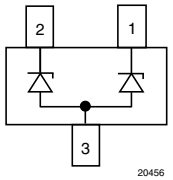
Two-Line ESD Protection Diode in SOT-23



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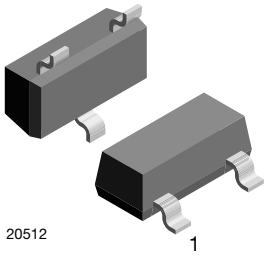
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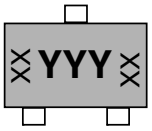
MARKING (example only)



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

FEATURES

- Two-line unidirectional ESD protection diode
- Common anode
- Can be used as bidirectional protection diode
- ESD immunity acc. IEC 61000-4-2 and ISO 10605
  ± 30 kV contact discharge
  ± 30 kV air discharge
- ESD capability according to AEC-Q101: human body model: class H3B: > 8 kV
- e3 - Sn
- AEC-Q101 qualified available
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE Available

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE Available

GREEN (5-2008)

LINKS TO ADDITIONAL RESOURCES

3D Models

SPICE Models

PRIMARY CHARACTERISTICS	
V_{BR}	4 V to 47 V
V_{RWM}	3.3 V to 36 V
P_{PPM} (8/20µs)	400 W to 540 W
P_{PPM} (10 x 1000µs)	44 W
ESD immunity (330 pF / 330 Ω)	± 30 kV
T_J max.	150 °C
Polarity	Unidirectional
Package	SOT-23
Circuit configuration	Dual, common anode

ORDERING INFORMATION

PART NUMBER (EXAMPLE)	ENVIRONMENTAL AND QUALITY CODE			REVISION	PACKAGING CODE		ORDERING CODE (EXAMPLE)
	AEC-Q101 QUALIFIED	RoHS-COMPLIANT + LEAD (Pb)-FREE TERMINATIONS	TIN PLATED		3K PER 7" REEL (8 mm TAPE), 15K/BOX = MOQ	10K PER 13" REEL (8 mm TAPE), 10K/BOX = MOQ	
VGSOT05C-		G	3	-	08		VGSOT05C-G3-08
VGSOT05C-	H	G	3	-	08		VGSOT05C-HG3-08
VGSOT05C-		G	3	-		18	VGSOT05C-G3-18
VGSOT05C-	H	G	3	-		18	VGSOT05C-HG3-18

PACKAGE DATA

DEVICE NAME	PACKAGE NAME	TYPE CODE	ENVIRONMENTAL STATUS	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS
VGSOT03C	SOT-23	H03	Green	9.2 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C
VGSOT04C	SOT-23	H04	Green	9.2 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C
VGSOT05C	SOT-23	H05	Green	9.2 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C
VGSOT08C	SOT-23	H08	Green	9.2 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C
VGSOT12C	SOT-23	H12	Green	9.2 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C
VGSOT15C	SOT-23	H15	Green	9.2 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C
VGSOT22C	SOT-23	H22	Green	9.2 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C
VGSOT24C	SOT-23	H24	Green	9.2 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C
VGSOT36C	SOT-23	H36	Green	9.2 mg	UL 94 V-0	MSL level 1 (according J-STD-020)	Peak temperature max. 260 °C

ABSOLUTE MAXIMUM RATINGS VGSOT03C (T_{amb} = 25 °C unless otherwise specified)

PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT
Peak pulse current	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	I_{PPM}	44	A
	t_p = 10/1000 µs; single shot		6	A
Peak pulse power	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	P_{PP}	540	W
	t_p = 10/1000 µs; single shot		44	W
ESD immunity	Air and contact discharge acc. ISO 10605 (330 pF / 330 Ω); 10 pulses	V_{ESD}	± 30	kV
	Air and contact discharge acc. IEC 61000-4-2 (150 pF / 330 Ω); 10 pulses		± 30	kV
Operating temperature	Junction temperature	T_J	-55 to +150	°C
Storage temperature		T_{STG}	-55 to +150	°C

ABSOLUTE MAXIMUM RATINGS VGSOT04C (T_{amb} = 25 °C unless otherwise specified)

PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT
Peak pulse current	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	I_{PPM}	40	A
	t_p = 10/1000 µs; single shot		5	A
Peak pulse power	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	P_{PP}	540	W
	t_p = 10/1000 µs; single shot		44	W
ESD immunity	Air and contact discharge acc. ISO 10605 (330 pF / 330 Ω); 10 pulses	V_{ESD}	± 30	kV
	Air and contact discharge acc. IEC 61000-4-2 (150 pF / 330 Ω); 10 pulses		± 30	kV
Operating temperature	Junction temperature	T_J	-55 to +150	°C
Storage temperature		T_{STG}	-55 to +150	°C

ABSOLUTE MAXIMUM RATINGS VGSOT05C (T_{amb} = 25 °C unless otherwise specified)				
PARAMETER	**TEST CONDITIONS**	**SYMBOL**	**VALUE**	**UNIT**
Peak pulse current	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	I_{PPM}	36	A
	t_p = 10/1000 µs; single shot		4	A
Peak pulse power	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	P_{PP}	500	W
	t_p = 10/1000 µs; single shot		44	W
ESD immunity	Air and contact discharge acc. ISO 10605 (330 pF / 330 Ω); 10 pulses	V_{ESD}	± 30	kV
	Air and contact discharge acc. IEC 61000-4-2 (150 pF / 330 Ω); 10 pulses		± 30	kV
Operating temperature	Junction temperature	T_J	-55 to +150	°C
Storage temperature		T_{STG}	-55 to +150	°C

ABSOLUTE MAXIMUM RATINGS VGSOT08C (T_{amb} = 25 °C unless otherwise specified)				
PARAMETER	**TEST CONDITIONS**	**SYMBOL**	**VALUE**	**UNIT**
Peak pulse current	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	I_{PPM}	28	A
	t_p = 10/1000 µs; single shot		3	A
Peak pulse power	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	P_{PP}	500	W
	t_p = 10/1000 µs; single shot		44	W
ESD immunity	Air and contact discharge acc. ISO 10605 (330 pF / 330 Ω); 10 pulses	V_{ESD}	± 30	kV
	Air and contact discharge acc. IEC 61000-4-2 (150 pF / 330 Ω); 10 pulses		± 30	kV
Operating temperature	Junction temperature	T_J	-55 to +150	°C
Storage temperature		T_{STG}	-55 to +150	°C

ABSOLUTE MAXIMUM RATINGS VGSOT12C (T_{amb} = 25 °C unless otherwise specified)				
PARAMETER	**TEST CONDITIONS**	**SYMBOL**	**VALUE**	**UNIT**
Peak pulse current	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	I_{PPM}	18.5	A
	t_p = 10/1000 µs; single shot		2	A
Peak pulse power	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	P_{PP}	480	W
	t_p = 10/1000 µs; single shot		44	W
ESD immunity	Air and contact discharge acc. ISO 10605 (330 pF / 330 Ω); 10 pulses	V_{ESD}	± 30	kV
	Air and contact discharge acc. IEC 61000-4-2 (150 pF / 330 Ω); 10 pulses		± 30	kV
Operating temperature	Junction temperature	T_J	-55 to +150	°C
Storage temperature		T_{STG}	-55 to +150	°C

ABSOLUTE MAXIMUM RATINGS VGSOT15C (T_{amb} = 25 °C unless otherwise specified)				
PARAMETER	**TEST CONDITIONS**	**SYMBOL**	**VALUE**	**UNIT**
Peak pulse current	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	I_{PPM}	15.5	A
	t_p = 10/1000 µs; single shot		1.6	A
Peak pulse power	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	P_{PP}	450	W
	t_p = 10/1000 µs; single shot		44	W
ESD immunity	Air and contact discharge acc. ISO 10605 (330 pF / 330 Ω); 10 pulses	V_{ESD}	± 30	kV
	Air and contact discharge acc. IEC 61000-4-2 (150 pF / 330 Ω); 10 pulses		± 30	kV
Operating temperature	Junction temperature	T_J	-55 to +150	°C
Storage temperature		T_{STG}	-55 to +150	°C

ABSOLUTE MAXIMUM RATINGS VGSOT22C (T_{amb} = 25 °C unless otherwise specified)				
PARAMETER	**TEST CONDITIONS**	**SYMBOL**	**VALUE**	**UNIT**
Peak pulse current	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	I_{PPM}	9.4	A
	t_p = 10/1000 µs; single shot		1.1	A
Peak pulse power	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	P_{PP}	400	W
	t_p = 10/1000 µs; single shot		44	W
ESD immunity	Air and contact discharge acc. ISO 10605 (330 pF / 330 Ω); 10 pulses	V_{ESD}	± 30	kV
	Air and contact discharge acc. IEC 61000-4-2 (150 pF / 330 Ω); 10 pulses		± 30	kV
Operating temperature	Junction temperature	T_J	-55 to +150	°C
Storage temperature		T_{STG}	-55 to +150	°C

