

# Transient Voltage Suppressors for ESD Protection

Low Capacitance

## ESD52DE005M05-A

### Description

The ESD52DE005M05-A is designed to protect voltage sensitive components that require ultra-low capacitance from ESD and transient voltage events. Excellent clamping capability, low capacitance, low leakage, and fast response time, make these parts ideal for ESD protection on designs where board space is at a premium. Because of its low capacitance, it is suited for use in high frequency designs such as USB 2.0 high speed and antenna line applications.

### Feature

- u Ultra Low Capacitance 0.5 pF
- u Low Clamping Voltage
- u Small Body Outline Dimensions: 0.063"x0.032"(1.60 mm x 0.80 mm)
- u Low Body Height: 0.028" (0.7 mm)
- u Stand-off Voltage: 5 V
- u Low Leakage
- u Response Time is Typically < 1.0 ns
- u IEC61000-4-2 Level 4 ESD Protection
- u IEC61000-4-2 (ESD) ±15kV (air), ±10kV (contact)

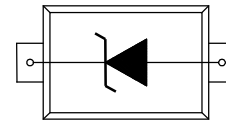
### Applications

- u Cellular phones
- u Portable devices
- u Digital cameras
- u Power supplies

SOD-523



### Functional Diagram



### Mechanical Characteristics

- u SOD-523 Package
- u Molding Compound Flammability Rating : UL 94V-0
- u Weight 2 Milligrams (Approximate)
- u Quantity Per Reel : 3,000pcs
- u Reel Size : 7 inch
- u Lead Finish : Lead Free

### Mechanical Characteristics

Symbol	Parameter	Value	Units
P <sub>D</sub>	Total Power Dissipation on FR-5 Board (Note 1) @ T <sub>A</sub> = 25°C	200	mW
T <sub>L</sub>	Lead Soldering Temperature	260 (10sec)	°C
T <sub>STG</sub>	Storage Temperature Range	-55 to +150	°C
T <sub>J</sub>	Maximum Junction Temperature	-55 to +125	°C
	IEC61000-4-2 (ESD)		
	Air Discharge	±15	KV
	Contact Discharge	±10	

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the recommended operating conditions is not implied. Extended exposure to stresses above the recommended operating conditions may affect device reliability.

1. FR-5 = 1.0 x 0.75 x 0.62 in.

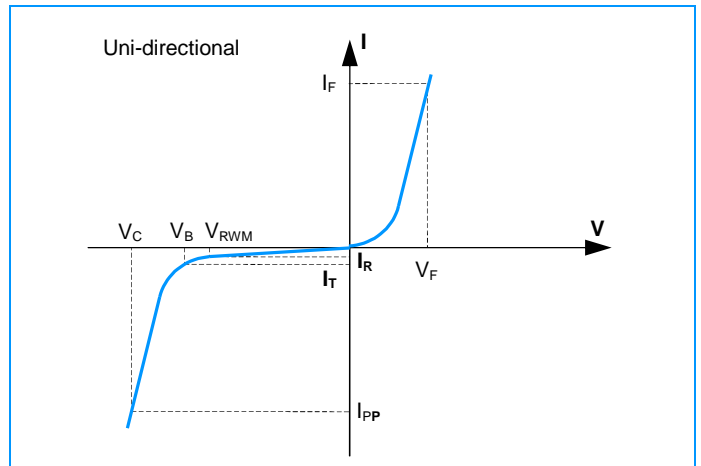
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### I-V Curve Characteristics

Symbol	Parameter
$I_{PP}$	Maximum Reverse Peak Pulse Current
$V_C$	Clamping Voltage @ $I_{PP}$
$V_{RWM}$	Working Peak Reverse Voltage
$I_R$	Maximum Reverse leakage Current @ $V_{RWM}$
$I_T$	Test Current
$V_B$	Breakdown Voltage @ $I_T$
$I_F$	Forward Current
$V_F$	Forward Voltage @ $I_F$
$P_{PK}$	Peak Power Dissipation
$C$	Max Capacitance @ $V_R=0V$ & $f=1MHz$



### Electrical Characteristics (Ratings at 25°C ambient temperature unless otherwise specified)

Part Number	Device Marking	$V_{RWM}$ (V) (Max.)	$V_B$ @ $I_T$ (V) (Note 2) (Min.)	$I_T$ (mA)	$V_C$ @ $I_{PP} = 1A$ (V) (Note 3) (Max.)	$I_R$ @ $V_{RWM}$ ( $\mu A$ ) (Max.)	C (pF)		$V_C$ Per IEC61000-4-2 (Note 4)
							Typ.	Max.	
ESD52DE005M05-A	5L	5.0	5.4	1.0	9.8	1.0	0.5	0.9	Fig1 and 2 See Below

- $V_B$  is measured with a pulse test current  $I_T$  at an ambient temperature of 25°C.
- Surge current waveform per Figure 5.
- For test procedure see Figures 3 and 4

