

# TVS Diodes

Transient Voltage Suppressor Diodes

## ESD5V0S1U-02V

Uni-directional ESD / Transient Protection Diode

ESD5V0S1U-02V

## Data Sheet

Revision 1.1, 2012-05-31  
Final

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Page or Item	Subjects (major changes since previous revision)
<b>Revision 1.1, 2012-05-31</b>	
Page 8	<b>Table 3</b> updated

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Last Trademarks Update 2010-10-26

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# 1 Uni-directional ESD / Transient Protection Diode

## 1.1 Features

- ESD / transient protection according to:
  - IEC61000-4-2 (ESD):  $\pm 25$  kV (air) 20 kV (contact)
  - IEC61000-4-4 (EFT): 50 A / 2.5 kV (5/50 ns)
  - IEC61000-4-5 (surge): 5.5 A / 66 W (8/20  $\mu$ s)
- Uni-directional, working voltage:  $V_{RWM} = 5$  V
- Ultra low clamping voltage, protects against both positive and negative ESD strikes
- Ultra low dynamic resistance:  $R_{DYN}$  down to 0.2  $\Omega$
- Very fast response time
- Pb-free (RoHS compliant) and halogen free package



## 1.2 Application Examples

- Notebooks, computers and consumer electronics
- Industrial applications, white goods, portable instrumentation
- Mobile communication

# 2 Product Description

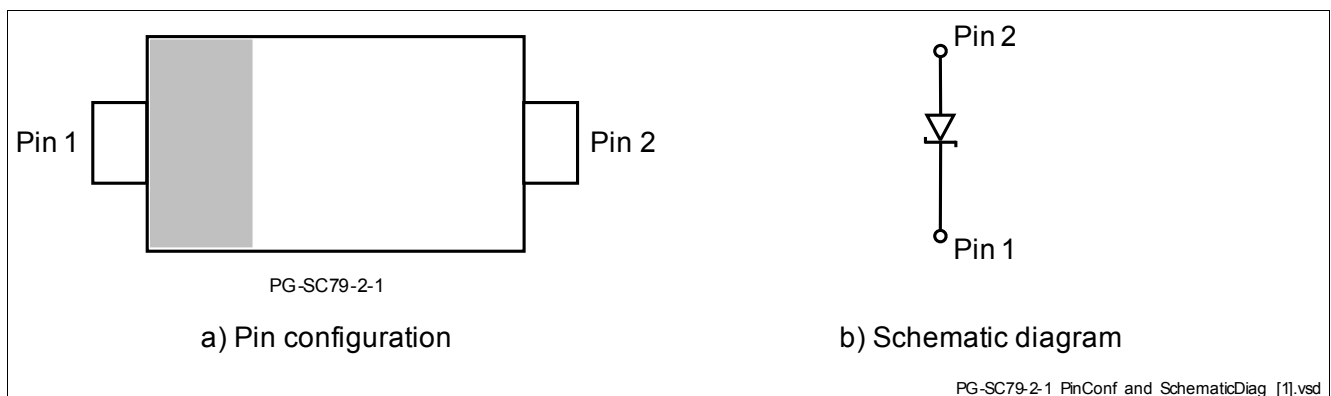


Figure 1 Pin configuration and schematic diagram

Table 1 Ordering information

Type	Package	Configuration	Marking code
ESD5V0S1U-02V	SC79	1 line, uni-directional	U

