Protection Devices

TVS (Transient Voltage Suppressor Diodes)

ESD206-B1-02V

Bi-directional, 5.5 V, 12 pF, 0201, RoHS and Halogen Free compliant

ESD206-B1-02V

Data Sheet

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Final

Power Management & Multimarket

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1 Bi-directional, 5.5 V, 12 pF, 0201, RoHS and Halogen Free compliant

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 µs)**
- 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: **9 V** (typ.)
- Very low dynamic resistance: **0.15 Ω** (typ.)
- Pb-free (RoHS compliant) and halogen free package

RoHS

1.2 Application Examples

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

1.3 Product Description

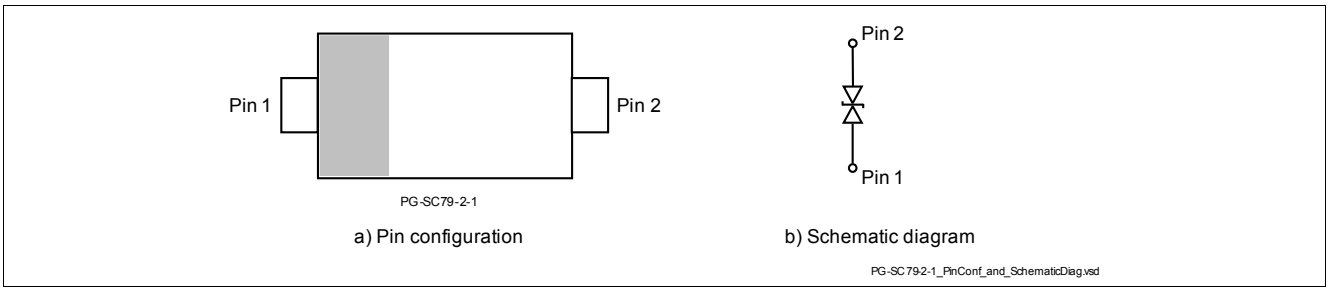

Figure 1-1 Pin Configuration and Schematic Diagram

Table 1-1 Ordering Information

Type	Package	Configuration	Marking code
ESD206-B1-02V	SC79	1 line, bi-directional	e

2 Characteristics

2.1 Maximum Ratings

Table 2-1 Maximum Ratings at T_A = 25 °C, unless otherwise specified[1)]

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
ESD[2)]air / contact discharge	V_{ESD}	-	-	30	kV
Peak pulse current (t_p = 8/20 µs)[3)]	I_{PP}	-	-	6	A
Operating temperature range	T_{OP}	-55	-	125	°C
Storage temperature	T_{stg}	-65	-	150	°C

1) Device is electrically symmetrical
2) V_{ESD} according to IEC61000-4-2
3) I_{PP} according to IEC61000-4-5

Attention: Stresses above the max. 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 integrated circuit.

