ESD7M5.0DT5G

Transient Voltage Suppressors

ESD Protection Diodes with Ultra-Low Capacitance

The ESD7M5.0DT5G is designed to protect voltage sensitive components from damage due to ESD in applications that require ultra low capacitance to preserve signal integrity. Excellent clamping capability, low leakage and fast response time are combined with an ultra low diode capacitance of 2.5 pF to provide best in class protection from IC damage due to ESD. The ultra small SOT-723 package is ideal for designs where board space is at a premium. The ESD7M5.0DT5G can be used to protect two uni-directional lines or one bi-directional line. When used to protect one bi-directional line, the effective capacitance is 1.25 pF. Because of its low capacitance, it is well suited for protecting high frequency signal lines such as USB2.0 high speed and antenna line applications.

Specification Features:

- Low Capacitance 2.5 pF Max
- Low Clamping Voltage
- Small Body Outline Dimensions: 0.047" x 0.047" (1.20 mm x 1.20 mm)
- Low Body Height: 0.020" (0.5 mm)
- Stand-off Voltage: 5 V
- Low Leakage
- Response Time is Typically < 1.0 ns
- IEC61000-4-2 Level 4 ESD Protection
- This is a Pb–Free Device

Mechanical Characteristics:

CASE: Void-free, transfer-molded, thermosetting plastic Epoxy Meets UL 94 V–0 LEAD FINISH: 100% Matte Sn (Tin) MOUNTING POSITION: Any QUALIFIED MAX REFLOW TEMPERATURE: 260°C Device Meets MSL 1 Requirements

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
IEC 61000–4–2 (ESD) Contact		±10	kV
Total Power Dissipation on FR–5 Board (Note 1) @ T _A = 25°C	P _D	150	mW
Storage Temperature Range	T _{stg}	–55 to +150	°C
Junction Temperature Range	TJ	-55 to +125	°C
Lead Solder Temperature – Maximum (10 Second Duration)	ΤL	260	°C

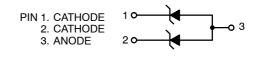
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability. 1. FR-5 = $1.0 \times 0.75 \times 0.62$ in.

See Application Note AND8308/D for further description of survivability specs.



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SOT-723 CASE 631AA

MARKING DIAGRAM



XX = Specific Device Code M = Date Code

ORDERING INFORMATION

Device	Package	Shipping [†]		
ESD7M5.0DT5G	SOT-723 (Pb-Free)	8000/Tape & Reel		

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

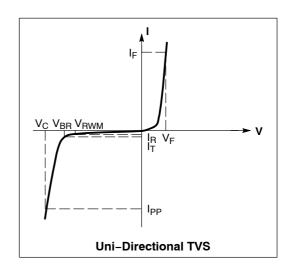
DEVICE MARKING INFORMATION

See specific marking information in the device marking column of the Electrical Characteristics tables starting on page 2 of this data sheet.

ELECTRICAL CHARACTERISTICS

(T_A = 25° C unless otherwise noted)

Symbol	Parameter				
I _{PP}	Maximum Reverse Peak Pulse Current				
V _C	Clamping Voltage @ IPP				
V _{RWM} Working Peak Reverse Voltage					
I _R	Maximum Reverse Leakage Current @ V_{RWM}				
V _{BR}	Breakdown Voltage @ I _T				
Ι _Τ	Test Current				
١ _F	Forward Current				
V _F	Forward Voltage @ I _F				
P _{pk}	Peak Power Dissipation				
С	Capacitance @ $V_R = 0$ and f = 1.0 MHz				



ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, V_F = 1.1 V Max. @ I_F = 10 mA for all types)

		V _{RWM} (V)	I _R (μΑ) @ V _{RWM}	V _{BR} (V) @ I _T (Note 2)	ŀŢ	C (pF), uni-directional (Note 3)	C (pF), bi-directional (Note 4)	V _C (V) @ I _{PP} = 1 A (Note 5)	v _c
Device	Device Marking	Max	Max	Min	mA	Max	Max	Max	Per IEC61000- 4-2 (Note 6)
ESD7M5.0DT5G	L7	5.0	1.0	5.4	1.0	2.5	1.25	10.4	Figures 1 and 2

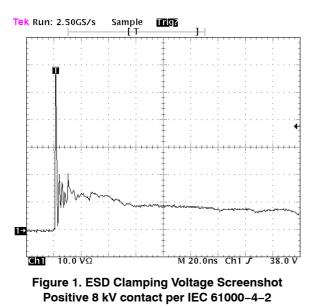
2. V_{BR} is measured with a pulse test current I_T at an ambient temperature of 25°C.

