

# TVS Diodes

Transient Voltage Suppressor Diodes

## ESD5V0L1B-02V

Bi-directional Low Capacitance TVS Diode

ESD5V0L1B-02V

## 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, 2010-12-16</b>	

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# 1 Bi-directional Low Capacitance TVS Diode

## 1.1 Features

- ESD / transient protection according to:
  - IEC61000-4-2 (ESD):  $\pm 25$  kV (contact)
  - IEC61000-4-4 (EFT): 40 A (5/50 ns)
  - IEC61000-4-5 (surge): 2.5 A (8/20  $\mu$ s)
- Max.working voltage:  $V_{RWM} = \pm 5$  V
- Ultra low dynamic resistance:  $R_{dyn} = 0.3\Omega$
- Low capacitance:  $C_L = 8.5$  pf typ.
- Very low reverse current:  $I_R = \leq 1$  nA typ.
- Pb-free (RoHS compliant) and halogen free package
- Qualified according AEC Q101



## 1.2 Application Examples

- Cellular handsets, portable devices, notebooks and computers
- Digital cameras, power supplies and audio / video equipment, accessories

# 2 Product Description

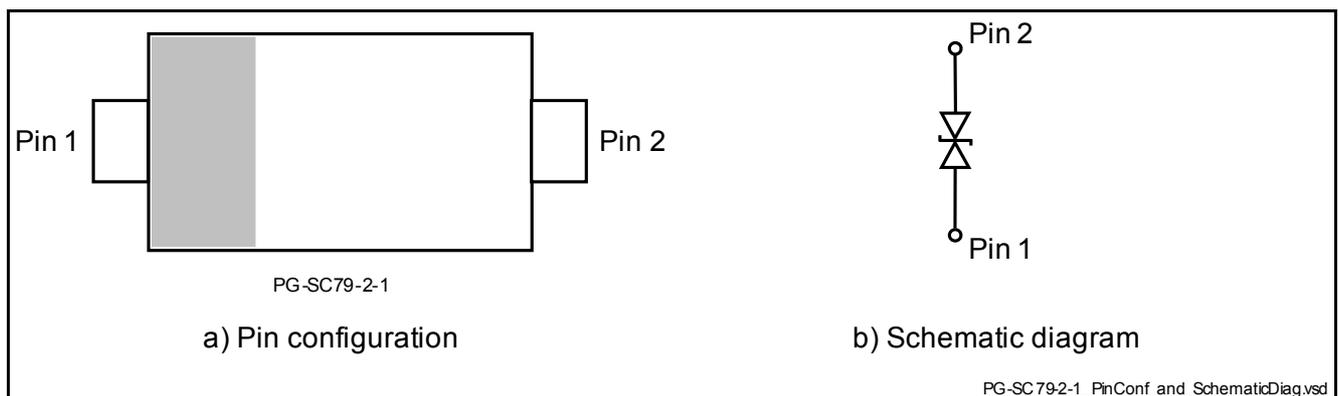


Figure 1 Pin configuration and schematic diagram

Table 1 Ordering information

Type	Package	Configuration	Marking code
ESD5V0L1B-02V	PG-SC79-2-1	1 channel, bi-directional	

