

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)
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1 Uni-directional ESD / Transient Protection Diode

1.1 Features

- ESD / transient protection according to:
 - IEC61000-4-2 (ESD): ± 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 μ 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 Ω
- 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

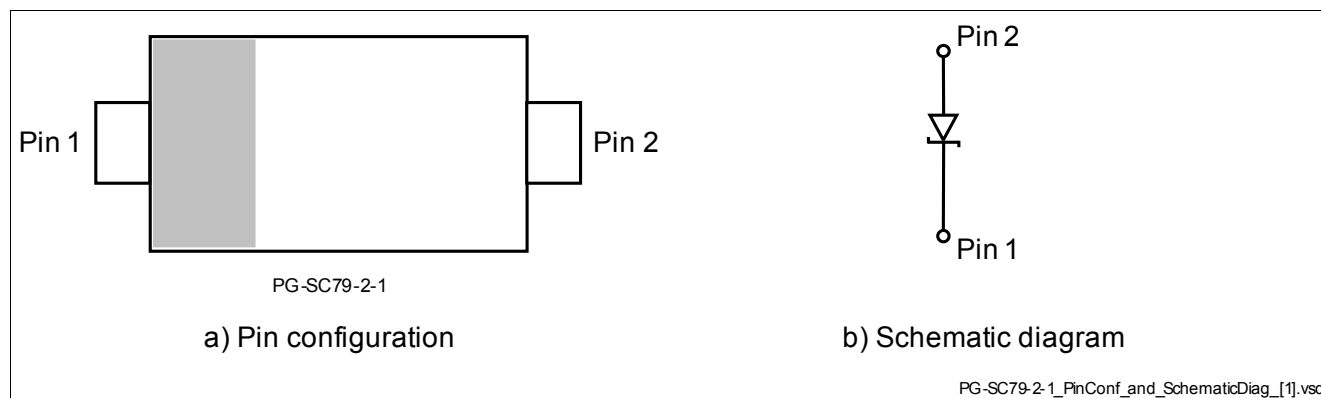


Figure 1 Pin configuration and schematic diagram

Table 1 Ordering information

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

3 Characteristics

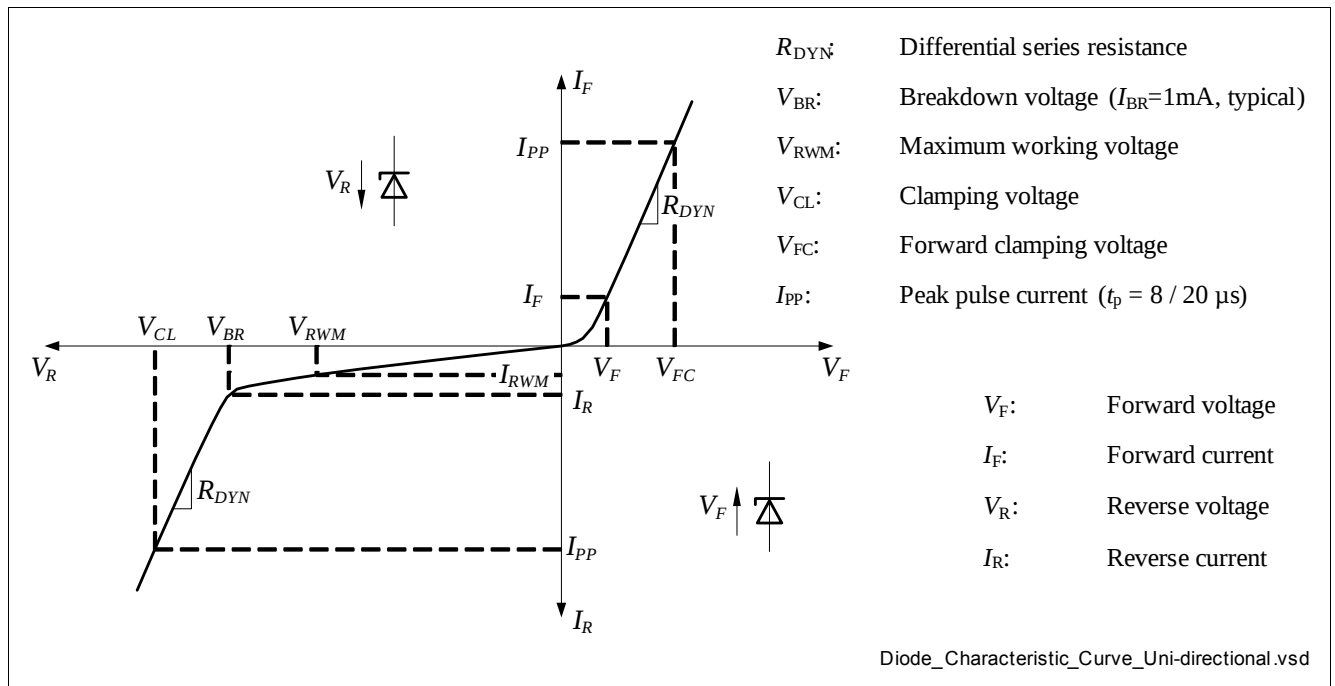
Table 2 Maximum Rating at $T_A = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
ESD air discharge ¹⁾	V_{ESD}	-25	–	25	kV
ESD contact discharge ¹⁾	V_{ESD}	-20	–	20	kV
Peak pulse current ($t_p = 8/20 \mu\text{s}$) ²⁾	I_{PP}	-5.5	–	5.5	A
Peak pulse power ($t_p = 8/20 \mu\text{s}$) ²⁾	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 $T_A=25^\circ\text{C}$, unless otherwise specified


