TVS Diode

Transient Voltage Suppressor Diodes

ESD5V3S1B-02LS

Bi-directional Symmetrical Medium Capacitance ESD / Transient Protection Diode

ESD5V3S1B-02LS

Data Sheet

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Revision History	
Page or Item	**Subjects (major changes since previous revision)**
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1 Bi-directional Symmetrical Medium Capacitance ESD / Transient Protection Diode

1.1 Features

- ESD / transient protection of signal lines in low voltage applications according to:
  - IEC61000-4-2 (ESD): ±20 kV (contact)
  - IEC61000-4-4 (EFT): 40 A / 2 kV (5/50 ns)
  - IEC61000-4-5 (surge): 5 A (8/20 µs)
- Bi-directional, symmetrical working voltage up to V_{RWM} = ±5.3 V
- Low clamping voltage, low dynamic resistance R_{DYN} = 0.5 Ω (typical)
- Smallest form factor: 0.62 x 0.32 x 0.31 mm^3
- Pb-free (RoHS compliant) and halogen free package

1.2 Application Examples

- Audio line protection
- Mobile communication, Consumer products (STB, MP3, DVD, DSC...)
- LCD displays, keypads, trackball protection, camera
- Notebooks and desktop computers, peripherals

2 Product Description

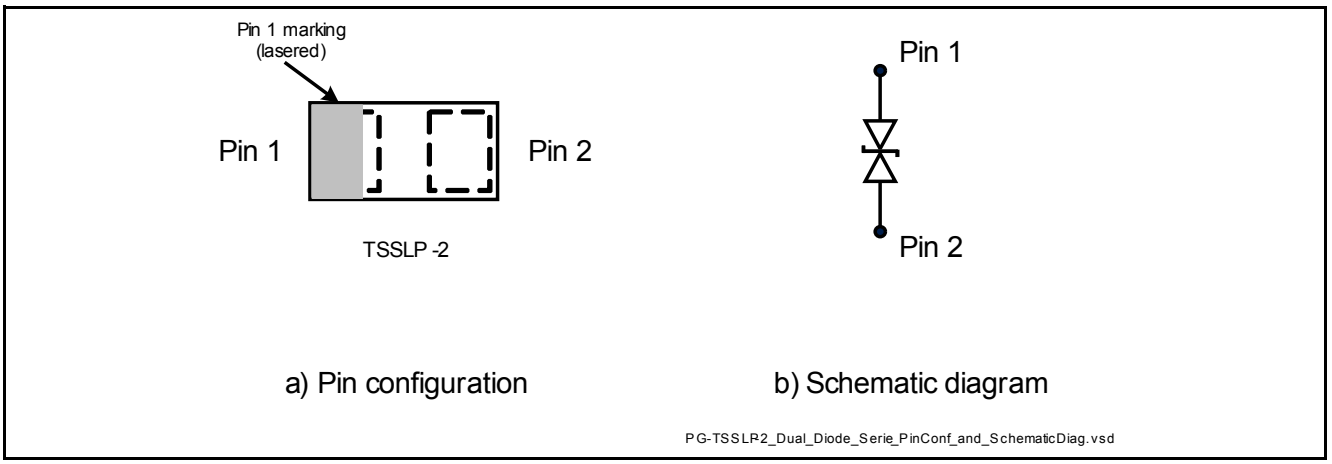

Figure 2-1 Pin Configuration and Schematic Diagram

Table 2-1 Ordering Information

Type	Package	Configuration	Marking code
ESD5V3S1B-02LS	PG-TSSLP-2-1	1 line, bi-directional	H

3 Characteristics

Table 3-1 Maximum Ratings at T_A = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
ESD contact discharge[1)]	V_{ESD}	–	–	20	kV
Peak pulse current (t_p = 8/20 µs)[2)]	I_{PP}	–	–	5	A
Operating temperature range	T_{OP}	-40	–	125	°C
Storage temperature	T_{stg}	-55	–	150	°C

