ESD103-B1-02EL

Bi-directional ESD protection device, 15 V, 0.09 pF, 0402

Order now | Technical documents | Simulation | Support

Product description

ESD protection device with a bi-dirctional symmetric I/V characteristic and excellent clamping performance, extremely low capacitance and high linearity for mobile device antenna.

Feature list

- ESD / transient protection according to:
  - IEC61000-4-2 (ESD): ±14 kV (air) / ±10 kV (contact)
- Bi-directional maximum working voltage: V_{WM} = ±15 V
- Line capacitance: C_L = 0.09 pF at f = 1 GHz
- Clamping voltage: V_{cl} = 48 V at I_{TLP} = 16 A with R_{dyn} = 1.8 Ω
- Very low leakage current: I_L = 0.1 nA
- Small form factor SMD size, low profile (1.0 x 0.6 x 0.3 mm^3)

Potential applications

- RF antennas and interfaces (LTE, WLAN)

Product validation

Qualified for industrial applications according to the relevant tests of JEDEC47/20/22.

Device information

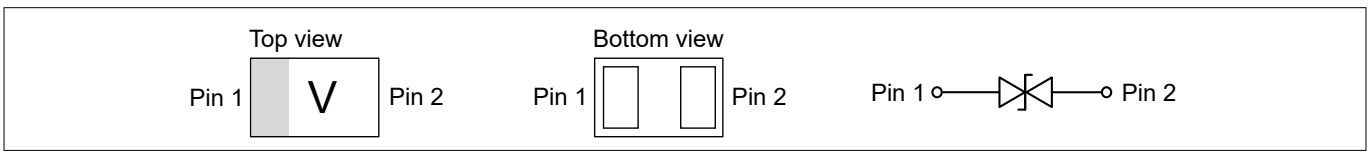

Figure 1 **Pin configuration and schematic diagram**

Table 1 **Part information**

Product name / Ordering code	Package	Pin configuration	Marking	Pieces / Reel
ESD103-B1-02EL / ESD103B102ELE6327XTMA1	TSLP-2-20	1 line, bi-directional	V	15 k

Table of contents

1 Absolute maximum ratings

Table 2 Absolute maximum ratings at T_A = 25°C, unless otherwise specified

Parameter	Symbol	Values		Unit	Note or test condition
		Min.	Max.		
Working voltage	V_{WM}	-15	+15	V	
ESD discharge voltage	V_{ESD} (contact)	-10	+10	kV	Discharge network: R = 330 Ω, C = 150 pF [1)]
	V_{ESD} (air)	-14	+14		
Operating temperature	T_{op}	-55	+125	°C	
Storage temperature	T_{stg}	-65	+150		

Attention**: **Stresses above the maximum 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 component.

1 Based on IEC61000-4-2.

2 Electrical characteristics

Note: *T_A = 25°C, unless otherwise specified. Device is electrically symmetrical.*