Figure 2 Definitions of electrical characteristics
Table 3 DC characteristics at $T_A = 25^\circ\text{C}$, 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	$I_{\text{R}} = 1 \text{ mA}$
Reverse current	I_{R}	–	–	0.1	μA	$V_{\text{R}} = 3.3 \text{ V}$

Characteristics

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

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Clamping voltage ¹⁾	V_{CL}	–	7.6	–	V	$I_{pp} = 5\text{ A}$, $t_p = 30\text{ ns}$, pin 1-2
Clamping voltage ¹⁾	V_{CL}	–	10.5	–	V	$I_{pp} = 16\text{ A}$, $t_p = 30\text{ ns}$, pin 1-2
Clamping voltage ¹⁾	V_{CL}	–	14.5	–	V	$I_{pp} = 30\text{ A}$, $t_p = 30\text{ ns}$, pin 1-2
Forward clamping voltage ¹⁾	V_{FC}	–	2	–	V	$I_{pp} = 5\text{ A}$, $t_p = 30\text{ ns}$, pin 2-1
Forward clamping voltage ¹⁾	V_{FC}	–	4.3	–	V	$I_{pp} = 16\text{ A}$, $t_p = 30\text{ ns}$, pin 2-1
Forward clamping voltage ¹⁾	V_{FC}	–	7.3	–	V	$I_{pp} = 30\text{ A}$, $t_p = 30\text{ ns}$, pin 2-1
Dynamic resistance ¹⁾	R_{DYN}	–	0.2	–	Ω	$t_p = 30\text{ ns}$, pin 2-1
Dynamic resistance ¹⁾	R_{DYN}	–	0.3	–	Ω	$t_p = 30\text{ ns}$, 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