1) V_{ESD} according to IEC61000-4-2

2) I_{PP} according to IEC61000-4-5

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

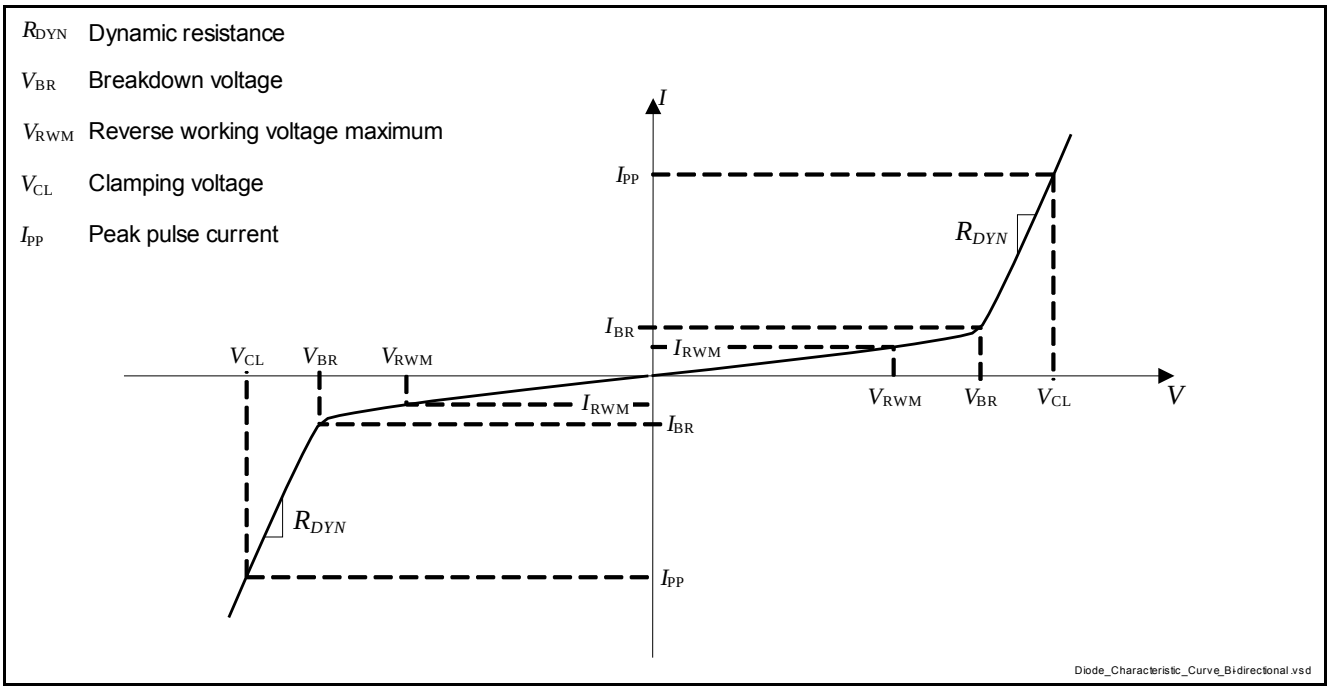

Figure 3-1 Definitions of electrical characteristics

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

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Reverse working voltage	V_{RWM}	-5.3	–	5.3	V	
Breakdown voltage	V_{BR}	6	–	–	V	I_R = 1 mA
Reverse current	I_R	–	–	0.1	µA	V_R = 3.3 V

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

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Line capacitance	C_L	–	17	20	pF	V_R = 0 V, f = 1 MHz

Table 3-4 ESD Characteristics at T_A = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Reverse clamping voltage[1] [2]	V_{CL}	–	18	–	V	I_{PP} = 16 A
		–	26	–	V	I_{PP} = 30 A
Dynamic resistance[1][2]	R_{DYN}	–	0.5	–	Ω	

1) Please refer to Application Note AN210. TLP parameter: Z_0 = 50 Ω , t_p = 100ns, t_r = 300ps, averaging window: t_1 = 30 ns to t_2 = 60 ns, extraction of dynamic resistance using least squares fit of TLP charactertistics between I_{PP1} = 10 A and I_{PP2} = 40 A.

