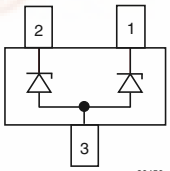
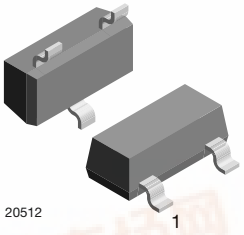
Two-Line ESD-Protection in SOT-23



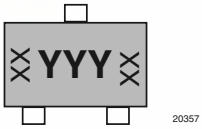


FEATURES

- Two-line ESD-protection device
- ESD-protection acc. IEC 61000-4-2
  ± 30 kV contact discharge
  ± 30 kV air discharge
- Space saving SOT-23 package
- AEC-Q101 qualified
- e3 - Sn
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC

Pb-free
e3
RoHS COMPLIANT
GREEN (5-2008)** Available

MARKING (example only)



YYY = type code (see table below)
XX = date code

ORDERING INFORMATION

DEVICE NAME	ENVIRONMENTAL STATUS	ORDERING CODE	TAPED UNITS PER REEL (8 mm TAPE ON 7" REEL)	MINIMUM ORDER QUANTITY
GSOT05CL-V	Standard	GSOT05CL-V-GS08	3000	15 000
	Green	GSOT05CL-V-G-08		

PACKAGE DATA

DEVICE NAME	PACKAGE NAME	TYPE CODE	ENVIRONMENTAL STATUS	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS
GSOT05CL-V	SOT-23	5CL	Standard	8.8 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	260 °C/10 s at terminals
		CLG	Green	8.1 mg			

ABSOLUTE MAXIMUM RATINGS GSOT05CL-V

PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT
Peak pulse current	Pin 1 to 3 or pin 2 to 3 acc. IEC 61000-4-5, t_p = 8/20 µs; single shot	I_{PPM}	13	A
	Pin 1 to 2 or pin 2 to 1; pin 3 not connected acc. IEC 61000-4-5, t_p = 8/20 µs; single shot		13	A
Peak pulse power	Pin 1 to 3 or pin 2 to 3 acc. IEC 61000-4-5, t_p = 8/20 µs; single shot	P_{PP}	156	W
	Pin 1 to 2 or pin 2 to 1; pin 3 not connected acc. IEC 61000-4-5, t_p = 8/20 µs; single shot		156	W
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V_{ESD}	± 30	kV
	Air discharge acc. IEC 61000-4-2; 10 pulses		± 30	kV
Operating temperature	Junction temperature	T_J	- 40 to + 125	°C
Storage temperature		T_{STG}	- 55 to + 150	°C

** Please see document "Vishay Material Category Policy": www.vishay.com/doc?99902

BiAs-MODE (2-line bidirectional asymmetrical protection mode)

With the GSOT05CL-V two signal- or data-lines (L1, L2) can be protected against voltage transients. With pin 3 connected to ground and pin 1 and pin 2 connected to a signal- or data-line which has to be protected. As long as the voltage level on the data- or signal-line is between 0 V (ground level) and the specified maximum reverse working voltage (V_{RWM}) the protection diode between pin 2 and pin 3 and between pin 1 and pin 3 offer a high isolation to the ground line. The protection device behaves like an open switch.

As soon as any positive transient voltage signal exceeds the break through voltage level of the protection diode, the diode becomes conductive and shorts the transient current to ground. Now the protection device behaves like a closed switch. The clamping voltage (V_C) is defined by the breakthrough voltage (V_{BR}) level plus the voltage drop at the series impedance (resistance and inductance) of the protection device.

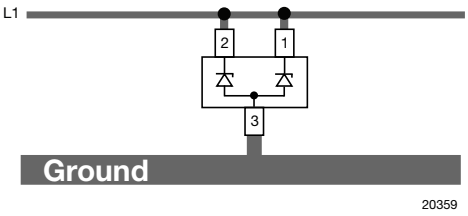
Any negative transient signal will be clamped accordingly. The negative transient current is flowing in the forward direction of the protection diode. The low forward voltage (V_F) clamps the negative transient close to the ground level.

Due to the different clamping levels in forward and reverse direction the GSOT05CL-V clamping behaviour is bidirectional and asymmetrical (BiAs).

If a higher surge current or peak pulse current (I_{PP}) is needed, both protection diodes in the GSOTxxC can also be used in parallel in order to “double” the performance.