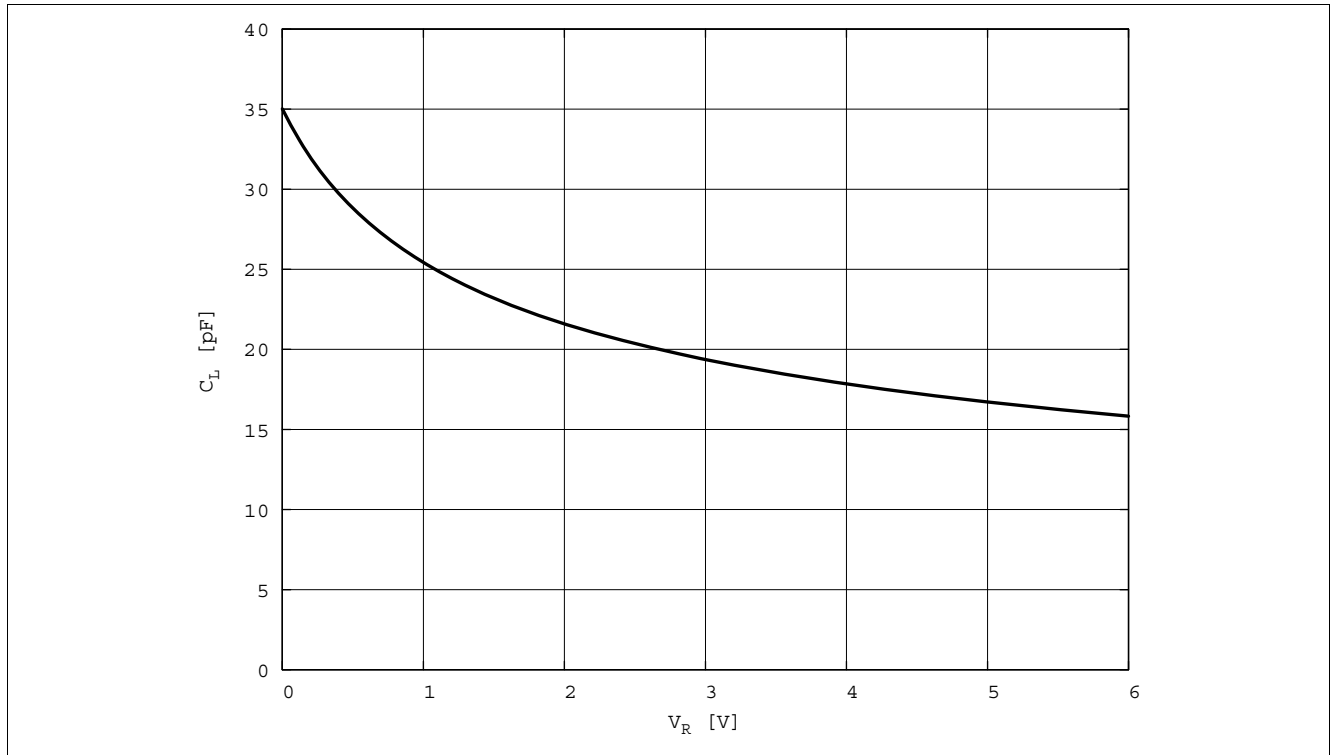


Figure 3 Capacitance characteristics: $C_L = f(V_R) - f = 1\text{ MHz}$

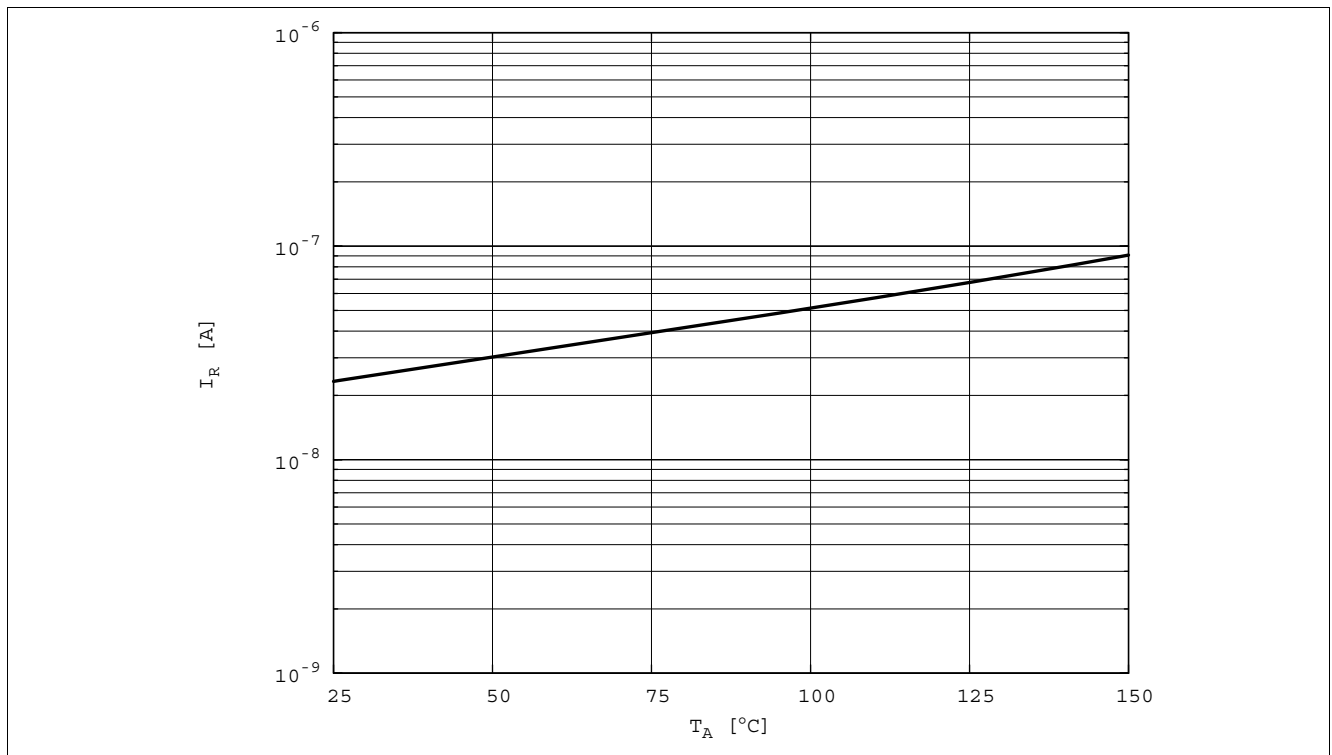