### 3 Characteristics

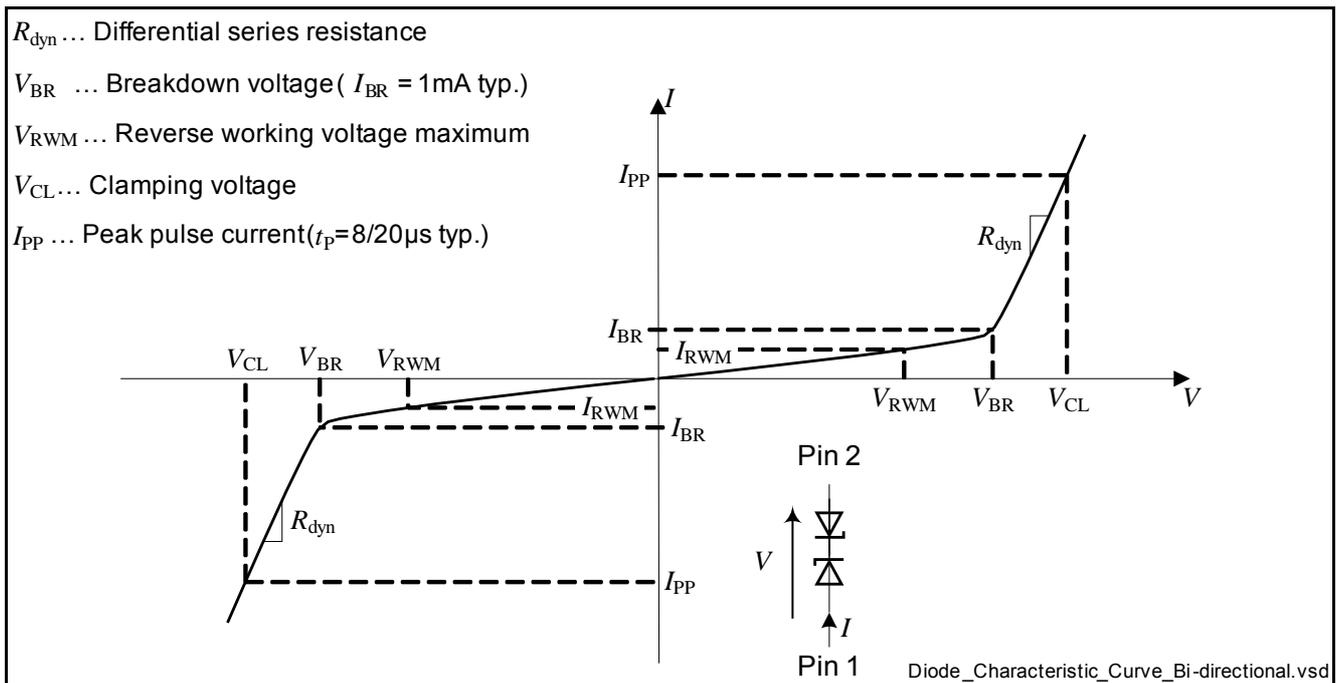
**Table 2** Maximum Rating at  $T_A = 25\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
ESD contact discharge <sup>1)</sup>	$V_{ESD}$	-25	–	25	kV
Peak pulse current ( $t_p = 8/20\ \mu\text{s}$ ) <sup>2)</sup>	$I_{PP}$	-2.5	–	2.5	A
Operating temperature range	$T_{OP}$	-55	–	125	°C
Storage temperature	$T_{stg}$	-65	–	150	°C

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

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

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



**Figure 2** Definitions of electrical characteristics

**Table 3** DC characteristics at  $T_A = 25\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Reverse working voltage	$V_{RWM}$	–	–	5	V	
Breakdown voltage	$V_{BR}$	7	–	–	V	$I_R = 1\text{ mA}$
Reverse current	$I_R$	–	$\leq 1$	50	nA	$V_R = 3\text{ V}$

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

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Diode capacitance	$C_L$	–	8.5	13	pF	$V_R = 0\text{ V}, f = 1\text{ MHz}$

**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	–	V	$I_{pp} = 5\text{ A},$ $t_p = 30\text{ ns},$ pin 1-2
Clamping voltage <sup>1)</sup>	$V_{CL}$	–	20	–	V	$I_{pp} = 5\text{ A},$ $t_p = 30\text{ ns},$ pin 2-1
Clamping voltage <sup>1)</sup>	$V_{CL}$	–	22	–	V	$I_{pp} = 16\text{ A},$ $t_p = 30\text{ ns},$ pin 1-2
Clamping voltage <sup>1)</sup>	$V_{CL}$	–	25	–	V	$I_{pp} = 16\text{ A},$ $t_p = 30\text{ ns},$ pin 2-1
Dynamic resistance <sup>1)</sup>	$R_{DYN}$	–	0.3	–	$\Omega$	$t_p = 30\text{ ns}$

