

TVS Diodes

Transient Voltage Suppressor Diodes

ESD5V0L1B-02V

Bi-directional Low Capacitance TVS Diode

ESD5V0L1B-02V

Data Sheet

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Final

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Revision History

| Page or Item | Subjects (major changes since previous revision) |
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| Revision 1.0, 2010-12-16 | |
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1 Bi-directional Low Capacitance TVS Diode

1.1 Features

- ESD / transient protection according to:
 - IEC61000-4-2 (ESD): ± 25 kV (contact)
 - IEC61000-4-4 (EFT): 40 A (5/50 ns)
 - IEC61000-4-5 (surge): 2.5 A (8/20 μ 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

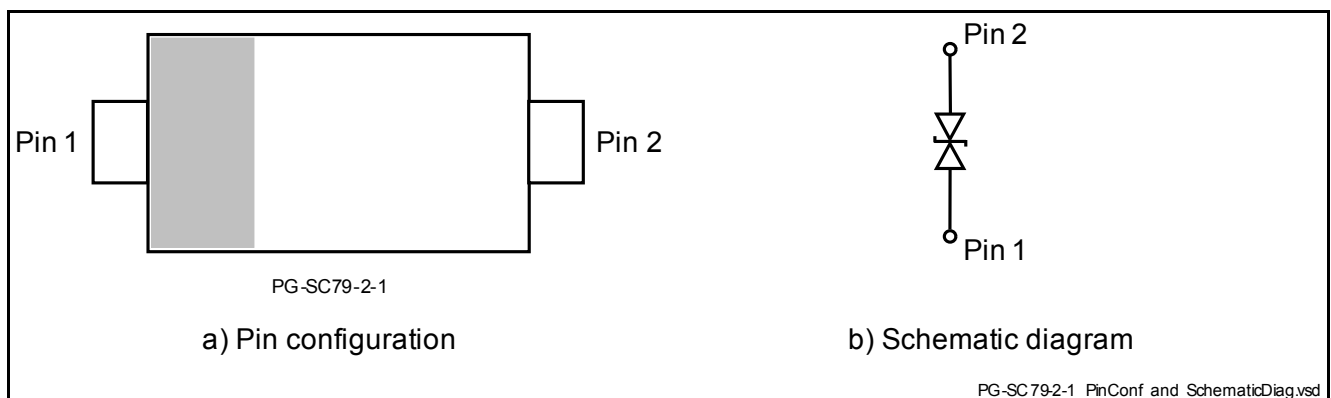


Figure 1 Pin configuration and schematic diagram

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 $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|--|-----------|--------|------|------|------------------|
| | | Min. | Typ. | Max. | |
| ESD contact discharge ¹⁾ | V_{ESD} | -25 | – | 25 | kV |
| Peak pulse current ($t_p = 8/20\ \mu\text{s}$) ²⁾ | I_{PP} | -2.5 | – | 2.5 | A |
| 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