### Characteristic Curves

Fig1. ESD Clamping Voltage Screenshot Positive 8 kV Contact per IEC61000-4-2

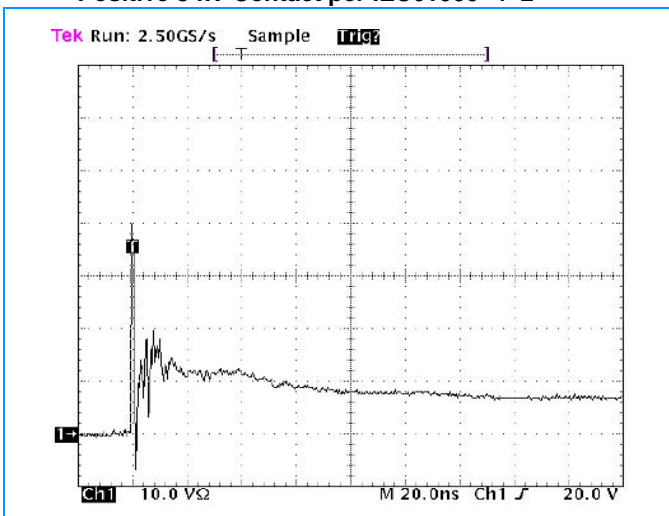
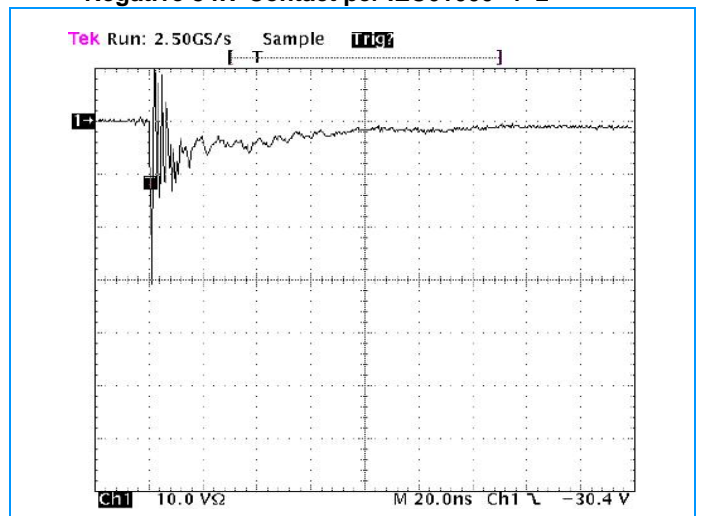


Fig2. ESD Clamping Voltage Screenshot Negative 8 kV Contact per IEC61000-4-2



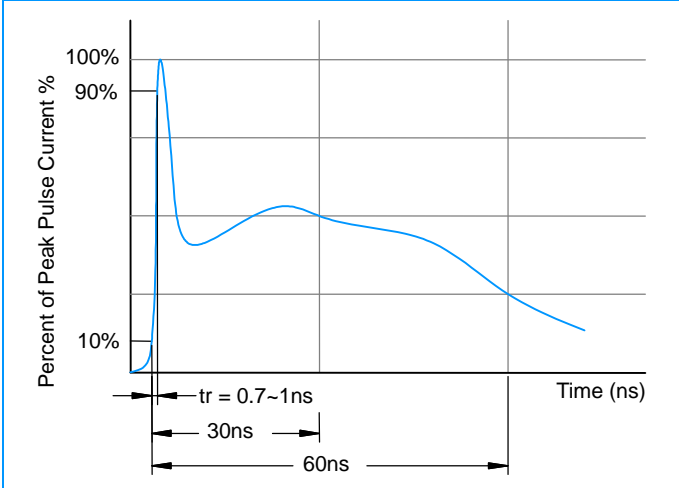
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## ESD52DE005M05-A

### Test Waveforms & Setup

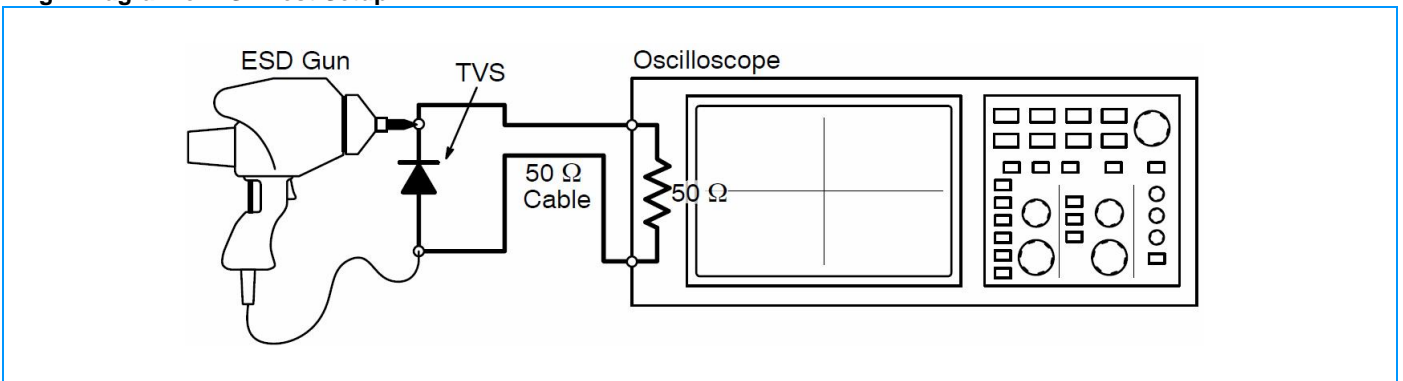
Fig3. ESD Pulse Waveform (according to IEC 61000-4-2)



