

TVS Diodes

Transient Voltage Suppressor Diodes

BGF120A

Dual Channel Ultra-Low Capacitance ESD Diode

Datasheet

Rev. 1.4, 2012-09-17
Final

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Revision History Rev.1.3, 2012-08-01

Page or Item	Subjects (major changes since previous revision)
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Rev. 1.4, 2012-09-17

12	Package outline updated

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Last Trademarks Update 2011-11-11

2 Electrical Characteristics

Table 2-1 Maximum Ratings $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Operating temperature range	T_{OP}	-40	-	+125	$^\circ\text{C}$	
Storage temperature range	T_{STG}	-65	-	+150	$^\circ\text{C}$	
Contact discharge ¹⁾	V_{ESD}	-	-	18	kV	

1) V_{ESD} according to IEC61000-4-2

Attention: Stresses above the max. values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the integrated circuit.

Table 2-2 DC Electrical Characteristics $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Reverse working voltage	V_{RWM}	-	-	5.3	V	
Breakdown voltage	V_{BR}	6	-	-	V	$I_{BR} = 1\text{ mA}$
Reverse current	I_R	-	<1	50	nA	$V_R = 5.3\text{ V}$

Table 2-3 DC Electrical Characteristics $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Line capacitance ¹⁾ A1 or A2 to B1/B2 A1 to A2, B1/B2 n.c.	C_L	- -	- -	1.5 0.75	pF	$V_R = 0\text{ V}, f = 1\text{ MHz}$
Series inductance per diode	L_S	-	0.25	-	nH	

1) Total capacitance line to ground

Table 2-4 ESD Characteristics at $T_A = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Reverse clamping voltage ¹⁾ A1 or A2 vs B1, B2 A1 or A2 vs B1, B2	V_{CL}	-	22	-	V	$I_{TLP} = 16\text{ A}$,
		-	31	-		$I_{TLP} = 30\text{ A}$,
Forward clamping voltage ¹⁾ A1 or A2 vs B1, B2 A1 or A2 vs B1, B2	V_{FC}	-	-14	-	V	$I_{TLP} = -16\text{ A}$,
		-	-20	-		$I_{TLP} = -30\text{ A}$,
Dynamic resistance ¹⁾ positive pulse A1 or A2 vs. B1, B2 negative pulse A1 or A2 vs B1, B2	R_{DYN}	-	0.7	-	Ω	
		-	0.5	-		

1) ANSI/ESD STM5.5.1 - Electrostatic Discharge Sensitive Testing using Transmission Line Pulse (TLP) Model. TLP conditions: $Z_0 = 50\ \Omega$, $t_p = 100\text{ ns}$, $t_r = 0.6\text{ ns}$, I_{TLP} and V_{TLP} averaging window: $t_1 = 30\text{ ns}$ to $t_2 = 60\text{ ns}$, extraction of dynamic resistance using least squares fit of TLP characteristic between $I_{PP1} = 10\text{ A}$ and $I_{PP2} = 30\text{ A}$. Please refer to Application Note AN210[1].

