ESD241-B1-W0201

Bi-directional ESD protection device, 3.3 V, 6.5 pF, 0201

Product description

This Infineon ESD (electrostatic discharge) protection device has a bi-directional and symmetric *I*/*V* characteristic and excellent clamping performance.

Feature list

RoHS

Halogen-Free

- ESD / transient protection according to:
  - IEC61000-4-2 (ESD): ±18 kV (air) / ±18 kV (contact)
  - IEC61000-4-4 (EFT): ±2 kV / ±40 A (5/50 ns)
  - IEC61000-4-5 (Surge): ±4.5 A (8/20 µs)
- Bi-directional maximum working voltage: V_{WM} = ±3.3 V
- Line capacitance: C_L = 6.5 pF at f = 1 MHz
- Clamping voltage: V_{cl} = 6 V at I_{TLP} = 16 A with R_{dyn} = 0.09 Ω
- Very low leakage current: I_L =1 nA
- Small form factor SMD size 0201, low profile (0.58 x 0.28 x 0.15 mm^3)

Potential applications

- Keypads, touchpads, buttons, convenience keys, LCD displays, cameras, audio lines
- Mobile communication, notebooks, tablets, desktop computers, modules (WIFI, fingerprint, flash)

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
ESD241-B1-W0201/ESD241B1W0201E6327XTSA1	WLL-2-3	1 line, bi-directional	AC	15 k

Table of contents

Product description . . . 1
Feature list . . . 1
Potential applications . . . 1
Product validation . . . 1
Device information . . . 1
Table of contents . . . 2
1 Absolute maximum ratings . . . 3
2 Electrical characteristics . . . 4
3 Typical characteristic diagrams . . . 6
4 Package information WLL-2-3 . . . 12
References . . . 13
Revision history . . . 14
Disclaimer . . . 15

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}	-3.3	+3.3	V	
ESD discharge voltage	V_{ESD} (contact)	-18	+18	kV	Discharge network: R = 330 Ω, C = 150 pF [1]
	V_{ESD} (air)	-18	+18		
Peak pulse power	P_{PK}	–	25	W	Stress pulse: 8/20 µs current waveform [2]
Peak pulse current	I_{PP}	-4.5	+4.5	A	
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] Based on IEC61000-4-5.

2 Electrical characteristics

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

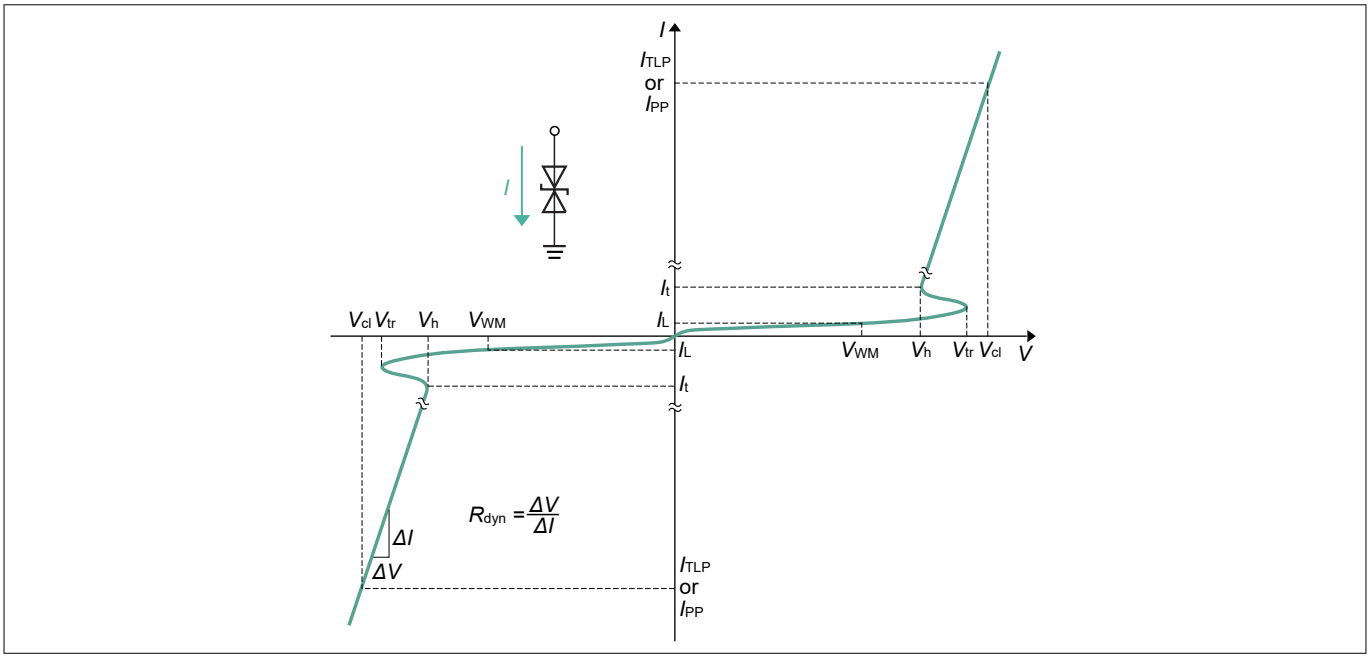


Figure 2 ***I/V* characteristic curve**

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

Note: *For more detailed explanation of electrical parameters, refer to [1].*

Table 4 DC characteristics

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Trigger voltage [3]	V_{tr}	5	6	7.5	V	
Holding voltage	V_h	4	5.7	7.2		I_t = 1 mA
Leakage current	I_L	–	1	30	nA	V_{WM} = 3.3 V

