

TVS Diode

Transient Voltage Suppressor Diodes

ESD206-B1-02 Series

Ultra Low Clamping Bi-directional ESD / Transient / Surge Protection Diode

ESD206-B1-02ELS
ESD206-B1-02EL

Data Sheet

Revision 1.5, 2013-12-19
Final

Revision History, Rev 1.4, 2013-11-26

Page or Item	Subjects (major changes since previous revision)
Revision 1.5, 2013-12-19	
5	Update of Table 2-2)

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Last Trademarks Update 2010-10-26

1 Ultra Low Clamping Bi-directional ESD / Transient / Surge Protection Diode

1.1 Features

- ESD/Transient/Surge protection of one data / V_{bus} line exceeding standard:
 - IEC61000-4-2 (ESD): ± 30 kV (air/contact discharge)
 - IEC61000-4-4 (EFT): ± 50 A (5/50 ns)
 - IEC61000-4-5 (surge): ± 6 A (8/20 μ s)
- Medium capacitance: $C_L = 12$ pF (typ.)
- Bi-directional symmetrical working voltage: -5.5 V to $+5.5$ V
- Low leakage current
- Very low ESD clamping voltage: 8 V (typ.)
- Very low dynamic resistance: 0.13Ω (typ.)
- Pb-free (RoHS compliant) and halogen free package



1.2 Application Examples

- Audio Line, Speaker, Headset, Microphone Protection
- Human Interface Devices (Keyboard, Touchpad, Buttons)

1.3 Product Description

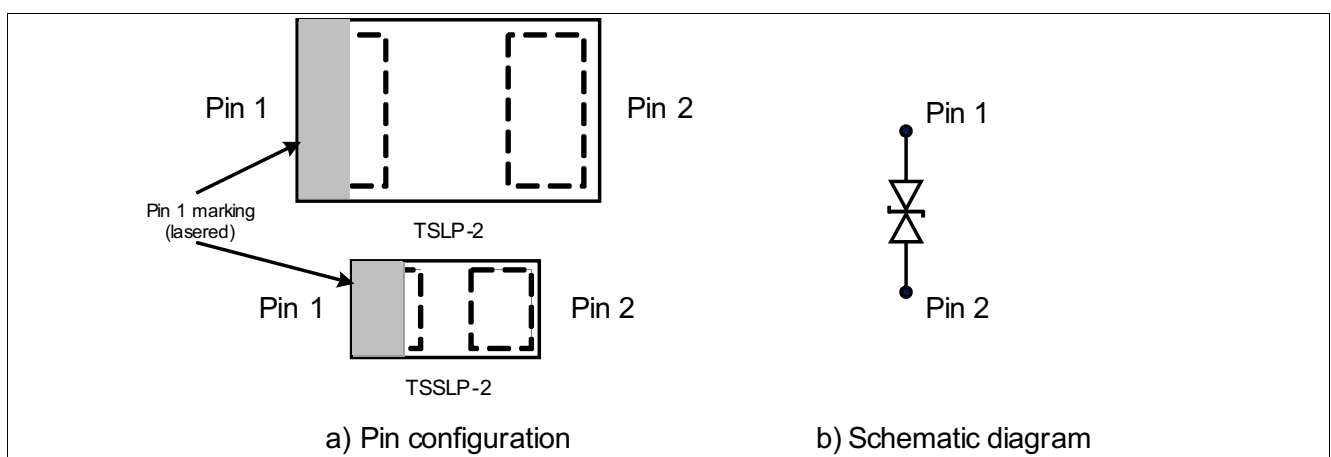


Figure 1-1 Pin Configuration and Schematic Diagram

Table 1-1 Ordering Information

Type	Package	Configuration	Marking code
ESD206-B1-02ELS	TSSLP-2-3	1 line, bi-directional	r
ESD206-B1-02EL	TSLP-2-19	1 line, bi-directional	A3

Table 2-2 DC Characteristics at $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified¹⁾

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Reverse working voltage	V_{RWM}	-	-	5.5	V	
Reverse current	I_R	-	-	50	nA	$V_R = 5.5\text{ V}$
Trigger voltage	V_{t1}	6.1	-	-	V	
Holding voltage	V_h	6.1	8	9.5	V	$I_R = 10\text{ mA}$

1) Device is electrically symmetrical

Table 2-3 AC 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	-	12	20	pF	$V_R = 0\text{ V}, f = 1\text{ MHz}$

Table 2-4 ESD and Surge 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⁾ Pin 1 to GND	V_{CL}	-	8	-	V	$I_{TLP} = 16\text{ A}$
		-	10.8	-		$I_{TLP} = 30\text{ A}$
Clamping voltage ¹⁾ GND to Pin1			8.5			$I_{TLP} = 16\text{ A}$
			12.5			$I_{TLP} = 30\text{ A}$
Clamping voltage ²⁾		-	7.5	-		$I_{PP} = 1\text{ A}, t_p = 8/20\text{ }\mu\text{s}$
		-	9.6	-		$I_{PP} = 6\text{ A}, t_p = 8/20\text{ }\mu\text{s}$
Dynamic resistance ¹⁾	R_{DYN}	-	0.13	-	Ω	Pin 1 to GND
			0.16			GND to Pin 1

1) 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].

