

ESD5401N

1-Line, Uni-directional, Transient Voltage Suppressors

<http://www.sh-willsemi.com>

Descriptions

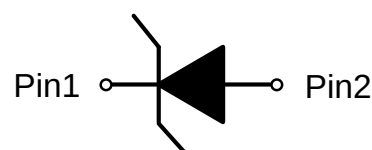
The ESD5401N is a TVS (Transient Voltage Suppressor) designed to protect sensitive electronic components which are connected to data and transmission lines from over-stress caused by ESD (Electrostatic Discharge), EFT (Electrical Fast Transients) and lightning.

The ESD5401N may be used to provide ESD protection up to $\pm 30\text{kV}$ (contact discharge) according to IEC61000-4-2, and withstand peak pulse current up to 8A (8/20 μs) 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): $\pm 30\text{kV}$ (contact discharge)
IEC61000-4-5 (surge): 8A (8/20 μs)
- Capacitance: $C_J = 42\text{pF}$ typ.
- Ultra-low leakage current: $I_R < 1\text{nA}$ typ.
- Low clamping voltage: $V_{CL} = 40\text{V}$ 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

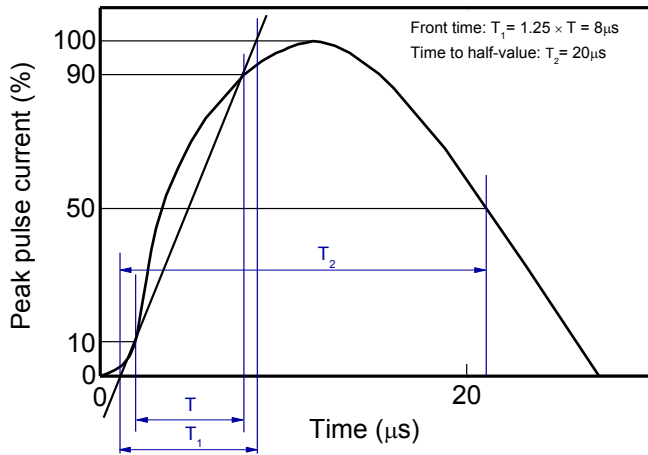
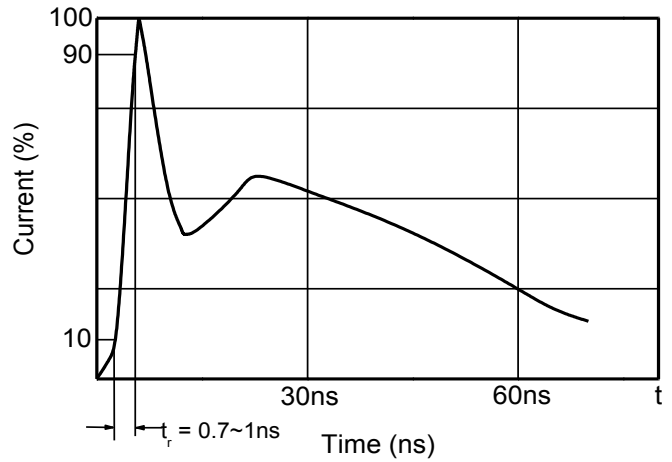
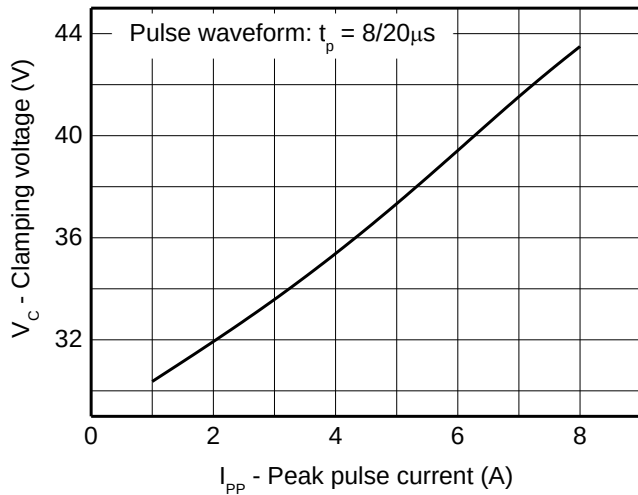
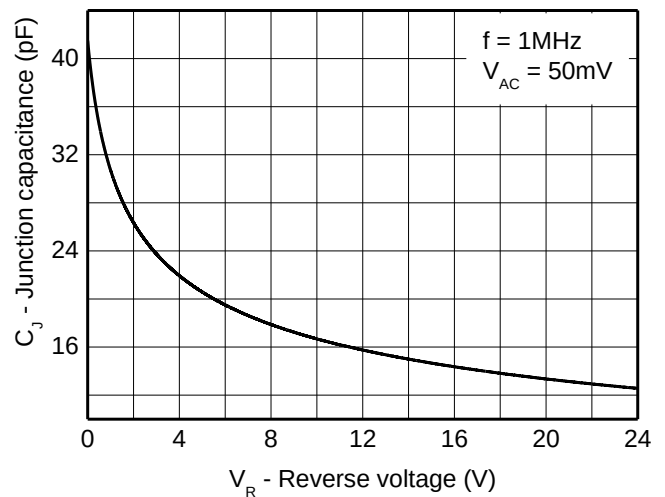
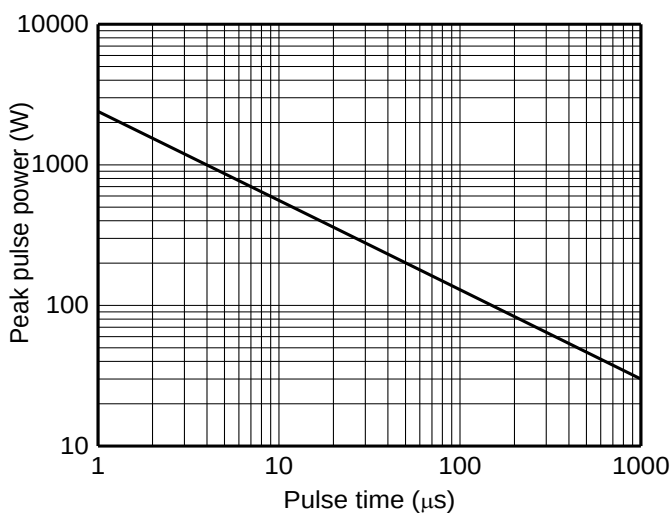
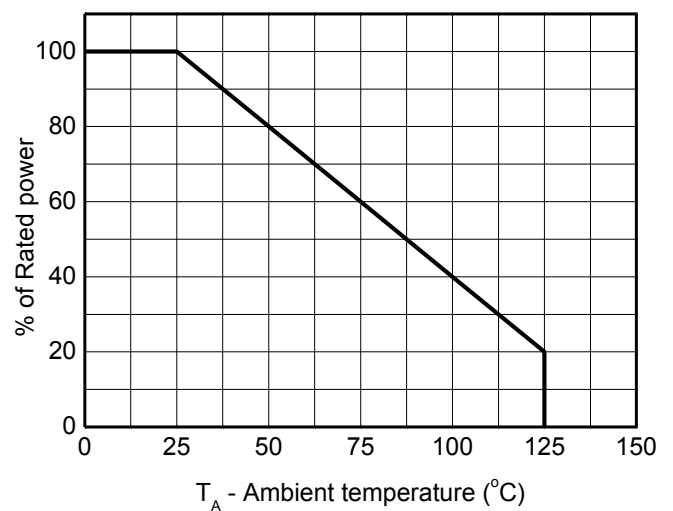
Parameter	Symbol	Rating	Unit
Peak pulse power ($t_p = 8/20\mu s$)	P_{pk}	360	W
Peak pulse current ($t_p = 8/20\mu s$)	I_{PP}	8	A
ESD according to IEC61000-4-2 air discharge	V_{ESD}	± 30	kV
ESD according to IEC61000-4-2 contact discharge		± 30	
Junction temperature	T_J	125	$^{\circ}C$
Operating temperature	T_{OP}	-40~85	$^{\circ}C$
Lead temperature	T_L	260	$^{\circ}C$
Storage temperature	T_{STG}	-55~150	$^{\circ}C$

