ESD5311Z

1-Line, Bi-directional, Ultra-low Capacitance Transient Voltage Suppressor

http//:www.sh-willsemi.com

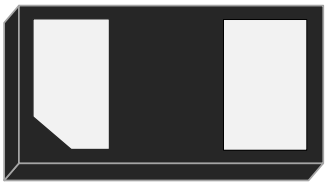
Descriptions

The ESD5311Z is an ultra-low capacitance TVS (Transient Voltage Suppressor) 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).

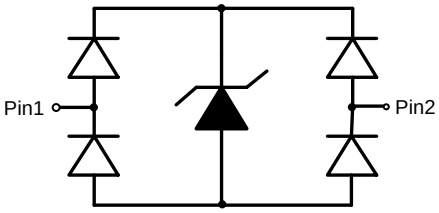
The ESD5311Z incorporates one pair of ultra- low capacitance steering diodes plus a TVS diode.

The ESD5311Z 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 ESD5311Z is available in DFN0603-2L package. Standard products are Pb-free and Halogen-free.



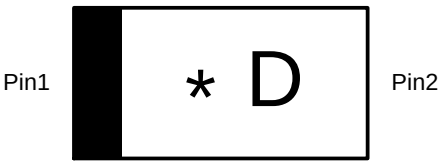
DFN0603-2L (Bottom View)



Pin configuration

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): 4 A (8/20μs)
- Ultra-low capacitance: C_J = 0.25pF typ.
- Ultra-low leakage current: I_R < 1nA typ.
- Low clamping voltage: V_{CL} = 21V typ. @ I_{PP} = 16A (TLP)
- Small package



D = Device code
* = Month code

Marking (Top View)

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
- Notebooks

Order information

Device	Package	Shipping
ESD5311Z-2/TR	DFN0603-2L	10000/Tape&Reel

Absolute maximum ratings

Parameter	Symbol	Rating	Unit
Peak pulse power (t_p = 8/20μs)	P_{pk}	84	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	
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

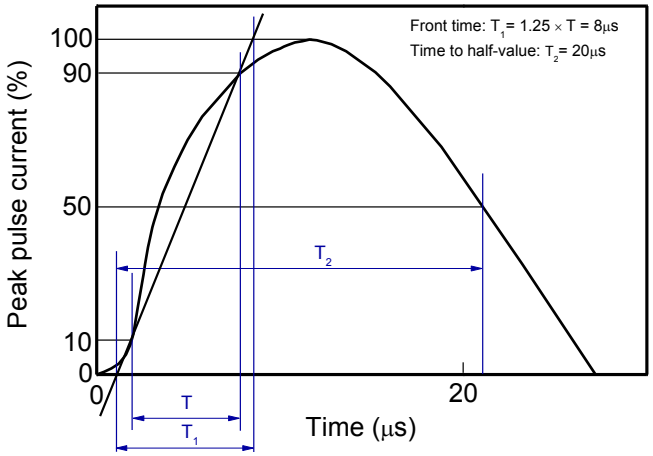
Electrical characteristics (T_A=25 °C, unless otherwise noted)

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	7.5	9.0	10.0	V
Clamping voltage [1]	V_{CL}	I_{PP} = 16A, t_p = 100ns		21		V
Dynamic resistance [1]	R_{DYN}			0.7		Ω
Clamping voltage [2]	V_{CL}	V_{ESD} = 8kV		21		V
Clamping voltage [3]	V_{CL}	I_{PP} = 1A, t_p = 8/20μs			14	V
		I_{PP} = 4A, t_p = 8/20μs			21	V
Junction capacitance	C_J	V_R = 0V, f = 1MHz		0.25	0.4	pF