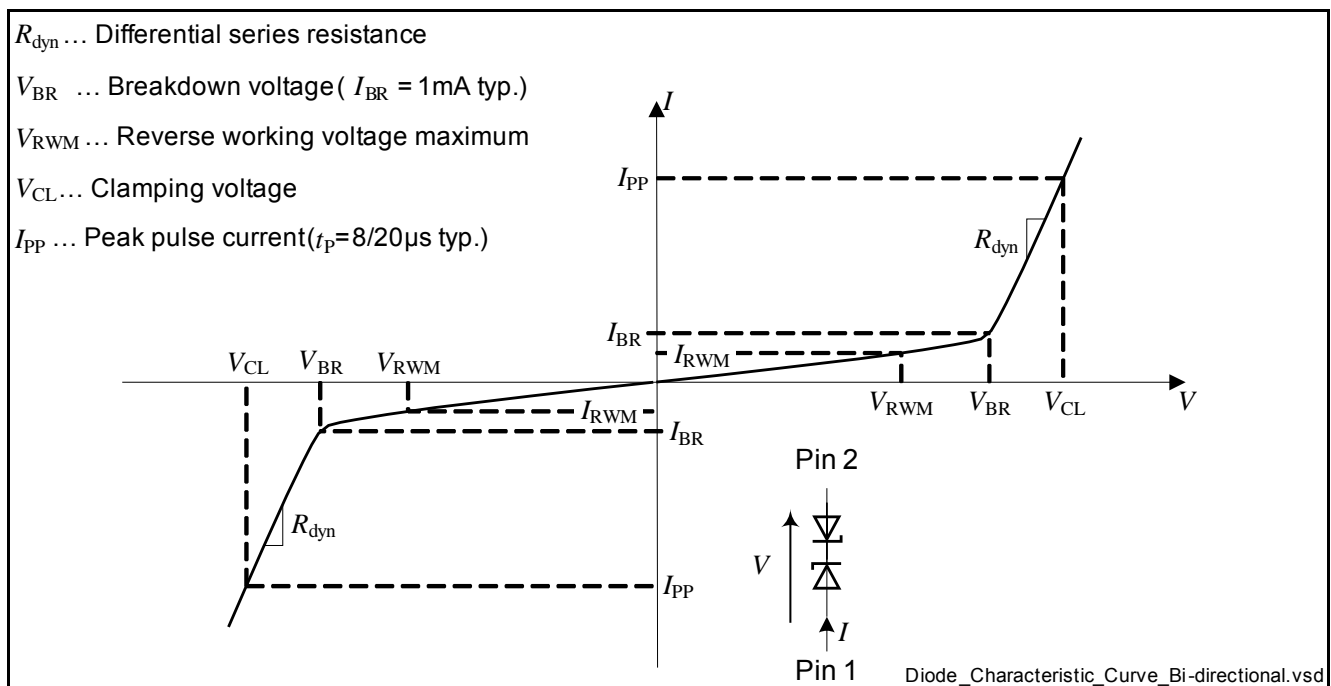


Figure 2 Definitions of electrical characteristics

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} | 7 | – | – | V | $I_R = 1\text{ mA}$ |
| Reverse current | I_R | – | ≤ 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 ¹⁾ | V_{CL} | – | 17 | – | V | $I_{pp} = 5\text{ A},$ $t_p = 30\text{ ns},$ pin 1-2 |
| Clamping voltage ¹⁾ | V_{CL} | – | 20 | – | V | $I_{pp} = 5\text{ A},$ $t_p = 30\text{ ns},$ pin 2-1 |
| Clamping voltage ¹⁾ | V_{CL} | – | 22 | – | V | $I_{pp} = 16\text{ A},$ $t_p = 30\text{ ns},$ pin 1-2 |
| Clamping voltage ¹⁾ | V_{CL} | – | 25 | – | V | $I_{pp} = 16\text{ A},$ $t_p = 30\text{ ns},$ pin 2-1 |
| Dynamic resistance ¹⁾ | R_{DYN} | – | 0.3 | – | Ω | $t_p = 30\text{ ns}$ |

