

**ESD9X5V**
**1-Line, Uni-directional, Transient Voltage Suppressor**
<http://www.sh-willsemi.com>
**Descriptions**

The ESD9X5V is a Uni-directional TVS (Transient Voltage Suppressor) designed to protect sensitive electronic components from damage due to ESD (Electrostatic Discharge), EFT (Electrical Fast Transients) and CDE (Cable Discharge Event). The ESD9X5V has been specifically designed to replace MLV (Multilayer Varistor) in portable application such as cellular handsets, notebook computers, tablets and PADs.

The ESD9X5V is based on solid-state silicon technology and offer unique electrical characteristics like lower clamping voltage and no device degrading compared to MLV.

The ESD9X5V may be used to provide ESD protection up to  $\pm 30\text{kV}$  (contact discharge) according to IEC61000-4-2, and withstand peak pulse current up to 11A (8/20 $\mu\text{s}$ ) according to IEC61000-4-5.

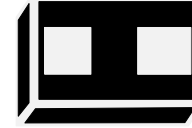
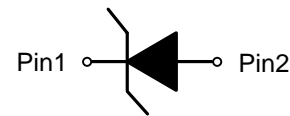
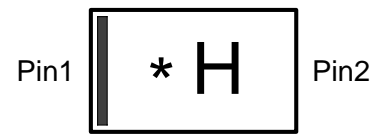
The ESD9X5V is available in FBP-02C package. Standard products are Pb-free and Halogen-free.

**Features**

- Stand-off voltage: 5V Max.
- Transient protection for each line according to IEC61000-4-2 (ESD):  $\pm 30\text{kV}$  (contact discharge) IEC61000-4-5 (surge): 11A (8/20 $\mu\text{s}$ )
- Capacitance:  $C_J = 60\text{pF}$  typ.
- Low clamping voltage
- Solid-state silicon technology

**Applications**

- Cellular handsets
- Tablets
- Computers and peripherals
- Notebooks
- Digital camera
- Other electronic equipment


**FBP-02C (Bottom view)**

**Circuit diagram**


\* = Month (A-Z)