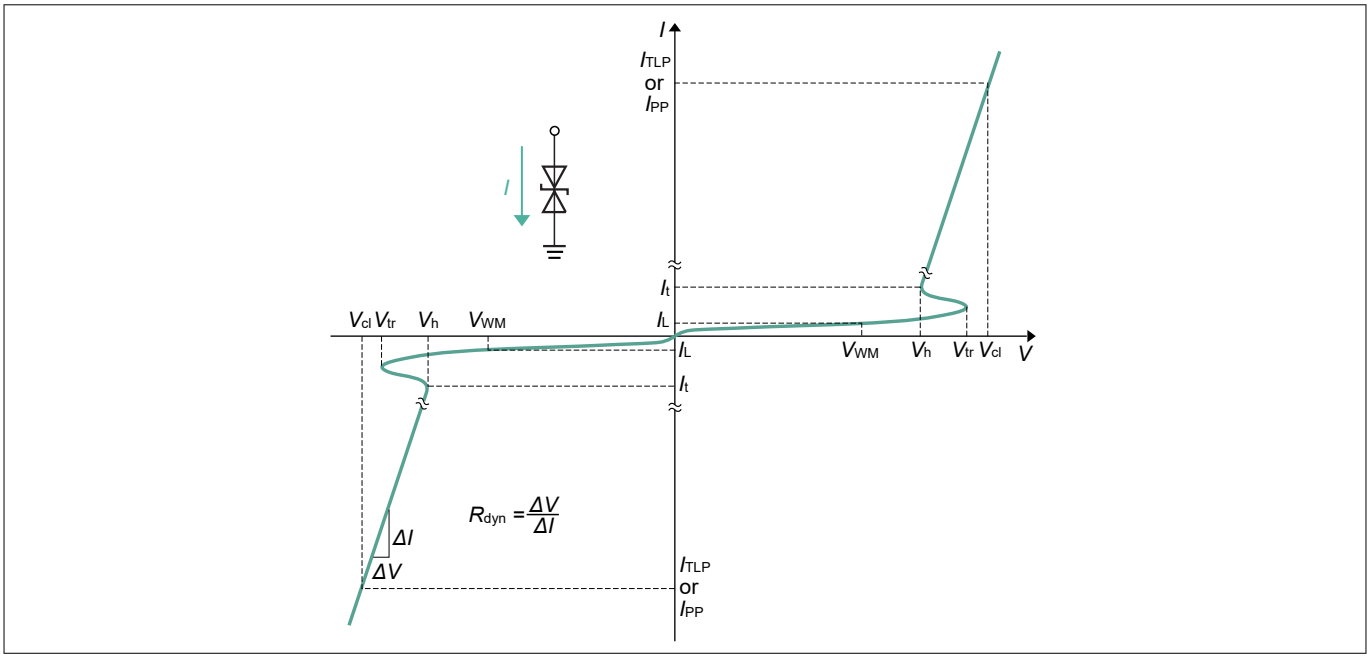

Figure 2 ***I/V* characteristic curve**

Table 3 ***I/V* characteristic parameters**

Symbol	Parameter
I_h	Holding current
I_L	Leakage current
I_{PP}	Peak pulse current, based on IEC61000-4-5
I_t	Test current
I_{TLP}	TLP current
R_{dyn}	Dynamic resistance
V_{cl}	Clamping voltage
V_h	Holding voltage
V_t	Test voltage
V_{tr}	Trigger voltage
V_{WM}	Maximum working voltage

Table 4 DC characteristics

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Trigger voltage [2]	V_{tr}	-	21	-	V	
Leakage current	I_L	-	0.1	50	nA	V_{WM} = 15 V

Table 5 AC characteristics

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Line capacitance	C_L	-	0.13	0.2	pF	V = 0 V, f = 1 MHz
		-	0.09	-		V = 0 V, f = 1 GHz
Series inductance	L_S	–	0.4	–	nH	Extracted from S-parameters

Table 6 Protection characteristics

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Clamping voltage (TLP) [3] [4]	V_{cl}	-	20	-	V	I_{TLP} = 1 A
		-	36	-		I_{TLP} = 8 A
		-	48	-		I_{TLP} = 16 A
Dynamic resistance	R_{dyn}	-	1.8	-	Ω	

2 Verified by design.
3 TLP parameters: Z_0 = 50 Ω, t_p = 100 ns, t_r = 0.6 ns, averaging window 30-60 ns.
4 Refer to application note AN210 [2]