3 Typical Characteristics

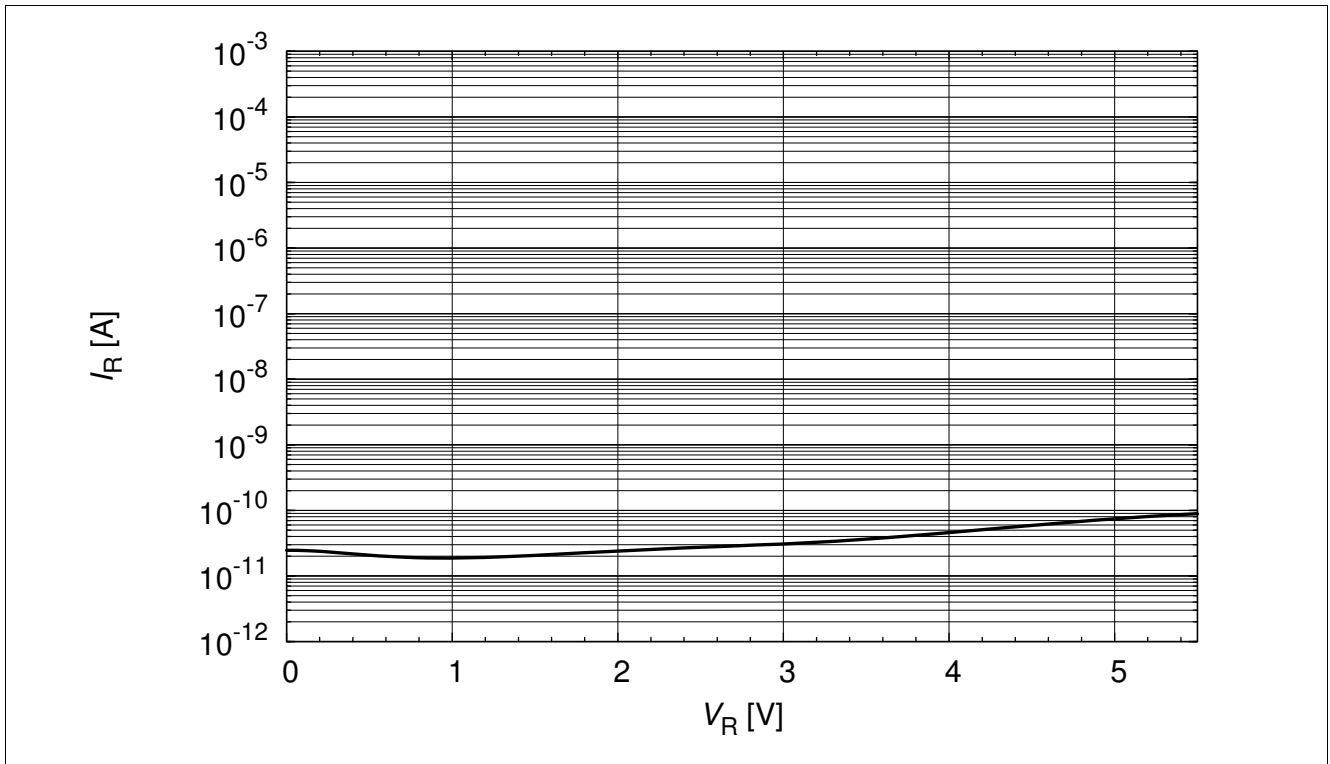


Figure 3-1 Reverse current $I_R = f(V_R)$

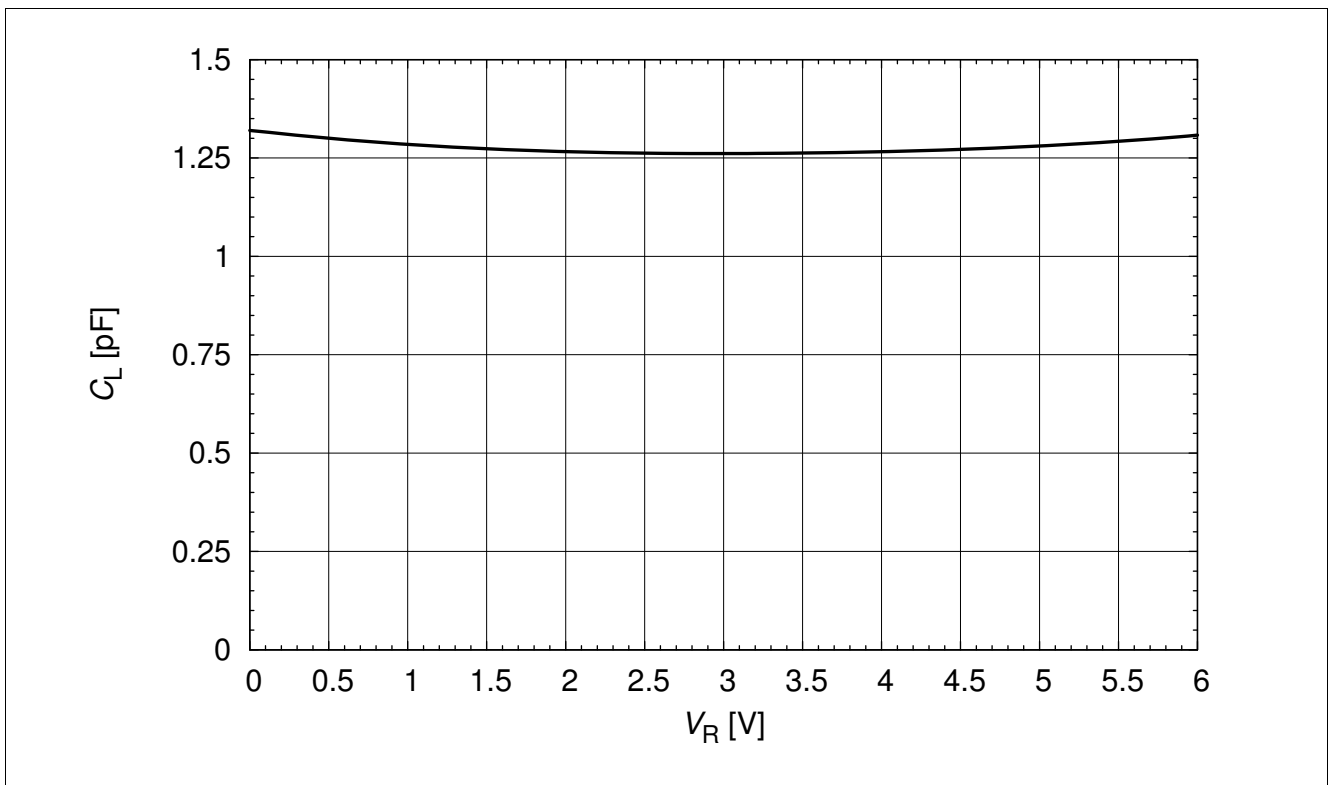


Figure 3-2 Capacitance A1 vs. B1, A2 vs. B2, $C_{L(A1,B1)} = C_{L(A2,B2)} = f(V_R)$

