ESD5304D

4-Lines, Uni-directional, Ultra-low Capacitance Transient Voltage Suppressors

http//:www.sh-willsemi.com

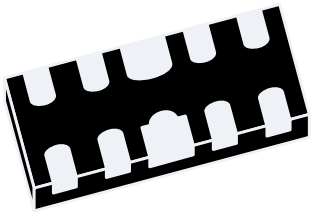
Descriptions

The ESD5304D is an ultra-low capacitance TVS (Transient Voltage Suppressor) array designed to protect high speed data interfaces. It has been specifically designed to protect sensitive electronic components which are connected to data and transmission lines from over-stress caused by ESD (Electrostatic Discharge).

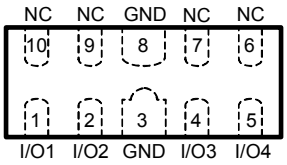
The ESD5304D incorporates four pairs of ultra- low capacitance steering diodes plus a TVS diode.

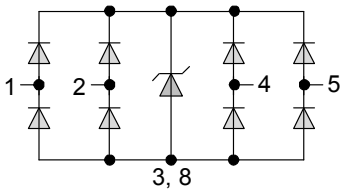
The ESD5304D may be used to provide ESD protection up to ±20kV (contact discharge) according to IEC61000-4-2, and withstand peak pulse current up to 4A (8/20μs) according to IEC61000-4-5.

The ESD5304D is available in DFN2510-10L package. Standard products are Pb-free and Halogen-free.

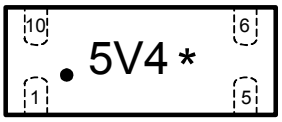


DFN2510-10L (Bottom view)





Pin configuration (Top view)



5V4 = Device code

* = Month code (A~Z)

Marking

Features

- Stand-off voltage: 5V max.
- Transient protection for each line according to
  IEC61000-4-2 (ESD): ±20kV (contact discharge)
  IEC61000-4-4 (EFT): 40A (5/50ns)
  IEC61000-4-5 (surge): 4A (8/20μs)
- Ultra-low capacitance: C_J = 0.4pF typ.
- Ultra-low leakage current: I_R <1nA typ.
- Low clamping voltage: V_{CL} = 19V typ. @ I_{PP} = 16A (TLP)
- Solid-state silicon technology

Applications

- USB 2.0 and USB 3.0
- HDMI 1.3 and HDMI 1.4
- SATA and eSATA
- DVI
- IEEE 1394
- PCI Express
- Portable Electronics and Notebooks

Order information

Device	Package	Shipping
ESD5304D-10/TR	DFN2510-10L	3000/Tape&Reel

Absolute maximum ratings

Parameter	Symbol	Rating	Unit
Peak pulse power (t_p = 8/20μs)	P_{pk}	60	W
Peak pulse current (t_p = 8/20μs)	I_{PP}	4	A
ESD according to IEC61000-4-2 air discharge	V_{ESD}	±20	kV
ESD according to IEC61000-4-2 contact discharge		±20	
Operation junction temperature	T_J	125	°C
Lead temperature	T_L	260	°C
Storage temperature	T_{STG}	-55~150	°C

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

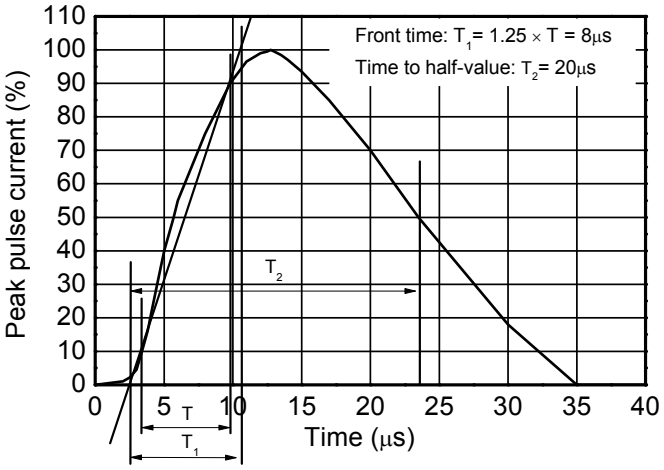
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse maximum working voltage	V_{RWM}				5.0	V
Reverse leakage current	I_R	V_{RWM} = 5V		<1	100	nA
Reverse breakdown voltage	V_{BR}	I_T = 1mA	7.0	8.0	9.0	V
Forward voltage	V_F	I_T = 10mA	0.6	0.9	1.2	V
Clamping voltage 1)	V_{CL}	I_{PP} = 16A, t_p = 100ns		19.0		V
Dynamic resistance 1)	R_{DYN}			0.65		Ω
Clamping voltage 2)	V_{CL}	I_{PP} = 1A, t_p = 8/20μs			11	V
		I_{PP} = 4A, t_p = 8/20μs			15	V
Junction capacitance	C_J	V_R = 0V, f = 1MHz Any I/O pin to GND		0.40	0.65	pF
		V_R = 0V, f = 1MHz Between any I/O pin		0.25	0.40	pF

