

**ESD5641DXX**
**1-Line, Uni-directional, Transient Voltage Suppressor**
<http://www.sh-willsemi.com>
**Descriptions**

The ESD5641DXX is a transient voltage suppressor designed to protect power interfaces. It is suitable to replace multiple discrete components in portable electronics.

The ESD5641DXX is specifically designed to protect USB port. TVS diode with higher surge capability is used to protect USB voltage bus pin.

The ESD5641DXX is available in DFN2x2-3L package. Standard products are Pb-free and Halogen-free.

**Features**

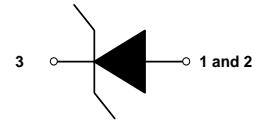
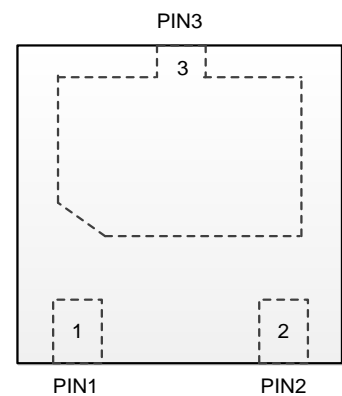
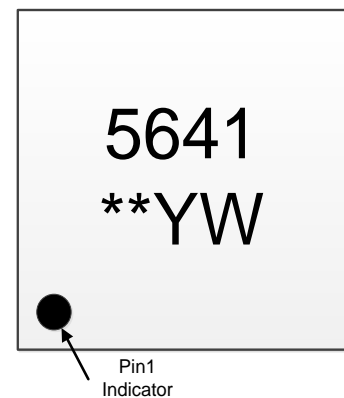
- Reverse stand-off voltage: 7.5V ~ 15V
- Surge protection according to IEC61000-4-5  
8/20μs waveform:  $I_{PPM}$  see [Table 4](#)
- Surge protection according to IEC61643-321  
10/1000μs waveform:  $I_{PPM}$  see [Table 4](#)
- Low clamping voltage
- Solid-state silicon technology

**Applications**

- Power supply protection
- Power management

**Order information**
**Table 1.**

Device	Package	Shipping	Device code
ESD5641D07-3/TR	DFN2x2-3L	3000/Tape&Reel	07
ESD5641D10-3/TR	DFN2x2-3L	3000/Tape&Reel	10
ESD5641D12-3/TR	DFN2x2-3L	3000/Tape&Reel	12
ESD5641D15-3/TR	DFN2x2-3L	3000/Tape&Reel	15