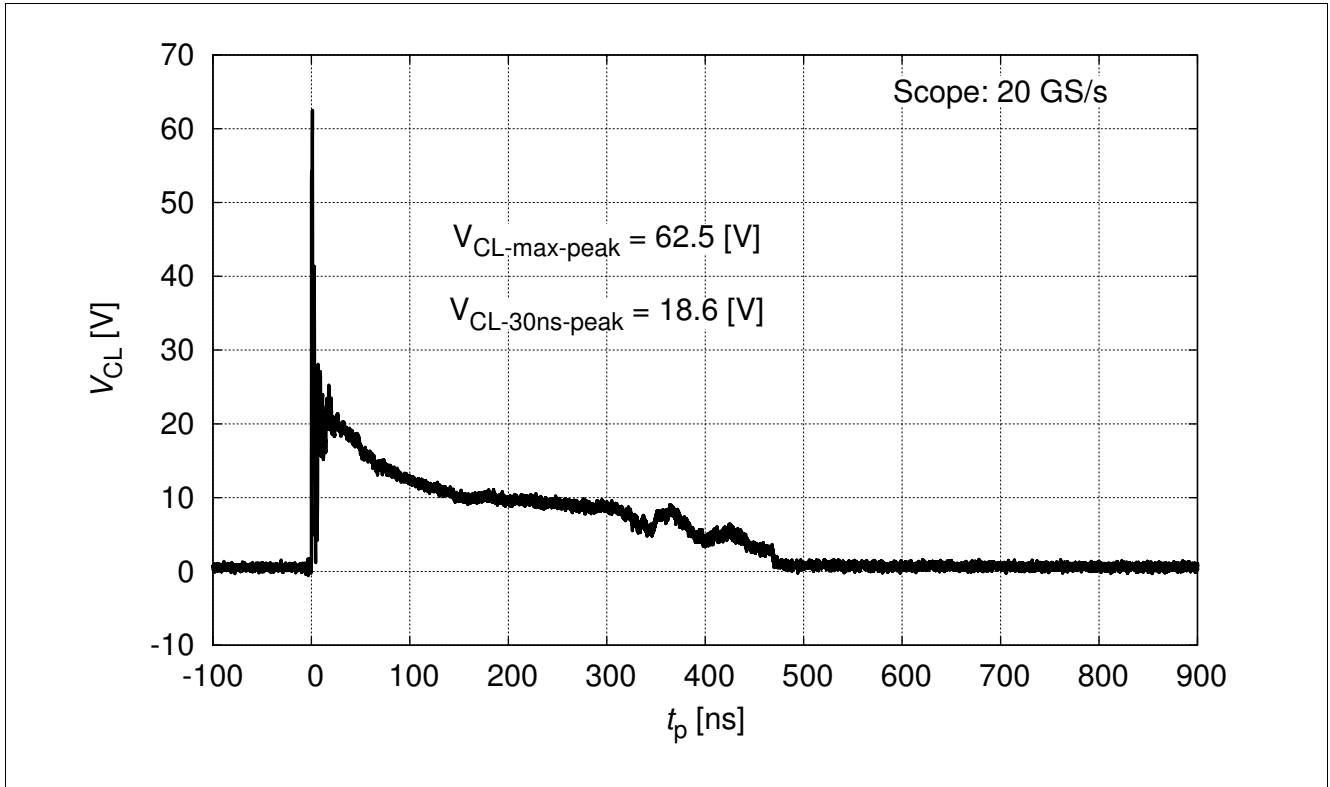


Figure 3-3 Clamping voltage at +8 kV discharge according IEC61000-4-2 ($R = 330 \Omega$, $C = 150 \text{ pF}$)