1) According TLP tests. Please refer to Application Note AN-210

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

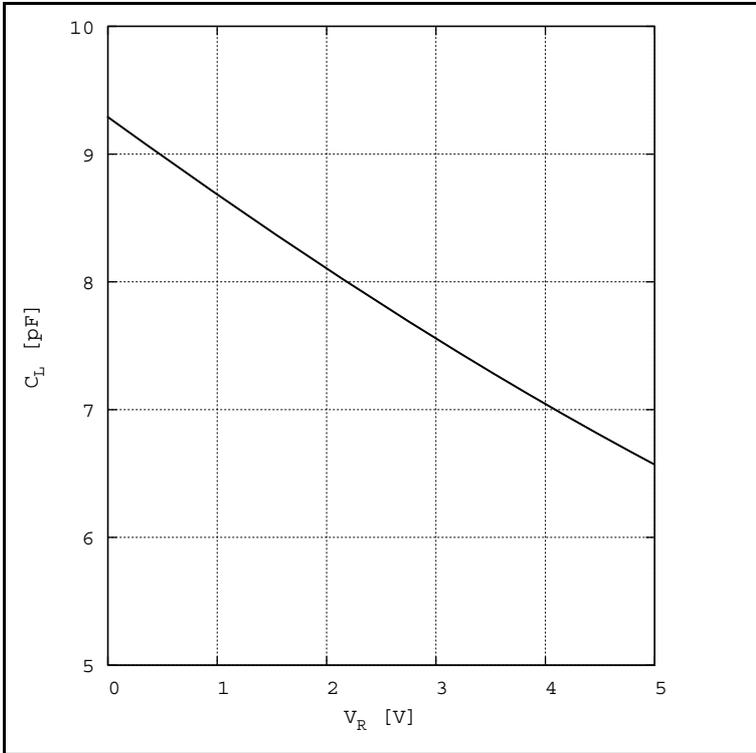


Figure 3 Capacitance characteristics:  $C_L = f(V_R)$

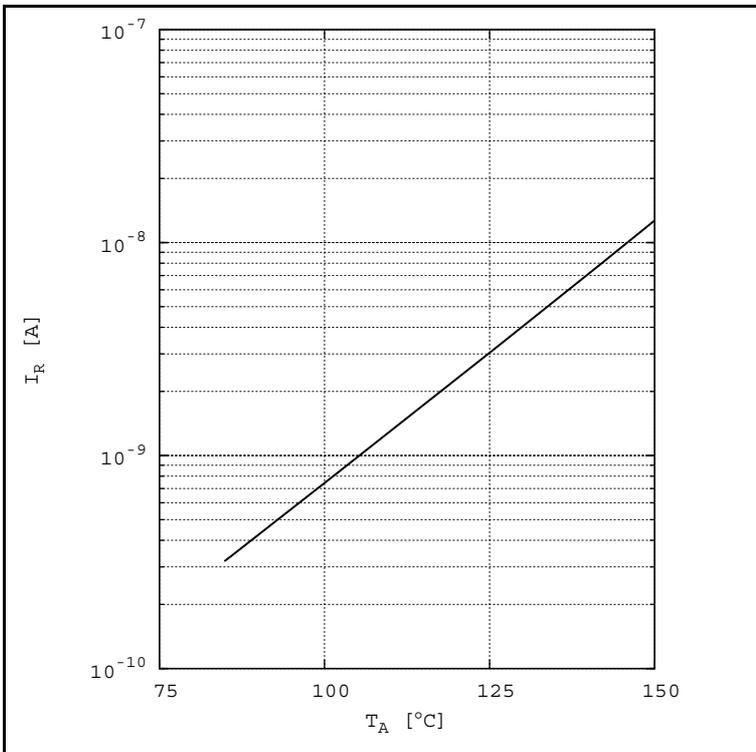


Figure 4 Reverse characteristics:  $I_R = f(V_R)$

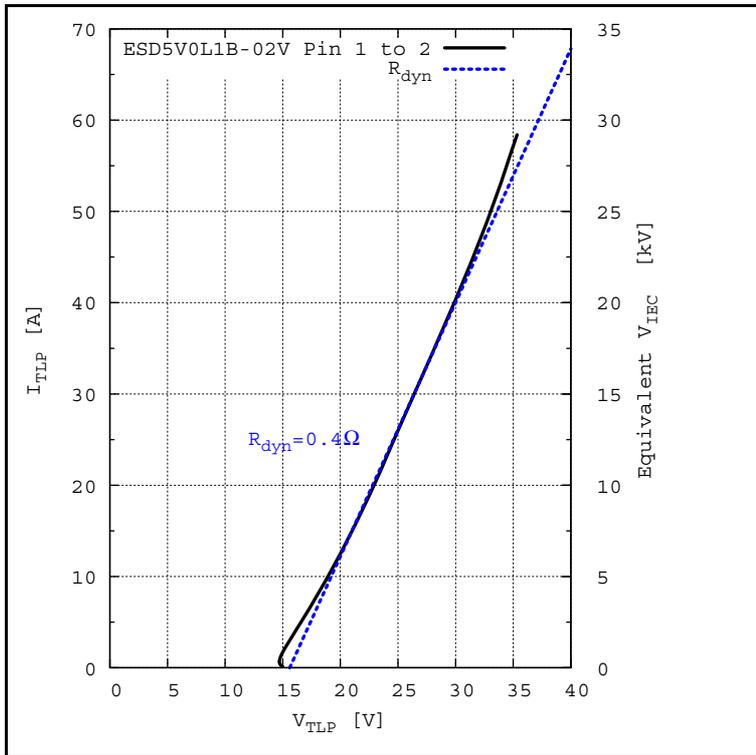


