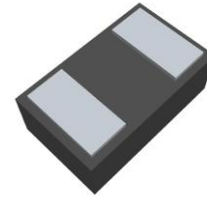
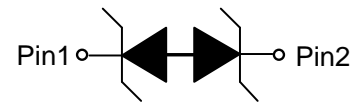


ESD5451NL
1-Line, Bi-directional, Transient Voltage Suppressors
<http://www.sh-willsemi.com>
Descriptions

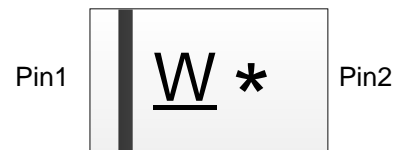
The ESD5451NL is a bi-directional TVS (Transient Voltage Suppressor). It is specifically designed to protect sensitive electronic components which are connected to low speed data lines and control lines from over-stress caused by ESD (Electrostatic Discharge), EFT (Electrical Fast Transients) and Lightning.

The ESD5451NL may be used to provide ESD protection up to $\pm 15\text{kV}$ (contact and air discharge) according to IEC61000-4-2, and withstand peak pulse current up to 4.0A (8/20 μs) according to IEC61000-4-5.

The ESD5451NL 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: $\pm 5.0\text{V}$ Max.
- Transient protection for each line according to IEC61000-4-2 (ESD): $\pm 15\text{kV}$ (contact discharge)
IEC61000-4-4 (EFT): 40A (5/50ns)
IEC61000-4-5 (surge): 4.0A (8/20 μs)
- Capacitance: $C_J = 11\text{pF}$ typ.
- Low leakage current
- Low clamping voltage: $V_{CL} = 12\text{V}$ typ. @ $I_{PP} = 16\text{A}$ (TLP)
- Solid-state silicon technology



W = Device code

* = Month code (A~Z)

Marking (Top View)
Applications

- Cellular handsets
- Tablets
- Laptops
- Other portable devices
- Network communication devices