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

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

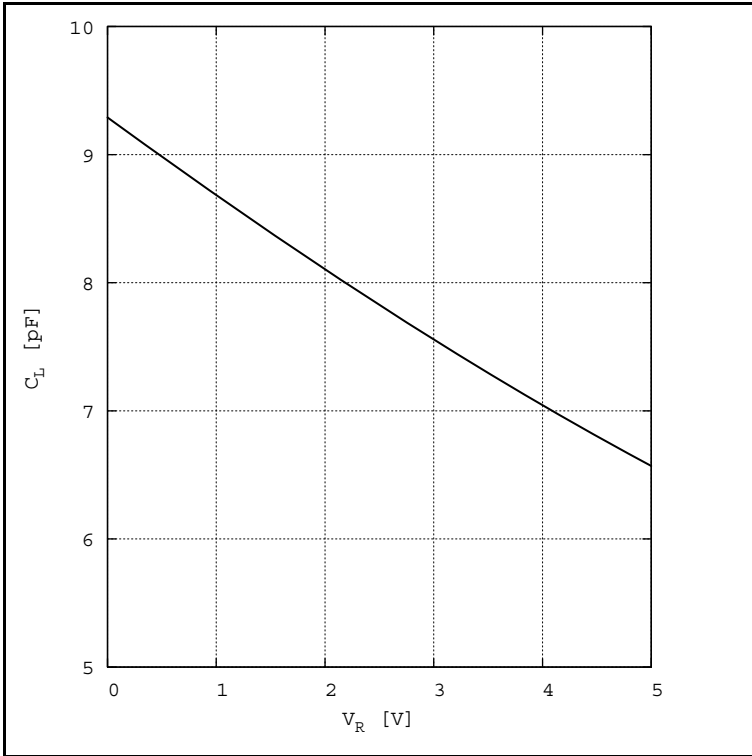


Figure 3 Capacitance characteristics: $C_L = f(V_R)$

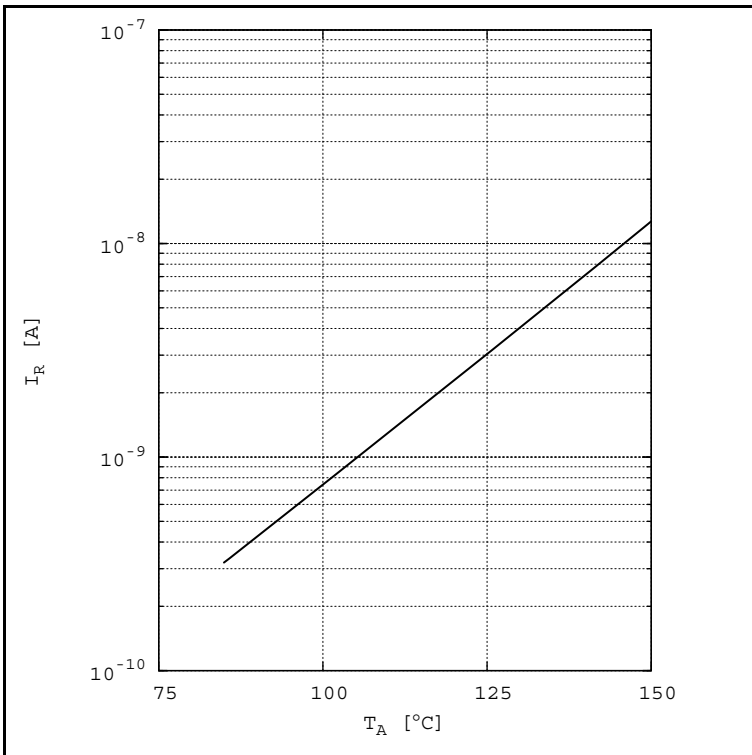


Figure 4 Reverse characteristics: $I_R = f(V_R)$

