ESD56051N

1-Line, Bi-directional, Transient Voltage Suppressors

http//:www.sh-willsemi.com

Descriptions

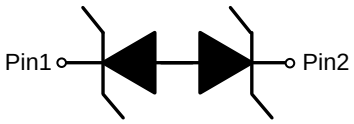
The ESD56051N is a bi-directional TVS (Transient Voltage Suppressor). It is specifically designed to protect sensitive electronic components which are connected to power lines, low speed data lines and control lines from over-stress caused by ESD (Electrostatic Discharge), EFT (Electrical Fast Transients)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

The ESD56051N may be used to provide ESD protection up to ±30kV (contact discharge) according to IEC61000-4-2, and withstand peak pulse current up to 55A (8/20μs) according to IEC61000-4-5.

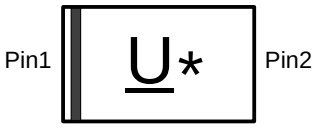
The ESD56051N is available in DFN1006-2L package. Standard products are Pb-free and Halogen-free.



DFN1006-2L (Bottom View)



Circuit diagram



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

Marking (Top View)

Features

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

Applications

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

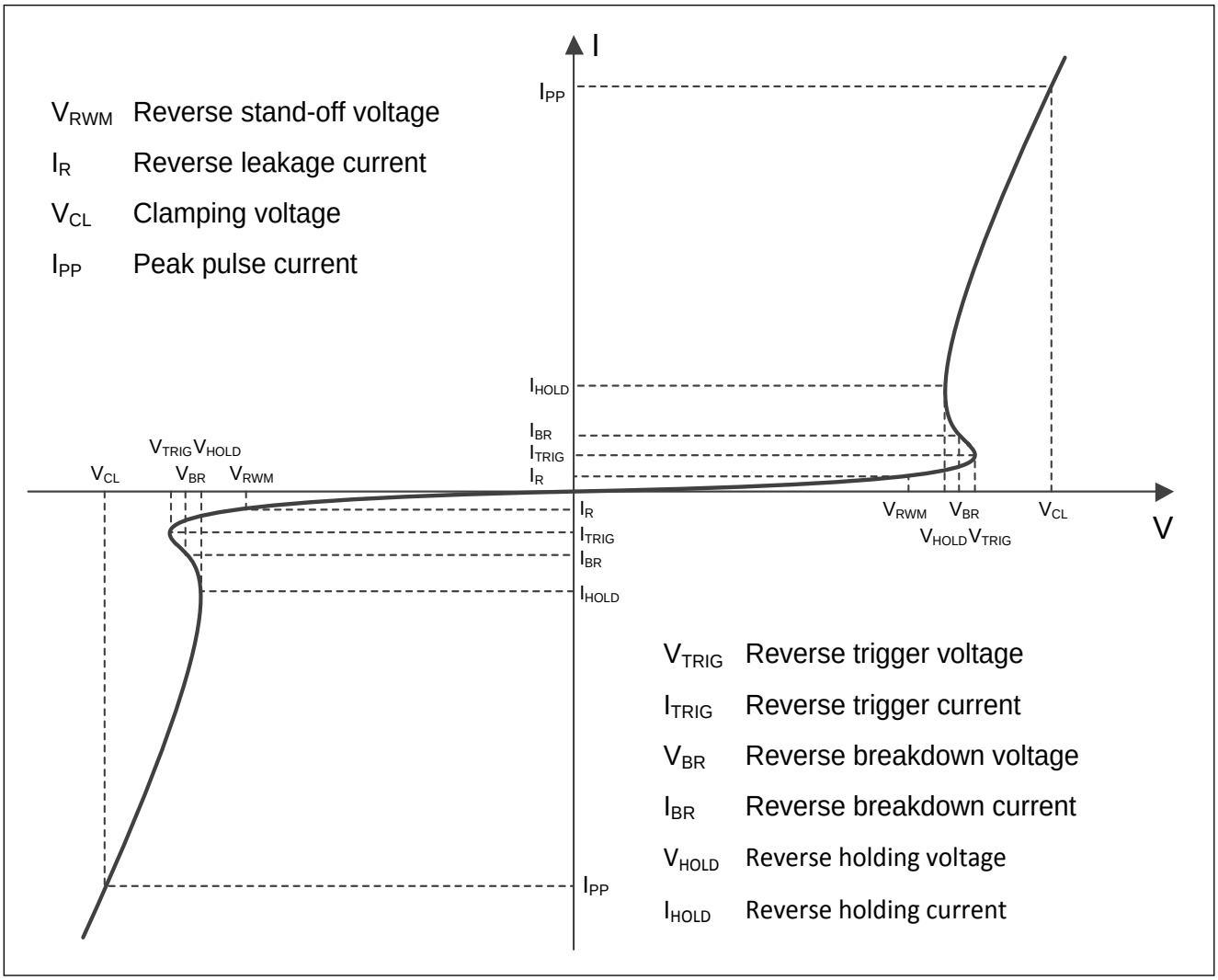
Order information

Device	Package	Shipping
ESD56051N-2/TR	DFN1006-2L	10000/Tape&Reel

