

# TVS Diodes

Transient Voltage Suppressor Diodes

## ESD8V0R1B Series

Bi-directional Low Capacitance TVS Diode

ESD8V0R1B-02EL  
ESD8V0R1B-02ELS

## Data Sheet

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Final

Industrial and Multi-Market

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**Revision History**

Page or Item	Subjects (major changes since previous revision)
<b>Revision 1.0, 2010-10-20</b>	
<b>Revision 2.0, 2010-12-15</b>	
	Carrier Tape drawing for TSSLP-2-2 Package updated

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# 1 Bi-directional Low Capacitance TVS Diode

## 1.1 Features

- ESD / Transient protection of data lines in 3.3 / 5 / 12 V applications according to :
  - IEC61000-4-2 (ESD) :  $\pm 20$  kV (air) and  $\pm 18$  kV (contact)
  - IEC61000-4-4 (EFT) : 40 A (5/50ns)
- Extremely small form factor down to 0.62 x 0.32 x 0.31 mm<sup>2</sup>
- Maximum working voltage:  $V_{RWM} = -8 / +14$  V
- Very low reverse current:  $I_R < 1$  nA (typical)
- Very low series inductance down to :  $L_S = 0.2$  nH (typical)
- Low capacitance  $C_L = 4$  pF I/O to GND (typical)
- Pb-free and Halogen-Free package (RoHS compliant)

## 1.2 Application Examples

- Keypad, touchpad, buttons, convenience keys
- LCD displays, Camera, audio lines, mobile communication, Consumer products (E-Book, MP3, DVD, DSC, ...)
- Notebooks tablets and desktop computers and their peripherals



# 2 Product Description

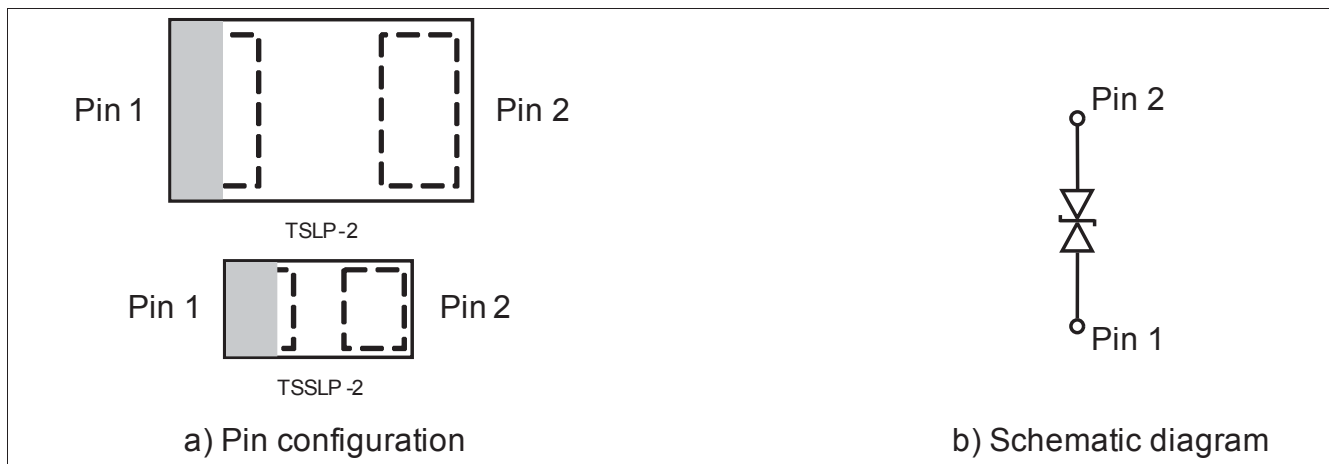


Figure 1 a) Pin Configuration and b) Schematic Diagram

Table 1 Ordering information

Type	Package	Configuration	Marking code
ESD8V0R1B-02EL	PG-TSLP-2-18	1 line, bi-directional	R
ESD8V0R1B-02ELS	PG-TSSLP-2-2	1 line, bi-directional	D

