

ESD56171D04
1-Line, Bi-directional, Transient Voltage Suppressor
<http://www.sh-willsemi.com>
Descriptions

The ESD56171D04 is a bi-directional Transient Voltage Suppressor designed to protect power interfaces. It is suitable to replace multiple discrete components in portable electronics.

The ESD56171D04 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 160A according to IEC61000-4-5 (8/20 μs).

The ESD56171D04 is available in DFN2.0 $\times$ 2.0-3L package. Standard products are Pb-free and Halogen-free.

Features

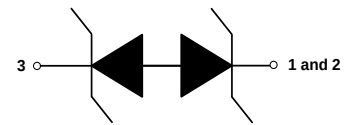
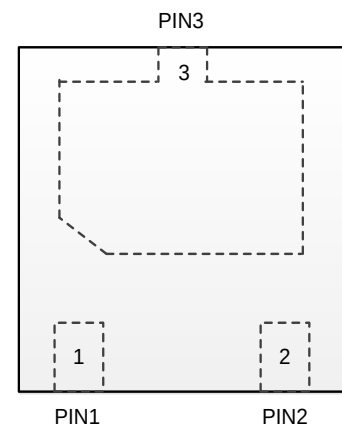
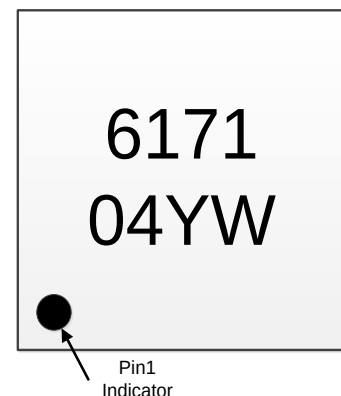
- Reverse stand-off voltage: $\pm 4.5\text{V}$ max.
- ESD protection according to IEC61000-4-2
Contact & Air discharge: $\pm 30\text{kV}$
- Surge protection according to IEC61000-4-5
8/20 μs waveform: 160A
- Capacitance: $C_J = 400\text{pF}$ typ.
- Low clamping voltage
- Low leakage current
- Solid-state silicon technology

Applications

- Power supply protection
- Power management

Order information

Device	Package	Shipping
ESD56171D04-3/TR	DFN2.0 $\times$ 2.0-3L	3000/Tape&Reel


Circuit diagram

Pin configuration (Top View)


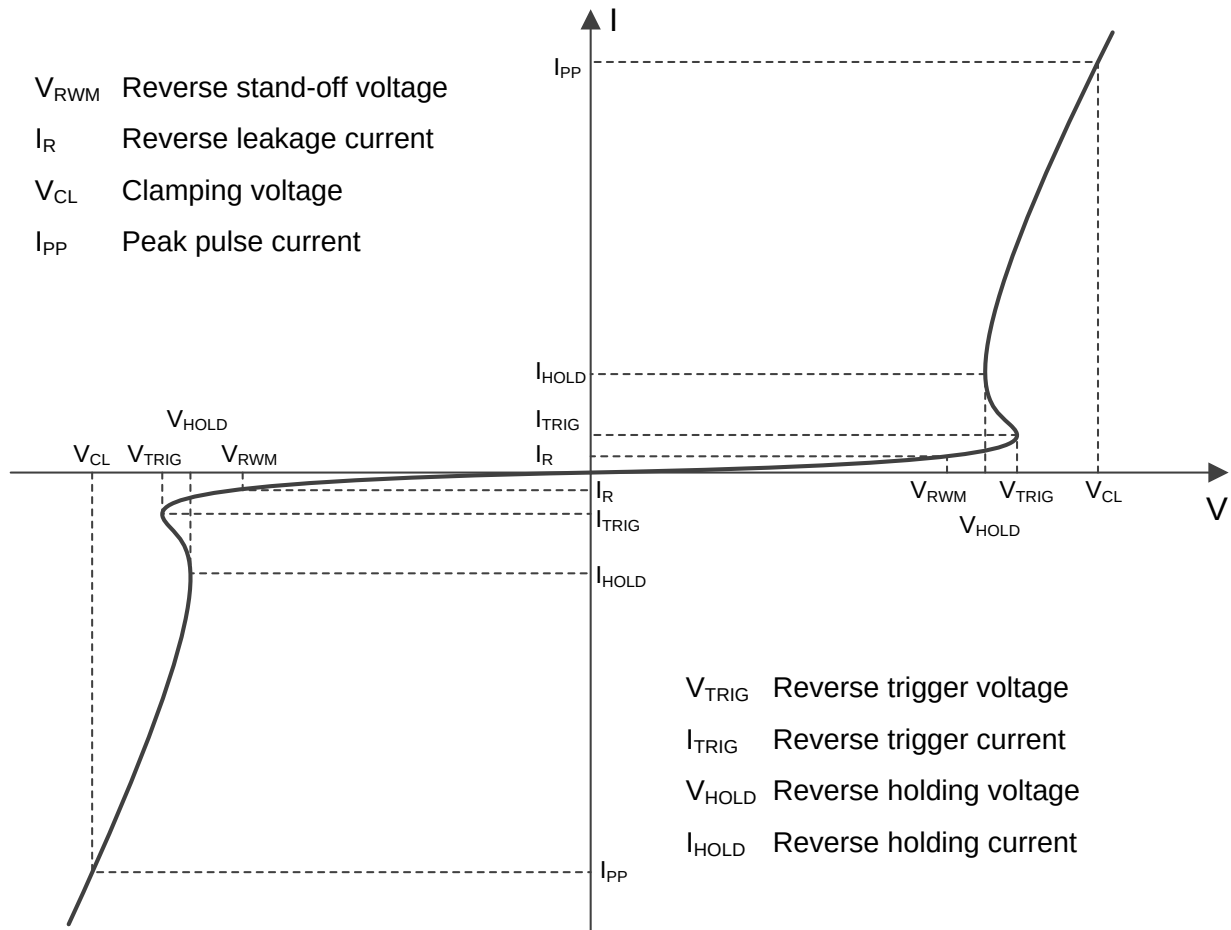
6171 = Series code
04 = Device code
YW = Date code