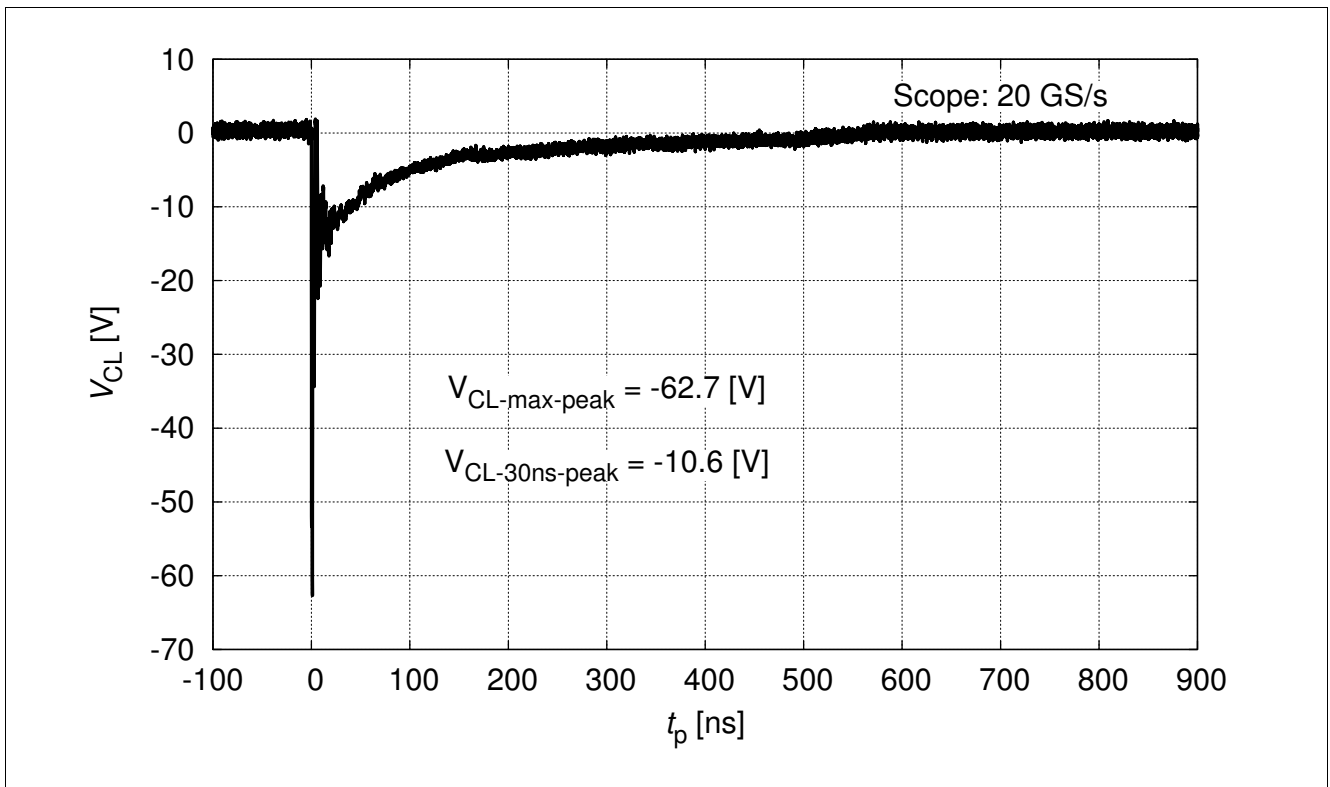


Figure 3-4 Clamping voltage at -8 kV discharge according IEC61000-4-2 ($R = 330 \Omega$, $C = 150 \text{ pF}$)

