

TVSL02

TVS Diode ESD suppressor



Product features

- Protects one bi-directional I/O line
- 0201 (0603 metric) package size
- Low clamping voltage
- Low leakage current
- Ultra-low capacitance
- Meets moisture sensitivity level (MSL) 1

Applications

- Computer interface protection
- Microprocessor protection
- Serial and parallel ports protection
- Control signal lines protection
- Latch-up protection

Environmental compliance and general specifications

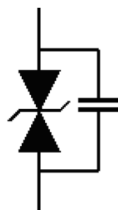
- IEC61000-4-2 (ESD)
 - up to ± 25 kV (air)
 - up to ± 25 kV (contact)



Ordering part number

	TVSL	02	V03	C011
Family				
Size				
Working DC voltage (V03 = 3 V)				
Capacitance (C011= 11 pF)				

Pin out/functional diagram



Powering Business Worldwide

Electrical characteristics

(+25 °C)

TVSL02V03C011

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Operating supply voltage		-	3	-	V _{dc}
Reverse stand-off voltage	+25 °C	-3	-	+3	V _{RWM} (V)
Reverse breakdown voltage	I _{BV} = 1 mA, T = +25 °C	4.7	6.7	8.7	V _{BV} (V)
Reverse leakage current	V _{RWM} = 5 V, T = +25 °C	-	-	1	I _{Leak} (μA)
Peak pulse current	t _p = 8/20 μs	-	8	-	I _{PP} (A)
Peak pulse power	t _p = 8/20 μs	-	50	-	P _{PP} (W)
Clamping voltage	I _{TLP} = 1 A (100 ns transmission line)	-	5.4	-	V _{TLP} (V)
	I _{TLP} = 16 A (100 ns transmission line)	-	6.3	-	V _{TLP} (V)
Channel input capacitance	V _R = 0 V, f = 1 MHz	-	11.5	13.5	C _{IN} (pF)
ESD per IEC 61000-4-2 (Air)	-	-	±25	-	V _{ESD} (kV)
ESD per IEC 61000-4-2 (Contact)	-	-	±25	-	V _{ESD} (kV)
Lead soldering temperature	-	-	260 (20 - 40 seconds)	-	T _{SOL} °C
Operating temperature range	-	-55	-	+85	T _{OP} °C

TVSL02V05C005

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Operating supply voltage		-	5	-	V _{dc}
Reverse stand-off voltage	+25 °C	-5	-	+5	V _{RWM} (V)
Reverse breakdown voltage	I _{BV} = 1 mA, T = +25 °C	7	10	13	V _{BV} (V)
Reverse leakage current	V _{RWM} = 5 V, T = +25 °C	-	-	1	I _{Leak} (μA)
Peak pulse current	t _p = 8/20 μs	-	6	-	I _{PP} (A)
Peak pulse power	t _p = 8/20 μs	-	46	-	P _{PP} (W)
Clamping voltage	I _{TLP} = 1 A (100 ns transmission line)	-	7.5	-	V _{TLP} (V)
	I _{TLP} = 16 A (100 ns transmission line)	-	11.5	-	V _{TLP} (V)
Channel input capacitance	V _R = 0 V, f = 1 MHz	-	5	-	C _{IN} (pF)
ESD per IEC 61000-4-2 (Air)	-	-	±15	-	V _{ESD} (kV)
ESD per IEC 61000-4-2 (Contact)	-	-	±15	-	V _{ESD} (kV)
Lead soldering temperature	-	-	260 (20 - 40 seconds)	-	T _{SOL} °C
Operating temperature range	-	-55	-	+85	T _{OP} °C