ABSOLUTE MAXIMUM RATINGS VGSOT24C (T_{amb} = 25 °C unless otherwise specified)				
PARAMETER	**TEST CONDITIONS**	**SYMBOL**	**VALUE**	**UNIT**
Peak pulse current	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	I_{PPM}	8.4	A
	t_p = 10/1000 µs; single shot		1	A
Peak pulse power	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	P_{PP}	400	W
	t_p = 10/1000 µs; single shot		44	W
ESD immunity	Air and contact discharge acc. ISO 10605 (330 pF / 330 Ω); 10 pulses	V_{ESD}	± 30	kV
	Air and contact discharge acc. IEC 61000-4-2 (150 pF / 330 Ω); 10 pulses		± 30	kV
Operating temperature	Junction temperature	T_J	-55 to +150	°C
Storage temperature		T_{STG}	-55 to +150	°C

ABSOLUTE MAXIMUM RATINGS VGSOT36C (T_{amb} = 25 °C unless otherwise specified)				
PARAMETER	**TEST CONDITIONS**	**SYMBOL**	**VALUE**	**UNIT**
Peak pulse current	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	I_{PPM}	5.6	A
	t_p = 10/1000 µs; single shot		0.7	A
Peak pulse power	t_p = 8/20 µs acc. IEC 61000-4-5; single shot	P_{PP}	400	W
	t_p = 10/1000 µs; single shot		44	W
ESD immunity	Air and contact discharge acc. ISO 10605 (330 pF / 330 Ω); 10 pulses	V_{ESD}	± 30	kV
	Air and contact discharge acc. IEC 61000-4-2 (150 pF / 330 Ω); 10 pulses		± 30	kV
Operating temperature	Junction temperature	T_J	-55 to +150	°C
Storage temperature		T_{STG}	-55 to +150	°C

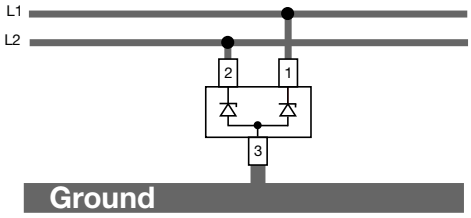
BiAs-MODE (2-line Bidirectional Asymmetrical protection mode)

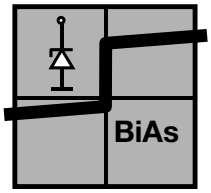
With the VGSOTxxC two signal- or data-lines (L1, L2) can be protected against voltage transients. With pin 3 connected to ground and pin 1 and pin 2 connected to a signal- or data-line which has to be protected. As long as the voltage level on the data- or signal-line is between 0 V (ground level) and the specified Maximum Reverse Working Voltage (V_{RWM}) the protection diode between pin 2 and pin 3 and between pin 1 and pin 3 offers 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 breakdown 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 breakdown voltage (V_{BR}) level plus the voltage drop at the series impedance (resistance and inductance) of the protection diode.

Any negative transient signal will be clamped accordingly. The negative transient current is flowing in the forward direction through 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 VGSOTxxC clamping behavior is Bidirectional and Asymmetrical (BiAs).





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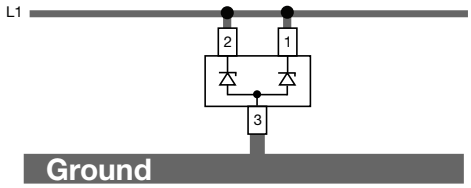
If a higher surge current or peak pulse current (I_{PP}) is needed, both protection diodes in the VGSOTxxC can also be used in parallel in order to “double” the performance.