Figure 4 Reverse characteristics: $I_R = f(T_A) - V_R = 3.3\text{ V}$

Characteristics

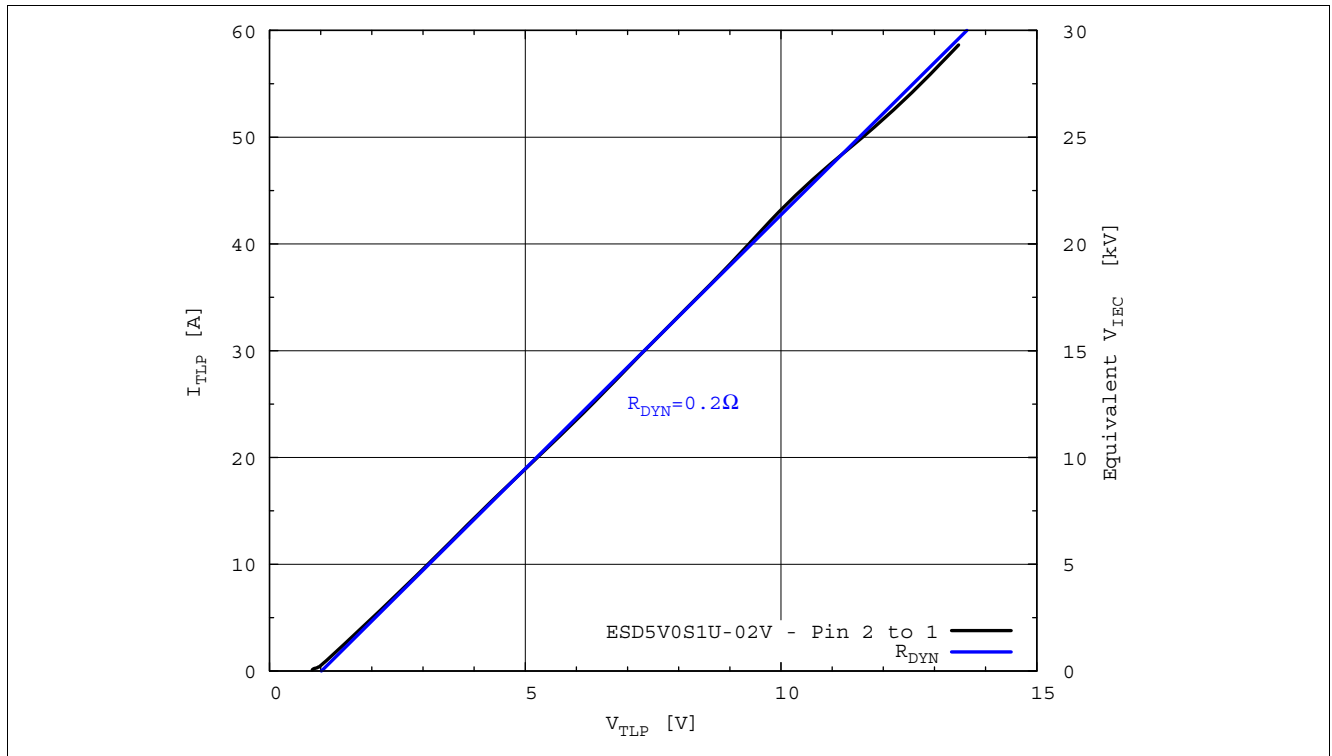


