

# ESD9N12BA

## 1-Line, Bi-directional, Transient Voltage Suppressors

### Descriptions

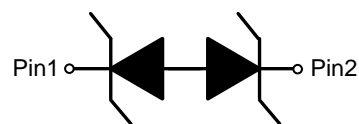
The ESD9N12BA is a TVS (Transient Voltage Suppressor) designed to protect sensitive electronic components which are connected to data and transmission lines from over-stress caused by ESD (Electrostatic Discharge), EFT (Electrical Fast Transients) and lightning.

The ESD9N12BA may be used to provide ESD protection up to  $\pm 30\text{kV}$  (contact discharge) according to IEC61000-4-2, and withstand peak pulse current up to 5.5A (8/20 $\mu\text{s}$ ) according to IEC61000-4-5.

The ESD9N12BA is available in DFN1006-2L package. Standard products are Pb-free and Halogen-free.



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



**Circuit diagram**

### Features

- Stand-off voltage:  $\pm 12\text{V}$  Max
- Transient protection for each line according to IEC61000-4-2 (ESD):  $\pm 30\text{kV}$  (contact discharge)  
IEC61000-4-5 (surge): 5.5A (8/20 $\mu\text{s}$ )
- Capacitance:  $C_J = 27\text{pF}$  typ.
- Ultra-low leakage current:  $I_R = 0.1\text{nA}$  typ.
- Low clamping voltage:  $V_{CL} = 20\text{V}$  typ. @  $I_{PP} = 16\text{A}$  (TLP)
- Solid-state silicon technology

### Applications

- Computers and peripherals
- Cellular handsets
- Portable Electronics
- Notebooks



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

**Marking (Top View)**

### Order information

Device	Package	Shipping
ESD9N12BA-2/TR	DFN1006-2L	10000/Tape&Reel

**Absolute maximum ratings**

Parameter	Symbol	Rating	Unit
Peak pulse power ( $t_p = 8/20\mu s$ )	$P_{pk}$	99	W
Peak pulse current ( $t_p = 8/20\mu s$ )	$I_{pp}$	5.5	A
ESD according to IEC61000-4-2 air discharge	$V_{ESD}$	$\pm 30$	kV
ESD according to IEC61000-4-2 contact discharge		$\pm 30$	
Operation junction temperature	$T_J$	125	$^{\circ}C$
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)**

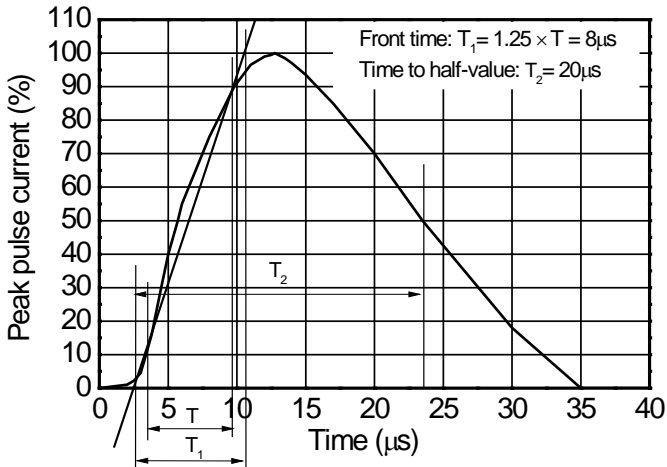
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Stand-off voltage	$V_{RWM}$				$\pm 12$	V
Reverse leakage current	$I_R$	$V_{RWM} = 12V$		0.1	50	nA
Reverse breakdown voltage	$V_{BR}$	$I_T = 1mA$	13		16.5	V
Clamping voltage <sup>1)</sup>	$V_{CL}$	$I_{PP} = 16A, t_p = 100ns$		20		V
Dynamic resistance <sup>1)</sup>	$R_{DYN}$			0.35		$\Omega$
Clamping voltage <sup>2)</sup>	$V_{CL}$	$I_{PP} = 1A, t_p = 8/20\mu s$			16	V
		$I_{PP} = 5.5A, t_p = 8/20\mu s$			18	V
Junction capacitance	$C_J$	$V_R = 0V, f = 1MHz$		27	35	pF
		$V_R = 12V, f = 1MHz$		14	20	pF

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.

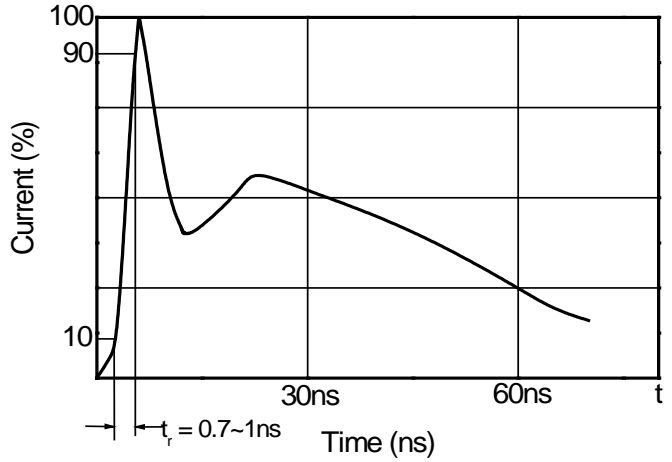
2) According to IEC61000-4-5.