This offers:

- double surge power = double peak pulse current (2 x I_{PPM})
- half of the line inductance = reduced clamping voltage
- half of the line resistance = reduced clamping voltage
- double line capacitance (2 x C_D)
- double reverse leakage current (2 x I_R)



ELECTRICAL CHARACTERISTICS GSOT05CLV						
PARAMETER	**TEST CONDITIONS/REMARKS**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	1	lines
Reverse working voltage	at I_R = 1 µA	V_{RWM}	5.5	6.1	7	V
Reverse current	at V_R = 5.5 V	I_R	-	-	1	µA
Reverse breakdown voltage	at I_R = 1 mA	V_{BR}	6	6.75	-	V
Reverse clamping voltage	at I_{PP} = 1 A	V_C	-	6.9	9	V
	at I_{PP} = I_{PPM} = 13 A		-	10	12	V
Forward clamping voltage	at I_{PP} = 1 A	V_F	-	1	1.3	V
	at I_{PP} = I_{PPM} = 30 A		-	2.6	3	V
Capacitance	at V_R = 0 V; f = 1 MHz	C_D	-	100	120	pF
	at V_R = 2.5V; f = 1 MHz		-	60	-	pF

Note

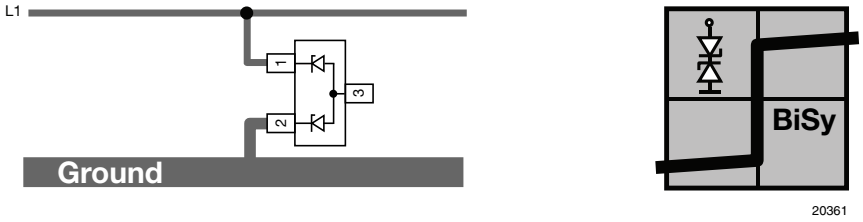
- BiAs mode (between pin 1 to pin 3 or pin 2 to 1)

BiSY-MODE (1-line bidirectional symmetrical protection mode)

If a bipolar symmetrical protection device is needed the GSOT05CL-V can also be used as a single line protection device. Therefore pin 1 has to be connected to the signal- or data-line (L1) and pin 2 to ground (or vice versa). Pin 3 must not be connected.

Positive and negative voltage transients will be clamped in the same way. The clamping current through the GSOT05CL-V passes one diode in forward direction and the other one in reverse direction. The clamping voltage (V_C) is defined by the breakthrough voltage (V_{BR}) level of one diode plus the forward voltage of the other diode plus the voltage drop at the series impedances (resistances and inductances) of the protection device.

Due to the same clamping levels in positive and negative direction the GSOT05CL-V voltage clamping behaviour is bidirectional and symmetrical (BiSy).



ELECTRICAL CHARACTERISTICS GSOT05CL-V						
PARAMETER	**TEST CONDITIONS/REMARKS**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	1	lines
Reverse working voltage	at I_R = 1 µA	V_{RWM}	6	-	-	V
Reverse current	at V_R = 6 V	I_R	-	-	1	µA
Reverse breakdown voltage	at I_R = 1 mA	V_{BR}	6.5	7.5	-	V
Reverse clamping voltage	at I_{PP} = 1 A	V_C	-	8	10	V
	at I_{PP} = I_{PPM} = 13 A		-	12.6	15	V
Capacitance	at V_R = 0 V; f = 1 MHz	C_D	-	50	60	pF
	at V_R = 2.5 V; f = 1 MHz		-	37	-	pF

Note

- Ratings at 25 °C, ambient temperature unless otherwise specified. BiAs mode (between pin 1 to 2 or pin 2 to 1; pin 3 not connected)

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

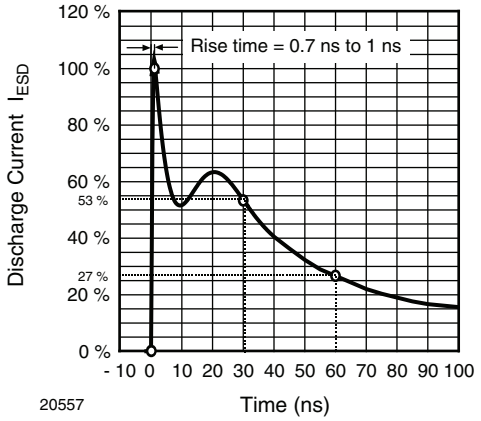


Fig. 1 - ESD Discharge Current Wave Form
acc. IEC 61000-4-2 (330 W/150 pF)