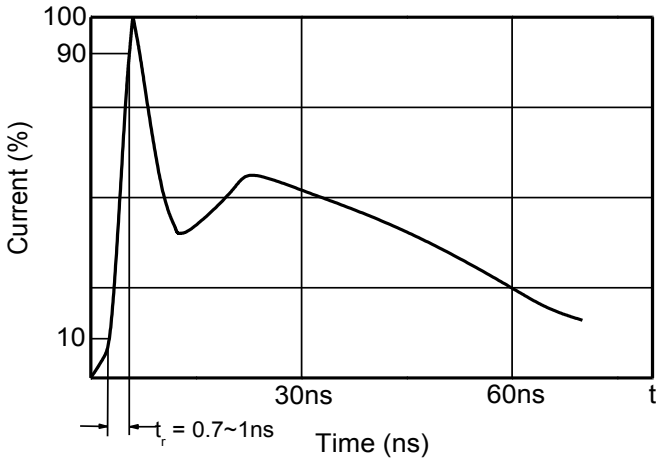
Notes:

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.*

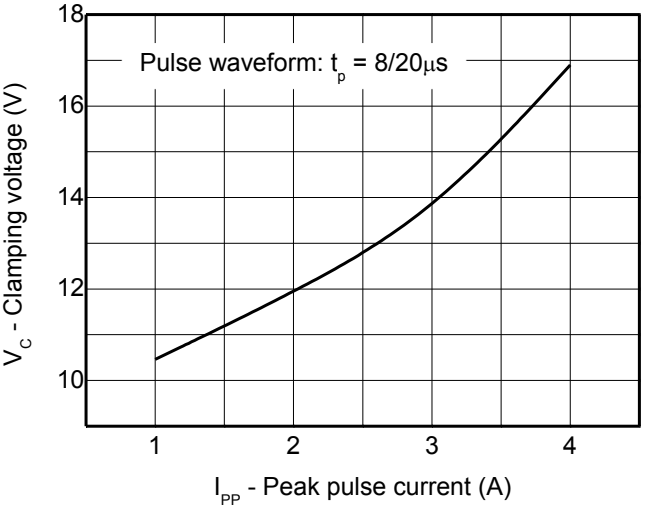
Typical characteristics (T_A=25°C, unless otherwise noted)



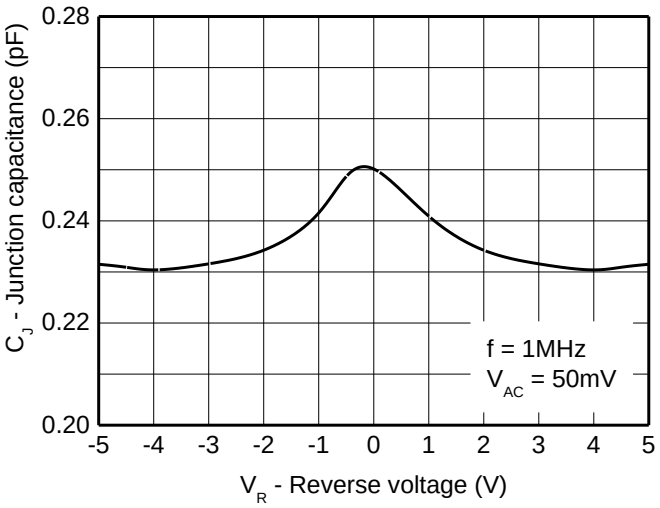
8/20μs waveform per IEC61000-4-5



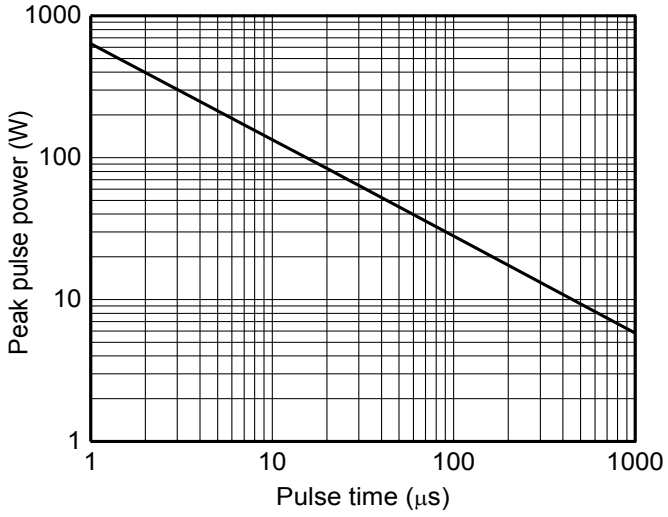
Contact discharge current waveform per IEC61000-4-2