Marking

Absolute maximum ratings

Parameter	Symbol	Rating	Unit
Peak pulse power ($t_p = 8/20\mu s$)	P_{pk}	2250	W
Peak pulse current ($t_p = 8/20\mu s$)	I_{pp}	160	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)

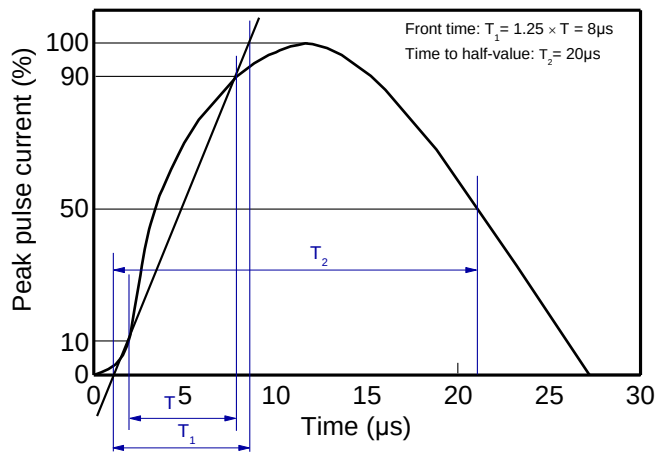
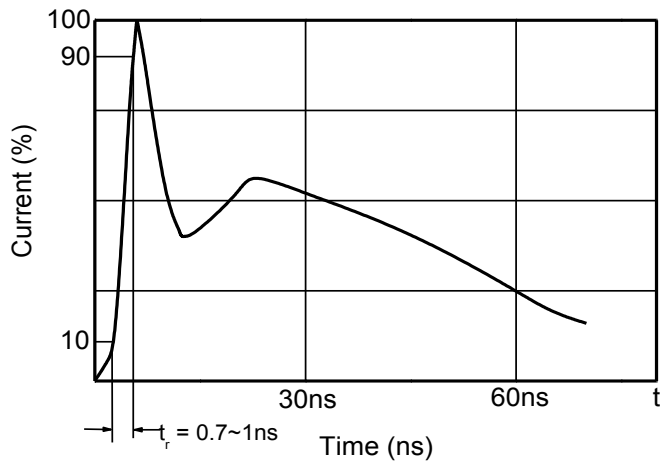
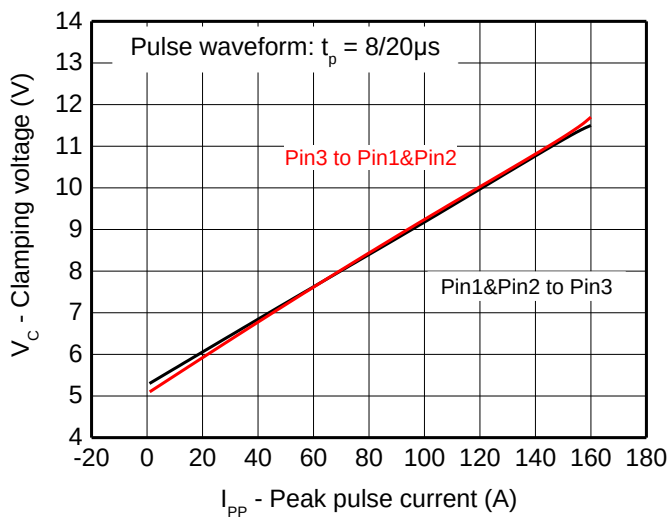
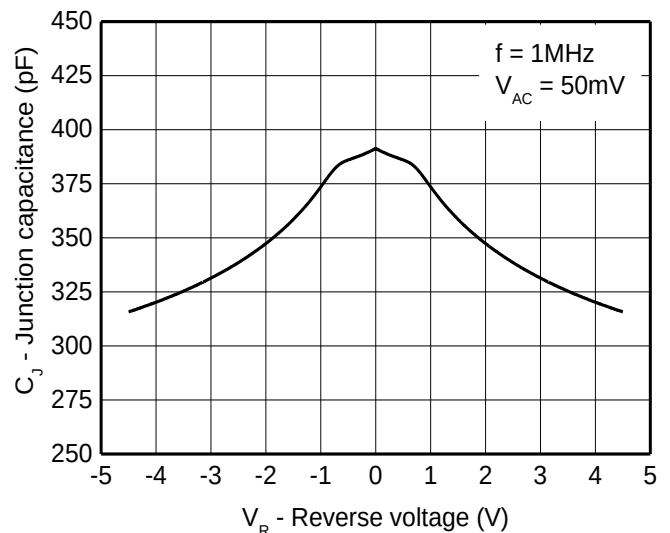
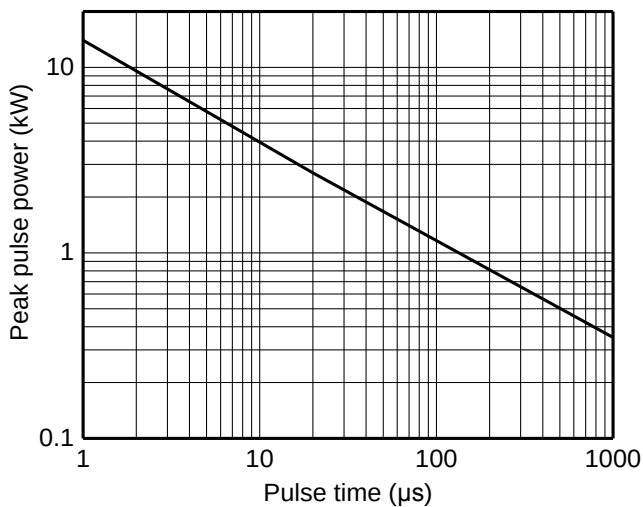
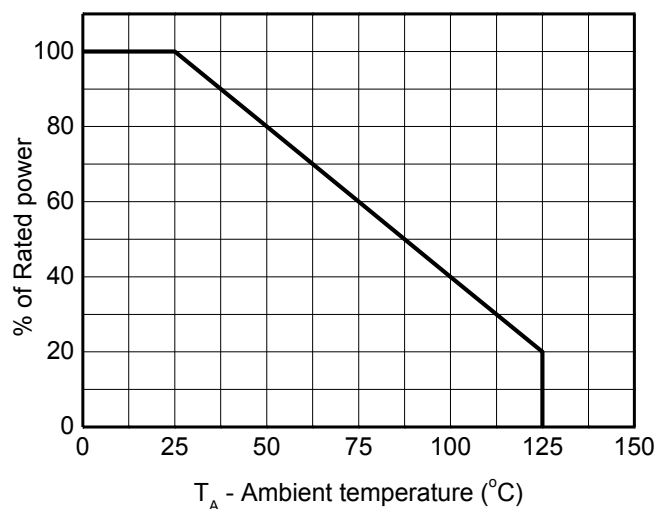
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse stand-off voltage	V_{RWM}				± 4.5	V
Reverse leakage current	I_R	$V_{RWM} = 4.5\text{V}$			1	μA
Reverse trigger voltage	V_{TRIG}	$I_{TRIG} = 2\mu\text{A}$	4.7			V
Reverse holding voltage	V_{HOLD}	$I_{HOLD} = 50\text{mA}$	4.6			V
Clamping voltage ¹⁾	V_{CL}	$V_{ESD} = 8\text{kV}$		7		V
Clamping voltage ²⁾	V_{CL}	$I_{PP} = 16\text{A}$, $t_p = 100\text{ns}$		6		V
Dynamic resistance ²⁾	R_{DYN}			0.05		Ω
Clamping voltage ³⁾	V_{CL}	$I_{PP} = 1\text{A}$, $t_p = 8/20\mu\text{s}$			6	V
		$I_{PP} = 100\text{A}$, $t_p = 8/20\mu\text{s}$			11	V
		$I_{PP} = 160\text{A}$, $t_p = 8/20\mu\text{s}$			14	V
Junction capacitance	C_J	$V_R = 0\text{V}$, $f = 1\text{MHz}$,		400	600	pF
		$V_R = 4.5\text{V}$, $f = 1\text{MHz}$		270	360	pF