### 3 Characteristics

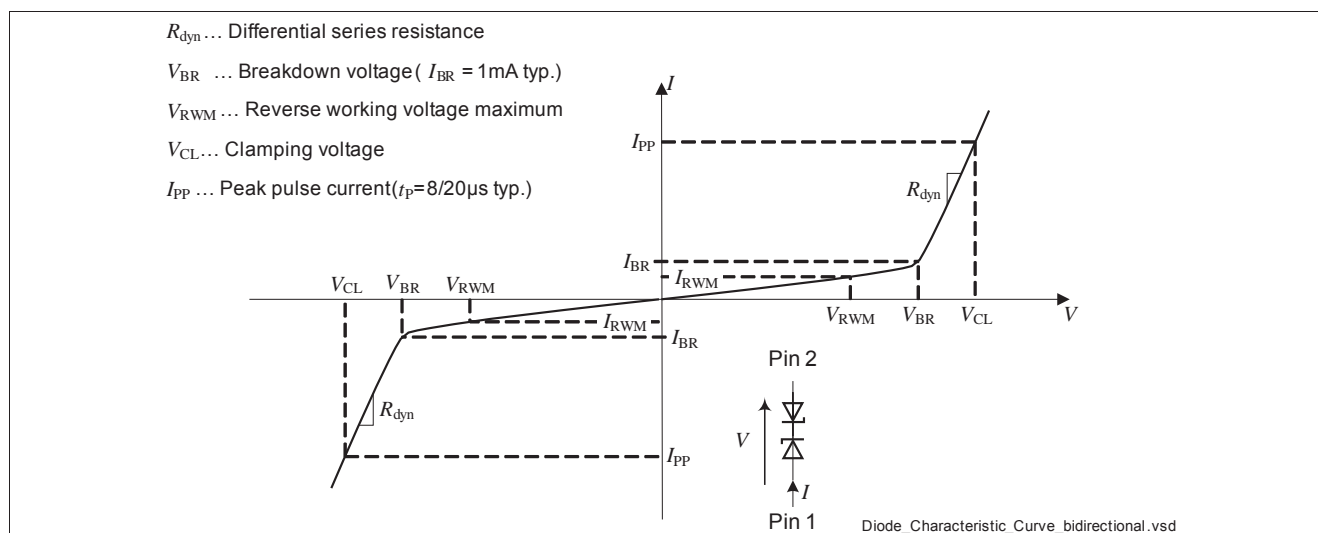
**Table 2 Maximum Rating at  $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise specified**

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
ESD air discharge <sup>1)</sup>	$V_{ESD}$	-20	–	20	kV
ESD contact discharge <sup>1)</sup>	$V_{ESD}$	-18	–	18	kV
Peak pulse current ( $t_p = 8/20\ \mu\text{s}$ ) <sup>2)</sup>	$I_{PP}$	-1	–	1	A
Operating temperature	$T_{OP}$	-55	–	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-65	–	150	$^\circ\text{C}$

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

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

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


**Figure 2 Definitions of electrical characteristics**
**Table 3 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	$V_{RWM}$	-8	–	14	V	from Pin2 to Pin1
Breakdown voltage	$V_{BR}$	8.5	11	14	V	$I_R = 1\text{ mA}$ , from Pin1 to Pin2
Breakdown voltage	$V_{BR}$	14.5	17	20	V	$I_R = 1\text{ mA}$ , from Pin2 to Pin1
Reverse current	$I_R$	–	<1	50	nA	$V_R = 3.3\text{ V}$



**Table 4 RF characteristics at  $T_A = 25\text{ °C}$ , unless otherwise specified**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Line capacitance	$C_L$	–	4	7	pF	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , I/O to <i>GND</i>
Serie inductance	$L_S$	–	0.4	–	nH	ESD8V0R1B-02EL
	$L_S$	–	0.2	–	nH	ESD8V0R1B-02ELS

