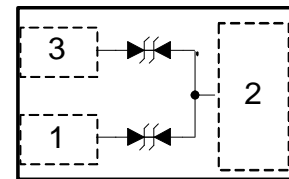
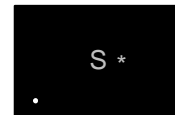


**ESD9NS5V**
**2-Lines, Bi-directional, Transient Voltage Suppressors**
<http://www.sh-willsemi.com>
**Descriptions**

The ESD9NS5V is a transient voltage suppressors (TVS) which provide a very high level protection for sensitive electronic components that may be subjected to electrostatic discharge (ESD). It is designed to replace multilayer varistors (MLV) in consumer equipment applications such as mobile phone, notebook, PDA, STB, LCD TV etc.

The ESD9NS5V was past ESD transient voltage up to  $\pm 30\text{kV}$  (contact) according to IEC61000-4-2 and withstand peak current up to 9A for 8/20 $\mu\text{s}$  pulse according to IEC61000-4-5.

The ESD9NS5V is available in DFN1006-3L package. Standard products are Pb-free and Halogen-free.


**DFN1006-3L**

**Pin configuration (Top view)**

**DFN1006-3L**

**S** = Device code  
**\*** = Month code (A~Z)  
**Marking**

**Features**

- Reverse stand-off voltage : 5V
- Peak current (tp=8/20 $\mu\text{s}$ ) : 9A
- Transient protection  
 IEC61000-4-2, Level 4 :  $\pm 30\text{kV}$  air  
 :  $\pm 30\text{kV}$  contact
- Low clamping voltage
- Low leakage current
- Small package

**Applications**

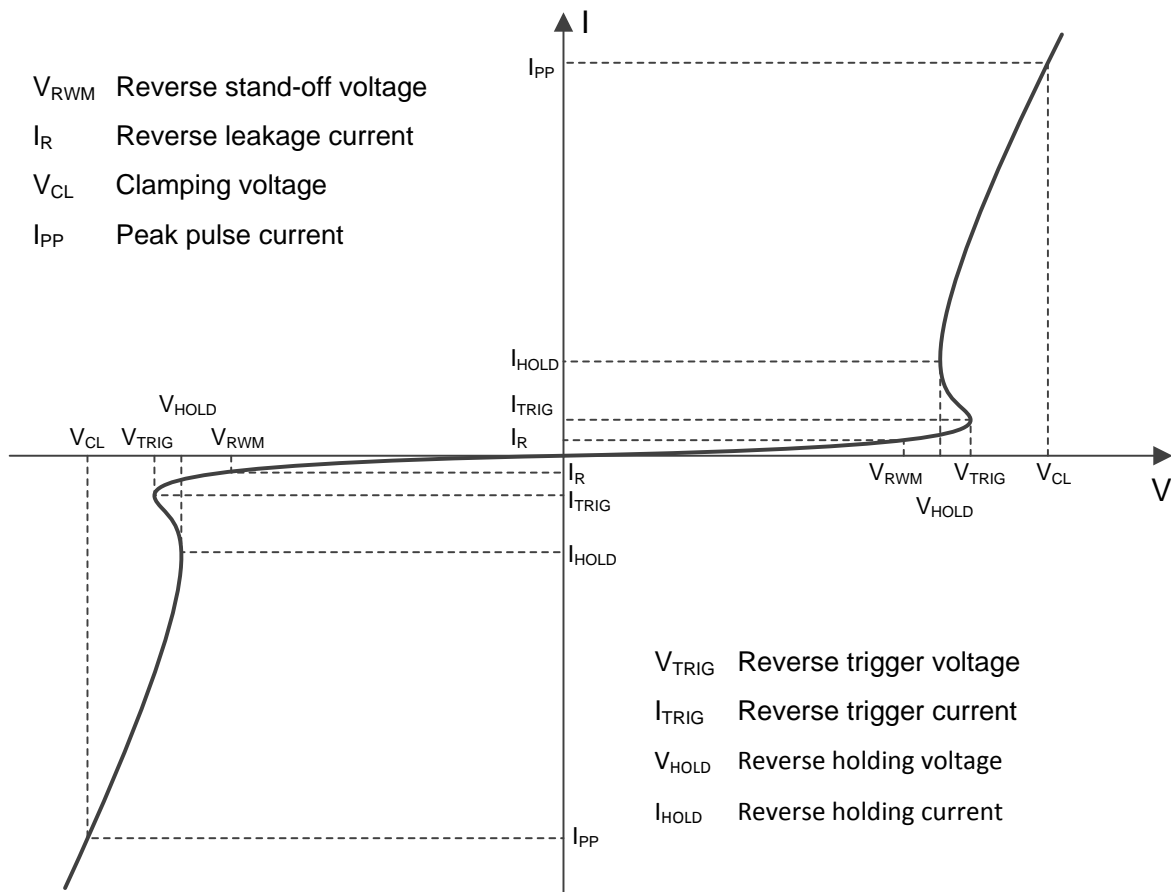
- Cell phone
- PMP
- MID
- PDA
- Digital camera
- Other electronic equipment