3 Typical characteristic diagrams

Note: *T_A = 25 °C, unless otherwise specified.*

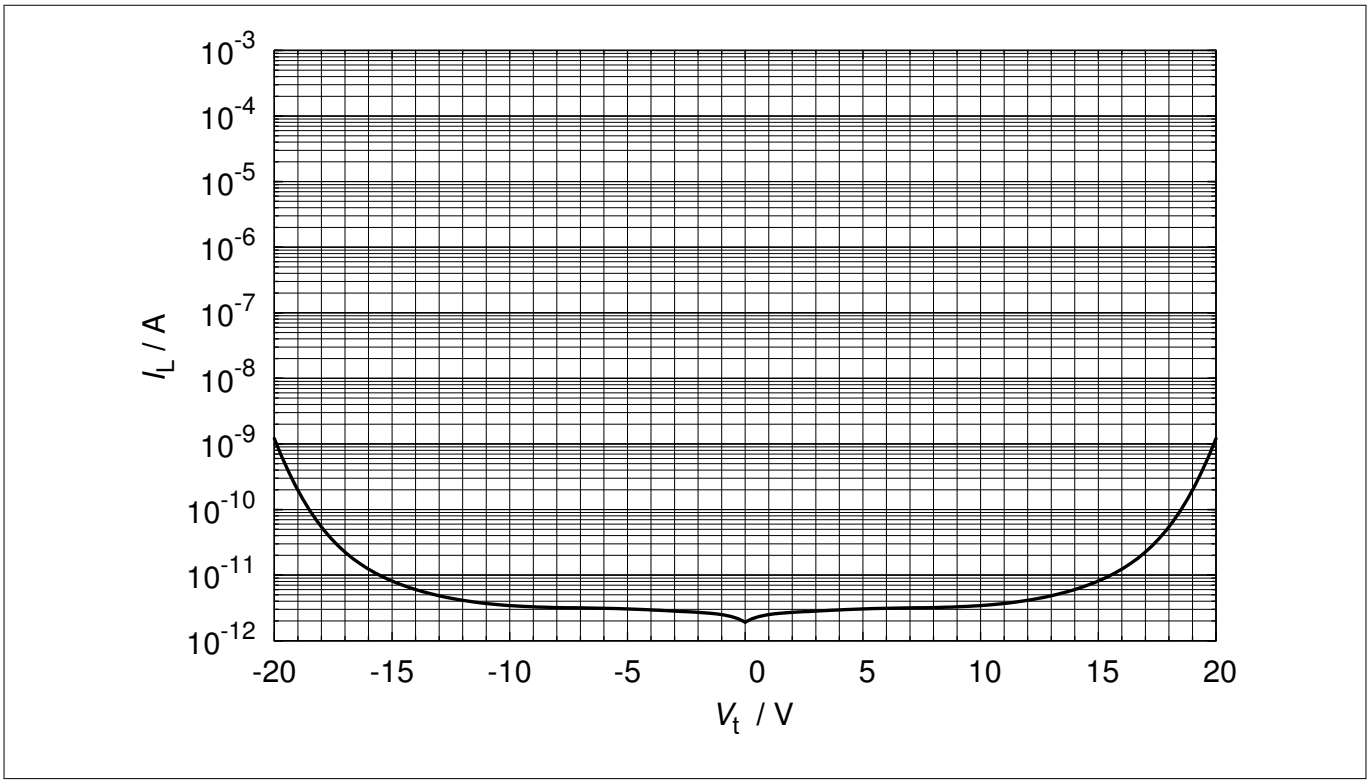

Figure 3 **Leakage current: $I_L = f(V_t)$**

3 Typical characteristic diagrams