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)



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ELECTRICAL CHARACTERISTICS VGSOT03C (T_{amb} = 25 °C unless otherwise specified)						
PARAMETER	**TEST CONDITIONS / REMARKS**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	2	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	3.3	V
Reverse voltage	At I_R = 100 µA	V_R	3.3	-	-	V
Reverse current	At V_R = 3.3 V	I_R	-	-	100	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	4.0	4.6	5.5	V
Reverse clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_C	-	5.7	7.5	V
	At I_{PP} = I_{PPM} = 44 A; t_p = 8/20 µs		-	9.2	12.3	V
Forward clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_F	-	1	1.2	V
	At I_{PP} = I_{PPM} = 44 A; t_p = 8/20 µs		-	4.5	-	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	460	600	pF
	At V_R = 1.6 V; f = 1 MHz		-	320	-	pF

ELECTRICAL CHARACTERISTICS VGSOT04C (T_{amb} = 25 °C unless otherwise specified)						
PARAMETER	**TEST CONDITIONS / REMARKS**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	2	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	4	V
Reverse voltage	At I_R = 20 µA	V_R	4	-	-	V
Reverse current	At V_R = 4 V	I_R	-	-	20	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	5	6.1	7	V
Reverse clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_C	-	6.5	8	V
	At I_{PP} = I_{PPM} = 40 A; t_p = 8/20 µs		-	10.3	13.5	V
Forward clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_F	-	1	1.2	V
	At I_{PP} = I_{PPM} = 40 A; t_p = 8/20 µs		-	4.2	-	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	360	450	pF
	At V_R = 2 V; f = 1 MHz		-	225	-	pF

ELECTRICAL CHARACTERISTICS VGSOT05C (T_{amb} = 25 °C unless otherwise specified)						
PARAMETER	**TEST CONDITIONS / REMARKS**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	2	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	5	V
Reverse voltage	At I_R = 10 µA	V_R	5	-	-	V
Reverse current	At V_R = 5 V	I_R	-	-	10	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	6	6.8	8	V
Reverse clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_C	-	7.3	8.7	V
	At I_{PP} = I_{PPM} = 36 A; t_p = 8/20 µs		-	11	14	V
Forward clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_F	-	1	1.2	V
	At I_{PP} = I_{PPM} = 36 A; t_p = 8/20 µs		-	3.9	-	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	276	350	pF
	At V_R = 2.5 V; f = 1 MHz		-	165	-	pF

ELECTRICAL CHARACTERISTICS VGSOT08C (T_{amb} = 25 °C unless otherwise specified)						
PARAMETER	**TEST CONDITIONS / REMARKS**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	2	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	8	V
Reverse voltage	At I_R = 5 µA	V_R	8	-	-	V
Reverse current	At V_R = 8 V	I_R	-	-	5	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	9	10	11	V
Reverse clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_C	-	10.7	13	V
	At I_{PP} = I_{PPM} = 28 A; t_p = 8/20 µs		-	14.4	18	V
Forward clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_F	-	1	1.2	V
	At I_{PP} = I_{PPM} = 28 A; t_p = 8/20 µs		-	3.2	-	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	175	250	pF
	At V_R = 4 V; f = 1 MHz		-	90	-	pF

ELECTRICAL CHARACTERISTICS VGSOT12C (T_{amb} = 25 °C unless otherwise specified)						
PARAMETER	**TEST CONDITIONS / REMARKS**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	2	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	12	V
Reverse voltage	At I_R = 1 µA	V_R	12	-	-	V
Reverse current	At V_R = 12 V	I_R	-	-	1	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	13.5	15	16.5	V
Reverse clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_C	-	15.4	18.7	V
	At I_{PP} = I_{PPM} = 18.5 A; t_p = 8/20 µs		-	20.2	26	V
Forward clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_F	-	1	1.2	V
	At I_{PP} = I_{PPM} = 18.5 A; t_p = 8/20 µs		-	2.5	-	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	115	150	pF
	At V_R = 6 V; f = 1 MHz		-	54	-	pF

ELECTRICAL CHARACTERISTICS VGSOT15C (T_{amb} = 25 °C unless otherwise specified)						
PARAMETER	**TEST CONDITIONS / REMARKS**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	2	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	15	V
Reverse voltage	At I_R = 1 µA	V_R	15	-	-	V
Reverse current	At V_R = 15 V	I_R	-	-	1	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	16.5	18	20	V
Reverse clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_C	-	18.5	22.5	V
	At I_{PP} = I_{PPM} = 15.5 A; t_p = 8/20 µs		-	23.5	28.8	V
Forward clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_F	-	1	1.2	V
	At I_{PP} = I_{PPM} = 15.5 A; t_p = 8/20 µs		-	2.2	-	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	100	120	pF
	At V_R = 7.5 V; f = 1 MHz		-	43	-	pF