**Circuit diagram**

**Pin configuration (Top View)**


5641 = Series code  
 \*\* = Device code  
 YW = Date code

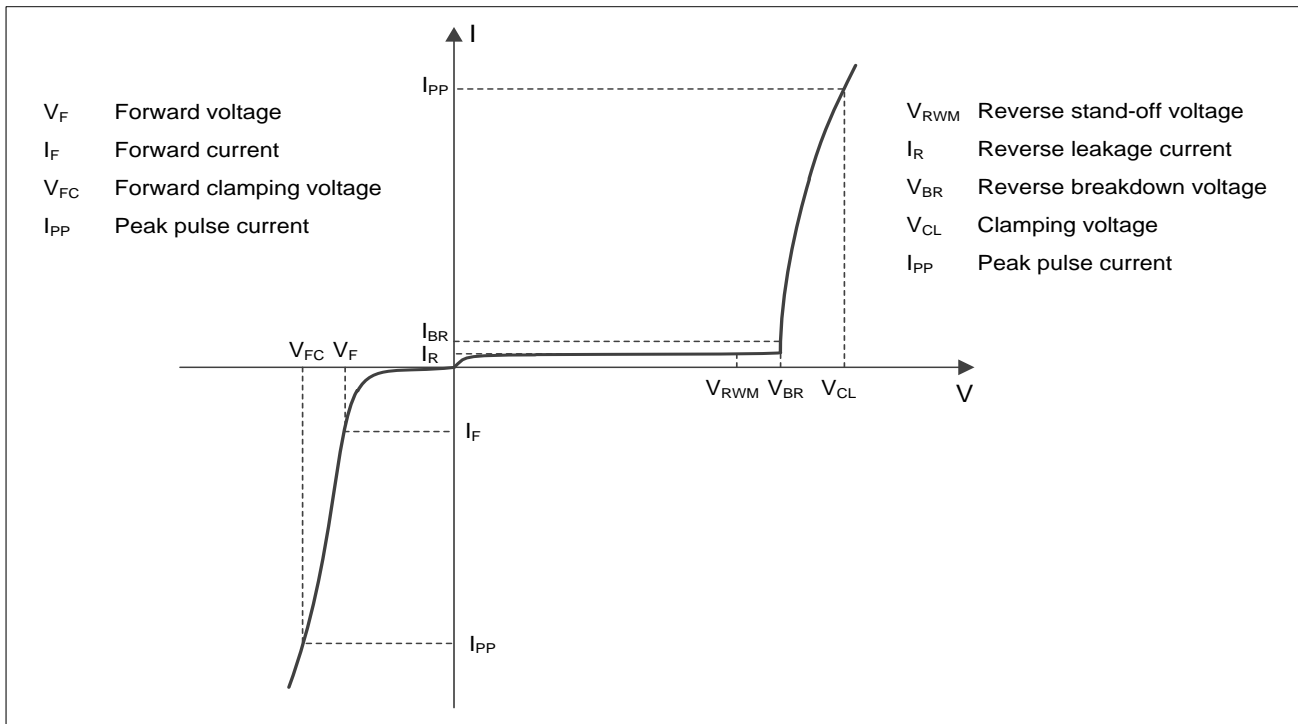
**Marking**

**Absolute maximum ratings**
**Table 2.**

Parameter	Symbol	Rating	Unit
Peak pulse power ( $t_p=8/20\mu s$ ) <sup>1)3)</sup>	$P_{PK}$	4000	W
Peak pulse power ( $t_p=10/1000\mu s$ ) <sup>2)3)</sup>	$P_{PK}$	350	W
ESD according to IEC61000-4-2 air discharge	$V_{ESD}$	$\pm 30$	kV
ESD according to IEC61000-4-2 contact discharge		$\pm 30$	
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	$^{\circ}C$

Notes:

- 1) Non-repetitive current pulse, according to IEC61000-4-5. (8/20 $\mu s$  current waveform)
- 2) Non-repetitive current pulse, according to IEC61643-321. (10/1000 $\mu s$  current waveform)
- 3) Measured from pin 3 to pin 1 and pin 2.

