

TVS Diode

Transient Voltage Suppressor Diodes

ESD300-B1-02LRH

Low Clamping & Low Capacitance ESD/Surge Protection Diode

ESD300-B1-02LRH

Data Sheet

Revision 1.2, 2013-11-26
Final

Revision History: Revision 1.1, 2013-06-17

Page or Item	Subjects (major changes since previous revision)
Revision 1.2, 2013-11-26	
4	Update of Figure 2-1)

Trademarks of Infineon Technologies AG

AURIX™, BlueMoon™, C166™, CanPAK™, CIPOS™, CIPURSE™, COMNEON™, EconoPACK™, CoolMOS™, CoolSET™, CORECONTROL™, CROSSAVE™, DAVE™, EasyPIM™, EconoBRIDGE™, EconoDUAL™, EconoPIM™, EiceDRIVER™, eupec™, FCOS™, HITFET™, HybridPACK™, I²RF™, ISOFACE™, IsoPACK™, MIPAQ™, ModSTACK™, my-d™, NovalithIC™, OmniTune™, OptiMOS™, ORIGATM, PRIMARION™, PrimePACK™, PrimeSTACK™, PRO-SIL™, PROFET™, RASIC™, ReverSave™, SatRIC™, SIEGETM, SINDRION™, SIPMOS™, SMARTi™, SmartLEWIS™, SOLID FLASH™, TEMPFET™, thinQ!™, TRENCHSTOP™, TriCore™, X-GOLD™, X-PMU™, XMM™, XPOSYS™.

Other Trademarks

Advance Design System™ (ADS) of Agilent Technologies, AMBA™, ARM™, MULTI-ICE™, KEIL™, PRIMECELL™, REALVIEW™, THUMB™, μVision™ of ARM Limited, UK. AUTOSAR™ is licensed by AUTOSAR development partnership. Bluetooth™ of Bluetooth SIG Inc. CAT-ig™ of DECT Forum. COLOSSUS™, FirstGPS™ of Trimble Navigation Ltd. EMV™ of EMVCo, LLC (Visa Holdings Inc.). EPCOS™ of Epcos AG. FLEXGO™ of Microsoft Corporation. FlexRay™ is licensed by FlexRay Consortium. HYPERTERMINAL™ of Hilgraeve Incorporated. IEC™ of Commission Electrotechnique Internationale. IrDA™ of Infrared Data Association Corporation. ISO™ of INTERNATIONAL ORGANIZATION FOR STANDARDIZATION. MATLAB™ of MathWorks, Inc. MAXIM™ of Maxim Integrated Products, Inc. MICROTEC™, NUCLEUS™ of Mentor Graphics Corporation. Mifare™ of NXP. MIPI™ of MIPI Alliance, Inc. MIPS™ of MIPS Technologies, Inc., USA. muRata™ of MURATA MANUFACTURING CO., MICROWAVE OFFICE™ (MWO) of Applied Wave Research Inc., OmniVision™ of OmniVision Technologies, Inc. Openwave™ Openwave Systems Inc. RED HAT™ Red Hat, Inc. RFMD™ RF Micro Devices, Inc. SIRIUS™ of Sirius Satellite Radio Inc. SOLARIS™ of Sun Microsystems, Inc. SPANSION™ of Spansion LLC Ltd. Symbian™ of Symbian Software Limited. TAIYO YUDEN™ of Taiyo Yuden Co. TEAKLITE™ of CEVA, Inc. TEKTRONIX™ of Tektronix Inc. TOKO™ of TOKO KABUSHIKI KAISHA TA. UNIX™ of X/Open Company Limited. VERILOG™, PALLADIUM™ of Cadence Design Systems, Inc. VLYNQ™ of Texas Instruments Incorporated. VXWORKS™, WIND RIVER™ of WIND RIVER SYSTEMS, INC. ZETEX™ of Diodes Zetex Limited.

Last Trademarks Update 2010-10-26

1 Low Clamping & Low Capacitance ESD/Surge Protection Diode

1.1 Features

- Extremely high ESD and surge protection
 - IEC61000-4-2 (ESD): ± 30 kV (air/contact discharge)
 - IEC61000-4-5 (surge): ± 18 A (8/20 μ s)
- Low clamping voltage $V_{CL} < 8$ V (8 kV contact)
- Maximum peak pulse power $P_{PP} = 260$ W (8/20 μ s)
- Extremely low dynamic resistance: $R_{DYN} = 0.23$ Ω typ.
- Supports applications with signal voltage 3.3 V max.
- Line capacitance: $C_L = \text{typ. } 1.2$ pF
- Package TSLP-2-17 compatible to SOD882D leadless ultra small Surface-Mounted Device (SMD)
- Size 1 mm x 0.6 mm x 0.39 mm (0402)



1.2 Application Examples

- Reliable ESD and surge protection of highly susceptible IC/ASICs in computers and peripherals, audio, headset, human digital interfaces, video equipment, cellular handsets and accessories and portable electronics
- Dedicated solution to boost ESD and surge protection performance in miniaturized modern electronics
- 10/100/1000 Ethernet

1.3 Product Description



Figure 1-1 Pin Configuration and Schematic Diagram

Table 1-1 Ordering Information

Type	Package	Configuration	Marking code
ESD300-B1-02LRH	TSLP-2-17	1 line, bi-directional	S3

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

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Reverse working voltage	V_{RWM}	-3.3	-	3.3	V	
Reverse current	I_R	-	-	100	nA	$V_R = 3.3\text{ V}$