Figure 5 Forward TLP characteristics (Pin 2 to 1)

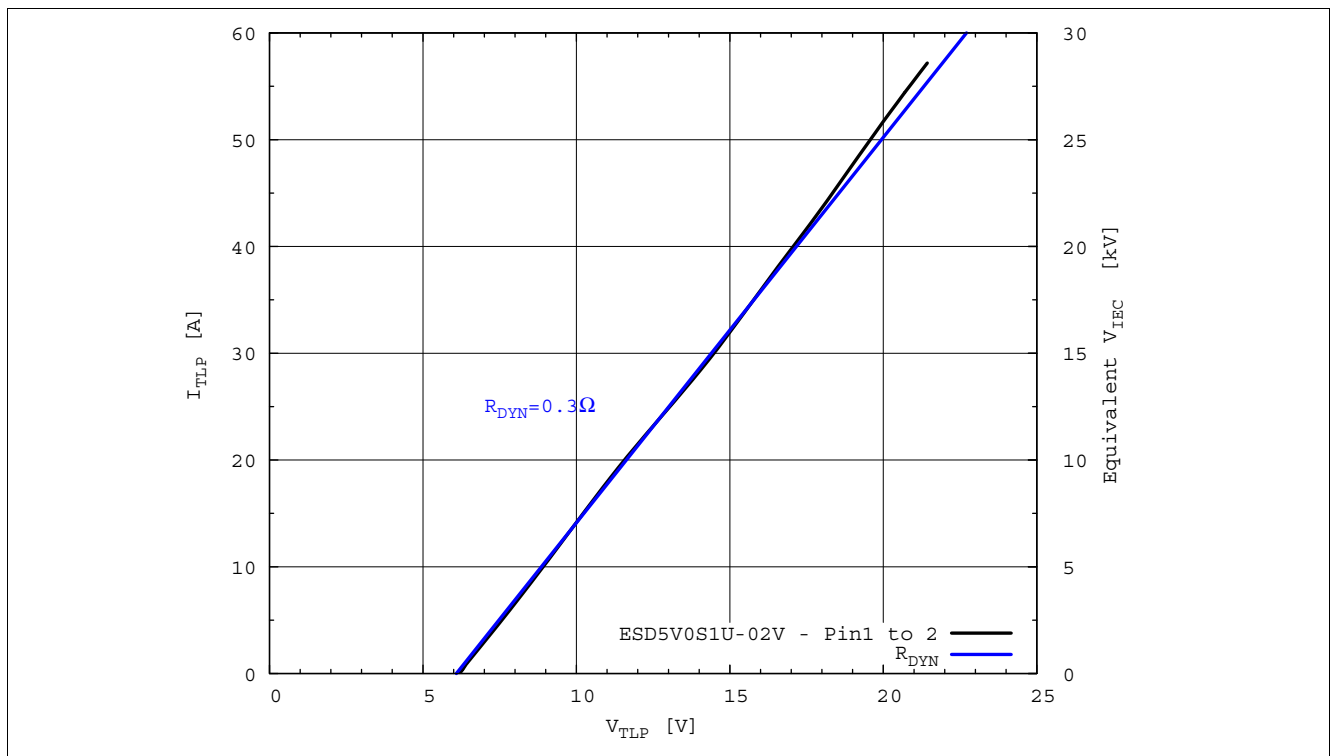


Figure 6 Reverse TLP characteristics (Pin 1 to 2)

