

Ultra-Low Capacitance ESD Protection Diodes

Micro-Packaged Diodes for ESD Protection

ESDL3552/ESDL3552A

The ESDL3552 and ESDL3552A are designed to protect voltage sensitive components that require ultra-low capacitance from ESD and transient voltage events. Excellent clamping capability, low capacitance, high breakdown voltage, high linearity, low leakage, and fast response time make these parts ideal for ESD protection on designs where board space is at a premium. It has industry leading capacitance linearity over voltage making it ideal for high-speed data line protection applications.

Features

- Industry Leading Capacitance Linearity Over Voltage
- Ultra-Low Capacitance: 0.25 pF
- Insertion Loss: 0.26 dB @ 5 GHz
- 0201 Isolated DSN Package: 0.62 mm x 0.32 mm
- Stand-off Voltage: 5.0 V
- Low Leakage: < 50 nA
- Low Dynamic Resistance: < 1.0 Ω
- These Devices are Pb-Free, Halogen-Free/BFR-Free and are RoHS Compliant

Typical Applications

- High Speed Data Line Protection
- USB 2.0, USB 3.0, USB 3.1

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
IEC 61000-4-2 Level 4 (Contact) (Note 1) IEC 61000-4-2 Level 4 (Air) (Note 1)	ESD	±20 ±20	kV
Maximum Peak Pulse Current IEC 61000-4-5 8/20 μs (Lightning) (Note 2)	I _{PP}	2.0	A
Total Power Dissipation (Note 3) @ T _A = 25°C Thermal Resistance, Junction-to-Ambient	P _D R _{θJA}	300 400	mW °C/W
Junction and Storage Temperature Range	T _J , T _{stg}	-55 to +150	°C
Lead Solder Temperature - Maximum (10 Second Duration)	T _L	260	°C

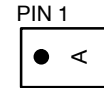
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Non-repetitive current pulse at T_A = 25°C, per IEC61000-4-2 waveform.
2. Non-repetitive current pulse at T_A = 25°C, per IEC61000-4-5 waveform.
3. Mounted with recommended minimum pad size, DC board FR-4



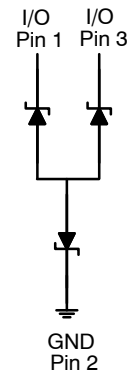
X4DFN3
CASE 718AB

MARKING DIAGRAM



A = Specific Device Code

ESDL3552 and ESDL3552A have the same marking



ORDERING INFORMATION

Device	Package	Shipping†
ESDL3552PFCT5G ESDL3552APFCT5G	X4DFN3 (Pb-Free/ Halide Free)	10000 / 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](#).

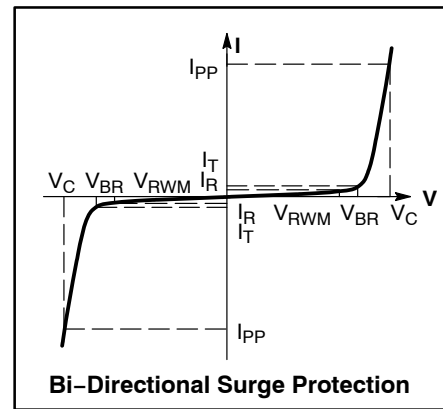
ESDL3552/ESDL3552A

ELECTRICAL CHARACTERISTICS

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

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

*See Application Note [AND8308/D](#) for detailed explanations of datasheet parameters.



ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Reverse Working Voltage	V_{RWM}	Between any two pins (-40°C to $+85^\circ\text{C}$)			5.0	V
Breakdown Voltage	V_{BR}	$I_T = 10\text{ mA}$, Between any two pins (-40°C to $+85^\circ\text{C}$)	6.5	10.2	11.5	V
		$I_T = 1\text{ mA}$, Between any two pins	7.0	9.3	11	
Reverse Leakage Current	I_R	$V_{RWM} = 5.0\text{ V}$, $T_A = 25^\circ\text{C}$		0.001	0.05	μA
		$V_{RWM} = 5.0\text{ V}$, $T_A = 85^\circ\text{C}$		0.001	0.25	μA
Clamping Voltage TLP	V_C	$I_{PP} = 4\text{ A}$ } IEC 61000-4-2 Level 1 equivalent ($\pm 2\text{ kV}$ Contact, $\pm 4\text{ kV}$ Air) Pin 1 to Pin 2, Pin 3 to Pin 2		14.5		V
		$I_{PP} = 16\text{ A}$ } IEC 61000-4-2 Level 4 equivalent ($\pm 8\text{ kV}$ Contact, $\pm 16\text{ kV}$ Air) Pin 1 to Pin 2, Pin 3 to Pin 2		21.5		V
Reverse Peak Pulse Current	I_{PP}	IEC61000-4-5 (8x20 μs), Between any two pins	2.0	3.0		A
Clamping Voltage (8x20 μs)	V_C	$I_{PP} = 2\text{ A}$		14	18	V
Dynamic Resistance	R_{DYN}	100 ns TLP, Pin 1 to Pin 2, Pin 3 to Pin 2		0.58		Ω
Junction Capacitance	C_J	$V_R = 0\text{ V}$, $f = 1\text{ MHz}$, Between any two pins		0.25	0.30	pF
Capacitance Linearity	C_Δ	$V_R = 0\text{ V}$ to 5 V , $f = 1\text{ MHz}$		0.03		pF
Insertion Loss	I_L	$f = 2.5\text{ GHz}$		0.16		dB
		$f = 5.0\text{ GHz}$		0.26		
		$f = 10.0\text{ GHz}$		0.41		