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

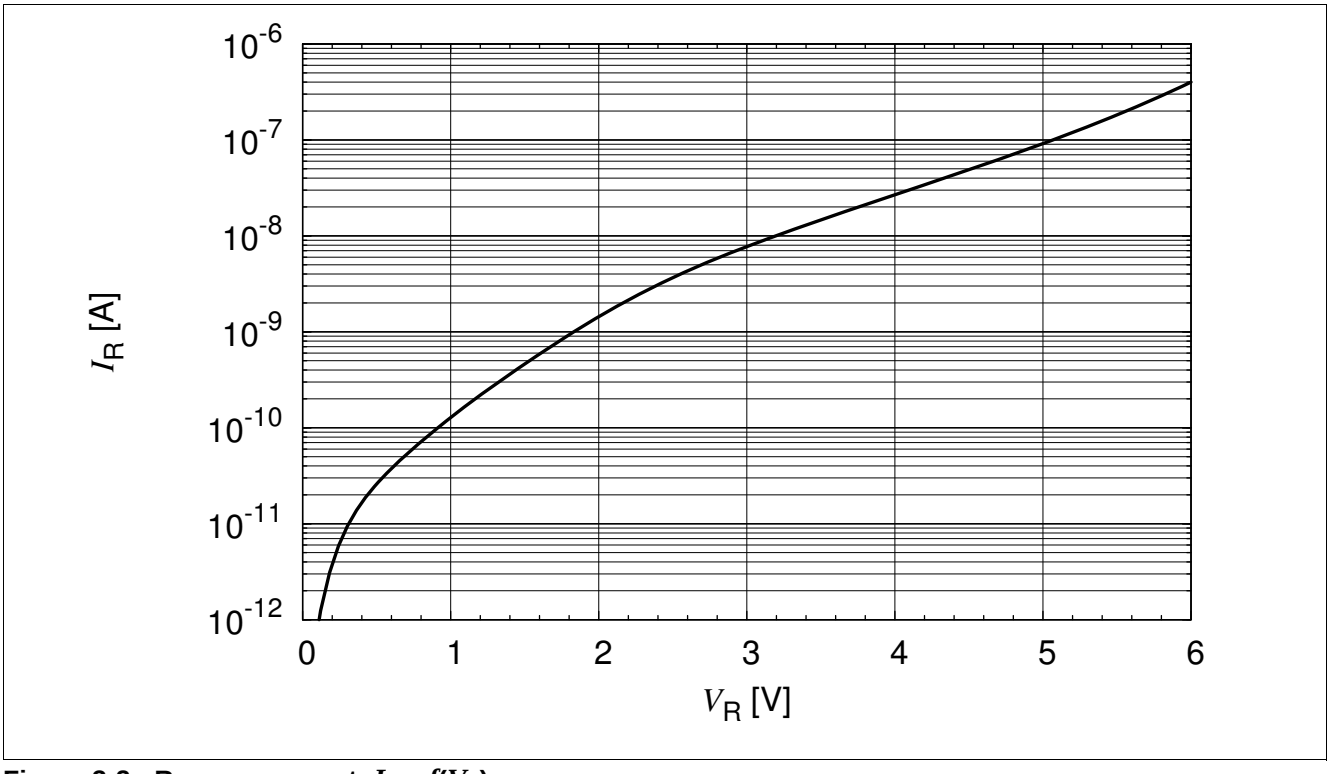

Figure 3-2 Reverse current: $I_R = f(V_R)$