Table 5 AC characteristics

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Line capacitance	C_L	–	6.5	7.5	pF	V = 0 V, f = 1 MHz
		–	6.5	7.5		V = 0 V, f = 1 GHz
Series inductance	L_S	–	<1	–	nH	Extracted from S-parameters

Table 6 Protection characteristics

Parameter	Symbol	Values			Unit	Note or test condition
		Min.	Typ.	Max.		
Clamping voltage (TLP) [4] [5]	V_{cl}	–	5	–	V	I_{TLP} = 4 A
		–	5.4	–		I_{TLP} = 8 A
		–	6.1	–		I_{TLP} = 16 A
		–	7.4	–		I_{TLP} = 30 A
Clamping voltage (8/20 µs) [6]		–	5	–		I_{PP} = 1 A
		–	6.3	–		I_{PP} = 4.5 A
Dynamic resistance [4]	R_{dyn}	–	0.09	–	Ω	

3 Verified by design.
4 TLP parameters: Z_0 = 50 Ω, t_p = 100 ns, t_r = 0.6 ns, averaging window 30-60 ns.
5 Refer to application note [2].
6 t_p = 8/20 µs. Stress pulse based on IEC61000-4-5.

3 Typical characteristic diagrams

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

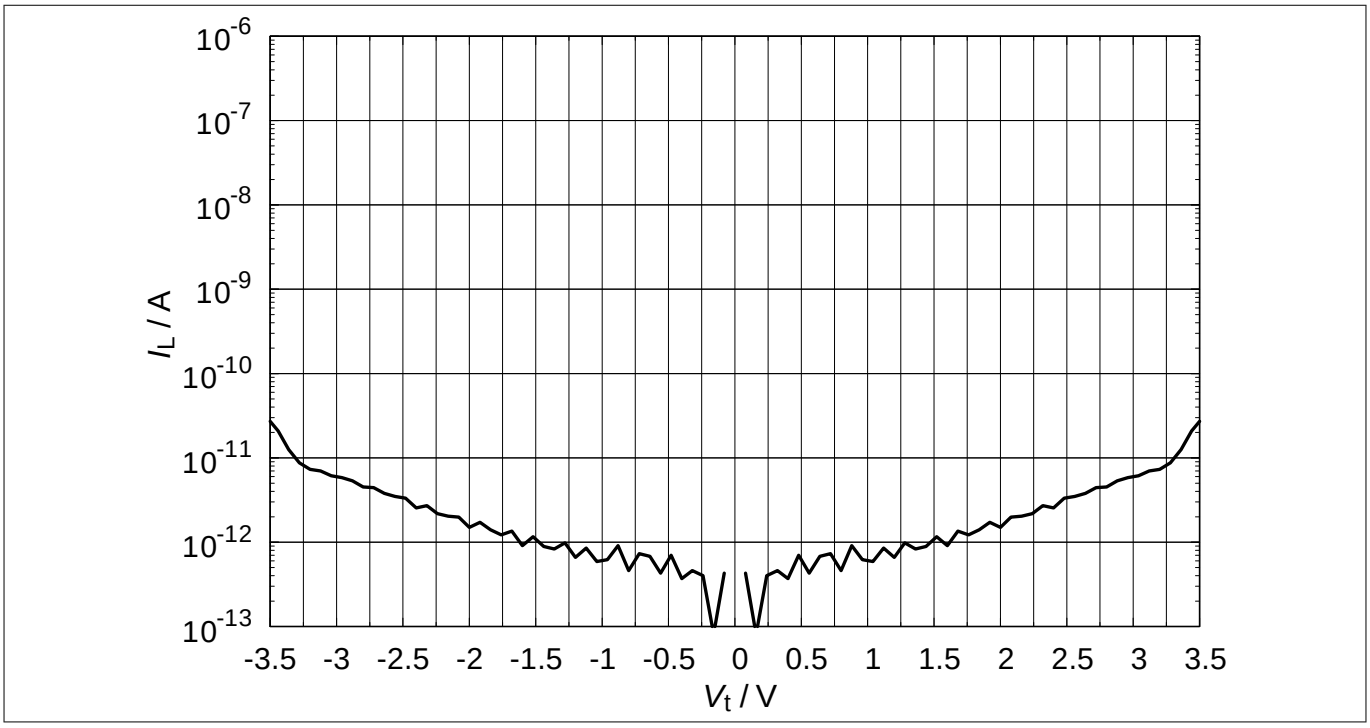


Figure 3 **Leakage current: I_L = f(V_t)**

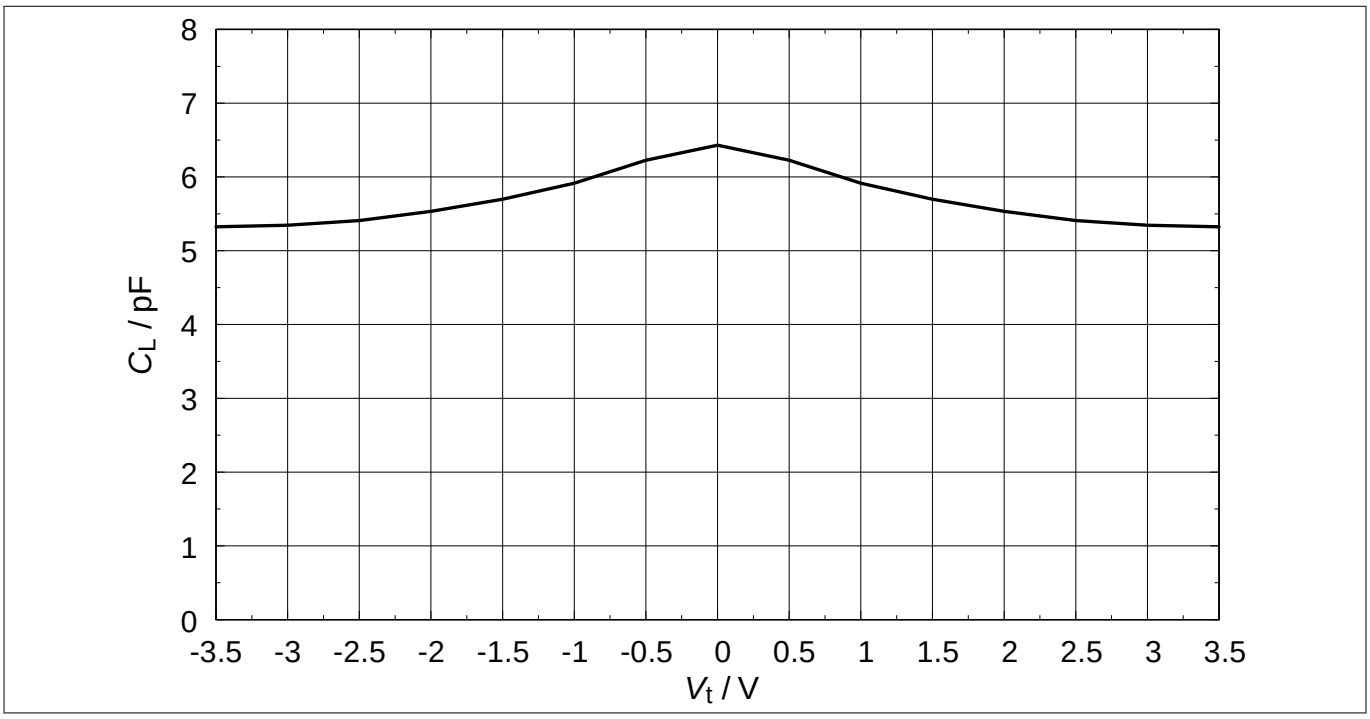


Figure 4 **Line capacitance: C_L = f(V_t), f = 1 MHz**

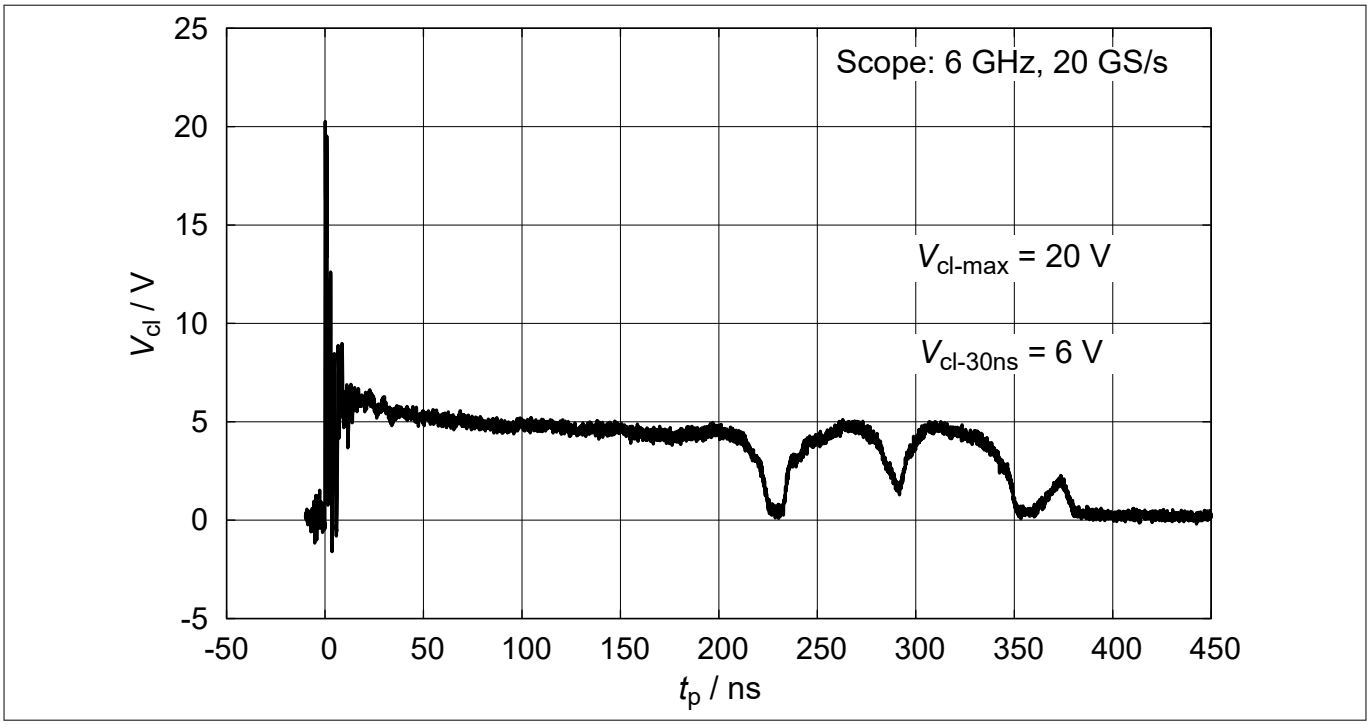


Figure 5 **Clamping voltage (ESD): V_{cl} = f(t_p), 8 kV positive pulse based on IEC61000-4-2**

