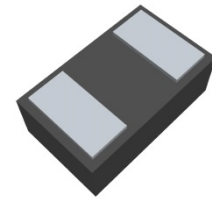
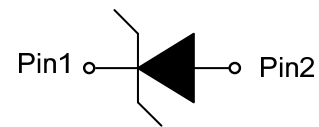


ESD5441N02
1-Line, Uni-directional, Transient Voltage Suppressor
<http://www.sh-willsemi.com>
Descriptions

The ESD5441N02 is a uni-directional TVS (Transient Voltage Suppressor). It is specifically designed to protect sensitive electronic components that may be subjected to ESD (Electrostatic Discharge), EFT (Electrical Fast Transients) and Lightning. It is particularly well-suited for cellular phones, portable device, digital cameras, power supplies and many other portable applications because of its small package and low weight.

The ESD5441N02 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 9A (8/20 μs) according to IEC61000-4-5.

The ESD5441N02 is available in DFN1006-2L package. Standard products are Pb-free and Halogen-free.


DFN1006-2L

Circuit diagram
Features

- Stand-off voltage: 2.2V Max.
- Transient protection for each line according to
IEC61000-4-2 (ESD): $\pm 30\text{kV}$ (contact discharge)
IEC61000-4-4 (EFT): 40A (5/50ns)
IEC61000-4-5 (surge): 9A (8/20 μs)
- Capacitance: $C_J = 5\text{pF}$ Typ.
- Solid-state silicon technology



H = Device code
* = Date code (A~Z)

Marking (Top View)
Applications

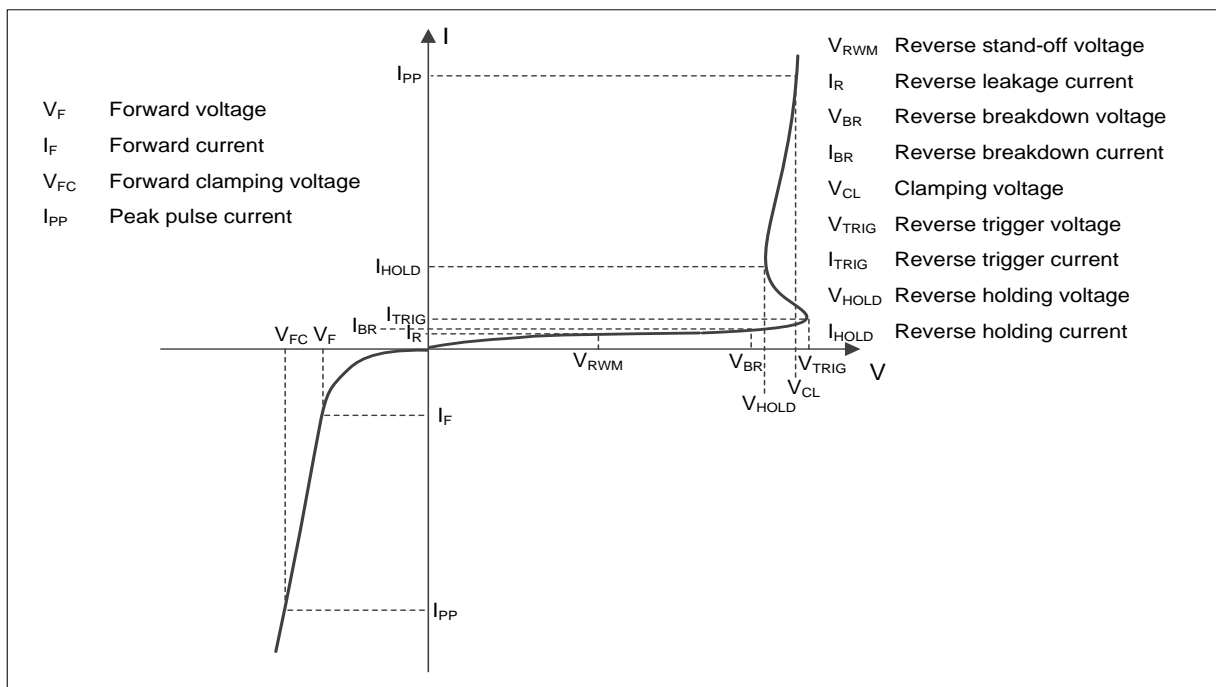
- Cell phone handsets and accessories
- Personal Digital Assistants (PDAs)
- Notebooks, Desktops, and Servers
- Portable Instrumentation
- Digital Cameras
- Power supply protection
- Power management