Notes:

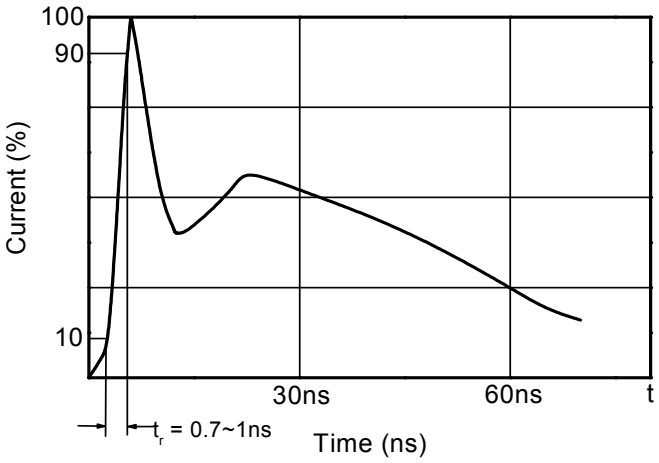
1) *TLP parameter: Z_0 = 50 Ω , t_p = 100ns, t_r = 2ns, averaging window from 60ns to 80ns. R_{DYN} is calculated from 4A to 16A.*

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

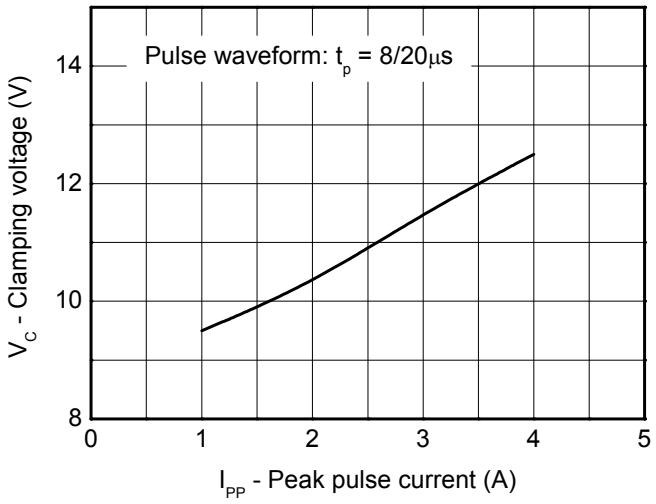
Typical characteristics (T_A = 25°C, unless otherwise noted)