4 Application Information

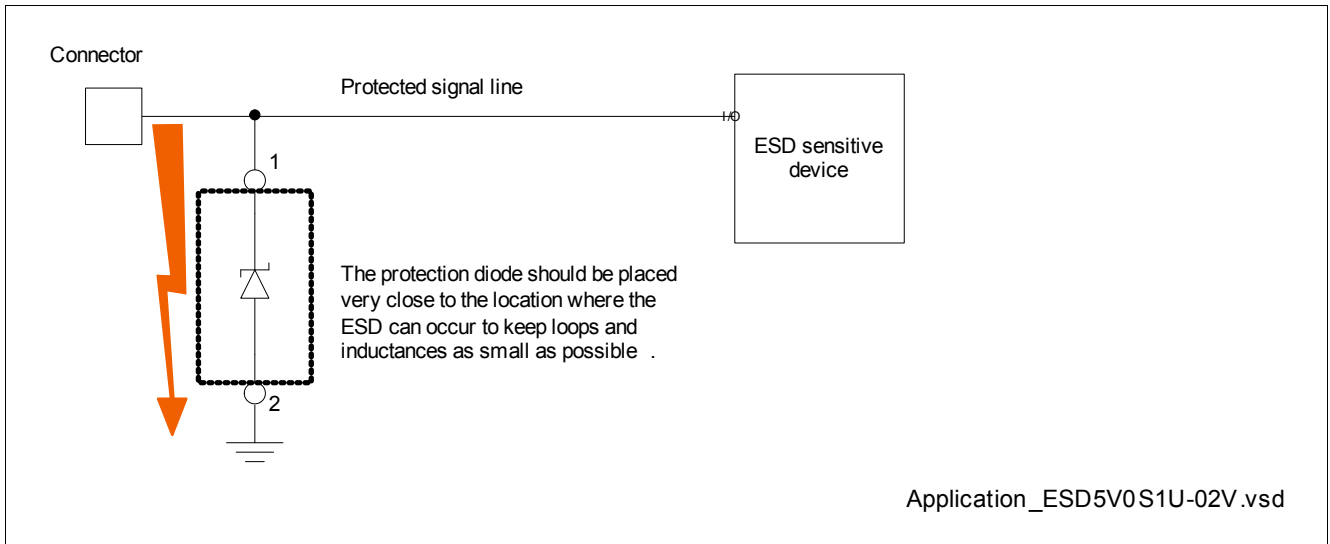


Figure 7 Single Channel, uni-directional ESD / Transient protection

5 Ordering information scheme (examples)