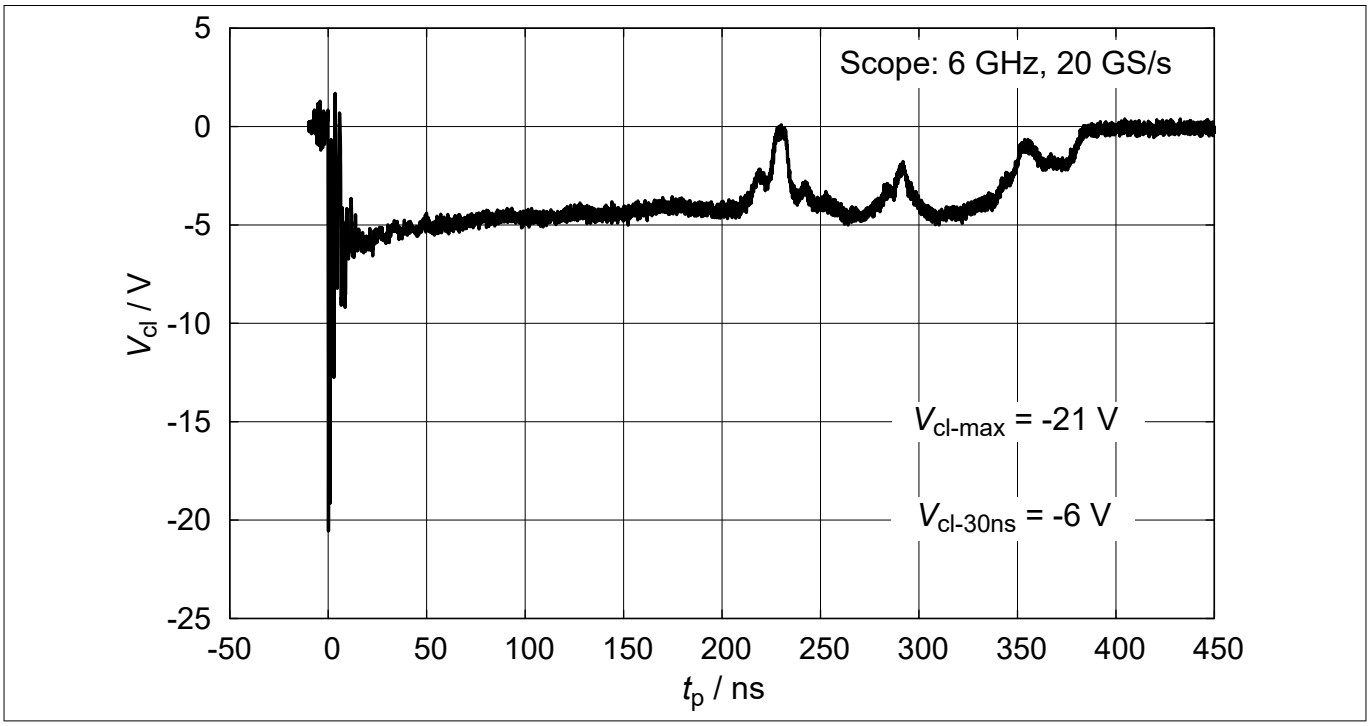


Figure 6 **Clamping voltage (ESD): V_{cl} = f(t_p), 8 kV negative pulse based on IEC61000-4-2**