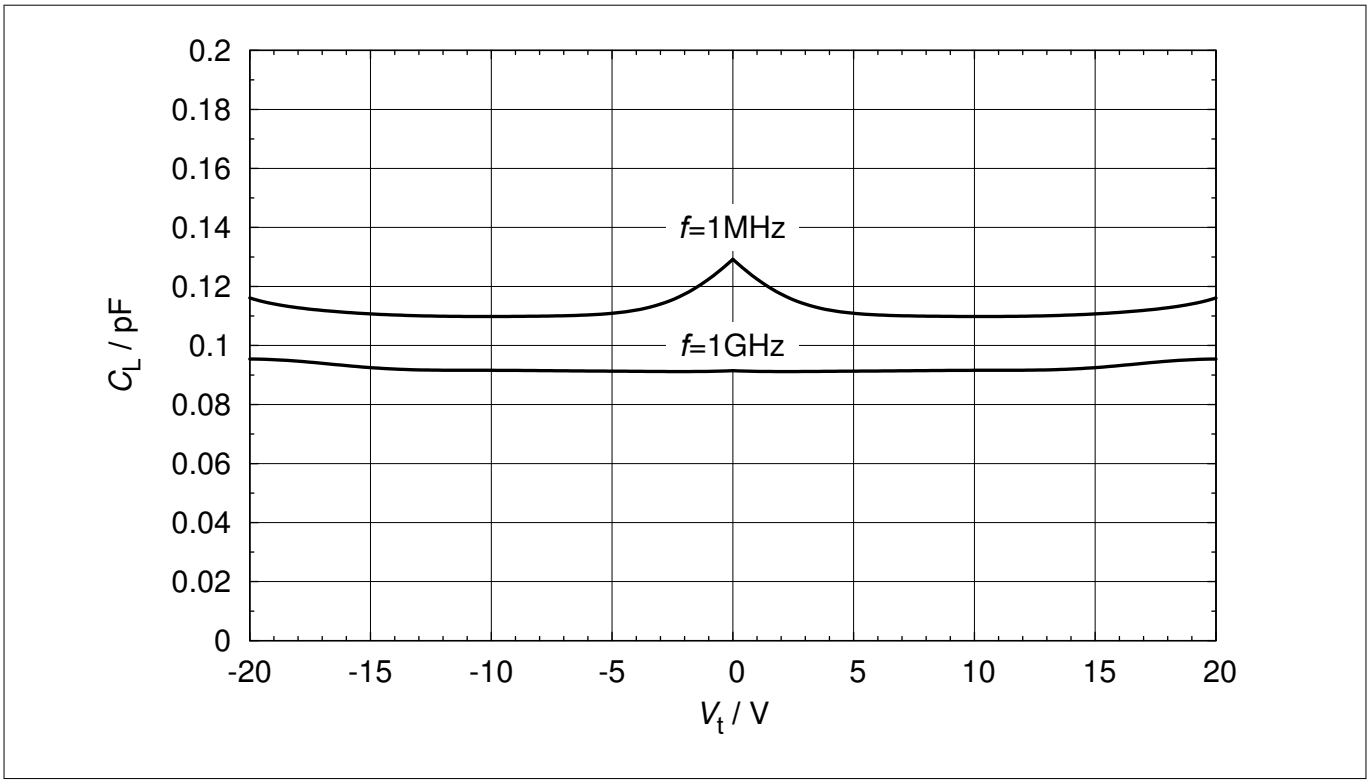

Figure 4 **Line capacitance: $C_L = f(V_t)$, $f = 1$ MHz, 1 GHz**

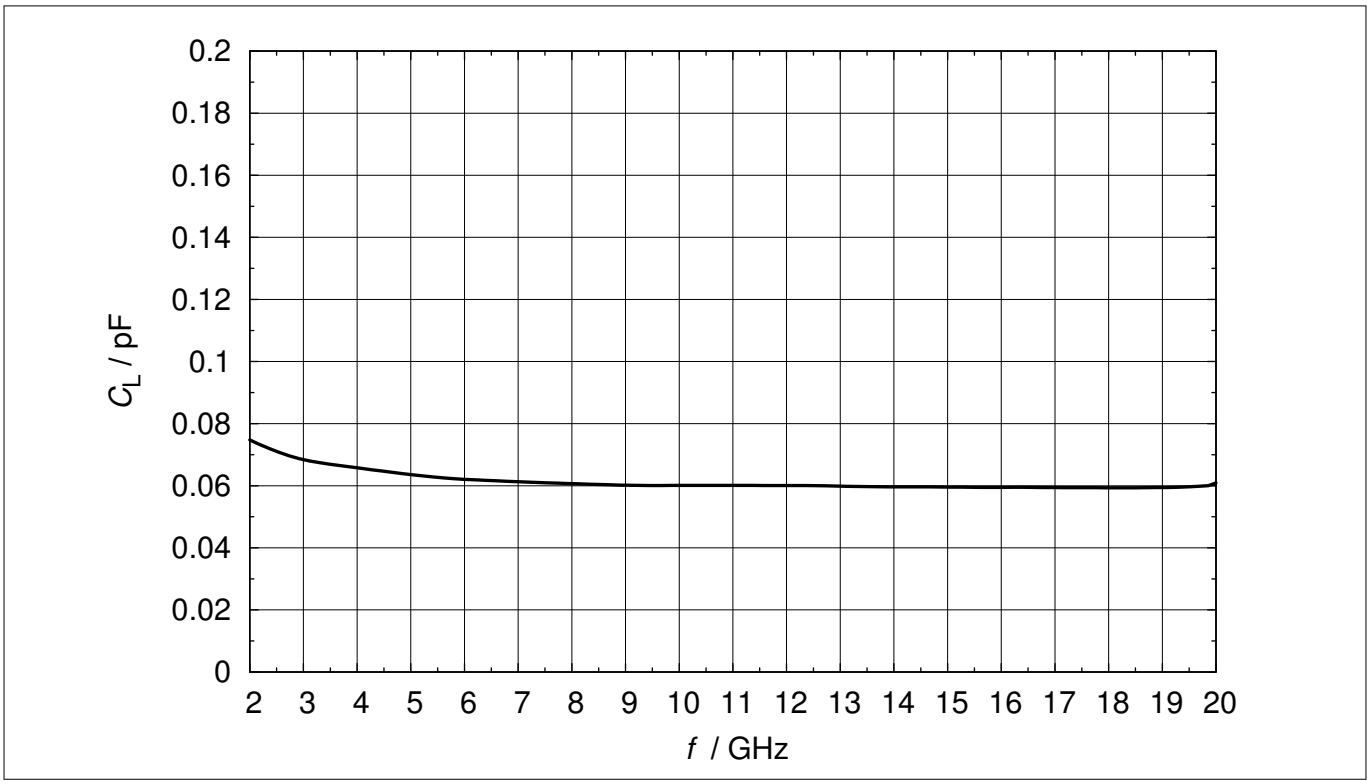

Figure 5 **Line capacitance: $C_L = f(f)$, $V_t = 0$ V**