Order information

Device	Package	Shipping
ESD5441N02-2/TR	DFN1006-2L	10000/Tape&Reel

Absolute maximum ratings

Parameter	Symbol	Rating	Unit
Peak pulse power ($t_p = 8/20\mu s$)	P_{pk}	72	W
Peak pulse current ($t_p = 8/20\mu s$)	I_{PP}	9	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	$^{\circ}C$

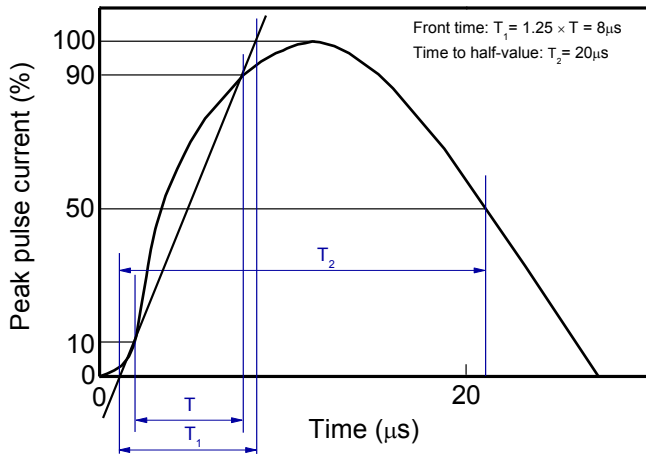
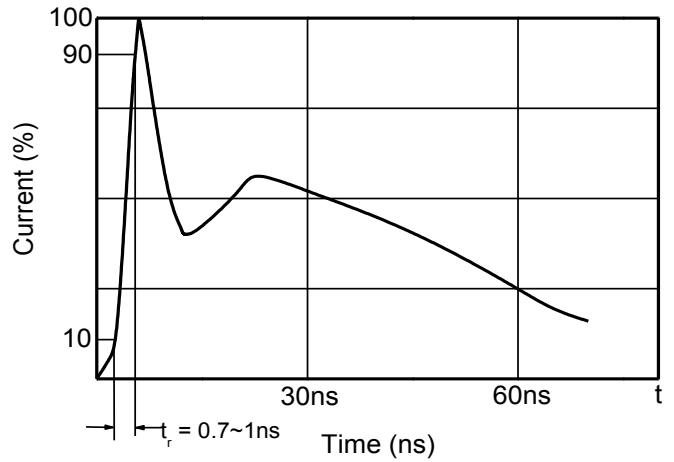
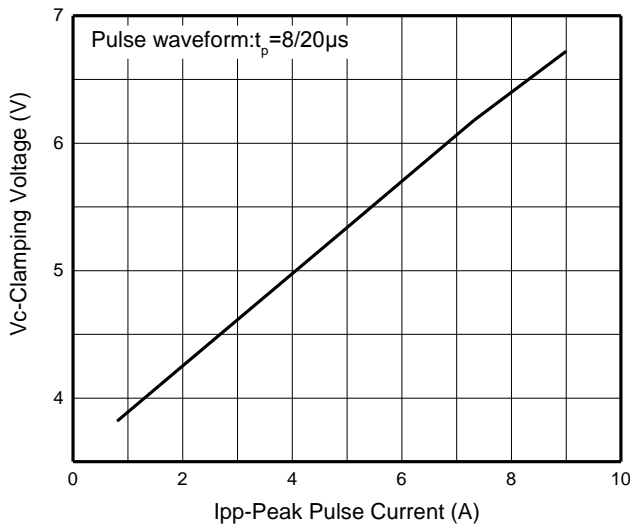
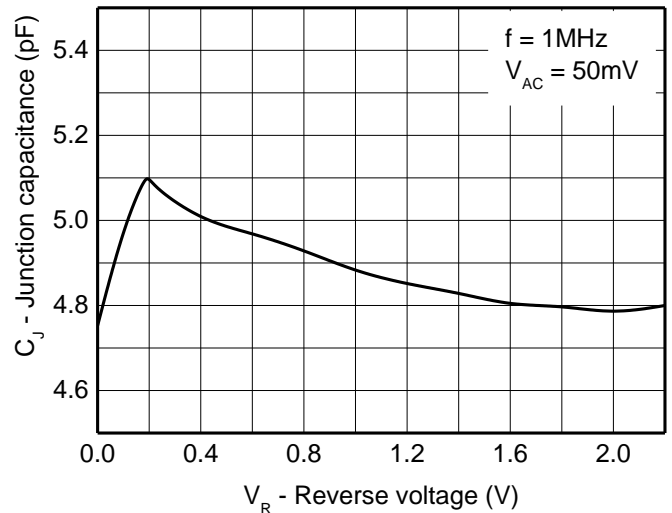
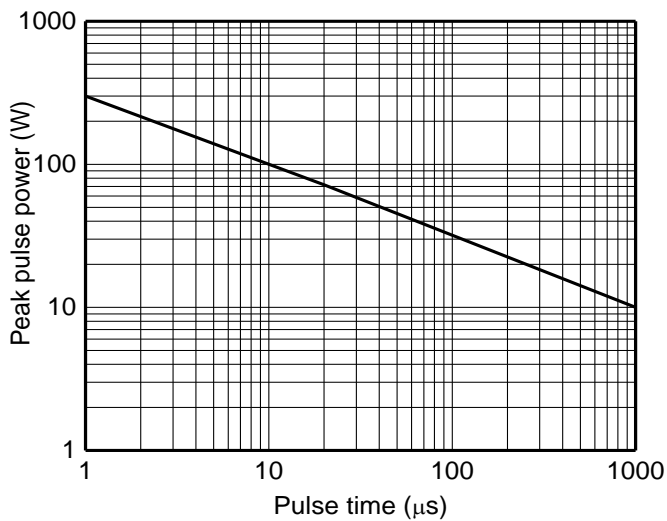
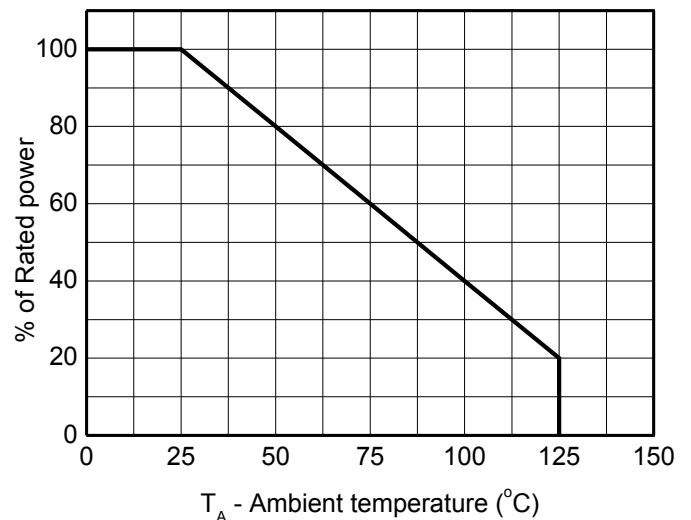
Electrical characteristics ($T_A = 25^{\circ}C$, unless otherwise noted)