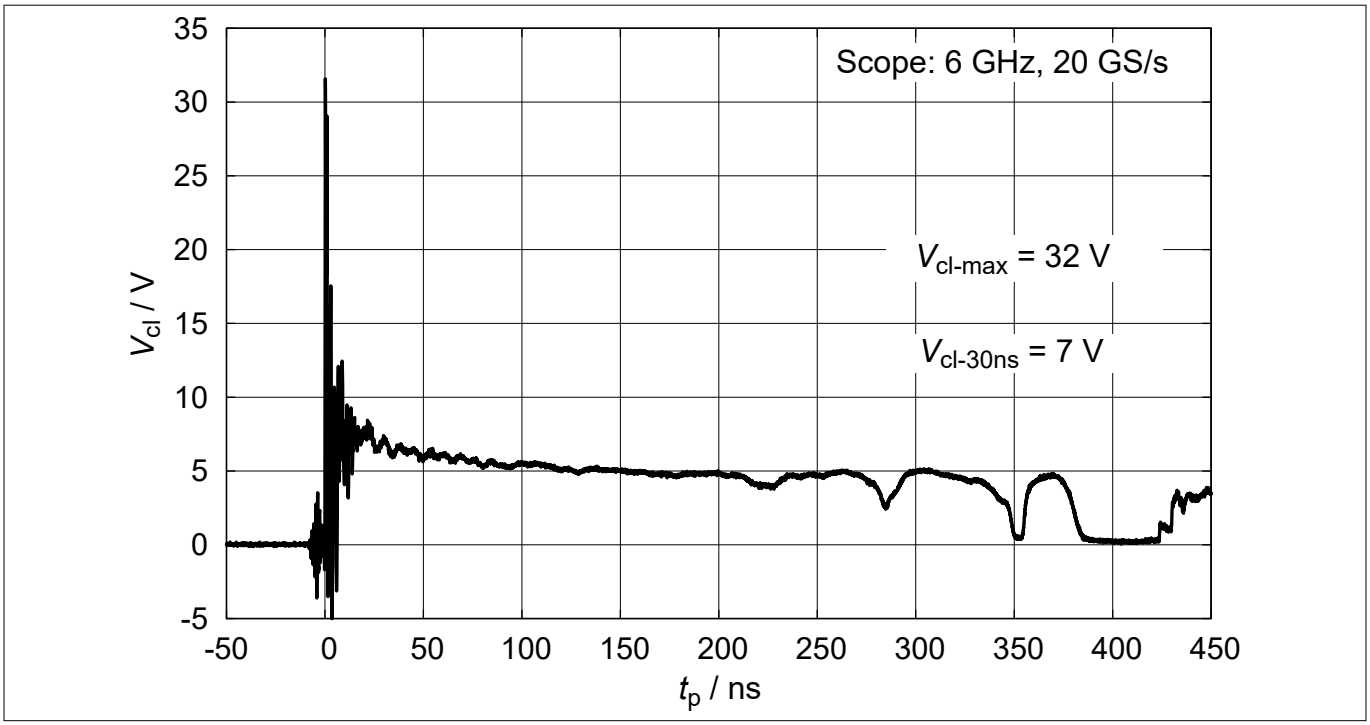


Figure 7 **Clamping voltage (ESD): V_{cl} = f(t_p), 15 kV positive pulse based on IEC61000-4-2**

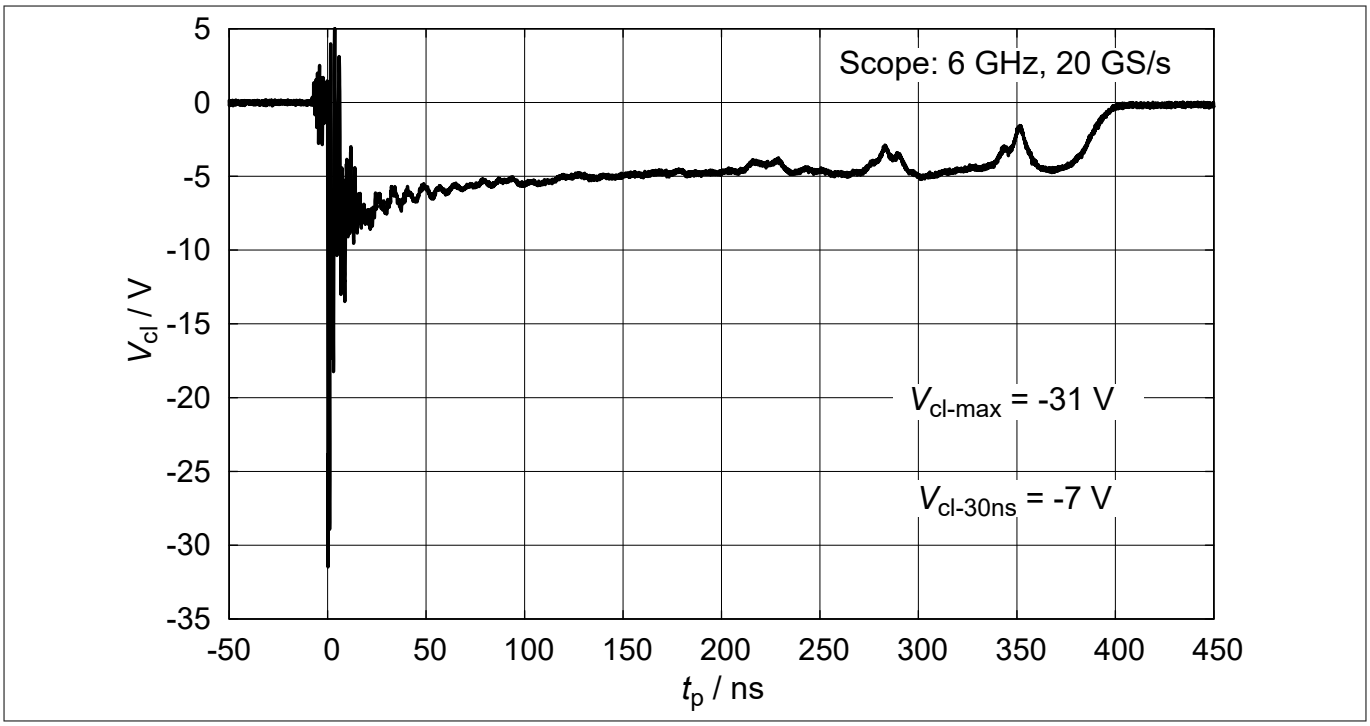


Figure 8 **Clamping voltage (ESD): V_{cl} = f(t_p), 15 kV negative pulse based on IEC61000-4-2**