3 Typical characteristic diagrams

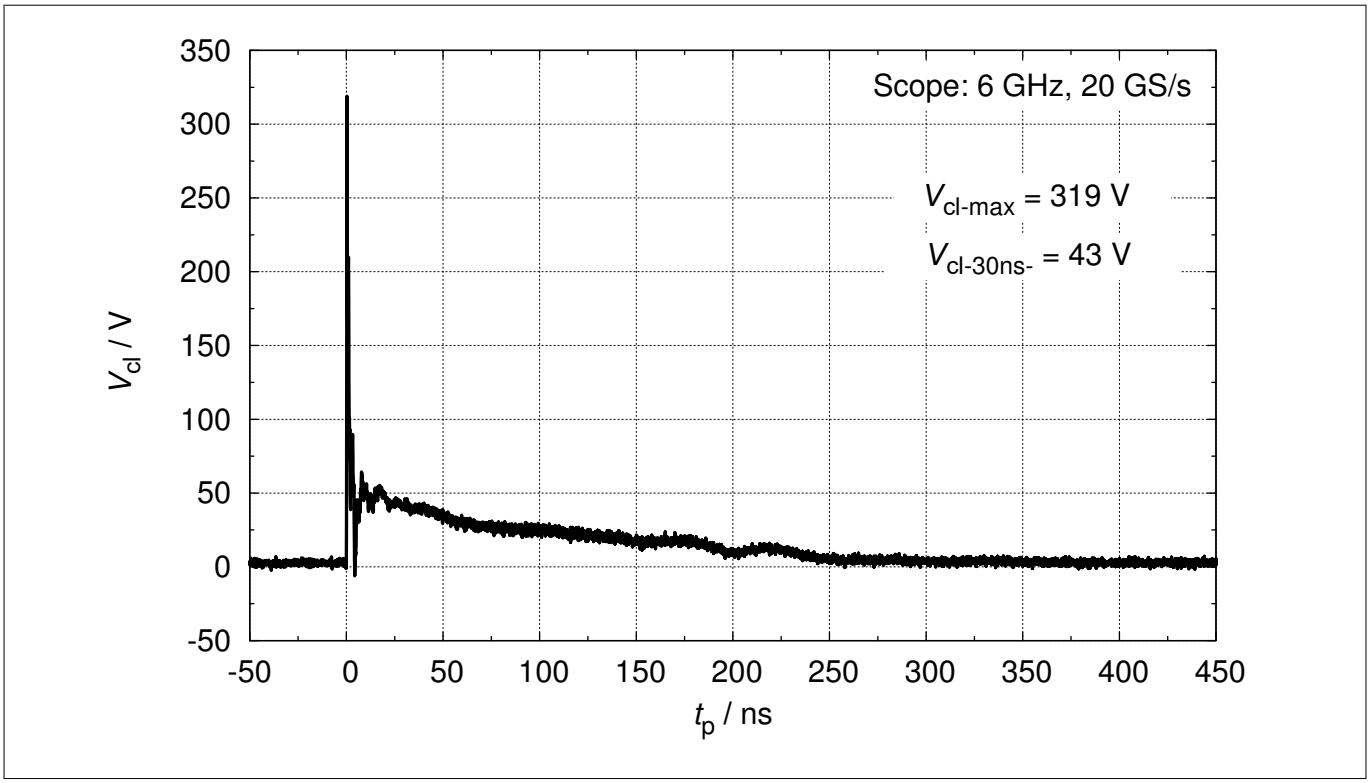

Figure 6 **Clamping voltage (ESD): V_{cl} = f(t_p), 8 kV positive pulse based on IEC61000-4-2**