### 3 Characteristics

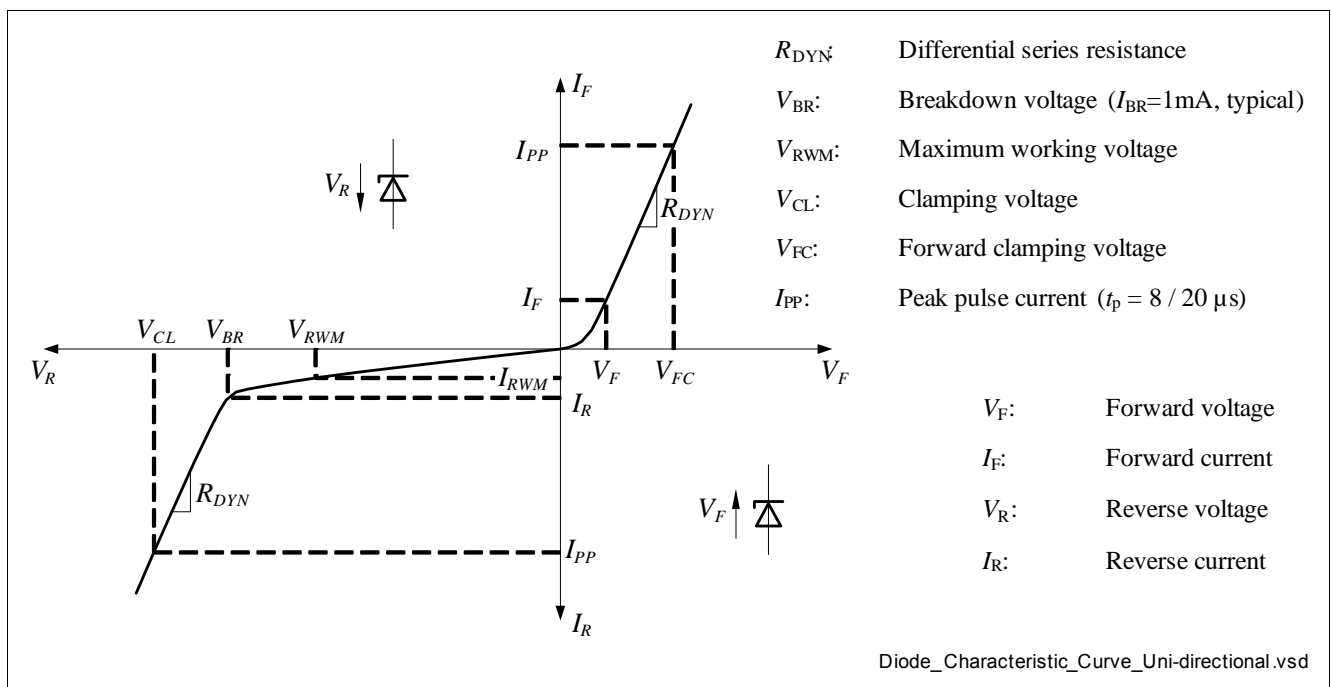
**Table 2 Maximum Rating at  $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise specified**

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
ESD air discharge <sup>1)</sup>	$V_{ESD}$	-25	–	25	kV
ESD contact discharge <sup>1)</sup>	$V_{ESD}$	-20	–	20	kV
Peak pulse current ( $t_p = 8/20\text{ }\mu\text{s}$ ) <sup>2)</sup>	$I_{PP}$	-5.5	–	5.5	A
Peak pulse power ( $t_p = 8/20\text{ }\mu\text{s}$ ) <sup>2)</sup>	$P_{PK}$	–	–	66	W
Operating temperature range	$T_{OP}$	-55	–	125	$^\circ\text{C}$
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	$V_{RWM}$	–	–	5	V	
Breakdown voltage	$V_{BR}$	5.7	6.5	7.5	V	$I_R = 1\text{ mA}$
Reverse current	$I_R$	–	–	0.1	$\mu\text{A}$	$V_R = 3.3\text{ V}$

## Characteristics

**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	$C_L$	–	35	40	pF	$V_R = 0\text{ V}, f = 1\text{ MHz}$
Diode capacitance	$C_L$	–	20	–	pF	$V_R = 2.5\text{ V}, f = 1\text{ MHz}$

**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>	$V_{CL}$	–	7.6	–	V	$I_{pp} = 5\text{ A},$ $t_p = 30\text{ ns},$ pin 1-2
Clamping voltage <sup>1)</sup>	$V_{CL}$	–	10.5	–	V	$I_{pp} = 16\text{ A},$ $t_p = 30\text{ ns},$ pin 1-2
Clamping voltage <sup>1)</sup>	$V_{CL}$	–	14.5	–	V	$I_{pp} = 30\text{ A},$ $t_p = 30\text{ ns},$ pin 1-2
Forward clamping voltage <sup>1)</sup>	$V_{FC}$	–	2	–	V	$I_{pp} = 5\text{ A},$ $t_p = 30\text{ ns},$ pin 2-1
Forward clamping voltage <sup>1)</sup>	$V_{FC}$	–	4.3	–	V	$I_{pp} = 16\text{ A},$ $t_p = 30\text{ ns},$ pin 2-1
Forward clamping voltage <sup>1)</sup>	$V_{FC}$	–	7.3	–	V	$I_{pp} = 30\text{ A},$ $t_p = 30\text{ ns},$ pin 2-1
Dynamic resistance <sup>1)</sup>	$R_{DYN}$	–	0.2	–	$\Omega$	$t_p = 30\text{ ns},$ pin 2-1
Dynamic resistance <sup>1)</sup>	$R_{DYN}$	–	0.3	–	$\Omega$	$t_p = 30\text{ ns},$ pin 1-2