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

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

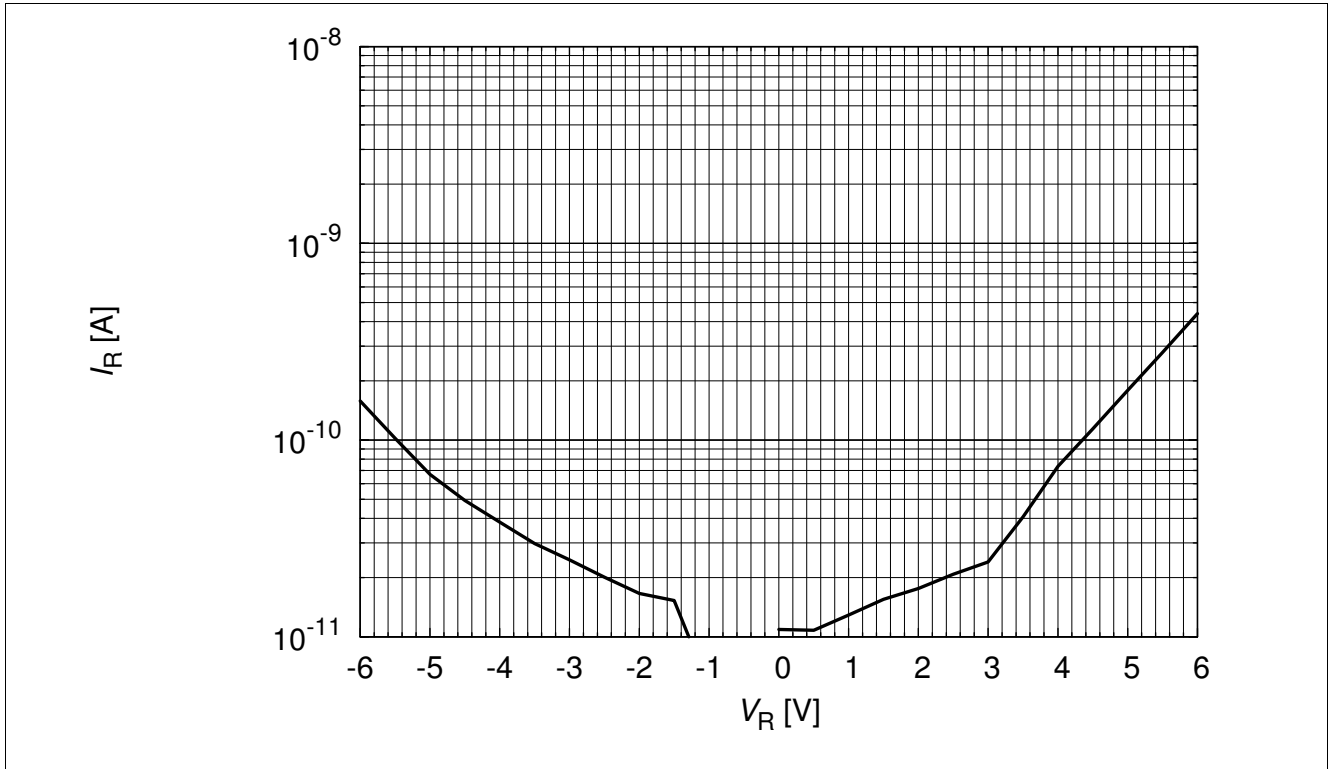


Figure 3-1 Reverse current: $I_R = f(V_R)$

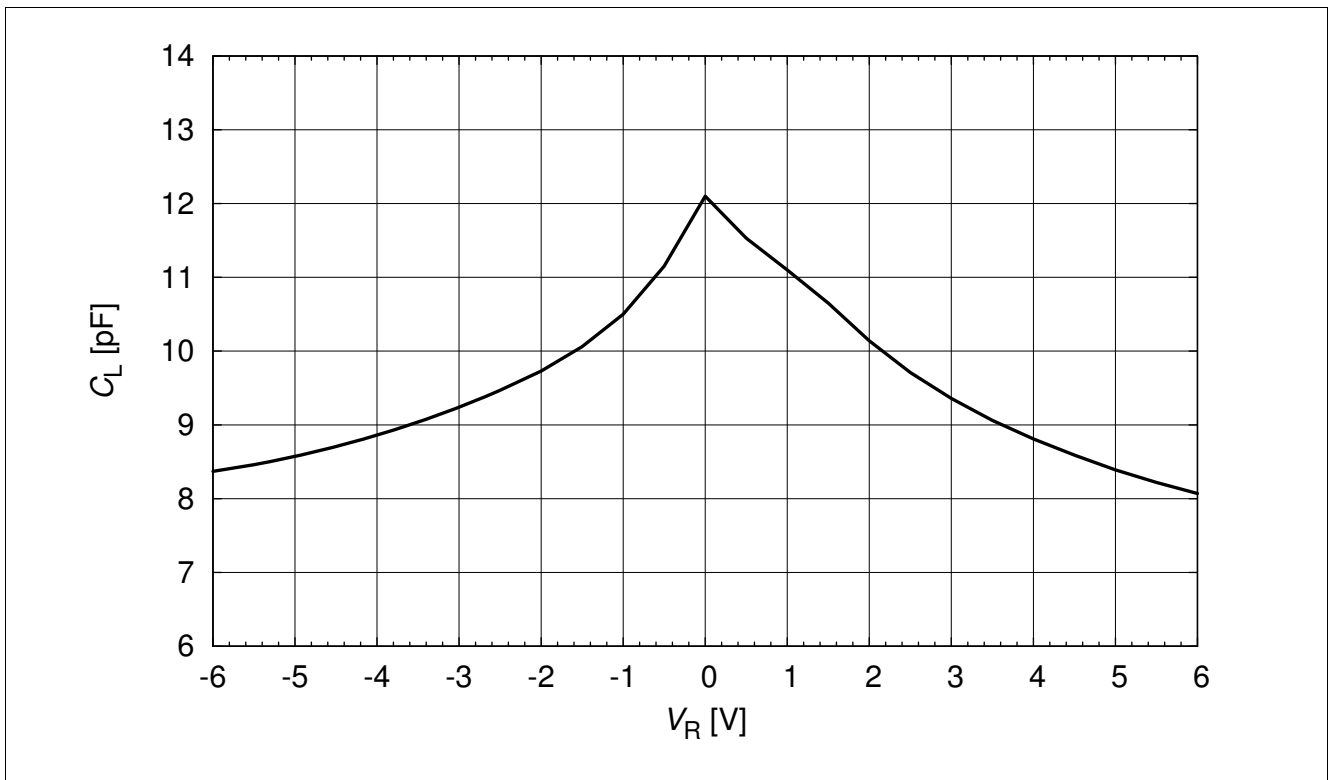


Figure 3-2 Line capacitance: $C_L = f(V_R), f = 1\text{ MHz}$

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

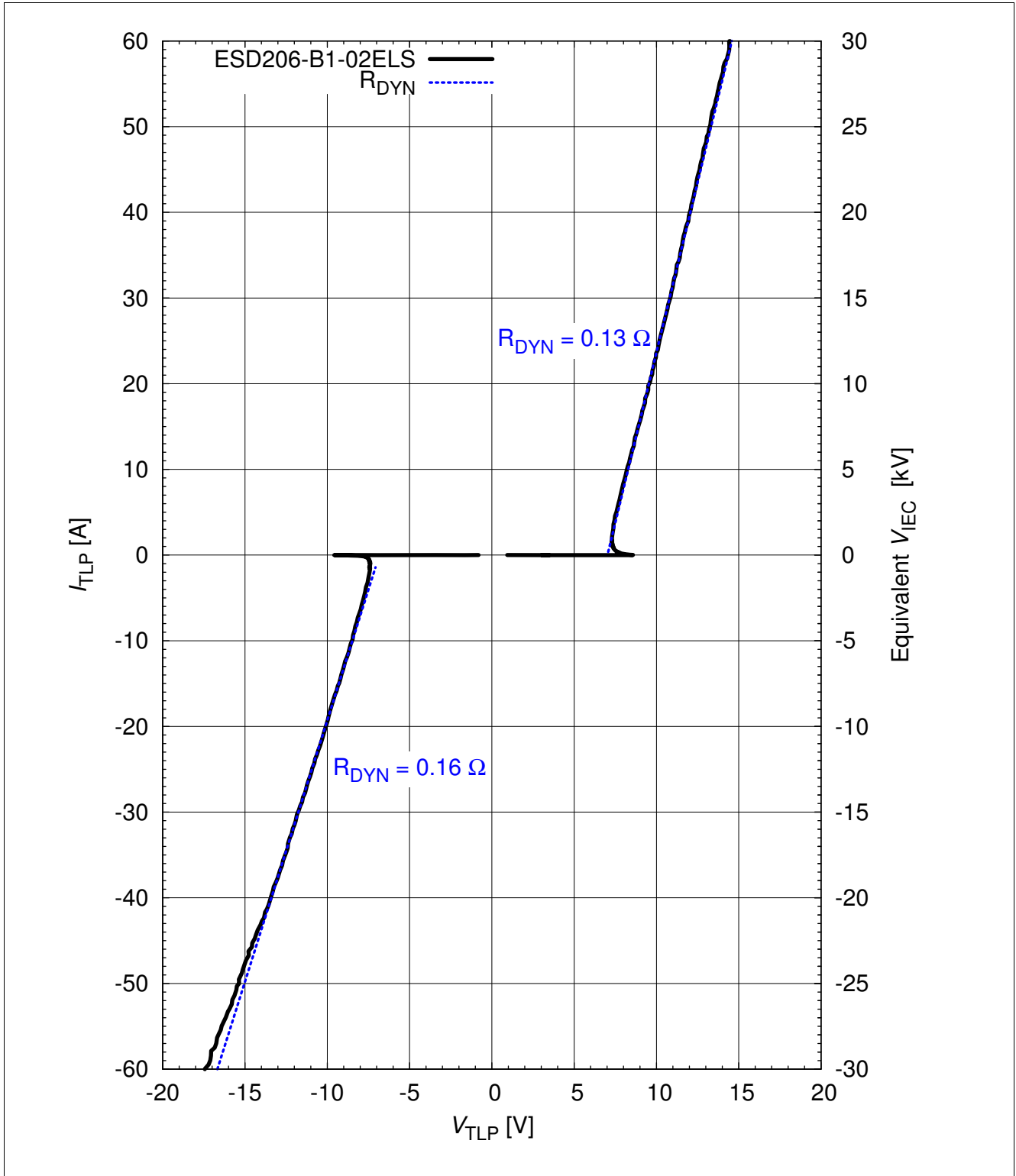


Figure 3-3 Clamping voltage (TLP): $I_{TLP} = f(V_{TLP})$ according ANSI/ESD STM5.5.1 - Electrostatic Discharge Sensitivity Testing using Transmission Line Pulse (TLP) Model. TLP conditions: $Z_0 = 50\ \Omega$, $t_p = 100\ \text{ns}$, $t_r = 0.6\ \text{ns}$, I_{TLP} and V_{TLP} averaging window: $t_1 = \text{ns}$ 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