2.2 Electrical Characteristics at T_A = 25 °C, unless otherwise specified

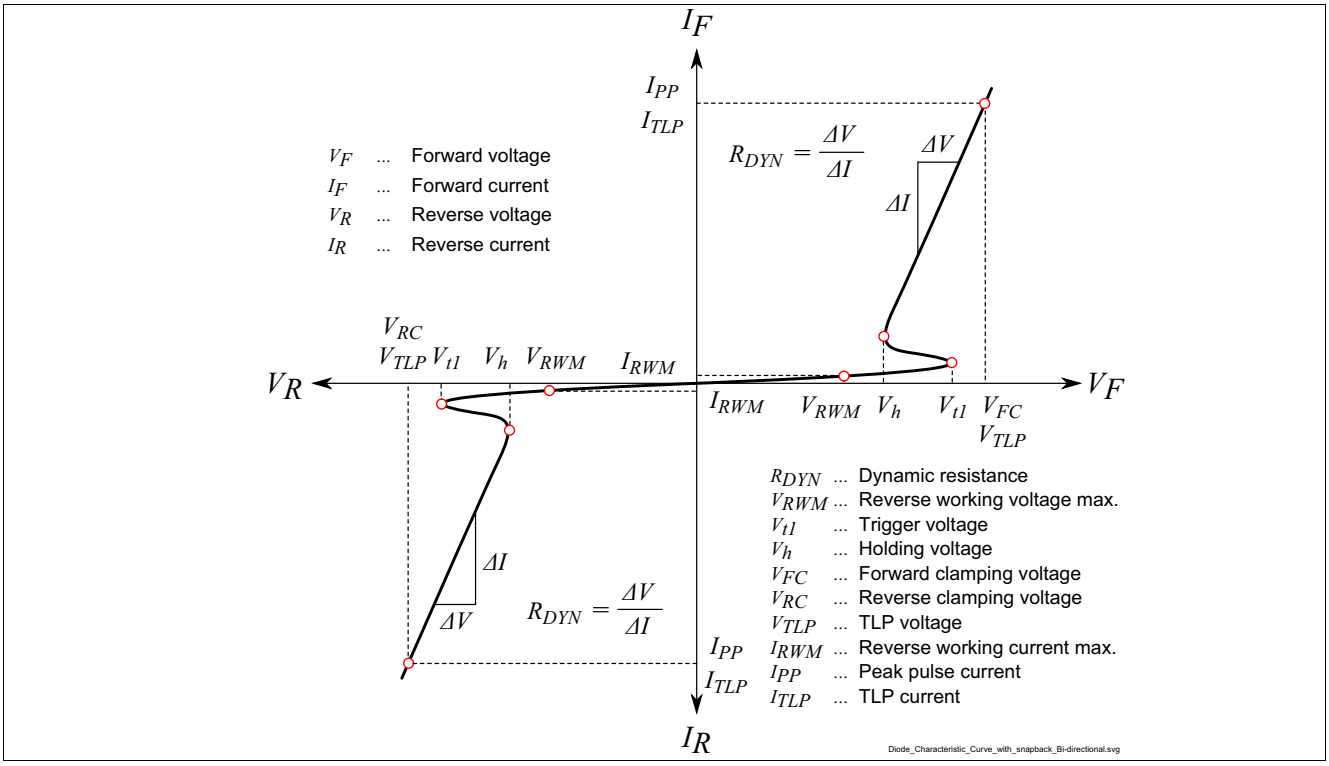

Figure 2-1 Definitions of electrical characteristics

Table 2-2 DC Characteristics at T_A = 25 °C, unless otherwise specified[1)]

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 V
Trigger voltage	V_{t1}	6.1	-	-	V	
Holding voltage	V_h	6.1	8	9.5	V	I_R = 10 mA

1) Device is electrically symmetrical

Table 2-3 AC Characteristics at T_A = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Line capacitance	C_L	-	12	20	pF	V_R = 0 V, f = 1 MHz

Table 2-4 ESD and Surge Characteristics at T_A = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Clamping voltage[1)]	V_{CL}	-	8	-	V	I_{TLP} = 16 A
		-	11.5	-		I_{TLP} = 30 A
Clamping voltage[2)]		-	8	-		I_{PP} = 1 A
		-	10	-		I_{PP} = 6 A
Dynamic resistance[1)]	R_{DYN}	-	0.15	-	Ω	

1) ANSI/ESD STM5.5.1 - Electrostatic Discharge Sensitive Testing using Transmission Line Pulse (TLP) Model. TLP conditions: Z_0 = 50 Ω, t_p = 100 ns, t_r = 0.6 ns, I_{TLP} and V_{TLP} averaging window: t_1 = 30 ns to t_2 = 60 ns, extraction of dynamic resistance using least squares fit of TLP characteristic between I_{TLP1} = 10 A and I_{TLP2} = 40 A. Please refer to Application Note AN210[1].

2) I_{PP} according to IEC61000-4-5 (t_p = 8/20 µs)

