

**ESD56161D24**
**1 Line, Uni-directional, Transient Voltage Suppressor**
**Descriptions**

The ESD56161D24 is a Uni-directional TVS (Transient Voltage Suppressor). It is specifically designed to protect sensitive electronic components which are connected to power lines, from over-stress caused by ESD (Electrostatic Discharge), EFT (Electrical Fast Transient) and Lightning.

The ESD56161D24 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 170A (8/20 $\mu\text{s}$ ) according to IEC61000-4-5.

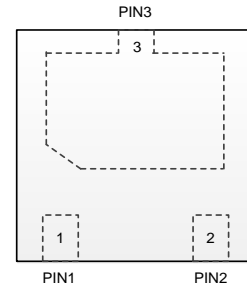
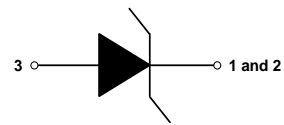
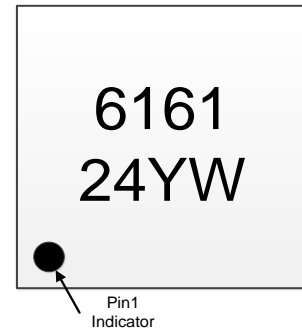
The ESD56161D24 is available in DFN2x2-3L package. Standard products are Pb-free and Halogen-free.

**Features**

- Reverse stand-off voltage: 24V Max.
- Transient protection for each line according to IEC61000-4-2 (ESD):  $\pm 30\text{kV}$  (contact and air discharge)  
IEC61000-4-4 (EFT): 80A (5/50ns)  
IEC61000-4-5 (surge): 170A (8/20 $\mu\text{s}$ )
- Capacitance:  $C_J = 700\text{pF}$  typ.
- Low clamping voltage
- Solid-state silicon technology

**Applications**

- Power lines
- Cellular handsets
- Tablets
- Microprocessors
- Portable Electronics

