

ESD200-B1-CSP0201

Protection device

TVS (transient voltage suppressor)

Bi-directional, 5.5 V, 6.5 pF, 0201, RoHS and halogen free compliant

Feature list

- ESD/transient protection of data lines according to:
 - IEC61000-4-2 (ESD): ± 19 kV (air), ± 17 kV (contact discharge)
 - IEC61000-4-4 (EFT): ± 2 kV/ ± 40 A (5/50 ns)
 - IEC61000-4-5 (Surge): ± 3 A (8/20 μ s)
- Bi-directional working voltage up to: $V_{RWM} = \pm 5.5$ V
- Line capacitance: $C_L = 6.5$ pF (typical) at $f = 1$ MHz
- Clamping voltage: $V_{CL} = 13$ V (typical) at $I_{TLP} = 16$ A with $R_{DYN} = 0.2 \Omega$ (typical)
- Very low reverse current: $I_R < 1$ nA (typical)
- Minimized clamping overshoot due to extremely low parasitic inductance
- Small form factor SMD size 0201, low profile (0.58 mm x 0.28 mm x 0.15 mm) [3]
- Bi-directional and symmetric I/V characteristic for optimized design and assembly, recommendations for PCB assembly see [2]



Potential applications

- ESD protection of highly susceptible IC/ASICs in audio, headset and human digital interfaces

Product validation

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

Device information

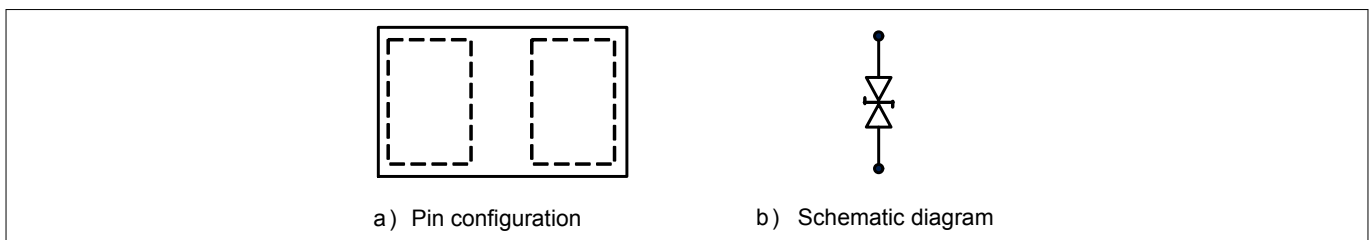


Figure 1 Pin configuration and schematic diagram

Table 1 Part information

Type	Package	Configuration	Marking code
ESD200-B1-CSP0201	WLL-2-1	1 line, bi-directional	A ¹⁾

¹ The device has no marking code on the device backside. The marking code is on pad side.

Table of contents

	Feature list	1
	Potential applications	1
	Product validation	1
	Device information	1
	Table of contents	2
1	Maximum ratings	3
2	Electrical characteristics	4
3	Typical characteristic diagrams	6
4	Package information	13
4.1	WLL-2-1 package	13
5	References	14
	Revision history	14
	Disclaimer	15

Maximum ratings

1 Maximum ratings

Note: $T_A = 25\text{ °C}$, unless otherwise specified.

Table 2 Maximum ratings

Parameter	Symbol	Values	Unit
Reverse working voltage	V_{RWM}	± 5.5	V
ESD discharge ¹⁾	V_{ESD} (contact)	± 17	kV
	V_{ESD} (air)	± 19	
Peak pulse power ²⁾	P_{PK}	45	W
Peak pulse current ²⁾	I_{PP}	± 3	A
Operating temperature range	T_{OP}	-55 to 125	°C
Storage temperature	T_{stg}	-65 to 150	°C

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 V_{ESD} according to IEC61000-4-2 ($R = 330\ \Omega$, $C = 150\text{ pF}$ discharge network)

² Stress pulse: 8/20 μs current waveform according to IEC61000-4-5

Electrical characteristics

2 Electrical characteristics

Note: $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified. Device is electrically symmetrical.