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

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Line capacitance	C_L	-	1.2	1.8	pF	$V_R = 0\text{ V}, f = 1\text{ MHz}$

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

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Clamping voltage ¹⁾	V_{CL}	-	8	-	V	$V_{ESD} = 8\text{ kV}, t_p = 30\text{ ns}$ contact discharge
Clamping voltage ²⁾	V_{CL}	-	5	-	V	$t_p = 8/20\text{ }\mu\text{s}$ $I_{PP} = 1\text{ A}$ $I_{PP} = 12\text{ A}$ $I_{PP} = 18\text{ A}$
		-	8.5	-		
		-	10.5	-		
Clamping voltage ³⁾	V_{CL}	-	9.5	-	V	$t_p = 100\text{ ns}$ $I_{PP} = 16\text{ A}$ $I_{PP} = 30\text{ A}$
		-	12.5	-		
Dynamic resistance ³⁾	R_{DYN}	-	0.23	-	Ω	

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

2) I_{PP} according to IEC61000-4-5 ($t_p = 8/20\text{ }\mu\text{s}$)

3) ANSI/ESD STM5.5.1 - Electrostatic Discharge Sensitive Testing using Transmission Line Pulse (TLP) Model. TLP conditions: $Z_0 = 50\text{ }\Omega, t_p = 100\text{ ns}, t_r = 0.6\text{ ns}, I_{TLP}$ 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 $I_{TLP1} = 10\text{ A}$ and $I_{TLP2} = 40\text{ A}$. Please refer to Application Note AN210 [1]

Typical Characteristics at $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified

