

**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 $\mu\text{s}$ ).

The ESD56171D04 is available in DFN2.0x2.0-3L package. Standard products are Pb-free and Halogen-free.

**Features**

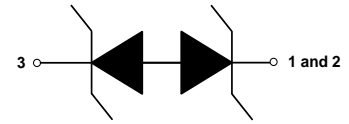
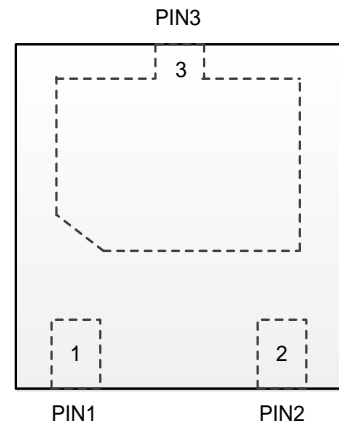
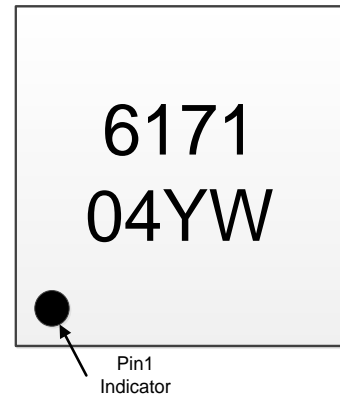
- Reverse stand-off voltage:  $\pm 4.5\text{V}$  max.
- ESD protection according to IEC61000-4-2  
Contact & Air discharge:  $\pm 30\text{kV}$
- Surge protection according to IEC61000-4-5  
8/20 $\mu\text{s}$  waveform: 160A
- Capacitance:  $C_J = 400\text{pF}$  typ.
- Low clamping voltage
- Low leakage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