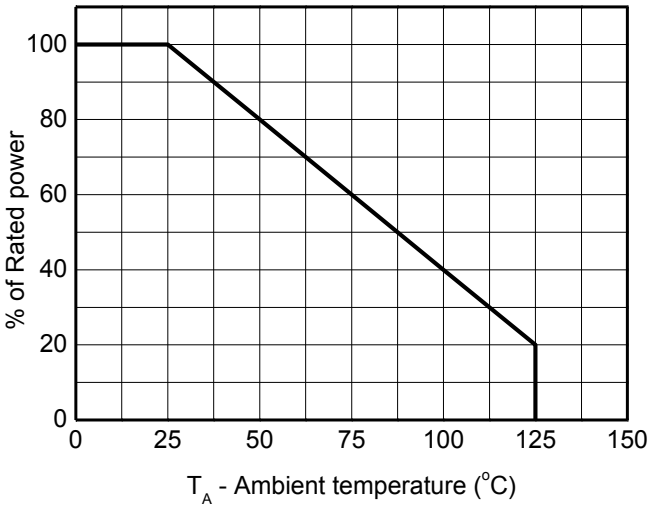
Clamping voltage vs. Peak pulse current



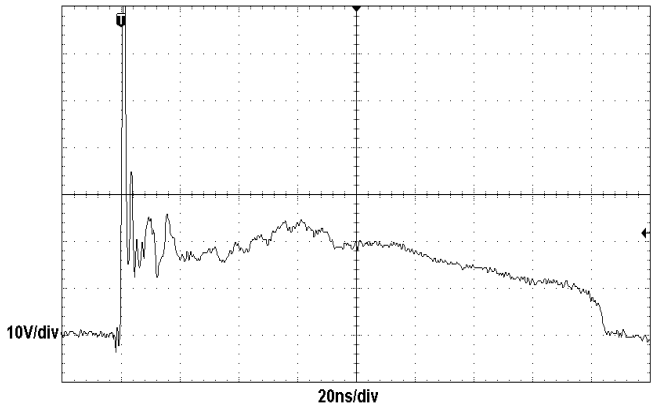
Capacitance vs. Reverse voltage



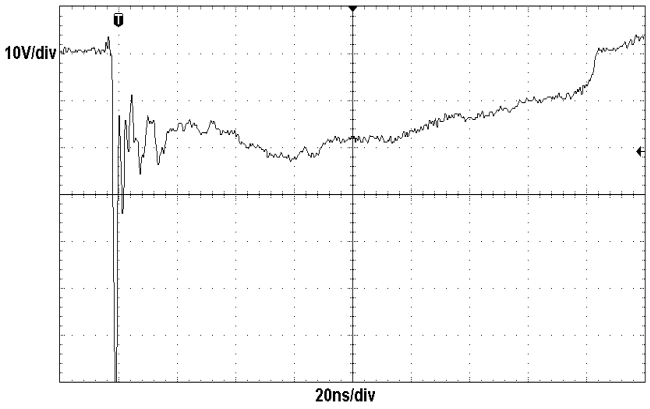
Non-repetitive peak pulse power vs. Pulse time