1)According TLP tests. Please refer to Application Note AN-210 [\[1\]](#)

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

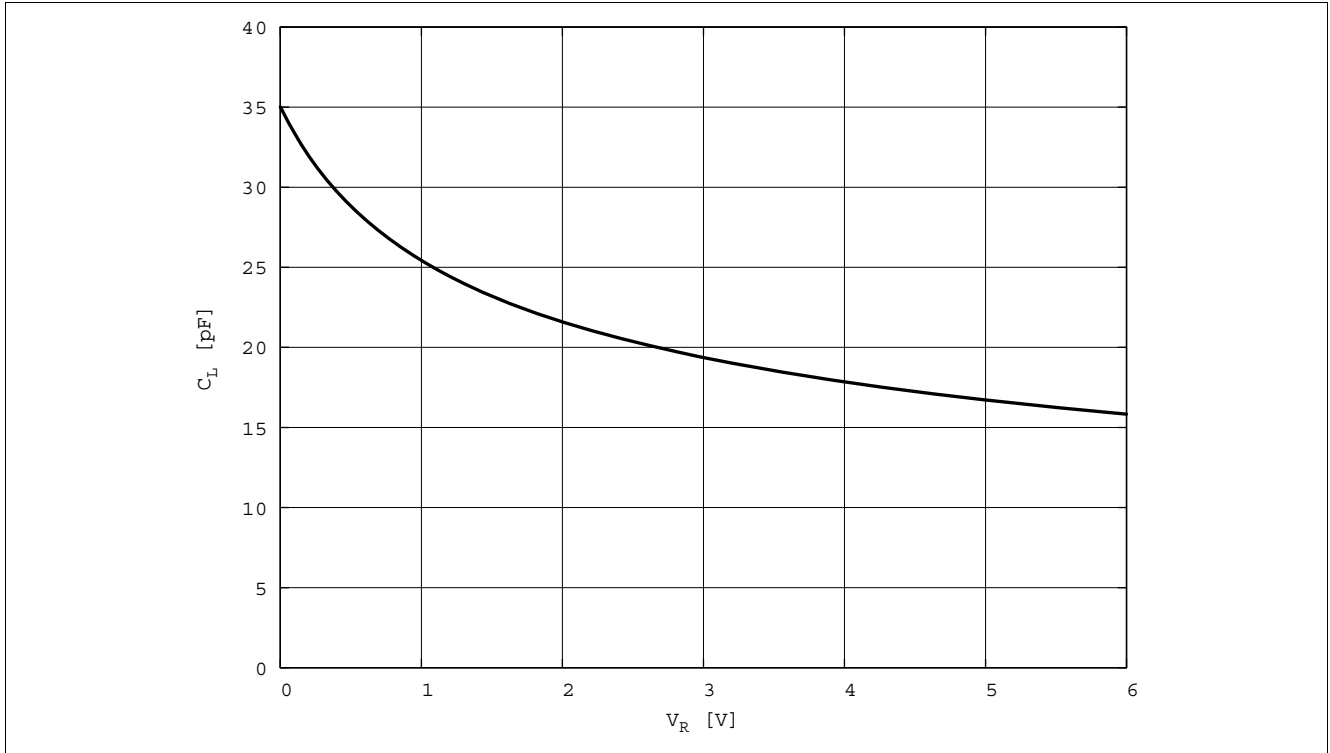


Figure 3 Capacitance characteristics:  $C_L = f(V_R) - f = 1\text{ MHz}$

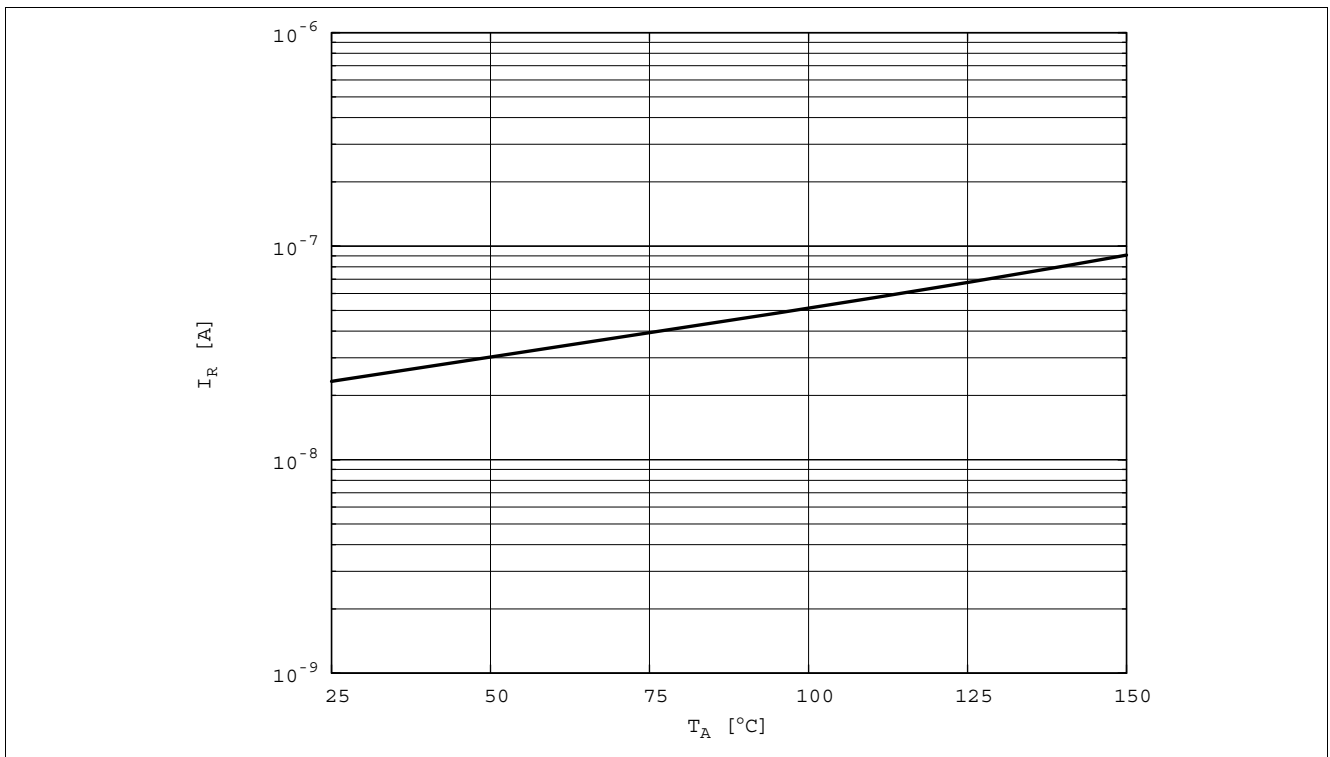