3 Typical Characteristics at T_A = 25 °C, unless otherwise specified

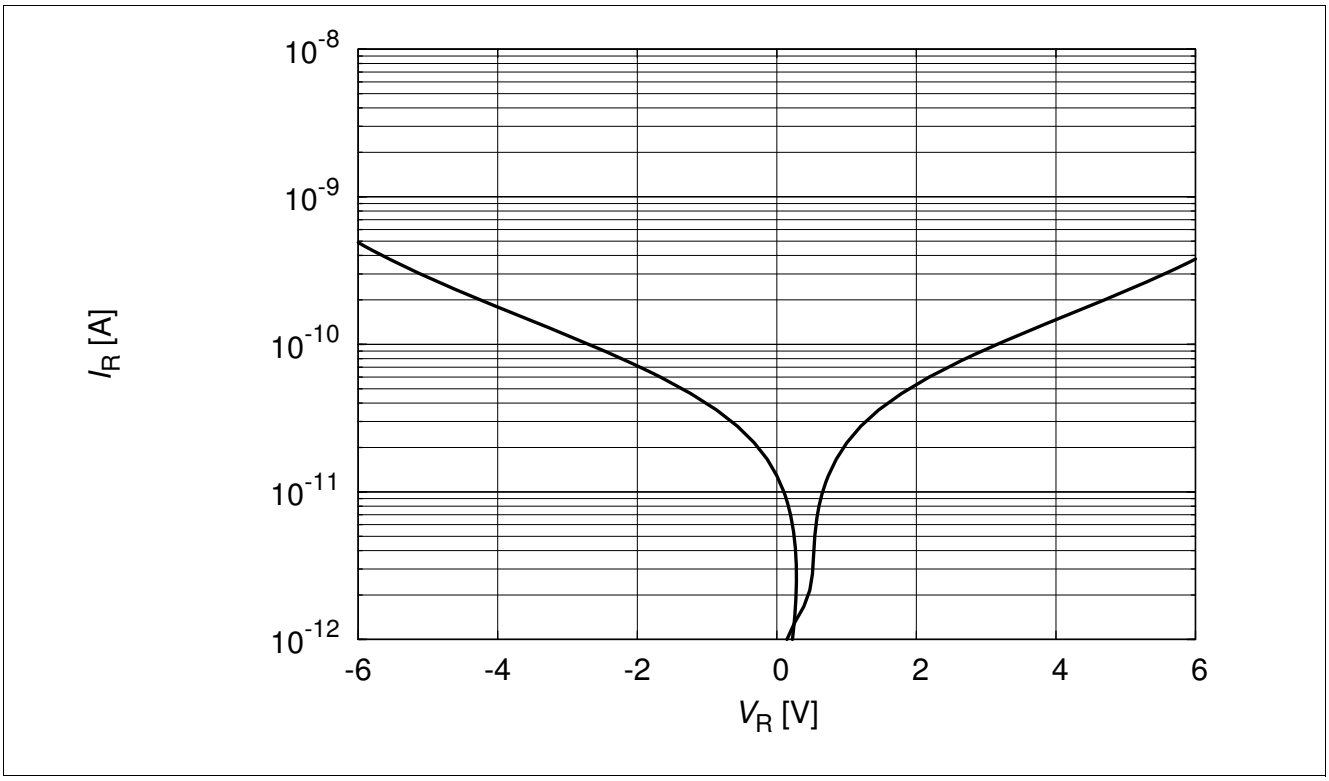

Figure 3-1 Reverse current, $I_R = (V_R)$

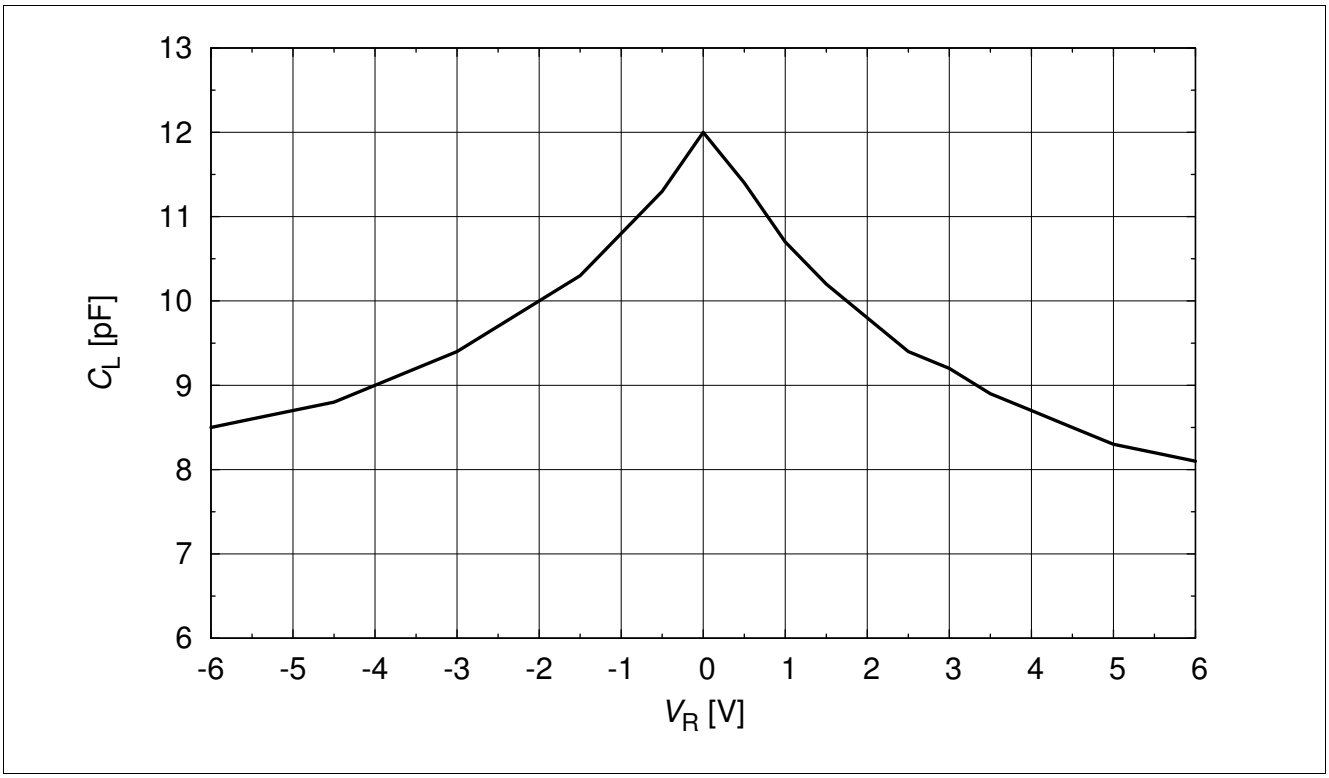

Figure 3-2 Line capacitance: $C_L = f(V_R)$, f = 1MHz

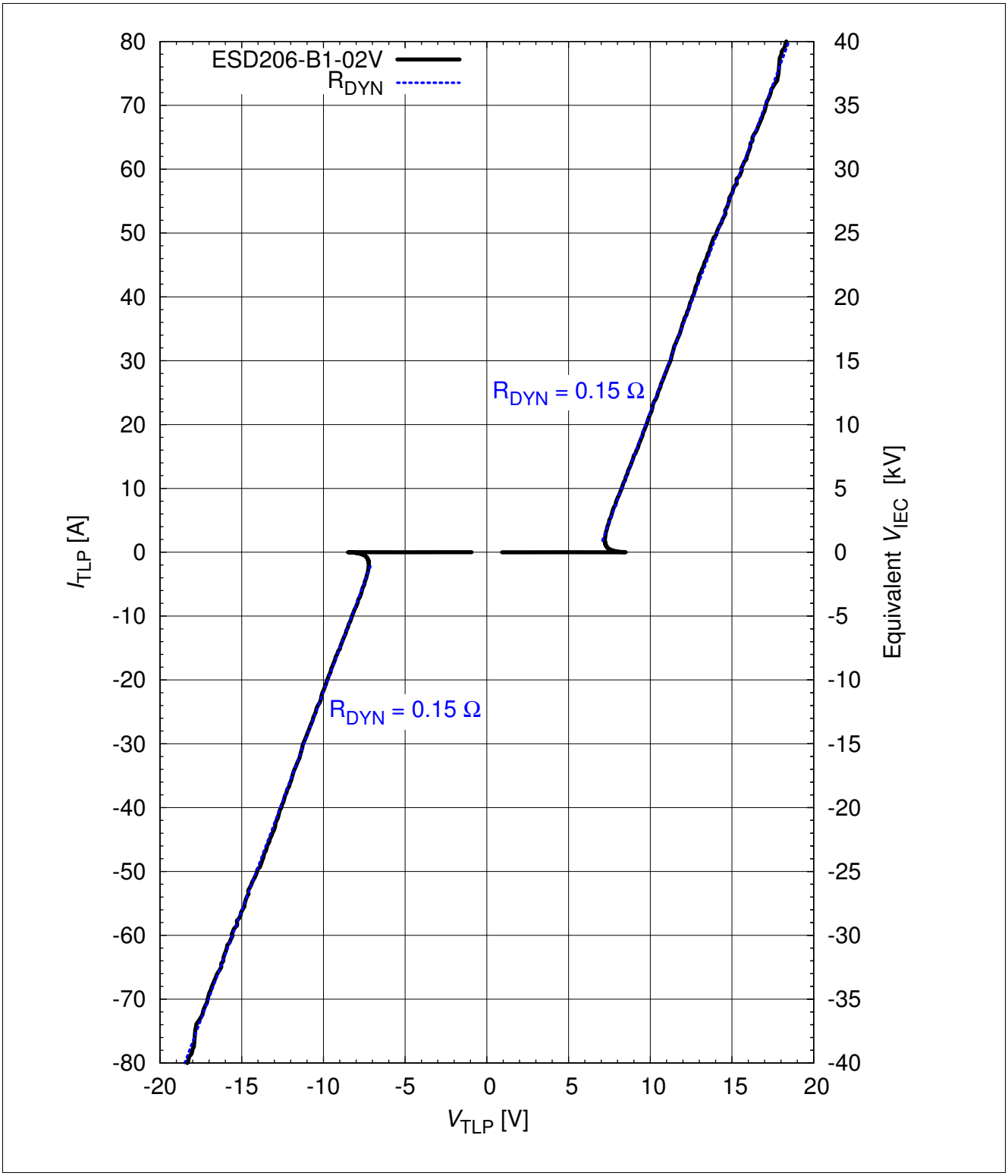

Figure 3-3 Clamping voltage $V_{TLP} = f(I_{TLP})$[1]

Note: TLP parameter: Z_0 = 50 Ω, t_p = 100 ns, t_r = 300 ps, averaging window: t_1 = 30 ns to t_2 = 60 ns, extraction of dynamic resistance using least squares fit of TLP characteristic between I_{TLP1} = 10 A and I_{TLP2} = 40 A. The equivalent stress level V_{IEC} according IEC 61000-4-2 (R = 330 Ω, C = 150 pF) is calculated at the broad peak of the IEC waveform at t = 30 ns with 2 A / kV

