

ESD56051N

1-Line, Bi-directional, Transient Voltage Suppressors

<http://www.omnivision-group.com>

Descriptions

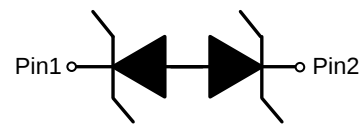
The ESD56051N is a bi-directional TVS (Transient Voltage Suppressor). It is specifically designed to protect sensitive electronic components which are connected to power lines, low speed data lines and control lines from over-stress caused by ESD (Electrostatic Discharge), EFT (Electrical Fast Transients) and Lightning.

The ESD56051N 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 55A (8/20 μs) according to IEC61000-4-5.

The ESD56051N is available in DFN1006-2L package. Standard products are Pb-free and Halogen-free.



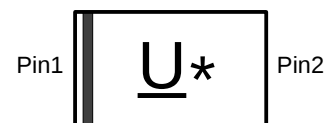
DFN1006-2L (Bottom View)



Circuit diagram

Features

- Stand-off voltage: $\pm 3.3\text{V}$ Max
- Transient protection for each line according to IEC61000-4-2 (ESD): $\pm 30\text{kV}$ (contact discharge)
IEC61000-4-4 (EFT): 80A (5/50ns)
IEC61000-4-5 (surge): 55A (8/20 μs)
- Capacitance: $C_J = 75\text{pF}$ typ.
- Low leakage current: $I_R < 1\text{nA}$ typ.
- Low clamping voltage: $V_{CL} = 5.4\text{V}$ typ. @ $I_{PP} = 16\text{A}$ (TLP)
- Solid-state silicon technology



U = Device code

* = Month code (A~Z)

Marking (Top View)

Applications

- Cellular handsets
- Computers and peripherals
- Microprocessors
- Power lines
- Portable Electronics
- Notebooks