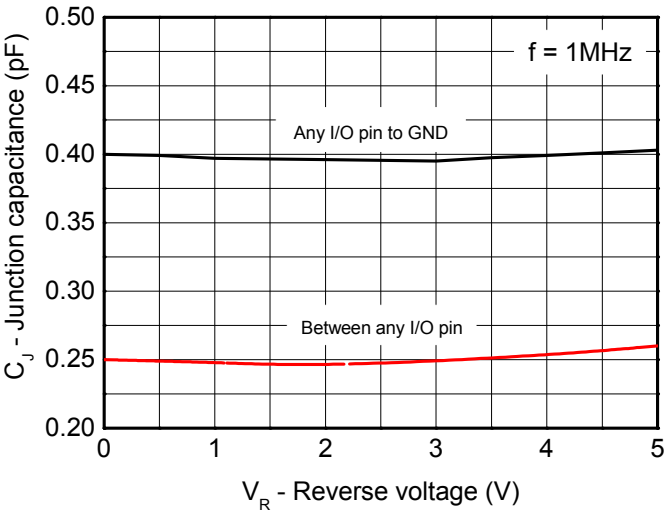
8/20μs waveform per IEC61000-4-5



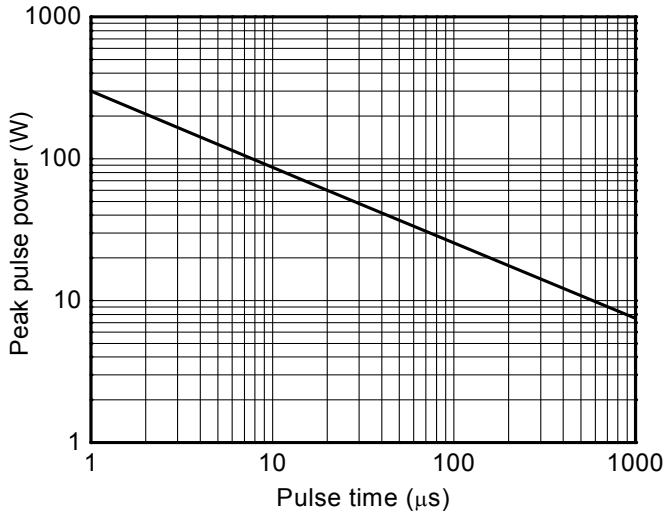
Contact discharge current waveform per IEC61000-4-2