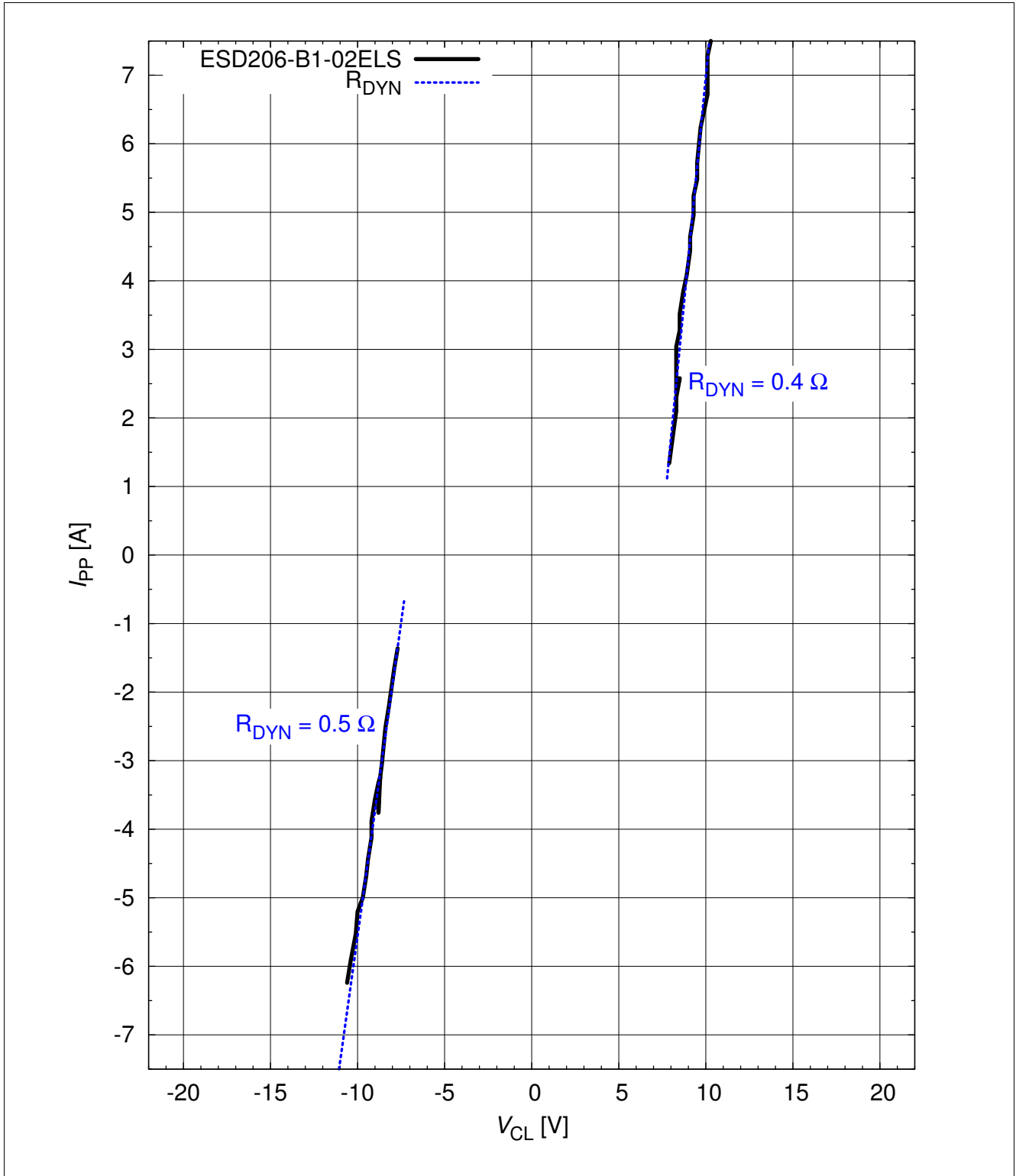


Figure 3-4 Pulse current (IEC61000-4-5) versus clamping voltage: $I_{PP} = f(V_{CL})$

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

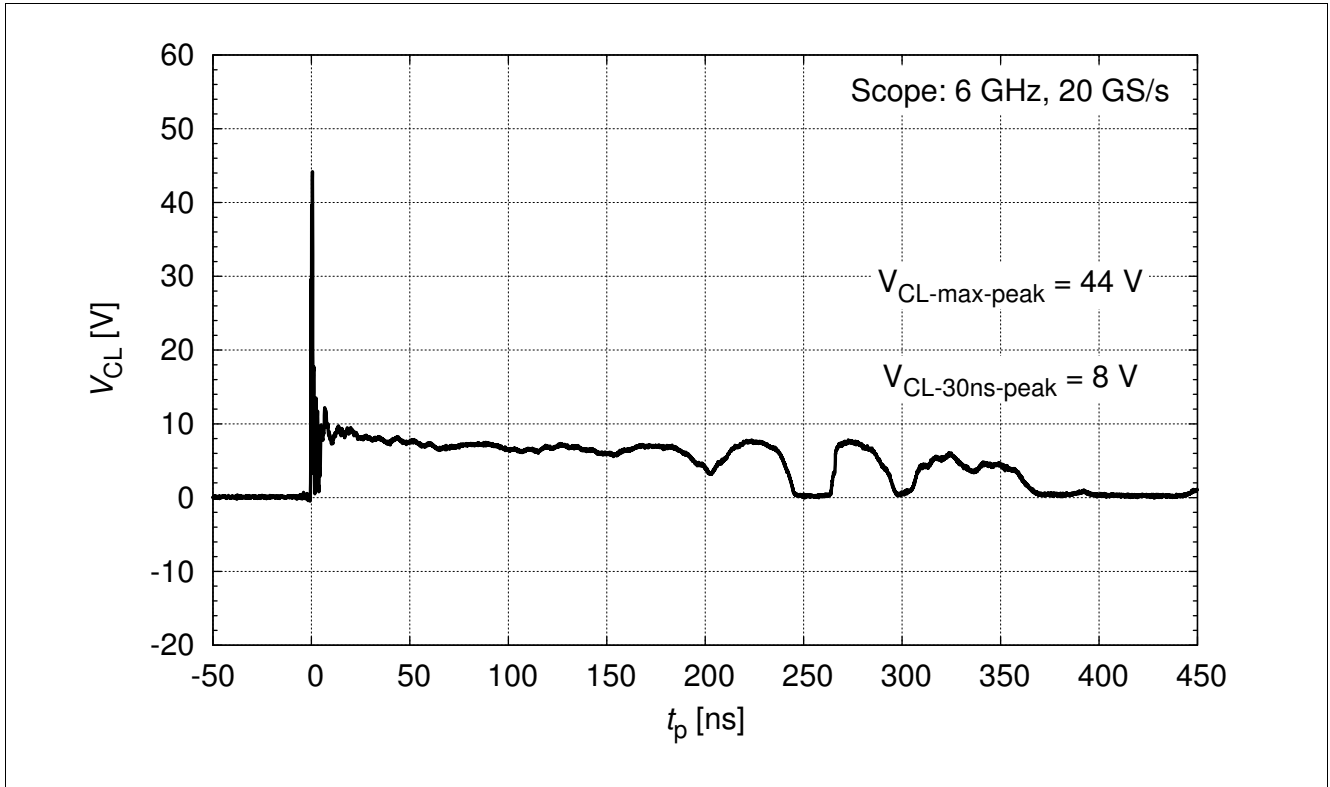


Figure 3-5 IEC61000-4-2 : $V_{CL} = f(t)$, 8 kV positive pulse from pin 1 to pin 2