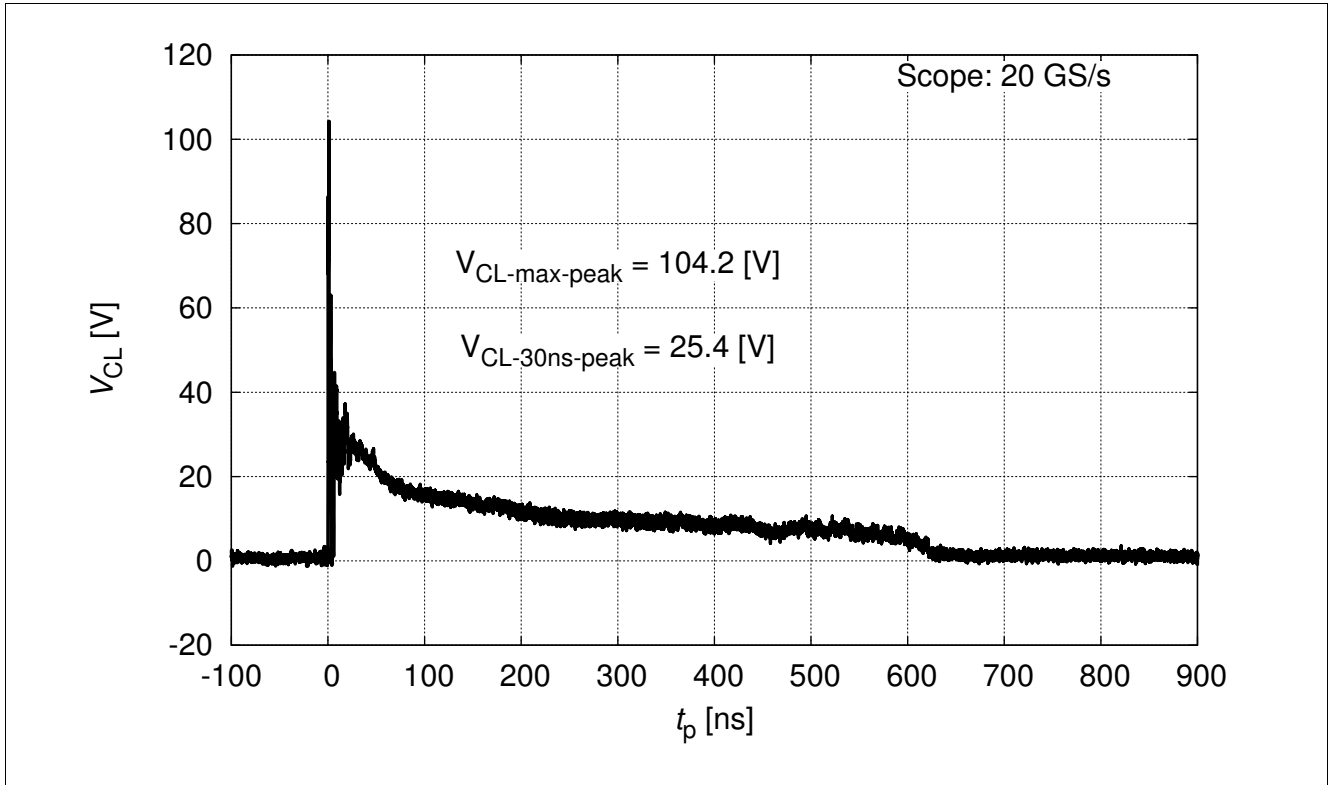


Figure 3-5 Clamping voltage at +15 kV discharge according IEC61000-4-2 ($R = 330 \text{ Ohm}$, $C = 150 \text{ pF}$)

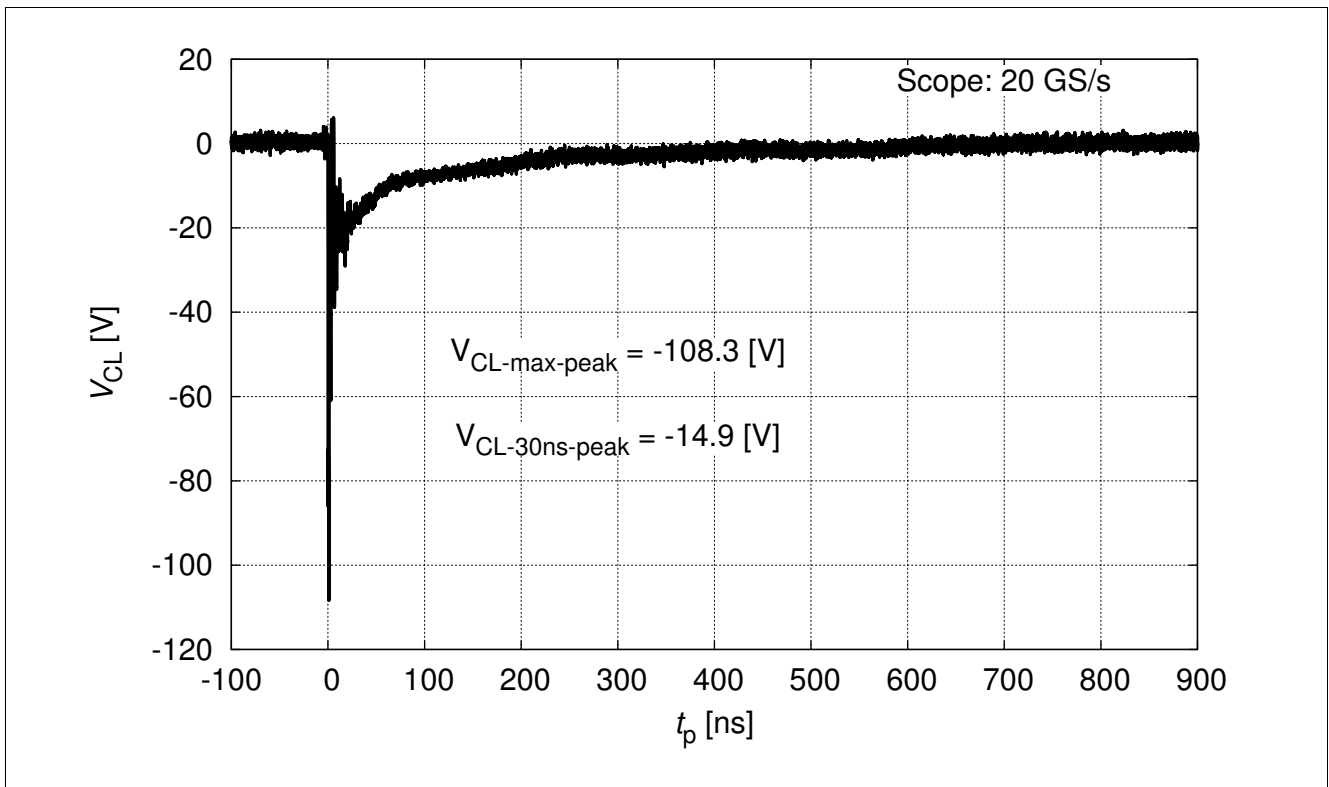


Figure 3-6 Clamping voltage at -15 kV discharge according IEC61000-4-2 ($R = 330 \text{ } \Omega$, $C = 150 \text{ pF}$)