ELECTRICAL CHARACTERISTICS VGSOT22C (T_{amb} = 25 °C unless otherwise specified)						
PARAMETER	**TEST CONDITIONS / REMARKS**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	2	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	22	V
Reverse voltage	At I_R = 1 µA	V_R	22	-	-	V
Reverse current	At V_R = 22 V	I_R	-	-	1	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	25.1	27	28.8	V
Reverse clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_C	-	28	32	V
	At I_{PP} = I_{PPM} = 9.4 A; t_p = 8/20 µs		-	34.5	41	V
Forward clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_F	-	1	1.2	V
	At I_{PP} = I_{PPM} = 9.4 A; t_p = 8/20 µs		-	1.8	-	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	70	85	pF
	At V_R = 11 V; f = 1 MHz		-	27	-	pF

ELECTRICAL CHARACTERISTICS VGSOT24C (T_{amb} = 25 °C unless otherwise specified)						
PARAMETER	**TEST CONDITIONS / REMARKS**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	2	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	24	V
Reverse voltage	At I_R = 1 µA	V_R	24	-	-	V
Reverse current	At V_R = 24 V	I_R	-	-	1	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	27	30	33	V
Reverse clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_C	-	31	37	V
	At I_{PP} = I_{PPM} = 8.4 A; t_p = 8/20 µs		-	37.5	46	V
Forward clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_F	-	1	1.2	V
	At I_{PP} = I_{PPM} = 8.4 A; t_p = 8/20 µs		-	1.7	-	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	65	80	pF
	At V_R = 12 V; f = 1 MHz		-	23	-	pF

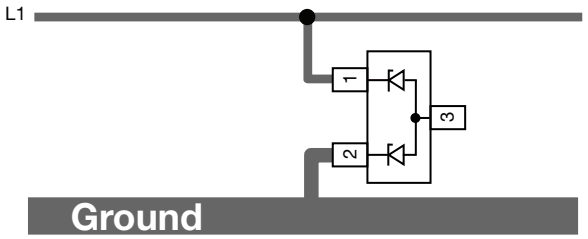
ELECTRICAL CHARACTERISTICS VGSOT36C (T_{amb} = 25 °C unless otherwise specified)						
PARAMETER	**TEST CONDITIONS / REMARKS**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	2	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	36	V
Reverse voltage	At I_R = 1 µA	V_R	36	-	-	V
Reverse current	At V_R = 36 V	I_R	-	-	1	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	39	43	47	V
Reverse clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_C	-	45	60	V
	At I_{PP} = I_{PPM} = 5.6 A; t_p = 8/20 µs		-	52	71	V
Forward clamping voltage	At I_{PP} = 1 A; t_p = 8/20 µs	V_F	-	1	1.2	V
	At I_{PP} = I_{PPM} = 5.6 A; t_p = 8/20 µs		-	1.4	-	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	45	65	pF
	At V_R = 18 V; f = 1 MHz		-	14	-	pF

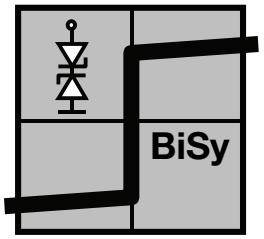
BiSy-MODE (1-line bidirectional symmetrical protection mode)

If a bipolar symmetrical protection device is needed the VGSOTxxC 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 VGSOTxxC passes one diode in forward direction and the other one in reverse direction. The clamping voltage (V_C) is defined by the breakdown 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 VGSOTxxC voltage clamping behaviour is bidirectional and symmetrical (BiSy).





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ELECTRICAL CHARACTERISTICS VGSOT03C (T_{amb} = 25 °C unless otherwise specified) between pin 1 to pin 2 or pin 2 to pin1; pin 3 not connected

PARAMETER	TEST CONDITIONS / REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	1	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	3.8	V
Reverse voltage	At I_R = 100 µA	V_R	3.8	-	-	V
Reverse current	At V_R = 3.8 V	I_R	-	-	100	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	4.5	5.3	6.2	V
Reverse clamping voltage	At I_{PP} = 1 A, t_p = 8/20 µs	V_C	-	7	8.4	V
	At I_{PP} = I_{PPM} = 44 A, t_p = 8/20 µs		-	14	16.8	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	230	300	pF
	At V_R = 1.6 V; f = 1 MHz		-	190	-	pF