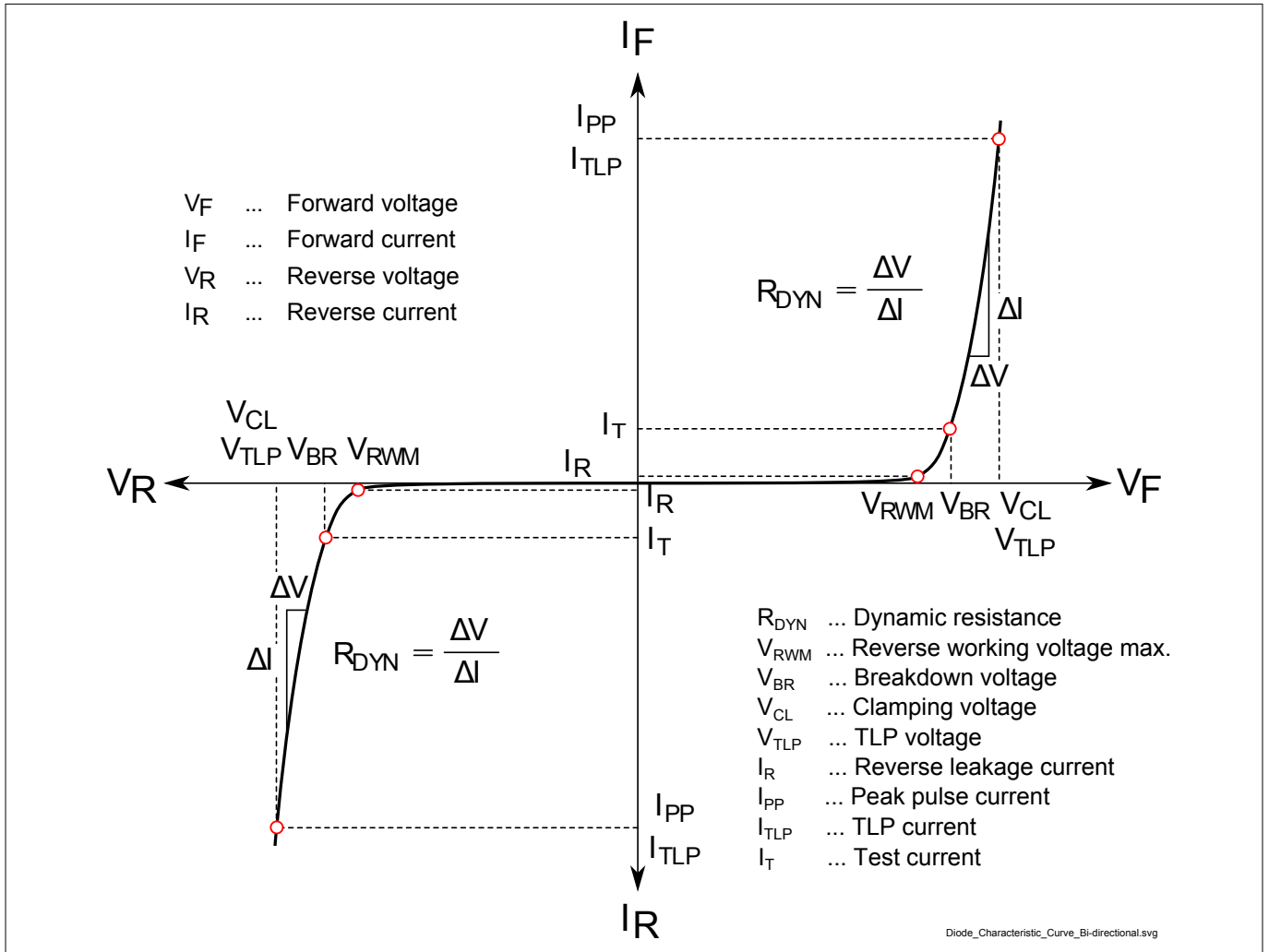


Figure 2 Definitions of electrical characteristics

Electrical characteristics

Table 3 DC characteristics

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Breakdown voltage	V_{BR}	6	–	10	V	$I_T = 1 \text{ mA}$
Reverse current	I_R	–	0.1	100	nA	$V_R = 5.5 \text{ V}$

Table 4 AC characteristics

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Line capacitance	C_L	–	6.5	–	pF	$V_R = 0 \text{ V}, f = 1 \text{ MHz}$
		–	6.5	–		$V_R = 0 \text{ V}, f = 1 \text{ GHz}$

Table 5 ESD and Surge characteristics

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Clamping voltage ¹⁾	V_{CL}	–	12	–	V	$V_{ESD} = 8 \text{ kV}$, contact discharge
Clamping voltage ²⁾		–	10	–		$I_{TLP} = 1 \text{ A}, t_p = 100 \text{ ns}$
		–	13	–		$I_{TLP} = 16 \text{ A}, t_p = 100 \text{ ns}$
Clamping voltage ³⁾		–	10	–		$I_{PP} = 1 \text{ A}, t_p = 8/20 \text{ } \mu\text{s}$
		–	12.5	–		$I_{PP} = 3 \text{ A}, t_p = 8/20 \text{ } \mu\text{s}$
Dynamic resistance ²⁾	R_{DYN}	–	0.2	–	Ω	$t_p = 100 \text{ ns}$

¹ V_{ESD} according to IEC61000-4-2 ($R = 330 \text{ } \Omega$, $C = 150 \text{ pF}$ discharge network)

² Please refer to application note AN210 [1], TLP parameters: $Z_0 = 50 \text{ } \Omega$, $t_p = 100 \text{ ns}$, $t_r = 0.6 \text{ ns}$

³ Stress pulse: 8/20 μs current waveform according to IEC61000-4-5

Typical characteristic diagrams

3 Typical characteristic diagrams

Note: $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified.