Figure 4 Reverse characteristics:  $I_R = f(T_A) - V_R = 3.3\text{ V}$



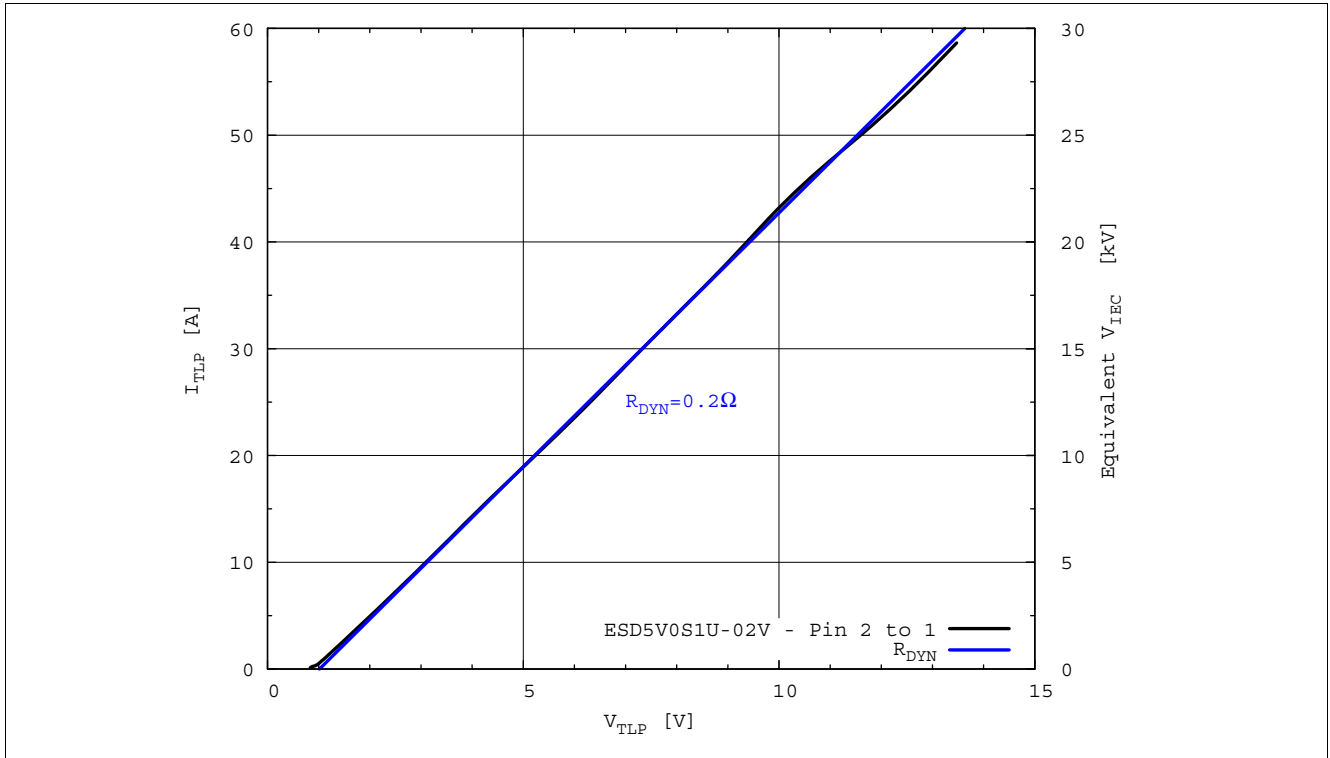


