

ESD5471XZ

1-Line, Bi-directional, Transient Voltage Suppressor

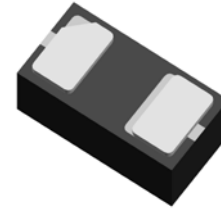
<http://www.sh-willsemi.com>

Descriptions

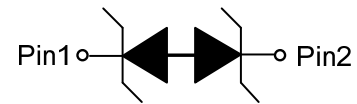
The ESD5471XZ is a bi-directional TVS (Transient Voltage Suppressor). It is specifically designed to protect sensitive electronic components which are connected to low speed data lines and control lines from over-stress caused by ESD (Electrostatic Discharge), EFT (Electrical Fast Transients) and Lightning.

The ESD5471XZ may be used to provide ESD protection up to $\pm 30\text{kV}$ (contact and air discharge) according to IEC61000-4-2, and withstand peak pulse current up to 6A (8/20 μs) according to IEC61000-4-5.

The ESD5471XZ is available in FBP0603-2L package. Standard products are Pb-free and Halogen-free.



FBP0603-2L (Bottom View)



Circuit diagram

Features

- Reverse stand-off voltage: $\pm 5\text{V}$ Max
- Transient protection for each line according to IEC61000-4-2 (ESD): $\pm 30\text{kV}$ (contact and air discharge)
IEC61000-4-4 (EFT): 40A (5/50ns)
IEC61000-4-5 (surge): 6A (8/20 μs)
- Capacitance: $C_J = 9\text{pF}$ typ.
- Low leakage current
- Low clamping voltage: $V_{CL} = 12\text{V}$ typ. @ $I_{PP} = 16\text{A}$ (TLP)
- Solid-state silicon technology



E = Device code

* = Month code

Marking (Top View)

Applications

- Cellular handsets
- Tablets
- Laptops
- Other portable devices
- Network communication devices