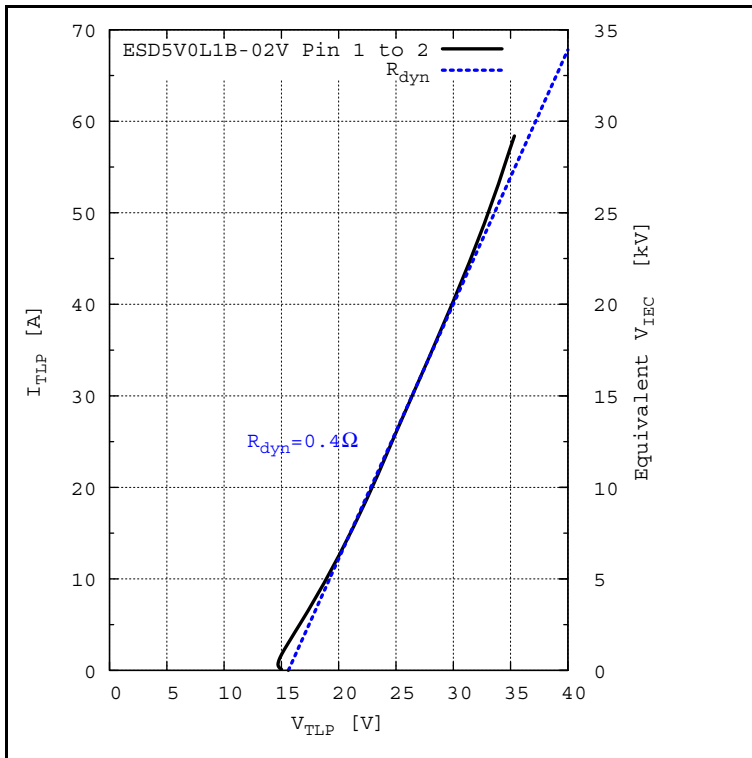


Figure 5 Reverse TLP characteristics

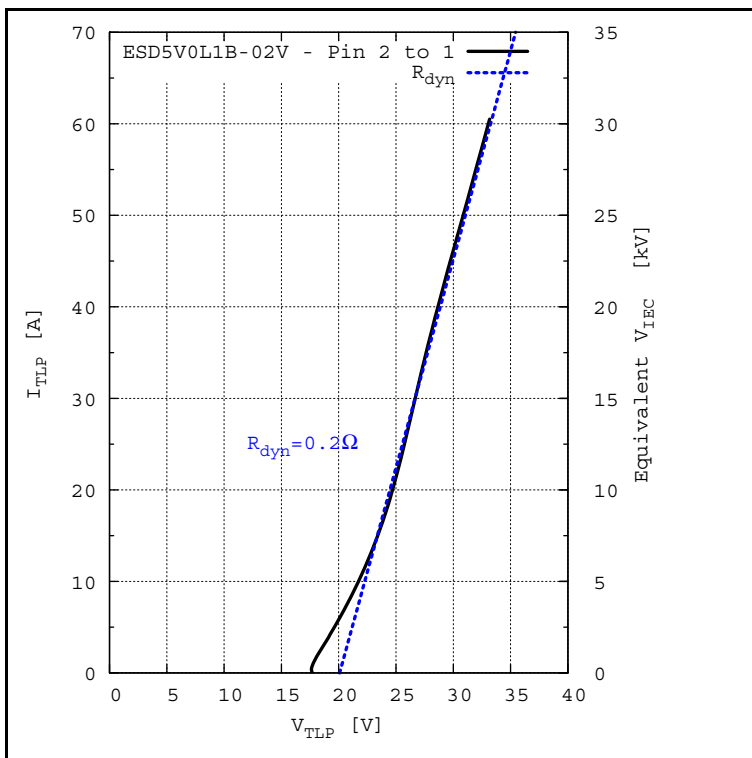


Figure 6 Forward TLP characteristics

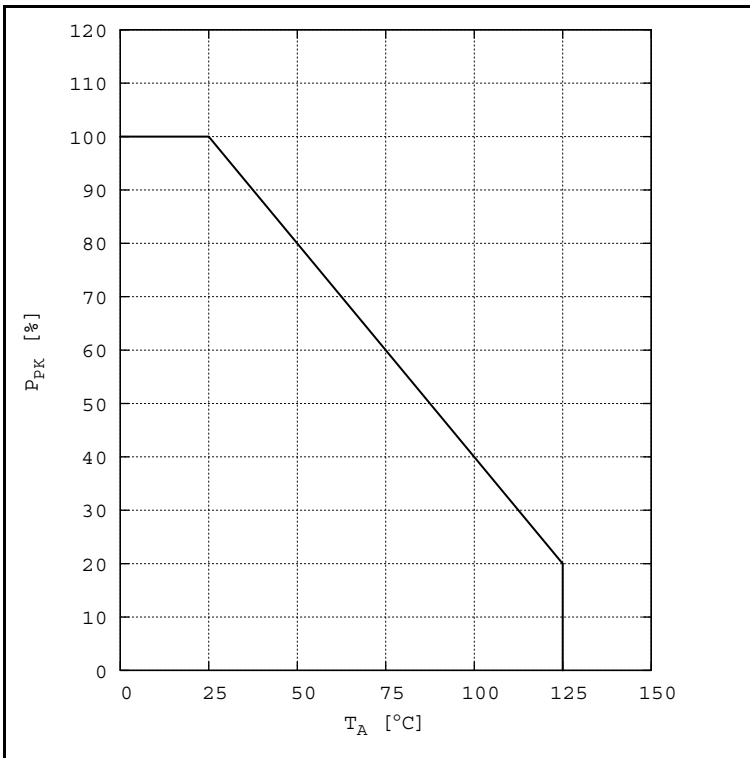


Figure 7 Power derating curve: $P_{PK} = f(T_A)$