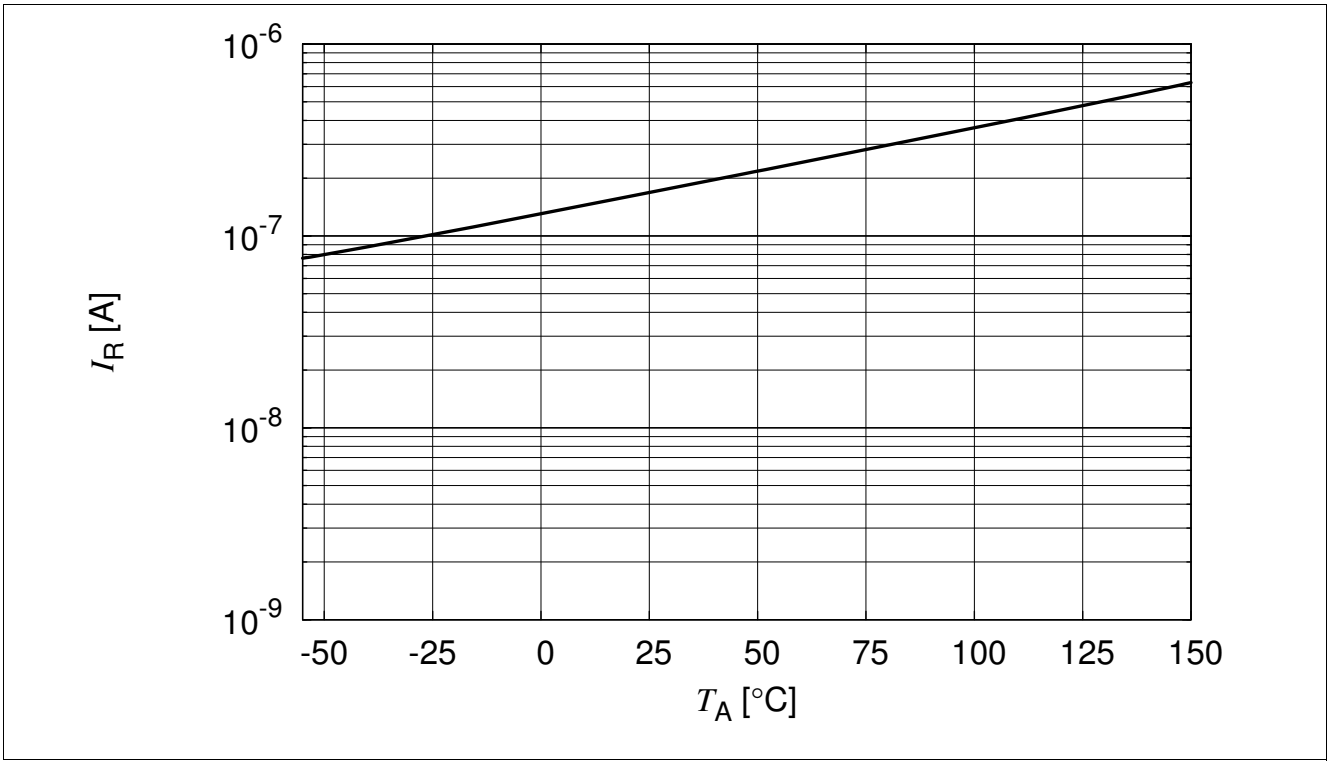

Figure 3-3 Reverse current: $I_R = f(T_A)$, V_R = 5.3 V

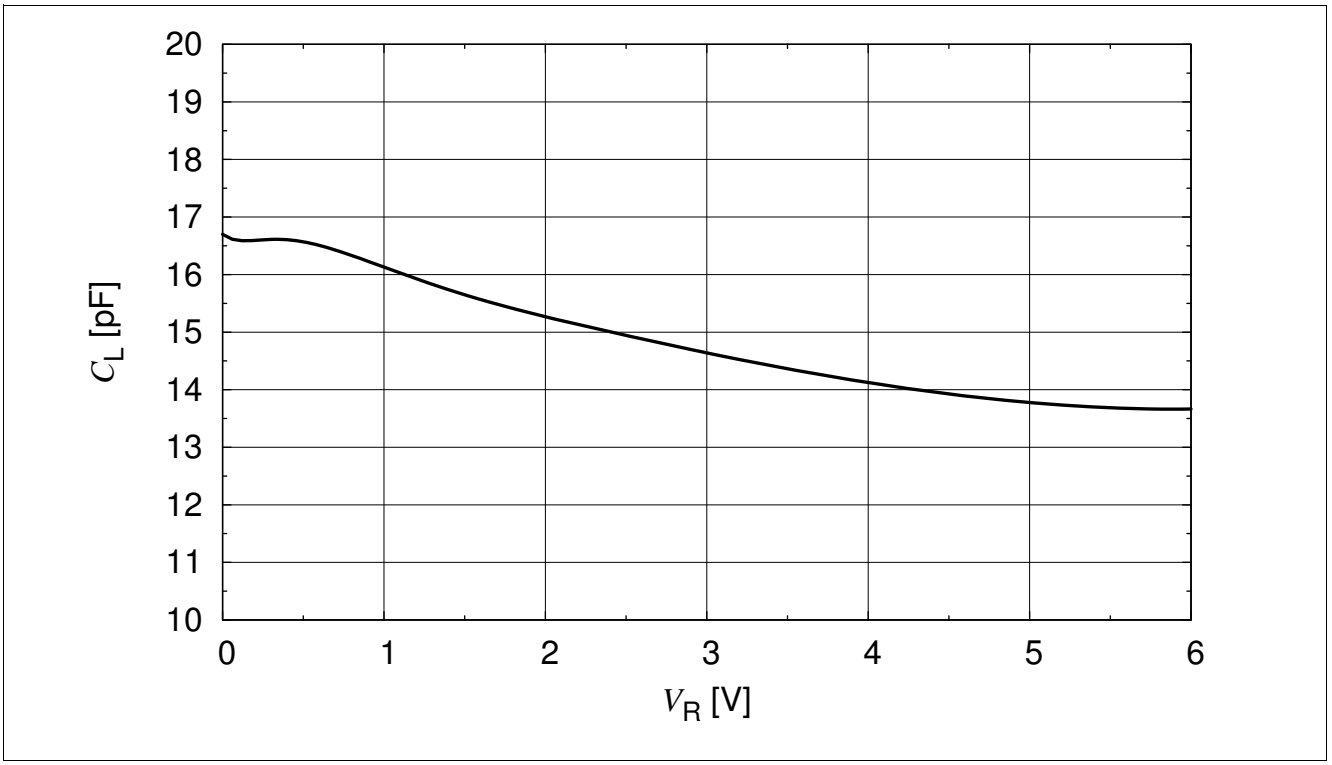