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

**DFN2x2-3L**

**Circuit diagram**


6161 = Series code  
24 = Device code  
YW = Date code

**Marking (Top View)**
**Order information**

Device	Package	Shipping
ESD56161D24-3/TR	DFN2x2-3L	3000/Tape&Reel

**Absolute maximum ratings**

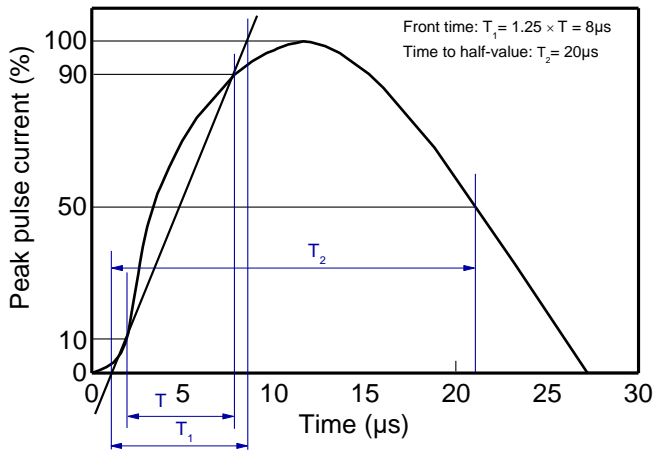
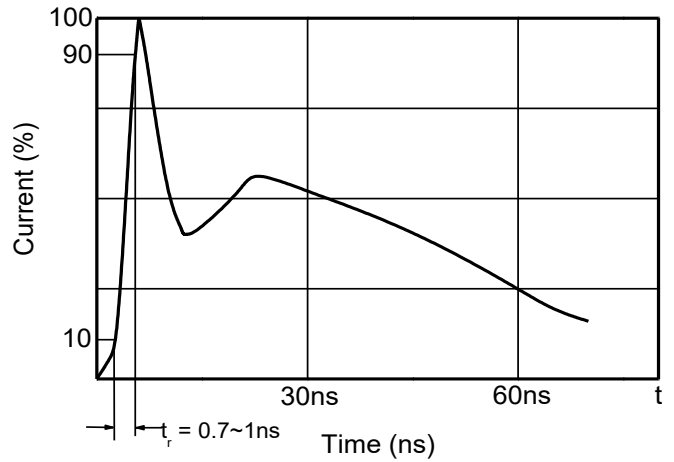
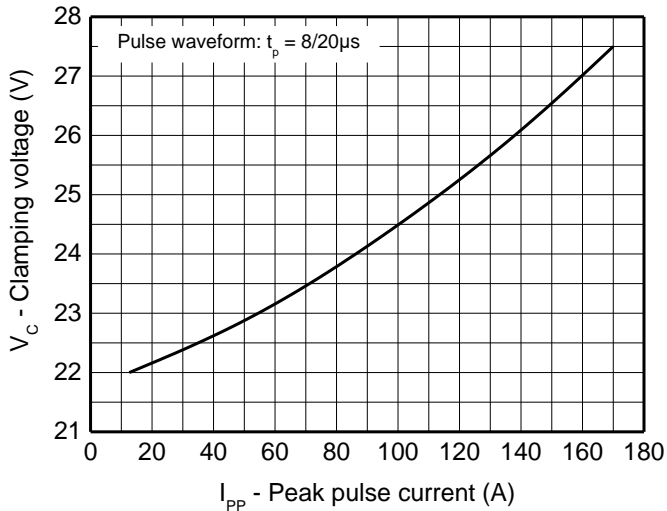
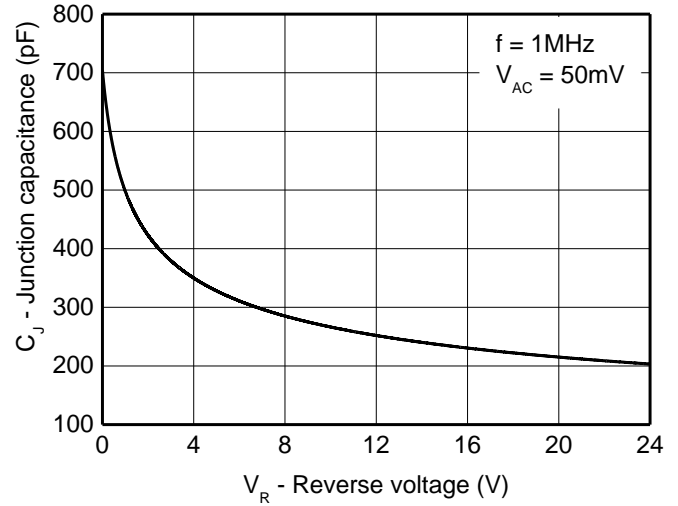
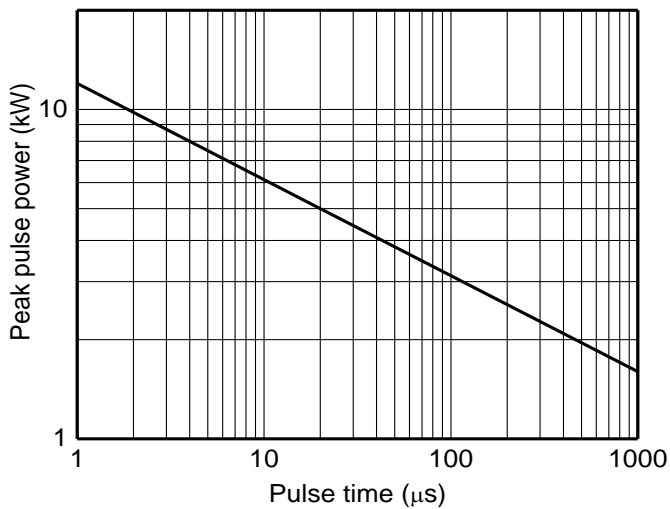
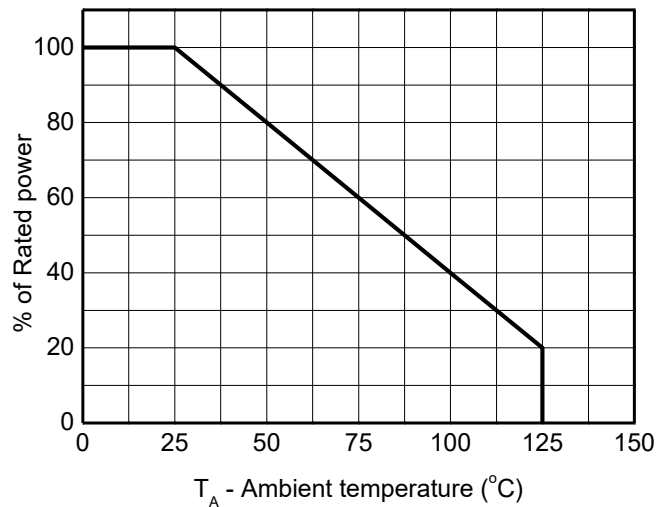
Parameter	Symbol	Rating	Unit
Peak pulse power ( $t_p = 8/20\mu s$ )	$P_{pk}$	5000	W
Peak pulse current ( $t_p = 8/20\mu s$ )	$I_{PP}$	170	A
ESD according to IEC61000-4-2 air discharge	$V_{ESD}$	$\pm 30$	kV
ESD according to IEC61000-4-2 contact discharge		$\pm 30$	
Junction temperature	$T_J$	125	$^{\circ}C$
Operating temperature	$T_{OP}$	-40~85	$^{\circ}C$
Lead temperature	$T_L$	260	$^{\circ}C$
Storage temperature	$T_{STG}$	-55~150	$^{\circ}C$