**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)**
**Table 3.**

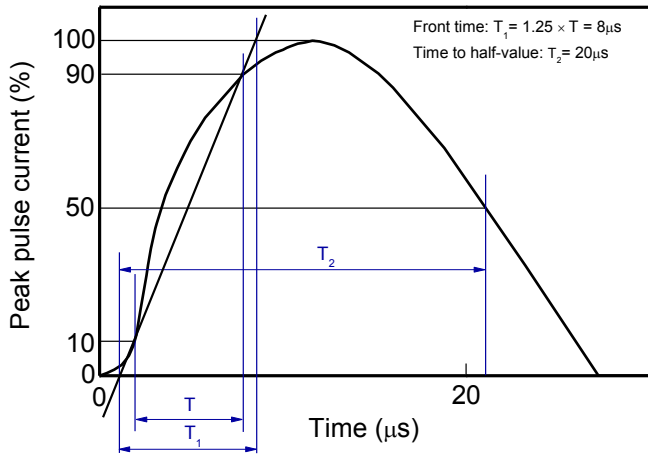
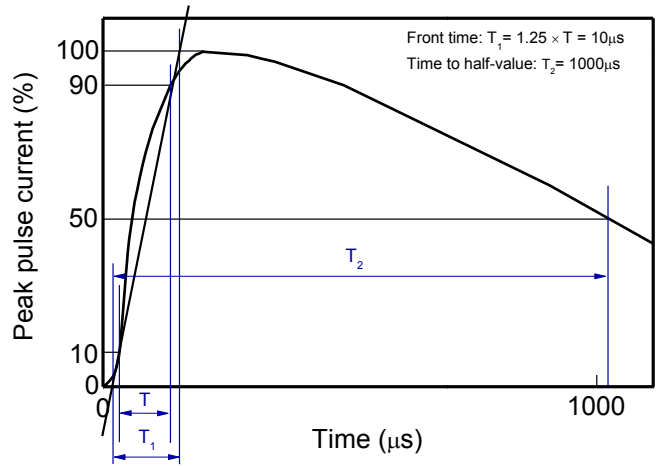
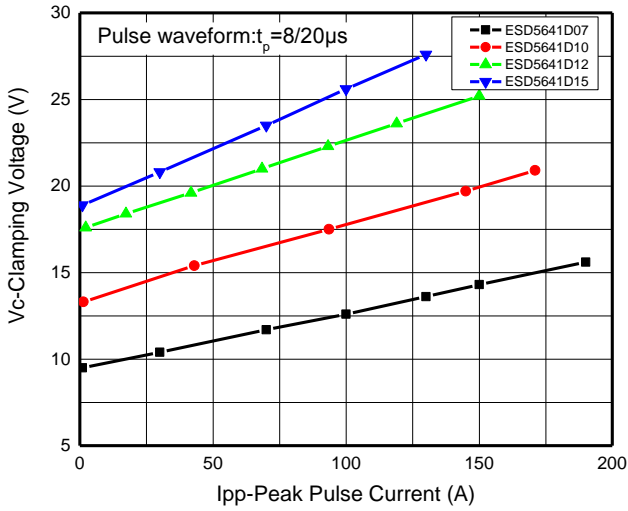
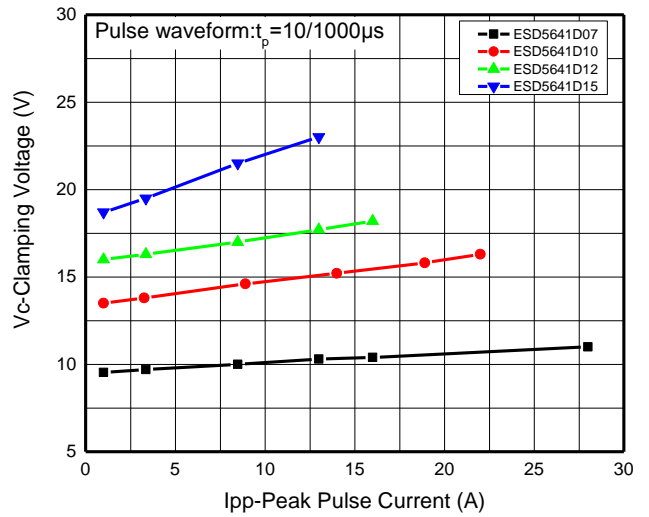
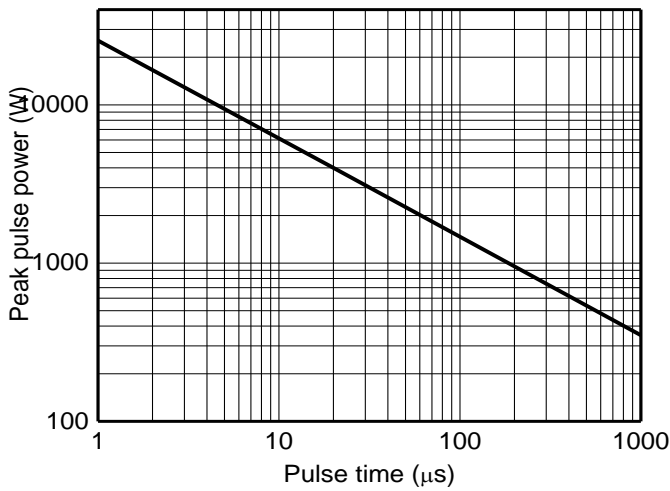
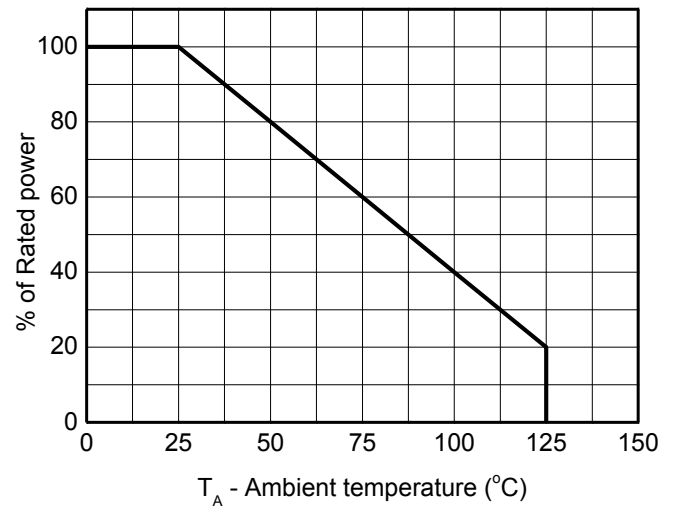
Type number	Reverse Standoff Voltage $V_{RWM}$ (V)	Breakdown voltage $V_{BR}(V)$ $I_{BR} = 1\text{mA}$				Reverse leakage current $I_{RM}(nA)$ at $V_{RWM}$		Forward voltage $V_F(V)$ $I_F = 20\text{mA}$		Junction capacitance $F=1\text{MHz}$ , $V_R=0V$ (pF)	
	Max.	Min.	Typ.	Max.	Typ.	Max.	Min.	Max.	Typ.	Max.	
ESD5641D07	7.5	8.0	9.0	10.0	10	1000	0.45	1.25	2200	3000	
ESD5641D10	10.0	11.5	13.5	15.5	1	500	0.45	1.25	1500	2000	
ESD5641D12	12.0	13.0	15.0	17.0	1	100	0.45	1.25	1200	1800	
ESD5641D15	15.0	16.0	17.5	19.0	1	100	0.45	1.25	1000	1500	