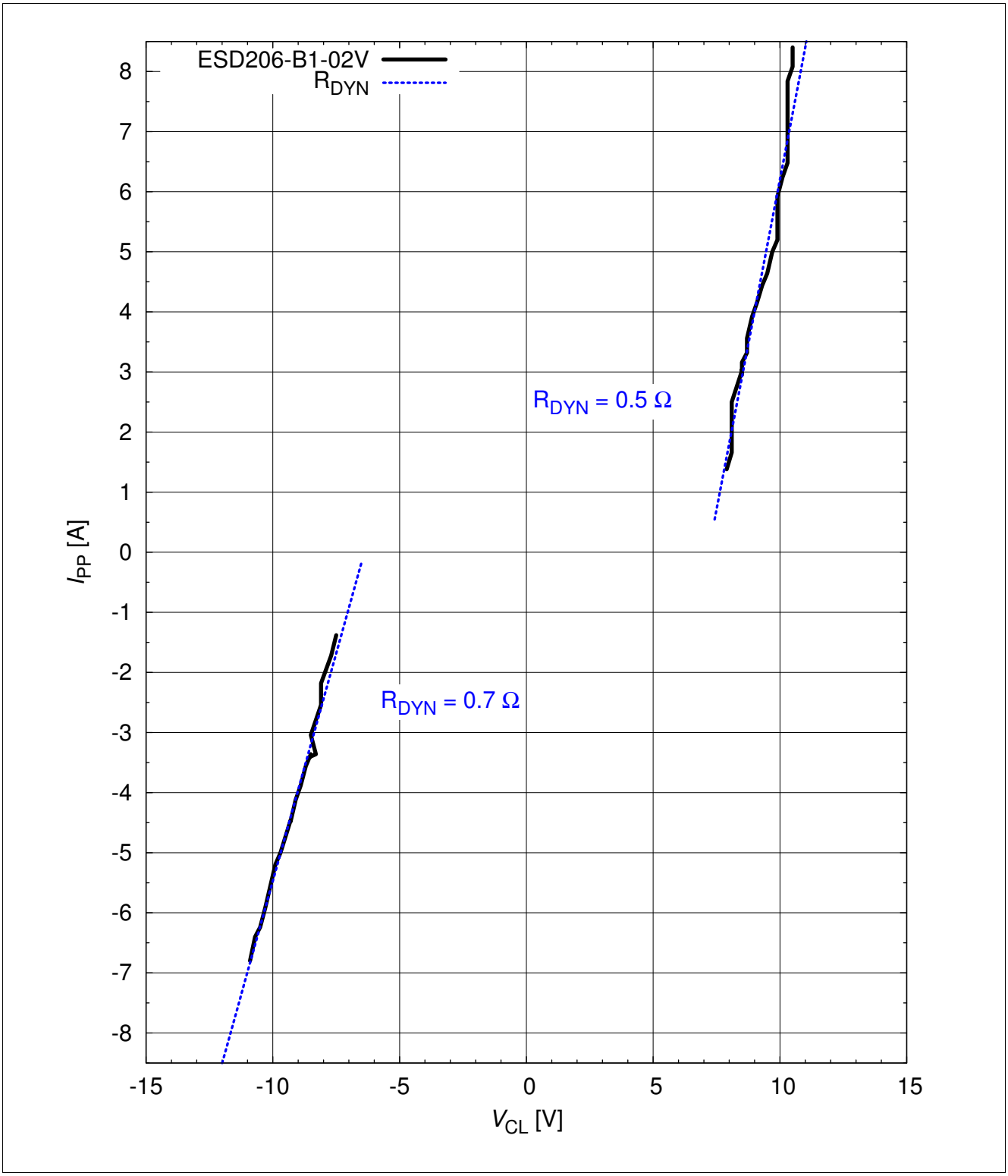

Figure 3-4 Pulse current (IEC61000-4-5) versus clamping voltage: $I_{PP} = f(V_{CL})$

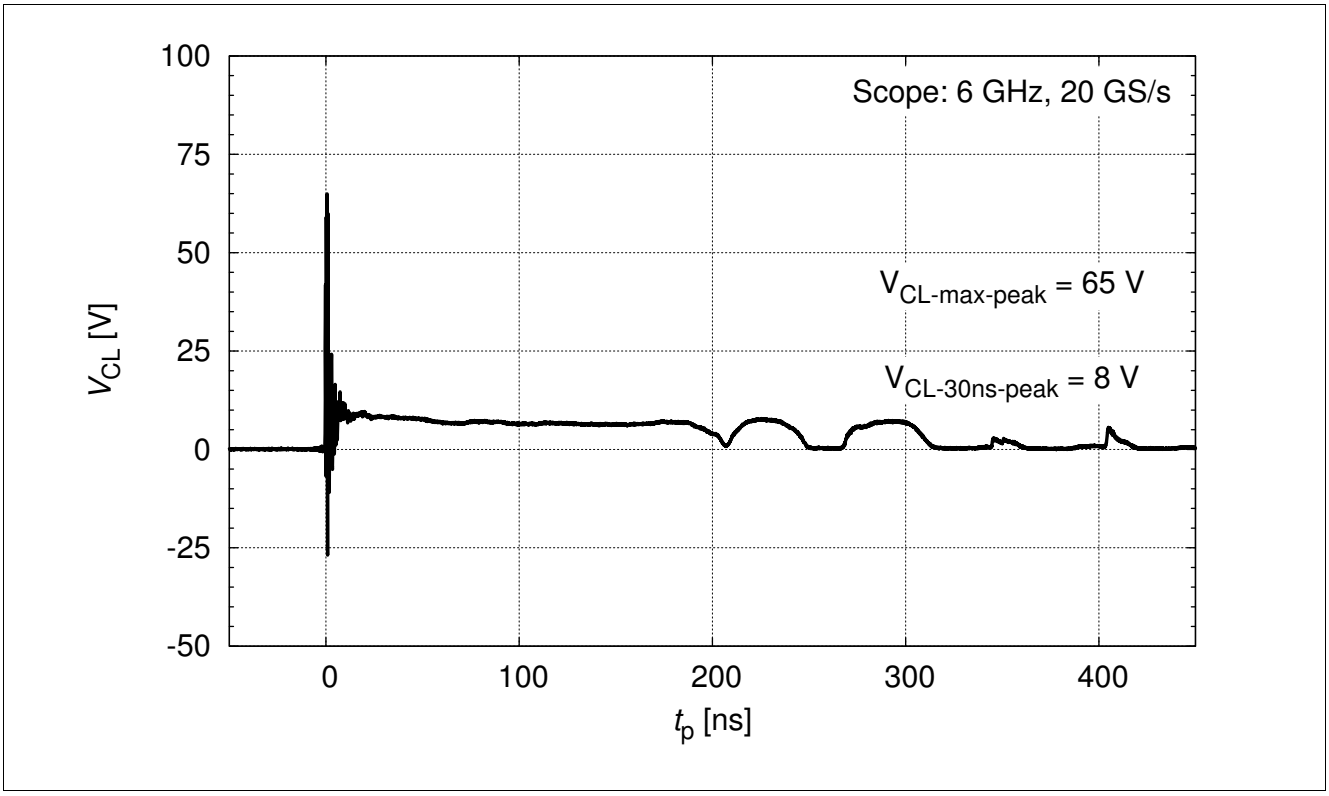

Figure 3-5 Clamping voltage at +8 kV discharge according IEC61000-4-2 (R = 330 Ω, C = 150 pF)