**Table 5 ESD characteristics at  $T_A = 25\text{ °C}$ , unless otherwise specified**

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Clamping voltage <sup>1)</sup>	$V_{CL}$	–	17	22	V	$I_{PP} = 1\text{ A}$ from Pin1 to Pin2
	$V_{CL}$	–	23	28	V	$I_{PP} = 1\text{ A}$ from Pin2 to Pin1

1) According to IEC61000-4-5 ( $t_p : 8 / 20\text{ }\mu\text{s}$ )

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

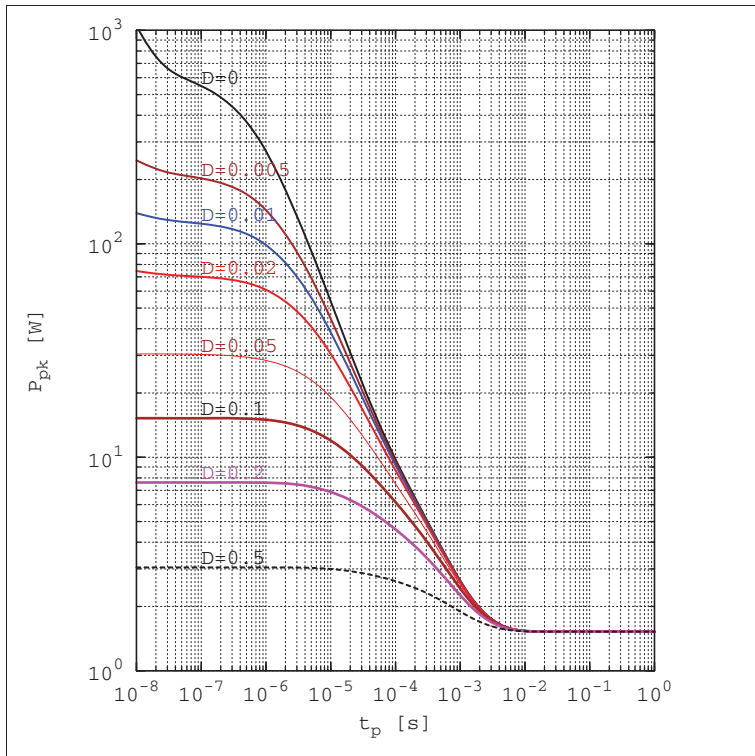


Figure 3 Non-repetitive peak pulse power:  $P_{pk} = f(t_p)$

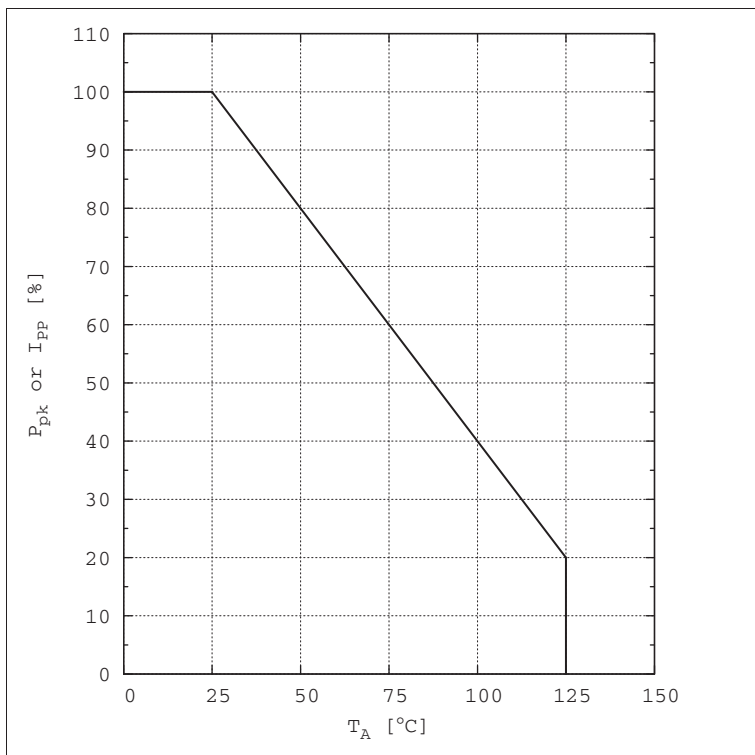


Figure 4 Power derating curve:  $P_{pk} = f(T_A)$

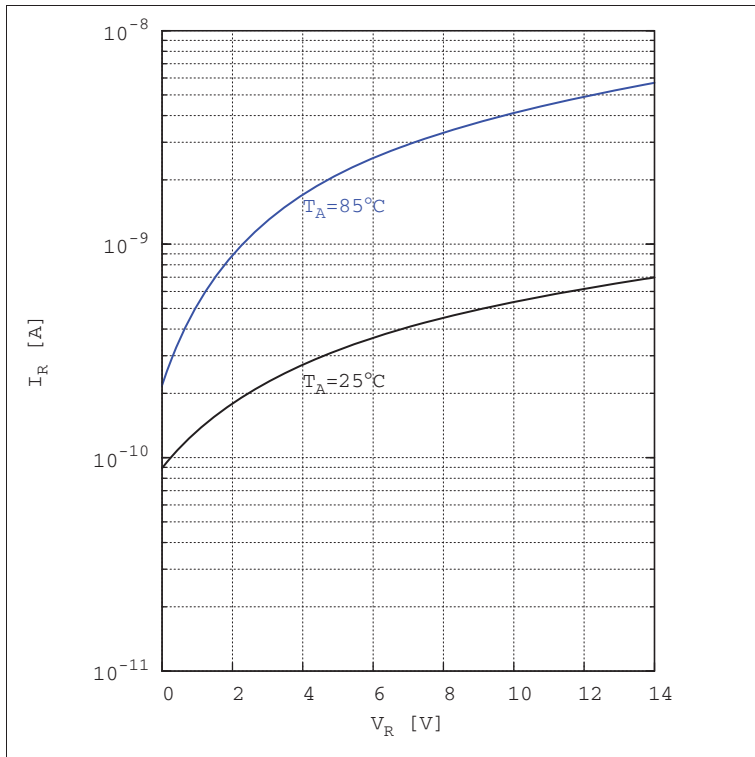


Figure 5 Reverse characteristic,  $I_R = f(V_R)$ ,  $T_A = \text{parameter}$

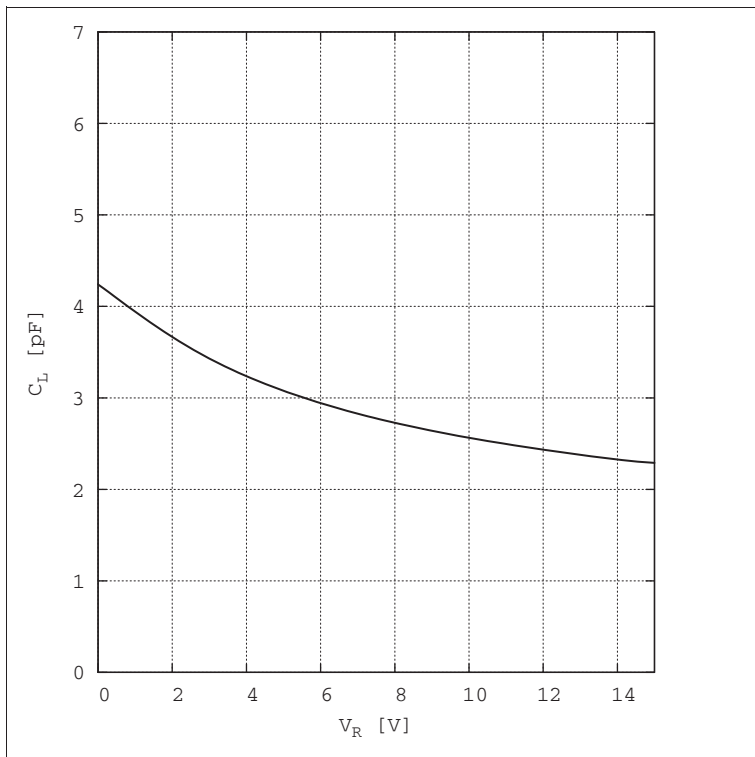