**Applications**

- Power supply protection
- Power management

**Order information**

Device	Package	Shipping
ESD56171D04-3/TR	DFN2.0x2.0-3L	3000/Tape&Reel

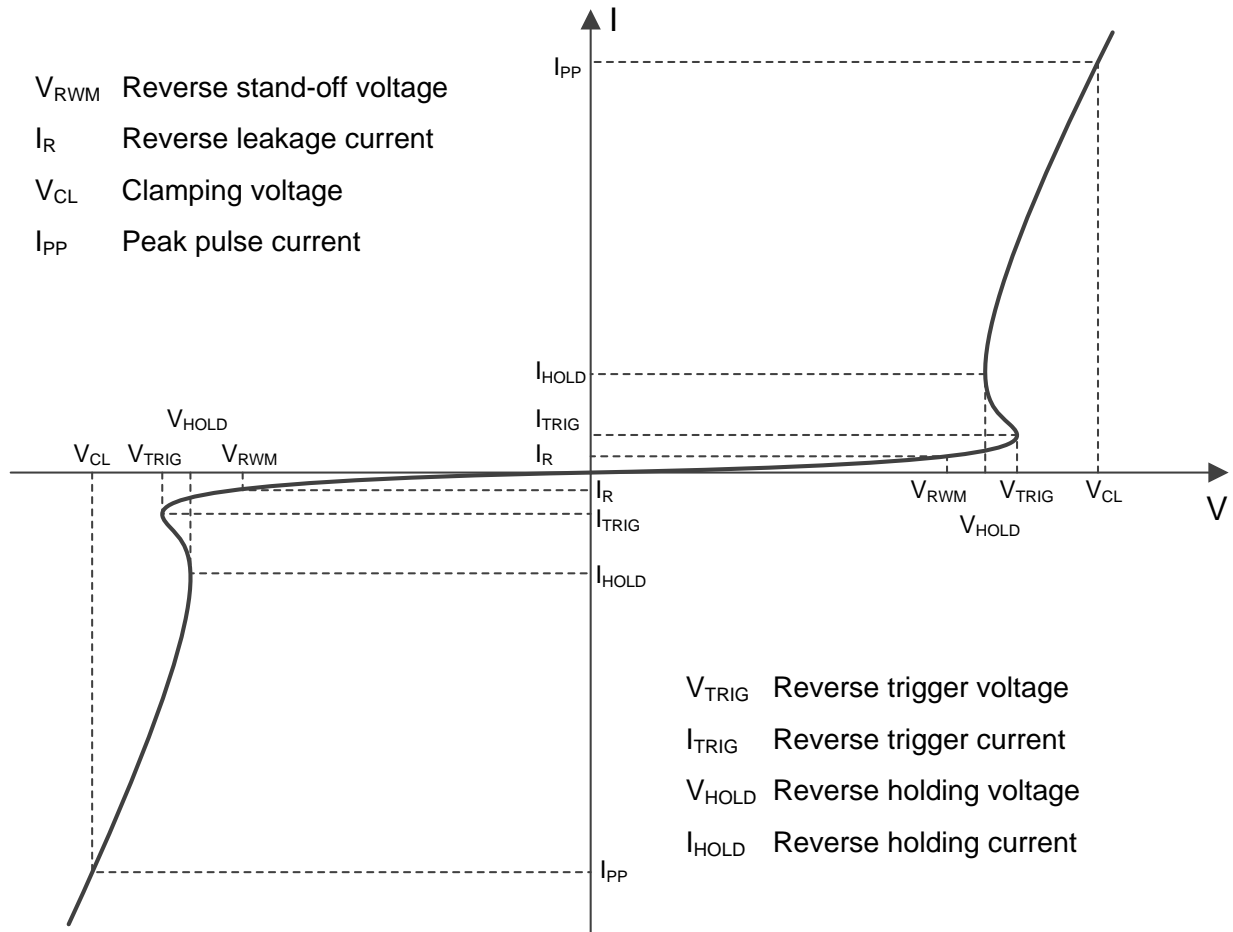

**Circuit diagram**

**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	$V_{ESD}$	$\pm 30$	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	$^{\circ}C$