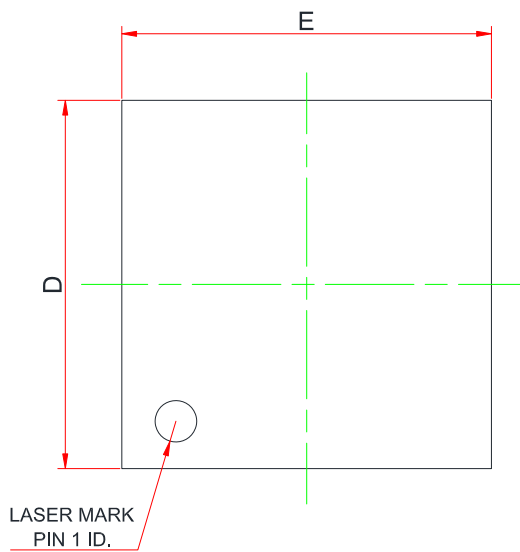
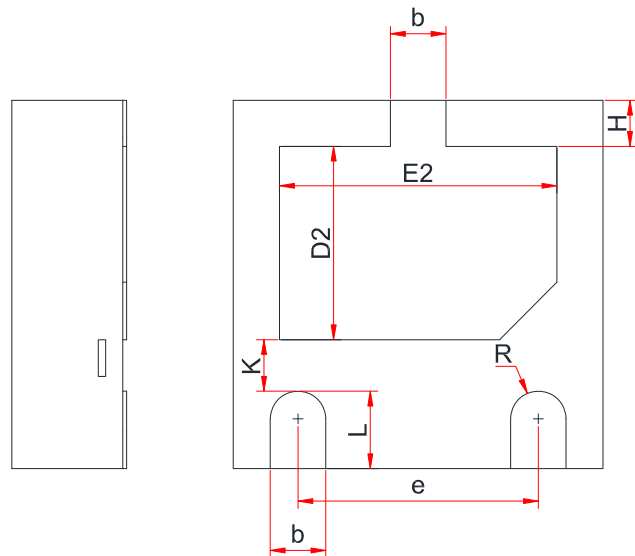
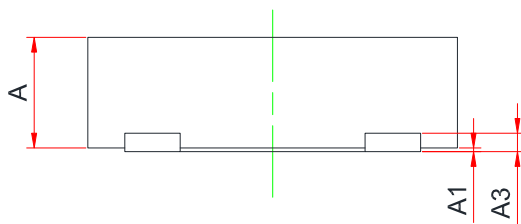
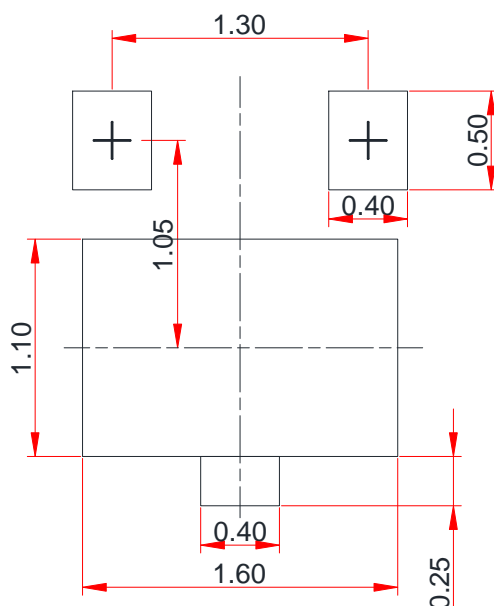
**Table 4.**

Type number	Rated peak pulse current $I_{PP}$ (A) <sup>1)3)</sup>	Clamping voltage $V_{CL}(V)$ at $I_{PP}$ (A) <sup>1)3)</sup>	Rated peak pulse current $I_{PP}$ (A) <sup>2)3)</sup>	Clamping voltage $V_{CL}(V)$ at $I_{PP}$ (A) <sup>2)3)</sup>
	Max.	Max.	Max.	Max.
ESD5641D07	190	18	28	13
ESD5641D10	170	23	22	18
ESD5641D12	150	27	16	20
ESD5641D15	130	30	13	25

**Notes:**

- 1) Non-repetitive current pulse, according to IEC61000-4-5. (8/20 $\mu\text{s}$  current waveform)
- 2) Non-repetitive current pulse, according to IEC61643-321. (10/1000 $\mu\text{s}$  current waveform)
- 3) Measured from pin 3 to pin 1 and pin 2.