TVSL02V05C018

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Operating supply voltage		-	5	-	V _{dc}
Reverse stand-off voltage		-5	-	+5	V _{RWM} (V)
Reverse breakdown voltage	I _{BV} = 1 mA, T = +25 °C	7	9	11.5	V _{BV} (V)
Reverse leakage current	V _{RWM} = 5 V, T = +25 °C	-	-	1	I _{Leak} (μA)
Peak pulse current	t _p = 8/20 μs	-	8	-	I _{PP} (A)
Peak pulse power	t _p = 8/20 μs	-	68	-	P _{PP} (W)
Clamping voltage	I _{TLP} = 1 A (100 ns transmission line)	-	6.2	-	V _{TLP} (V)
	I _{TLP} = 16 A (100 ns transmission line)	-	7.4	-	V _{TLP} (V)
Channel input capacitance	V _R = 0 V, f = 1 MHz	-	18	-	C _{IN} (pF)
ESD per IEC 61000-4-2 (Air)	-	-	±20	-	V _{ESD} (kV)
ESD per IEC 61000-4-2 (Contact)	-	-	±20	-	V _{ESD} (kV)
Lead soldering temperature	-	-	260 (20 - 40 seconds)	-	T _{SOL} °C
Operating temperature range	-	-55	-	+85	T _{OP} °C

Electrical characteristics
(+25 °C)

TVSL02V07C006

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Operating supply voltage		-	7	-	V _{dc}
Reverse stand-off voltage	+25 °C	-7	-	+7	V _{RWM} (V)
Reverse breakdown voltage	I _{BV} = 1 mA, T = +25 °C	7.5	8.8	10.5	V _{BV} (V)
Reverse leakage current	V _{RWM} = 7 V, T = +25 °C	-	-	1	I _{Leak} (μA)
Peak pulse current	t _p = 8/20 μs	-	8	-	I _{PP} (A)
Peak pulse power	t _p = 8/20 μs	-	90	-	P _{PP} (W)
Clamping voltage	I _{TLP} = 1 A (100 ns transmission line)	-	9.2	-	V _{TLP} (V)
	I _{TLP} = 16 A (100 ns transmission line)	-	12.8	-	V _{TLP} (V)
Channel input capacitance	V _R = 0 V, f = 1 MHz	6.8	8.5	10.3	C _{IN} (pF)
ESD per IEC 61000-4-2 (Air)	-	-	±25	-	V _{ESD} (kV)
ESD per IEC 61000-4-2 (Contact)	-	-	±20	-	V _{ESD} (kV)
Lead soldering temperature	-	-	260 (20 - 40 seconds)	-	T _{SOL} °C
Operating temperature range	-	-55	-	+85	T _{OP} °C

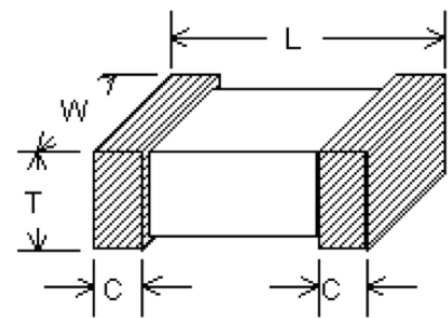
TVSL02V09C005

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Operating supply voltage		-	9	-	V _{dc}
Reverse stand-off voltage	+25 °C	-9	-	9	V _{RWM} (V)
Reverse breakdown voltage	I _{BV} = 1 mA, T = +25 °C	10	11.8	14	V _{BV} (V)
Reverse leakage current	V _{RWM} = 9 V, T = +25 °C	-	-	1	I _{Leak} (μA)
Peak pulse current	t _p = 8/20 μs	-	6	-	I _{PP} (A)
Peak pulse power	t _p = 8/20 μs	-	80	-	P _{PP} (W)
Clamping voltage	I _{TLP} = 1 A (100 ns transmission line)	-	12.3	-	V _{TLP} (V)
	I _{TLP} = 16 A (100 ns transmission line)	-	17.3	-	V _{TLP} (V)
Channel input capacitance	V _R = 0 V, f = 1 MHz	-	7.5	-	C _{IN} (pF)
ESD per IEC 61000-4-2 (Air)	-	-	±20	-	V _{ESD} (kV)
ESD per IEC 61000-4-2 (Contact)	-	-	±20	-	V _{ESD} (kV)
Lead soldering temperature	-	-	260 (20 - 40 seconds)	-	T _{SOL} °C
Operating temperature range	-	-55	-	+85	T _{OP} °C