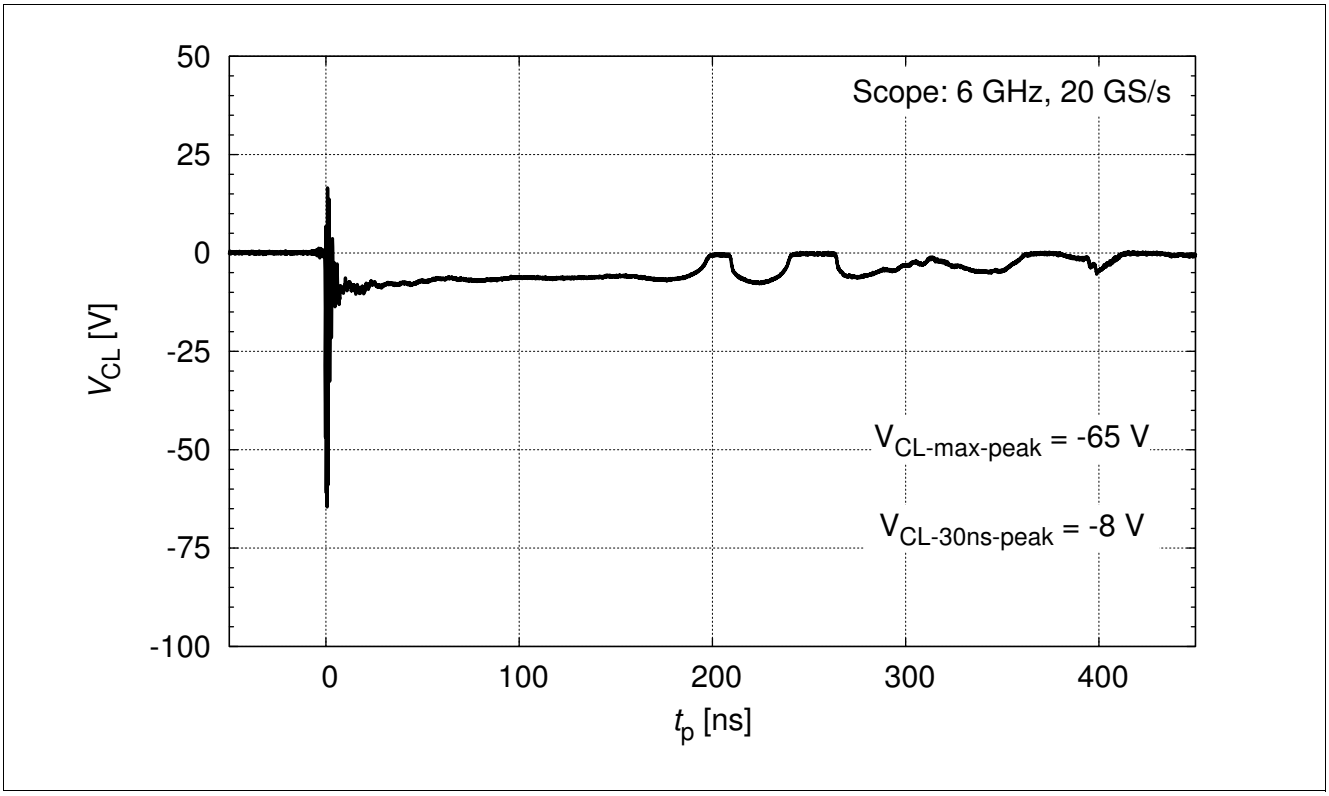

Figure 3-6 Clamping voltage at -8 kV discharge according IEC61000-4-2 (R = 330 Ω, C = 150 pF)