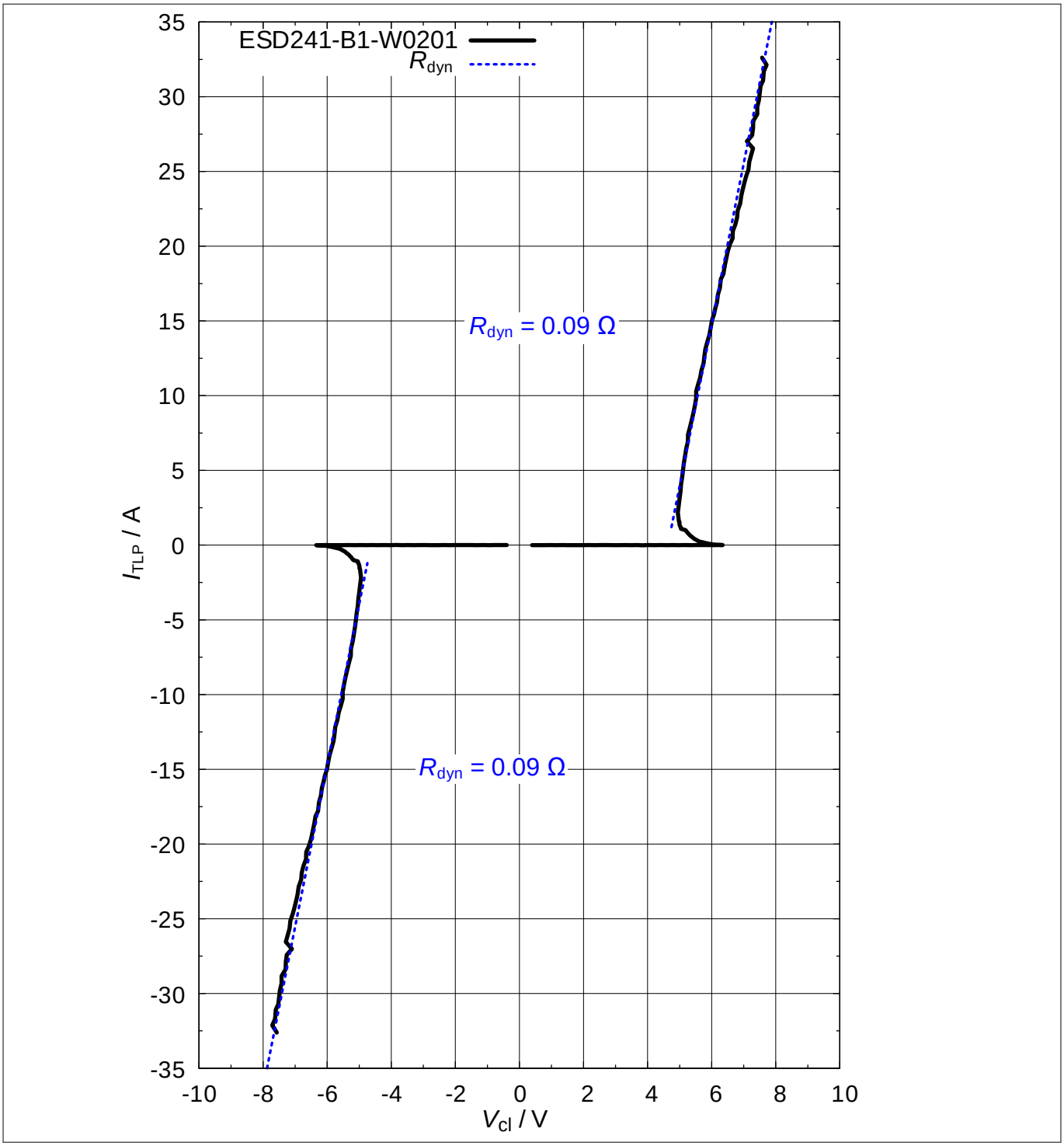


Figure 9 **Clamping voltage (TLP): I_{TLP} = f(V_{cl})**

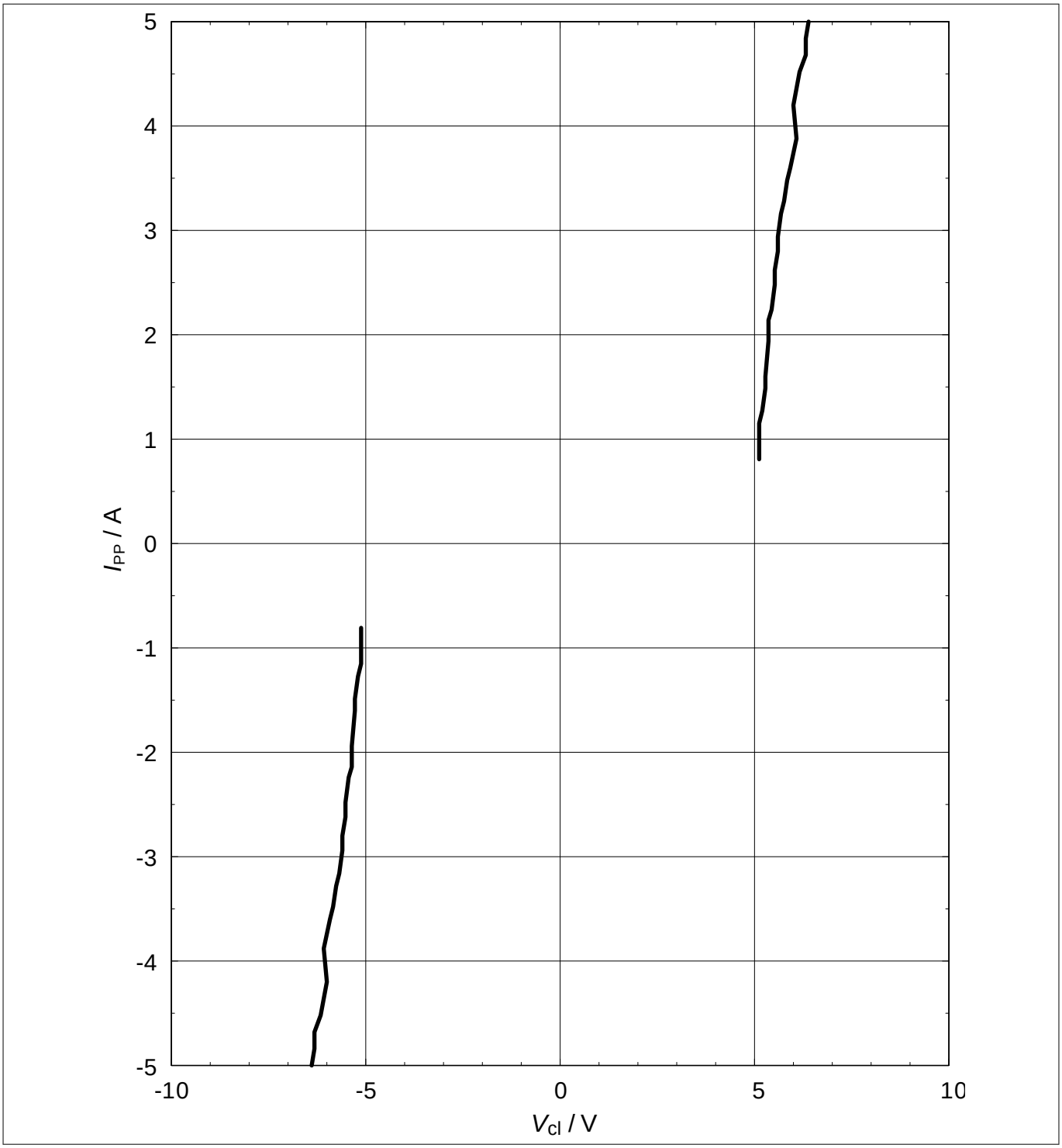