H = Device code

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

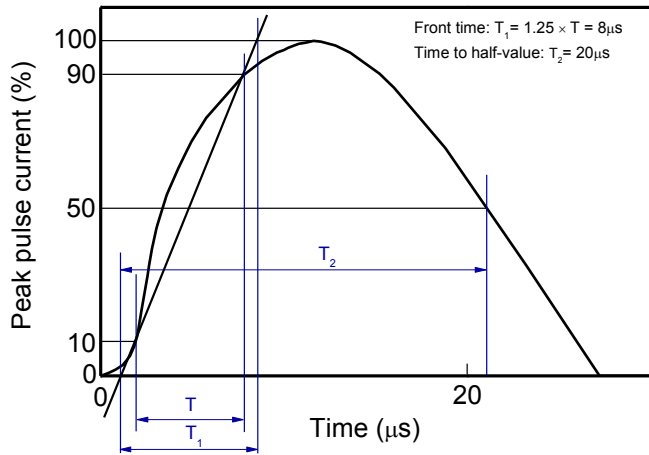
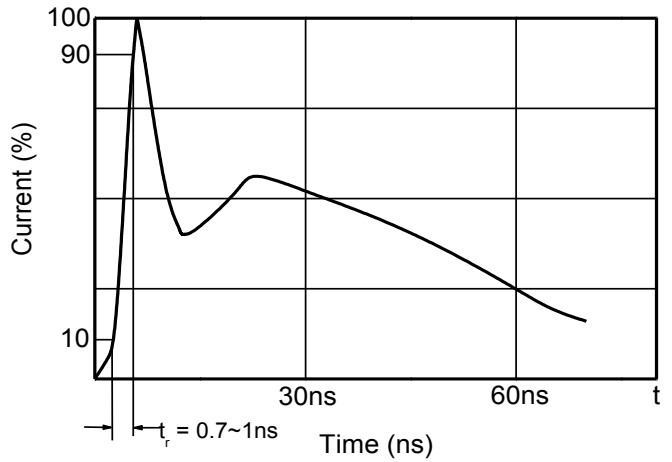
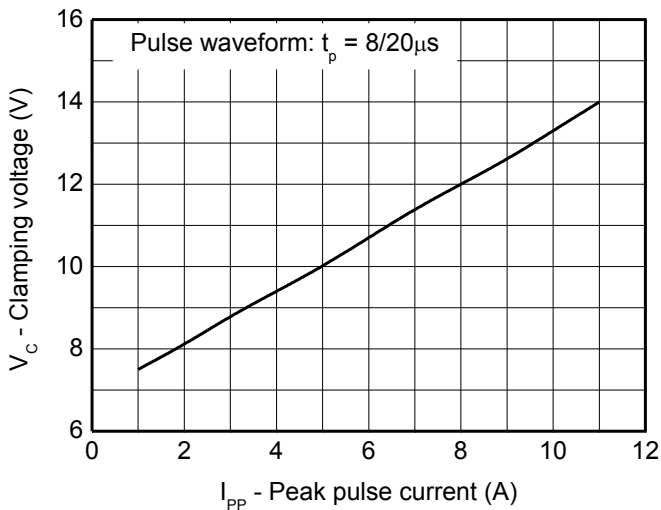
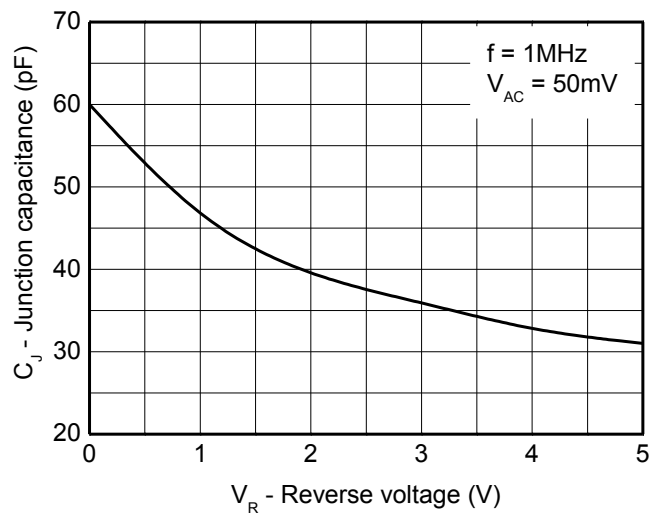
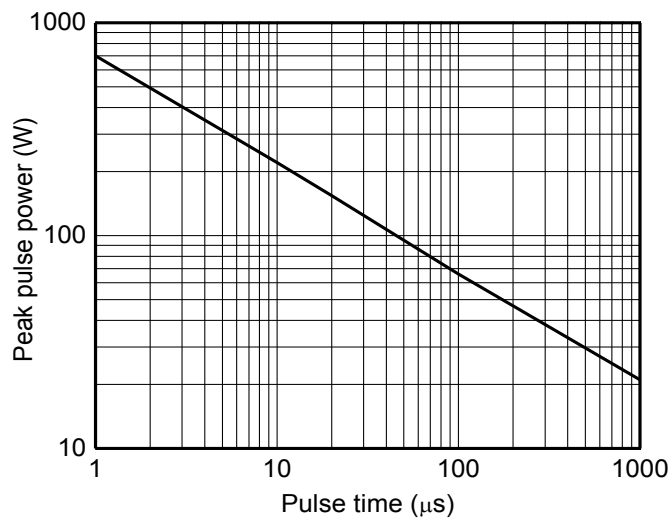
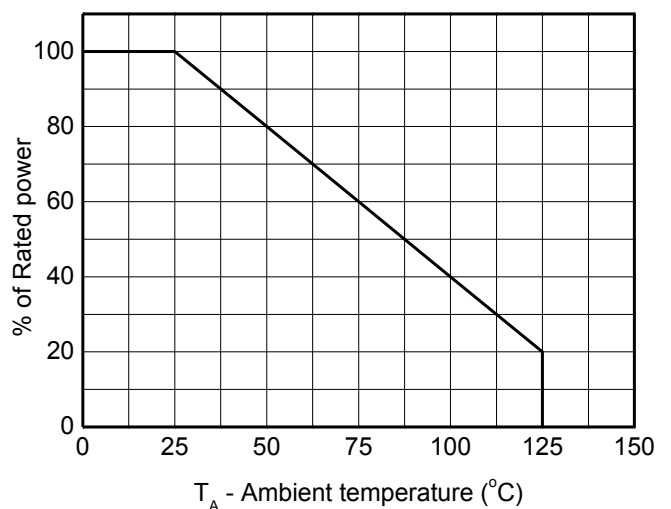
Device	Package	Shipping
ESD9X5V-2/TR	FBP-02C	10000/Tape&Reel