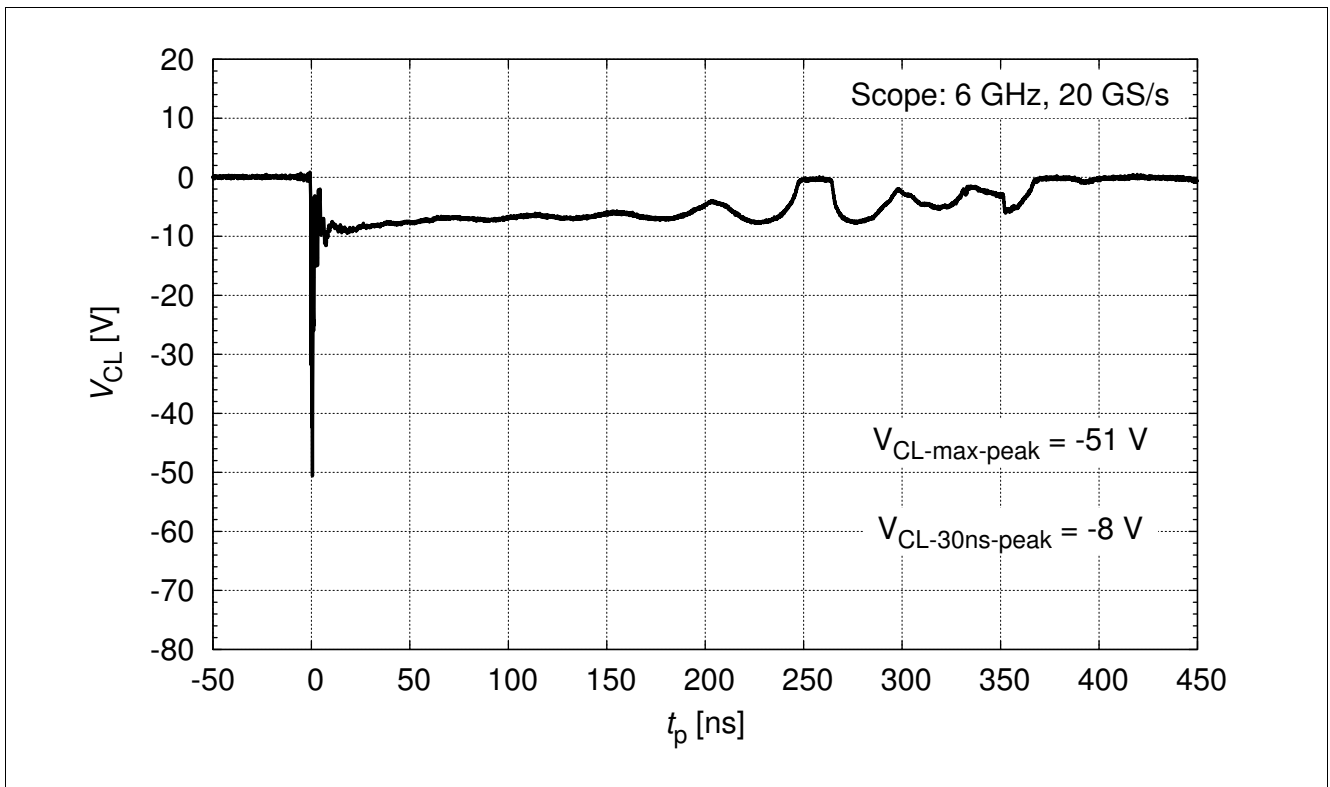


Figure 3-6 IEC61000-4-2 : $V_{CL} = f(t)$, 8 kV negative pulse from pin 1 to pin 2