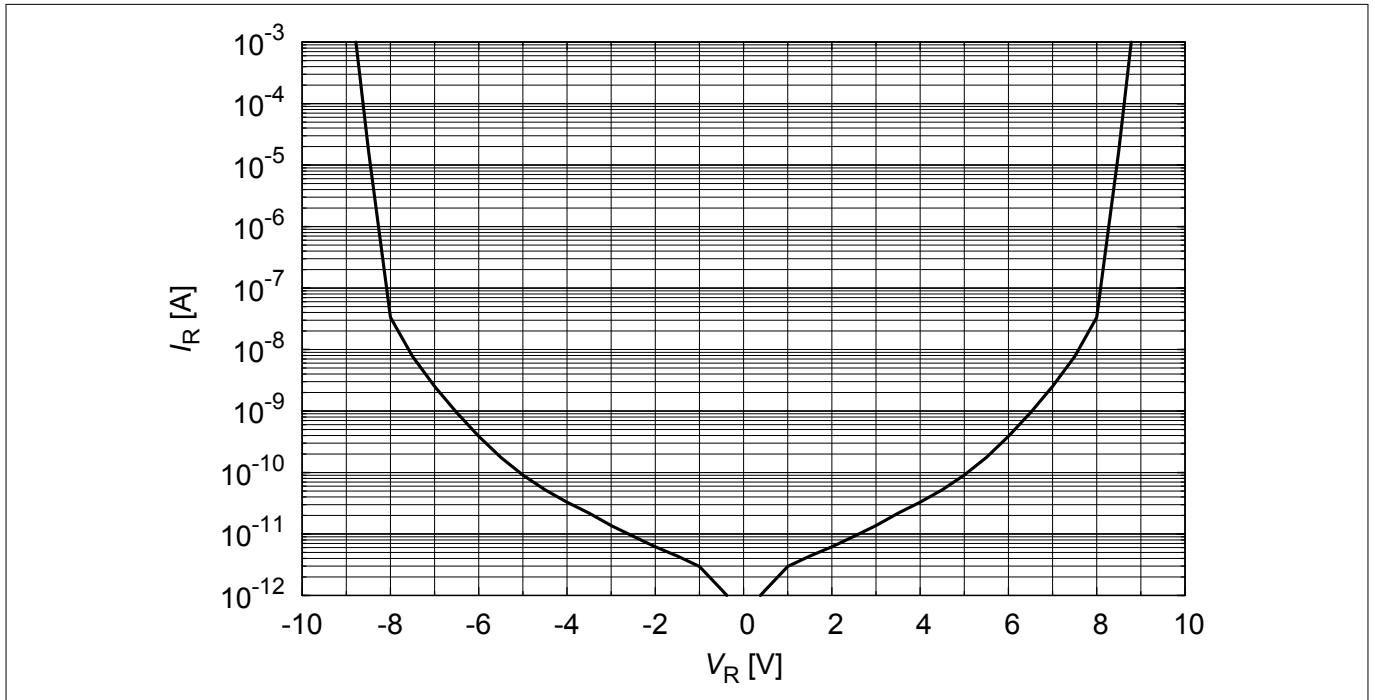


Figure 3 Reverse leakage current: $I_R = f(V_R)$

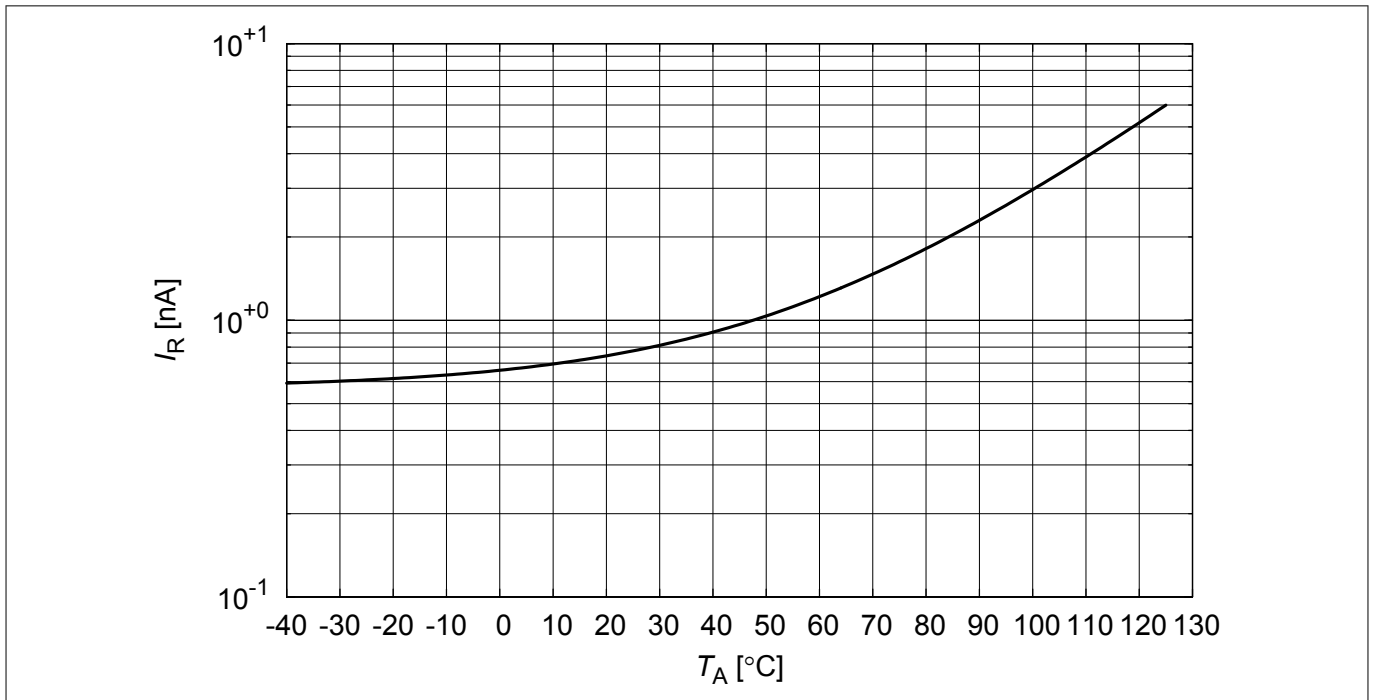


Figure 4 Reverse current $I_R = f(T_A)$, $V_R = 5.5\text{ V}$

Typical characteristic diagrams

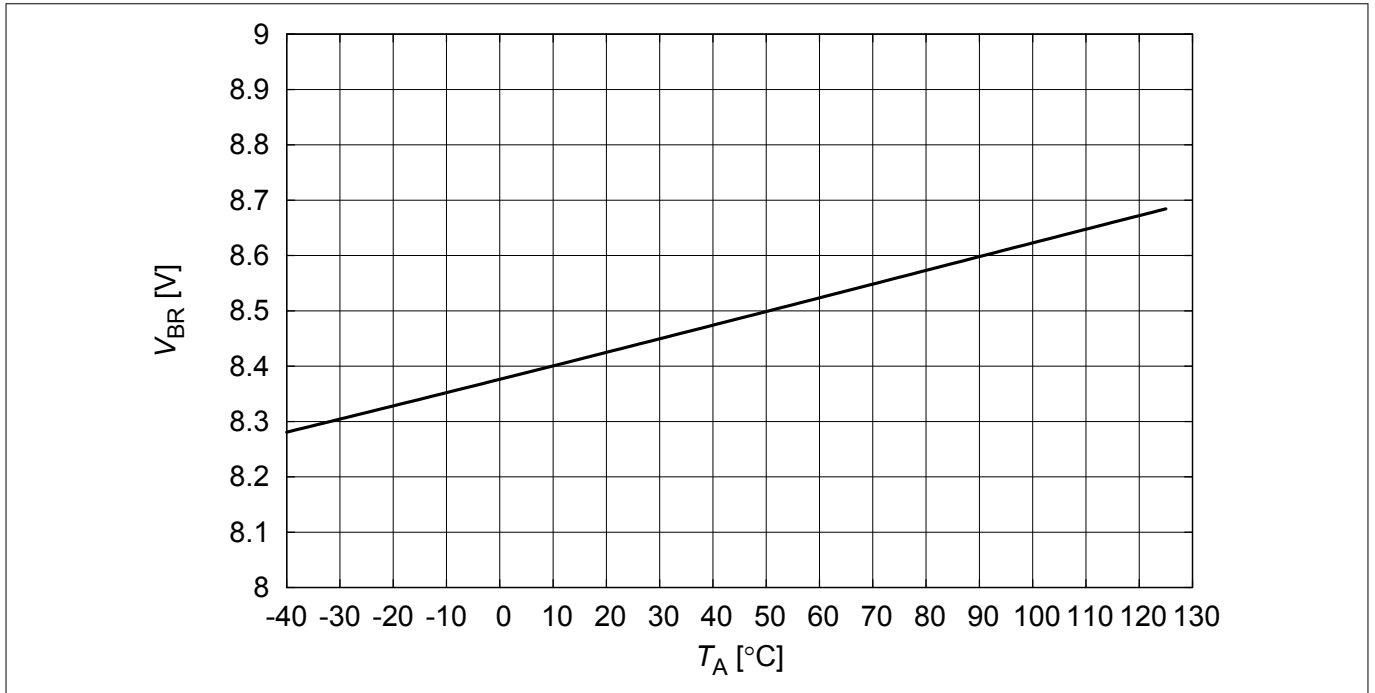


Figure 5 Reverse voltage $V_{BR} = f(T_A)$, $I_{BR} = 1$ mA