Figure 3-4 Line capacitance: $C_L = f(V_R)$, f = 1MHz

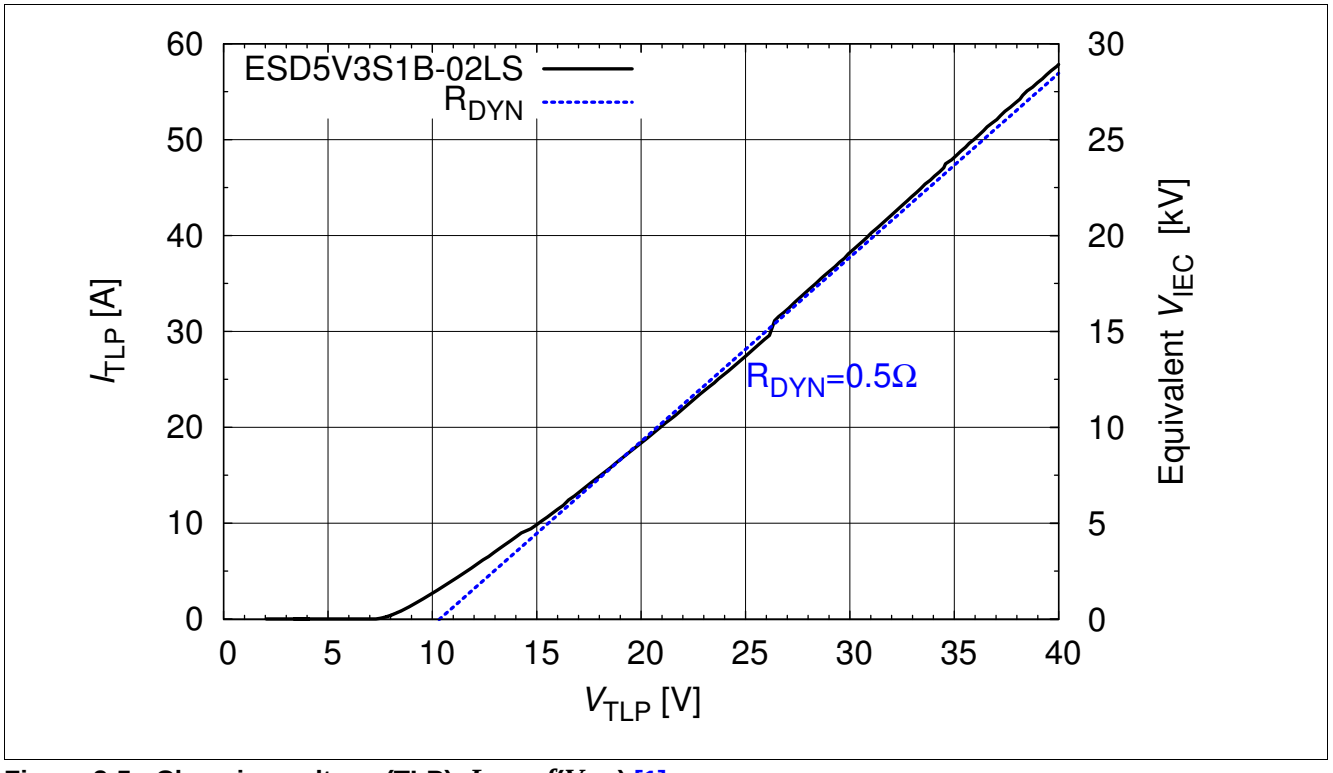

Figure 3-5 Clamping voltage (TLP): $I_{TLP} = f(V_{TLP})$ [1]