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

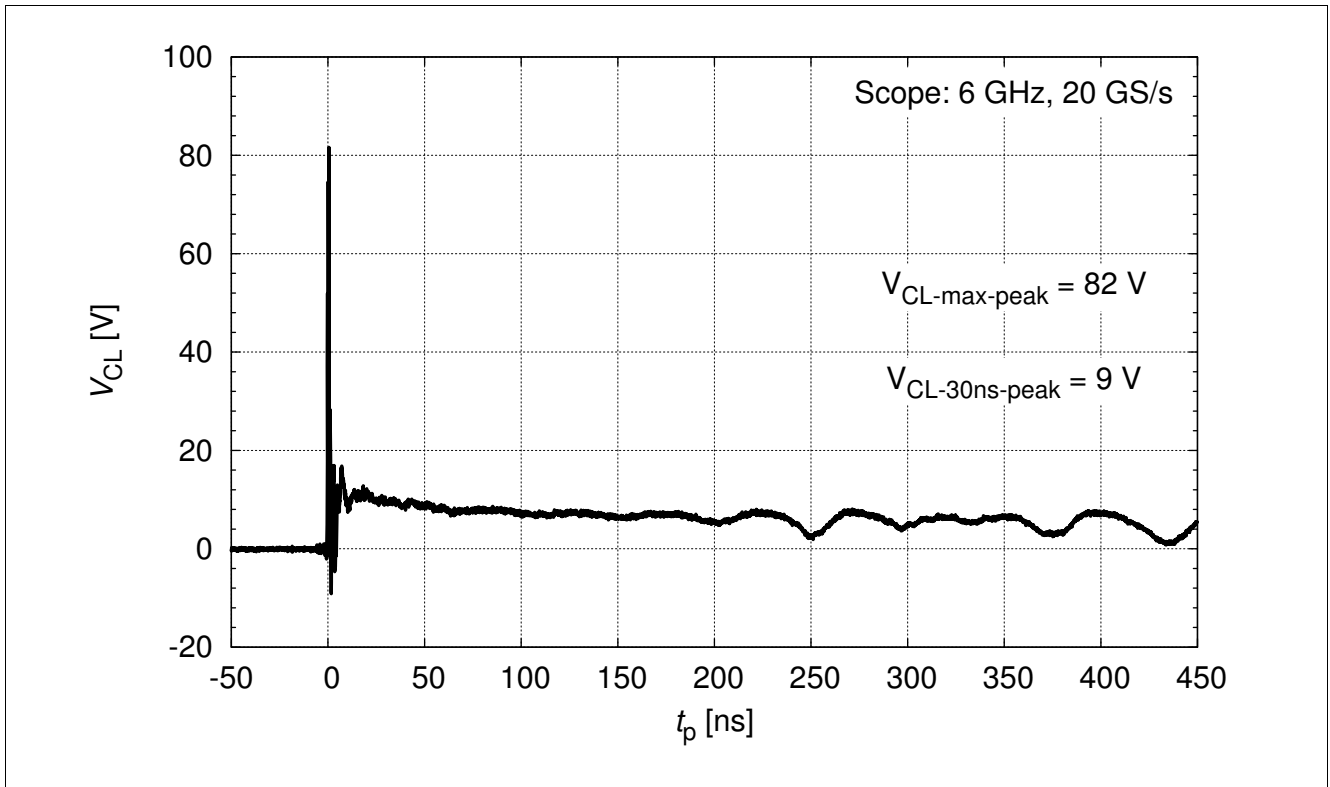


Figure 3-7 IEC61000-4-2 : $V_{CL} = f(t)$, 15 kV positive pulse from pin 1 to pin 2

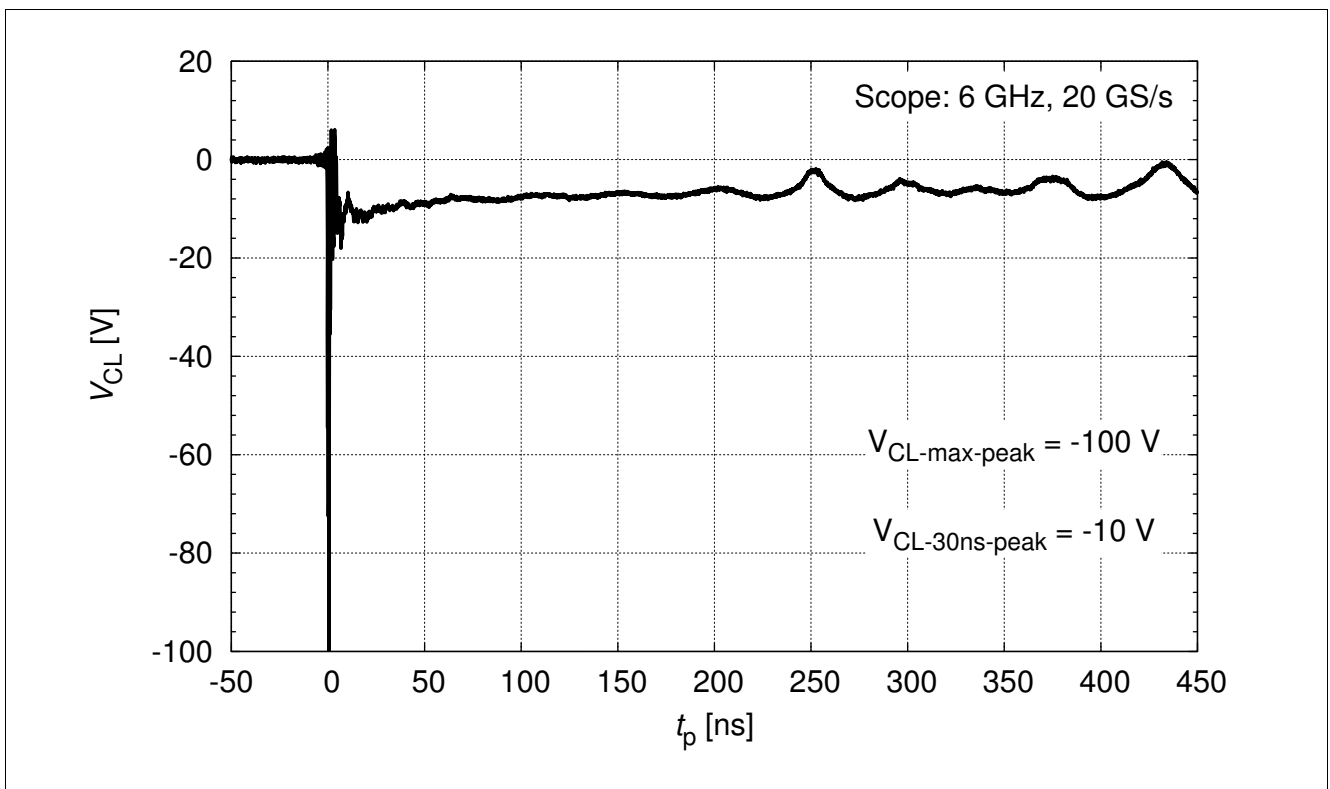


Figure 3-8 IEC61000-4-2 : $V_{CL} = f(t)$, 15 kV negative pulse from pin 1 to pin 2