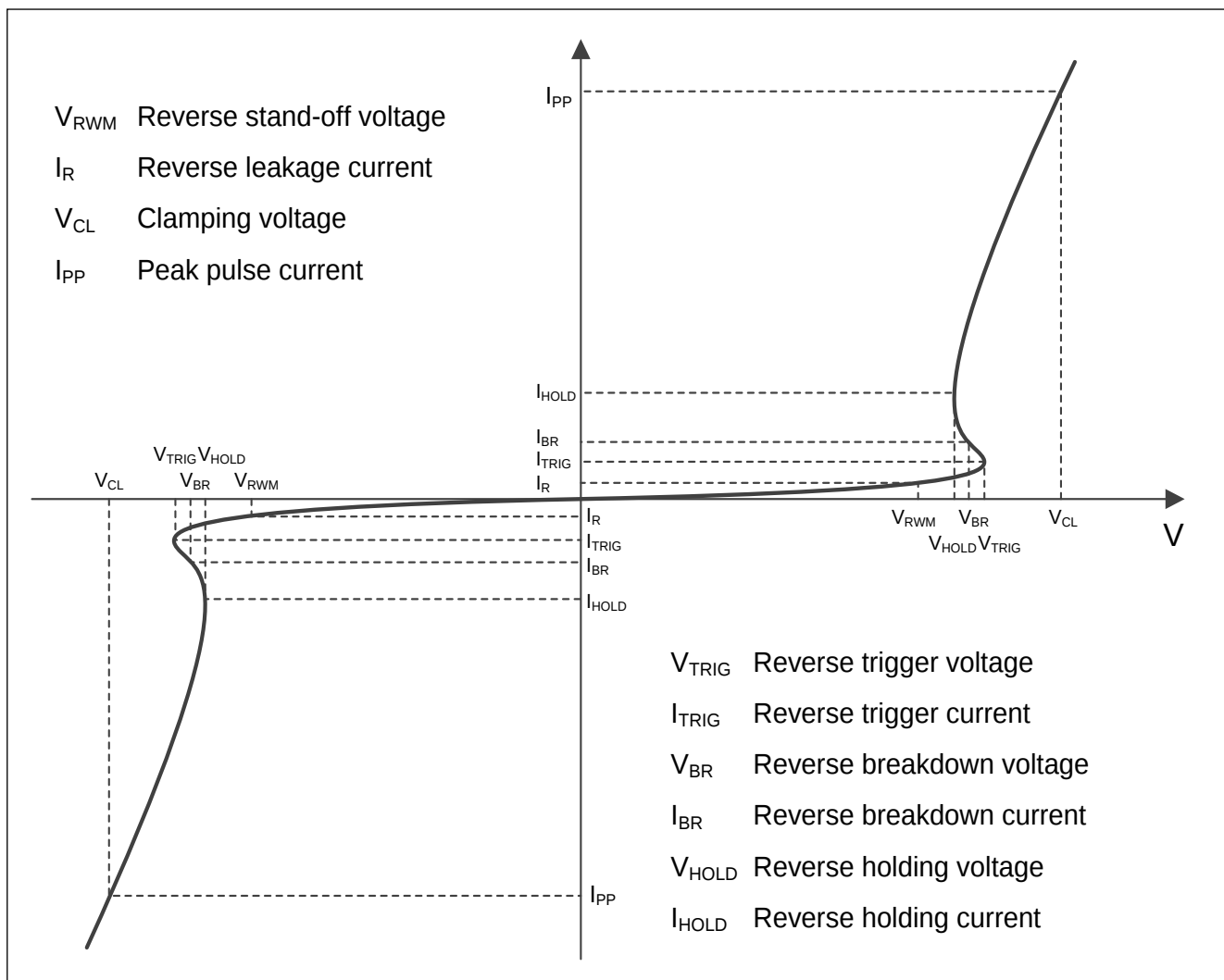
Order information

Device	Package	Shipping
ESD5471XZ-2/TR	FBP0603-2L	10000/Tape&Reel

Absolute maximum ratings

Parameter	Symbol	Rating	Unit
Peak pulse power ($t_p = 8/20\mu s$)	P_{pk}	70	W
Peak pulse current ($t_p = 8/20\mu s$)	I_{pp}	6	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)