Absolute maximum ratings

Parameter	Symbol	Rating	Unit
Peak pulse power (t_p = 8/20μs)	P_{pk}	550	W
Peak pulse current (t_p = 8/20μs)	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	°C
Operating temperature	T_{OP}	-40~85	°C
Lead temperature	T_L	260	°C
Storage temperature	T_{STG}	-55~150	°C

Electrical characteristics (T_A=25°C, unless otherwise noted)



Definitions of electrical characteristics

Electrical characteristics (T_A=25 °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} = 3.3V		<1	100	nA
Reverse breakdown voltage	V_{BR}	I_{BR} = 1mA	3.6			V
Reverse holding voltage	V_{HOLD}	I_{HOLD} = 50mA	3.6			V
Clamping voltage 1)	V_{CL}	I_{PP} = 16A, t_p = 100ns		8		V
Clamping voltage 2)	V_{CL}	V_{ESD} = 8kV		8		V
Clamping voltage 3)	V_{CL}	I_{PP} = 1A, t_p = 8/20μs			4.5	V
		I_{PP} = 10A, t_p = 8/20μs			5	V
		I_{PP} = 55A, t_p = 8/20μs			10	V
Dynamic resistance 1)	R_{DYN}			0.07		Ω
Junction capacitance	C_J	V_R = 0V, f = 1MHz		75	85	pF
		V_R = 3.3V, f = 1MHz		58	65	pF

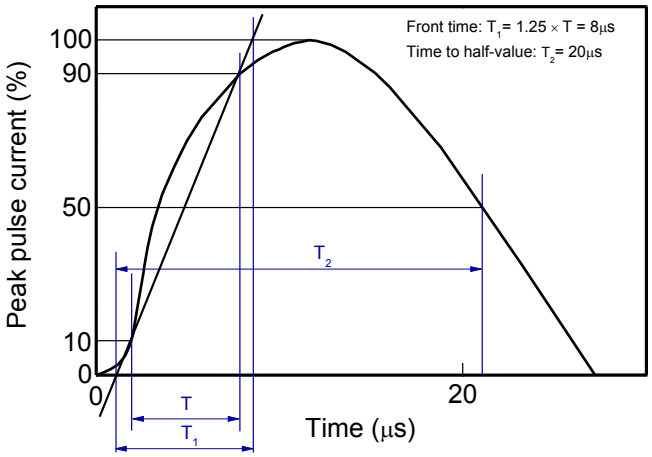
Notes:

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

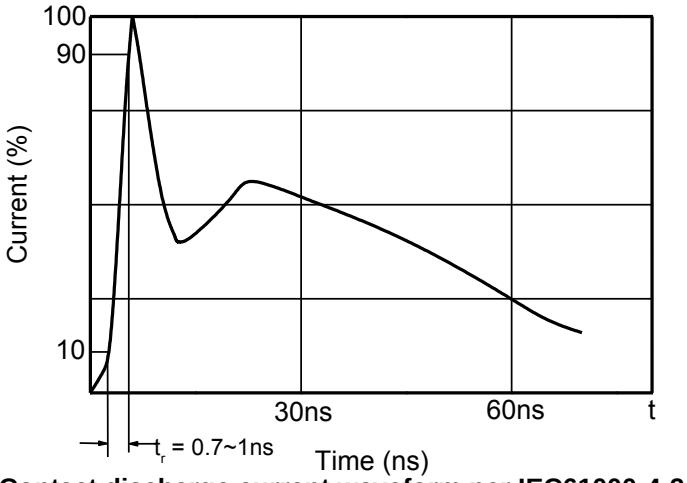
2) Contact discharge mode, according to IEC61000-4-2.