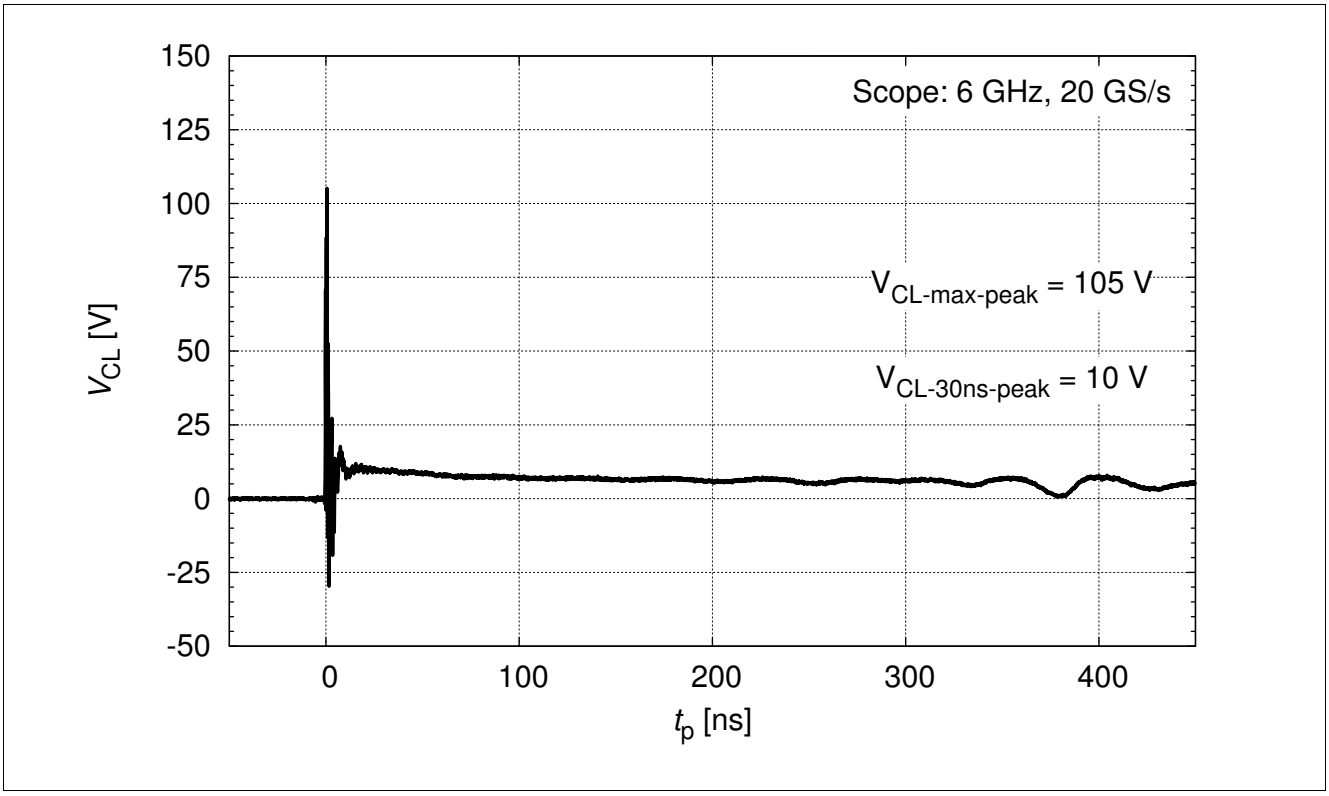

Figure 3-7 Clamping voltage at +15 kV discharge according IEC61000-4-2 (R = 330 Ohm, C = 150 pF)

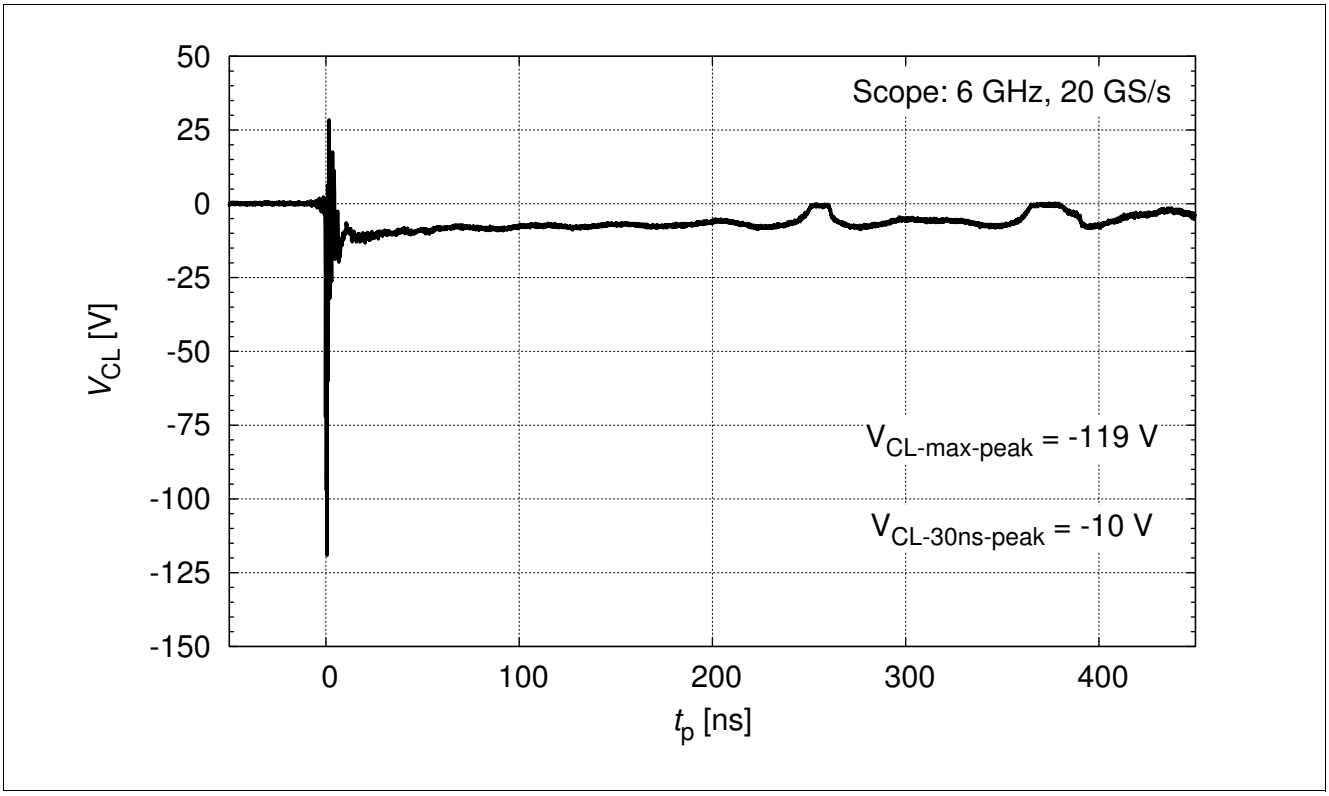

Figure 3-8 Clamping voltage at -15 kV discharge according IEC61000-4-2 (R = 330 Ω, C = 150 pF)