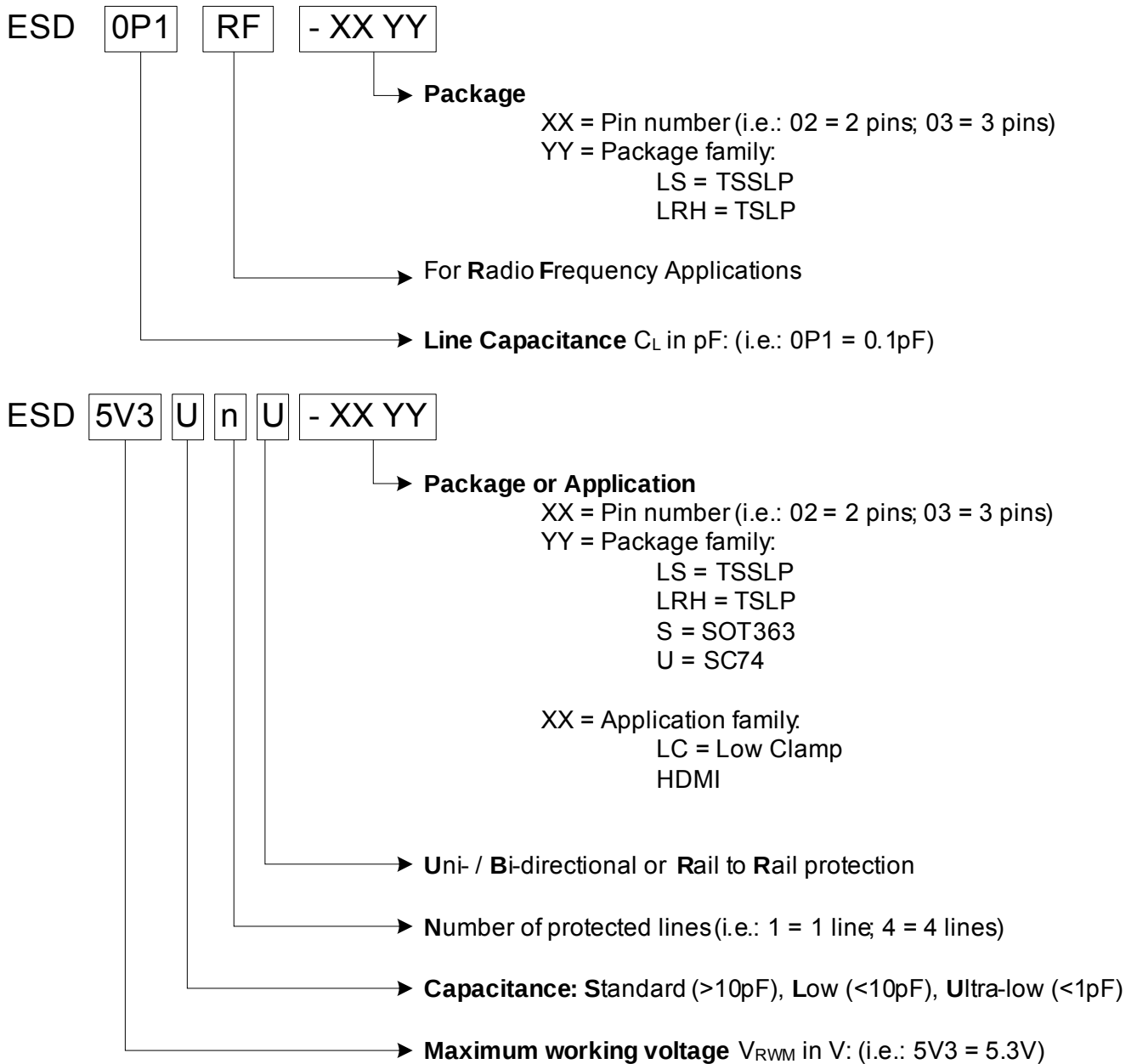


Figure 8 Ordering Information Scheme

6 Package Information

6.1 SC79 Package

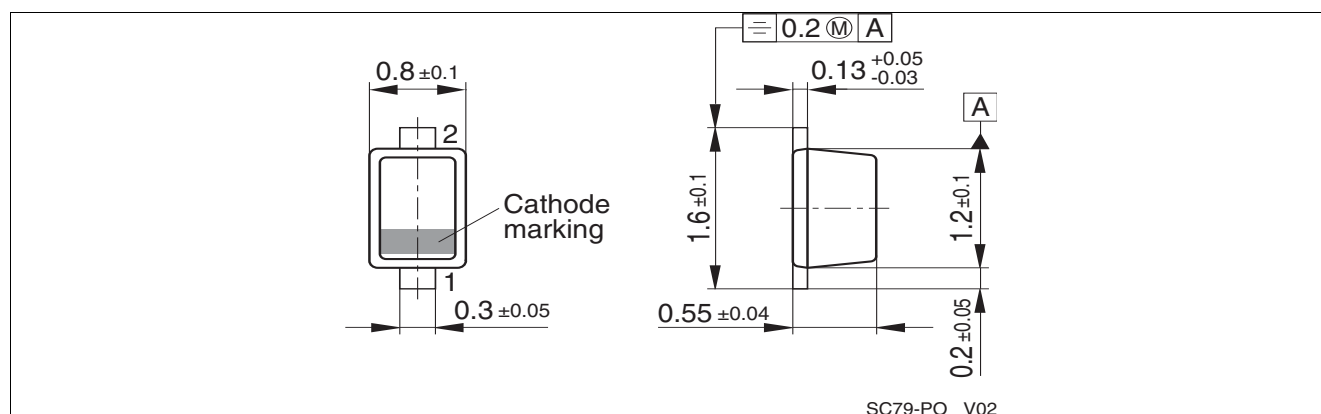


Figure 9 SC79: Package outline (dimension in mm)

