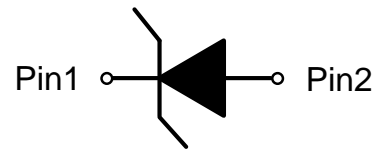


**ESD5401N**
**1-Line, Unii-directional, Transient Voltage Suppressors**
<http://www.sh-willsemi.com>
**Descriptions**

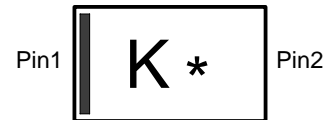
The ESD5401N is a TVS (Transient Voltage Suppressor) designed to protect sensitive electronic components which are connected to data and transmission lines from over-stress caused by ESD (Electrostatic Discharge), EFT (Electrical Fast Transients) and lightning.

The ESD5401N may be used to provide ESD protection up to  $\pm 20\text{kV}$  (contact discharge) according to IEC61000-4-2, and withstand peak pulse current up to 3.0A (8/20 $\mu\text{s}$ ) according to IEC61000-4-5.

The ESD5401N is available in DFN1006-2L package. Standard products are Pb-free and Halogen-free.


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

**Circuit diagram**
**Features**

- Stand-off voltage: 24V Max
- Transient protection for each line according to IEC61000-4-2 (ESD):  $\pm 20\text{kV}$  (contact discharge)  
IEC61000-4-5 (surge): 3.0A (8/20 $\mu\text{s}$ )
- Capacitance:  $C_J = 14.2\text{pF}$  typ.
- Ultra-low leakage current:  $I_R = 0.1\text{nA}$  typ.
- Low clamping voltage:  $V_{CL} = 48\text{V}$  typ. @  $I_{PP} = 16\text{A}$  (TLP)
- Solid-state silicon technology



K= Device code

\* = Month code ( A~Z)