**Order information**

Device	Package	Shipping
ESD9NS5V-3/TR	DFN1006-3L	10000/Tape&Reel

**Absolute maximum ratings**

Parameter	Symbol	Rating	Unit
Peak pulse power (tp=8/20μs) (pin1 or pin3 to pin2)	P <sub>pk</sub>	100	W
Peak pulse power (tp=8/20μs) (pin2 to pin1 or pin3)		150	W
Peak pulse current (tp=8/20μs)	I <sub>pp</sub>	9	A
ESD voltage IEC61000-4-2 air	V <sub>ESD</sub>	±30	kV
ESD voltage IEC61000-4-2 contact		±30	
Junction temperature	T <sub>J</sub>	125	°C
Operating temperature	T <sub>OP</sub>	-40~85	°C
Lead temperature	T <sub>L</sub>	260	°C
Storage temperature	T <sub>STG</sub>	-55~150	°C

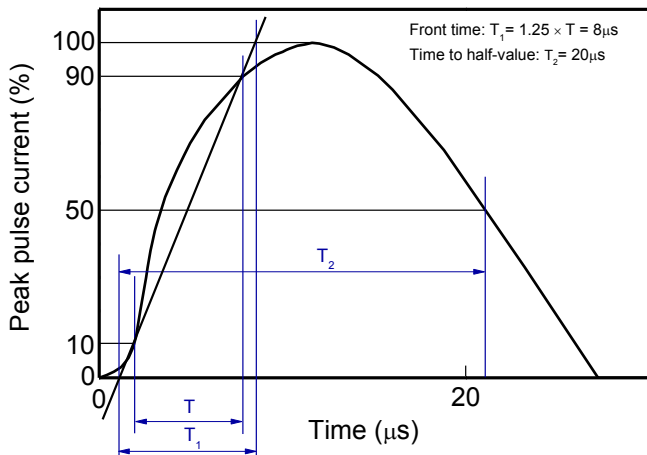
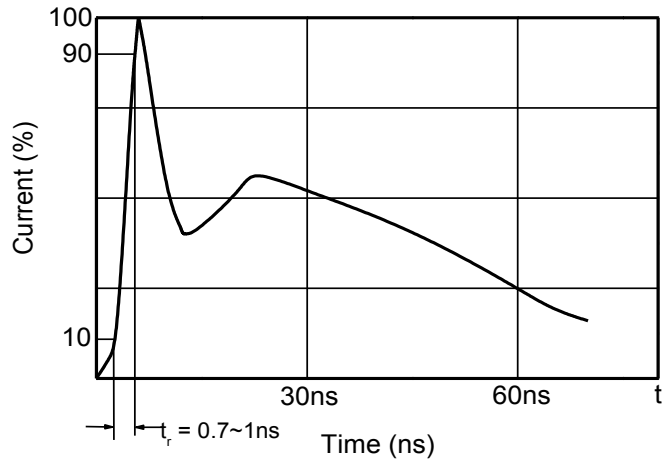
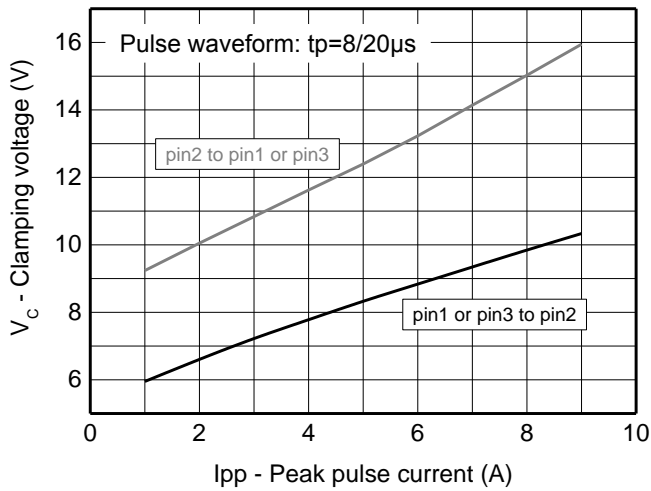
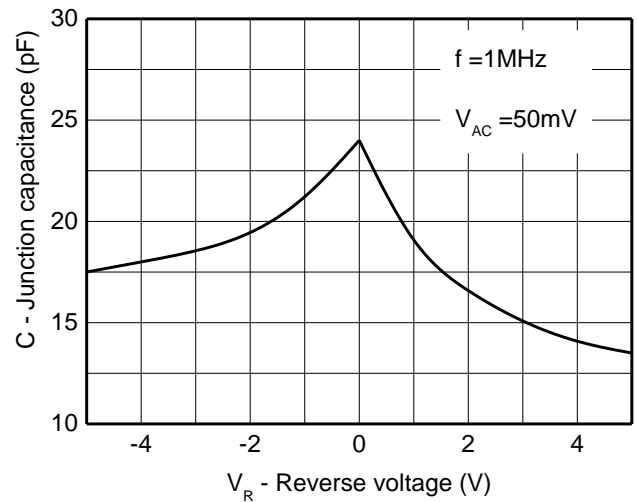
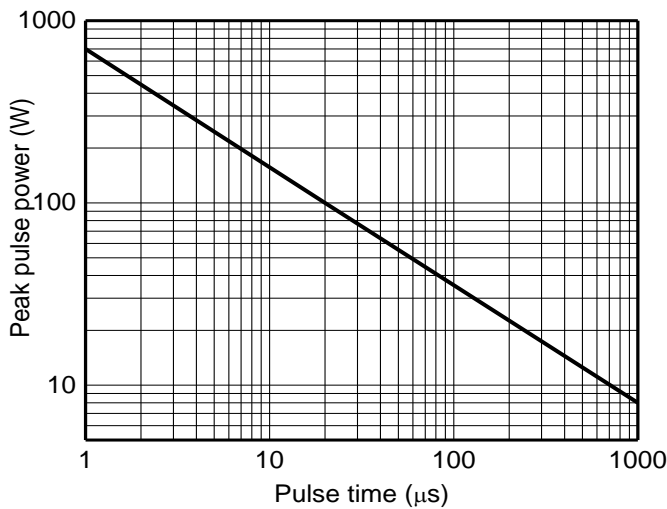
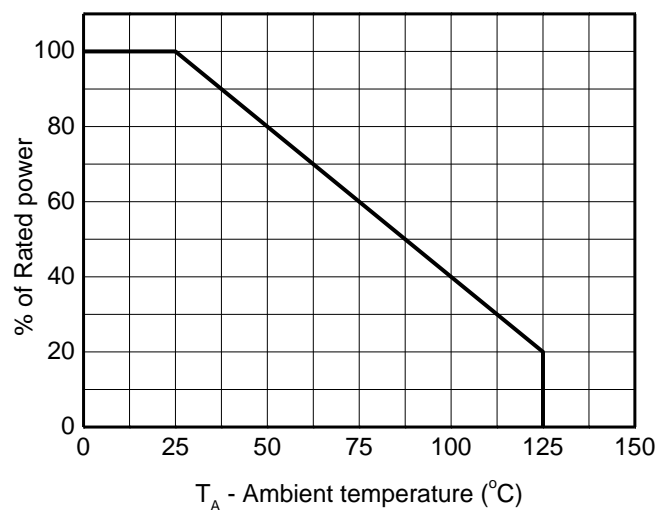
**Electrical characteristics (T<sub>A</sub> = 25°C, unless otherwise noted)**

**Definitions of electrical characteristics**

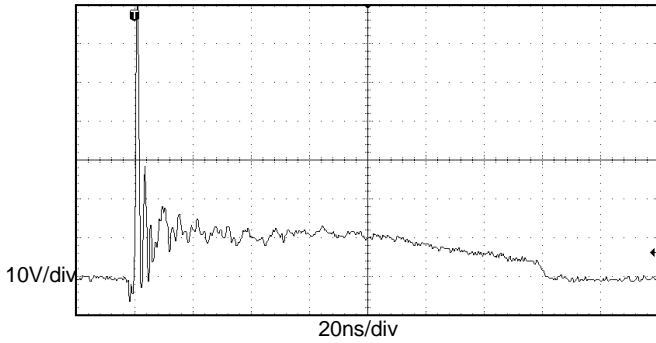
**Electrical characteristics (Ta=25 °C, unless otherwise noted)**