4 Application Information

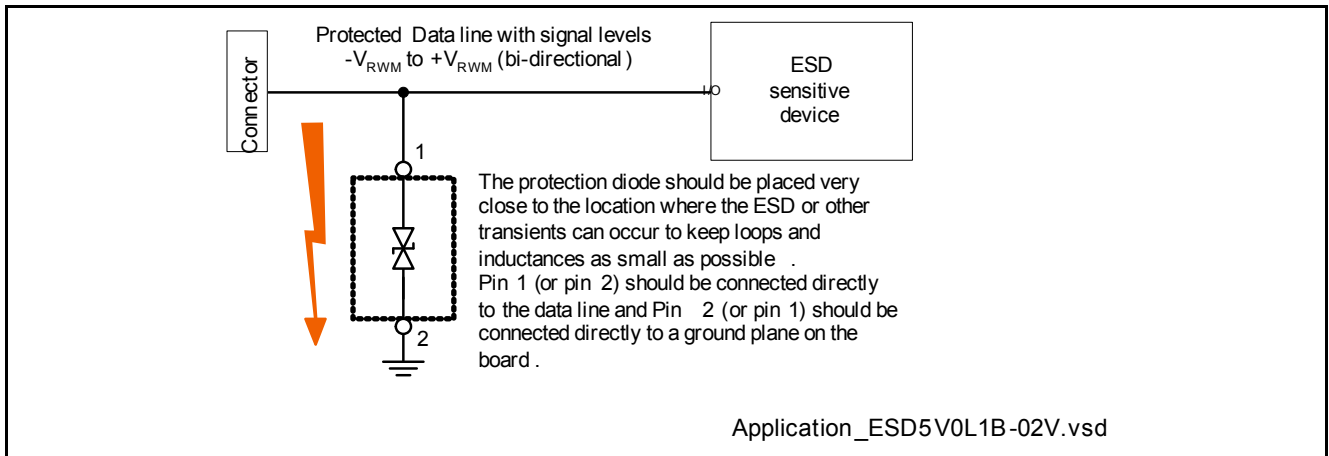


Figure 8 Single Chanel, uni-directional TVS protection

5 Ordering information scheme

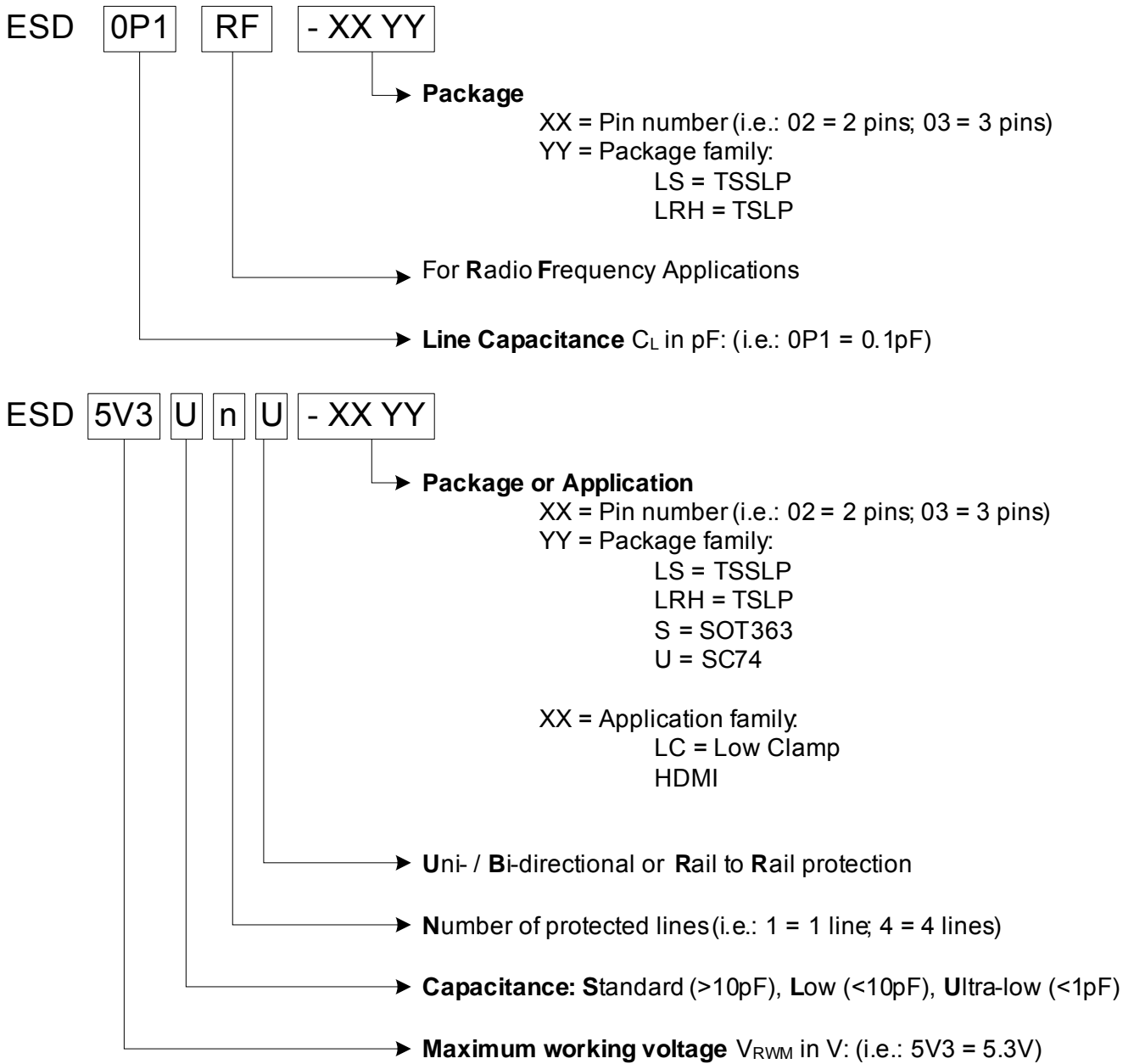


Figure 9 Ordering Information Scheme

6 Package Information

6.1 PG-SC79-2-1