Definitions of electrical characteristics

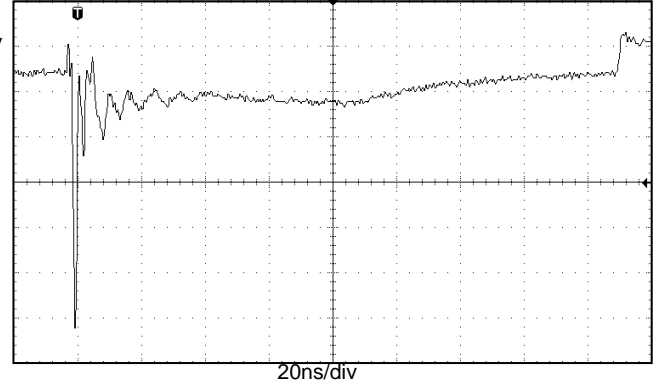
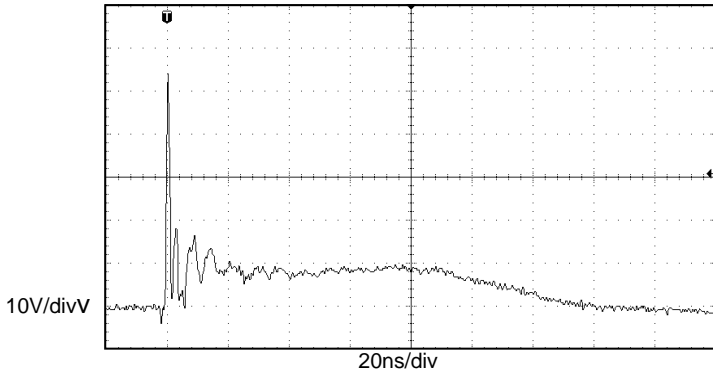
Electrical characteristics ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse stand-off voltage	V_{RWM}				2.2	V
Reverse leakage current	I_R	$V_{RWM} = 2.2\text{V}$			0.1	μA
Reverse breakdown voltage	V_{BR}	$I_T = 1\text{mA}$	2.6	2.8	3.0	V
Forward voltage	V_F	$I_F = 20\text{mA}$	0.6	0.8	1.1	V
Clamping voltage ¹⁾	V_{CL}	$I_{PP} = 16\text{A}$, $t_p = 100\text{ns}$		7.5		V
Clamping voltage ²⁾	V_{CL}	$V_{ESD} = 8\text{kV}$		7.5		V
Clamping voltage ³⁾	V_C	$I_{pp}=1\text{A}$ $t_p=8/20\mu\text{s}$			5	V
		$I_{pp}=9\text{A}$ $t_p=8/20\mu\text{s}$			8	V
Dynamic resistance ¹⁾	R_{DYN}			0.22		Ω
Junction capacitance	C_J	$V_R = 0\text{V}$, $f = 1\text{MHz}$		5	6.5	pF