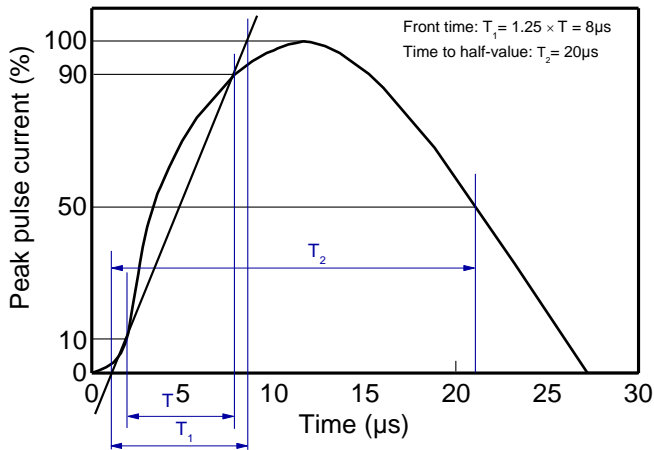
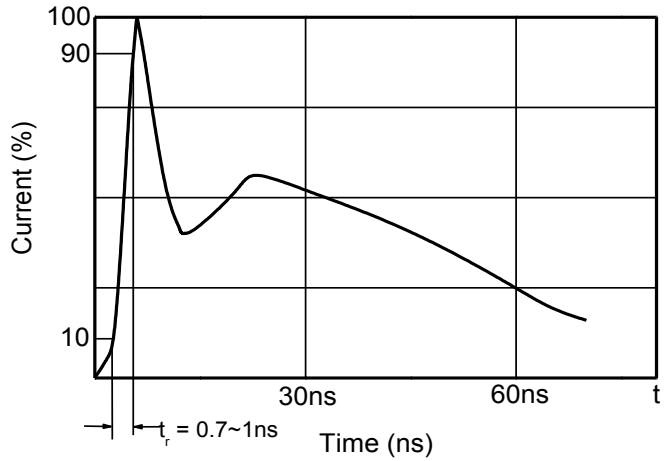
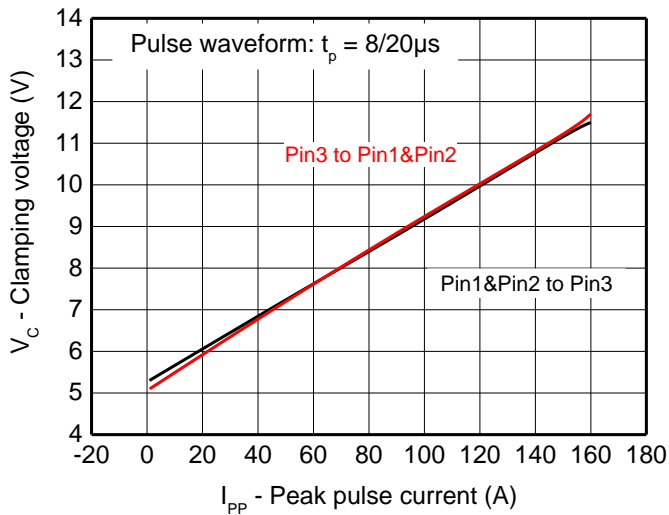
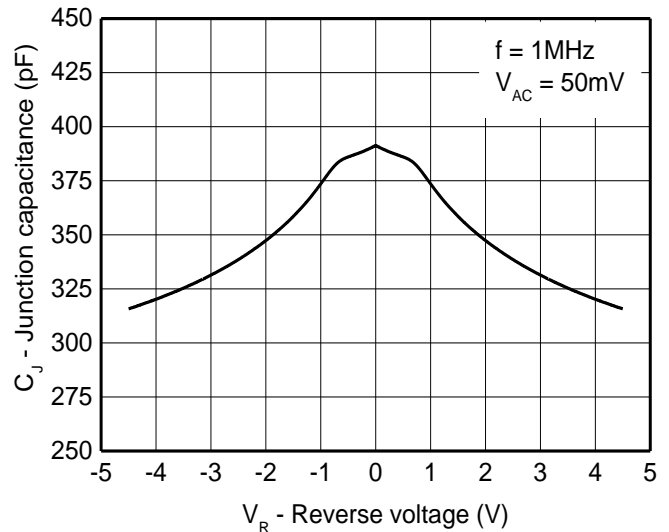
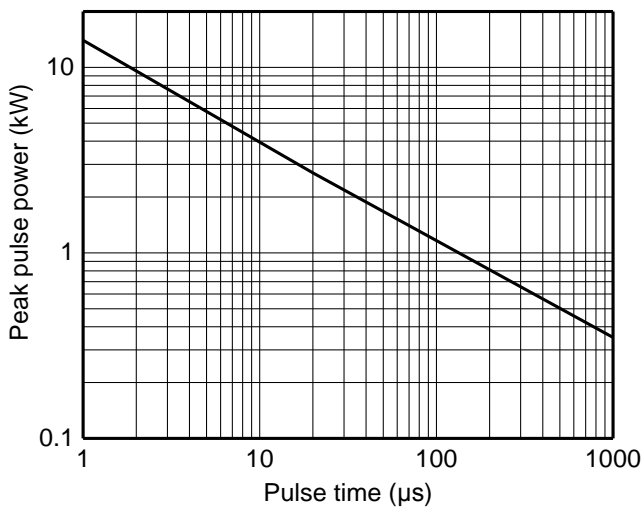
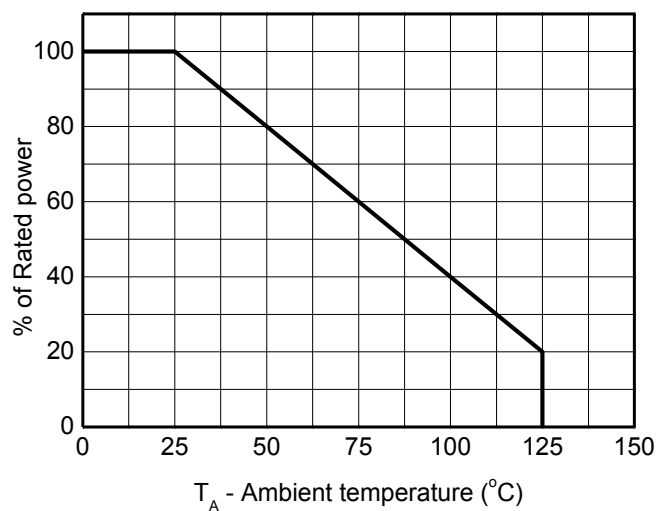
**Electrical characteristics ( $T_A = 25^{\circ}C$ , unless otherwise noted)**