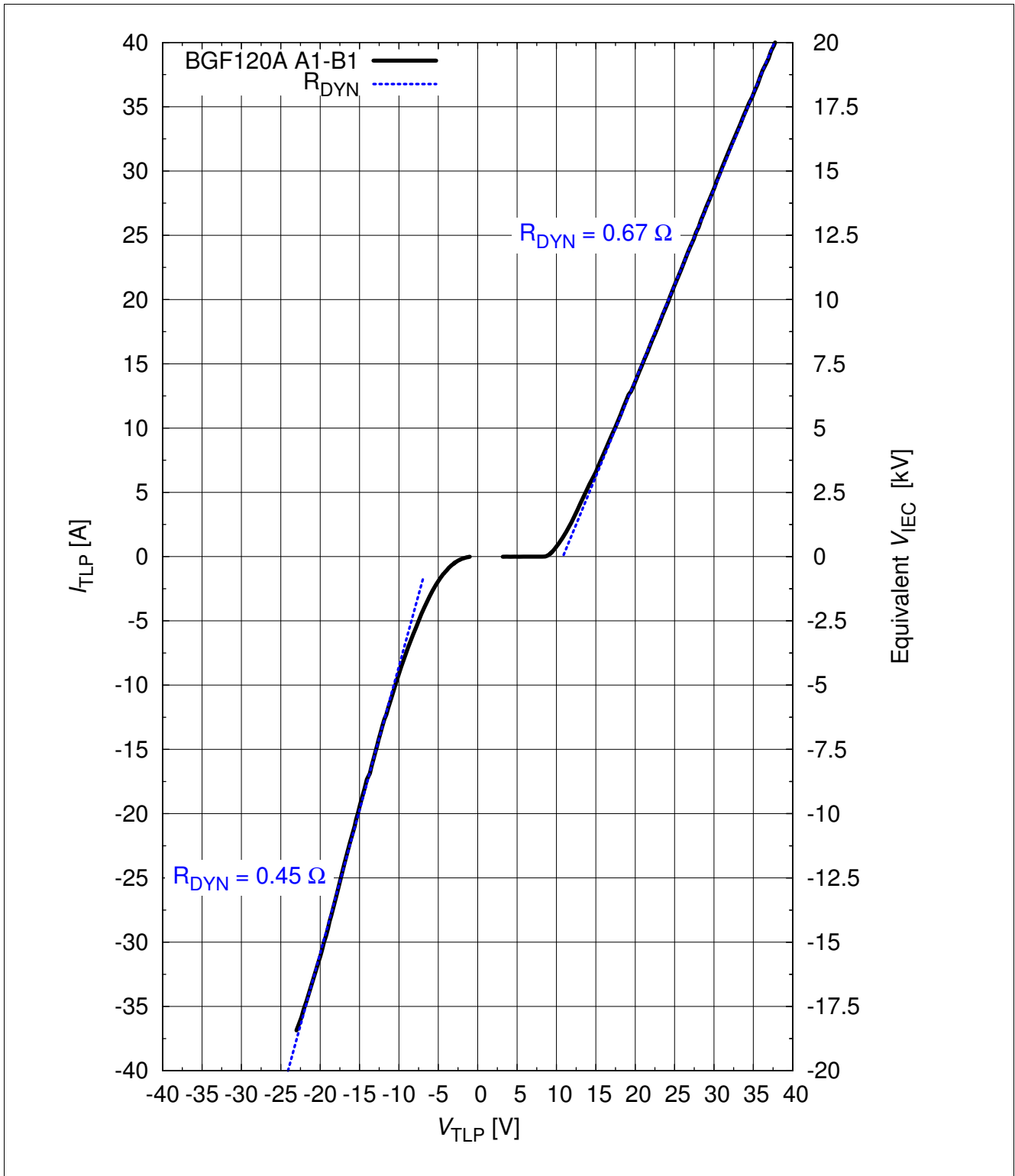


Figure 3-7 Clamping voltage (TLP): $I_{TLP} = f(V_{TLP})$ according ANSI/ESD STM5.5.1- Electrostatic Discharge Sensitivity Testing using Transmission Line Pulse (TLP) Model. TLP conditions: $Z_0 = 50 \Omega$, $t_p = 100 \text{ ns}$, $t_r = 0.6 \text{ ns}$, I_{TLP} and V_{TLP} averaging window: $t_1 = 30 \text{ ns}$ to $t_2 = 60 \text{ ns}$, extraction of dynamic resistance using squares fit to ELP characteristic between $I_{TLP1} = 10 \text{ A}$ and $I_{TLP2} = 30 \text{ A}$. Please refer to Application Note AN210 [1]

4 Application and Signal Routing

Application example for high-speed data line protection (uni-directional)

This low parasitic capacitance dual channel TVS diode array can be used either in a 2 channel uni-directional configuration or in a single channel bi-directional configuration. Due to the low capacitance and low inductance the configurations are perfect fit for ultra high-speed interfaces, such as USB2.0/3.0, S-ATA, DVI or HDMI ports.