3 Typical Characteristics at $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified

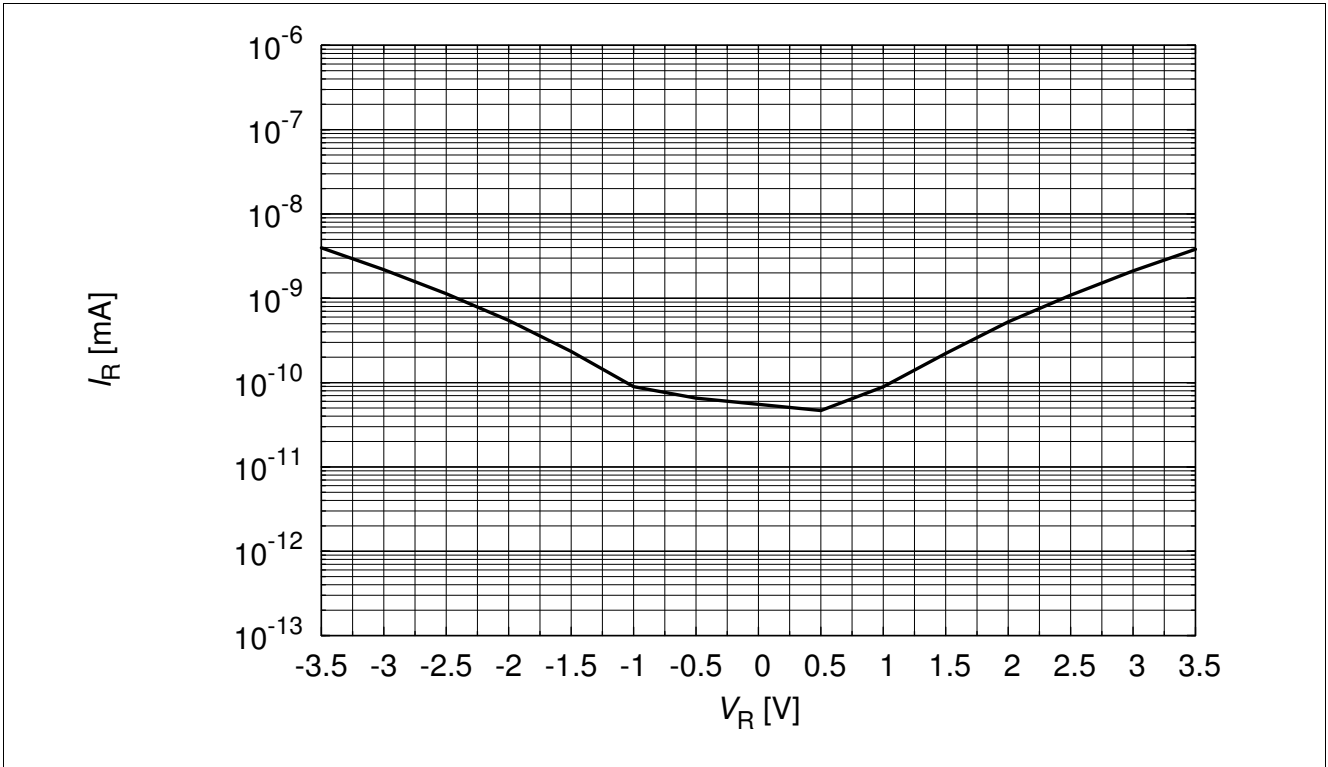


Figure 3-1 Reverse current: $I_R = f(V_R)$

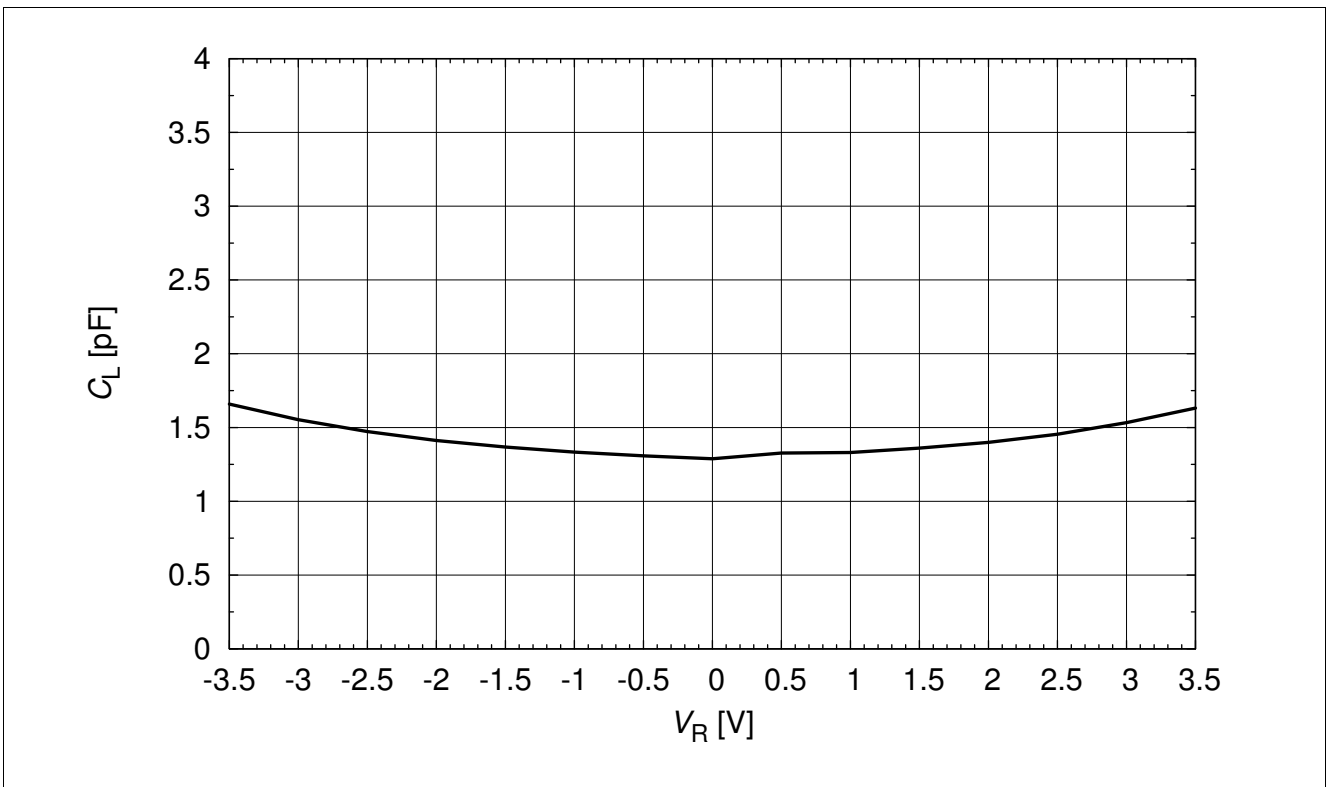


Figure 3-2 Line capacitance: $C_L = f(V_R), f = 1\text{ MHz}$

Typical Characteristics at $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified

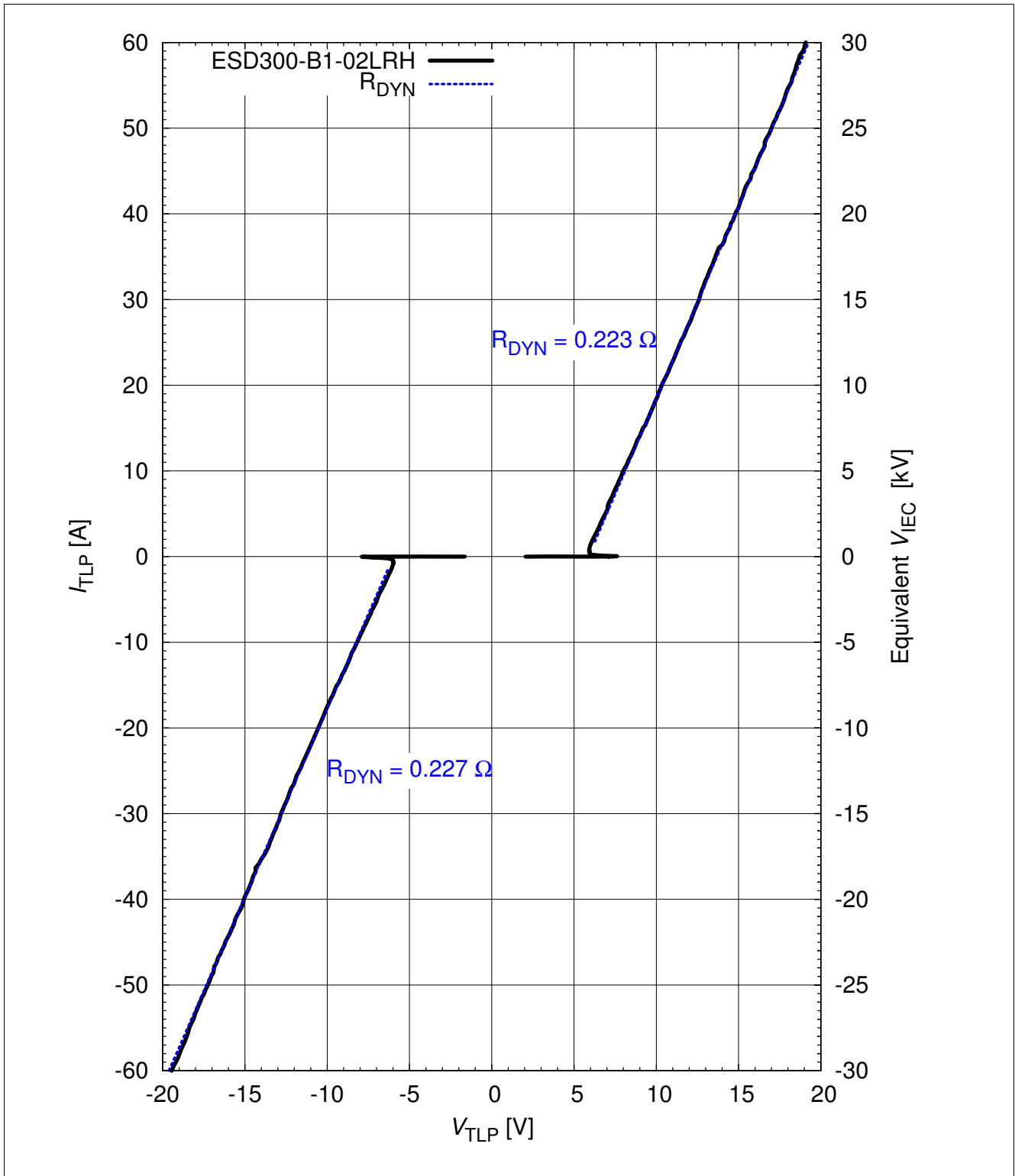


Figure 3-3 Clamping voltage (TLP): $I_{TLP} = f(V_{TLP})$ according ANSI/ESD STM5.5.1 - Electrostatic Discharge Sensitivity Testing using Transmission Line Pulse (TLP) Model. TLP conditions: $Z_0 = 50\ \Omega$, $t_p = 100\text{ ns}$, $t_r = 0.6\text{ ns}$, I_{TLP} and V_{TLP} averaging window: $t_1 = \text{ns}$ to $t_2 = 60\text{ ns}$, extraction of dynamic resistance using squares fit to TLP characteristics between $I_{TLP1} = 10\text{ A}$ and $I_{TLP2} = 40\text{ A}$. Please refer to Application Note AN210 [1]

Typical Characteristics at $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified

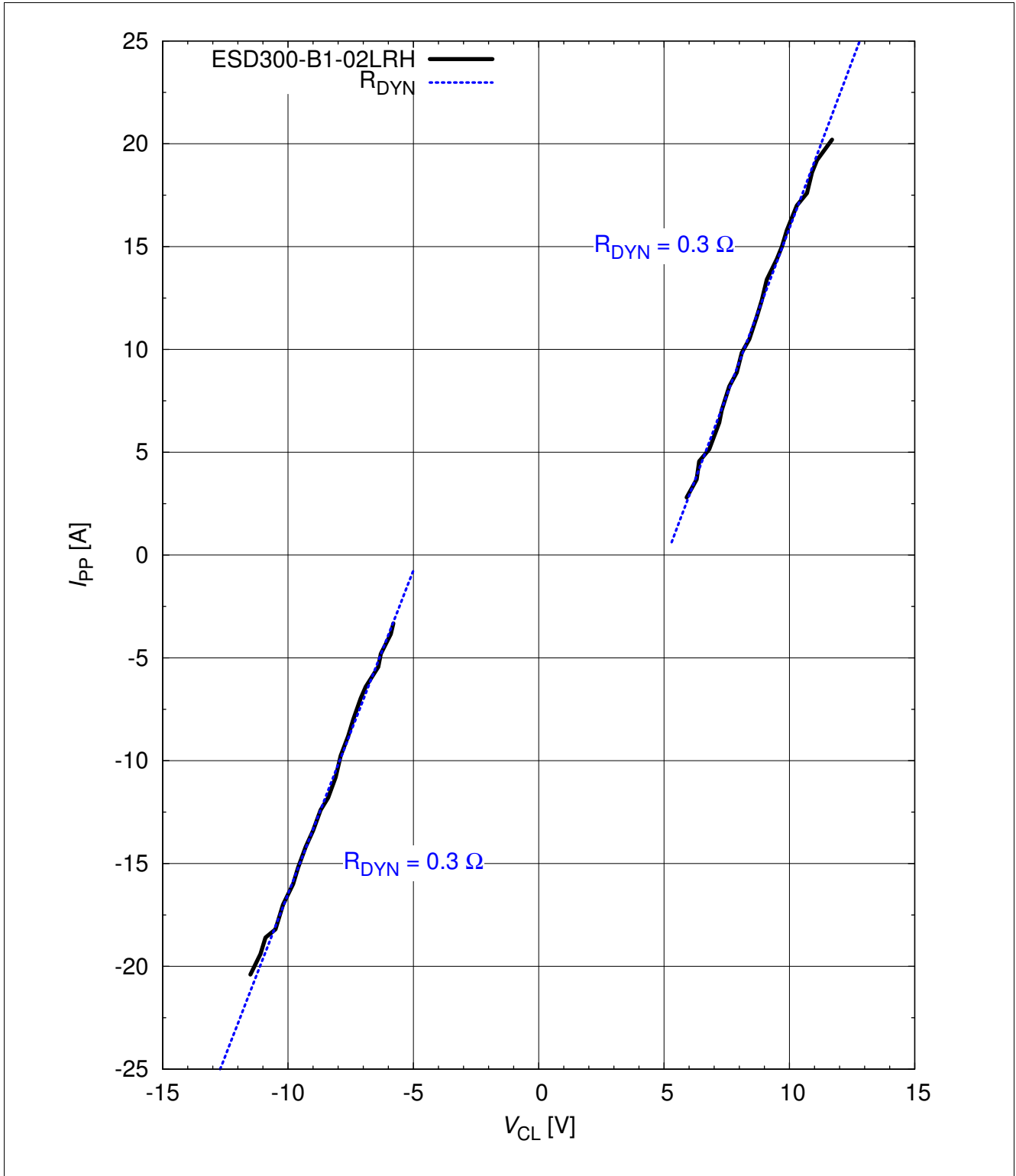


Figure 3-4 Pulse current (IEC61000-4-5) versus clamping voltage: $I_{PP} = f(V_{CL})$

Typical Characteristics at $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified

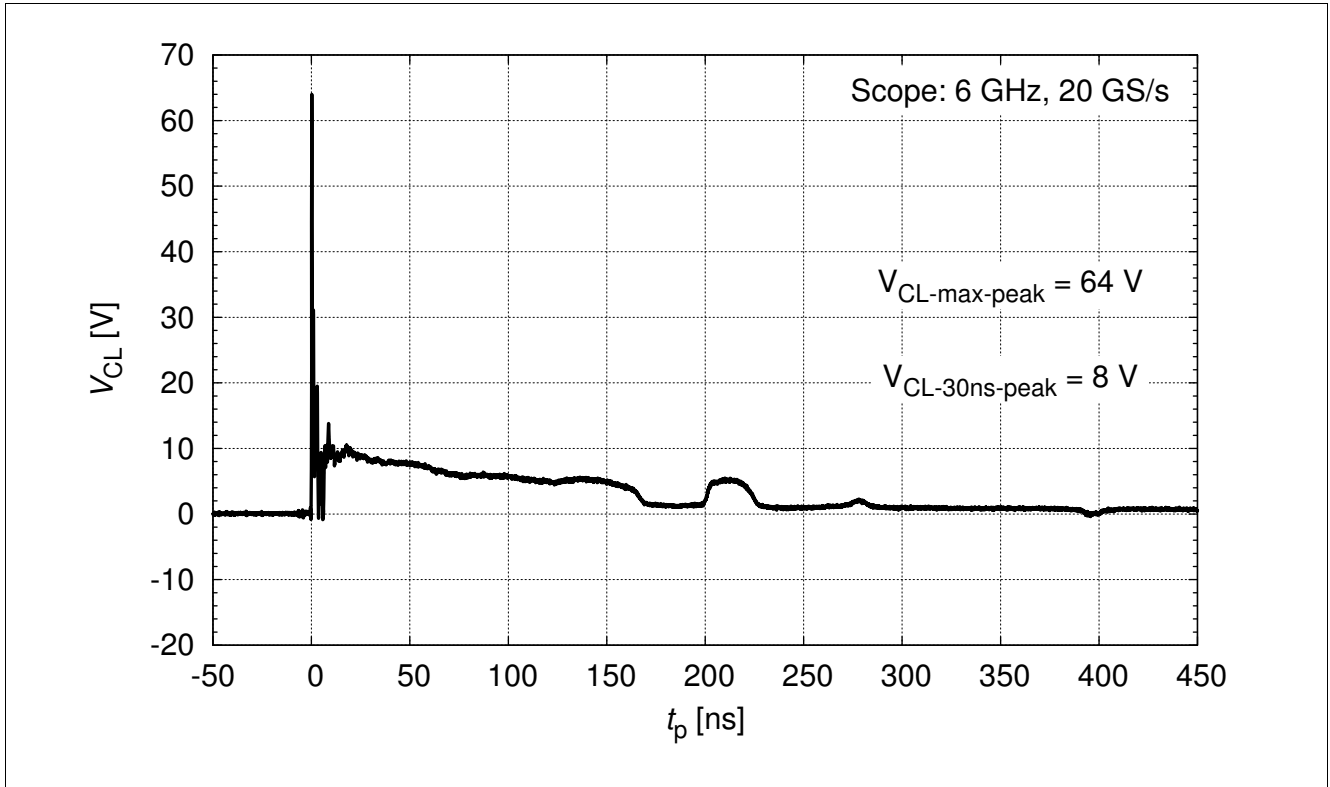


Figure 3-5 IEC61000-4-2 : $V_{CL} = f(t)$, 8 kV positive pulse from pin 1 to pin 2