4 Package Information

4.1 TSSLP-2-3

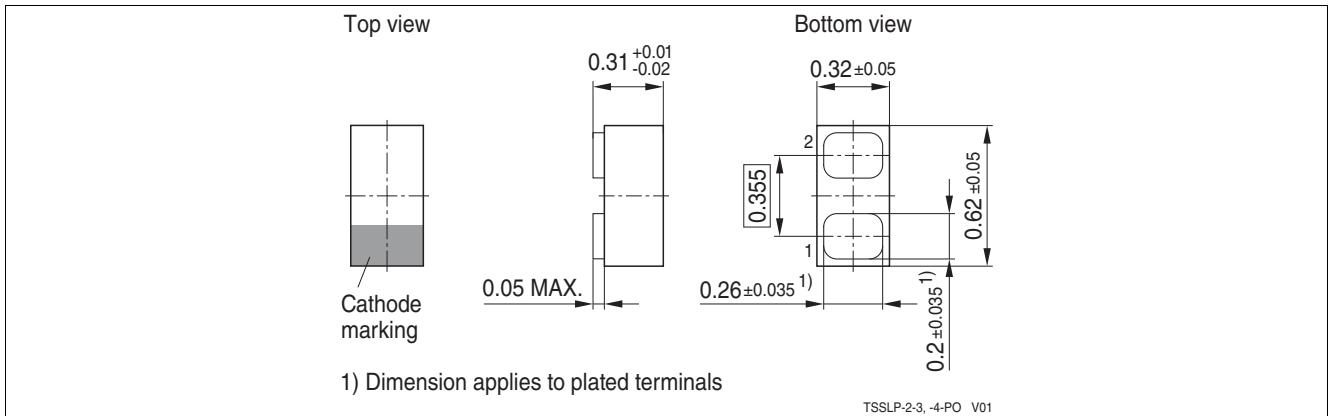


Figure 4-1 TSSLP-2-3: Package outline (dimension in mm)

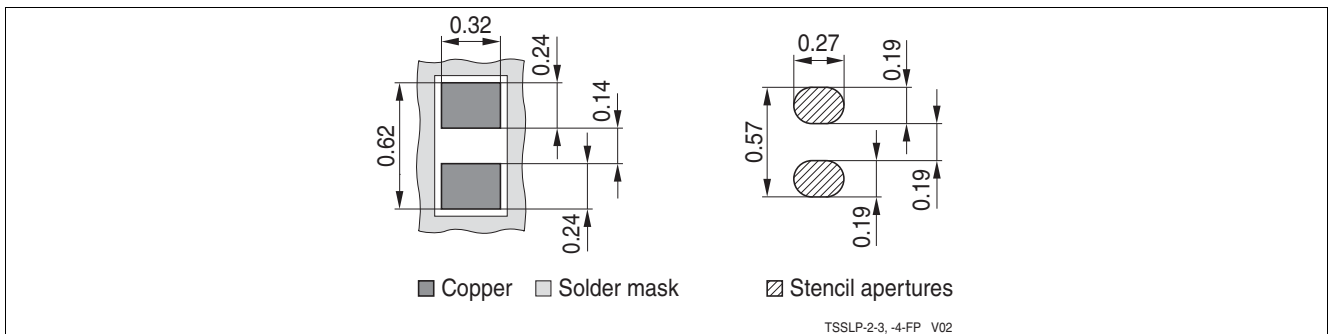


Figure 4-2 TSSLP-2-3: Footprint (dimension in mm)

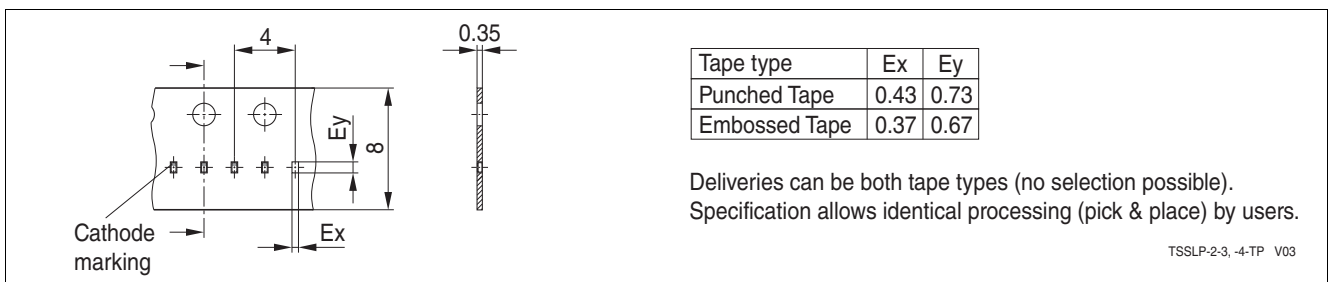


Figure 4-3 TSSLP-2-3: Tape and reel (dimension in mm)