Order information

Device	Package	Shipping
ESD5451NL-2/TR	DFN1006-2L	10000/Tape&Reel

Absolute maximum ratings

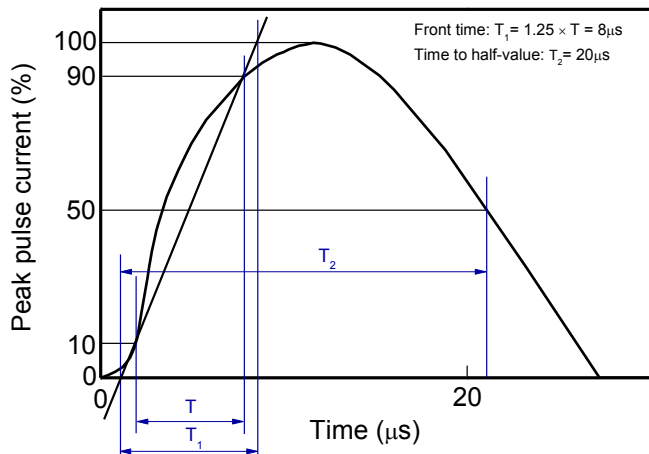
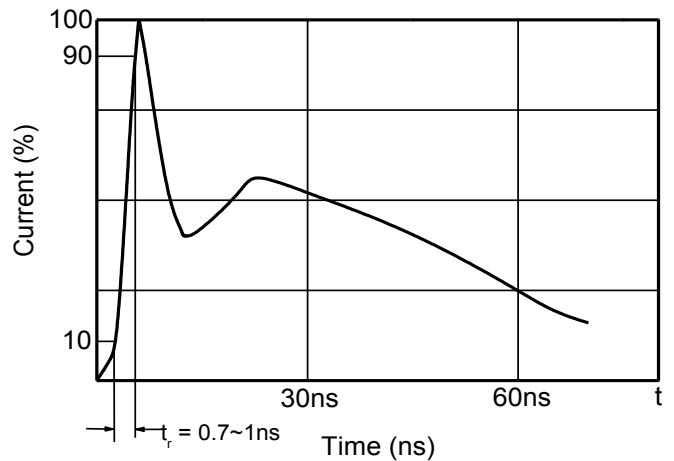
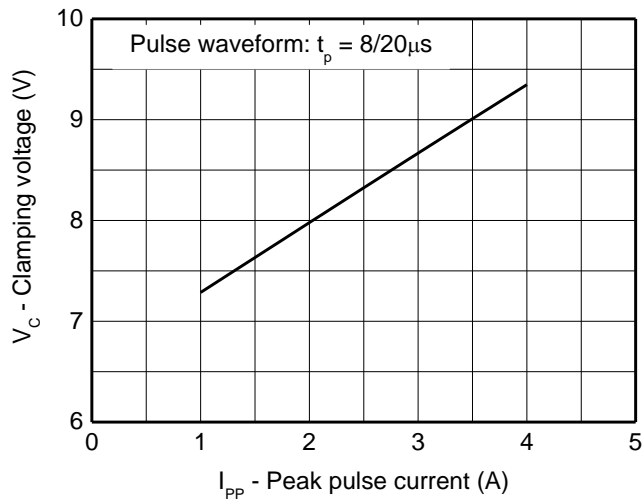
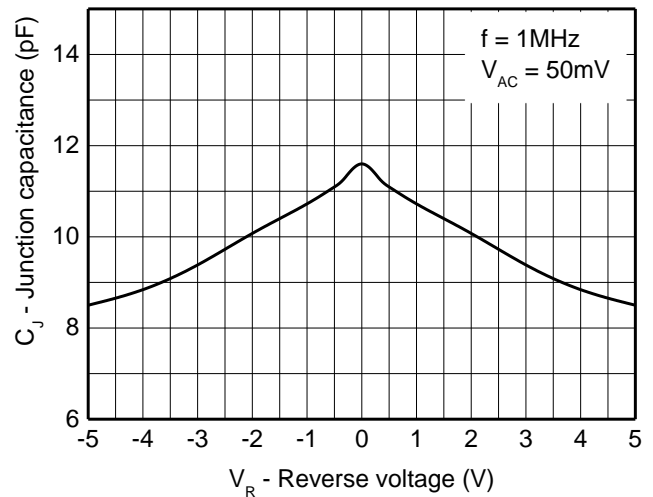
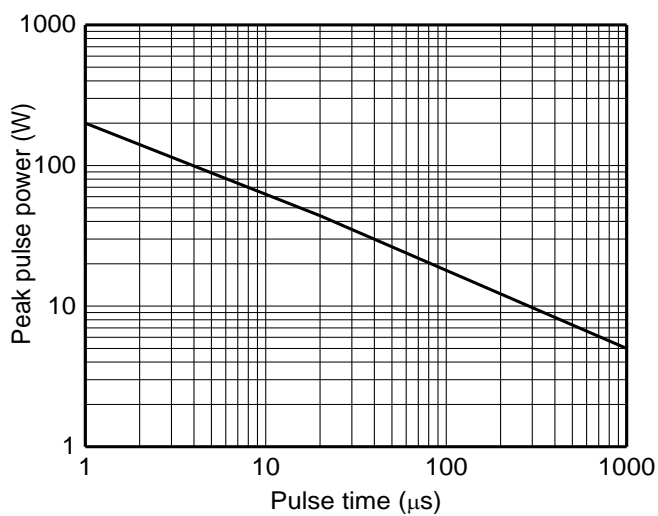
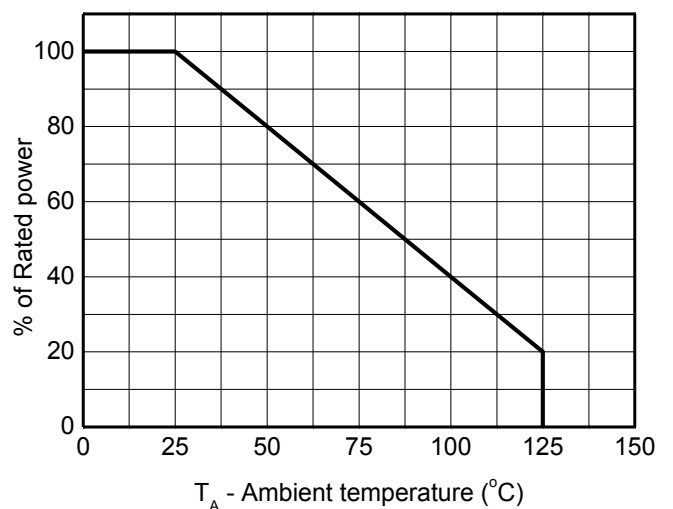
Parameter	Symbol	Rating	Unit
Peak pulse power ($t_p = 8/20\mu s$)	P_{pk}	44	W
Peak pulse current ($t_p = 8/20\mu s$)	I_{PP}	4	A
ESD according to IEC61000-4-2 air discharge	V_{ESD}	± 20	kV
ESD according to IEC61000-4-2 contact discharge		± 15	
Junction temperature	T_J	125	$^{\circ}C$
Operating temperature	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)