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

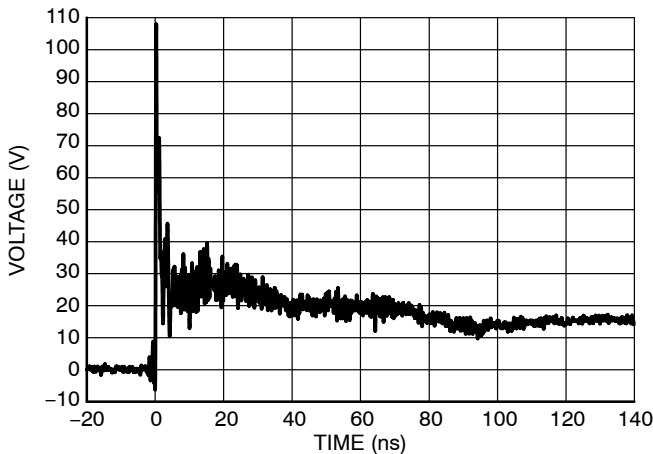


Figure 1. ESD Clamping Voltage Screenshot Positive 8 kV Contact per IEC61000-4-2

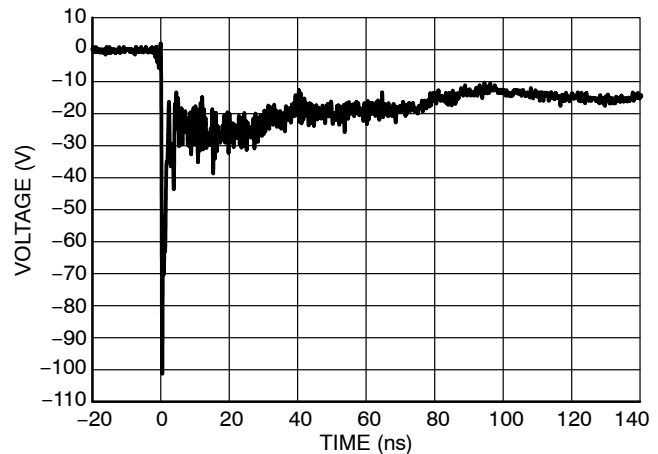


Figure 2. ESD Clamping Voltage Screenshot Negative 8 kV Contact per IEC61000-4-2

TYPICAL CHARACTERISTICS

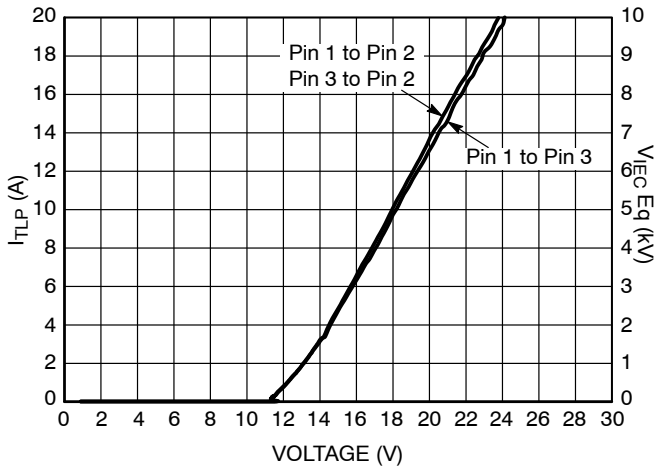


Figure 3. Positive TLP I-V Curve

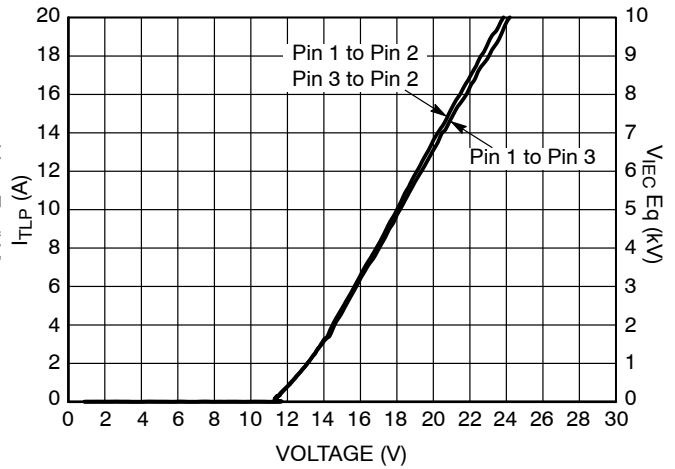


Figure 4. Negative TLP I-V Curve

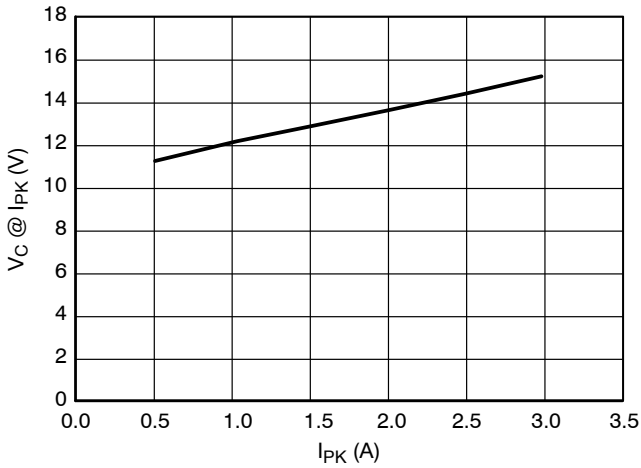


Figure 5. Positive Clamping Voltage vs. Peak Pulse Current ($t_p = 8/20 \mu s$)

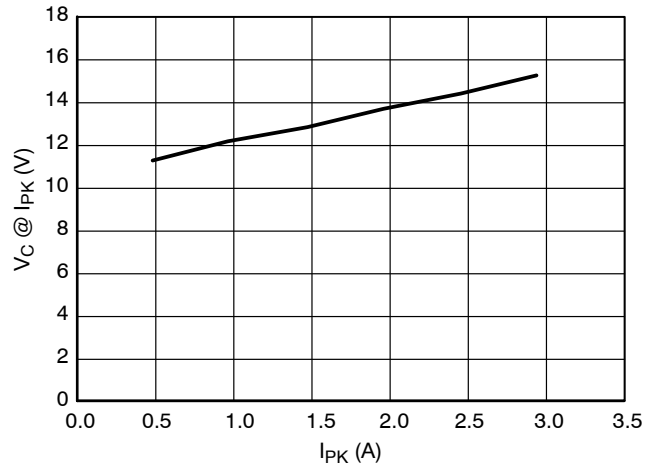


Figure 6. Negative Clamping Voltage vs. Peak Pulse Current ($t_p = 8/20 \mu s$)