Figure 5 Forward TLP characteristics (Pin 2 to 1)

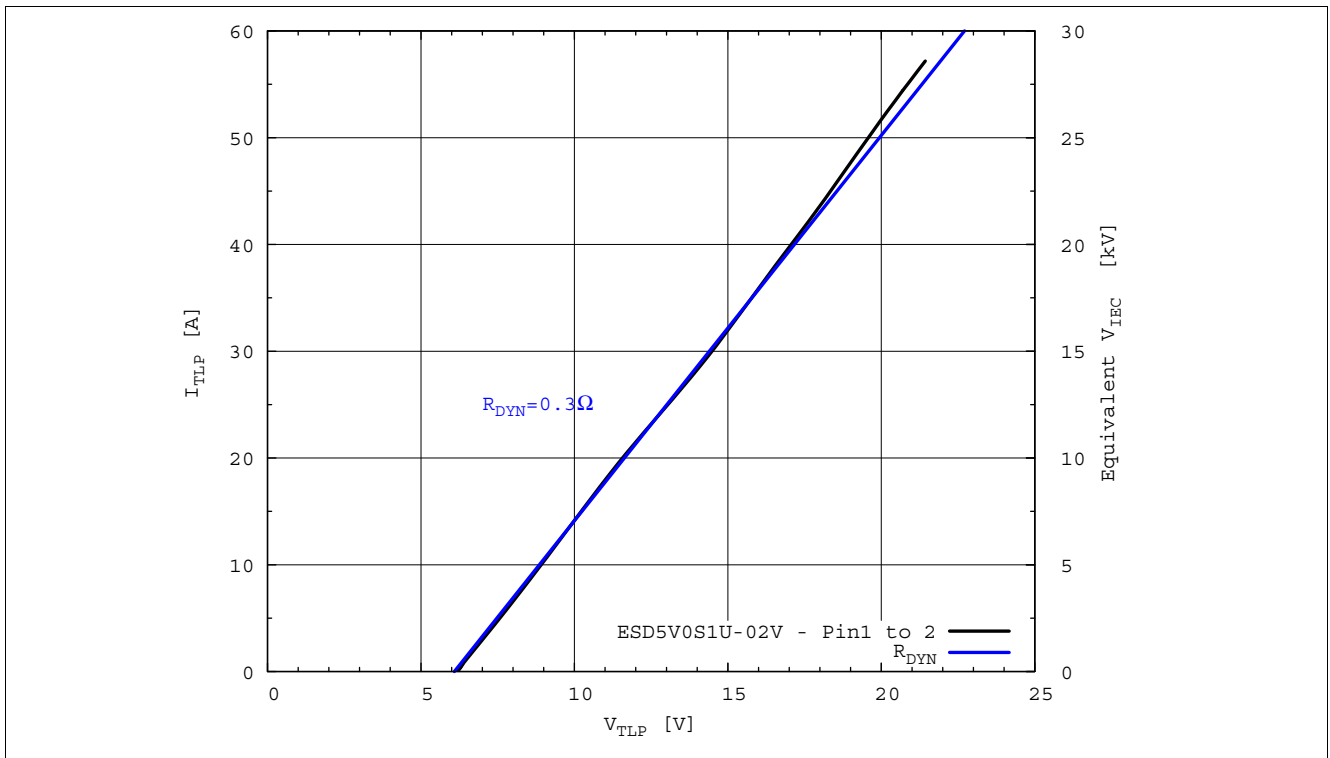
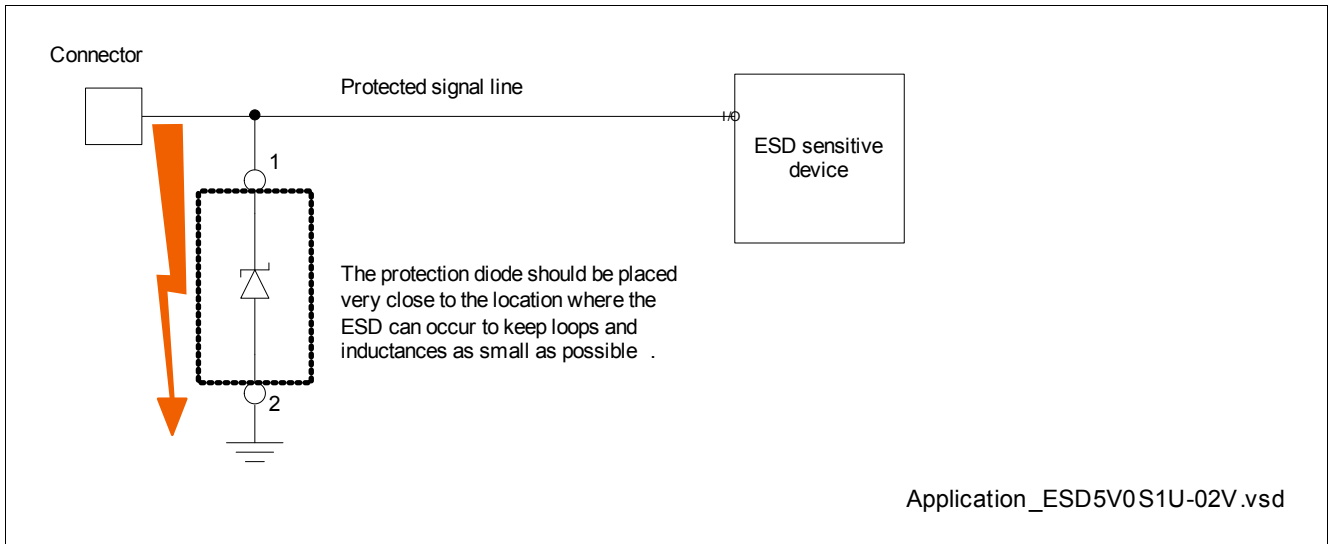