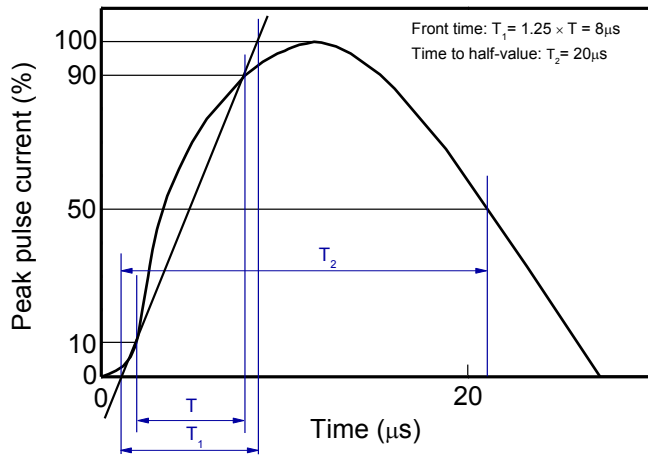
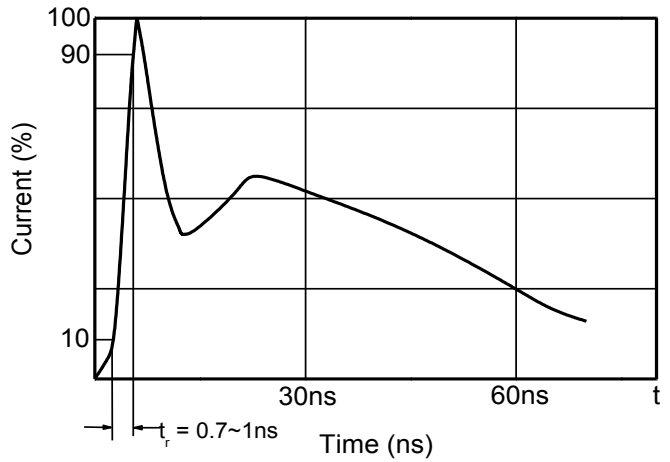
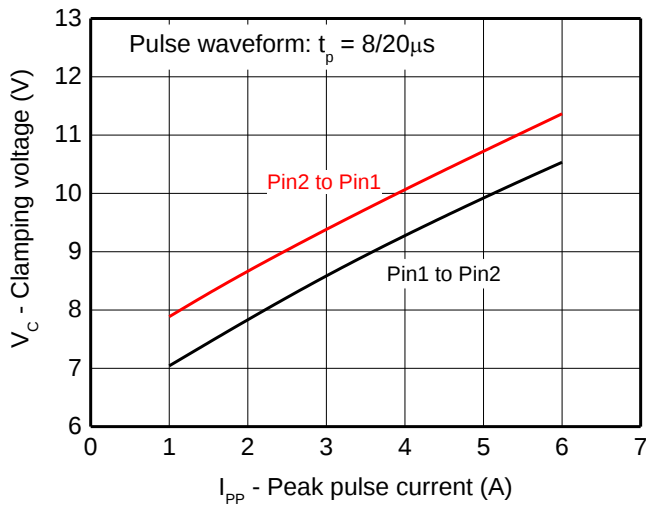
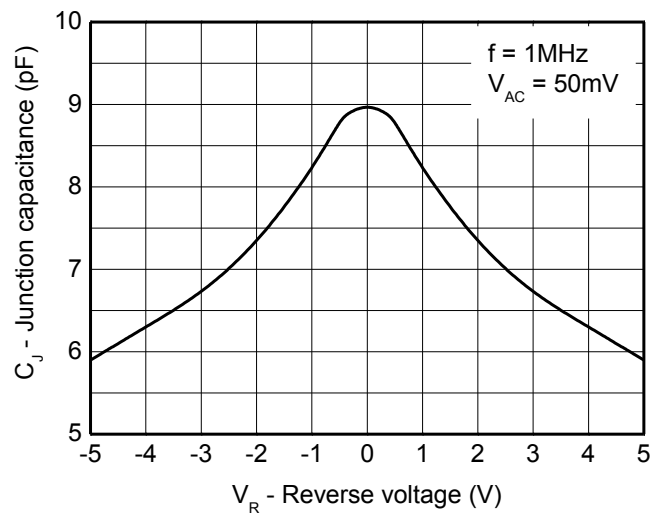
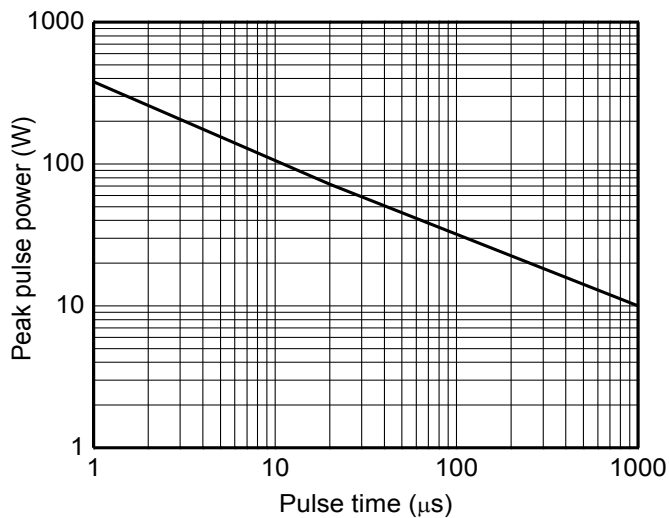
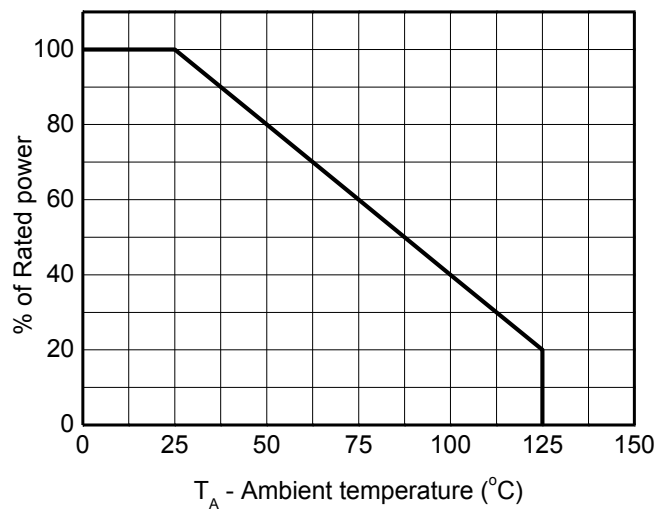
Definitions of electrical characteristics