Figure 6 Line capacitance  $C_L = f(V_R)$

## 4 Application Information

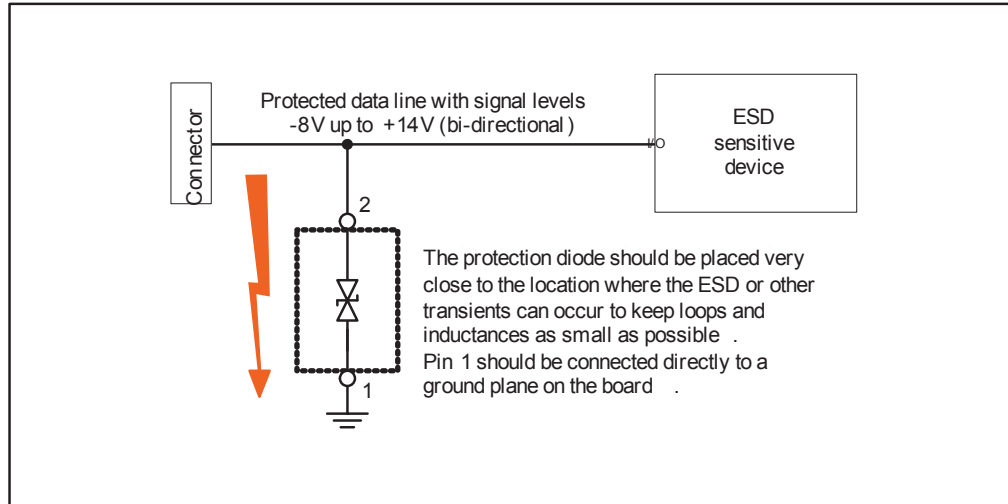


Figure 7 1 Line, bi-directional protection with ESD diode

## 5 Ordering information scheme

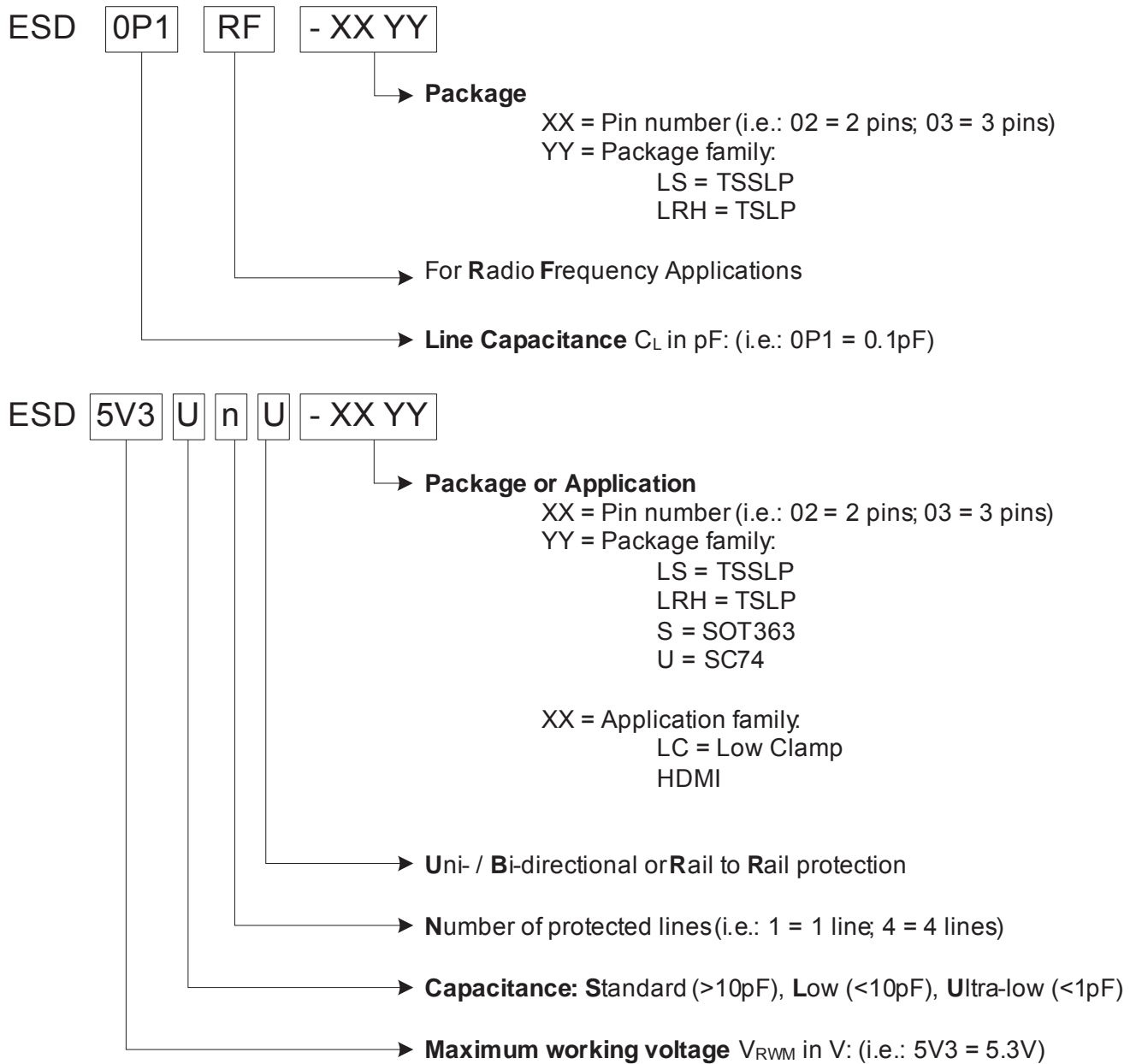
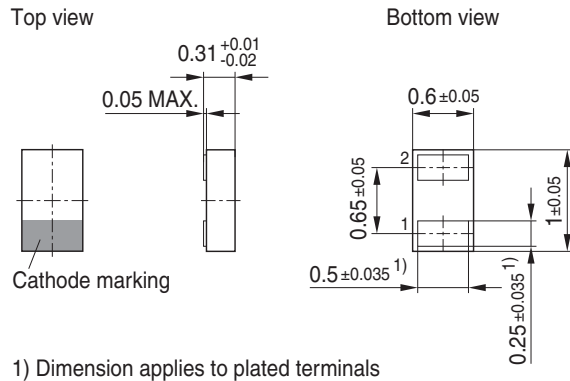


Figure 8 Ordering Information Scheme (examples)

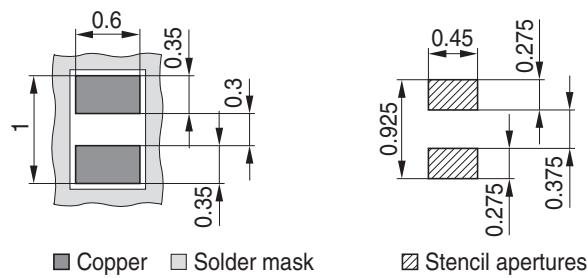
## 6 Package Information

### 6.1 PG-TSLP-2-18



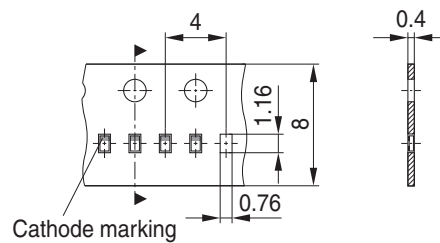
TSLP-2-18-PO V01

Figure 9 PG-TSLP-2-18: Package Overview



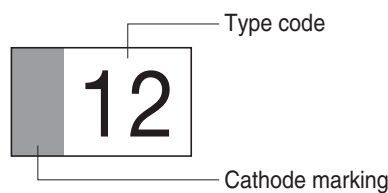
TSLP-2-18-FP V01

Figure 10 PG-TSLP-2-18: Footprint



TSLP-2-18-TP V01

Figure 11 PG-TSLP-2-18: Packing



TSLP-2-18-MK V01

Figure 12 PG-TSLP-2-18: Marking (example)