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

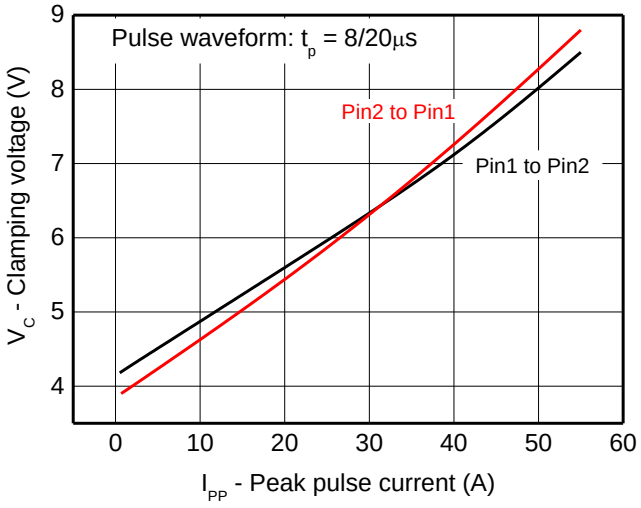
Typical characteristics (T_A=25°C, unless otherwise noted)



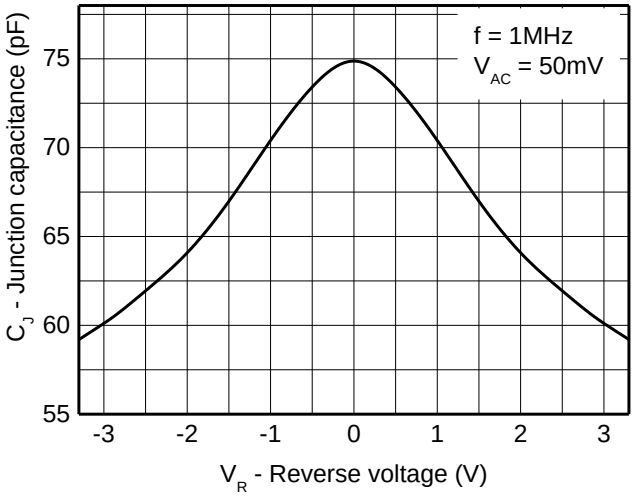
8/20μs waveform per IEC61000-4-5



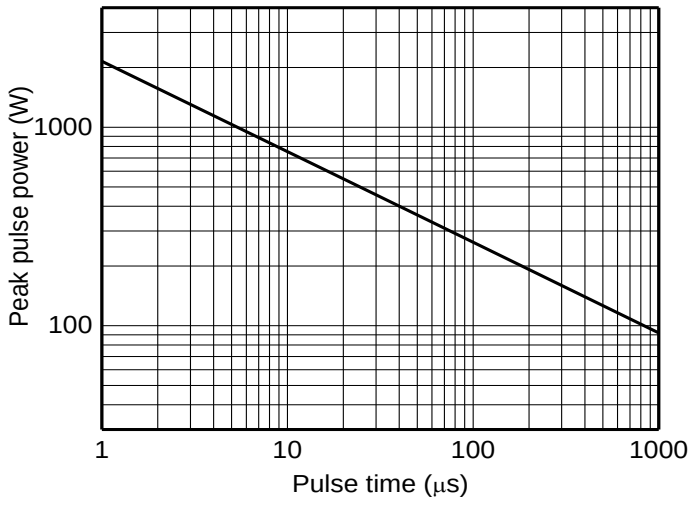
Contact discharge current waveform per IEC61000-4-2