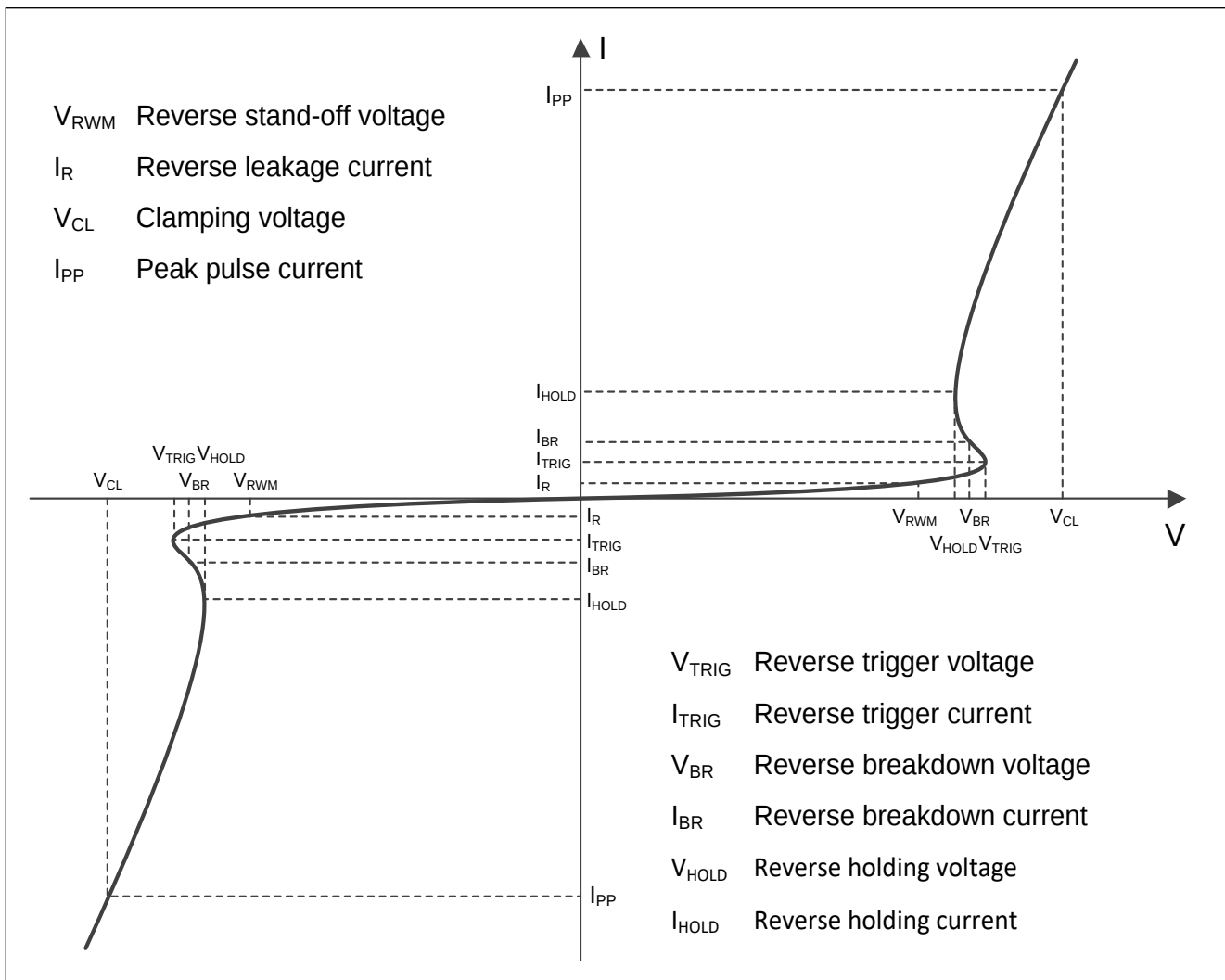
Order information

Device	Package	Shipping
ESD56051N-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}	550	W
Peak pulse current ($t_p = 8/20\mu s$)	I_{PP}	55	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)



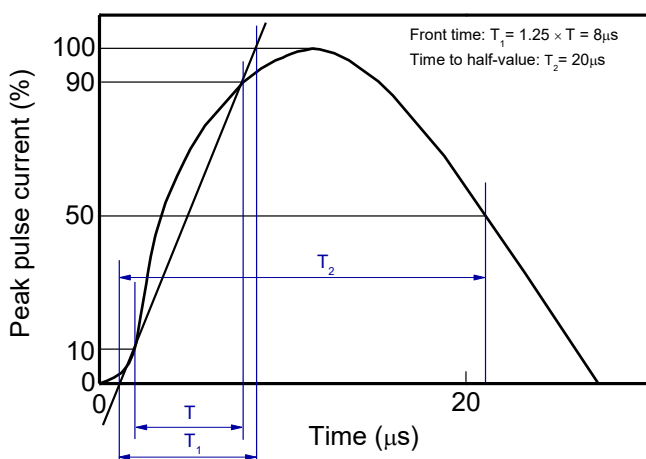
Definitions of electrical characteristics

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

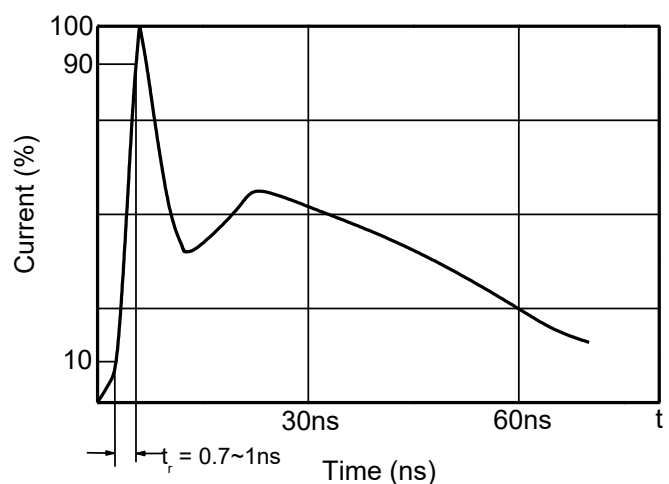
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse stand-off voltage	V_{RWM}				± 3.3	V
Reverse leakage current	I_R	$V_{RWM} = 3.3\text{V}$		<1	100	nA
Reverse breakdown voltage	V_{BR}	$I_{BR} = 1\text{mA}$	3.6			V
Reverse holding voltage	V_{HOLD}	$I_{HOLD} = 50\text{mA}$	3.6			V
Clamping voltage ¹⁾	V_{CL}	$I_{PP} = 16\text{A}$, $t_p = 100\text{ns}$		5.4		V
Clamping voltage ²⁾	V_{CL}	$V_{ESD} = 8\text{kV}$		8		V
Clamping voltage ³⁾	V_{CL}	$I_{PP} = 1\text{A}$, $t_p = 8/20\mu\text{s}$			5	V
		$I_{PP} = 10\text{A}$, $t_p = 8/20\mu\text{s}$			6	V
		$I_{PP} = 55\text{A}$, $t_p = 8/20\mu\text{s}$			10	V
Dynamic resistance ¹⁾	R_{DYN}			0.07		Ω
Junction capacitance	C_J	$V_R = 0\text{V}$, $f = 1\text{MHz}$		75	85	pF
		$V_R = 3.3\text{V}$, $f = 1\text{MHz}$		58	65	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.