Notes:

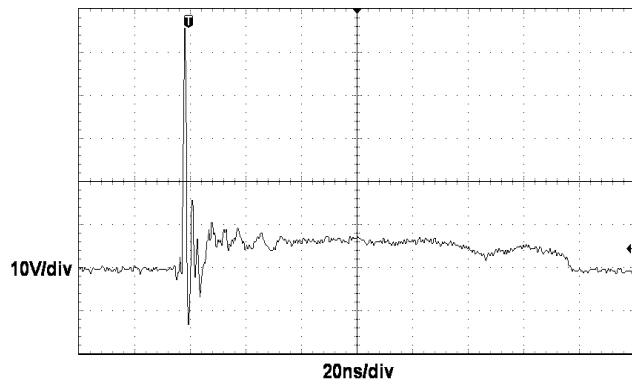
1) Contact discharge mode, according to IEC61000-4-2.

2) 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.

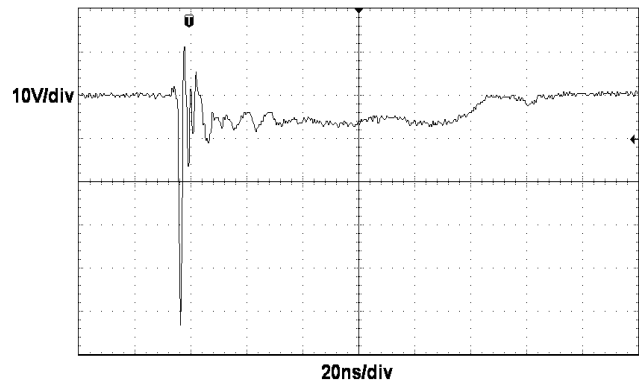
3) Non-repetitive current pulse, according to IEC61000-4-5.

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

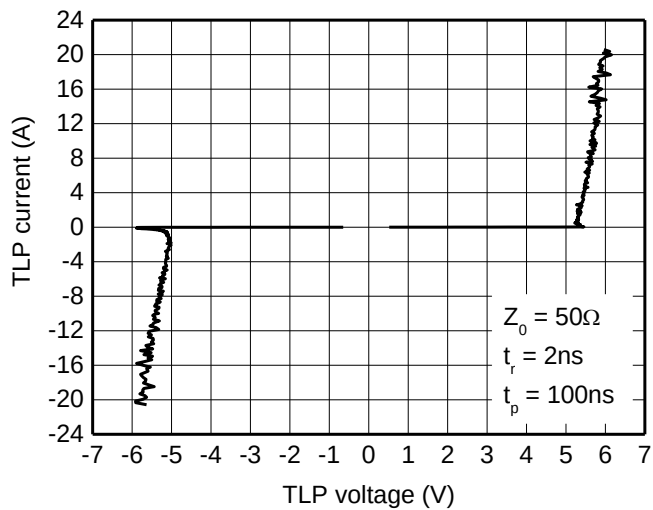
Typical characteristics ($T_A=25^{\circ}\text{C}$, unless otherwise noted)