Figure 6 Reverse TLP characteristics (Pin 1 to 2)

## 4 Application Information



**Figure 7 Single Channel, uni-directional ESD / Transient protection**

## 5 Ordering information scheme (examples)

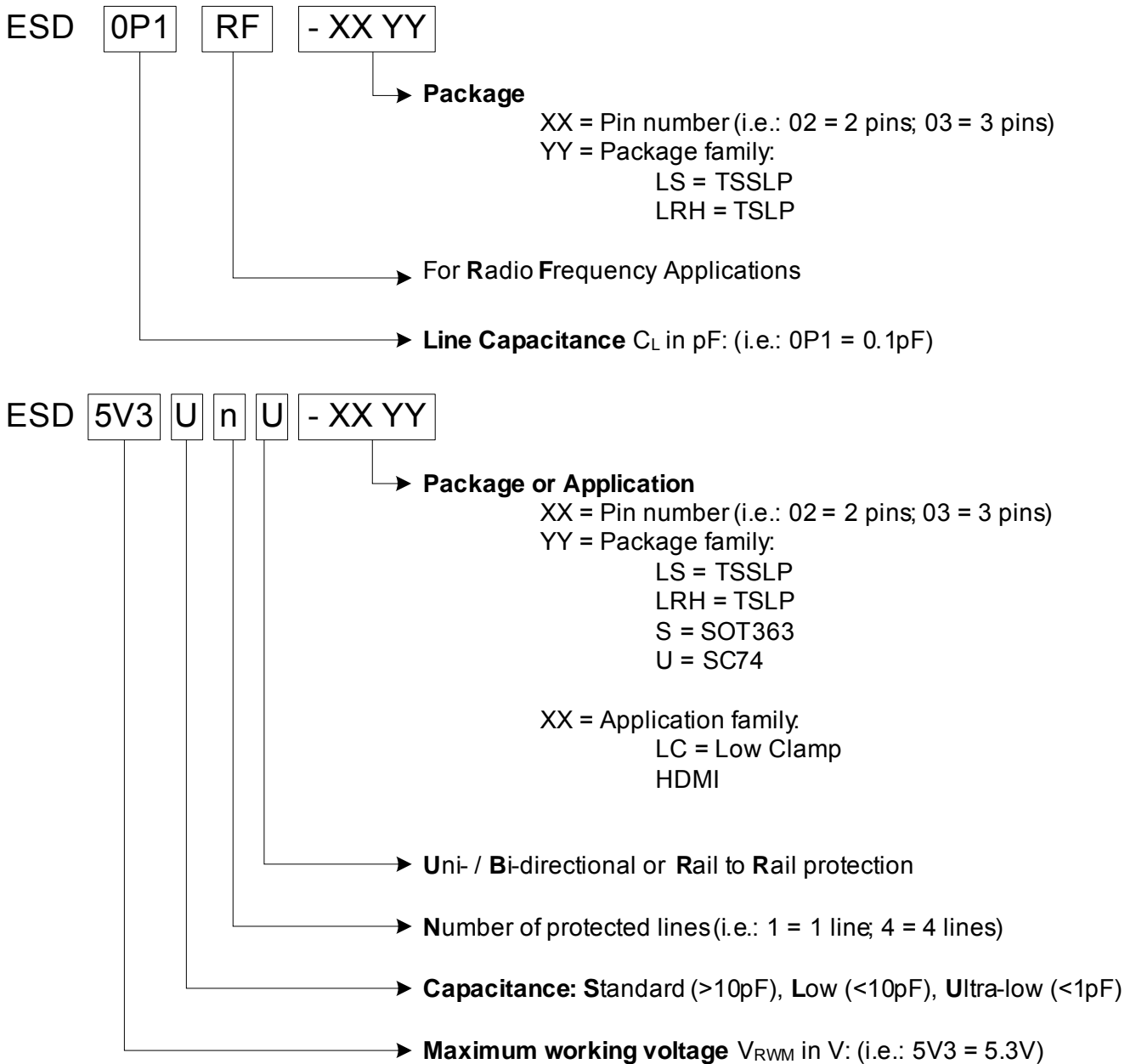


Figure 8 Ordering Information Scheme

## 6 Package Information

### 6.1 SC79 Package

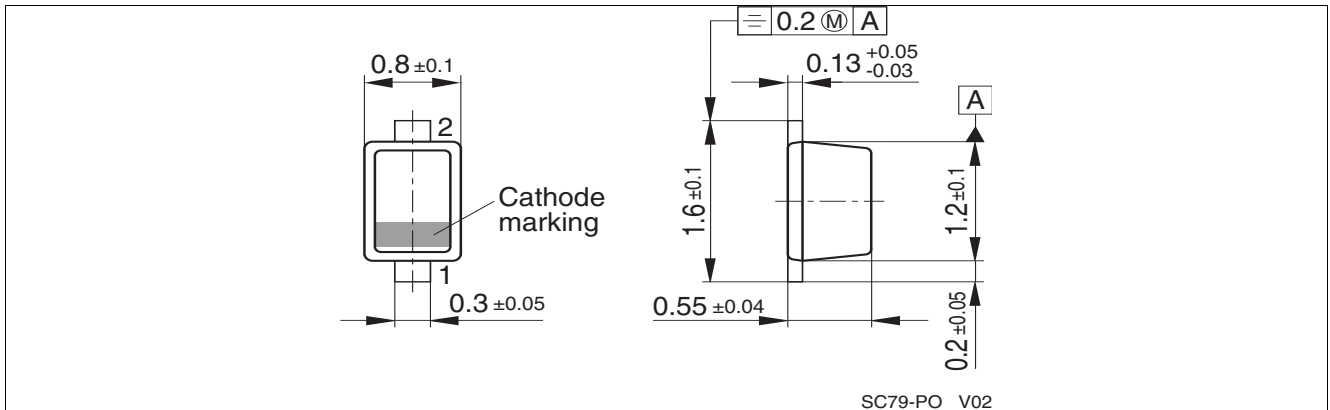


Figure 9 SC79: Package outline (dimension in mm)