**ESD9N12BA**

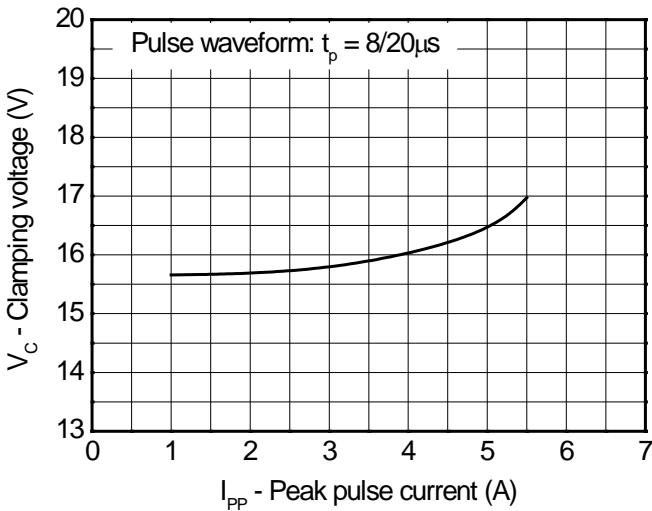
**Typical characteristics ( $T_A=25^\circ\text{C}$ , unless otherwise noted)**



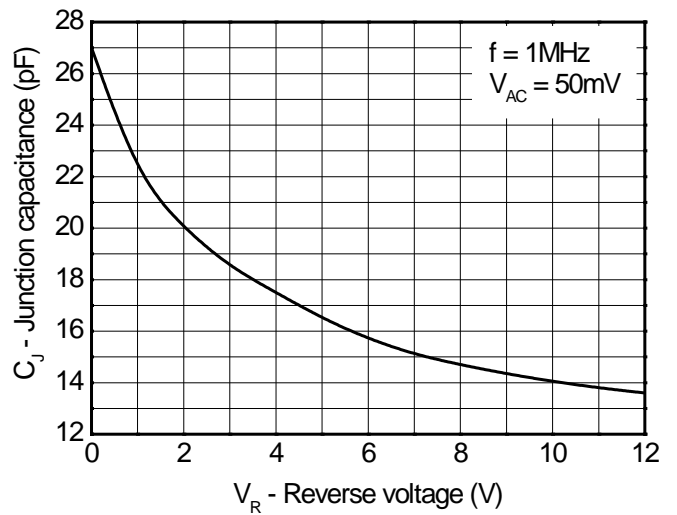
**8/20 $\mu\text{s}$  waveform per IEC61000-4-5**



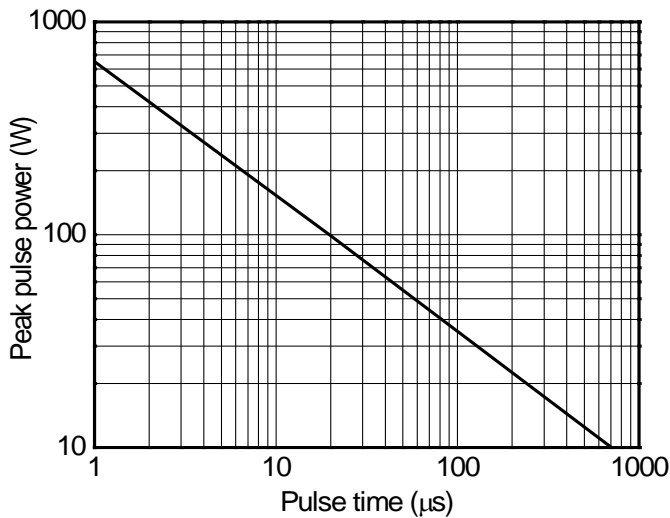
**Contact discharge current waveform per IEC61000-4-2**



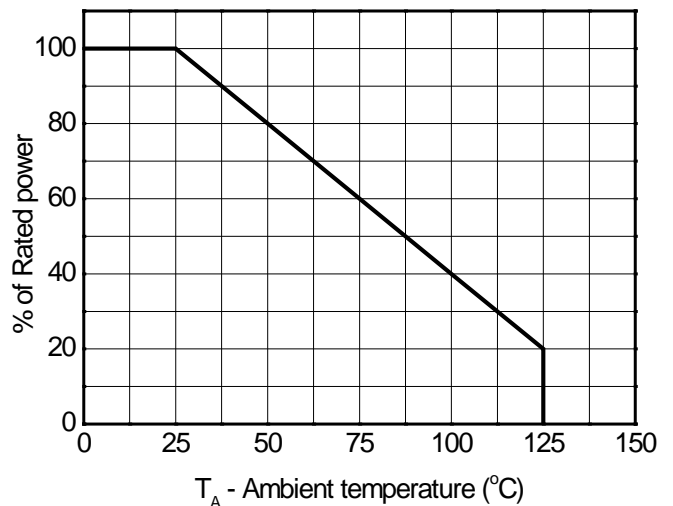
**Clamping voltage vs. Peak pulse current**