Figure 10 **Clamping voltage (Surge): I_{PP} = f(V_{cl}), based on IEC61000-4-5**

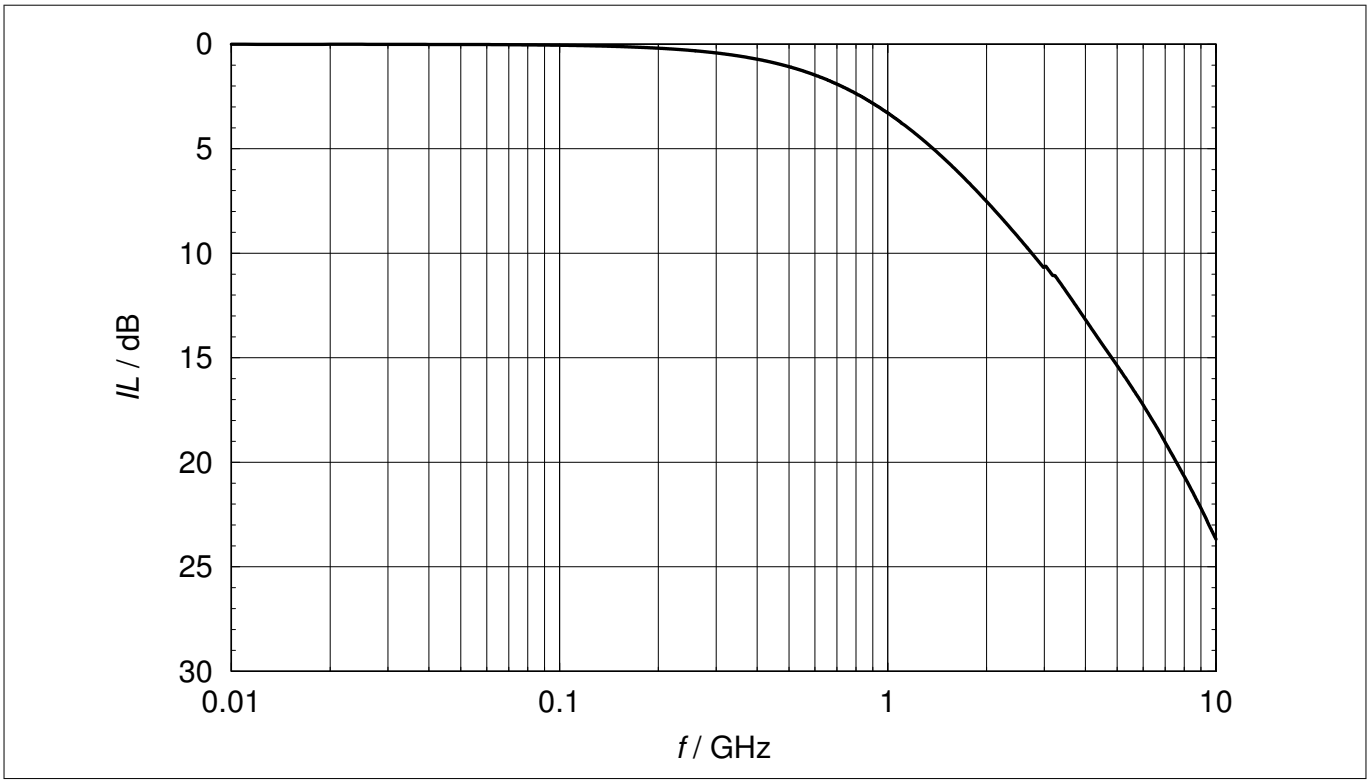
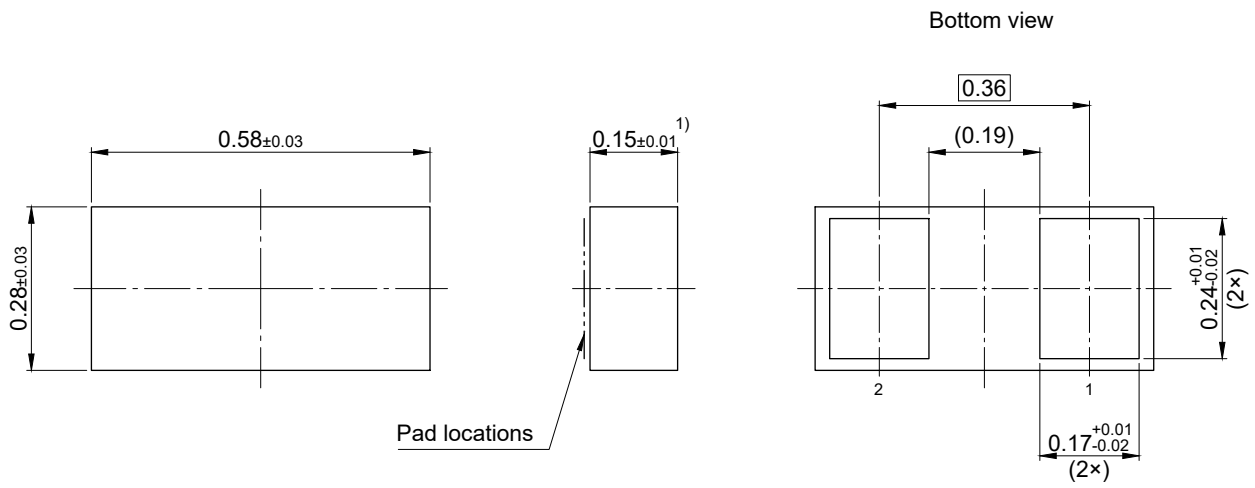