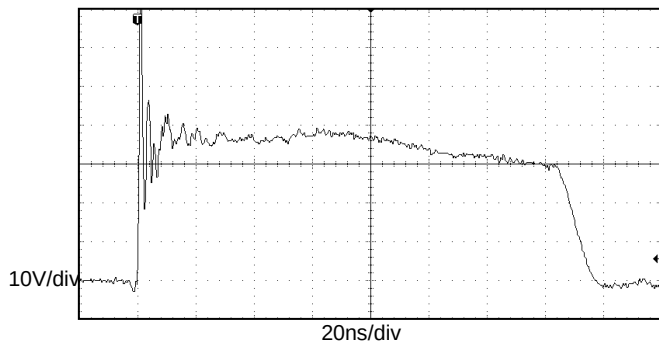
Electrical characteristics ($T_A=25^{\circ}C$, unless otherwise noted)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse maximum working voltage	V_{RWM}				24	V
Reverse leakage current	I_R	$V_{RWM} = 24V$		<1	50	nA
Reverse breakdown voltage	V_{BR}	$I_T = 1mA$	27	29	33	V
Forward voltage	V_F	$I_F = 20mA$	0.65	0.83	1.25	V
Clamping voltage ¹⁾	V_{CL}	$I_{PP} = 16A, t_p = 100ns$		40		V
Dynamic resistance ¹⁾	R_{DYN}			0.6		Ω
Clamping voltage ²⁾	V_{CL}	$I_{PP} = 1A, t_p = 8/20\mu s$			33	V
		$I_{PP} = 8A, t_p = 8/20\mu s$			45	V
Junction capacitance	C_J	$V_R = 0V, f = 1MHz$		42	50	pF
		$V_R = 24V, f = 1MHz$		12	15	pF

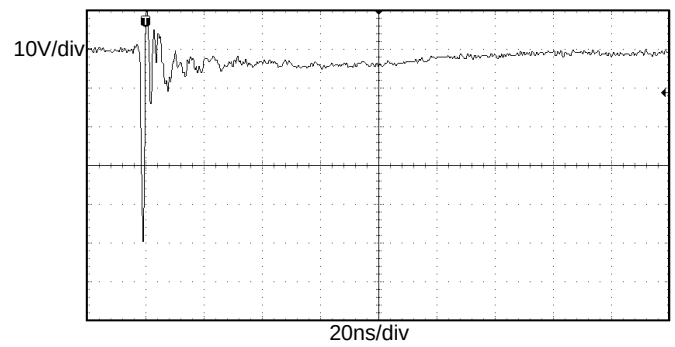
1) TLP parameter: $Z_0 = 50 \Omega$, $t_p = 100ns$, $t_r = 2ns$, averaging window from 60ns to 80ns. R_{DYN} is calculated from 4A to 16A.

2) Non-repetitive current pulse, according to IEC61000-4-5.

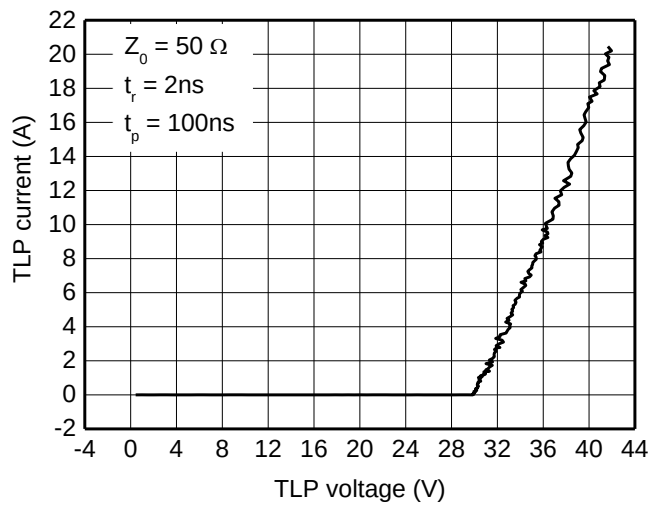
Typical characteristics ($T_A=25^\circ\text{C}$, unless otherwise noted)