Notes:

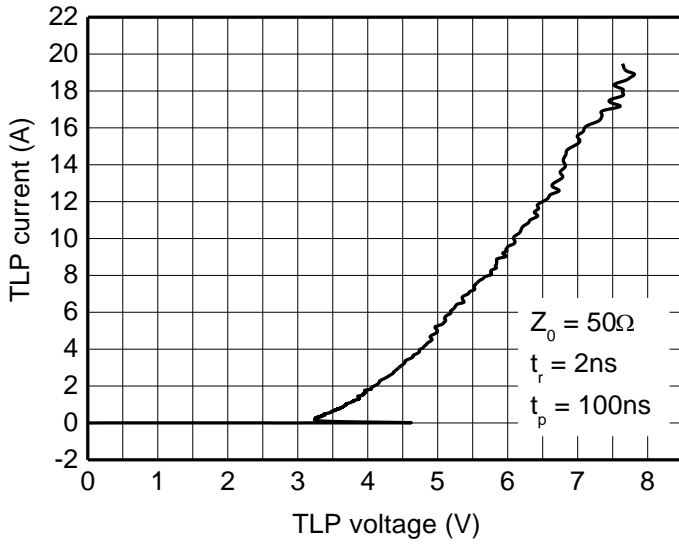
- 1) TLP parameter: $Z_0 = 50\Omega$, $t_p = 100\text{ns}$, $t_r = 2\text{ns}$, averaging window from 60ns to 80ns. R_{DYN} is calculated from 4A to 16A.
- 2) Contact discharge mode, according to IEC61000-4-2.
- 3) Non-repetitive current pulse, according to IEC61000-4-5.

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

8/20μs 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

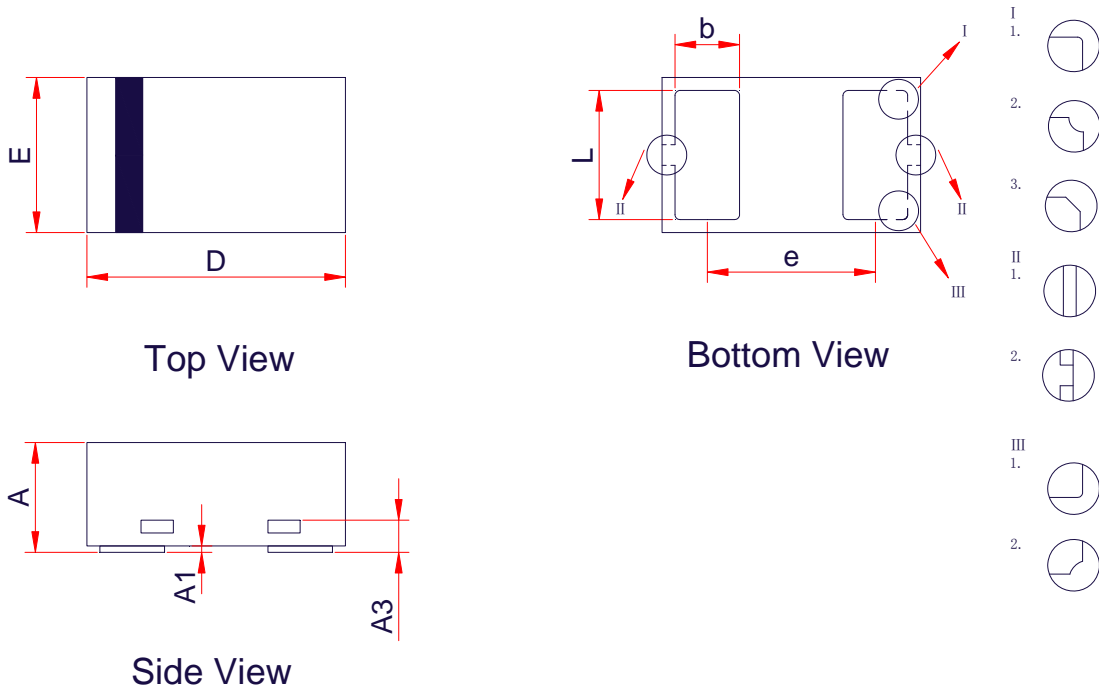
Typical characteristics ($T_A=25^{\circ}\text{C}$, unless otherwise noted)