Figure 5 Reverse TLP characteristics

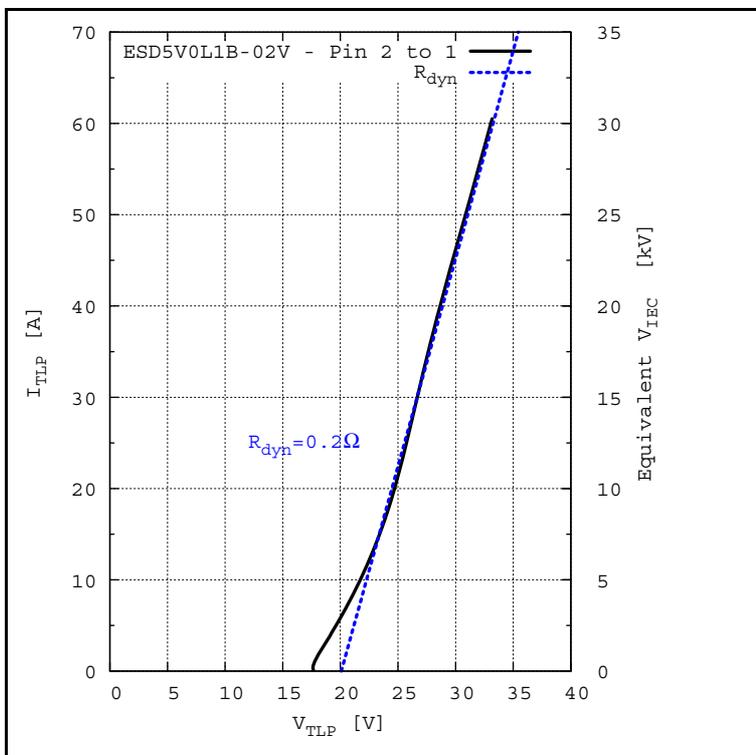


Figure 6 Forward TLP characteristics

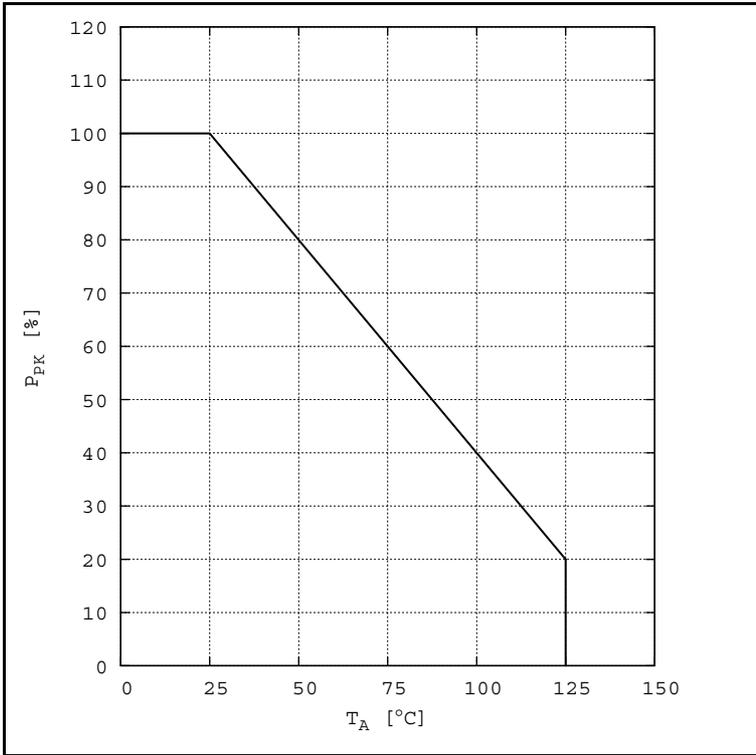


Figure 7 Power derating curve:  $P_{PK} = f(T_A)$

## 4 Application Information

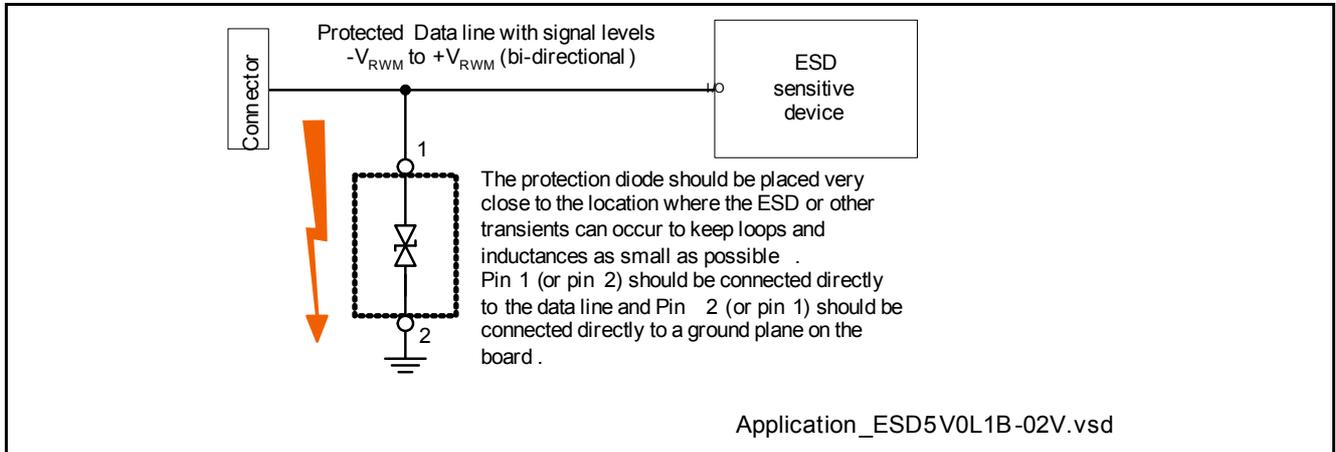


Figure 8 Single Chanel, uni-directional TVS protection