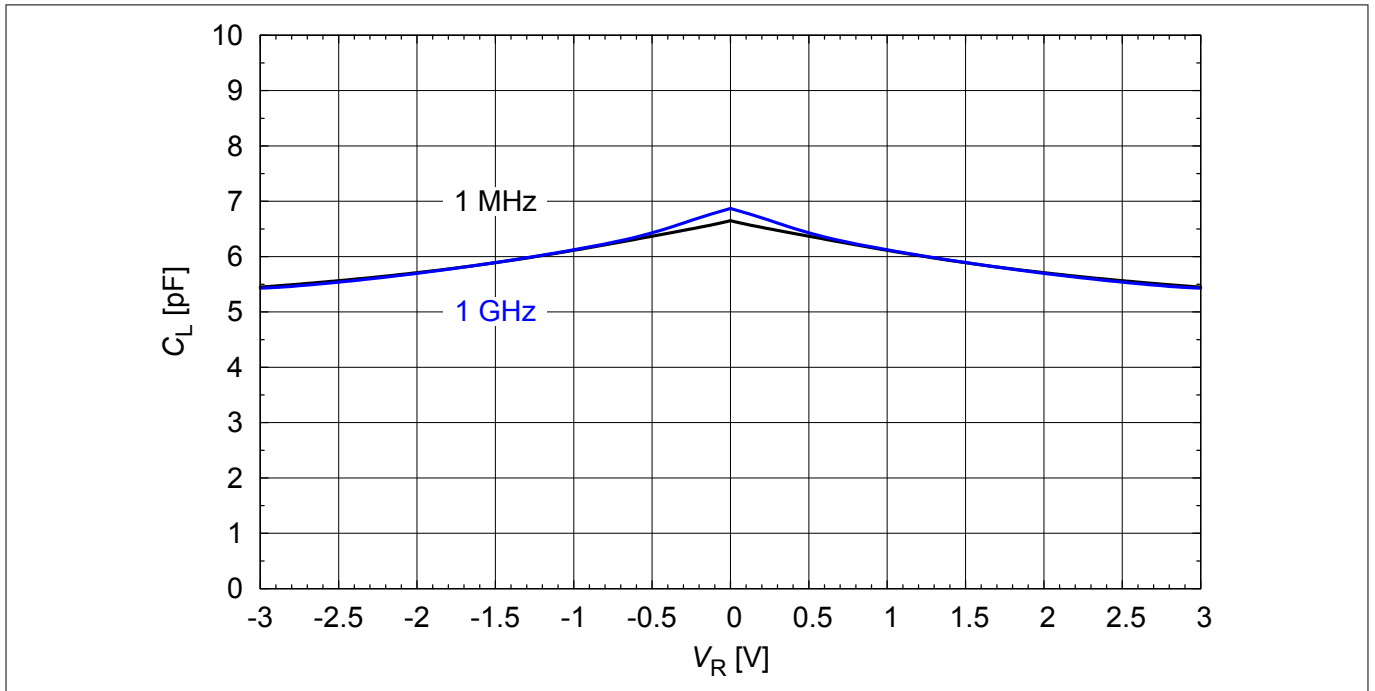


Figure 6 Line capacitance: $C_L = f(V_R)$, $f = 1$ MHz, 1 GHz

Typical characteristic diagrams

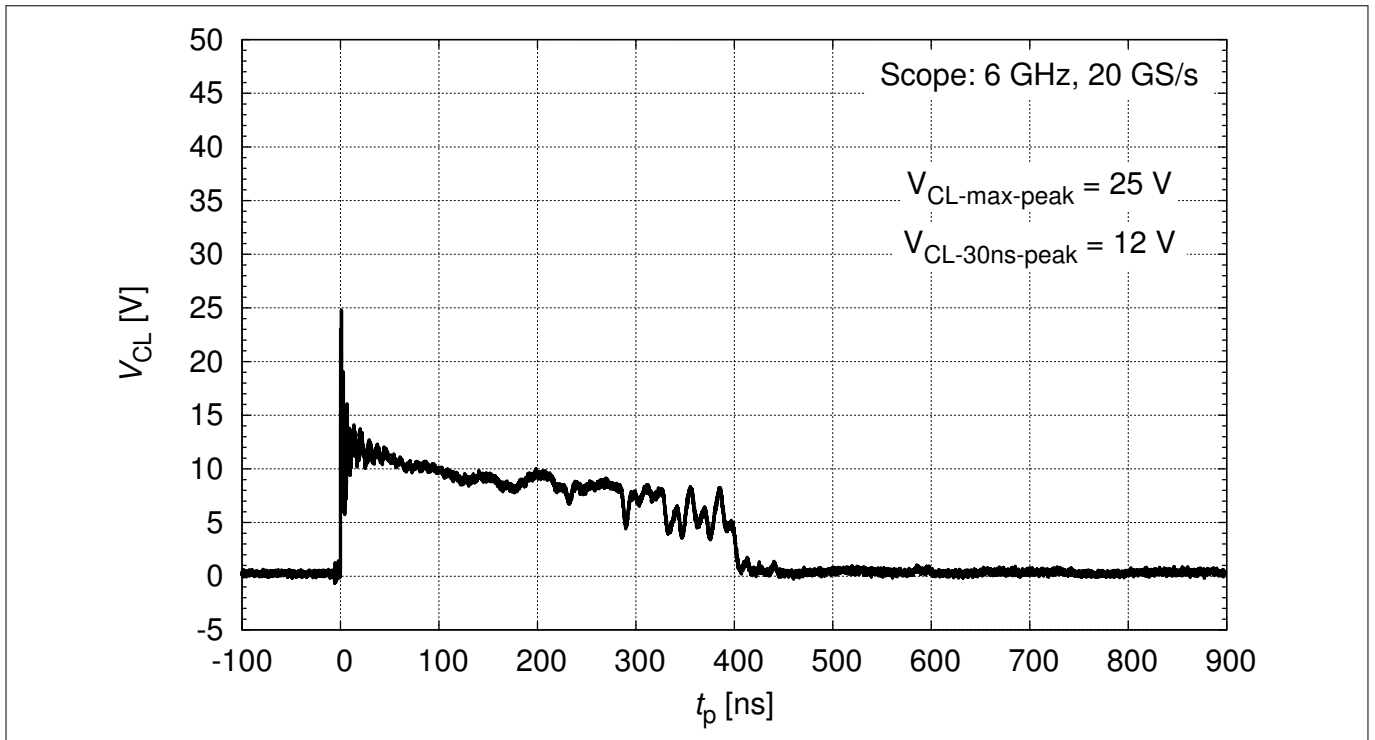


Figure 7 Clamping voltage (ESD): $V_{CL} = f(t)$, 8 kV positive pulse according to IEC61000-4-2