**Definitions of electrical characteristics**

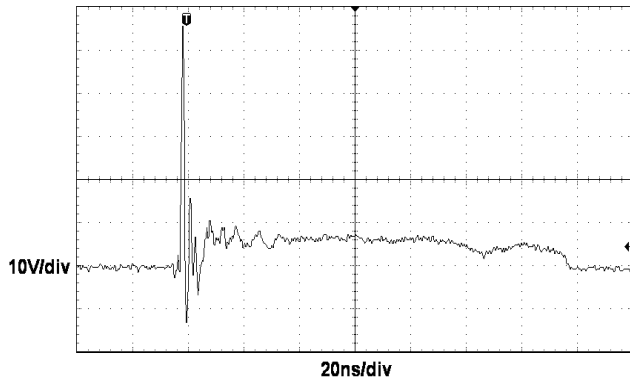
**Electrical characteristics ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)**

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse stand-off voltage	$V_{RWM}$				$\pm 4.5$	V
Reverse leakage current	$I_R$	$V_{RWM} = 4.5\text{V}$			1	$\mu\text{A}$
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 <sup>1)</sup>	$V_{CL}$	$V_{ESD} = 8\text{kV}$		7		V
Clamping voltage <sup>2)</sup>	$V_{CL}$	$I_{PP} = 16\text{A}$ , $t_p = 100\text{ns}$		6		V
Dynamic resistance <sup>2)</sup>	$R_{DYN}$			0.05		$\Omega$
Clamping voltage <sup>3)</sup>	$V_{CL}$	$I_{PP} = 1\text{A}$ , $t_p = 8/20\mu\text{s}$			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

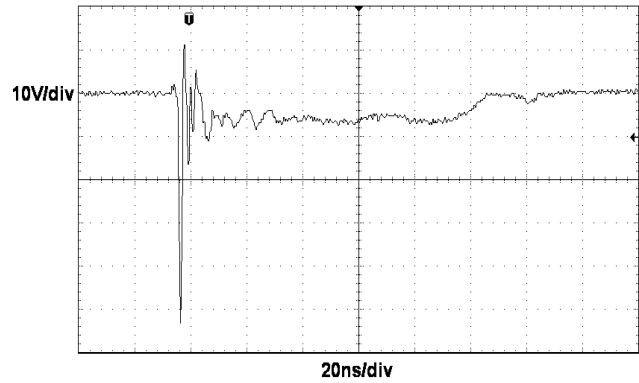
Notes:

- 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.

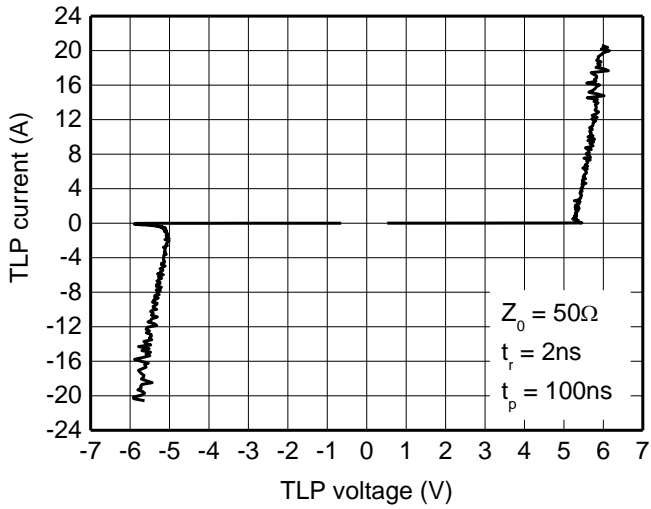
**Typical characteristics ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)**

