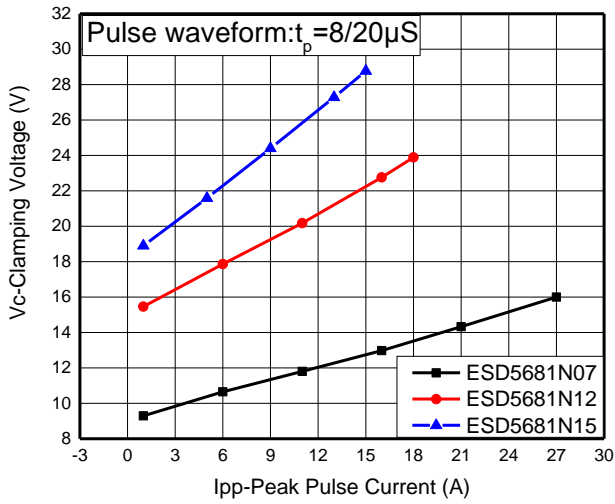
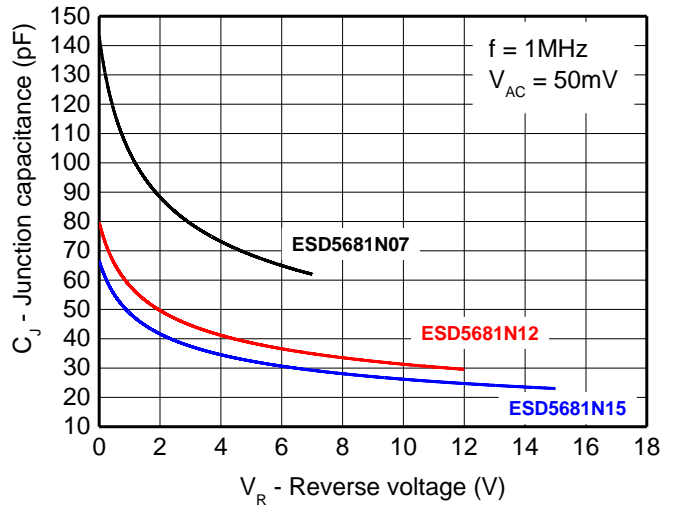
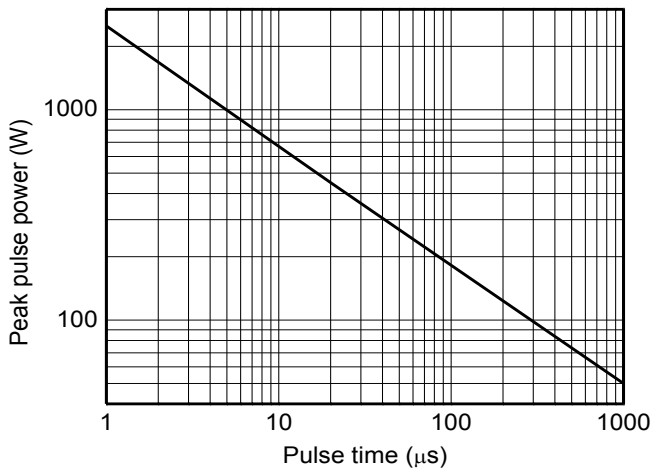
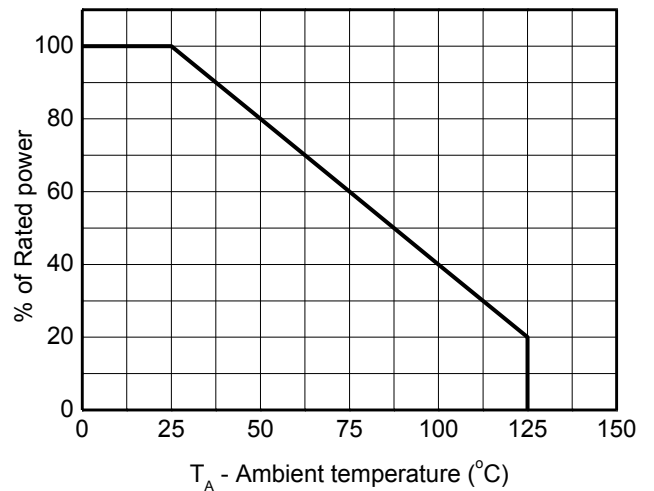
Type number	Reverse Stand off Voltage $V_{RWM}$ (V)	Breakdown voltage $V_{BR}(V)$ $I_{BR} = 1\text{mA}$			Reverse leakage current $I_{RM}(\text{nA})$ at $V_{RWM}$		Forward voltage $V_F(V)$ $I_F = 20\text{mA}$		Junction capacitance $F=1\text{MHz}$ , $V_R=0\text{V}$ (pF)	
	Max	Min	Typ	Max	Typ	Max	Min	Max	Typ	Max
ESD5681N07	7	8.0	9.0	10.0	10	1000	0.45	1.25	140	210
ESD5681N12	12	13.0	15.0	17.0	1	100	0.45	1.25	80	120
ESD5681N15	15	16.0	18.0	20.0	0.5	50	0.45	1.25	65	100