**Capacitance vs. Reverse voltage**

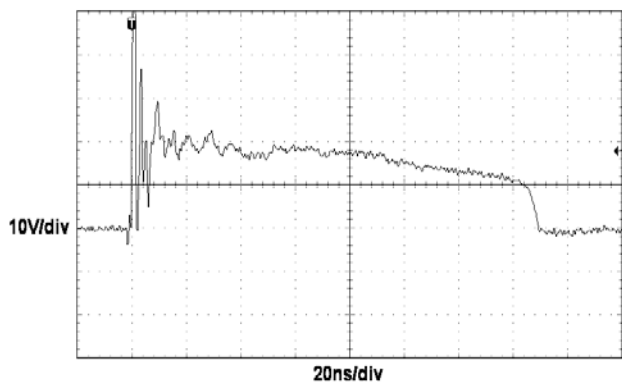


**Non-repetitive peak pulse power vs. Pulse time**

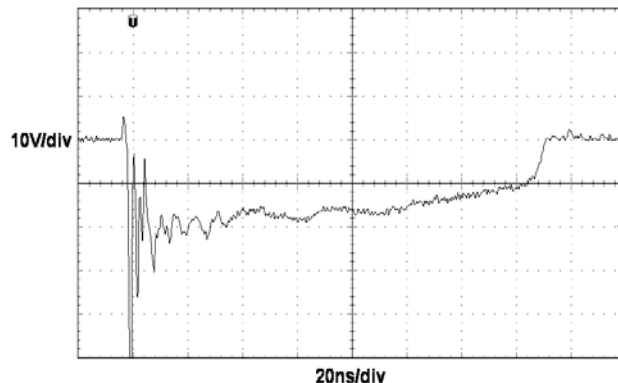


**Power derating vs. Ambient temperature**

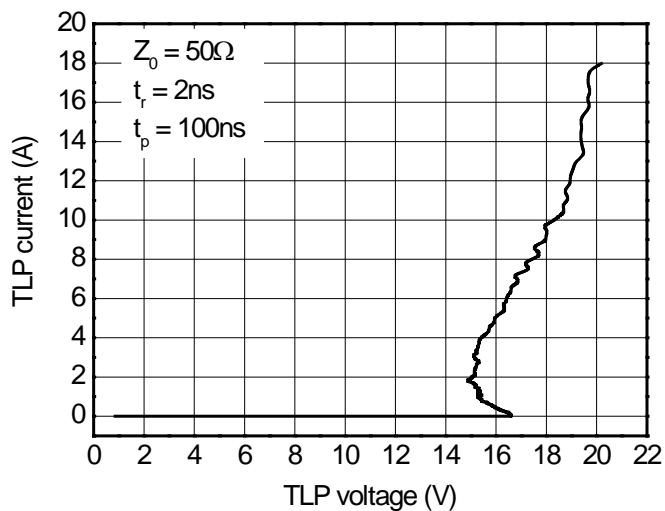
**ESD9N12BA**



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



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

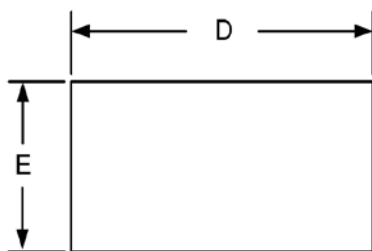


**TLP Measurement**

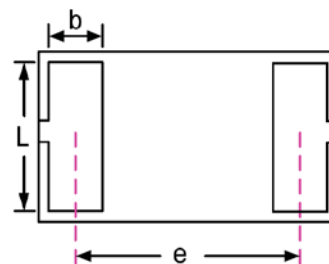
ESD9N12BA

Package outline dimensions

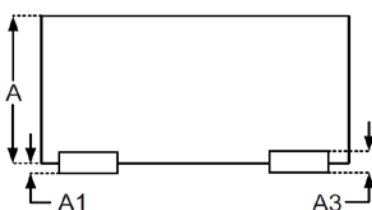
DFN1006-2L



Top View



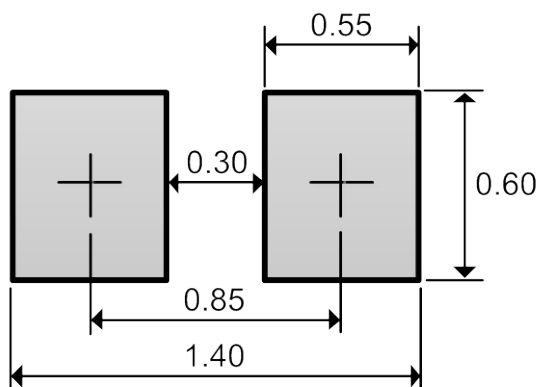
Bottom View



Side View

Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	0.40	-	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.		

Recommend land pattern (Unit: mm)



Note: This land pattern is for your reference only.