## 5 Ordering information scheme

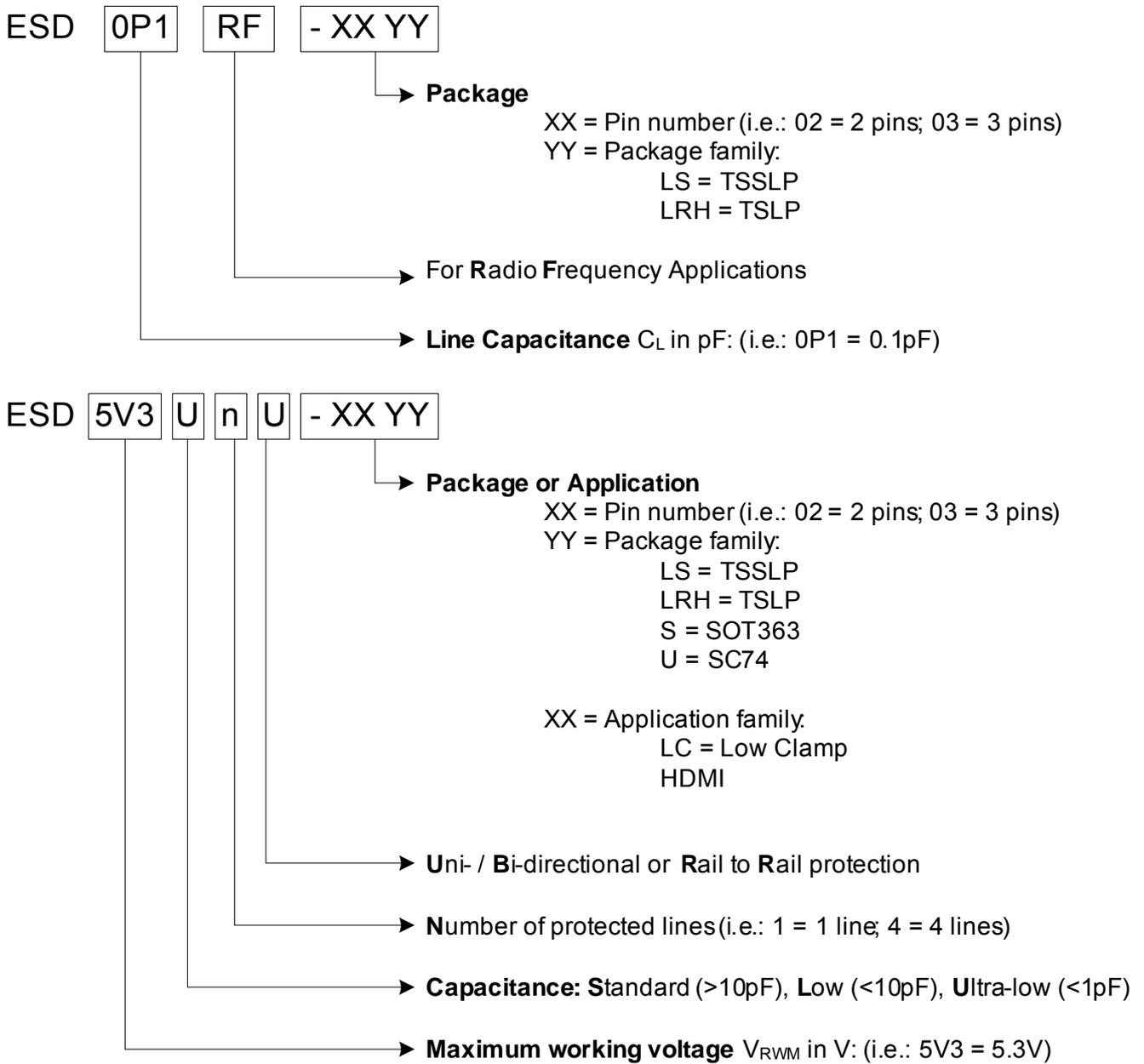


Figure 9 Ordering Information Scheme

## 6 Package Information

### 6.1 PG-SC79-2-1

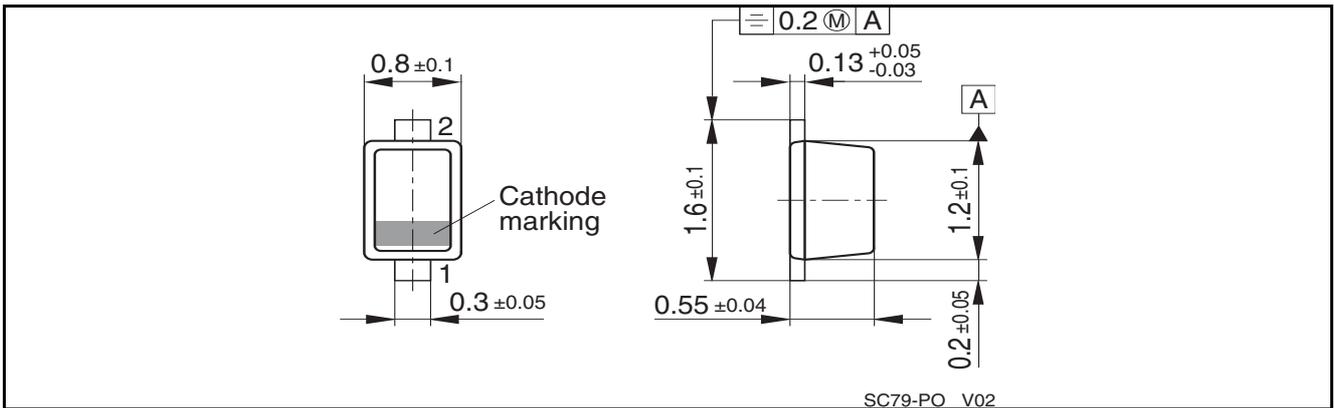


Figure 10 PG-SC79-2-1: Package Overview

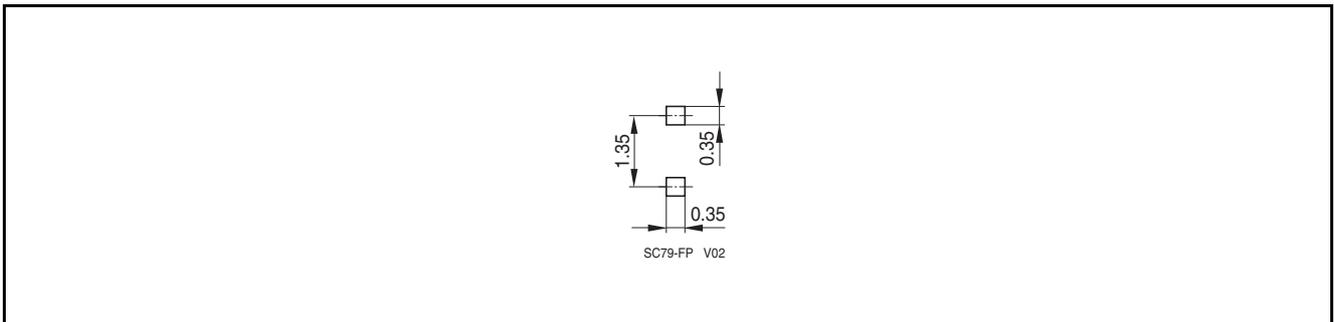


Figure 11 PG-SC79-2-1: Footprint

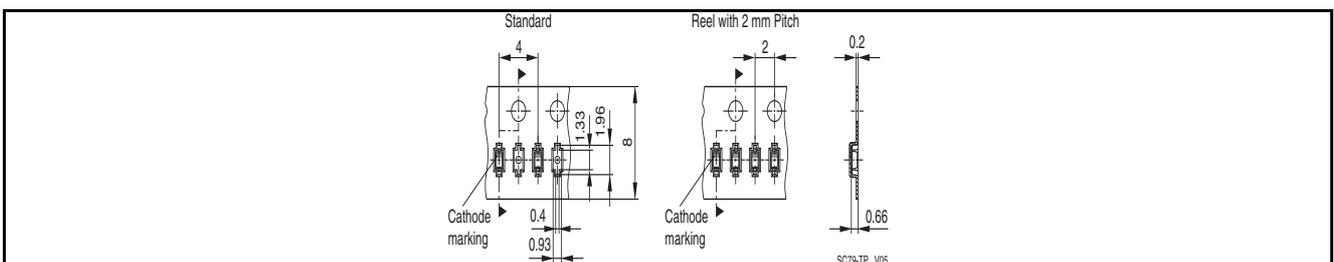


Figure 12 PG-SC79-2-1: Packing