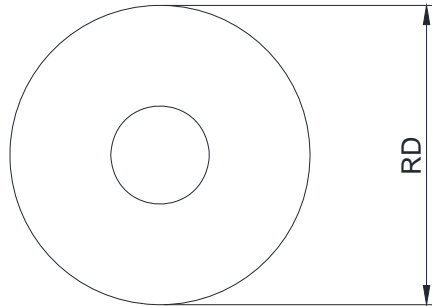
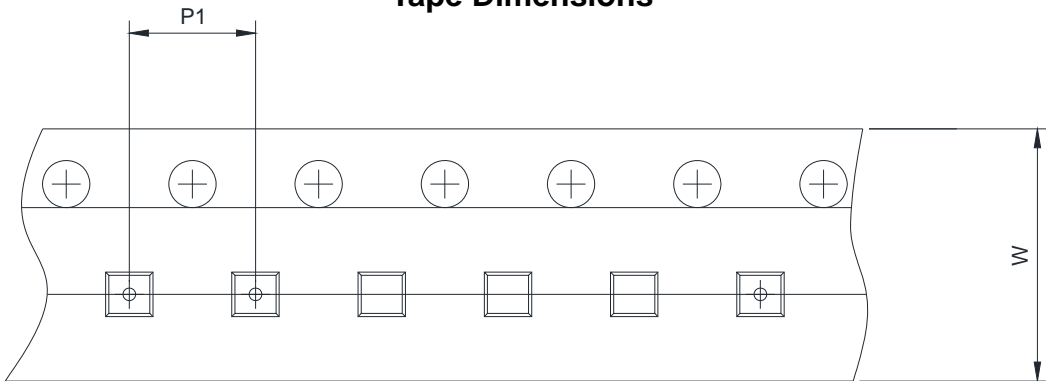
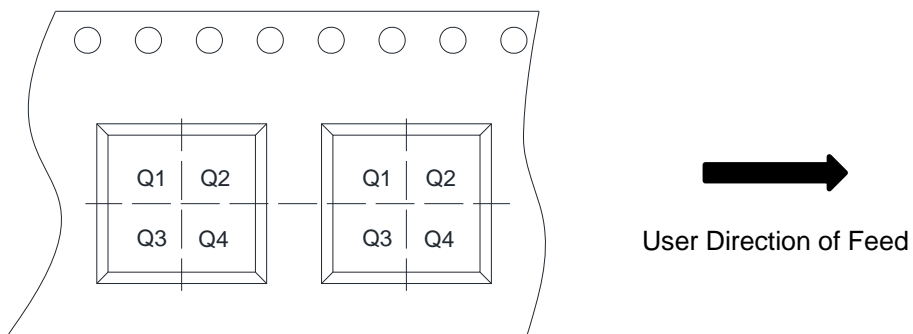
**Typical characteristics ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)**

**8/20 $\mu\text{s}$  waveform per IEC61000-4-5**

**10/1000 $\mu\text{s}$  waveform per IEC61643-321**

**Clamping voltage vs. Peak pulse current**

**Clamping voltage vs. Peak pulse current**

**Non-repetitive peak pulse power vs. Pulse time**

**Power derating vs. Ambient temperature**

**Package outline dimensions**
**DFN2x2-3L**

**Top View**

**Bottom View**

**Side View**
**Recommended land pattern (Unit: mm)**


Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.50	0.58	0.65
A1	0.00	0.02	0.05
A3	0.10 REF.		
b	0.25	0.30	0.35
D	1.90	2.00	2.10
E	1.90	2.00	2.10
D2	0.95	1.05	1.15
E2	1.40	1.50	1.60
e	1.20	1.30	1.40
H	0.20	0.25	0.30
K	0.20	0.30	0.40
L	0.33	0.39	0.45
R	0.13	-	-

**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**


RD	Reel Dimension	<input checked="" type="checkbox"/> 7inch	<input type="checkbox"/> 13inch	
W	Overall width of the carrier tape	<input checked="" type="checkbox"/> 8mm	<input type="checkbox"/> 12mm	
P	Pitch between successive cavity centers	<input type="checkbox"/> 2mm	<input checked="" type="checkbox"/> 4mm	<input type="checkbox"/> 8mm
Pin1	Pin1 Quadrant	<input type="checkbox"/> Q1	<input checked="" type="checkbox"/> Q2	<input type="checkbox"/> Q3 <input type="checkbox"/> Q4

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