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

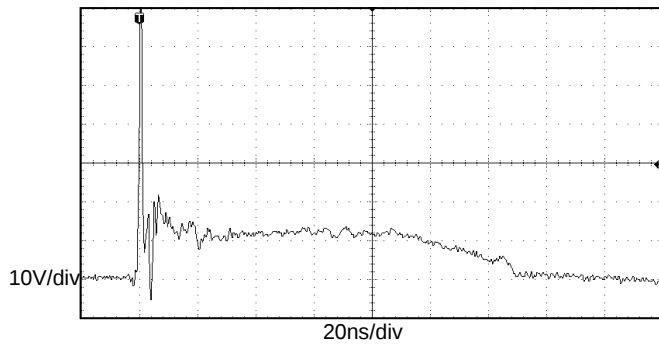
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse stand-off voltage	V_{RWM}				± 5	V
Reverse leakage current	I_{R}	$V_{\text{RWM}} = 5\text{V}$			1	μA
Reverse breakdown voltage	V_{BR}	$I_{\text{BR}} = 1\text{mA}$	5.2			V
Reverse holding voltage	V_{HOLD}	$I_{\text{HOLD}} = 50\text{mA}$	5.2			V
Clamping voltage ¹⁾	V_{CL}	$I_{\text{PP}} = 16\text{A}$, $t_p = 100\text{ns}$		12		V
Clamping voltage ²⁾	V_{CL}	$V_{\text{ESD}} = 8\text{kV}$		12		V
Clamping voltage ³⁾	V_{CL}	$I_{\text{PP}} = 1\text{A}$, $t_p = 8/20\mu\text{s}$			8	V
		$I_{\text{PP}} = 6\text{A}$, $t_p = 8/20\mu\text{s}$			12	V
Dynamic resistance ¹⁾	R_{DYN}			0.28		Ω
Junction capacitance	C_{J}	$V_{\text{R}} = 0\text{V}$, $f = 1\text{MHz}$		9	12	pF
		$V_{\text{R}} = 5\text{V}$, $f = 1\text{MHz}$		6	8	pF

Notes:

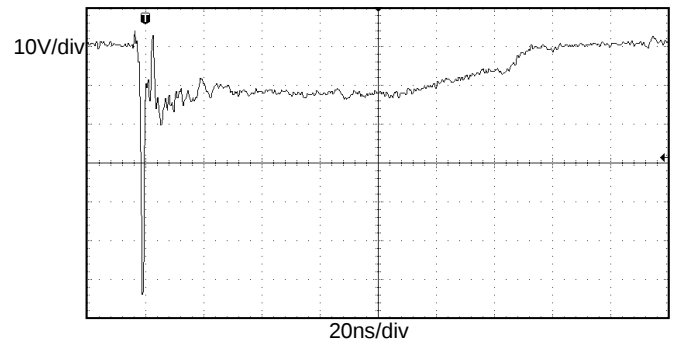
- 1) TLP parameter: $Z_0 = 50\Omega$, $t_p = 100\text{ns}$, $t_r = 2\text{ns}$, averaging window from 60ns to 80ns. R_{DYN} is calculated from 4A to 16A.
- 2) Contact discharge mode, according to IEC61000-4-2.
- 3) Non-repetitive current pulse, according to IEC61000-4-5.

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

Clamping voltage vs. Peak pulse current

Capacitance vs. Reverse voltage

Non-repetitive peak pulse power vs. Pulse time

Power derating vs. Ambient temperature

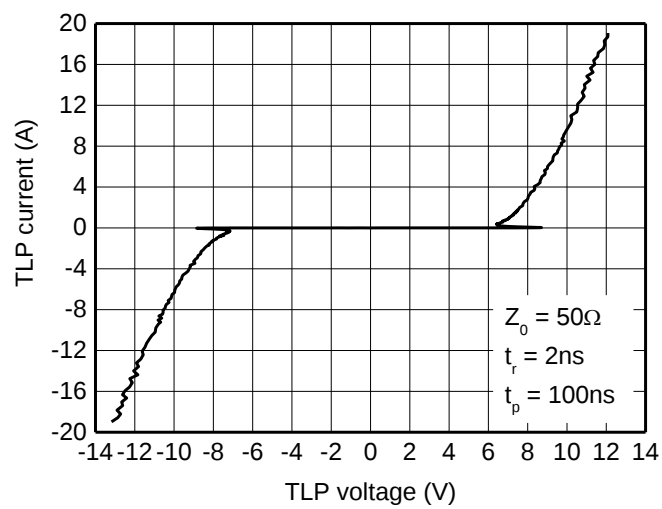
Typical characteristics ($T_A=25^{\circ}\text{C}$, unless otherwise noted)