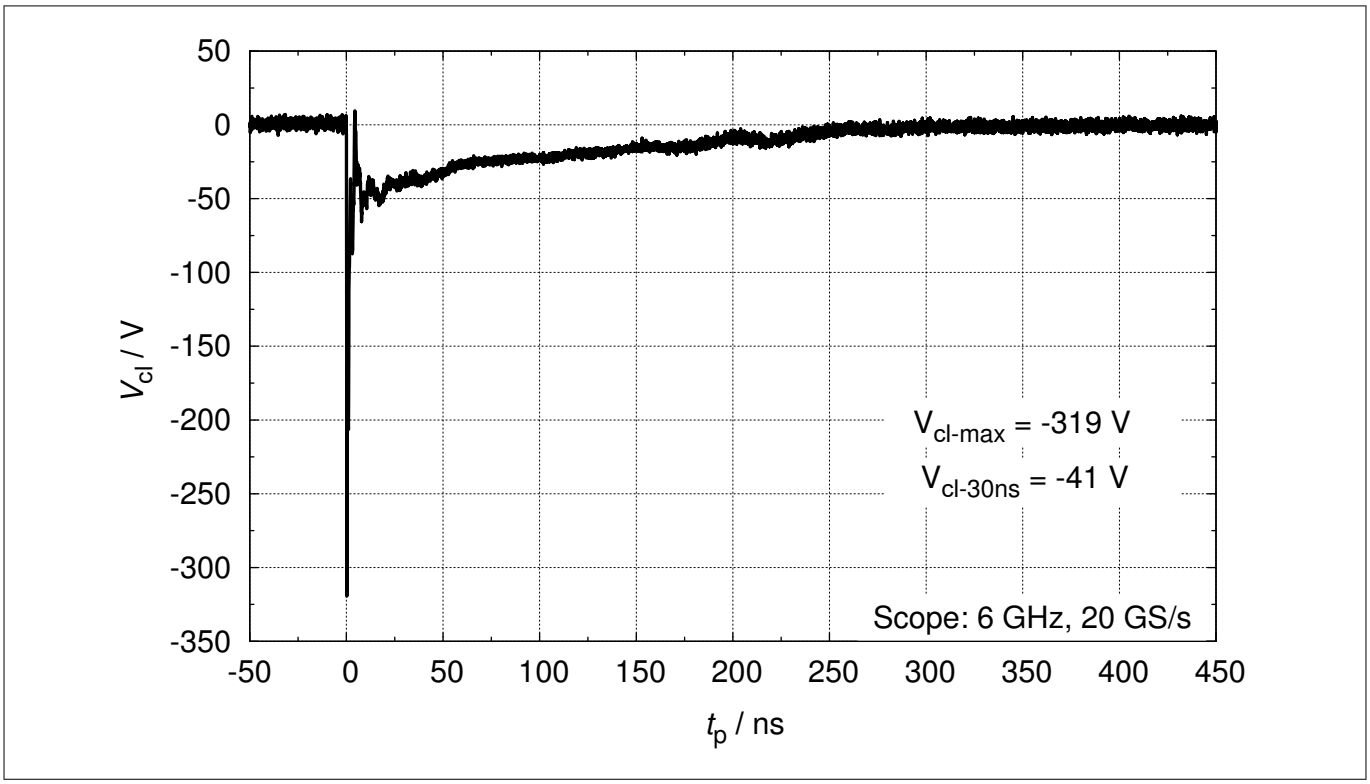

Figure 7 **Clamping voltage (ESD): V_{cl} = f(t_p), 8 kV negative pulse based on IEC61000-4-2**