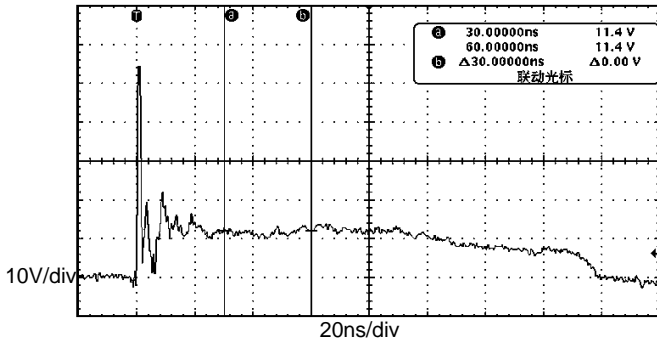
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse stand-off voltage	V_{RWM}				± 5.0	V
Reverse leakage current	I_R	$V_{RWM} = 5V$			0.5	μA
Reverse breakdown voltage	V_{BR}	$I_{BR} = 1mA$	5.2		8.0	V
Clamping voltage ¹⁾	V_{CL}	$I_{PP} = 16A, t_p = 100ns$		12		V
Clamping voltage ²⁾	V_{CL}	$V_{ESD} = 8kV$		12		V
Clamping voltage ³⁾	V_{CL}	$I_{PP} = 1A, t_p = 8/20\mu s$		7.5	9	V
		$I_{PP} = 4A, t_p = 8/20\mu s$		9.5	11	V
Dynamic resistance ¹⁾	R_{DYN}			0.35		Ω
Junction capacitance	C_J	$V_R = 0V, f = 1MHz$		11	15	pF

Notes:

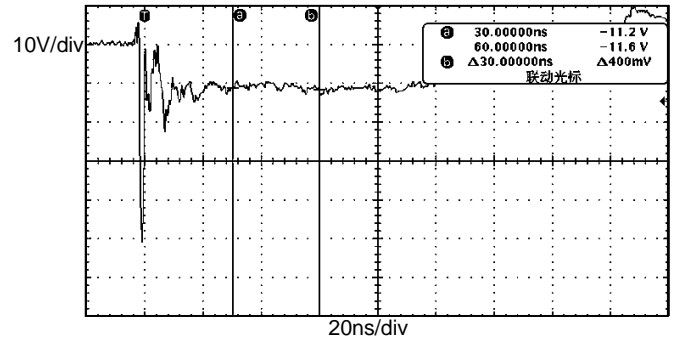
- 1) TLP parameter: $Z_0 = 50\Omega, t_p = 100ns, t_r = 2ns$, averaging window from 60ns to 80ns. R_{DYN} is calculated from 4A to 16A.
- 2) Contact discharge mode, according to IEC61000-4-2.
- 3) Non-repetitive current pulse, according to IEC61000-4-5.

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

8/20 μs 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

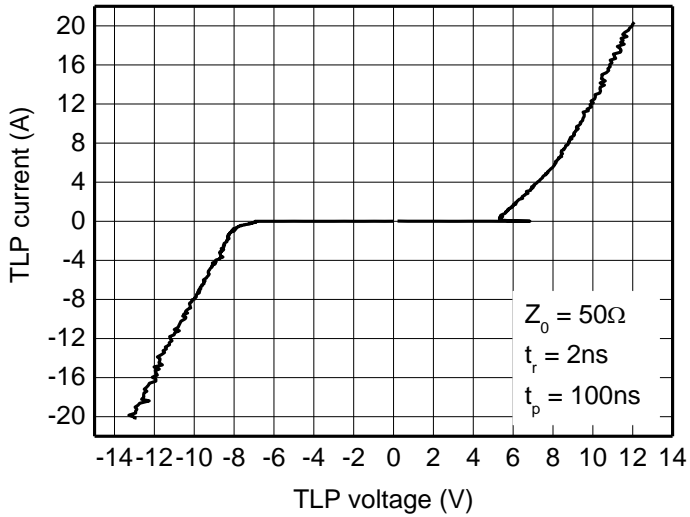
Typical characteristics ($T_A=25^{\circ}\text{C}$, unless otherwise noted)