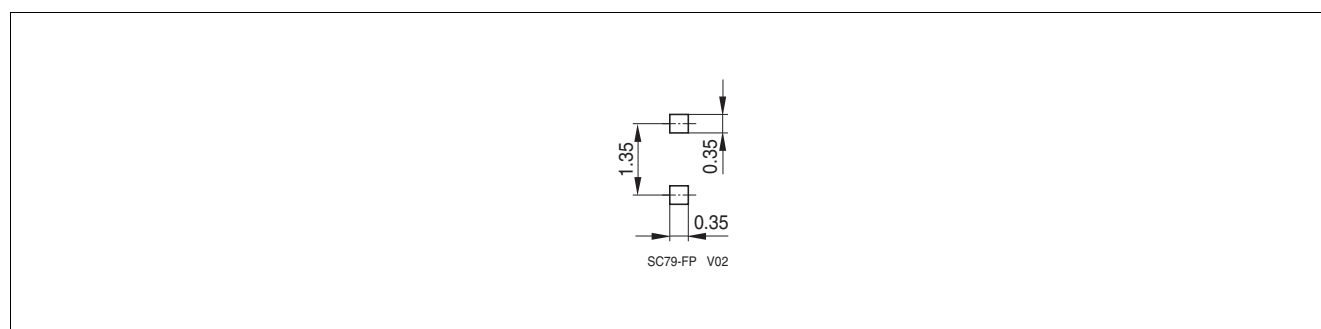


Figure 10 SC79: Footprint (dimension in mm)

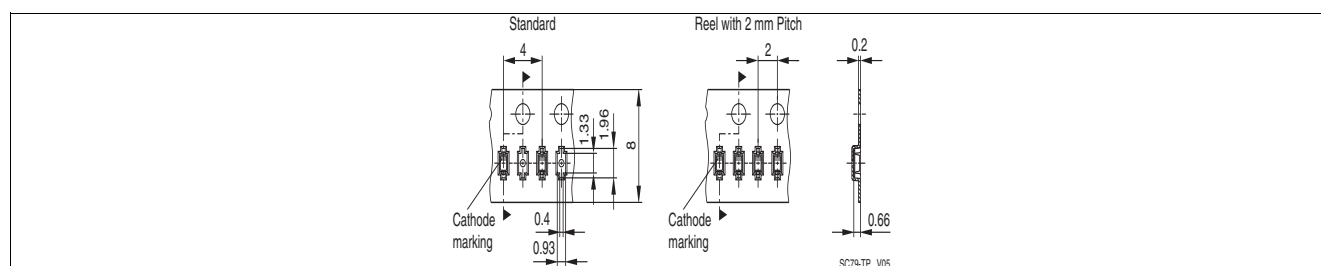


Figure 11 SC79: Packing (dimension in mm)

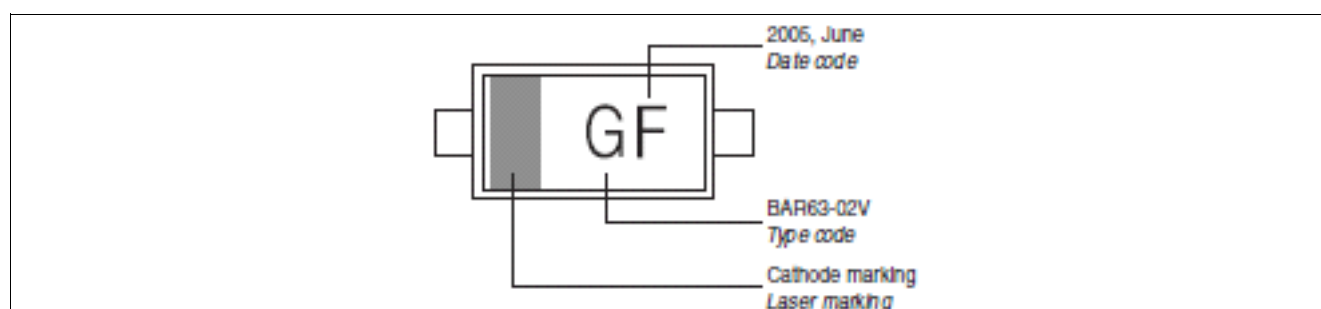


Figure 12 SC79: Marking (example)

7 Date Code Marking for SC79

one digit (SCD80, SC79, SC75¹⁾) 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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