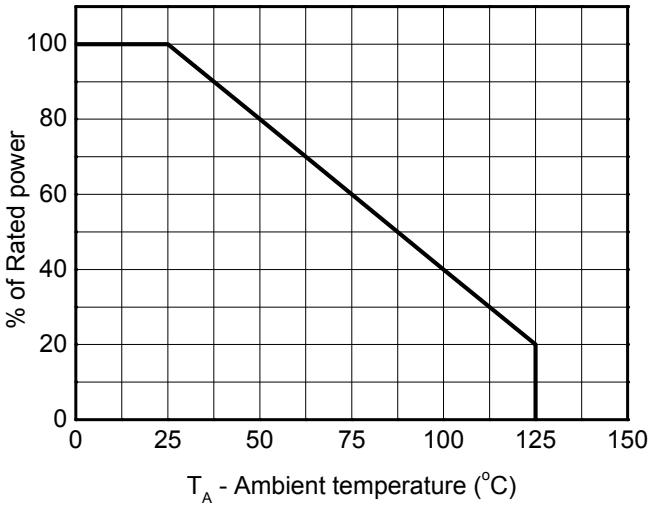
Clamping voltage vs. Peak pulse current



Capacitance vs. Reveres voltage

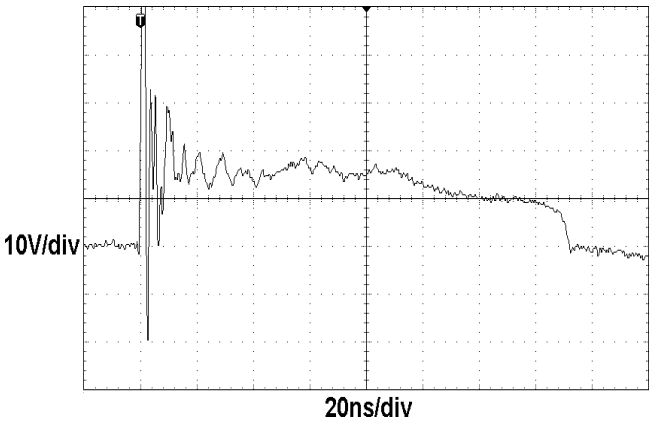


Non-repetitive peak pulse power vs. Pulse time

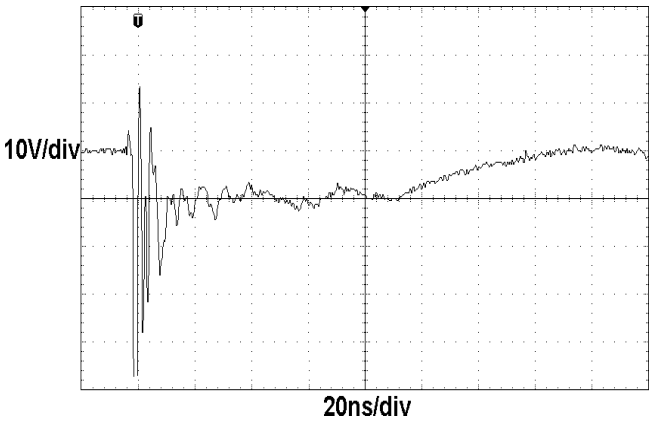


Power derating vs. Ambient temperature

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



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



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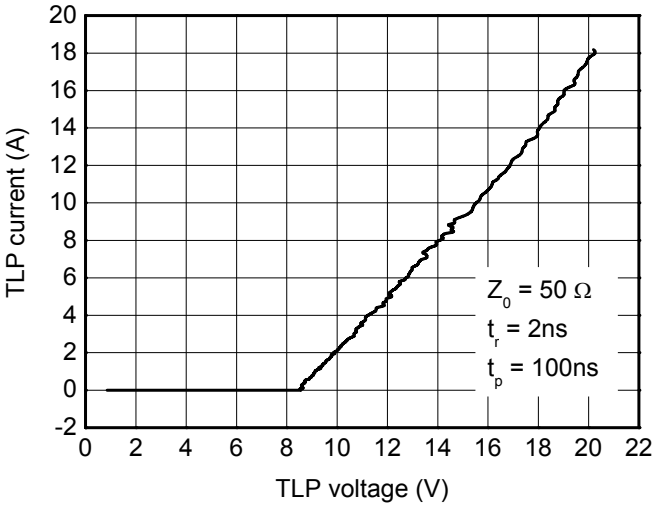
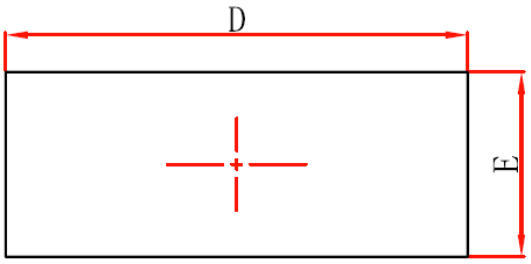


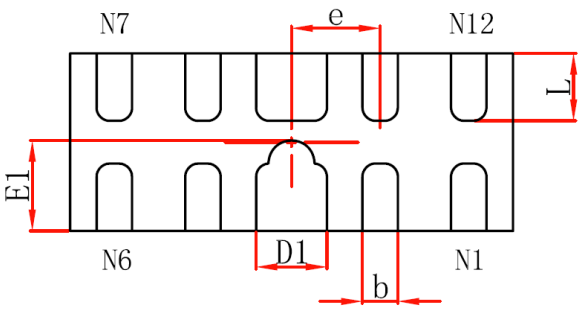
TLP Measurement

Package outline dimensions

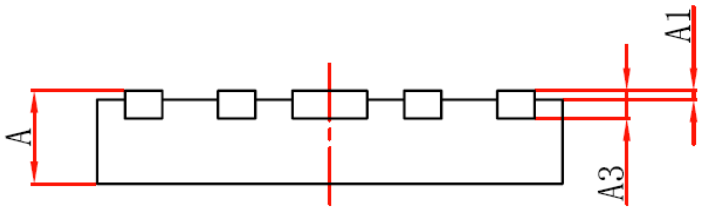
DFN2510-10L



Top View



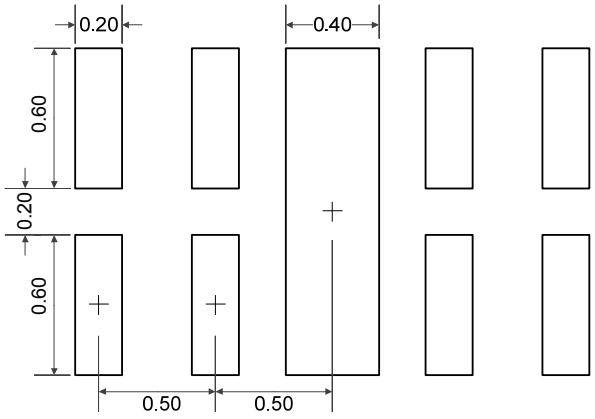
Bottom View



Side View

Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	0.550	0.600	0.650
A1	0.000	-	0.050
A3	0.150 Ref.		
D	2.424	2.500	2.576
E	0.924	1.000	1.076
D1	0.300	0.400	0.500
E1	0.410	0.510	0.610
b	0.150	0.200	0.250
e	0.500 Typ.		
L	0.304	0.380	0.456

Recommend 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.