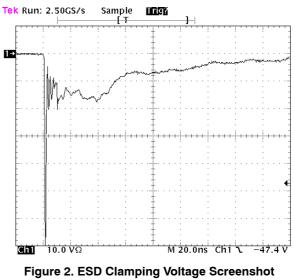
3. Uni-directional capacitance at f = 1 MHz, $V_R = 0 V$, $T_A = 25^{\circ}C$ (pin1 to pin 3; pin 2 to pin 3).

4. Bi-directional capacitance at f = 1 MHz, $V_R = 0 V$, $T_A = 25^{\circ}C$ (pin1 to pin 2).

5. Surge current waveform per Figure 5.

6. For test procedure see Figures 3 and 4 and Application Note AND8307/D.





Negative 8 kV contact per IEC 61000-4-2

ESD7M5.0DT5G

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	

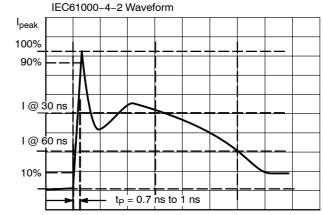


Figure 3. IEC61000-4-2 Spec

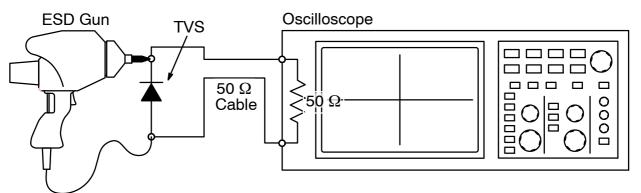


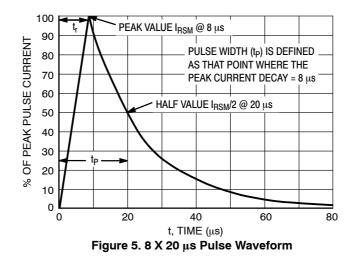
Figure 4. Diagram of ESD Test Setup

The following is taken from Application Note AND8308/D – Interpretation of Datasheet Parameters for ESD Devices.

ESD Voltage Clamping

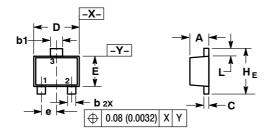
For sensitive circuit elements it is important to limit the voltage that an IC will be exposed to during an ESD event to as low a voltage as possible. The ESD clamping voltage is the voltage drop across the ESD protection diode during an ESD event per the IEC61000–4–2 waveform. Since the IEC61000–4–2 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. ON Semiconductor has developed a way to examine the entire voltage waveform across the ESD protection diode over the time domain of an ESD pulse in the form of an oscilloscope screenshot, which can be found on the datasheets for all ESD protection diodes. For more information on how ON Semiconductor creates these screenshots and how to interpret them please refer to AND8307/D.



PACKAGE DIMENSIONS

SOT-723 CASE 631AA-01 **ISSUE C**

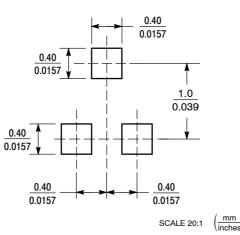


NOTES

- 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982. CONTROLLING DIMENSION: MILLIMETERS.
- 2 З.
- MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
- DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. 4

	MILLIMETERS			INCHES			
DIM	MIN	NOM	MAX	MIN	NOM	MAX	
Α	0.45	0.50	0.55	0.018	0.020	0.022	
b	0.15	0.21	0.27	0.0059	0.0083	0.0106	
b1	0.25	0.31	0.37	0.010	0.012	0.015	
С	0.07	0.12	0.17	0.0028	0.0047	0.0067	
D	1.15	1.20	1.25	0.045	0.047	0.049	
Е	0.75	0.80	0.85	0.03	0.032	0.034	
е	0.40 BSC			0	.016 BS	С	
ΗE	1.15	1.20	1.25	0.045	0.047	0.049	
L	0.15	0.20	0.25	0.0059	0.0079	0.0098	

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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