Power derating vs. Ambient temperature



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



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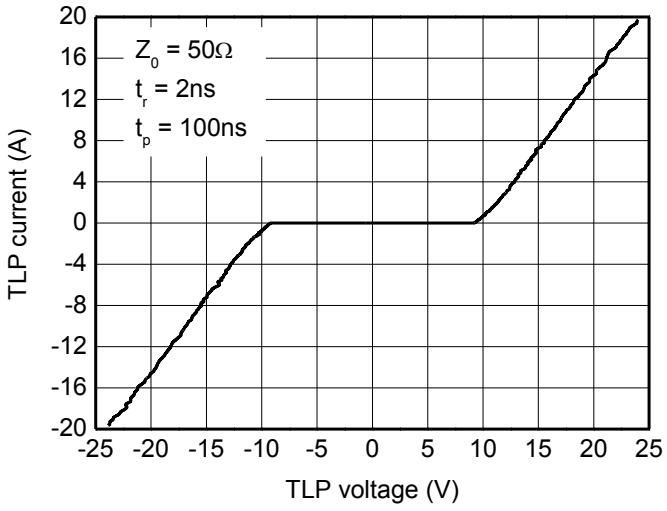
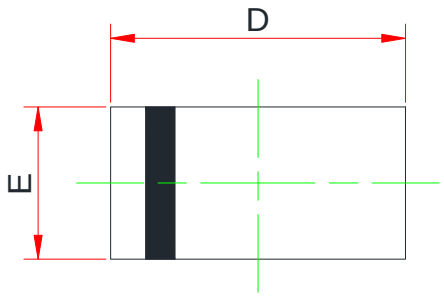


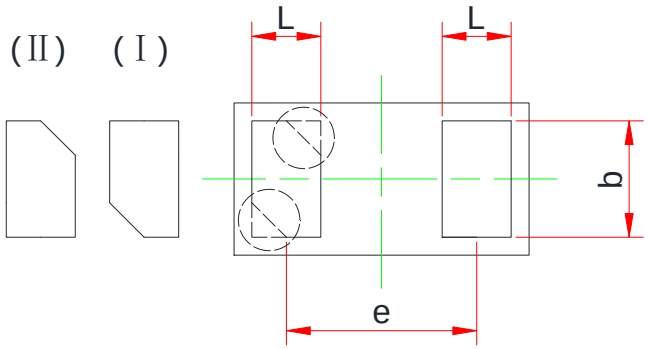
TLP Measurement

Package outline dimensions

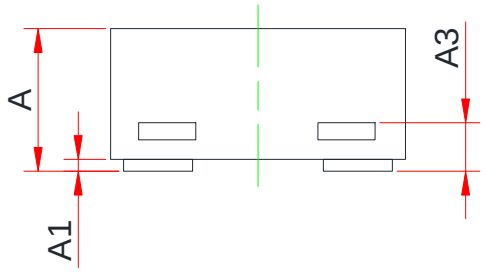
DFN0603-2L



Top View



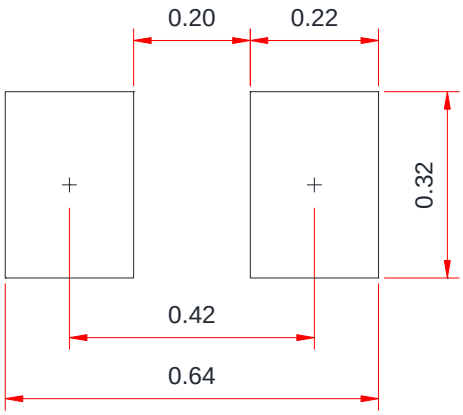
Bottom View



Side View

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.230	-	0.340
A1	0.000	-	0.050
A3	0.102 REF.		
D	0.550	0.600	0.670
E	0.250	0.300	0.370
b	0.215	-	0.295
e	0.400 BSC		
L	0.115	-	0.195

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.

Reversion history

制 修 订 记 录			
文件版本	制修日期	修订页次	变更内容
Rev 1.0	2014/07/27	1-5	初版发布。
Rev 1.1	2014/10/09	5	VBR@1mA 下限由 8V 改为 7.5V。 修改电容曲线图，更改 ESD 波形图
Rev 1.2	2014/11/17	5	修改 ESD 波形图、拼写错误。
Rev 1.3	2016/6/24	1, 6	修改封装图与实物匹配。