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AND9110/D

ON Semiconductor's ESD 0201 Package Series

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APPLICATION NOTE

Introduction

ON Semiconductor's 0.6 × 0.3 mm DSN and DFN (Dual Silicon No-lead) two pin package represents the latest in extremely small surface mount packaging technology − is approximately 70% smaller than prior-generation devices, offering designers flexibility in PCB space-constrained applications.

Key Features

- Industry Leading Capacitance Linearity Over Voltage
- Ultra-Low Capacitance: down to 0.2 pF
- Insertion Loss: 0.030 dBm
- 0201 Package: 0.60 × 0.30 mm
- Low Leakage: < 1 nA
- Low Dynamic Resistance: < 1 Ω
- IEC61000−4−2 Level 4 ESD Protection
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- Mobile Phones and Portable Electronics
- High-Speed Data Lines (Low Capacitance and Dynamic Resistance)
- Low-Voltage Antenna Ports (Bidirectional 0201)
- USB 2.0/3.0, HDMI 1.3/1.4, and Display Port, Low Voltage VBUS Line
- Applications Requiring high ESD Performance in a Ultra Small Package

Package Overview

This small package outline provides a component option that can be added to a design with minimal impact to the overall PCB area budget enhancing the ease of layout in space constrained applications. A finished package is shown in Figure 1. Figure 2 is shown package dimension.

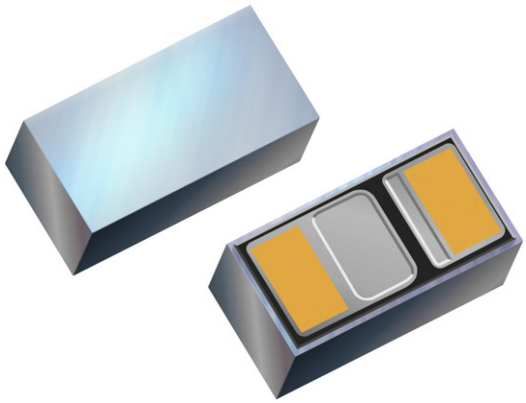
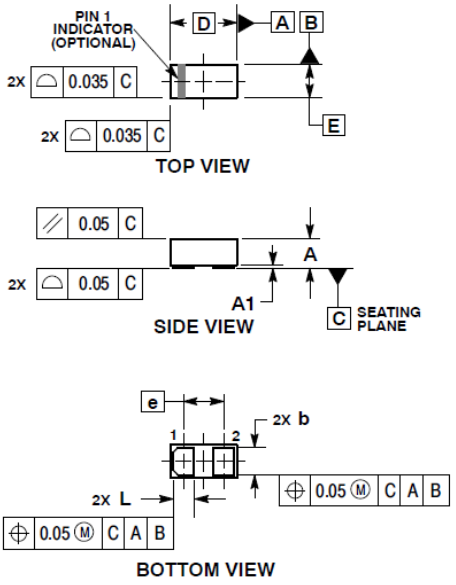


Figure 1. 0.60 mm x 0.30 mm Two Pin No-Lead Package



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.

	MILLIMETERS	
DIM	MIN	MAX
A	0.25	0.33
A1	---	0.05
b	0.22	0.28
D	0.62 BSC	
E	0.32 BSC	
e	0.355 BSC	
L	0.17	0.23

Figure 2. Package Dimensions

ELECTRICAL CHARACTERISTICS

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 @ VRWM
V_{BR}	Breakdown Voltage @ IT
I_T	Test Current

*See Application Note AND8308/D for detailed explanations of datasheet parameters.

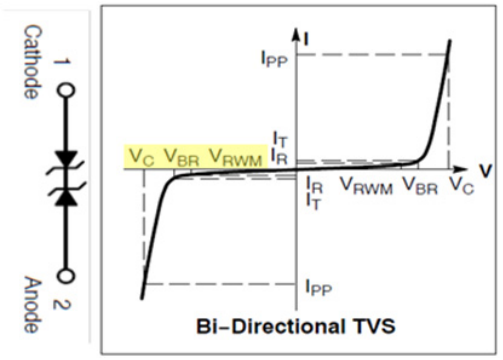


Figure 3.

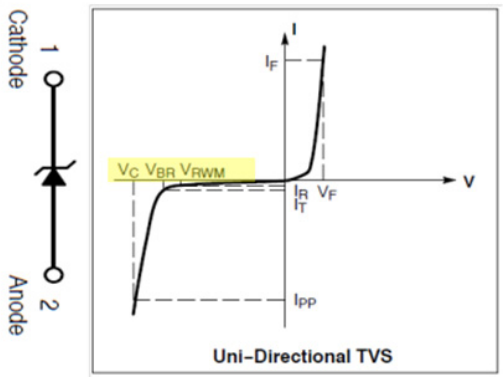


Figure 4.

Design Applications

As shown in Table 1, ESD8472MUT5G/ ESD7481MUT5G devices are a bi-directional and ultra-low capacitance from to 0.25 down to 0.20 picofarad (pF) these devices are suited for protecting very-high-speed data lines, such as USB 2.0, USB 3.0 and HDMI, or low-voltage antenna ports. The device's ultra-low capacitance, low insertion loss (< 0.05 dB up to 8.5 GHz), and high linearity of capacitance vs. frequency helps minimize signal degradation. A typical application USB 2.0 configuration is shown in Figure 5 with ESD7381.