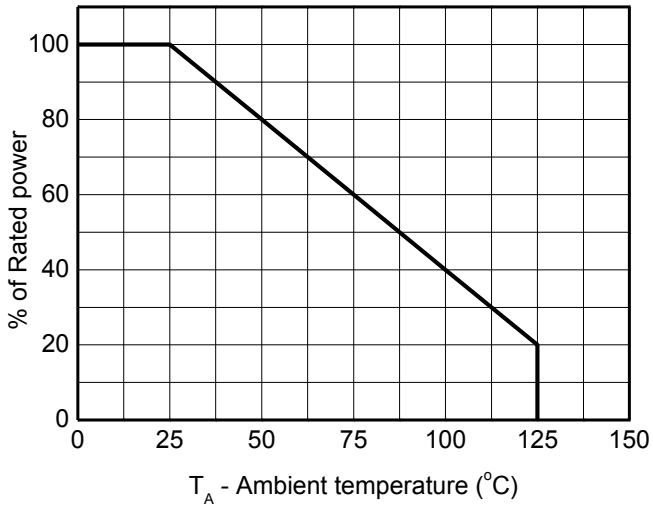
Clamping voltage vs. Peak pulse current



Capacitance vs. Reverse voltage

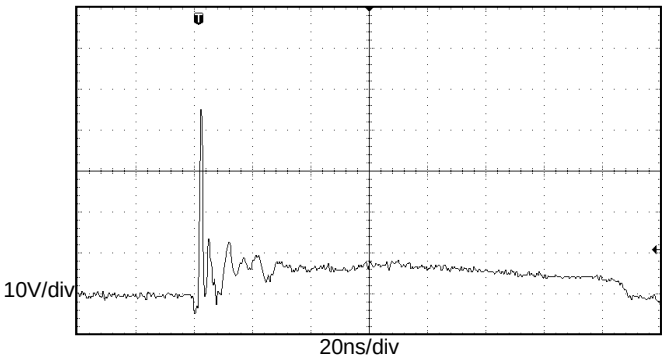


Non-repetitive peak pulse power vs. Pulse time

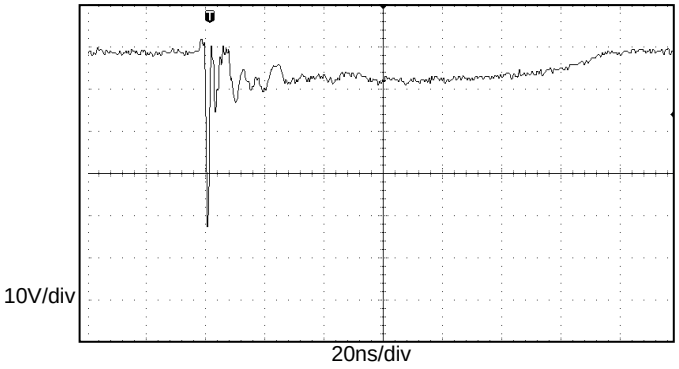


Power derating vs. Ambient temperature

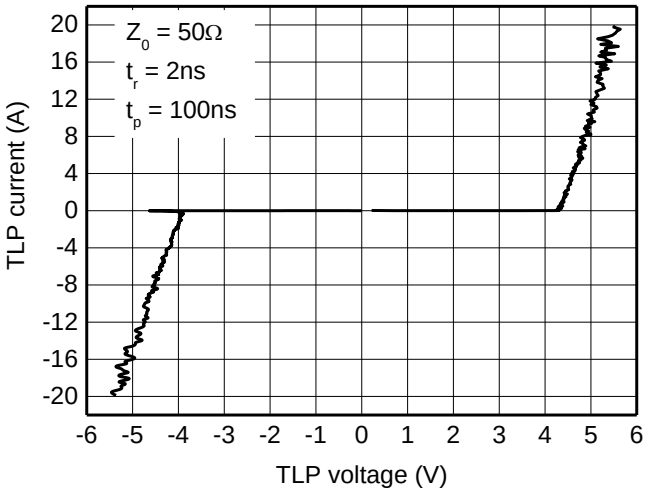
Typical characteristics (T_A=25°C, unless otherwise noted)



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



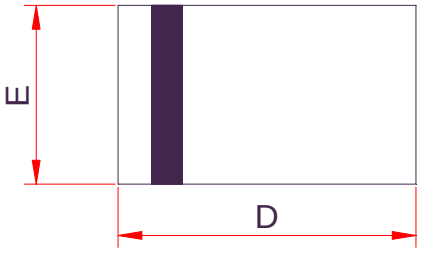
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(-8kV contact discharge per IEC61000-4-2)