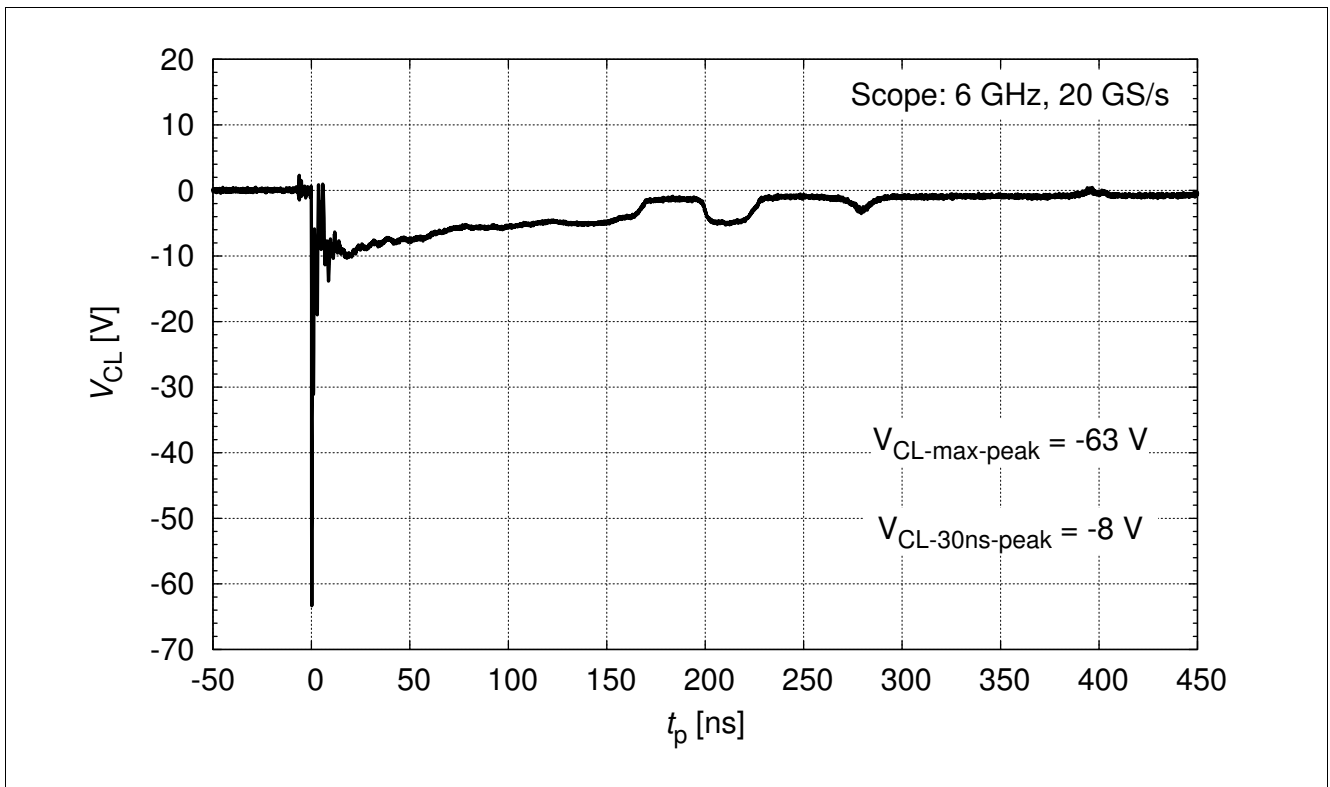


Figure 3-6 IEC61000-4-2 : $V_{CL} = f(t)$, 8 kV negative pulse from pin 1 to pin 2

Typical Characteristics at $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified