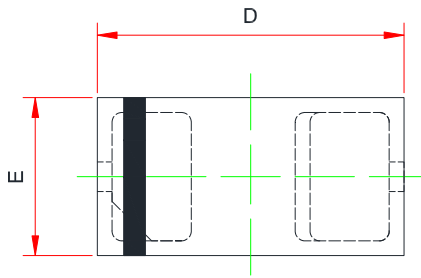
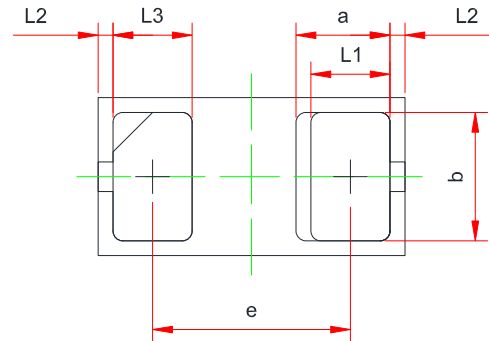
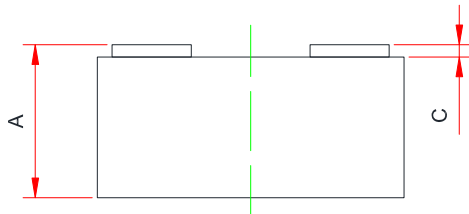
ESD clamping
(+8kV contact discharge per IEC61000-4-2)



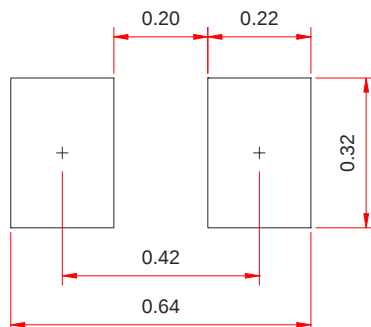
ESD clamping
(-8kV contact discharge per IEC61000-4-2)



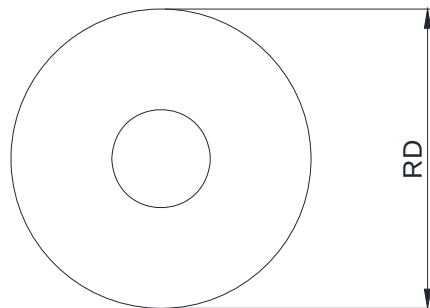
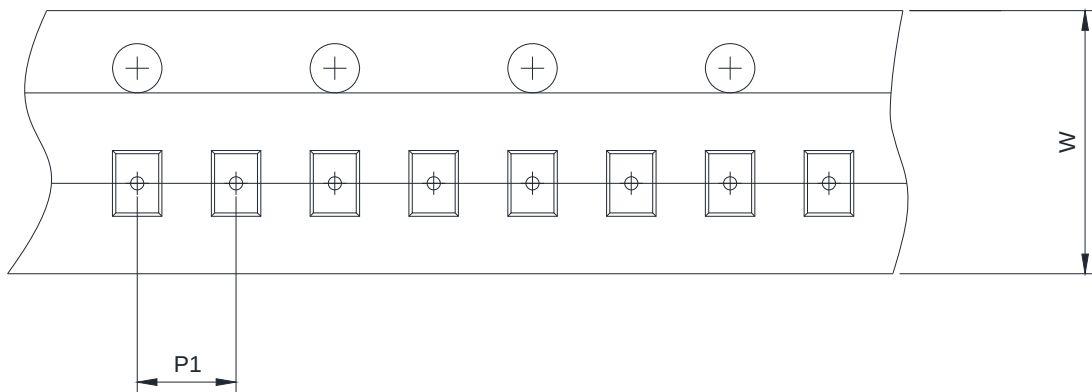
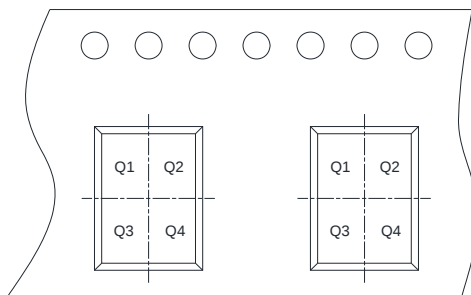
TLP Measurement

PACKAGE OUTLINE DIMENSIONS
FBP0603-2L

Top View

Bottom View

Side View

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.275	0.307	0.340
D	0.570	0.620	0.670
E	0.270	0.320	0.370
a	0.190REF		
b	0.225	0.260	0.295
c	0.010	0.050	0.090
e	0.365	0.400	0.435
L1	0.125	0.160	0.195
L2	0.030REF		
L3	0.125	0.160	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.

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