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



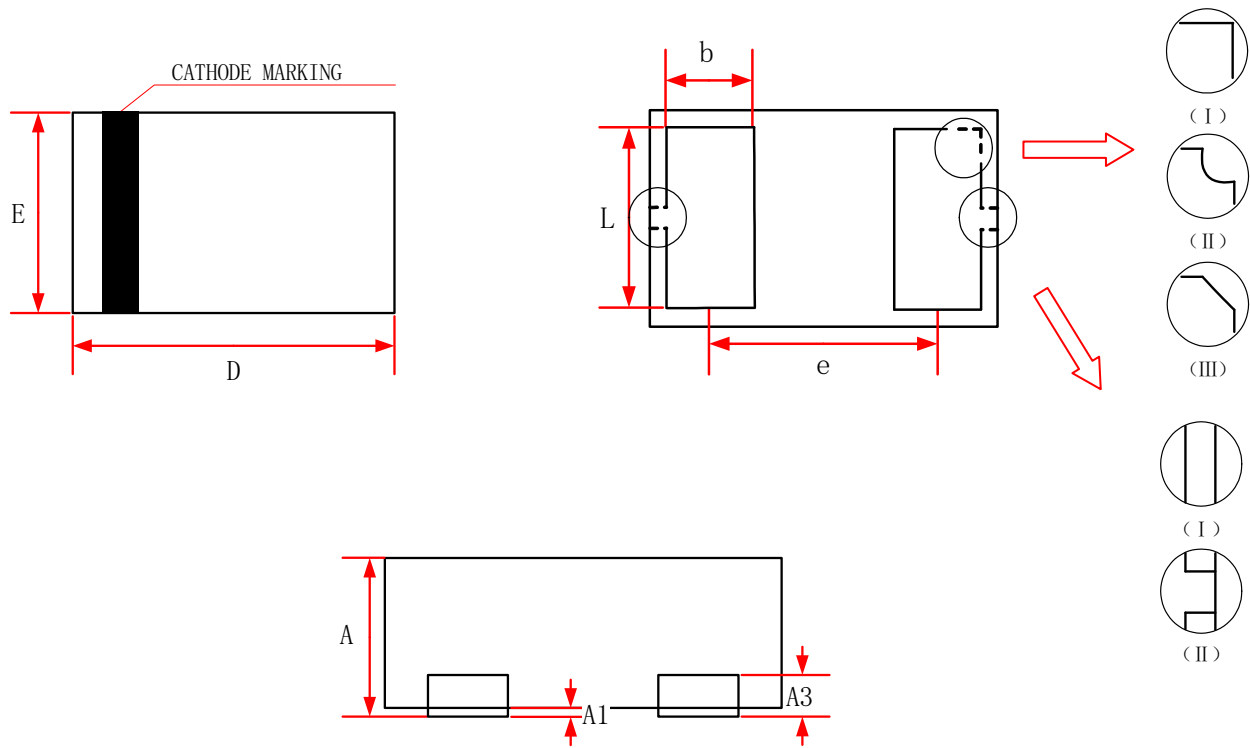
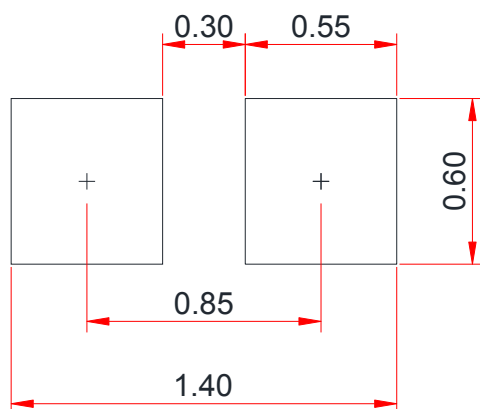
ESD clamping
(+8kV contact discharge per IEC61000-4-2)



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



TLP Measurement

Package outline dimensions
DFN1006-2L

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.