**Absolute maximum ratings**

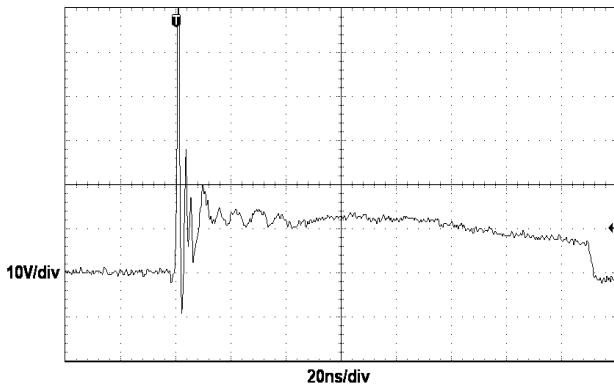
Parameter	Symbol	Rating	Unit
Peak pulse power ( $t_p = 8/20\mu s$ )	$P_{pk}$	154	W
Peak pulse current ( $t_p = 8/20\mu s$ )	$I_{PP}$	11	A
ESD according to IEC61000-4-2 air discharge	$V_{ESD}$	$\pm 30$	kV
ESD according to IEC61000-4-2 contact discharge		$\pm 30$	
Junction temperature	$T_J$	125	$^{\circ}C$
Operating temperature	$T_{OP}$	-40~85	$^{\circ}C$
Lead temperature	$T_L$	260	$^{\circ}C$
Storage temperature	$T_{STG}$	-55~150	$^{\circ}C$

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

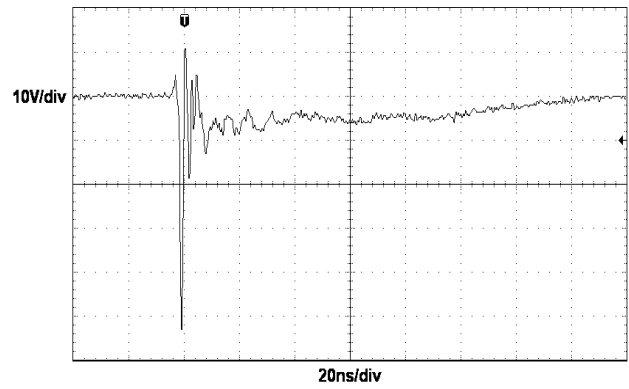
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse stand-off voltage	$V_{RWM}$				5.0	V
Reverse leakage current	$I_R$	$V_{RWM} = 5V$			1.0	$\mu A$
Reverse breakdown voltage	$V_{BR}$	$I_T = 1mA$	6.2	6.8	7.6	V
Forward voltage	$V_F$	$I_F = 1mA$	0.4	0.8	1.3	V
Clamping voltage	$V_{CL}$	$I_{PP} = 1A, t_p = 8/20\mu s$			7.5	V
		$I_{PP} = 11A, t_p = 8/20\mu s$			14	V
Junction capacitance	$C_J$	$V_R = 0V, f = 1MHz$		60	70	pF

**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**

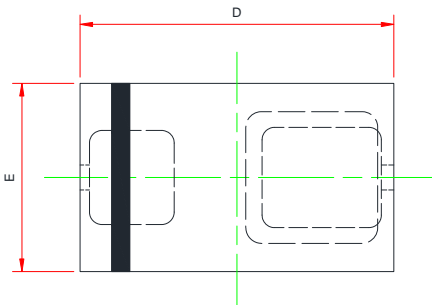
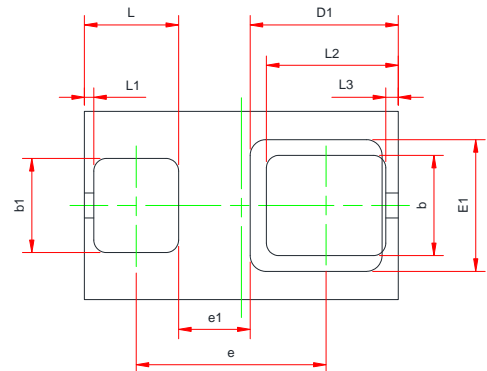
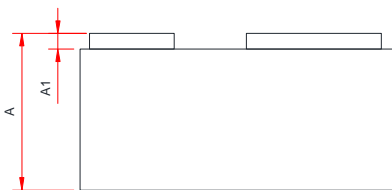
Typical characteristics ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)



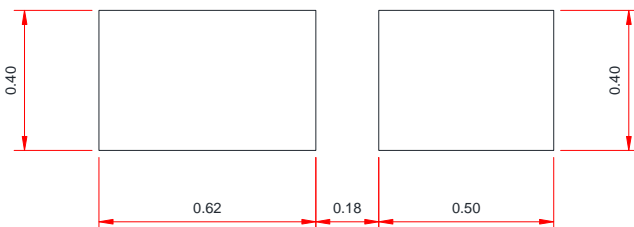
**ESD clamping**  
(+8kV contact discharge per IEC61000-4-2)



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

**Package outline dimensions**
**FBP-02C**

**Top View**

**Bottom View**

**Side View**

Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.450	0.500	0.550
A1	0.010	--	0.100
D	0.950	1.000	1.050
E	0.550	0.600	0.650
D1	0.470 Ref.		
E1	0.420 Ref.		
b	0.270	0.320	0.370
b1	0.250	0.300	0.350
e	0.555	0.605	0.655
e1	0.230 Ref.		
L	0.250	0.300	0.350
L1	0.030 Ref.		
L2	0.370	0.420	0.470
L3	0.040 Ref.		

**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.