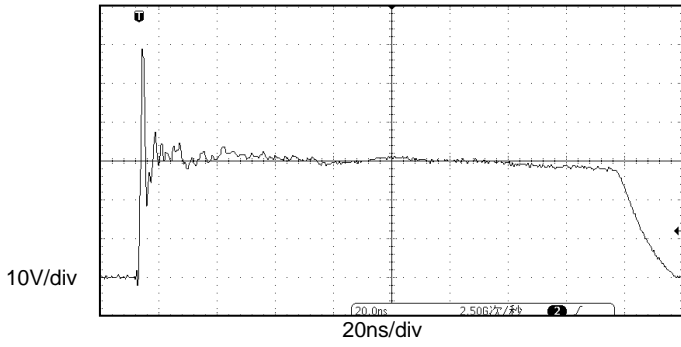
**Electrical characteristics ( $T_A=25^{\circ}C$ , unless otherwise noted)**

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse stand-off voltage	$V_{RWM}$				24.0	V
Reverse leakage current	$I_R$	$V_{RWM} = 24V$			1.0	$\mu A$
Reverse breakdown voltage	$V_{BR}$	$I_{BR} = 1mA$	25.0			V
Clamping voltage <sup>1)</sup>	$V_{CL}$	$V_{ESD} = 8kV$		28.0		V
Clamping voltage <sup>2)</sup>	$V_{CL}$	$I_{PP} = 100A, t_p = 8/20\mu s$		24.5	27.0	V
		$I_{PP} = 170A, t_p = 8/20\mu s$		27.5	30.0	V
Junction capacitance	$C_J$	$V_R = 0V, f = 1MHz$		700	800	pF
		$V_R = 24V, f = 1MHz$		200	250	pF

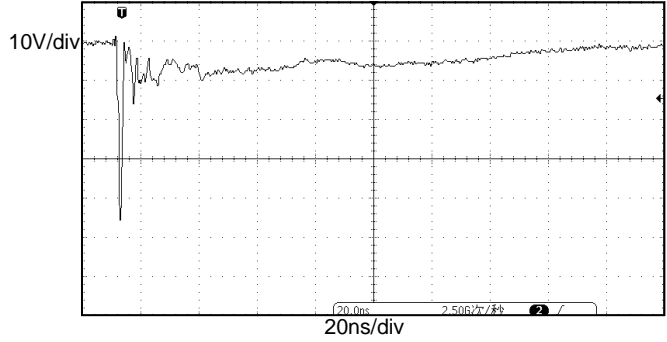
Notes:

- 1) Contact discharge mode, according to IEC61000-4-2.
- 2) Non-repetitive current pulse, according to IEC61000-4-5.

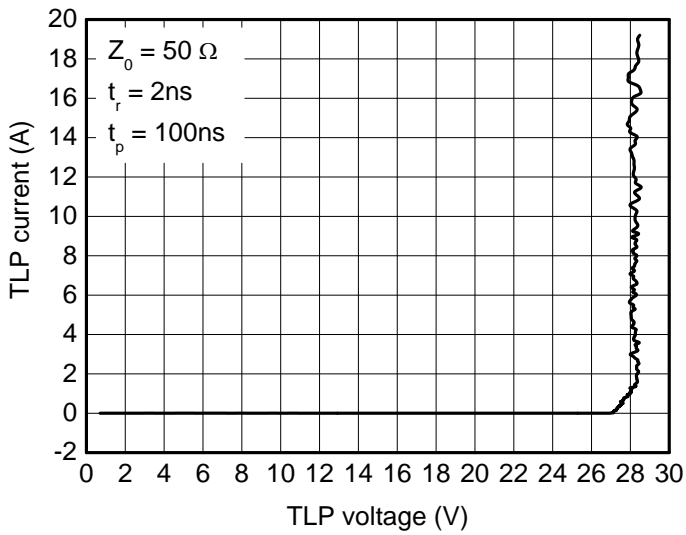
**Typical characteristics ( $T_A=25^\circ\text{C}$ , unless otherwise noted)**