IEC 61000-4-2 Spec.

Level	Test Voltage (kV)	First Peak Current (A)	Current at 30 ns (A)	Current at 60 ns (A)
1	2	7.5	4	2
2	4	15	8	4
3	6	22.5	12	6
4	8	30	16	8

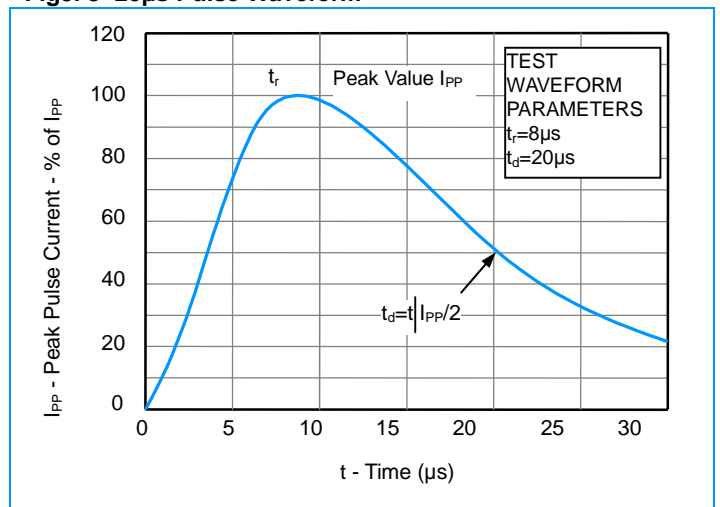
Fig4. Diagram of ESD Test Setup



### ESD Voltage Clamping

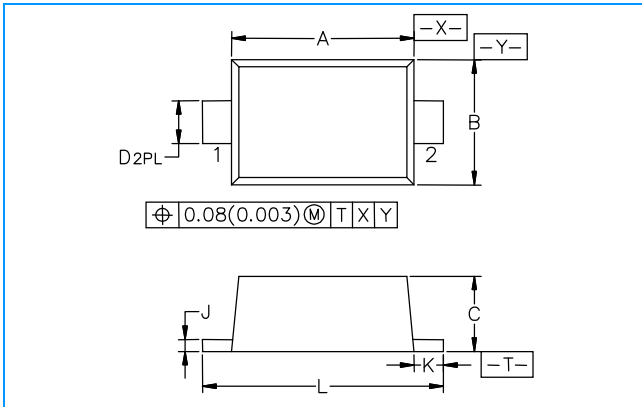
For sensitive circuit elements it is important to limit the voltage that an IC will be exposed to during an ESD event to as low a voltage as possible. The ESD clamping voltage is the voltage drop across the ESD protection diode during an ESD event per the IEC61000-4-2 waveform. Since the IEC61000-4-2 was written as a pass/fail spec for larger systems such as cell phones or laptop computers it is not clearly defined in the spec how to specify a clamping voltage at the device level.

Fig5. 8x20µs Pulse Waveform

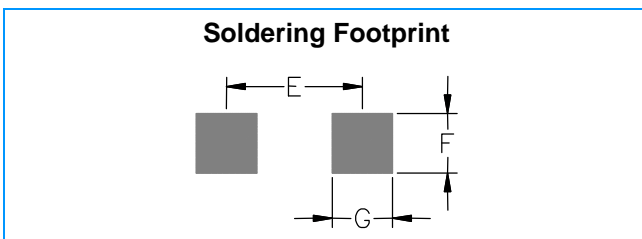


## ESD52DE005M05-A

### SOD-523 Package Outline & Dimensions



Symbol	Millimeters			Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	1.10	1.20	1.30	0.043	0.047	0.051
B	0.70	0.80	0.90	0.028	0.032	0.035
C	0.50	0.60	0.70	0.020	0.024	0.028
D	0.25	0.30	0.35	0.010	0.012	0.014
J	0.07	0.14	0.20	0.0028	0.0055	0.0079
K	0.15	0.20	0.25	0.006	0.008	0.010
L	1.50	1.60	1.70	0.059	0.063	0.067



Symbol	Millimeters	Inches
E	1.40	0.0547
F	0.40	0.0157
G	0.40	0.0157