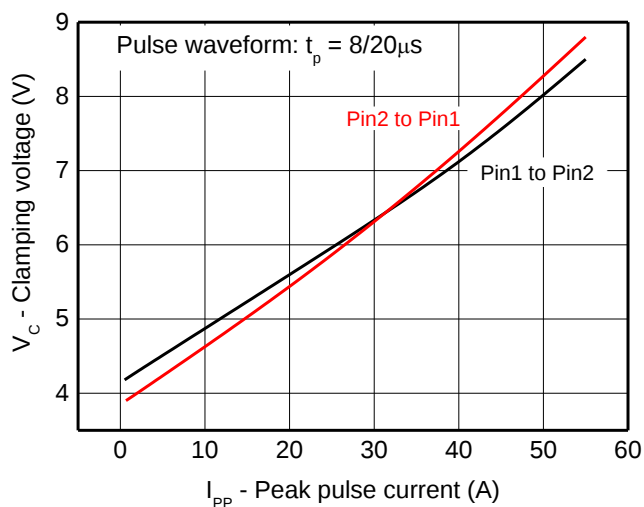
Typical characteristics ($T_A=25^\circ\text{C}$, unless otherwise noted)


8/20 μs waveform per IEC61000-4-5

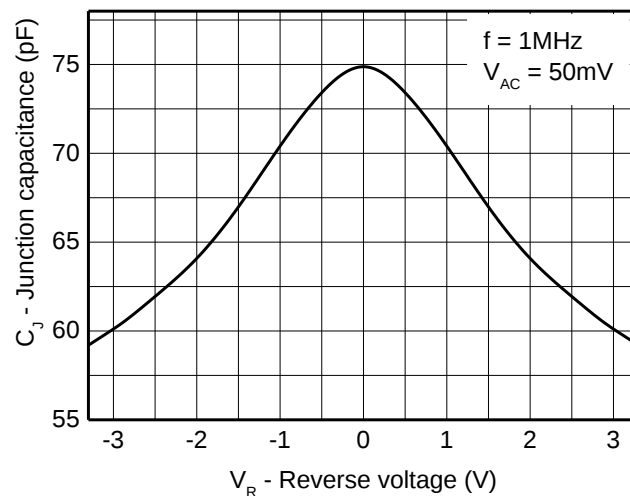


Contact discharge current waveform per IEC61000-4-2

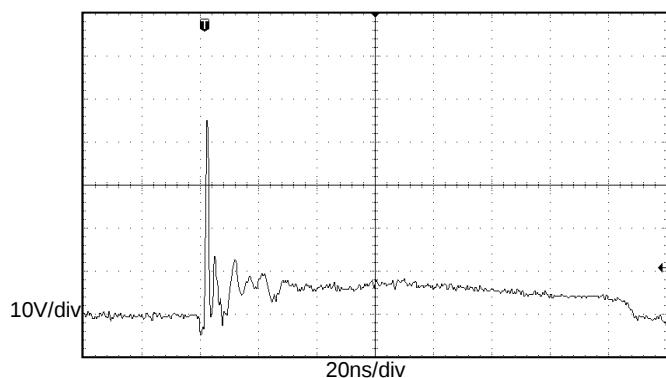
Typical characteristics ($T_A=25^\circ\text{C}$, unless otherwise noted)