3 Typical characteristic diagrams

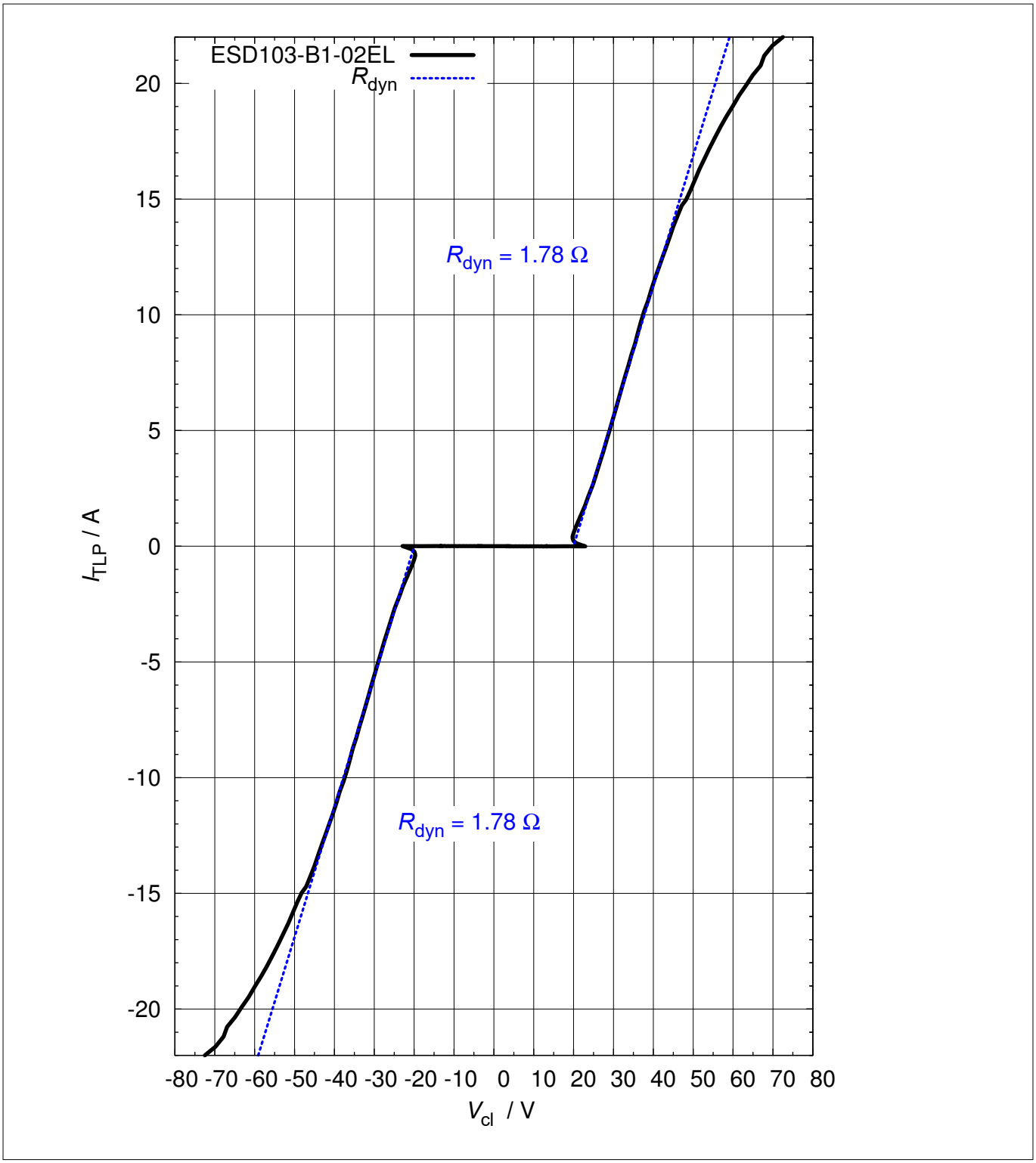

Figure 8 **Clamping voltage (TLP): I_{TLP} = f(V_{cl})**

4 Package information TSLP-2-20

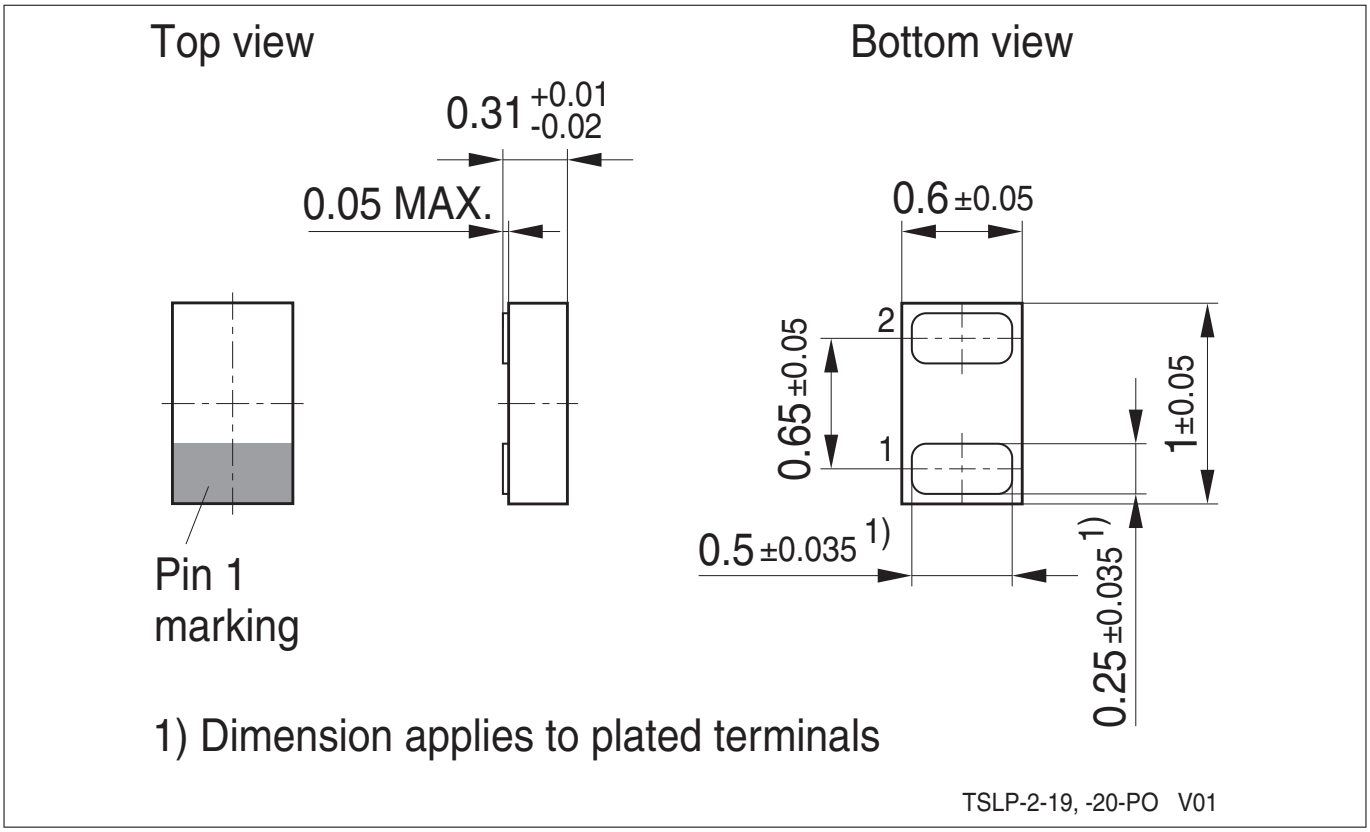

Figure 9 TSLP-2-20 package

Note: For package information including footprint, packing and assembly recommendation refer to:

https://www.infineon.com/cms/en/product/packages/PG-TSLP/PG-TSLP-2-20/

5 References

[1]	Infineon AG - Understanding ESD protection device characteristics
[2]	Infineon AG - **Application note AN210**: Effective ESD Protection Design at System Level Using VF-TLP Characterization Methodology

6 Revision history

Document version	Date of release	Description of changes
V2.0	2022-03-15	• New datasheet layout

Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

Edition 2022-03-15

Published by

Infineon Technologies AG

81726 Munich, Germany

Do you have a question about any aspect of this document?

Email: erratum@infineon.com

Document reference
IFX-yia1643879790426

Important notice

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

Warnings

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.