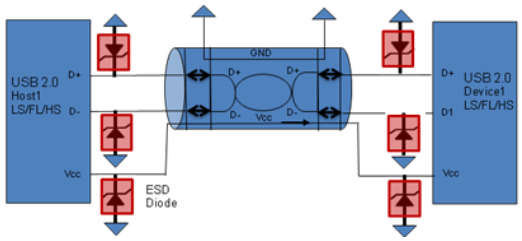


Figure 5. A Typical Application USB 2.0 Configuration with ESD7381 (uni-direction)

The ESD7481MUT5G is designed for ESD protection of low to medium power antenna systems. The parts are bidirectional characteristics enable it to handle AC coupled signals without clipping or distorting the RF signal, expanding its range of applications. With only 0.25 pF capacitance it enables high RF signal integrity with a maximum of ESD protection without signal degradation effects, Figure 6 show a typical antenna application, either ESD8472 or ESD7481 can be designed in.

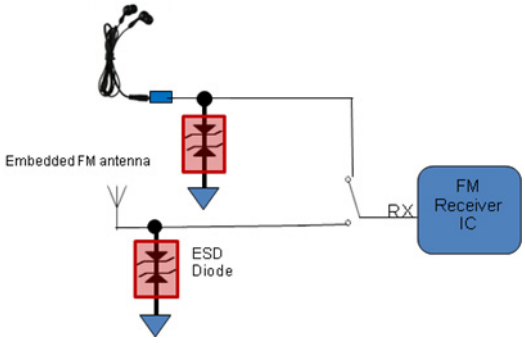


Figure 6. A Typical Application Antenna/FM Configuration with ESD7481

ESD11B5.OST5G and ESD5482MUT5G ESD diodes are designed to reduce ESD strikes with low clamping voltage and fast recovering to normal state and without signal degradation. These devices are suited for implementation in applications with signals having voltage ranges up to +5.3 V or +3.3 V making them appropriate for most audio signals, and with low leakage current to provide system power saving. Figure 7 is shown a typical design application.

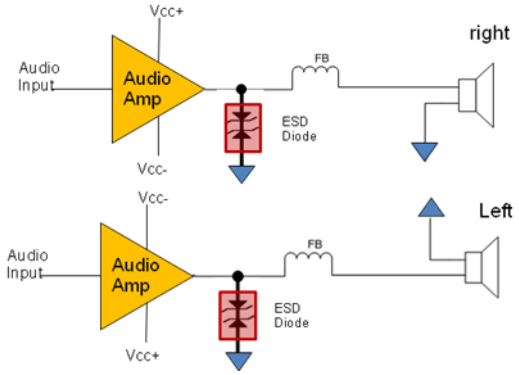


Figure 7. A typical Application Audio/Speaker Configuration with ESD11B5.OST5G or ESD5482MUT5G

The ESD5482/ESD5484 and ESD5381 ranging from 5 pF up to 35 pF devices are higher-capacitance bidirectional devices that can be used for low-speed generic interfaces such as keypads, power buttons, Vbus line and microphone ports in portable electronics. These devices offer ±30 kV contact discharge protection per the IEC61000−4−2, level 4 standard, while the ESD5381 device offers ±8 kV per the IEC61000−4−2, level 4 standard.

Conclusions

The 0201 package offers a 70% board space reduction from the popular 0402 outline. ON Semiconductor's 0201 ESD offers a wide range of applications with ultra-low capacitance of 0.20 pF for high speed USB 2.0/3.0, HDMI, MIPI interfaces, to higher-capacitance bidirectional devices that can be used for low-speed generic interfaces such as keypads, power buttons, Vbus line and microphone ports in portable electronics.

Table 1. ON SEMICONDUCTOR ESD 0201 PACKAGE SERIES

ON Semiconductor TVS Part Number	0201 Package (Size, mm)	Directional	ch #	IR Max (μA)	VRWM Max (V)	VBR Min (V)	Cj Typ (pF)
ESD11N5.0ST5G	DSN (0.6 × 0.3)	bi	1	1.0	5.0	5.8	0.60
ESD11B5.0ST5G	DSN (0.6 × 0.3)	bi	1	1.0	5.0	5.8	12.00
ESD5481MUT5G	DFN (0.6 × 0.3)	bi	1	1.0	5.0	6.0	12.00
CM1242−07CP	2−CSP (0.6 × 0.3)	bi	1	0.1	5.0	6.0	5.80
CM1242−33CP	2−CSP (0.6 × 0.3)	bi	1	0.5	5.0	6.0	55.00
ESD5484FCT5G	2−CSP (0.6 × 0.3)	bi	1	1.0	5.0	6.0	35.00
ESD5381MUT5G	DSN (0.6 × 0.3)	uni	1	1.0	3.0	6.0	12.00
ESD5382MUT5G	DSN (0.6 × 0.3)	uni	1	1.0	3.0	14.2	5.2
ESD7381MUT5G	DFN (0.6 × 0.3)	uni	1	1.0	3.3	5.0	0.37
ESD7481MUT5G	DFN (0.6 × 0.3)	bi	1	1.0	5.0	6.0	0.25
ESD8472MUT5G	DSN (0.6 × 0.3)	bi	1	1.0	5.3	7.0	0.20
ESD5483MUT5G	DSN (0.6 × 0.3)	bi	1	1.0	3.3	8.0	10.00
ESD5482MUT5G	DFN (0.6 × 0.3)	bi	1	1.0	3.3	5.0	5.00

1. Electrostatic discharge, contact discharge as per IEC61000−4−2.
2. Surge, according to IEC61000−4−5 (8/20 μs).

Reference

[1] AND9107/D − Guidelines for SMT Assembly of 0201 Package

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
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