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

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

**Order information**

Device	Package	Shipping
ESD5401N-2/TR	DFN1006-2L	10000/Tape&Reel

**Absolute maximum ratings**

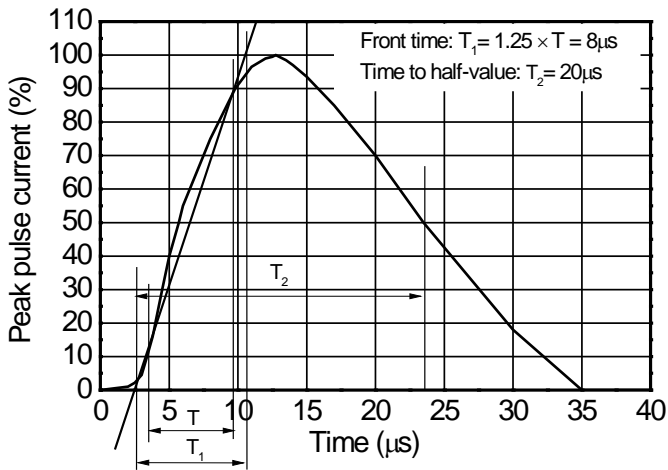
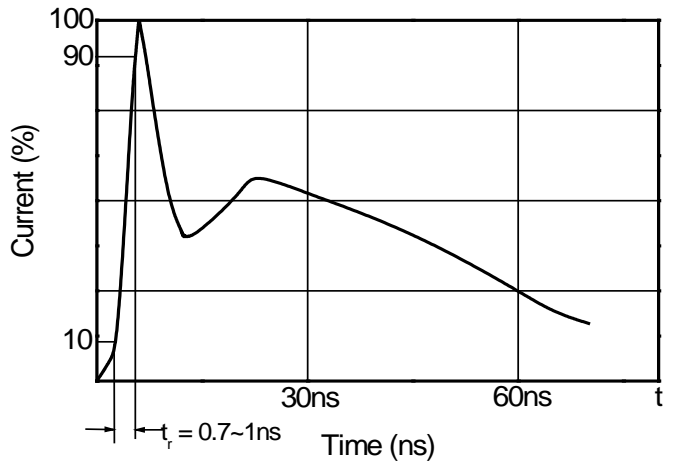
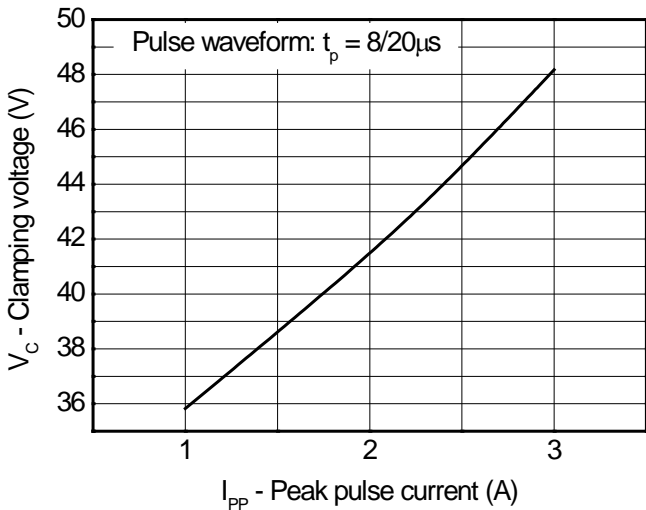
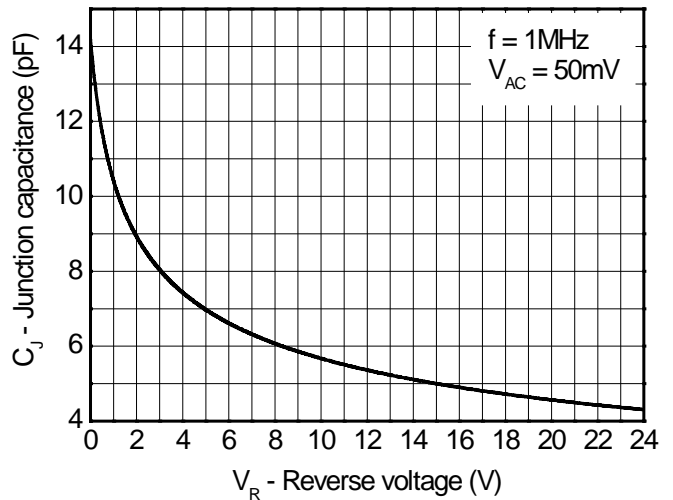
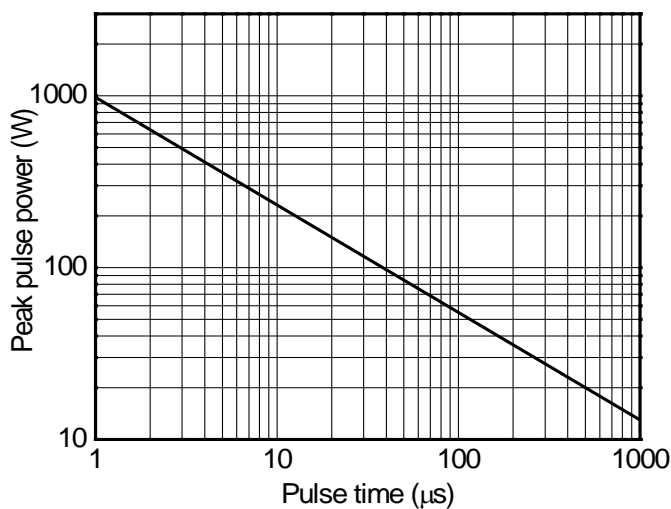
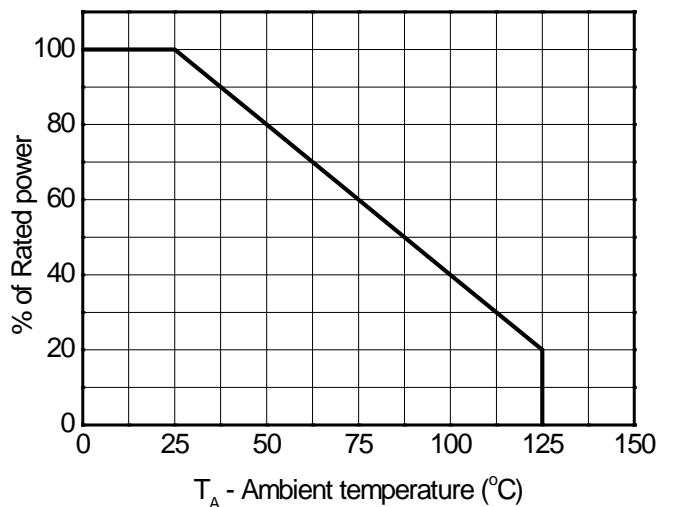
Parameter	Symbol	Rating	Unit
Peak pulse power ( $t_p = 8/20\mu s$ )	$P_{pk}$	150	W
Peak pulse current ( $t_p = 8/20\mu s$ )	$I_{PP}$	3.0	A
ESD according to IEC61000-4-2 air discharge	$V_{ESD}$	$\pm 20$	kV
ESD according to IEC61000-4-2 contact discharge		$\pm 20$	
Operation junction temperature	$T_J$	125	$^{\circ}C$
Lead temperature	$T_L$	260	$^{\circ}C$
Storage temperature	$T_{STG}$	-55~150	$^{\circ}C$

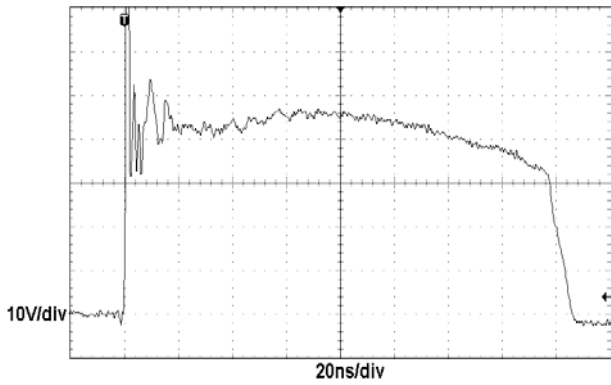
**Electrical characteristics ( $T_A=25^{\circ}C$ , unless otherwise noted)**