TVSL02V12C008

Parameter	Test condition	Minimum	Typical	Maximum	Symbol (Units)
Operating supply voltage		-	12	-	V _{dc}
Reverse stand-off voltage		-12	-	+12	V _{RWM} (V)
Reverse breakdown voltage	I _{BV} = 5 μA, T = +25 °C	15.5	19	22.5	V _{BV} (V)
Reverse leakage current	V _{RWM} = 12 V, T = +25 °C	-	-	1	I _{Leak} (μA)
Peak pulse current	t _p = 8/20 μs	-	4	-	I _{PP} (A)
Peak pulse power	t _p = 8/20 μs	-	60	-	P _{PP} (W)
Clamping voltage	I _{TLP} = 1 A (100 ns transmission line)	-	15.8	-	V _{TLP} (V)
	I _{TLP} = 16 A (100 ns transmission line)	-	19.4	-	V _{TLP} (V)
Channel input capacitance	V _R = 0 V, f = 1 MHz	-	8.5	-	C _{IN} (pF)
ESD per IEC 61000-4-2 (Air)	-	-	±25	-	V _{ESD} (kV)
ESD per IEC 61000-4-2 (Contact)	-	-	±20	-	V _{ESD} (kV)
Lead soldering temperature	-	-	260 (20 - 40 seconds)	-	T _{SOL} °C
Operating temperature range	-	-55	-	+85	T _{OP} °C

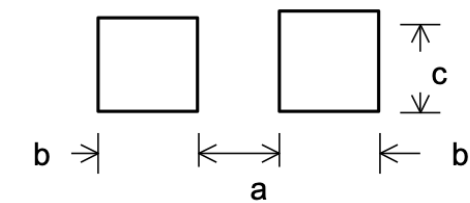
Mechanical parameters- mm



Dimension	Value
L	0.60 ± 0.05
W	0.30 ± 0.04
T	0.30 ± 0.04
C	0.20 ± 0.06

Part marking: (No marking)
Terminal plating: Ni > 2.5 µm; Sn > 3.5 µm

Recommended pad layout

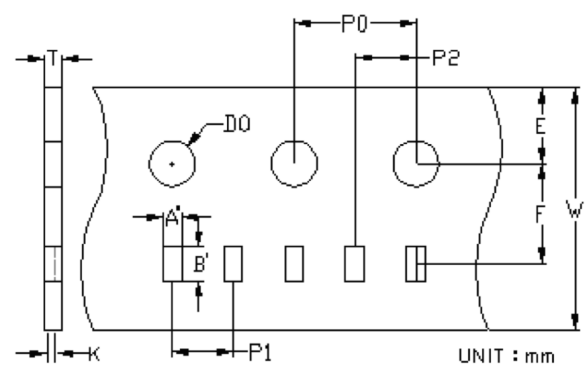


Dimension	Value
a	0.2 to 0.3
b	0.25 to 0.30
c	0.3 to 0.4

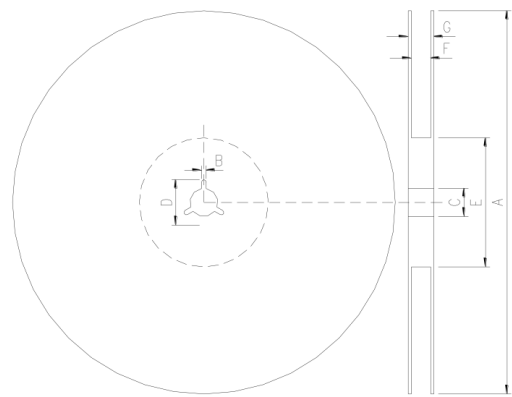
Print solder in a thickness of 150 to 200 µm

Packaging information- mm/inches

Drawing not to scale.
Supplied in tape and reel packaging, 15,000 parts per 7" diameter reel (EIA-481 compliant)



Dimension	Milimeter
A	0.35
B	0.67
W	8
E	1.75
F	3.5
P0	4
P1	2
P2	2
D0	1.55
T	0.42
K	0.35