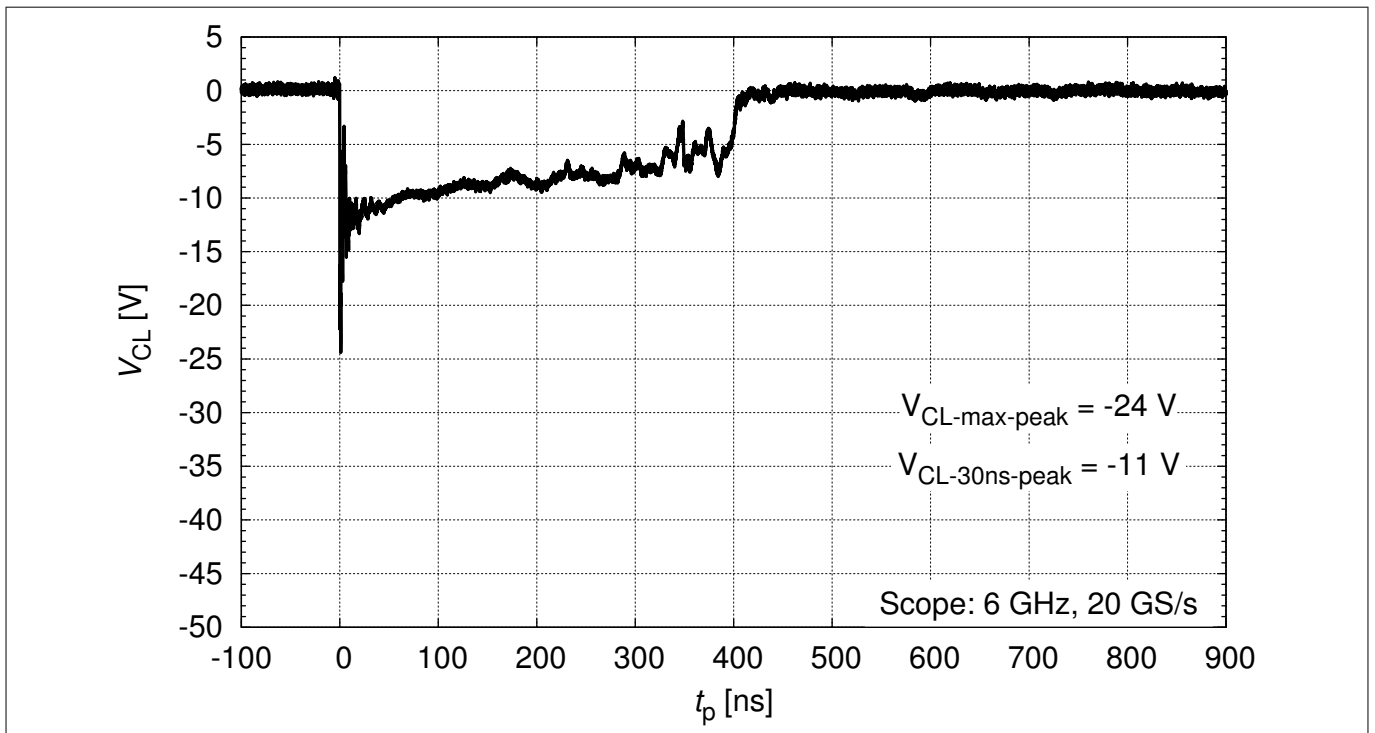


Figure 8 Clamping voltage (ESD): $V_{CL} = f(t)$, 8 kV negative pulse according to IEC61000-4-2

Typical characteristic diagrams

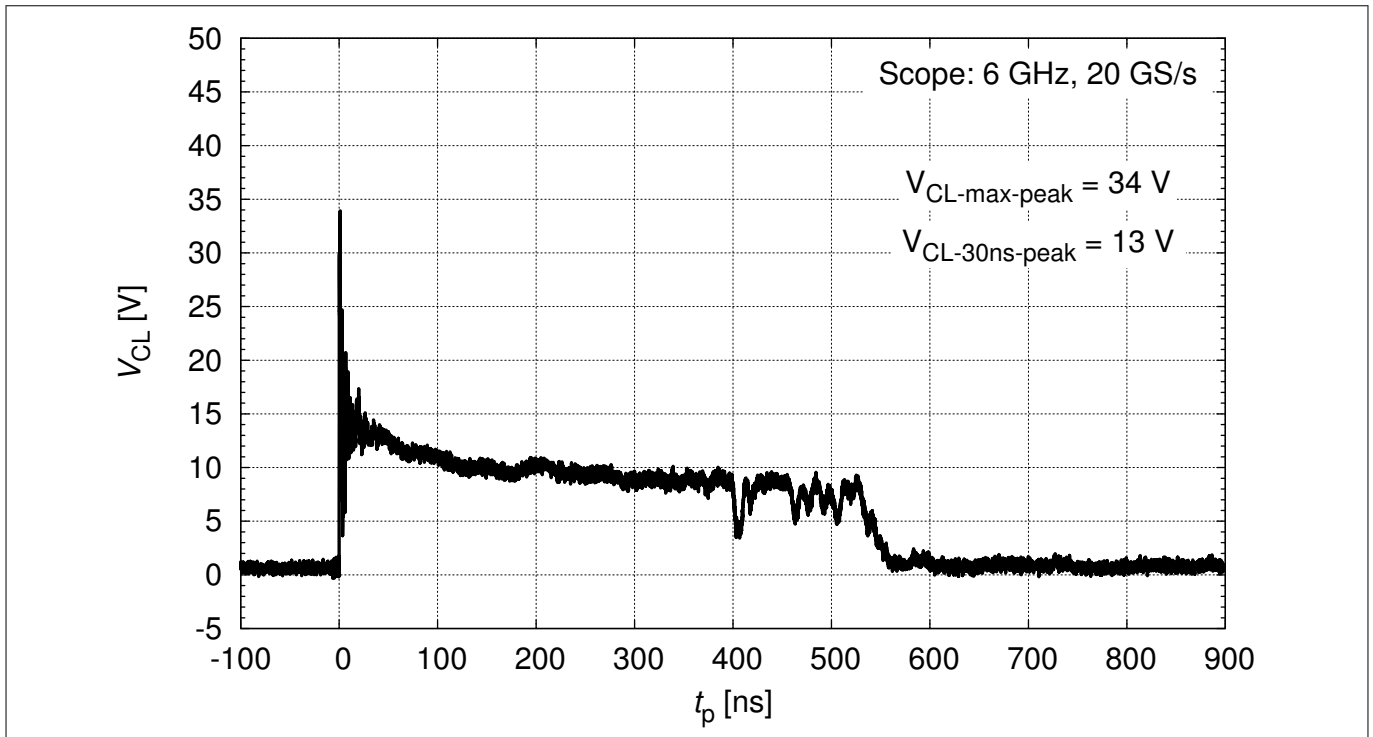


Figure 9 Clamping voltage (ESD): $V_{CL} = f(t)$, 15 kV positive pulse according to IEC61000-4-2