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

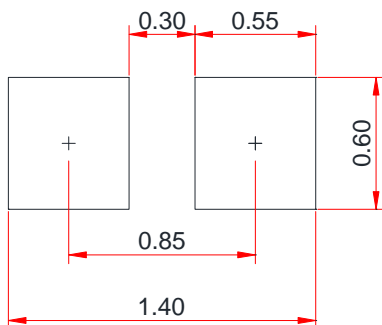
ESD clamping
 (-8kV contact discharge per IEC61000-4-2)



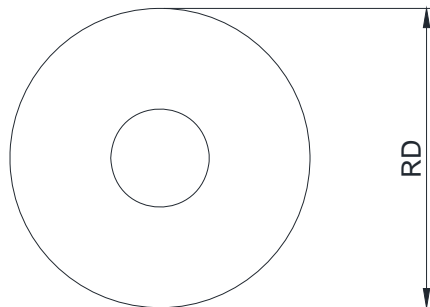
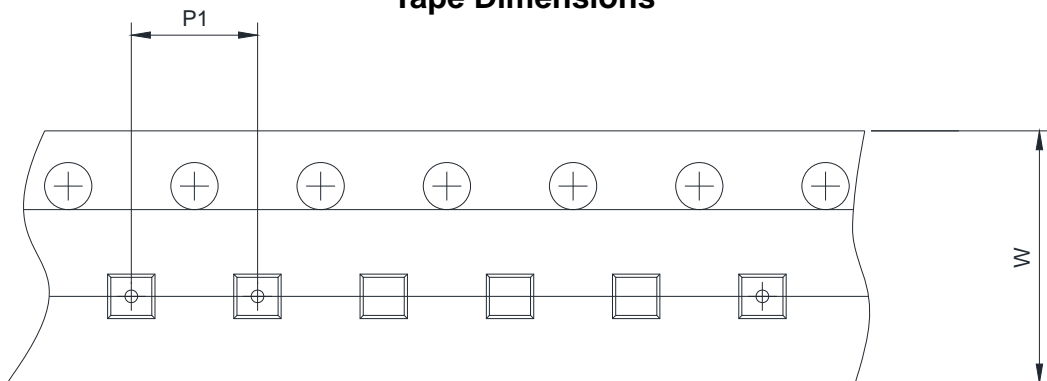
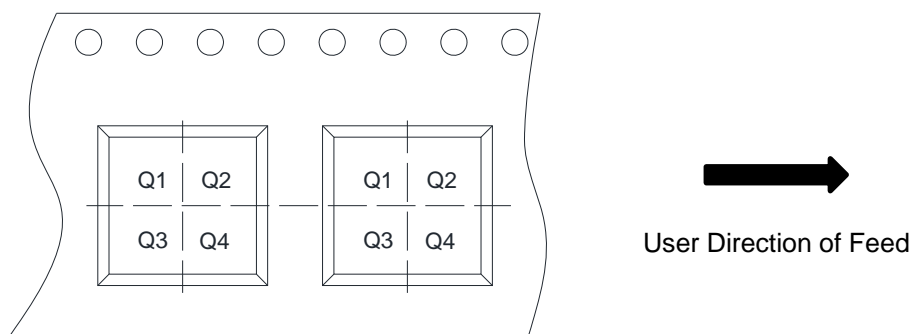
TLP Measurement

PACKAGE OUTLINE DIMENSIONS
DFN1006-2L


Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.34	0.45	0.53
A1	0.00	0.02	0.05
A3	0.12 Ref.		
D	0.95	1.00	1.08
E	0.55	0.60	0.68
b	0.20	0.25	0.30
L	0.45	0.50	0.55
e	0.65 BSC		

Recommended land pattern (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


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