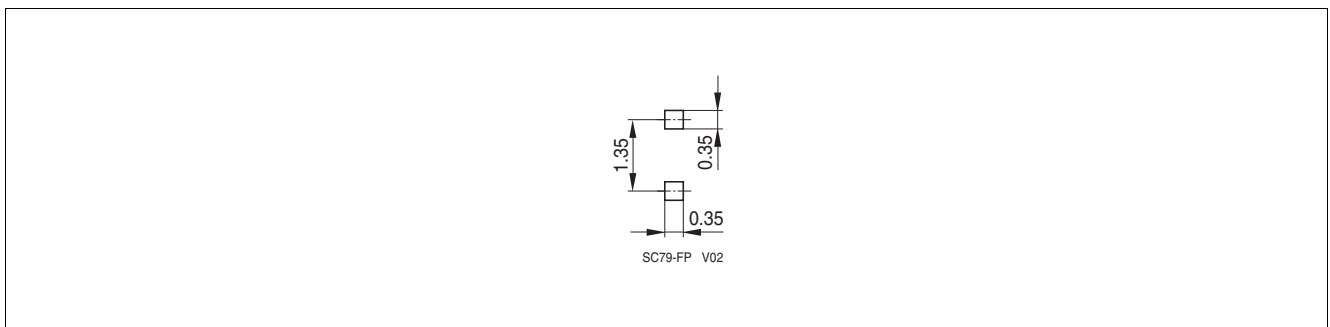


Figure 10 SC79: Footprint (dimension in mm)

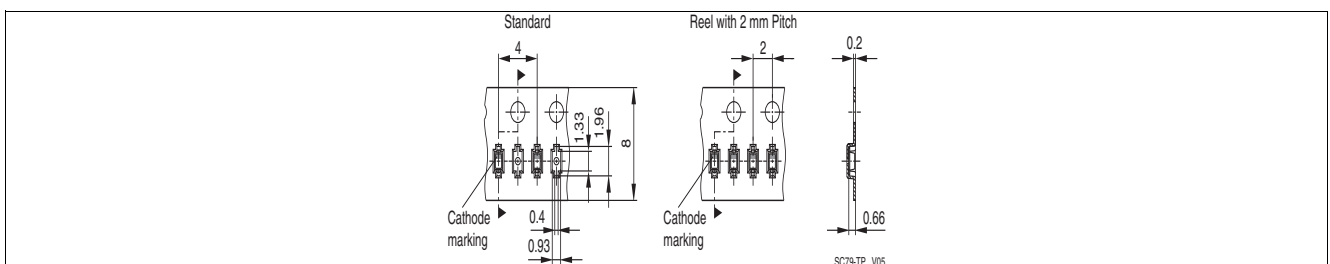


Figure 11 SC79: Packing (dimension in mm)

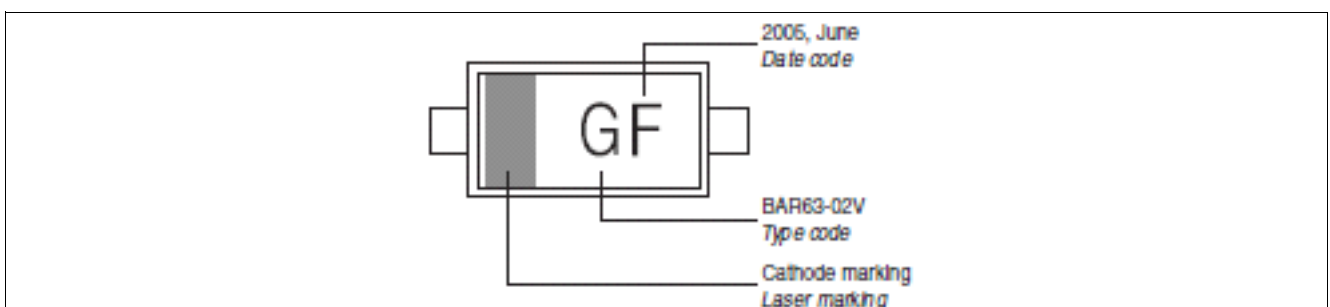


Figure 12 SC79: Marking (example)

## 7 Date Code Marking for SC79

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 13 Date Code marking for SC79 packages

**References**

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

## Terminology

CES	Character Encoding Scheme
$C_L$	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
$V_{FC}$	Forward Clamping Voltage
$V_R$	Reverse voltage
$V_{RWM}$	Reverse working voltage maximum
$V_{BR}$	Breakdown voltage
$R_{DYN}$	Dynamic resistance

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