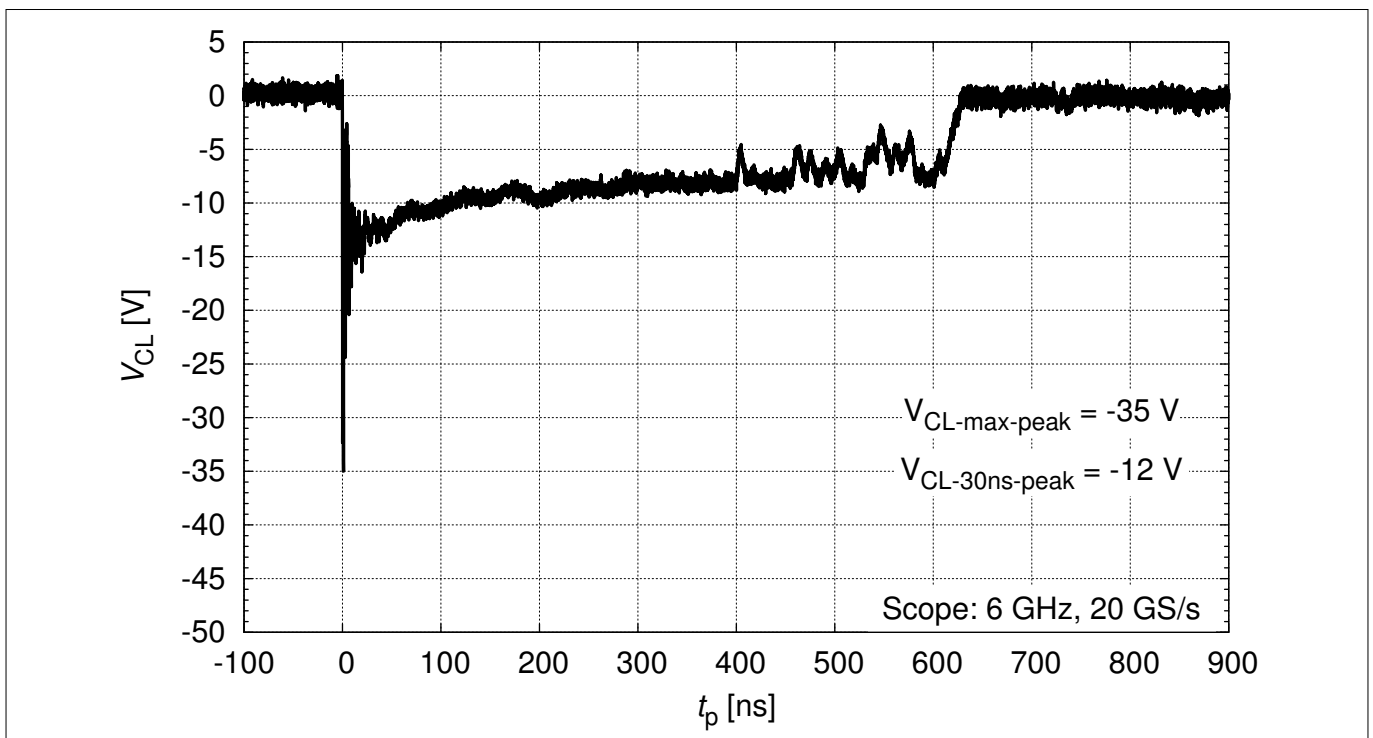


Figure 10 Clamping voltage (ESD): $V_{CL} = f(t)$, 15 kV negative pulse according to IEC61000-4-2

Typical characteristic diagrams

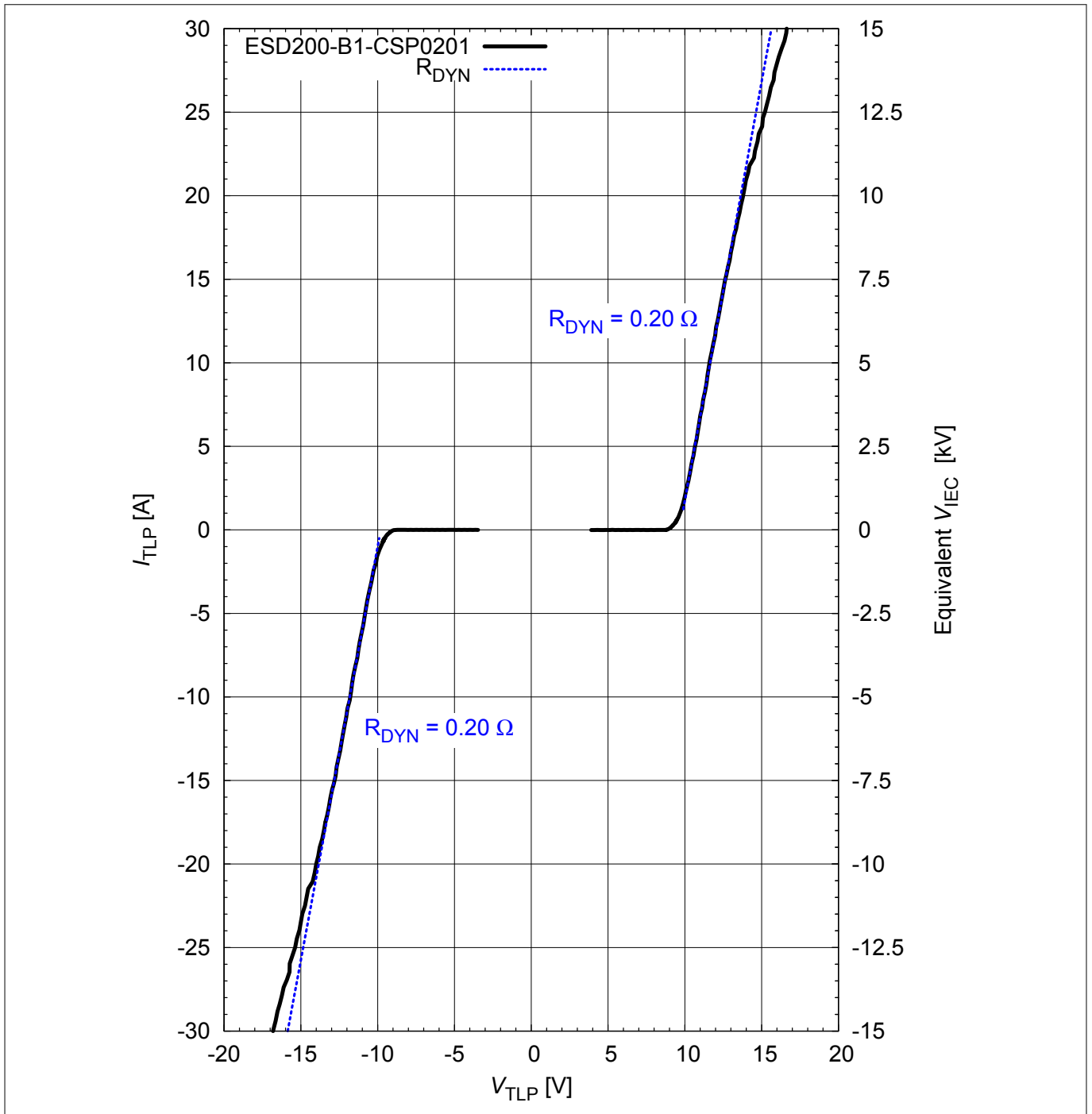


Figure 11 Clamping voltage (TLP): $I_{TLP} = f(V_{TLP})$ [1]