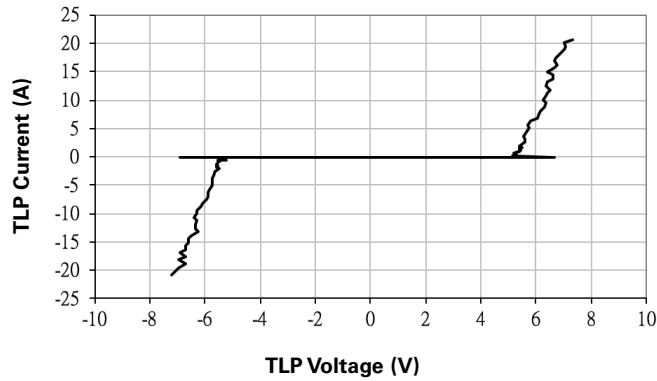


Dimension	Milimeter
A	178
B	2
C	13
D	21
E	62
F	9
G	13

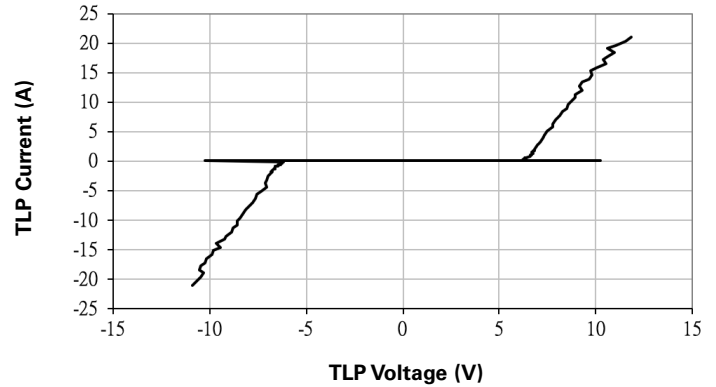
Ratings and V-I characteristic curves (+25 °C unless otherwise noted)

Typical characteristics

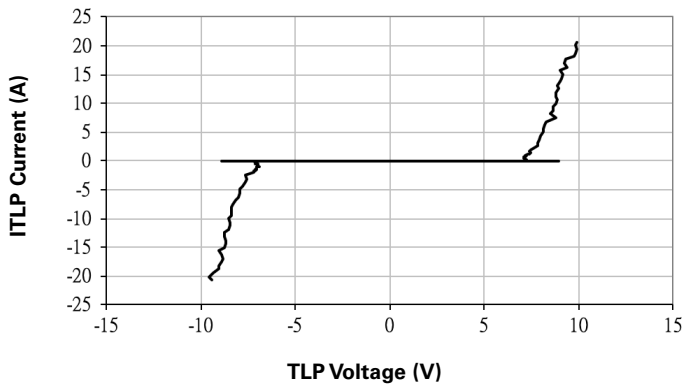
TVSL02V03C011



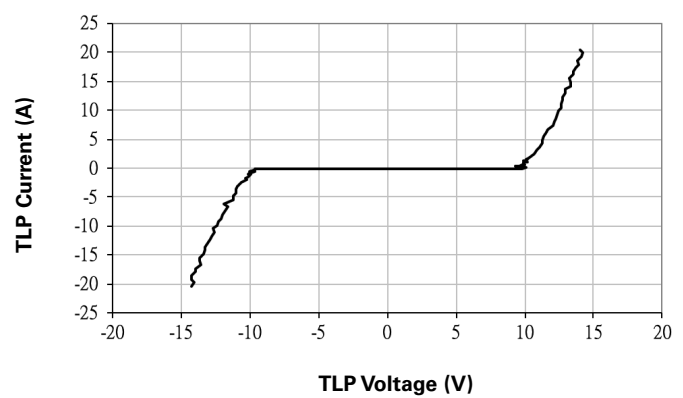
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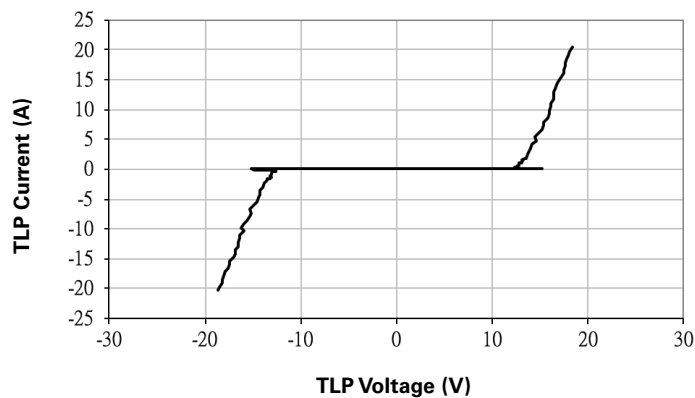
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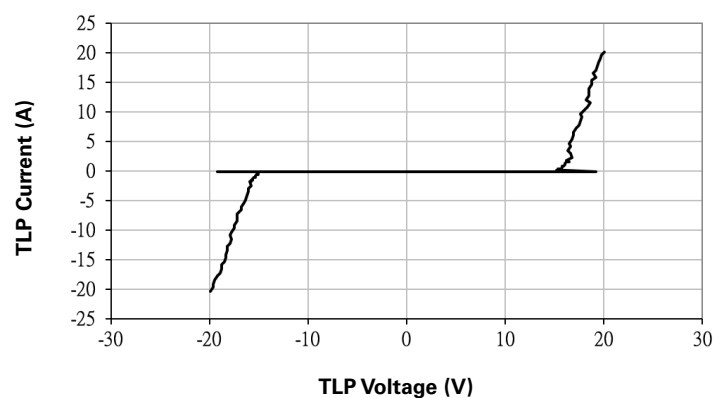
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TVSL02V09C005