6.2 PG-TSSLP-2-2

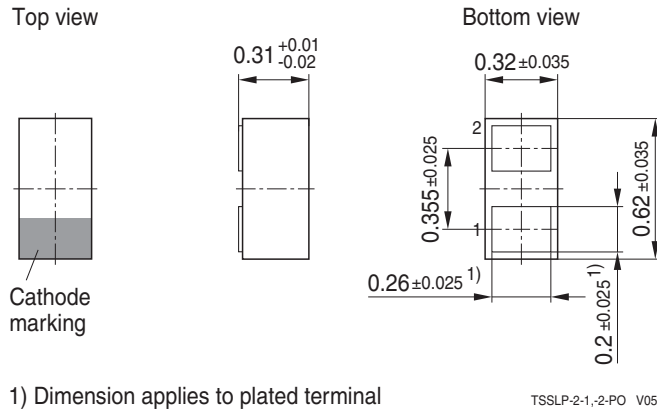


Figure 13 PG-TSSLP-2-2: Package Overview

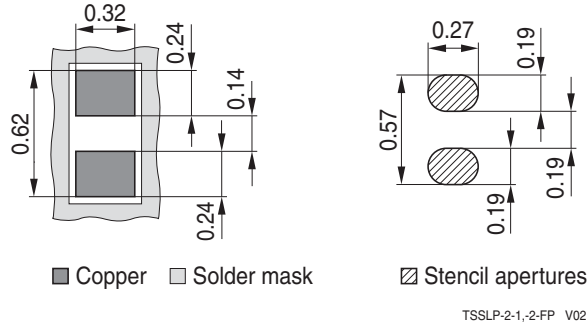
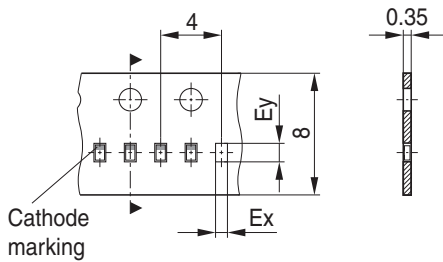


Figure 14 PG-TSSLP-2-2: Footprint



Tape type	Ex	Ey
Punched Tape	0.43	0.73
Embossed Tape	0.37	0.67

Deliveries can be both tape types (no selection possible).  
Specification allows identical processing (pick & place) by users.

TSSLP-2-1,-2-TP V03

Figure 15 PG-TSSLP-2-2: Packing

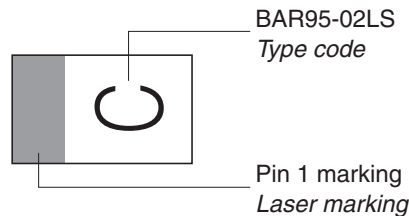


Figure 16 PG-TSSLP-2-2: Marking (example)

## Terminology

$C_L$	Line capacitance
DSC	Digital Still Camera
DVD	Digital Versatile Disc
EFT	Electrical Fast Transient
ESD	Electrostatic Discharge
IEC	International Electrotechnical Commission
$I_{PP}$	Peak pulse current
$I_R$	Reverse current
$I_{RWM}$	Reverse working current maximum
LCD	Liquid Crystal Display
$L_S$	Serial inductance
MP3	Moving Picture Experts Group III
<b>RoHS</b>	Restriction of Hazardous Substances Directive
$T_A$	Ambient temperature
$T_{OP}$	Operation temperature
$t_p$	Pulse duration
$T_{stg}$	Storage temperature
$V_{CL}$	Reverse clamping voltage
$V_{ESD}$	Electrostatic discharge voltage
$V_R$	Reverse voltage
$V_{RWM}$	Reverse working voltage maximum



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