Typical characteristic diagrams

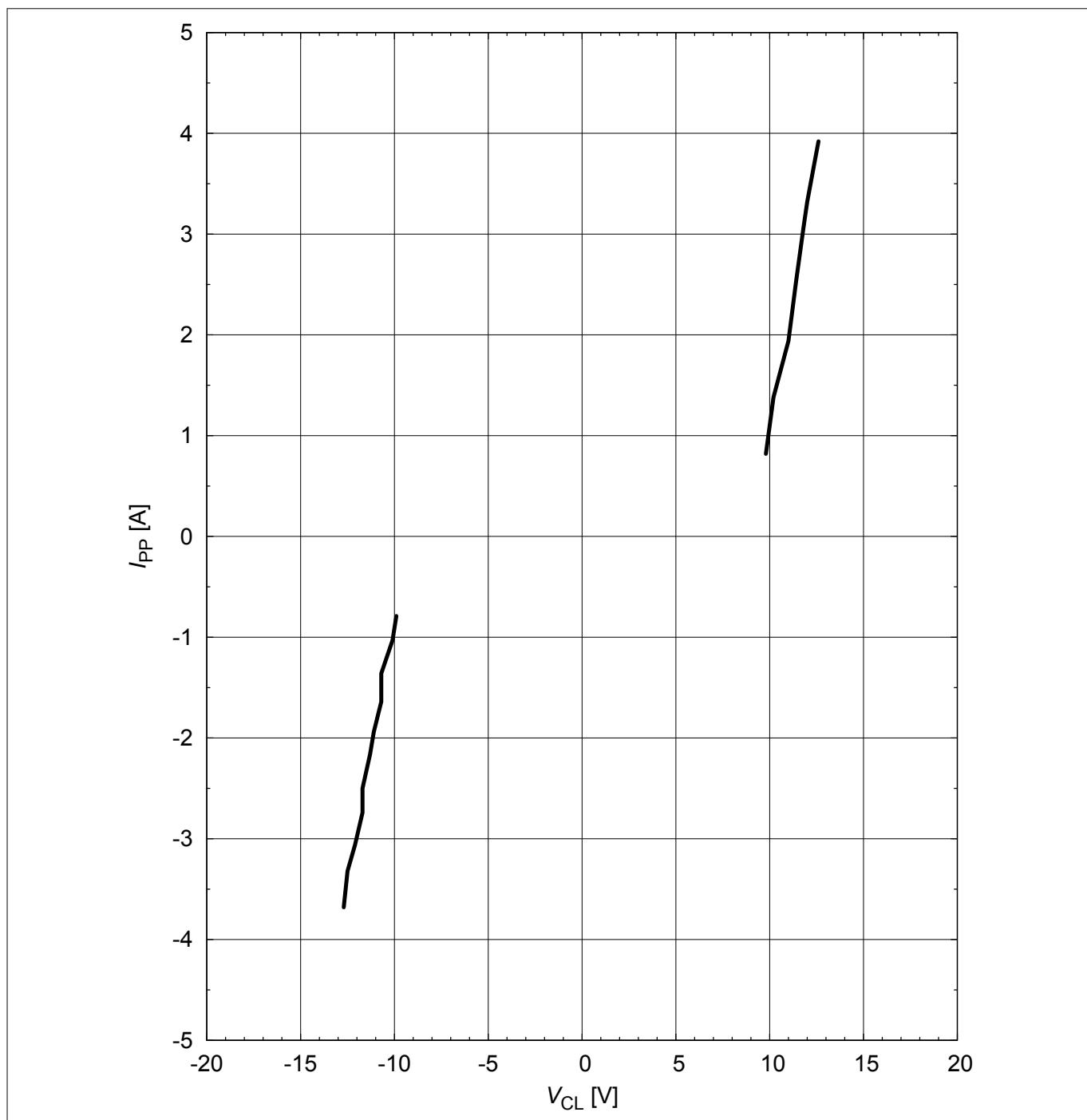


Figure 12 Clamping voltage (Surge): $I_{PP} = f(V_{CL})$ according to IEC61000-4-5 [1]