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse stand-off voltage	$V_{RWM}$				5.0	V
Reverse leakage current	$I_R$	$V_{RWM}=5V$			1	$\mu A$
Reverse breakdown voltage	$V_{BR}$	$I_{BR}=1mA$			9.5	V
Clamping voltage <sup>1)</sup>	$V_{CL}$	$I_{PP} = 16A, t_p = 100ns$ pin1 or pin3 to pin2		6		V
		$I_{PP} = 16A, t_p = 100ns$ pin2 to pin1 or pin3		11		V
Clamping voltage <sup>2)</sup>	$V_{CL}$	$V_{ESD} = 8kV$ pin1 or pin3 to pin2		10		V
		$V_{ESD} = 8kV$ pin2 to pin1 or pin3		15		V
Clamping voltage <sup>3)</sup>	$V_C$	$I_{pp}=1A, t_p = 8/20\mu s$ pin1 or pin3 to pin2			7	V
		$I_{pp}=9A, t_p = 8/20\mu s$ pin1 or pin3 to pin2			11	V
Clamping voltage <sup>3)</sup>	$V_C$	$I_{pp}=1A, t_p = 8/20\mu s$ pin2 to pin1 or pin3			11	V
		$I_{pp}=9A, t_p = 8/20\mu s$ pin2 to pin1 or pin3			17	V
Dynamic resistance <sup>1)</sup>	$R_{DYN}$	pin1 or pin3 to pin2		0.05		$\Omega$
		pin2 to pin1 or pin3		0.11		$\Omega$
Junction capacitance	$C_J$	$f=1MHz, V_R=0V$		24	30	pF

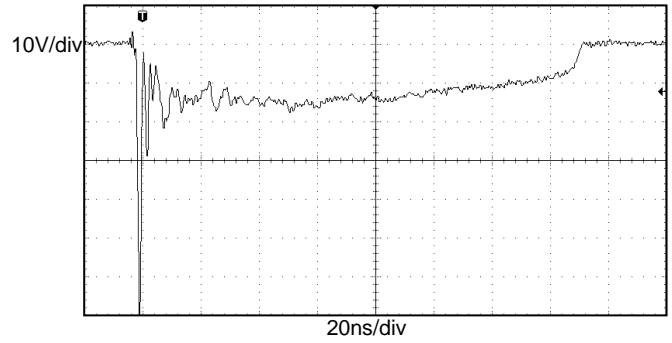
**Notes:**

- 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.

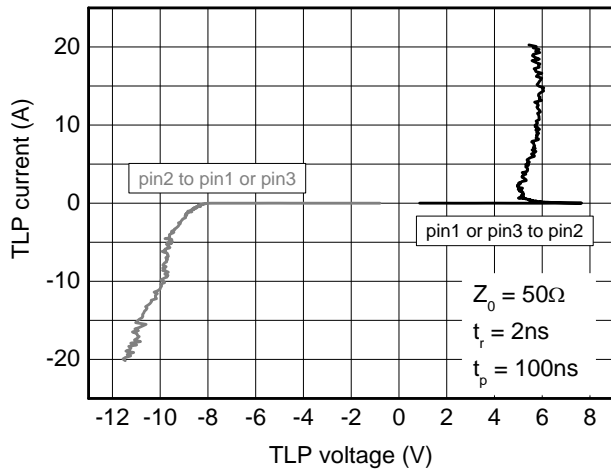
**Typical characteristics ( $T_A=25^\circ\text{C}$ , unless otherwise noted)**

**8/20 $\mu\text{s}$  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**

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


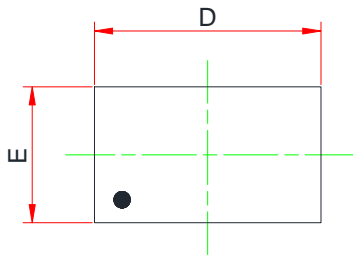
**ESD clamping**  
**(+8kV contact discharge per IEC61000-4-2)**



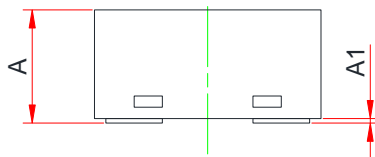
**ESD clamping**  
**(-8kV contact discharge per IEC61000-4-2)**