TVSL02V12C008



Solder reflow profile

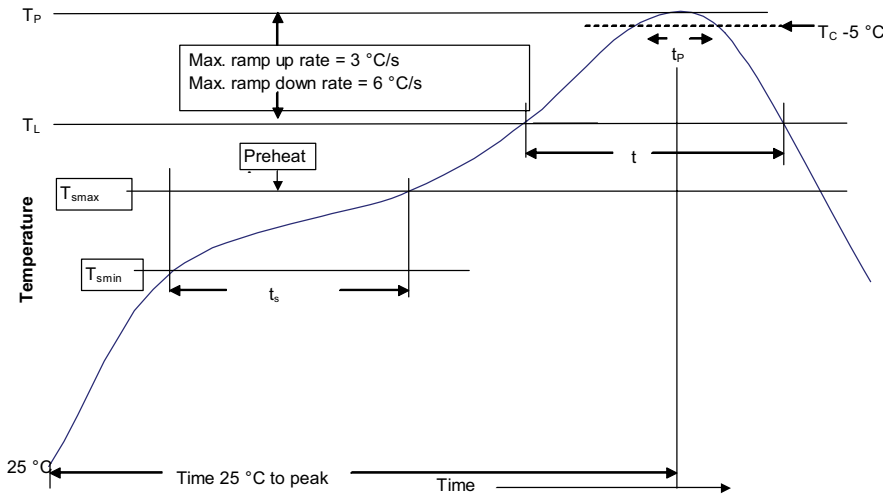


Table 1 - Standard SnPb solder (T_c)

Package thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

Table 2 - Lead (Pb) free solder (T_c)

Package thickness	Volume mm ³ <350	Volume mm ³ 350 - 2000	Volume mm ³ >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 – 2.5 mm	260 °C	250 °C	245 °C
>2.5 mm	250 °C	245 °C	245 °C

Reference J-STD-020

Profile feature	Standard SnPb solder	Lead (Pb) free solder
Preheat and soak		
• Temperature min. (T_{smin})	100 °C	150 °C
• Temperature max. (T_{smax})	150 °C	200 °C
• Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds	60-120 seconds
Ramp up rate T_L to T_p	3 °C/ second max.	3 °C/ second max.
Liquidous temperature (T_L)	183 °C	217 °C
Time (t_L) maintained above T_L	60-150 seconds	60-150 seconds
Peak package body temperature (T_p)*	Table 1	Table 2
Time (t_p)* within 5 °C of the specified classification temperature (T_c)	20 seconds*	30 seconds*
Ramp-down rate (T_p to T_L)	6 °C/ second max.	6 °C/ second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

* Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.

Manual solder

+330 °C, 6 seconds maximum, 30 W maximum soldering iron, generally manual/hand soldering is not recommended

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