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


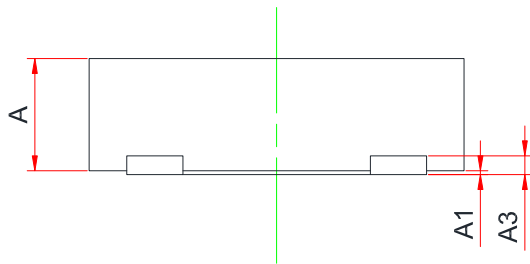
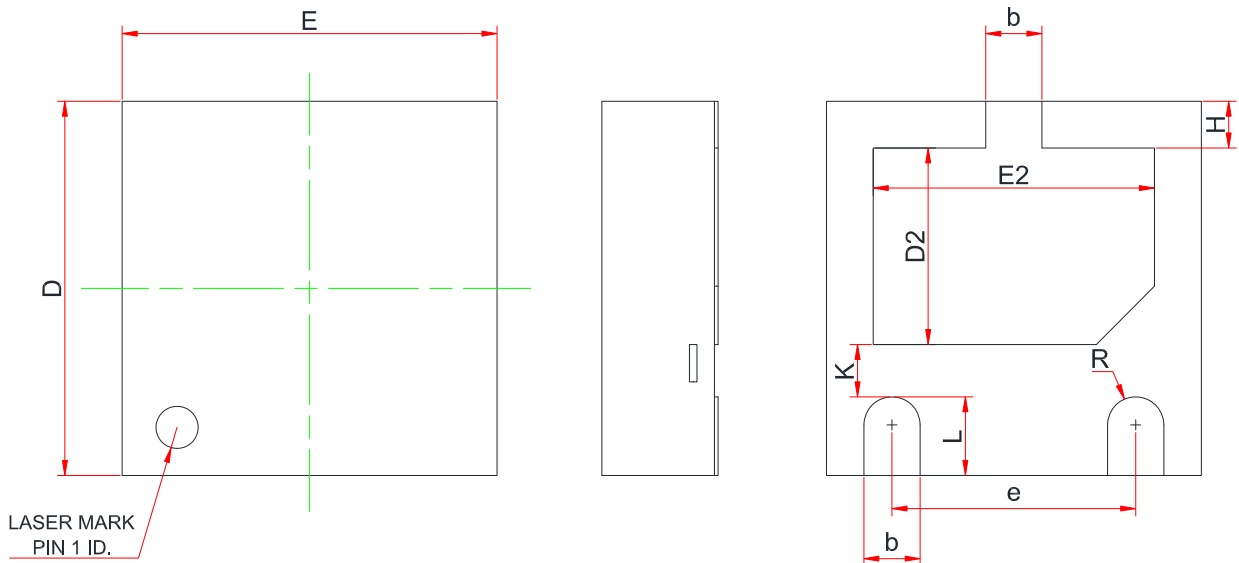
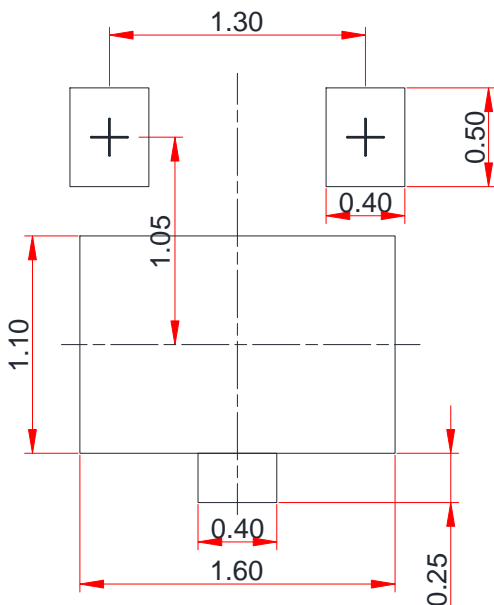
**ESD clamping**  
 (+8kV contact discharge per IEC61000-4-2)



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



**TLP Measurement**

**Package outline dimensions**
**DFN2.0x2.0-3L**

**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.