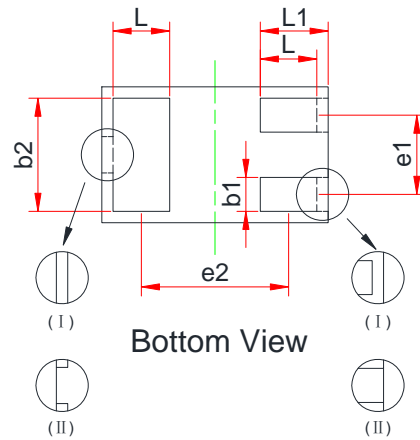
**TLP Measurement**

**P PACKAGE OUTLINE DIMENSIONS**
**DFN1006-3L**


Top View

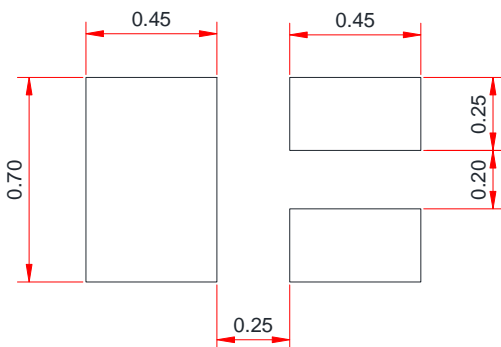


Side View

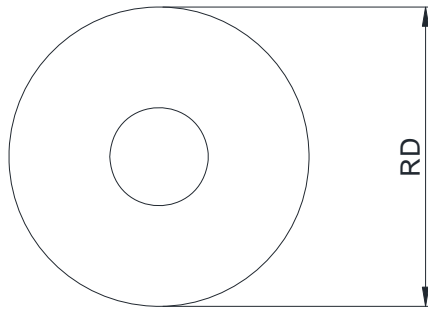
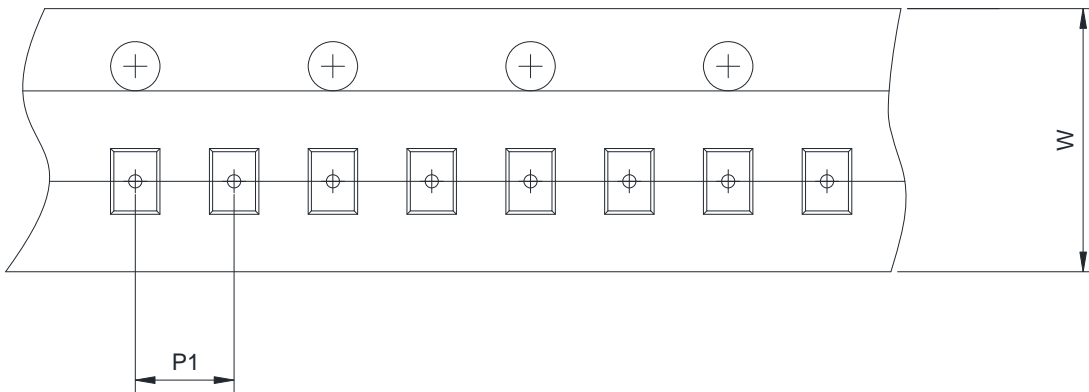
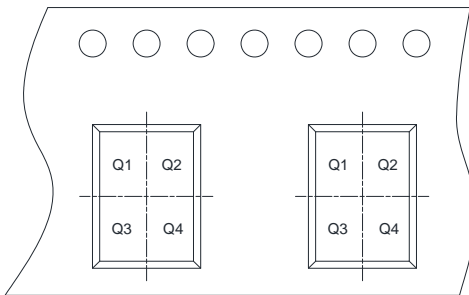


Bottom View

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.36	-	0.50
A1	0.00	-	0.05
D	0.95	1.00	1.05
E	0.55	0.60	0.65
b1	0.10	0.15	0.20
b2	0.40	0.50	0.60
L	0.20	0.25	0.30
L1	0.20	0.30	0.40
e1	0.35 BSC		
e2	0.65 BSC		

**Recommend PCB Layout (Unit: mm)**

**Notes:**

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

**TAPE AND REEL INFORMATION**
**Reel Dimensions**

**Tape Dimensions**

**Quadrant Assignments For PIN1 Orientation In Tape**


  
 User Direction of Feed

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 type="checkbox"/> Q2 <input type="checkbox"/> Q3 <input type="checkbox"/> Q4

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