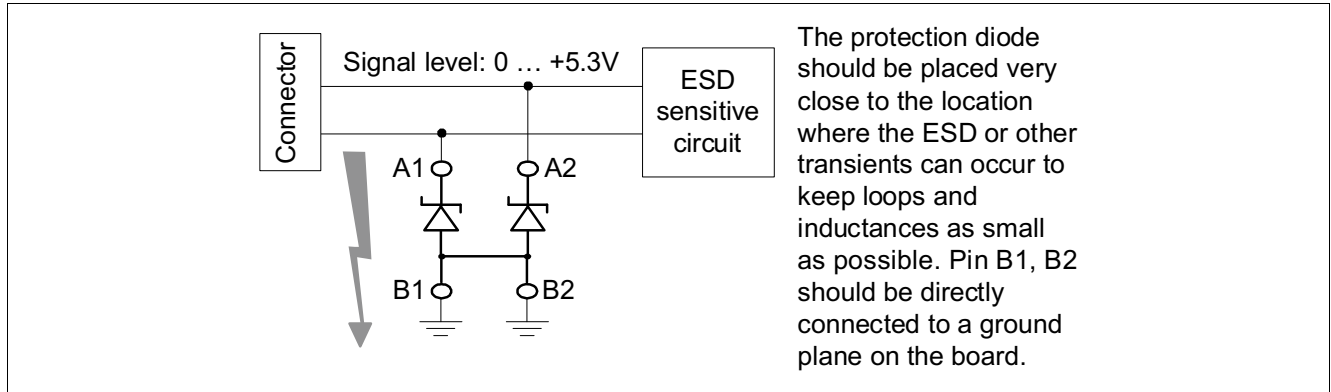


Figure 4-1 Application example for high-speed data line protection (uni-directional)

Application example for RF antenna line (bi-directional)

Connecting pin A1(A2) to the signal line and A2(A1) to GND and leaving pin B1/B2 floating even further reduces the parasitics to 0.75 pF only and correspondingly enable the user to add reliable ESD protection to RF antennas in e.g. GPS, FM radio or mobile TV applications without influence of the RF circuitry.

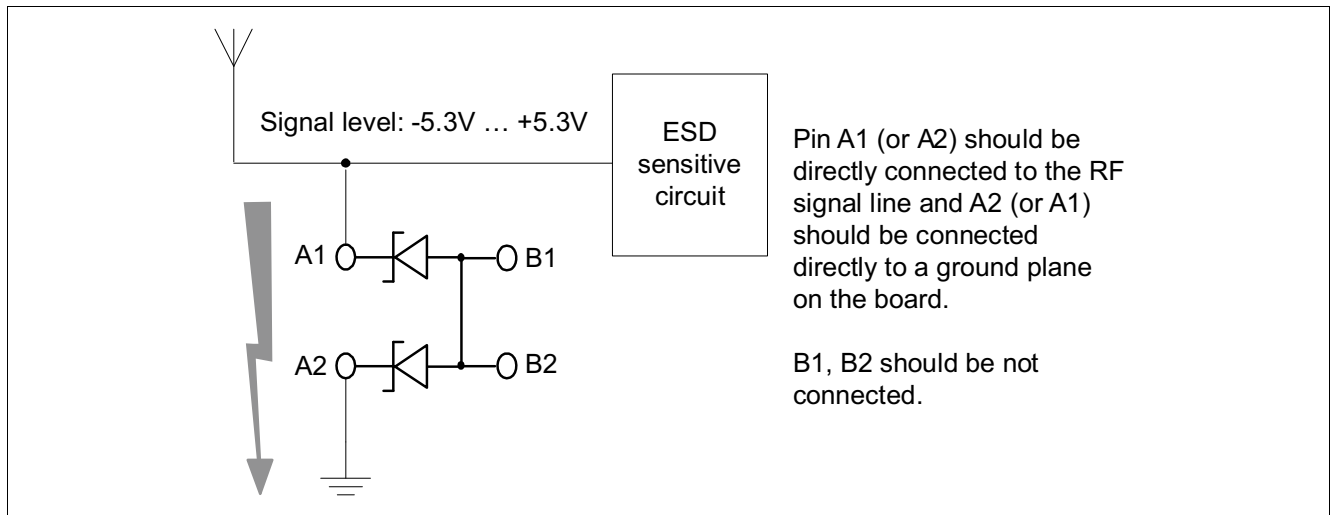


Figure 4-2 Application example for RF antenna line (bi-directional)