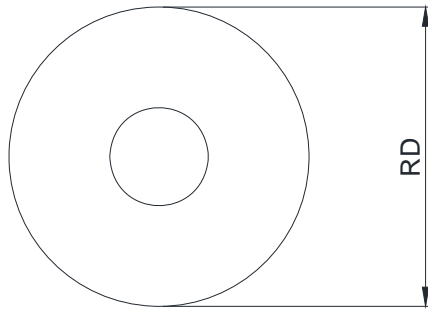
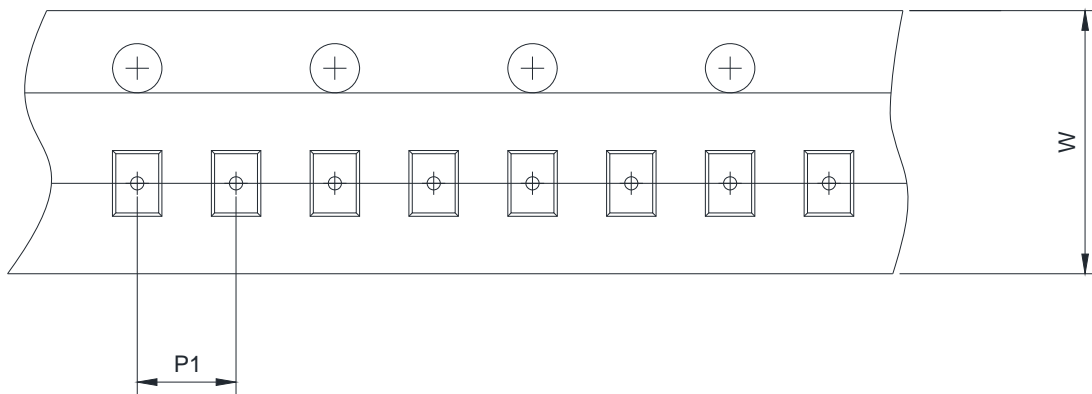
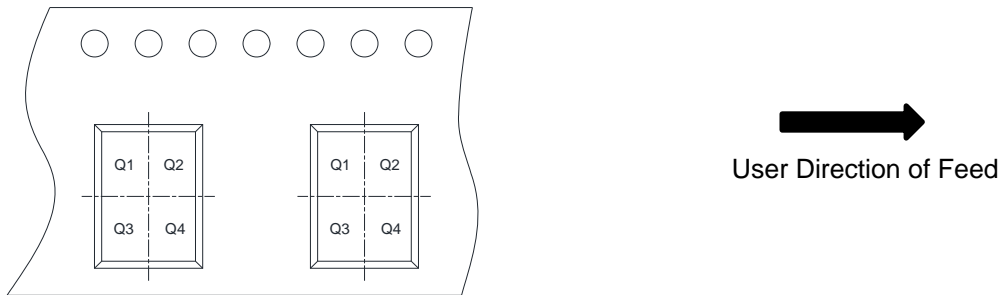
ESD clamping
(+8kV contact discharge per IEC61000-4-2)



ESD clamping
(-8kV contact discharge per IEC61000-4-2)



TLP Measurement

TAPE AND REEL INFORMATION
Reel Dimensions

Tape Dimensions

Quadrant Assignments For PIN1 Orientation In Tape


RD	Reel Dimension	<input checked="" type="checkbox"/> 7inch	<input type="checkbox"/> 13inch	
W	Overall width of the carrier tape	<input checked="" type="checkbox"/> 8mm	<input type="checkbox"/> 12mm	<input type="checkbox"/> 16mm
P1	Pitch between successive cavity centers	<input checked="" type="checkbox"/> 2mm	<input type="checkbox"/> 4mm	<input type="checkbox"/> 8mm
Pin1	Pin1 Quadrant	<input checked="" type="checkbox"/> Q1	<input checked="" type="checkbox"/> Q2	<input type="checkbox"/> Q3 <input type="checkbox"/> Q4