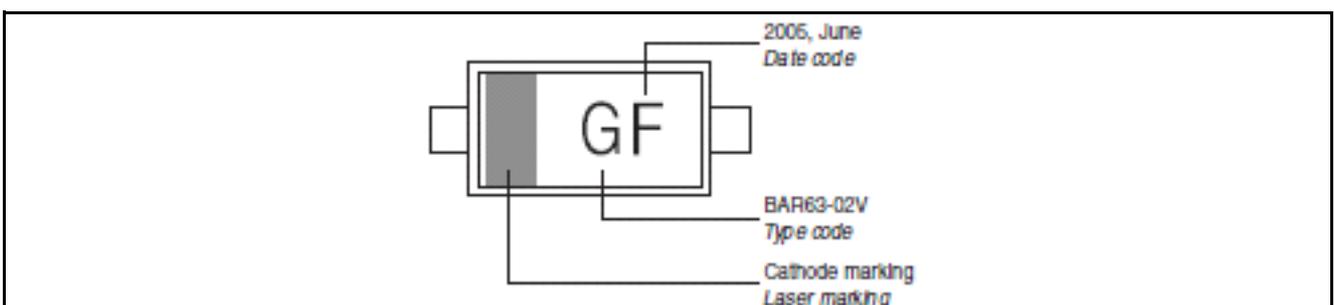


Figure 13 PG-SC79-2-1: Marking (example)

## 7 Date Code Marking<sup>1)</sup>

one digit (SCD80, SC79, SC75<sup>1)</sup>) CES-Code

Month	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
01	a	p	A	P	a	p	A	P	a	p	A	P
02	b	q	B	Q	b	q	B	Q	b	q	B	Q
03	c	r	C	R	c	r	C	R	c	r	C	R
04	d	s	D	S	d	s	D	S	d	s	D	S
05	e	t	E	T	e	t	E	T	e	t	E	T
06	f	u	F	U	f	u	F	U	f	u	F	U
07	g	v	G	V	g	v	G	V	g	v	G	V
08	h	x	H	X	h	x	H	X	h	x	H	X
09	j	y	J	Y	j	y	J	Y	j	y	J	Y
10	k	z	K	Z	k	z	K	Z	k	z	K	Z
11	l	2	L	4	l	2	L	4	l	2	L	4
12	n	3	N	5	n	3	N	5	n	3	N	5

**Figure 14** Date Code marking for Discrete packages with one digit (SCD8, SC79, SC75<sup>1)</sup>) CES-Code

1) New Marking Layout for SC75, implemented at October 2005

## Terminology

$C_L$	Line capacitance
EFT	Electrical Fast Transient
ESD	Electrostatic Discharge
$I_{PP}$	Peak pulse current
$I_R$	Reverse current
RoHS	Restriction of Hazardous Substance 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
$V_{BR}$	Breakdown voltage
$R_{DYN}$	Dynamic resistance

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