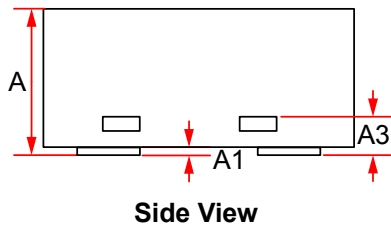
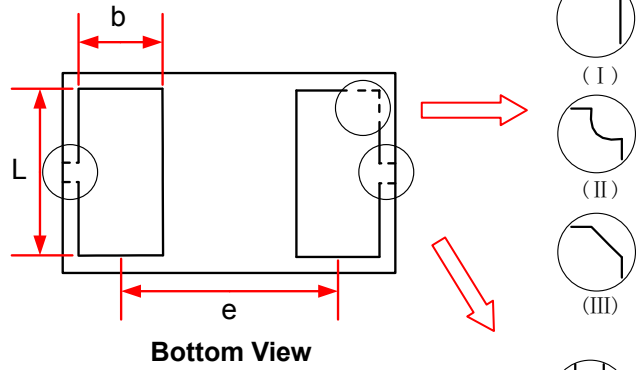
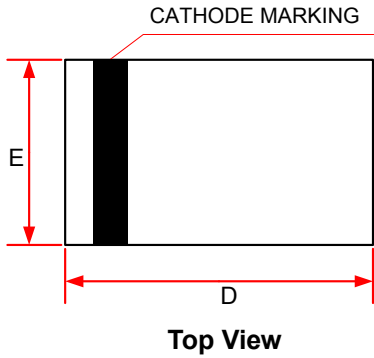
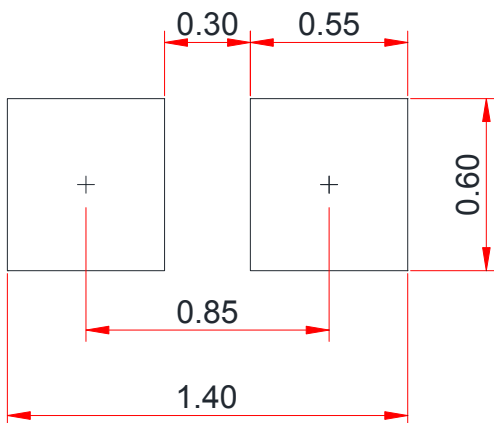
**Table 4.**

Type number	Rated peak pulse current $I_{PP}$ (A) <sup>1)3)</sup>	Clamping voltage $V_{CL}(V)$ at $I_{PP}$ (A) <sup>1)3)</sup>	Clamping voltage $V_{CL}(V)$ at $I_{PP} = 16\text{A}$ , $t_p = 100\text{ns}$ <sup>2)3)</sup>	Clamping voltage $V_{CL}(V)$ at $V_{ESD} = 8\text{kV}$ <sup>2)3)</sup>
ESD5681N07	27	16	11	11
ESD5681N12	18	24	19	19
ESD5681N15	15	29	22	24

Notes:

- 1) Non-repetitive current pulse, according to IEC61000-4-5. (8/20 $\mu\text{s}$  current waveform)
- 2) Non-repetitive current pulse, according to IEC61000-4-2.
- 3) Measured from pin 1 to pin 2.

**Typical characteristics ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)**

**8/20 $\mu\text{s}$  waveform per IEC61000-4-5**

**Contact discharge current waveform per IEC61000-4-2**

**Clamping voltage vs. Peak pulse current**

**Capacitance vs. Reverse voltage**

**Non-repetitive peak pulse power vs. Pulse time**

**Power derating vs. Ambient temperature**

**Package outline dimensions**
**DFN1006-2L**

**Recommend land pattern (Unit: mm)**


Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.30	-	0.50
A1	0.00	-	0.05
A3	0.125 REF.		
D	0.95	1.00	1.05
E	0.55	0.60	0.65
b	0.20	0.25	0.30
L	0.45	0.50	0.55
e	0.65 Typ.		

**Notes:**

This recommended land pattern is for reference purposes only. Please consult your manufacturing group to ensure your PCB design guidelines are met.