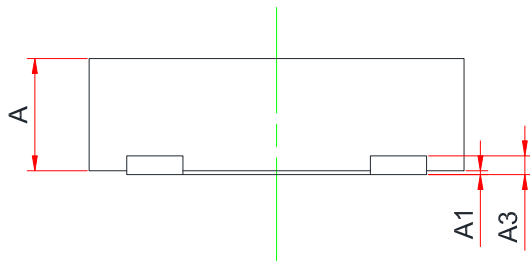
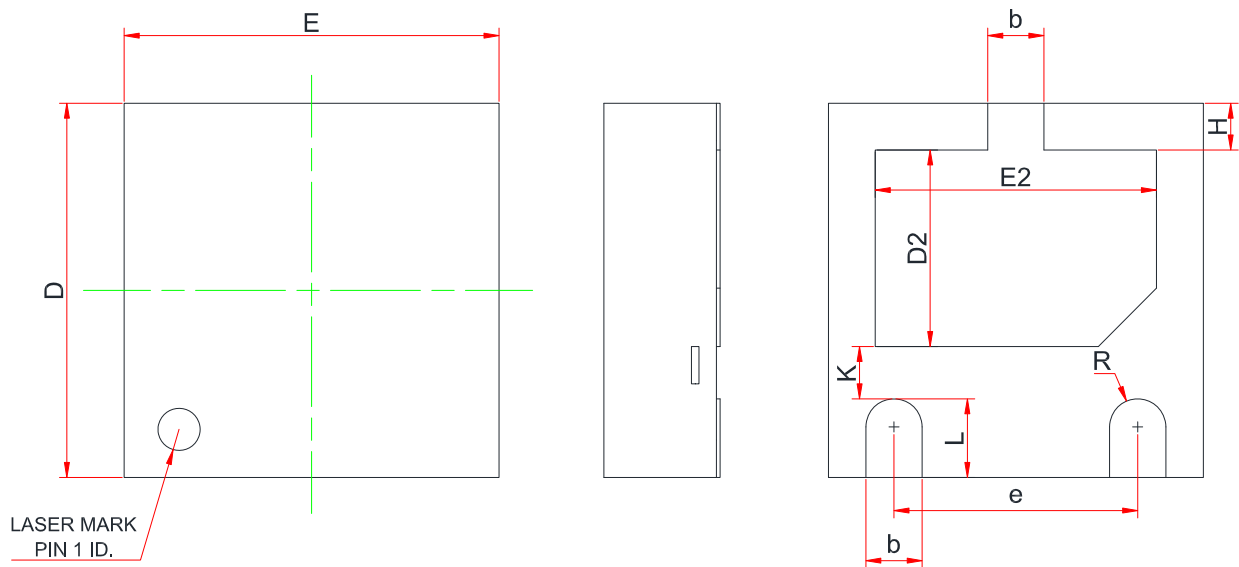
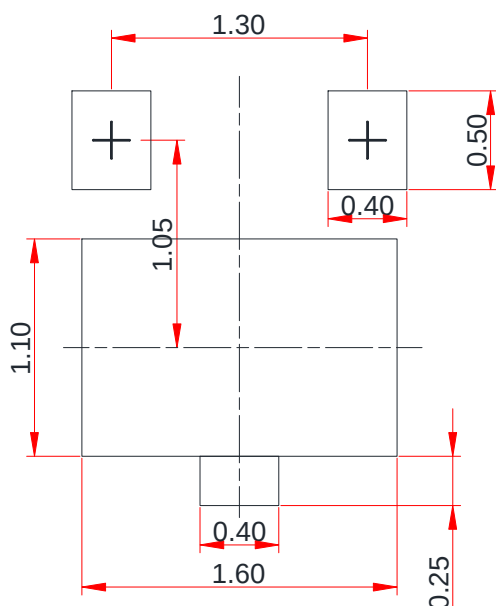
ESD clamping
(+8kV contact discharge per IEC61000-4-2)



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



TLP Measurement

Package outline dimensions
DFN2.0×2.0-3L

Recommended land pattern (Unit: mm)


Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.55	0.60	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	0.35	0.40	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.