**8/20 $\mu\text{s}$  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)**


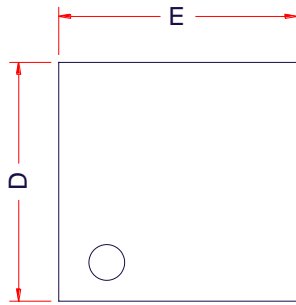
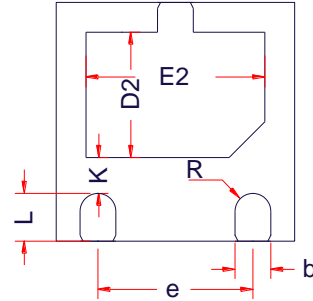
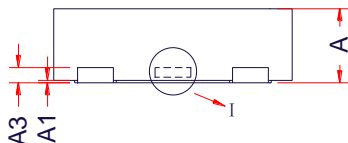
**ESD clamping**  
**(+8kV contact discharge per IEC61000-4-2)**




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

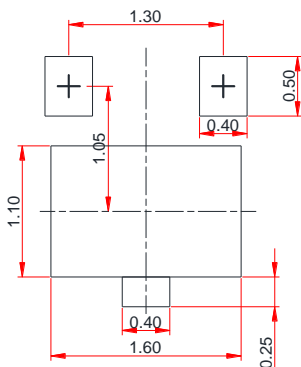


**TLP Measurement**

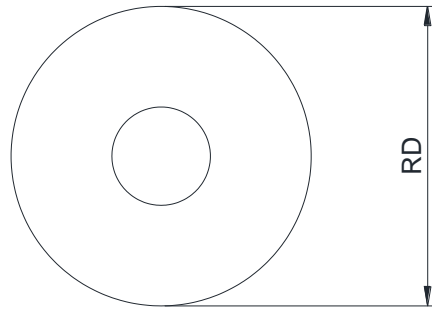
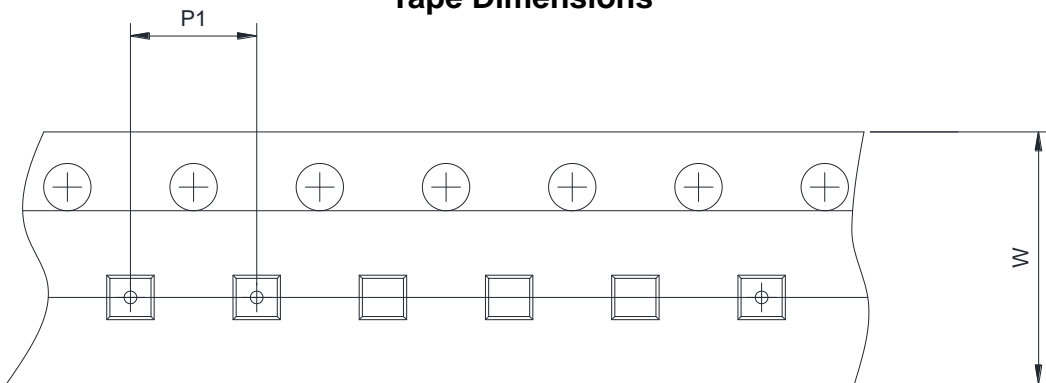
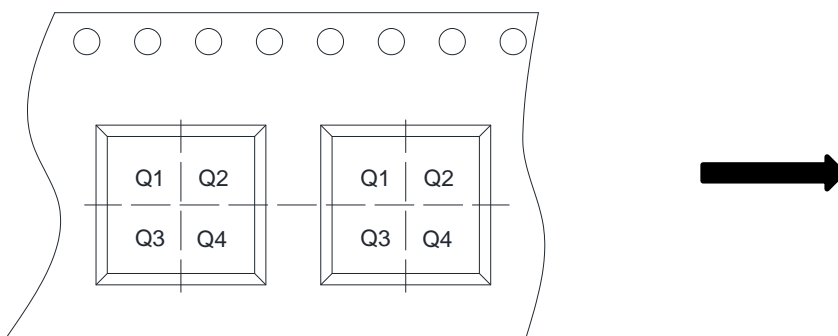
**PACKAGE OUTLINE DIMENSIONS**
**DFN2x2-3L**

**TOP VIEW**

**BOTTOM VIEW**

**SIDE VIEW**

- I
1. 
  2. (N/A)

Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.50	0.58	0.65
A1	0.00	0.02	0.05
A3	0.127Ref.		
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
R	0.13	-	-
L	0.33	0.39	0.45
K	0.20	-	-

**Recommend 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**


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 <sub>1</sub>	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