5 Package

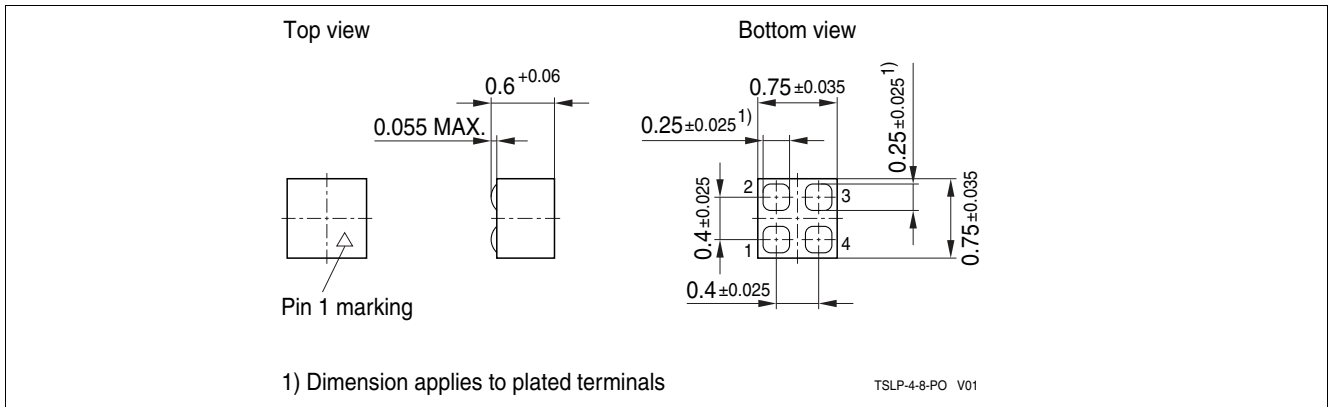


Figure 5-1 Package outline for TSLP-4-8 (dimension in mm)

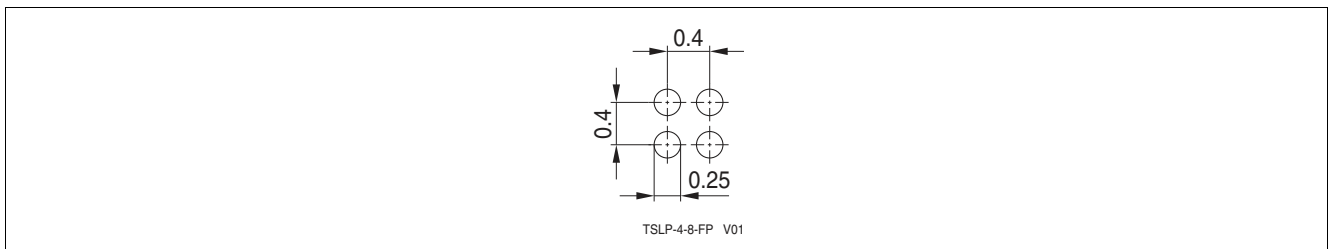


Figure 5-2 Package footprint for TSLP-4-8 (dimension in mm)

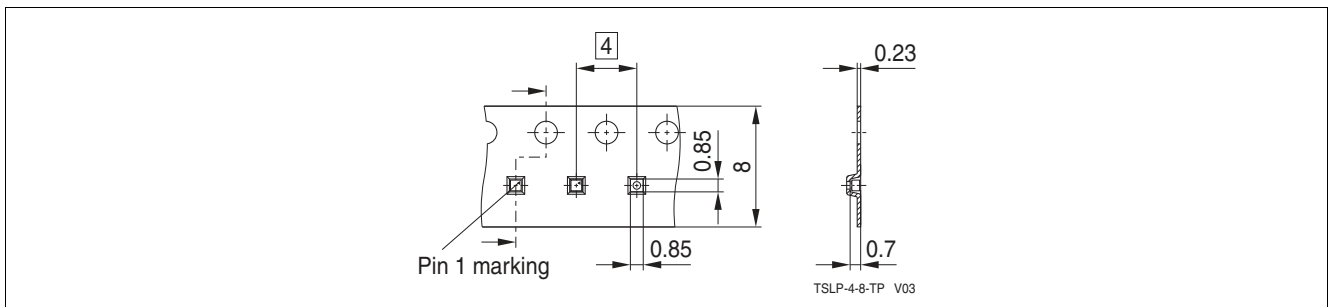


Figure 5-3 Tape and Reel Information for TSLP-4-8 (dimension in mm)

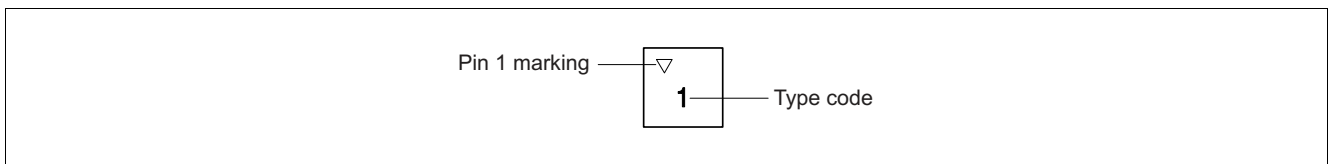


Figure 5-4 Marking (example) for TSLP-4-8

References

- [1] Infineon Technologies AG, "Effective ESD Protection Design at System Level Using VF-TLP Characterization Methodology", Application Note 210, RF and Protection Devices, April 22, 2010, Rev.1.0
- [2] Infineon Technologies AG, "Recommendation for PCB Assembly of Infineon TSLP and TSSLP Packages".

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