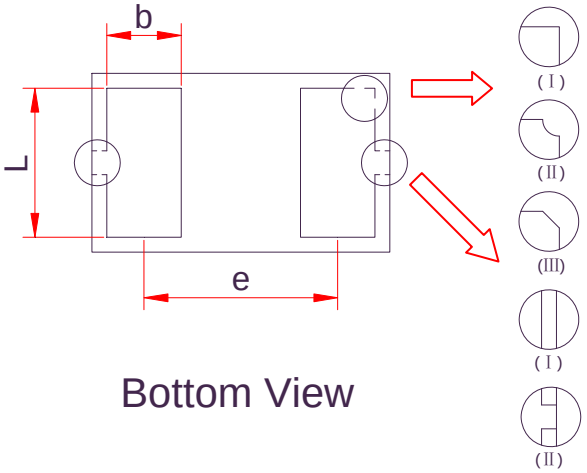
TLP Measurement

PACKAGE OUTLINE DIMENSIONS

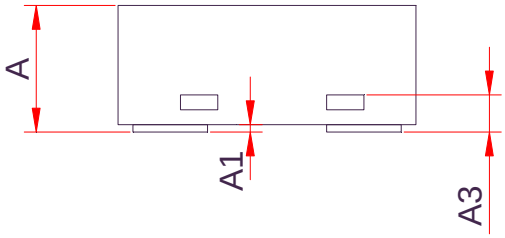
DFN1006-2L



Top View



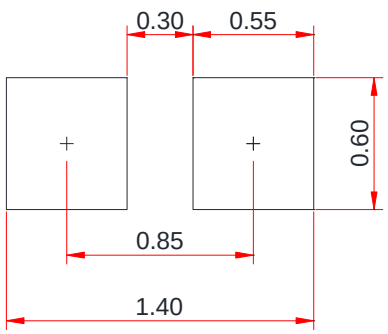
Bottom View



Side View

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.340	0.450	0.530
A1	0.000	0.020	0.050
A3	0.125 Ref.		
D	0.950	1.000	1.075
E	0.550	0.600	0.675
b	0.200	0.250	0.300
L	0.450	0.500	0.550
e	0.650 BSC		

Recommended PCB Layout (Unit: mm)

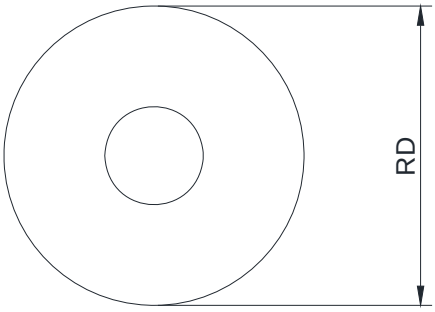


Notes:

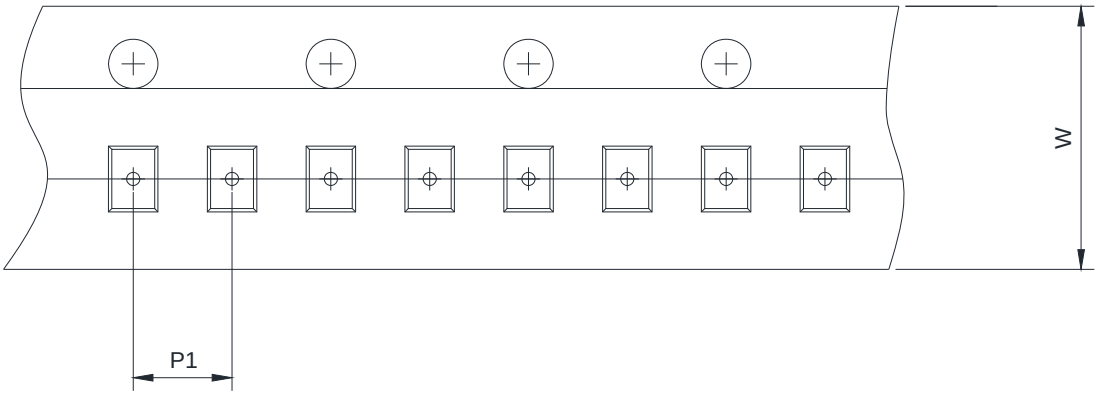
This recommended land pattern is for reference purposes only. Please consult your manufacturing group to ensure your PCB design guidelines are met.

TAPE AND REEL INFORMATION

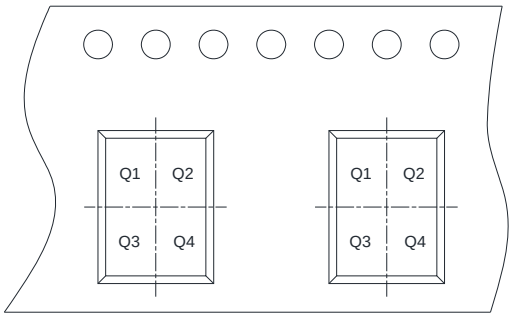
Reel Dimensions



Tape Dimensions



Quadrant Assignments For PIN1 Orientation In Tape





User Direction of Feed

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