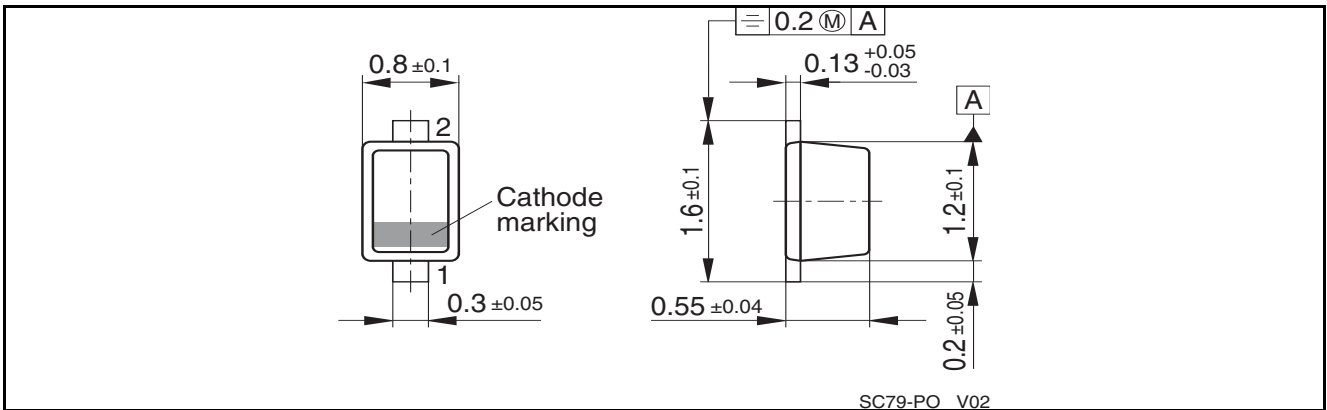


Figure 10 PG-SC79-2-1: Package Overview

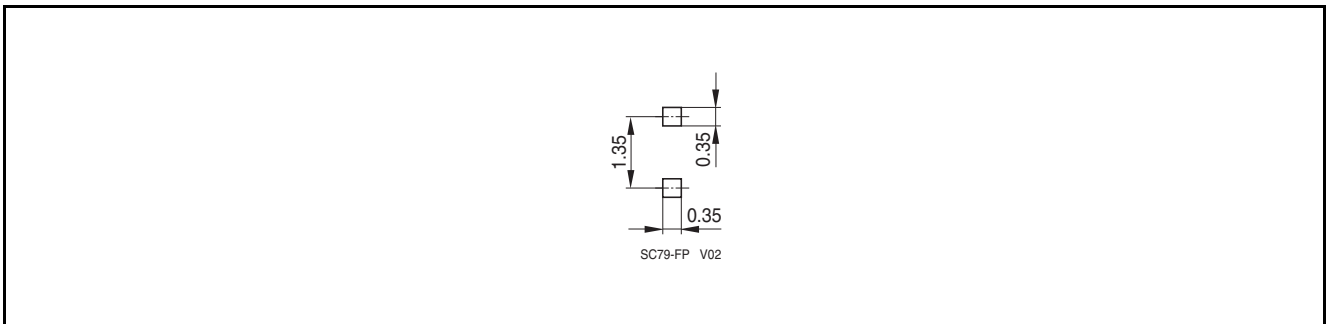


Figure 11 PG-SC79-2-1: Footprint

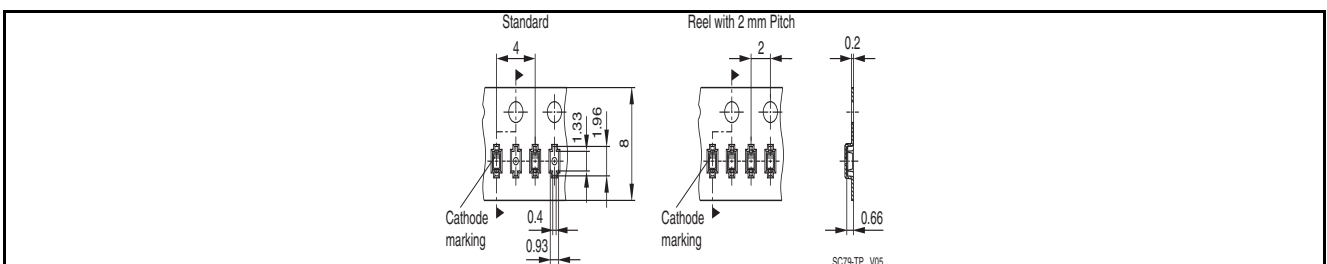


Figure 12 PG-SC79-2-1: Packing

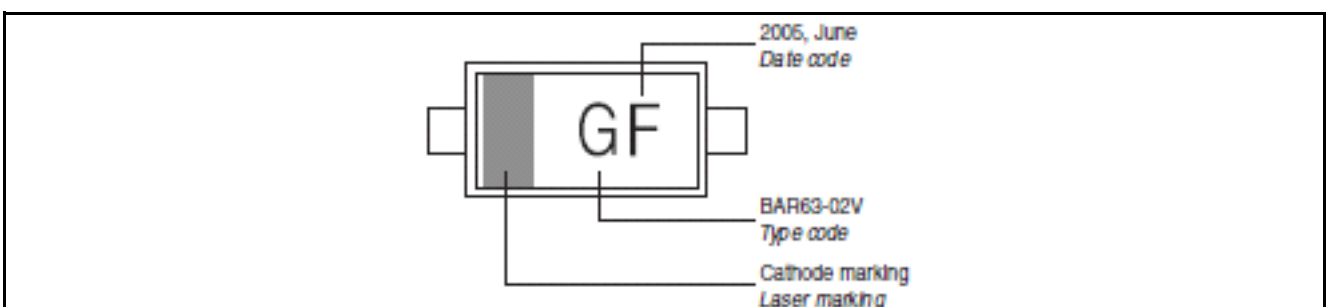


Figure 13 PG-SC79-2-1: Marking (example)

7 Date Code Marking¹⁾

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 14 Date Code marking for Discrete packages with one digit (SCD8, SC79, SC75¹⁾) 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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