4 Application Information

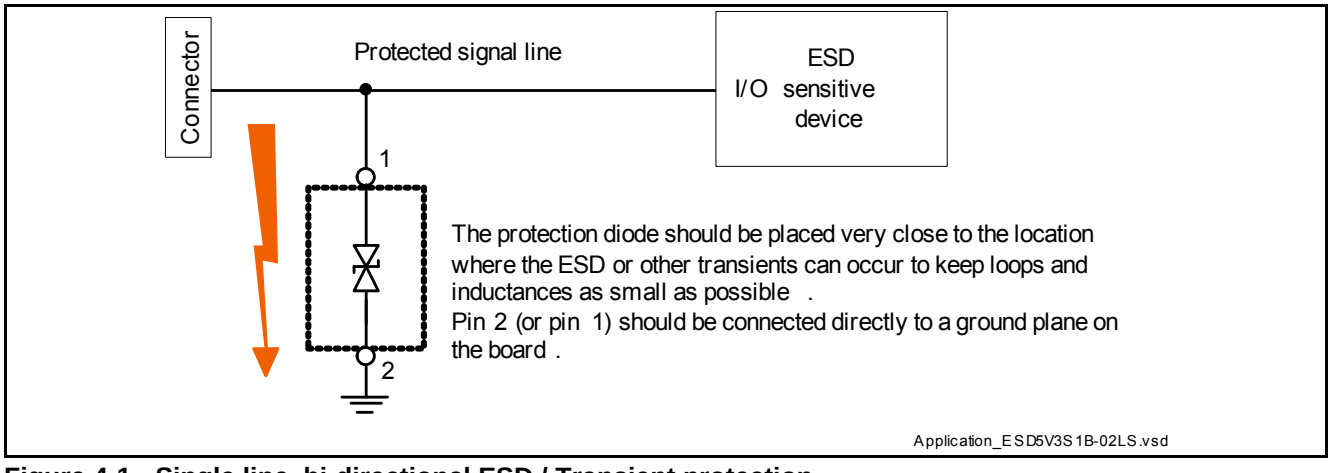

Figure 4-1 Single line, bi-directional ESD / Transient protection

5 Ordering Information Scheme (Examples)

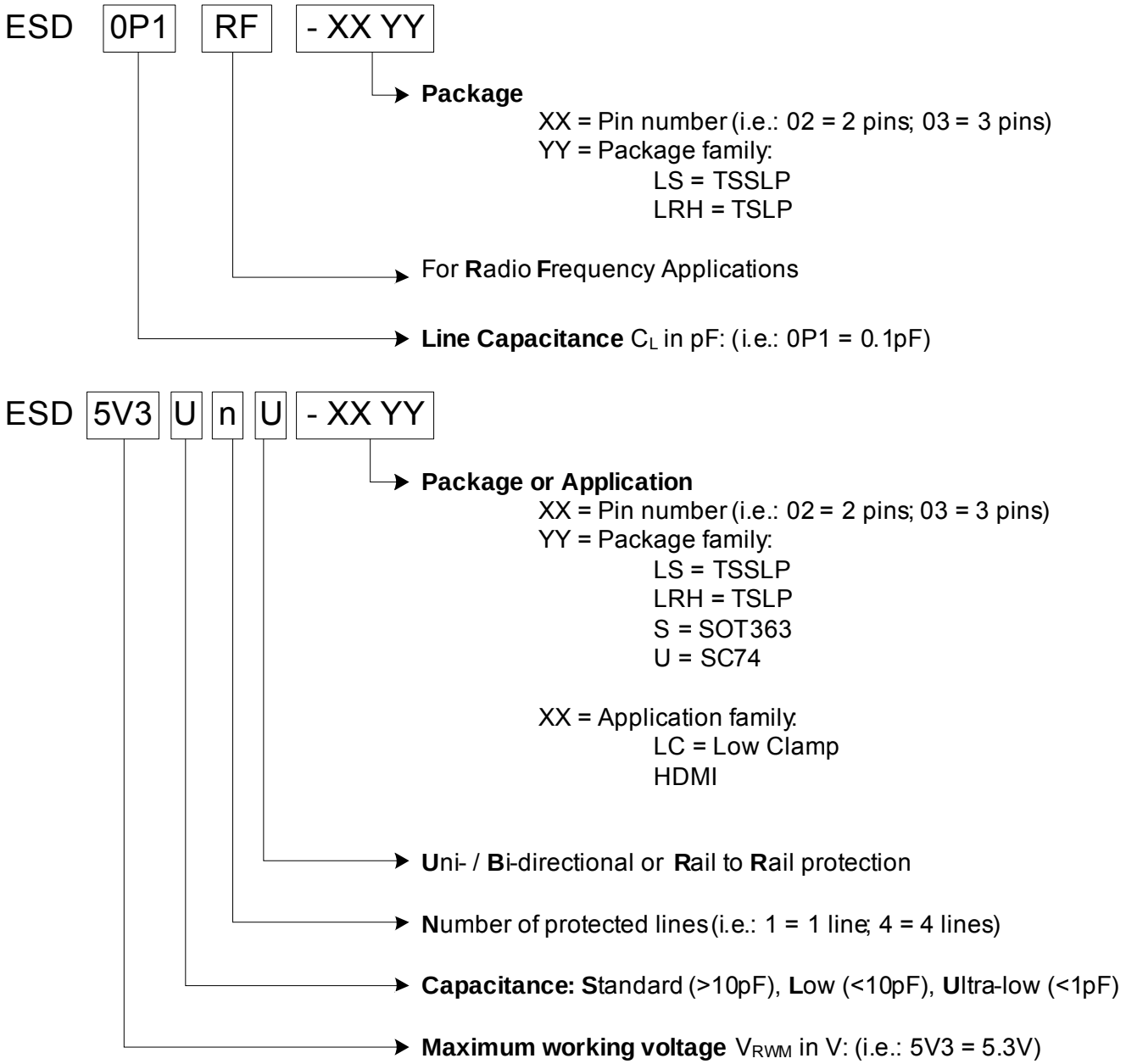

Figure 5-1 Ordering information scheme

6 Package Information

6.1 PG-TSSLP-2-1 (mm) [2]

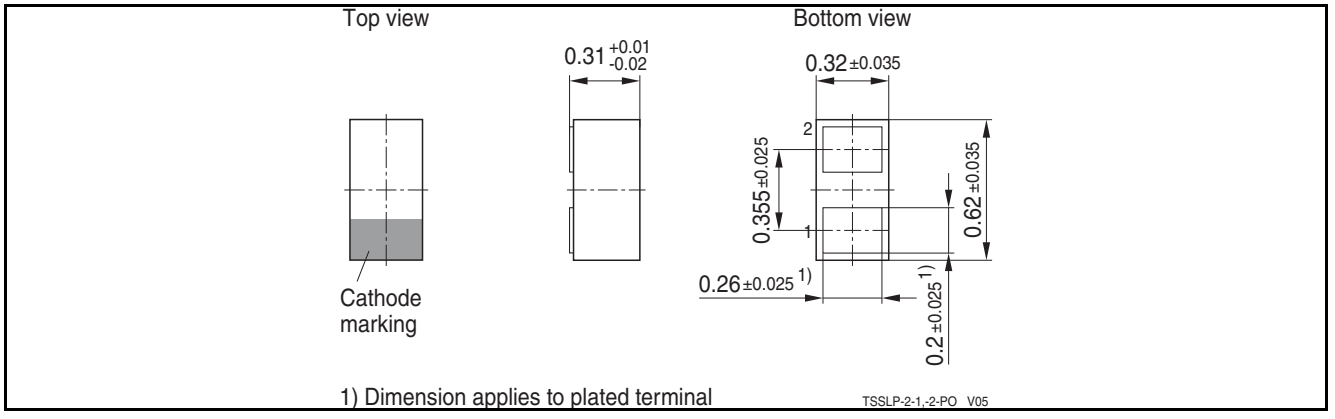

Figure 6-1 PG-TSSLP-2-1: Package overview

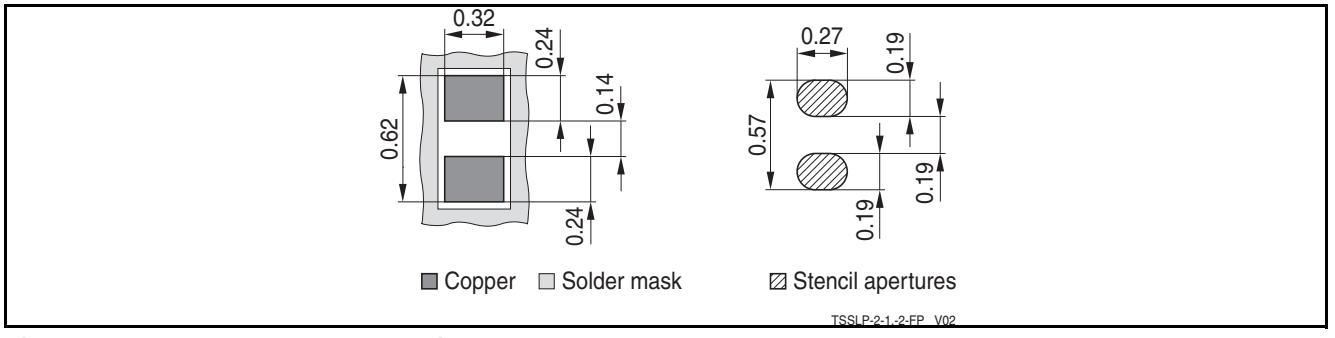

Figure 6-2 PG-TSSLP-2-1: Footprint

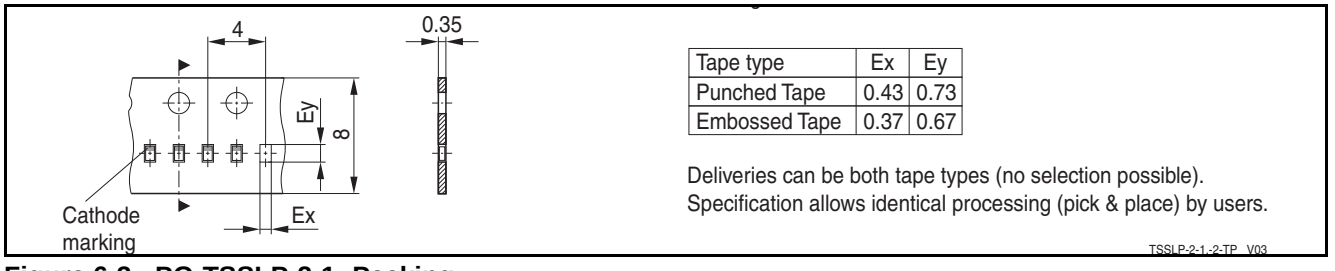

Figure 6-3 PG-TSSLP-2-1: Packing

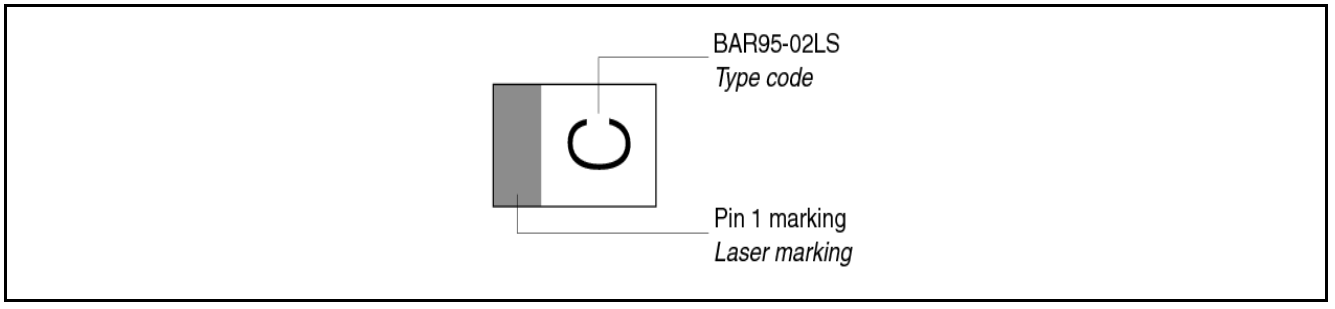

Figure 6-4 PG-TSSLP-2-1: Marking (example)

References

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

[2] Infineon AG - Recommendations for PCB Assembly of Infineon TSLP and TSSLP Packages

Terminology

C_L	Line capacitance
DSC	Digital Still Camera
DVD	Digital Versatile Disc
EFT	Electrical Fast Transient
ESD	Electrostatic Discharge
I_{PP}	Peak pulse current
I_R	Reverse current
LCD	Liquid Crystal Display
MP3	Audio player device based on MPEG Audio Layer III