Clamping voltage vs. Peak pulse current

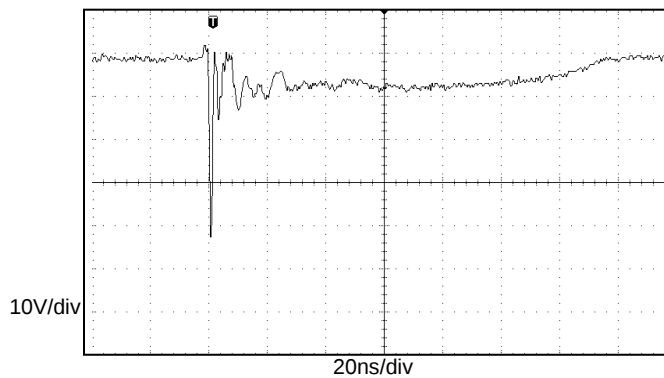


Capacitance vs. Reverse voltage



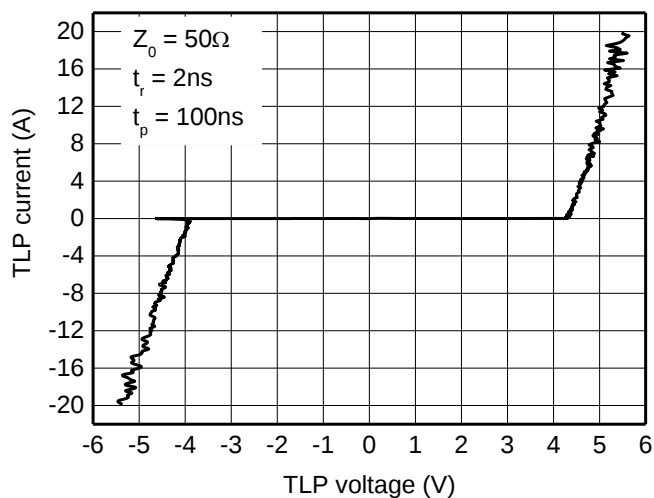
ESD clamping

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



ESD clamping

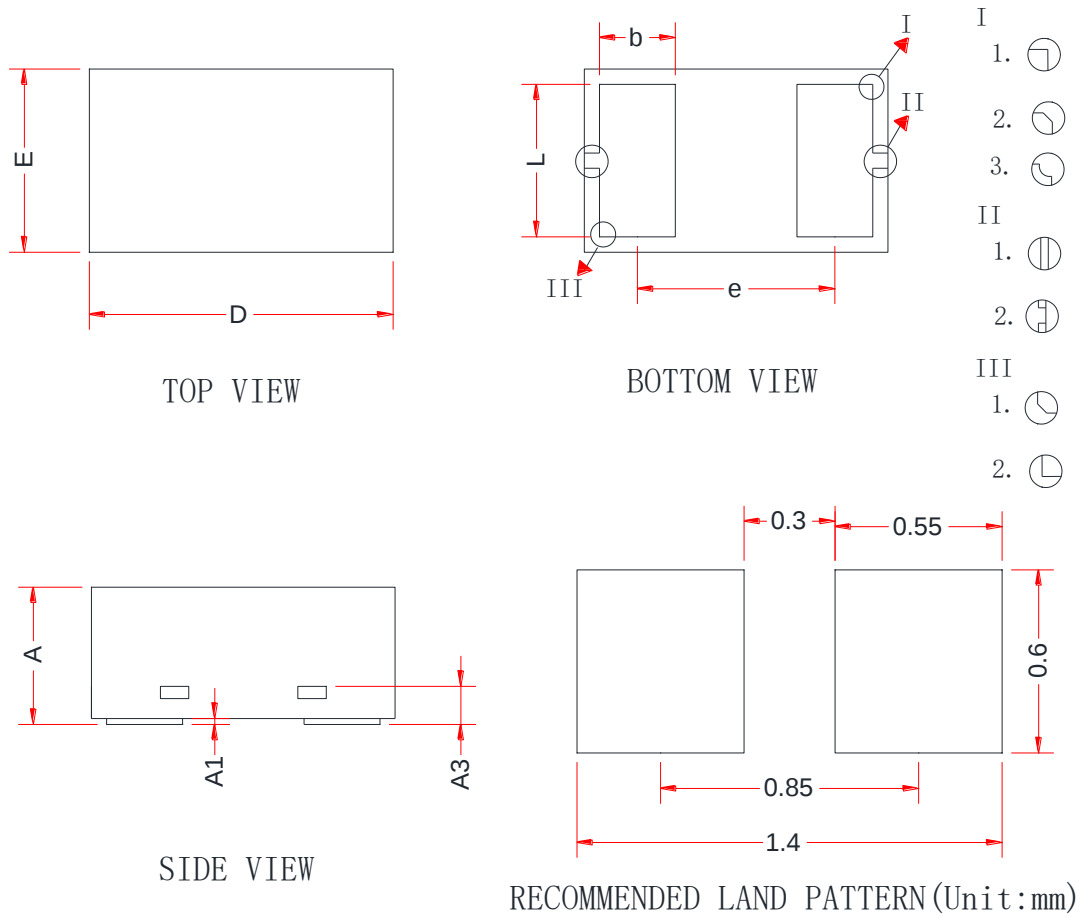
(-8kV contact discharge per IEC61000-4-2)