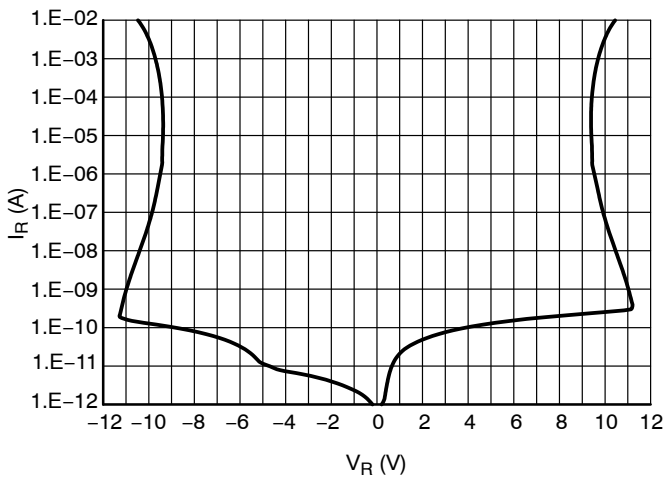


Figure 7. Breakdown Voltage

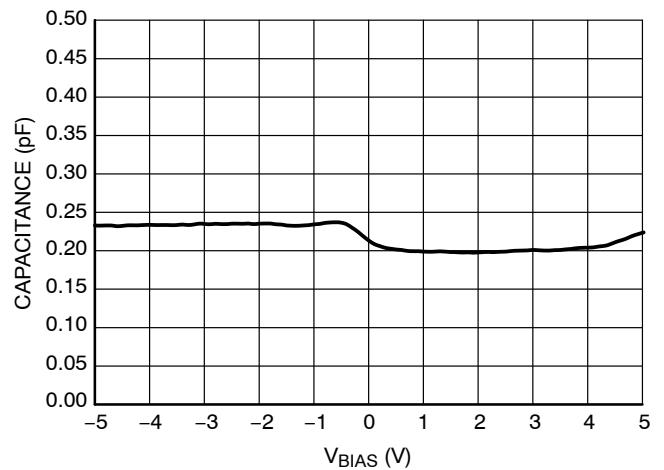


Figure 8. Line Capacitance, $f = 1 \text{ MHz}$

ESDL3552/ESDL3552A

TYPICAL CHARACTERISTICS

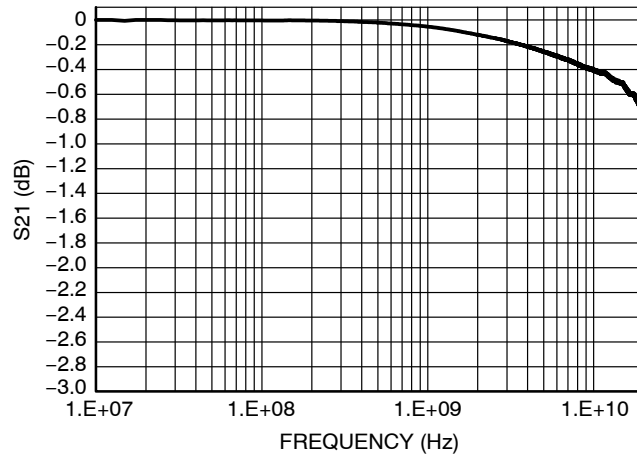
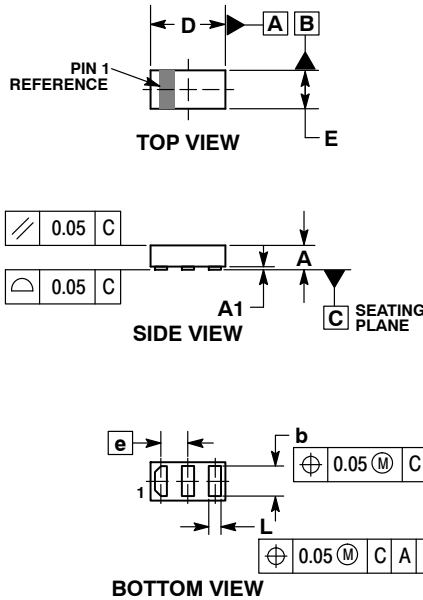


Figure 9. Insertion Loss

ESDL3552/ESDL3552A

PACKAGE DIMENSIONS

X4DFN3 0.62x0.32, 0.225P
CASE 718AB
ISSUE A

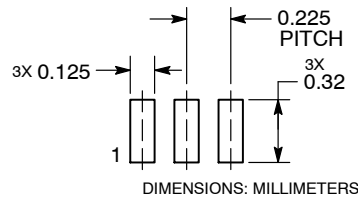


NOTES:

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

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.175	0.20	0.225
A1	0.000	0.015	0.030
b	0.23	0.25	0.27
D	0.595	0.620	0.645
E	0.295	0.320	0.345
e	0.225 BSC		
L	0.08	0.10	0.12

RECOMMENDED MOUNTING FOOTPRINT*



See Application Note [AND8398/D](#) for more mounting details
*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, [SOLDDERM/D](#).

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