$\boldsymbol{P_{PK}}$	Peak pulse power
R_{DYN}	Dynamic resistance
RoHs	Restriction of Hazardous Substance directive
STB	Set-Top-Box
T_A	Ambient temperature
T_{OP}	Operation temperature
t_p	Pulse duration
T_{stg}	Storage temperature
V_{BR}	Breakdown voltage
V_{CL}	Reverse clamping voltage
V_{ESD}	Electrostatic discharge voltage
V_R	Reverse voltage
V_{RWM}	Reverse working voltage maximum

Predefined Names

Name	Initial Cross-Reference
X-GOLD	X-GOLD
XMM	XMM

Definition of “Predefined Names”

Frequently used expressions, such as component names, file names, tools releases, version numbers, proprietary variables and software links, can be used in a similar way as user variables. However, they must be listed in a special table and **not** in the standard file “Variables”.

Correct Usage

Steps:

1. Insert all expressions into the left column of the above table.
2. Insert an initial Cross-Reference into the right column of the same row. The initial Cross-Reference is necessary to ensure that a single ID is used in all your documents using the “Predefined_Names.fm” file (Example: **X-GOLD** has the unique ID = CHDGHJGH).
3. Insert a Cross-Reference (Element “CrossReference”) into your document to the Element Identifier of the “Predefined_Names.fm” file. Set the output format of the Cross-Reference to “Variable” (example: X-GOLD).

Notes

1. *All documents in a project (such as XMM) and within a book should use the same file “Predefined Names”. This allows copying content between different documents. For this reason, local versions of “Predefined Names” must not be produced.*
2. *New definitions must be inserted in a new row. Never change existing definitions, as they might be used in other documents.*
3. *This file does not need to be included in your book, but it must be in the fm sub-folder of your document.*
4. *You can sort the above table with FrameMaker only if the initial cross-reference in the right column has been properly inserted. Otherwise, the table may only be sorted by hand, as the cross-references to your document would get lost.*

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