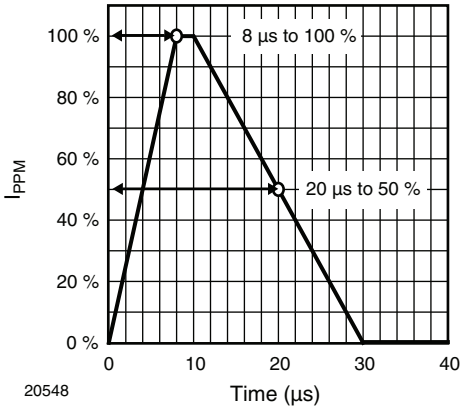


Fig. 2 - 8/20 µs Peak Pulse Current Wave Form
acc. IEC 61000-4-5

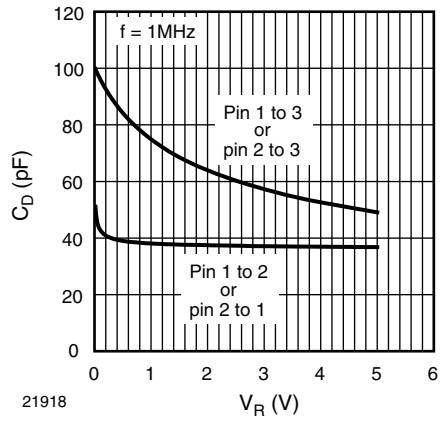


Fig. 3 - Typical Capacitance CD vs. Reverse Voltage VR

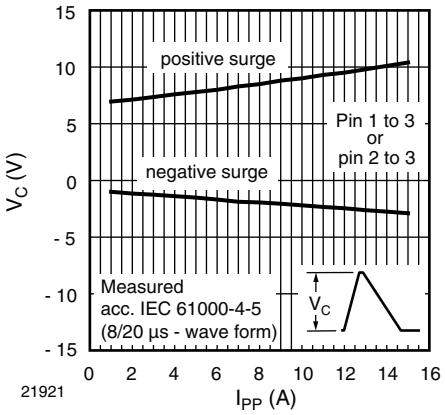


Fig. 6 - Typical Peak Clamping Voltage VC vs. Peak Pulse Current IPP

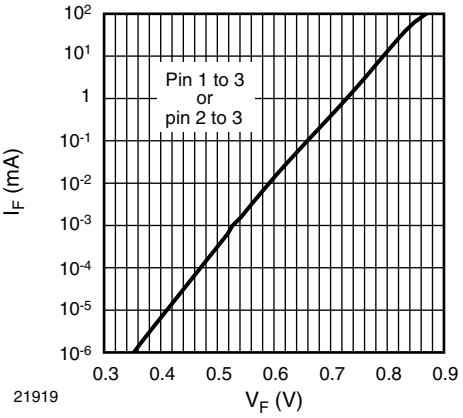


Fig. 4 - Typical Forward Current IF vs. Forward Voltage VF

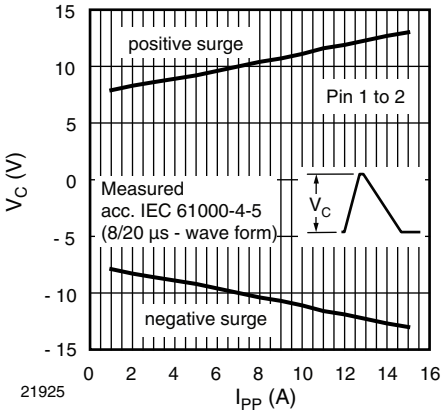


Fig. 7 - Typical Peak Clamping Voltage VC vs. Peak Pulse Current IPP

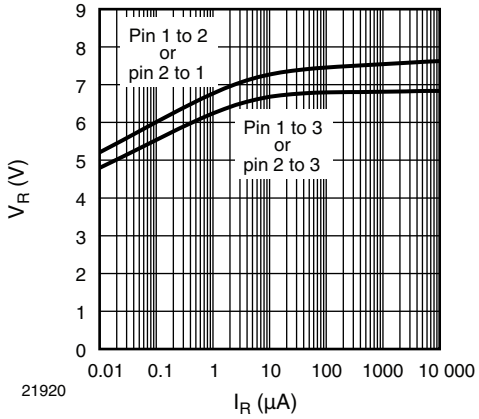


Fig. 5 - Typical Reverse Voltage VR vs. Reverse Current IR

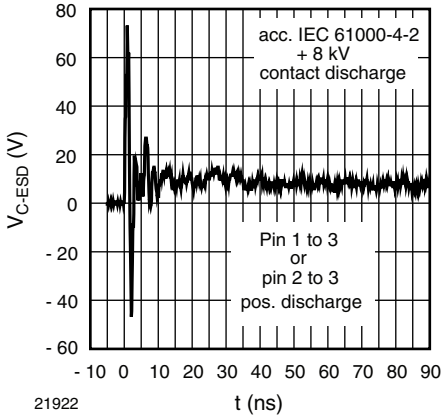