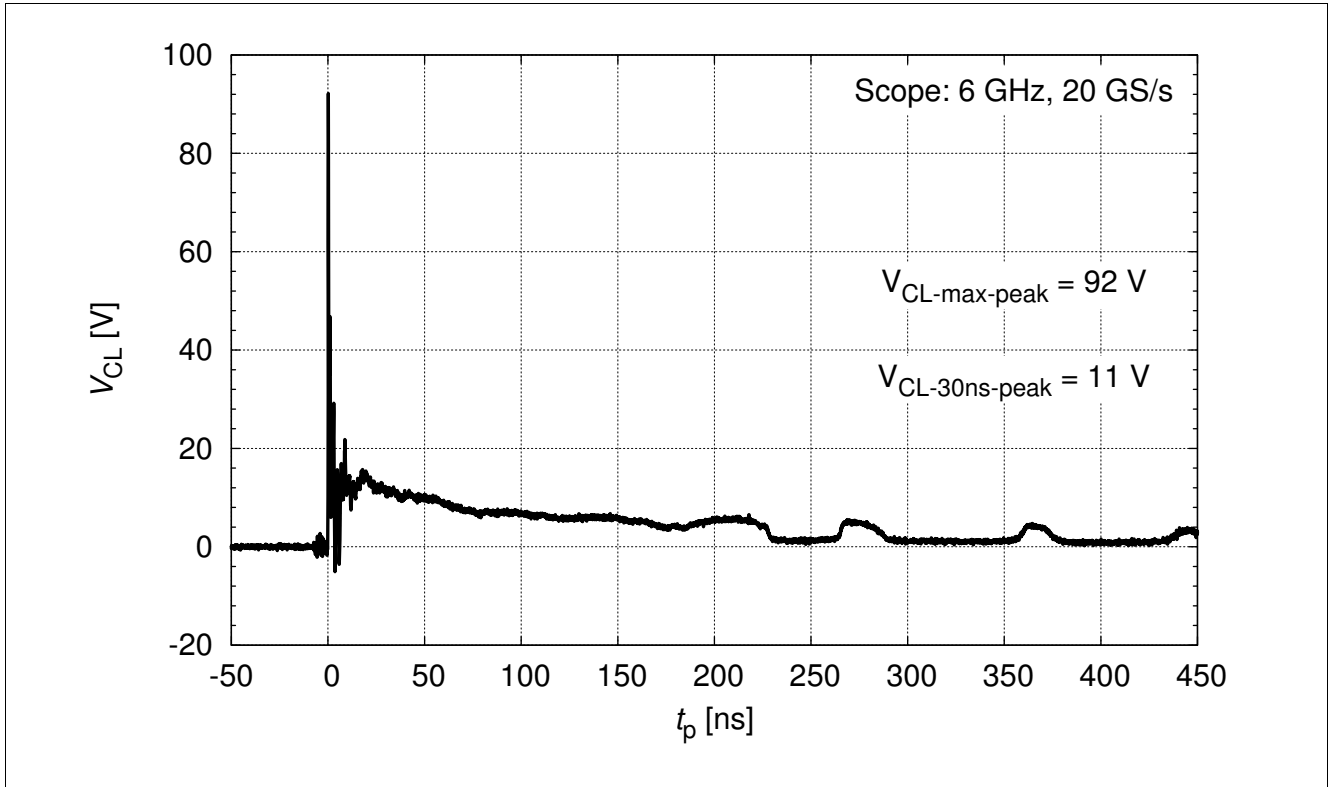


Figure 3-7 IEC61000-4-2 : $V_{CL} = f(t)$, 15 kV positive pulse from pin 1 to pin 2

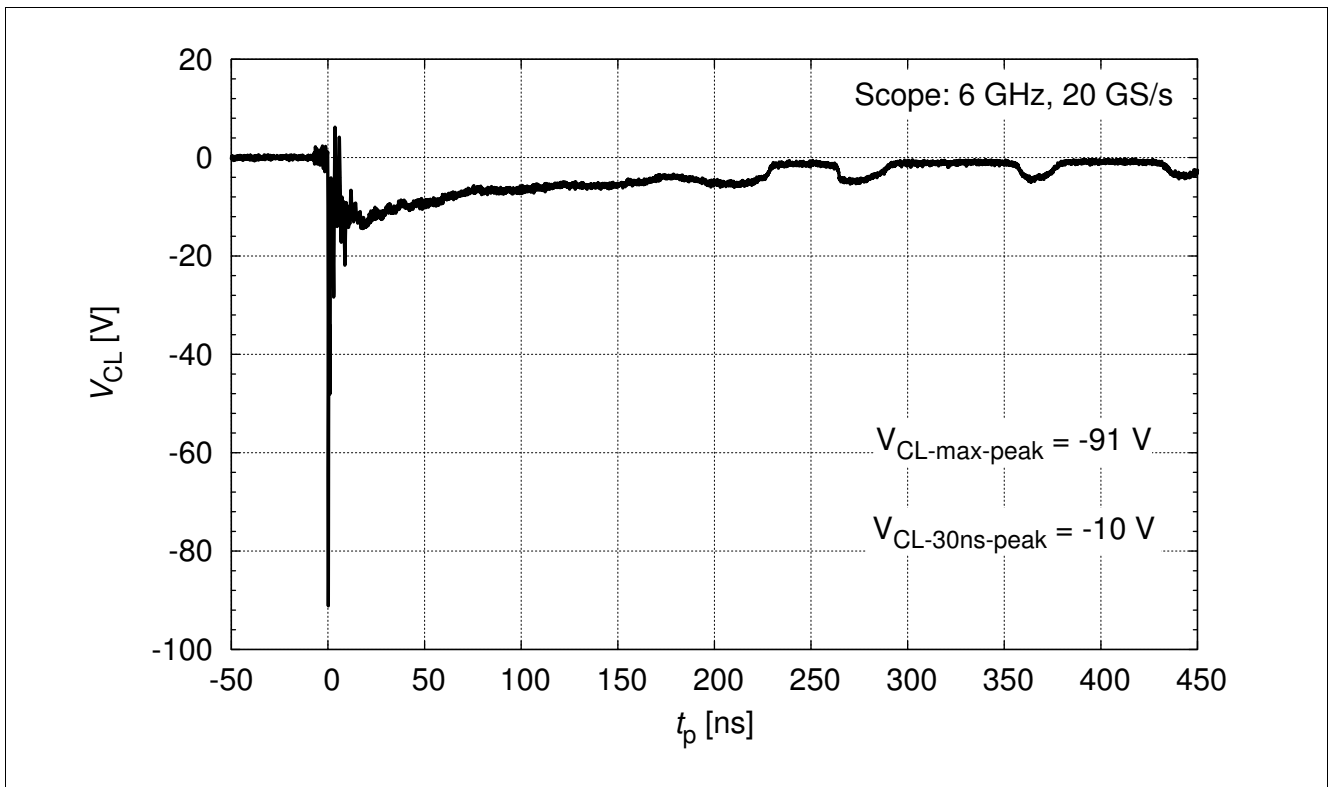


Figure 3-8 IEC61000-4-2 : $V_{CL} = f(t)$, 15 kV negative pulse from pin 1 to pin 2