4 Package Information

4.1 SC79

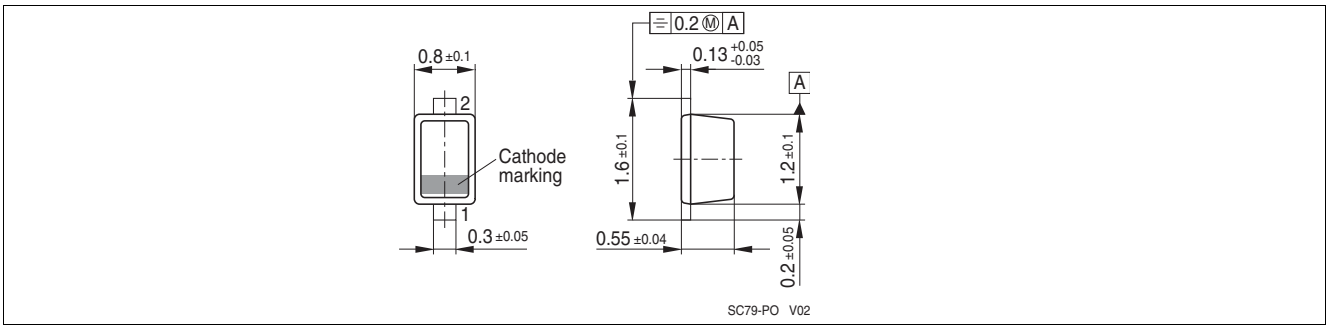

Figure 4-1 SC79: Package outline(dimension in mm)

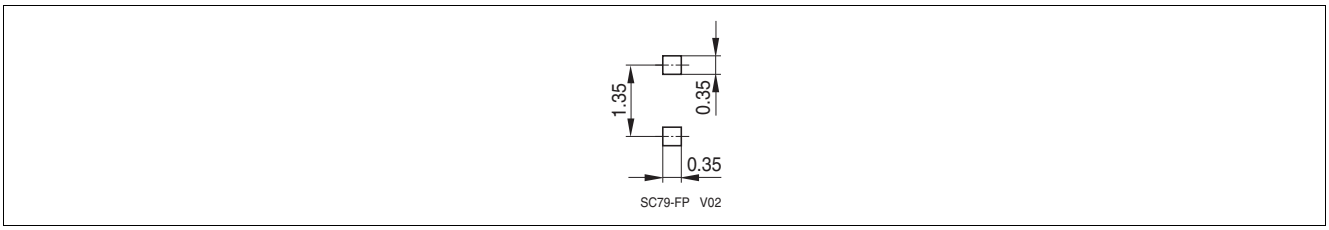

Figure 4-2 SC79: Footprint (dimension in mm)

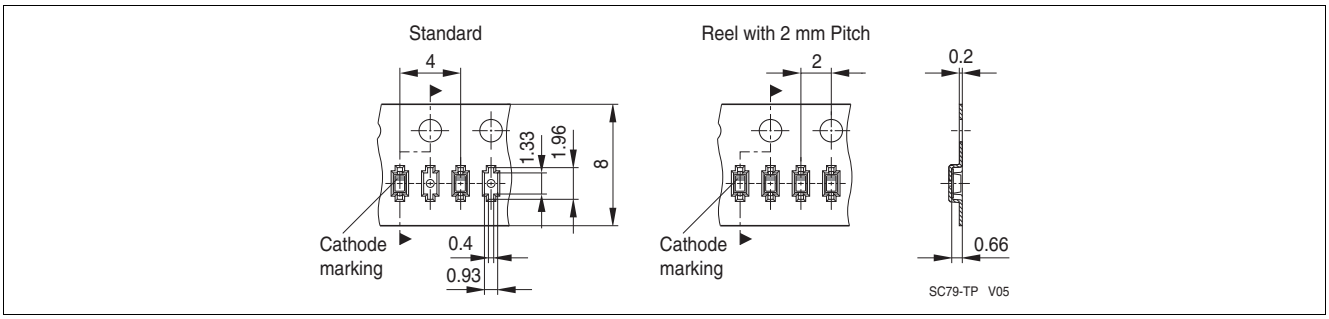

Figure 4-3 SC79: Tape and reel (dimension in mm)

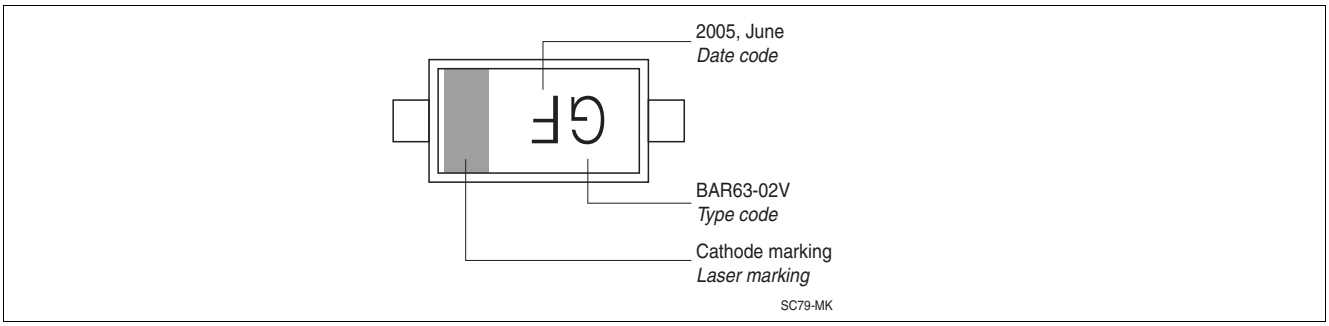

Figure 4-4 SC79: Marking example, for this device cathode marking equals pin 1 marking

References

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

Revision History: Rev. 1.2, 2013-12-19	
Page or Item	**Subjects (major changes since previous revision)**
Revision 1.3, 2016-06-27	
11	Figure 4-4) updated

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