Fig. 8 - Typical Clamping Performance at + 8 kV Contact Discharge (acc. IEC 61000-4-2)

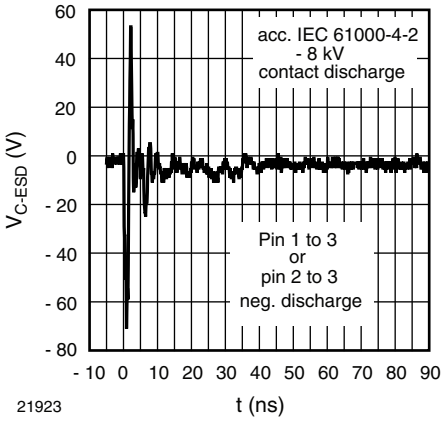


Fig. 9 - Typical Clamping Performance at - 8 kV Contact Discharge (acc. IEC 61000-4-2)

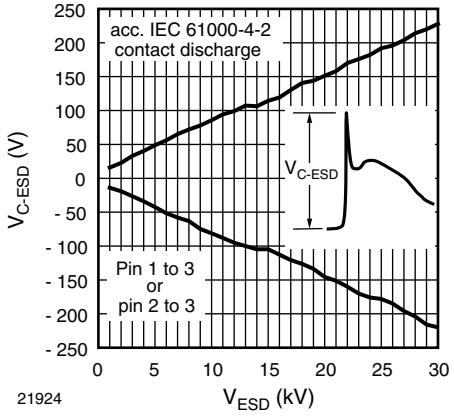
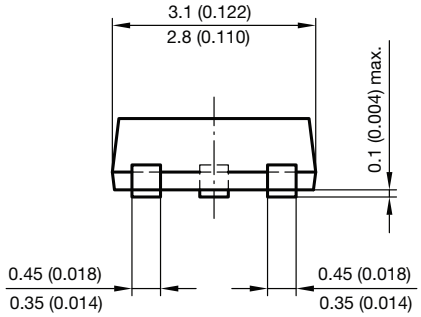
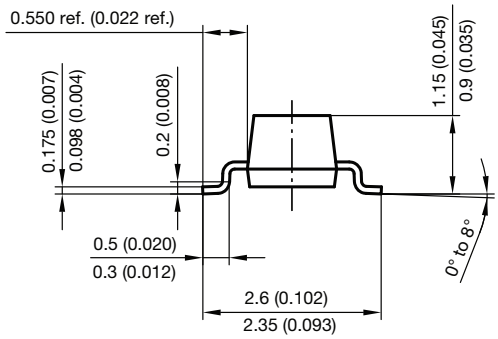
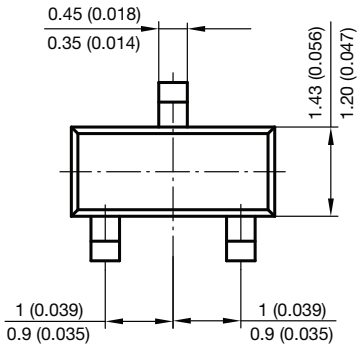


Fig. 10 - Typical Peak. Clamping Voltage at ESD Contact Discharge (acc. IEC 61000-4-2)

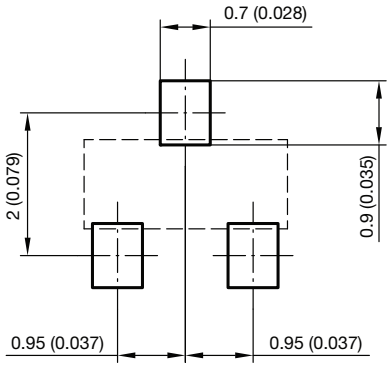
PACKAGE DIMENSIONS in millimeters (inches): **SOT-23**







Foot print recommendation:



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