Figure 11 **Insertion loss: IL = f(*f*), measured in a 50 Ω system**

4 Package information WLL-2-3



1) The total package height includes the pad thickness
All dimensions are in units mm
The drawing is in compliance with ISO 128-30, Projection Method 1 [ ]
Drawing according to ISO 8015, general tolerances

Figure 12 WLL-2-3 package

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

https://www.infineon.com/package/SG-WLL-2-3/

References

[1] Infineon Technologies AG: *Understanding ESD protection device characteristics product information*; Available online

[2] Infineon Technologies AG: *Effective ESD protection design at system level using VF-TLP characterization methodology application note*; Available online

Revision history

Document version	Date of release	Description of changes
1.1	2017-11-27	Initial release
1.2	2018-03-19	Max value of electrical parameter V_{tr} updated Editorial changes
2.0	2021-04-19	New datasheet layout Potential applications and electrical values updated Insertion loss curve added
2.1	2025-07-30	Updated new package drawing
2.2	2026-06-19	Updated Insertion loss curve

Trademarks

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

Edition 2026-06-19

Published by

Infineon Technologies AG

81726 Munich, Germany

© 2026 Infineon Technologies AG

All Rights Reserved.

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

Email: erratum@infineon.com

Document reference
IFX-pvt1605187004795

Important notice

Products which may also include samples and may be comprised of hardware or software or both ("Product(s)") are sold or provided and delivered by Infineon Technologies AG and its affiliates ("Infineon") subject to the terms and conditions of the frame supply contract or other written agreement(s) executed by a customer and Infineon or, in the absence of the foregoing, the applicable Sales Conditions of Infineon. General terms and conditions of a customer or deviations from applicable Sales Conditions of Infineon shall only be binding for Infineon if and to the extent Infineon has given its express written consent.

For the avoidance of doubt, Infineon disclaims all warranties of non-infringement of third-party rights and implied warranties such as warranties of fitness for a specific use/purpose or merchantability. Infineon shall not be responsible for any information with respect to samples, the application or customer's specific use of any Product or for any examples or typical values given in this document.

If this document is marked as 'Preliminary', 'Target', 'Draft' or 'Proposal', Infineon reserves the right to change all information given in this document at any time without notice. Subject to the development and release of a Product for series supply by Infineon, the technical specifications of the Product are set forth in the relevant datasheet provided by Infineon without such marking.

The data contained in this document is exclusively intended for technically qualified and skilled customer representatives. It is the responsibility of the customer to evaluate the suitability of the Product for the intended application and the customer's specific use and to verify all relevant technical data contained in this document in the intended application and the customer's specific use. The customer is responsible for properly designing, programming, and testing the functionality and safety of the intended application, as well as complying with any legal requirements related to its use.

Unless otherwise explicitly approved by Infineon, Products may not be used in any application where a failure of the Products or any consequences of the use thereof can reasonably be expected to result in personal injury.

However, the foregoing shall not prevent the customer from using any Product in such fields of use that Infineon has explicitly designed and sold it for, provided that the overall responsibility for the application lies with the customer. Infineon expressly reserves the right to use its content for commercial text and data mining (TDM) according to applicable laws, e.g. Section 44b of the German Copyright Act (UrhG). If the Product includes security features:

Because no computing device can be absolutely secure, and despite security measures implemented in the Product, Infineon does not guarantee that the Product will be free from intrusion, data theft or loss, or other breaches ("Security Breaches"), and Infineon shall have no liability arising out of any Security Breaches.

If this document includes or references software:

The software is owned by Infineon under the intellectual property laws and treaties of the United States, Germany, and other countries worldwide. All rights reserved. Therefore, you may use the software only as provided in the software license agreement accompanying the software.

If no software license agreement applies, Infineon hereby grants you a personal, non-exclusive, non-transferable license (without the right to sublicense) under its intellectual property rights in the software (a) for software provided in source code form, to modify and reproduce the software solely for use with Infineon hardware products, only internally within your organization, and (b) to distribute the software in binary code form externally to end users, solely for use on Infineon hardware products. Any other use, reproduction, modification, translation, or compilation of the software is prohibited.

For further information on the Product, technology, delivery terms and conditions, and prices, please contact your nearest Infineon office or visit www.infineon.com.