Typical characteristic diagrams

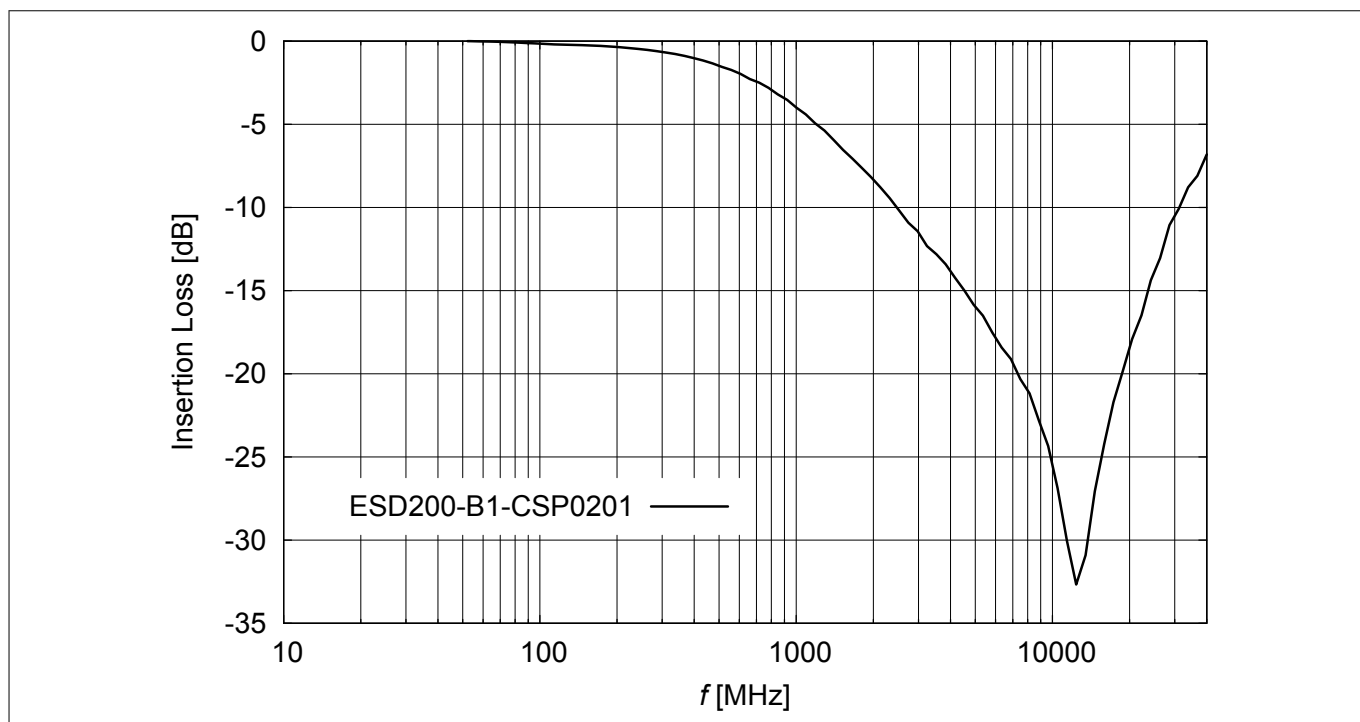


Figure 13 Insertion loss versus frequency in a 50 Ω system

Package information

4 Package information

4.1 WLL-2-1 package

Note: Dimensions in mm

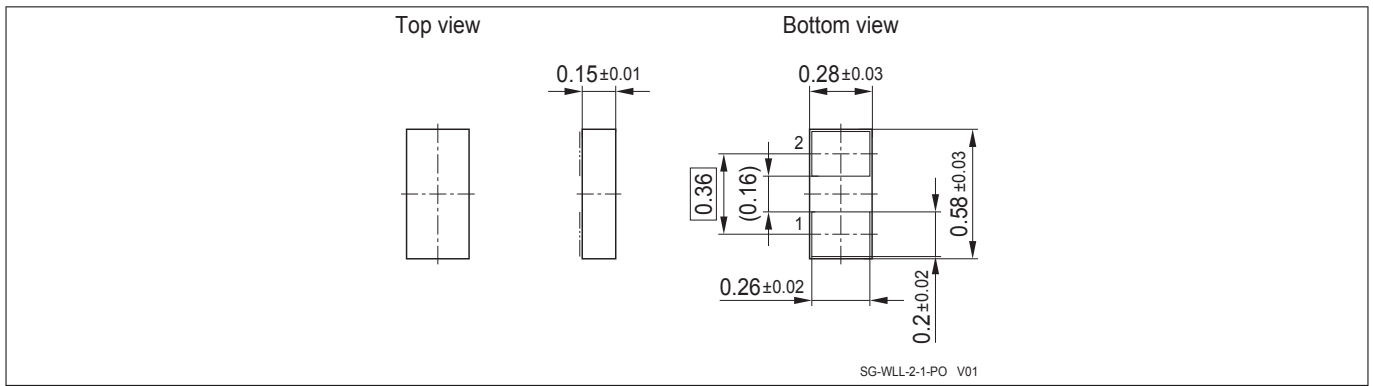


Figure 14 WLL-2-1 package outline

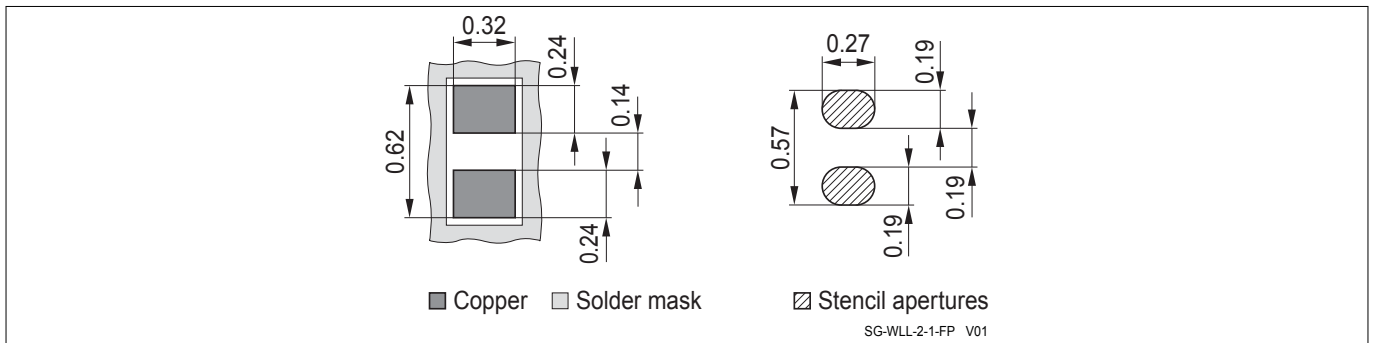


Figure 15 WLL-2-1 footprint

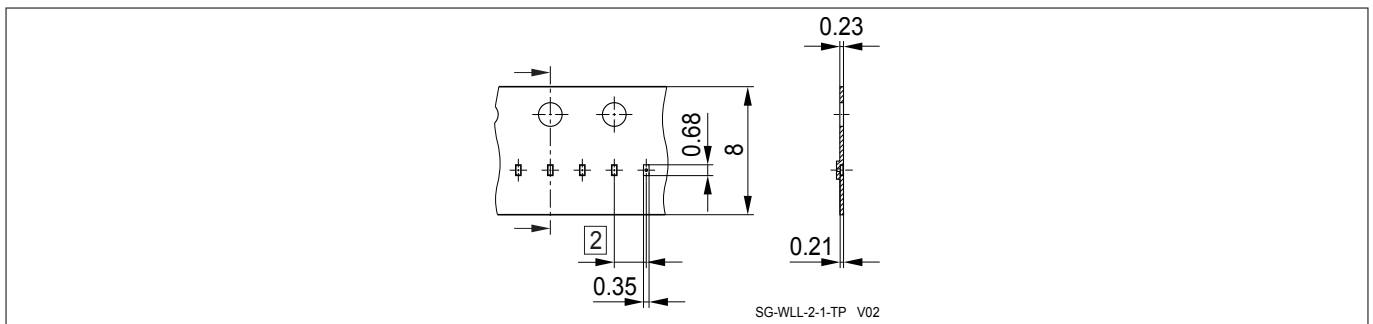


Figure 16 WLL-2-1 packing

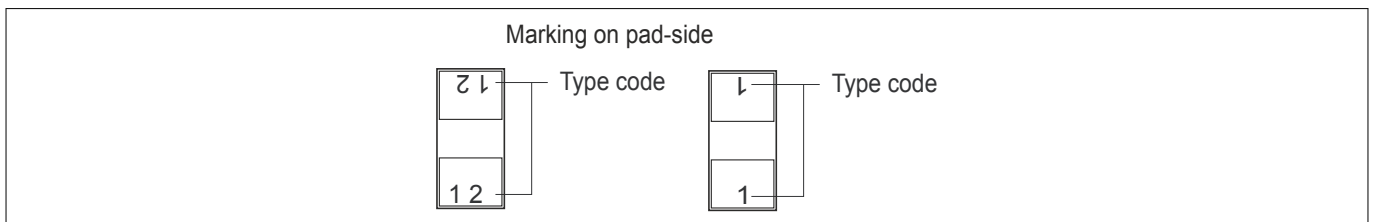


Figure 17 WLL-2-1 marking example (marking code see [Device information](#))

References

5 References

- [1] Infineon AG - **Application note AN210**: Effective ESD protection design at system level using VF-TLP characterization methodology
- [2] Infineon AG - Recommendations for Printed Circuit Board Assembly of Infineon WLL Packages
http://www.infineon.com/Packageinformation_WLL
- [3] Infineon AG - **Application note AN392**: TVS diodes in ChipScalePackage reduce size and save cost

Revision history

Revision history: Rev. 1.2. 2016-05-13

Page or Item	Subjects (major changes since previous revision)
Revision 1.3, 2018-02-19	
All	Data sheet layout changed
	References updated, editorial changes

Trademarks

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

Edition 2018-02-19

Published by
Infineon Technologies AG
81726 Munich, Germany

© 2018 Infineon Technologies AG
All Rights Reserved.

Do you have a question about any
aspect of this document?
Email: erratum@infineon.com

Document reference
IFX-sws1502286912666

IMPORTANT NOTICE

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

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