4 Package Information

4.1 TSLP-2-17

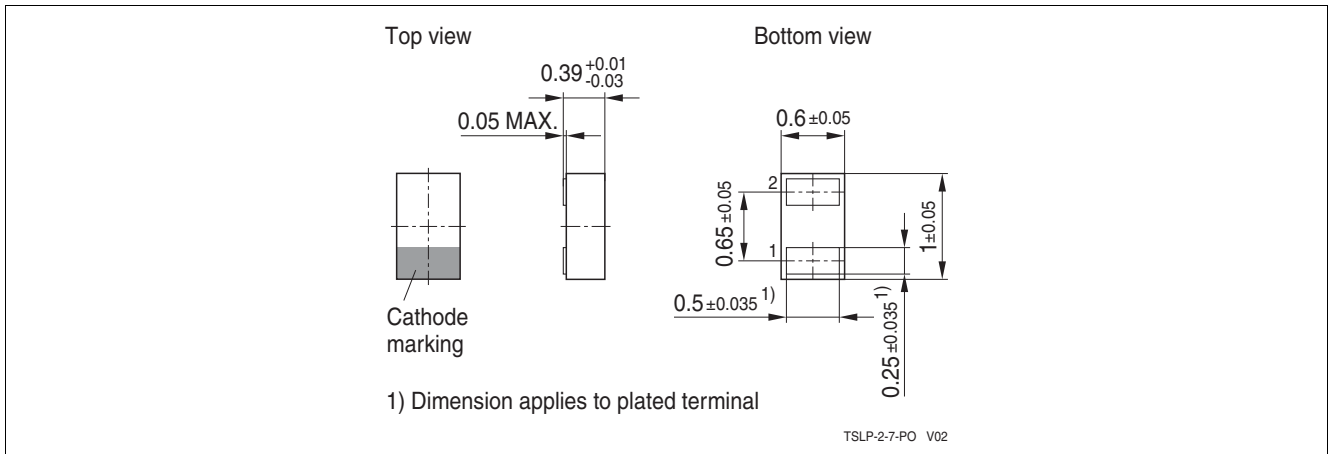


Figure 4-1 TSLP-2-17 Package outline (dimension in mm)

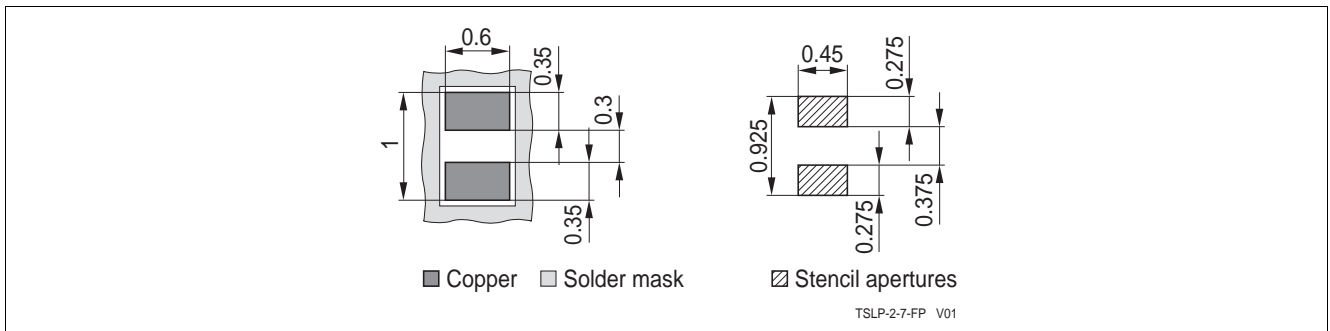


Figure 4-2 TSLP-2-17 Footprint (dimension in mm)

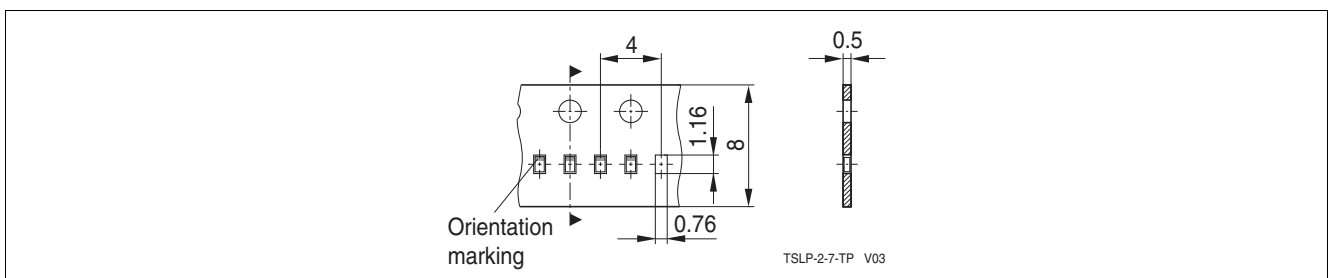


Figure 4-3 TSLP-2-17 Packing (dimension in mm)

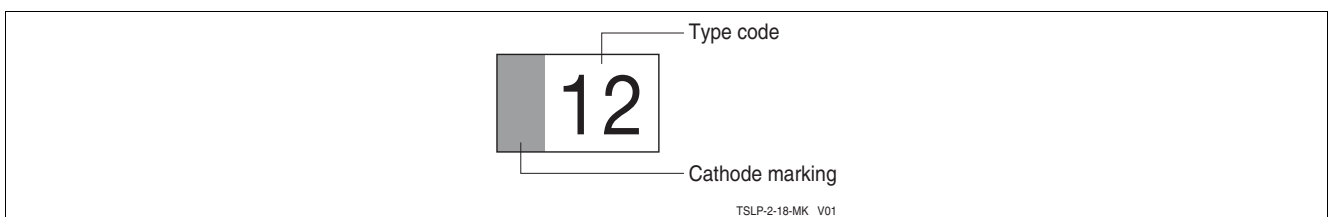


Figure 4-4 TSLP-2-17 Marking (example)

References

- [1] Infineon AG - **Application Note AN210**: Effective ESD Protection design at System Level Using VF-TLP Characterization Methodology

www.infineon.com

Published by Infineon Technologies AG