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse maximum working voltage	$V_{RWM}$				24	V
Reverse leakage current	$I_R$	$V_{RWM} = 24V$		0.1	50	nA
Reverse breakdown voltage	$V_{BR}$	$I_T = 1mA$	27		33	V
Forward voltage	$V_F$	$I_F = 20mA$	0.65	0.83	1.25	V
Clamping voltage <sup>1)</sup>	$V_{CL}$	$I_{PP} = 16A, t_p = 100ns$		48		V
Dynamic resistance <sup>1)</sup>	$R_{DYN}$			0.84		$\Omega$
Clamping voltage <sup>2)</sup>	$V_{CL}$	$I_{PP} = 1A, t_p = 8/20\mu s$		36		V
		$I_{PP} = 3.0A, t_p = 8/20\mu s$		48		V
Junction capacitance	$C_J$	$V_R = 0V, f = 1MHz$		14.2	17	pF
		$V_R = 24V, f = 1MHz$		4.3	7	pF

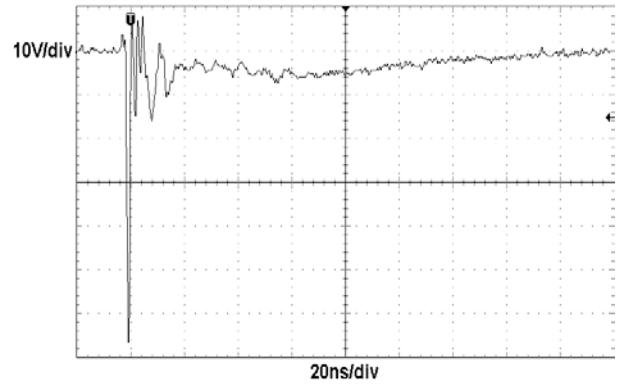
1) TLP parameter:  $Z_0 = 50 \Omega$ ,  $t_p = 100ns$ ,  $t_r = 2ns$ , averaging window from 60ns to 80ns.  $R_{DYN}$  is calculated from 4A to 16A.

2) According to IEC61000-4-5.

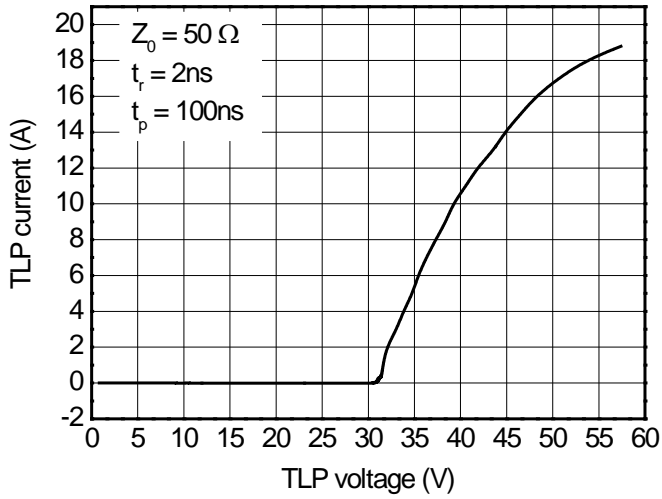
**Typical characteristics ( $T_A=25^\circ\text{C}$ , unless otherwise noted)**

**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. Reverses voltage**

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

**Power derating vs. Ambient temperature**



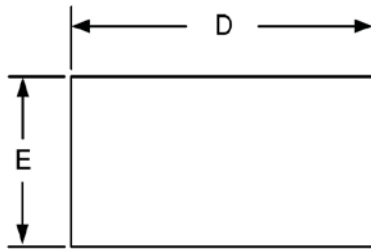
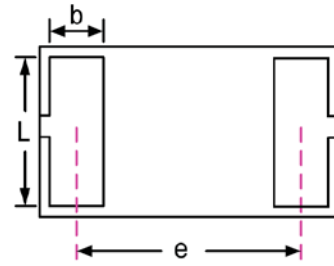
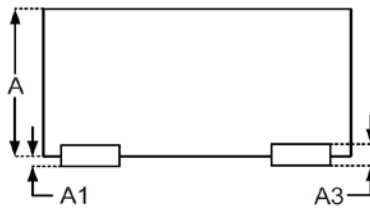
**ESD clamping**  
 (+8kV contact discharge per IEC61000-4-2)



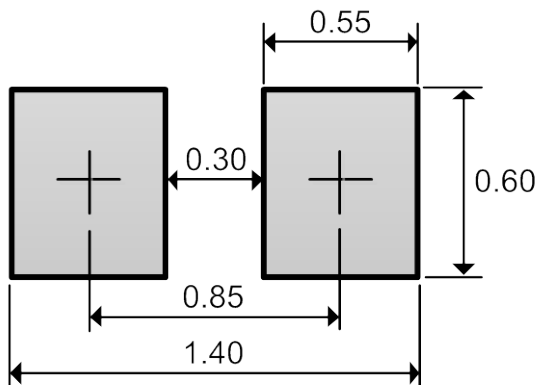
**ESD clamping**  
 (-8kV contact discharge per IEC61000-4-2)



**TLP Measurement**

**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.*