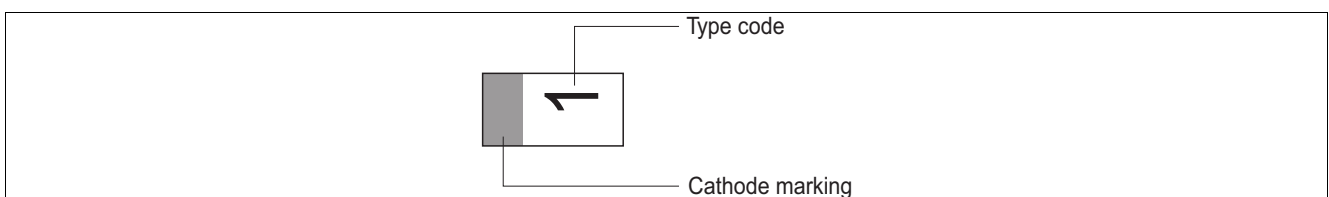


Figure 4-4 TSSLP-2-3: Marking example

4.2 TSLP-2-19

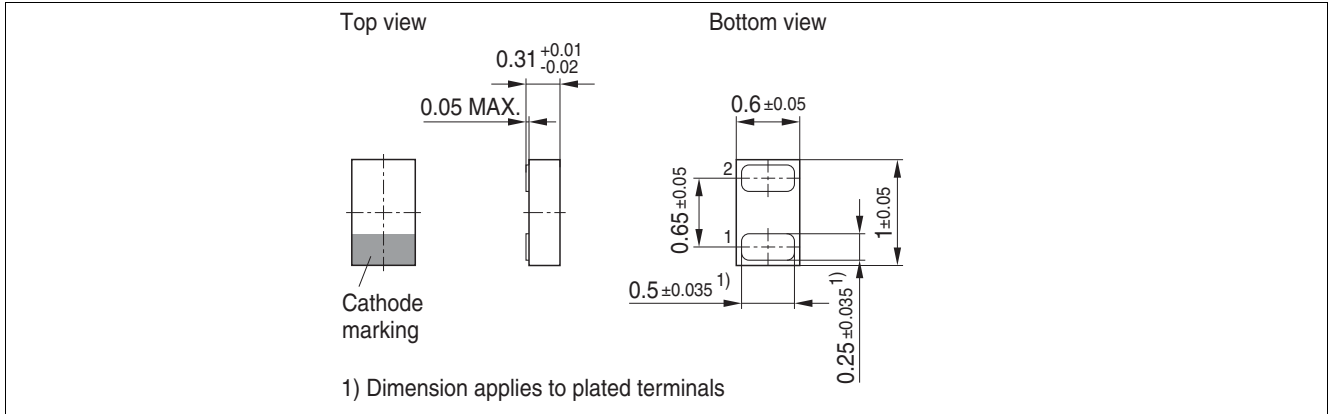


Figure 4-5 TSLP-2-19: Package outline (dimension in mm)

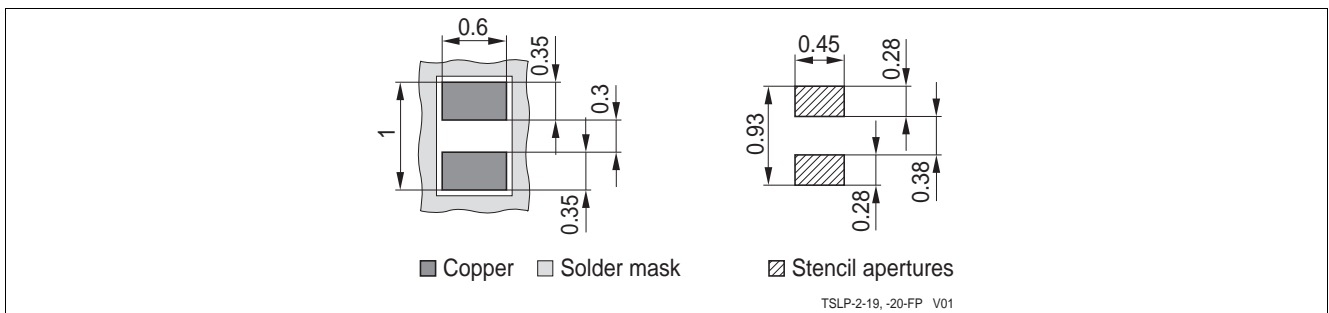


Figure 4-6 TSLP-2-19: Footprint (dimension in mm)

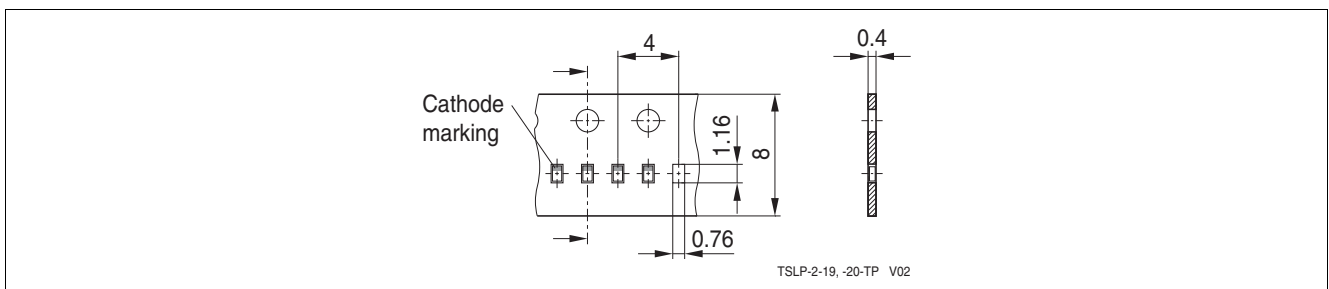


Figure 4-7 TSLP-2-19: Tape and reel (dimension in mm)

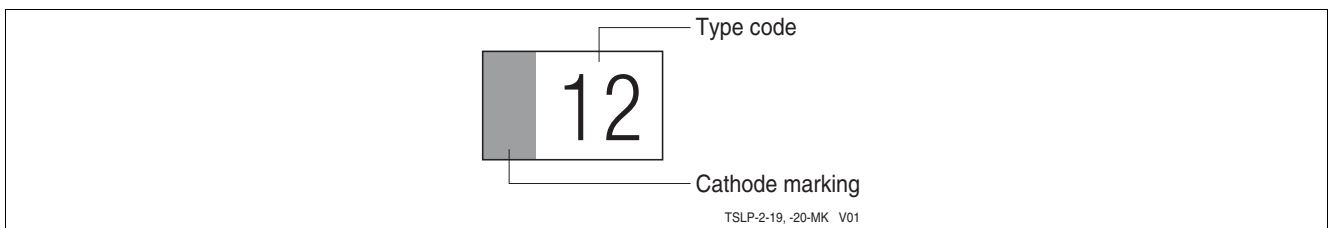


Figure 4-8 TSLP-2-19: Marking example

References

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

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