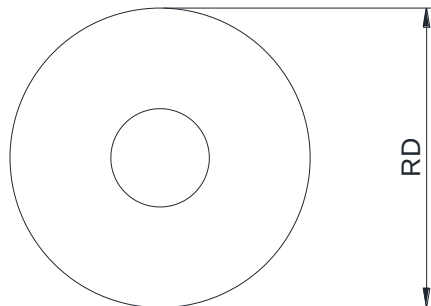
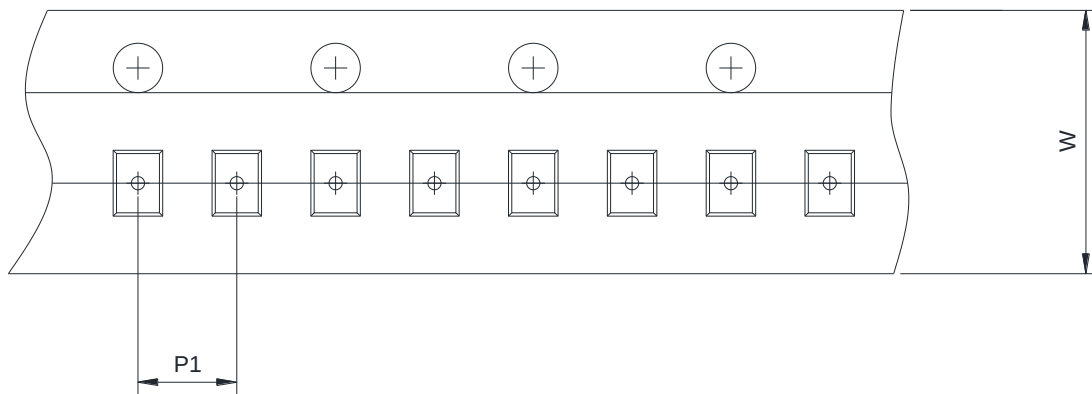
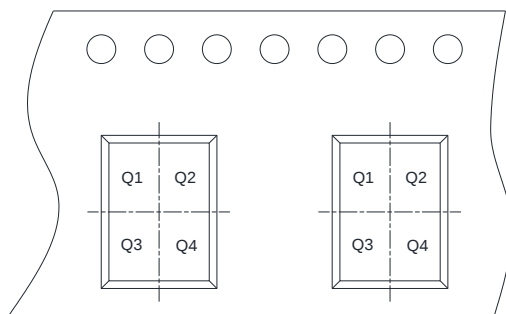
TLP Measurement

PACKAGE OUTLINE DIMENSIONS

DFN1006-2L



Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.36	0.45	0.50
A1	0.00	0.02	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 BSC		

TAPE AND REEL INFORMATION
Reel Dimensions

Tape Dimensions

Quadrant Assignments For PIN1 Orientation In Tape


User Direction of Feed

RD	Reel Dimension	☒ 7inch	☐ 13inch
W	Overall width of the carrier tape	☒ 8mm	☐ 12mm ☐ 16mm
P1	Pitch between successive cavity centers	☒ 2mm	☐ 4mm ☐ 8mm
Pin1	Pin1 Quadrant	☒ Q1	☒ Q2 ☐ Q3 ☐ Q4