ELECTRICAL CHARACTERISTICS VGSOT04C (T_{amb} = 25 °C unless otherwise specified) between pin 1 to pin 2 or pin 2 to pin1; pin 3 not connected

PARAMETER	TEST CONDITIONS / REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	1	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	4.5	V
Reverse voltage	At I_R = 20 µA	V_R	4.5	-	-	V
Reverse current	At V_R = 4.5 V	I_R	-	-	20	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	5.5	6.8	7.7	V
Reverse clamping voltage	At I_{PP} = 1 A, t_p = 8/20 µs	V_C	-	7.5	9	V
	At I_{PP} = I_{PPM} = 40 A, t_p = 8/20 µs		-	15.7	18.8	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	180	225	pF
	At V_R = 2 V; f = 1 MHz		-	136	-	pF

ELECTRICAL CHARACTERISTICS VGSOT05C (T_{amb} = 25 °C unless otherwise specified)
between pin 1 to pin 2 or pin 2 to pin1; pin 3 not connected

PARAMETER	TEST CONDITIONS / REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	1	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	5.5	V
Reverse voltage	At I_R = 10 µA	V_R	5.5	-	-	V
Reverse current	At V_R = 5.5 V	I_R	-	-	10	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	6.5	7.5	8.7	V
Reverse clamping voltage	At I_{PP} = 1 A, t_p = 8/20 µs	V_C	-	8.1	9.7	V
	At I_{PP} = I_{PPM} = 36 A, t_p = 8/20 µs		-	17	20.4	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	138	175	pF
	At V_R = 2.5 V; f = 1 MHz		-	100	-	pF

ELECTRICAL CHARACTERISTICS VGSOT08C (T_{amb} = 25 °C unless otherwise specified)
between pin 1 to pin 2 or pin 2 to pin1; pin 3 not connected

PARAMETER	TEST CONDITIONS / REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	1	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	8.5	V
Reverse voltage	At I_R = 5 µA	V_R	8.5	-	-	V
Reverse current	At V_R = 8.5 V	I_R	-	-	5	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	9.5	10.7	11.7	V
Reverse clamping voltage	At I_{PP} = 1 A, t_p = 8/20 µs	V_C	-	11.7	14	V
	At I_{PP} = I_{PPM} = 28 A, t_p = 8/20 µs		-	18.5	22.2	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	87	125	pF
	At V_R = 4 V; f = 1 MHz		-	60	-	pF

ELECTRICAL CHARACTERISTICS VGSOT12C (T_{amb} = 25 °C unless otherwise specified)
between pin 1 to pin 2 or pin 2 to pin1; pin 3 not connected

PARAMETER	TEST CONDITIONS / REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	1	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	12.5	V
Reverse voltage	At I_R = 1 µA	V_R	12.5	-	-	V
Reverse current	At V_R = 12.5 V	I_R	-	-	1	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	13.5	15.7	16.5	V
Reverse clamping voltage	At I_{PP} = 1 A, t_p = 8/20 µs	V_C	-	16.4	19.7	V
	At I_{PP} = I_{PPM} = 18.5 A, t_p = 8/20 µs		-	23.4	28.1	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	58	75	pF
	At V_R = 6 V; f = 1 MHz		-	36	-	pF

ELECTRICAL CHARACTERISTICS VGSOT15C (T_{amb} = 25 °C unless otherwise specified)
between pin 1 to pin 2 or pin 2 to pin1; pin 3 not connected

PARAMETER	TEST CONDITIONS / REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	1	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	15.5	V
Reverse voltage	At I_R = 1 µA	V_R	15.5	-	-	V
Reverse current	At V_R = 15.5 V	I_R	-	-	1	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	17	18.7	20.7	V
Reverse clamping voltage	At I_{PP} = 1 A, t_p = 8/20 µs	V_C	-	20.4	24.5	V
	At I_{PP} = I_{PPM} = 15.5 A, t_p = 8/20 µs		-	26.6	30.6	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	50	60	pF
	At V_R = 7.5 V; f = 1 MHz		-	30	-	pF

ELECTRICAL CHARACTERISTICS VGSOT22C (T_{amb} = 25 °C unless otherwise specified)
between pin 1 to pin 2 or pin 2 to pin1; pin 3 not connected

PARAMETER	TEST CONDITIONS / REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	1	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	22.5	V
Reverse voltage	At I_R = 1 µA	V_R	22.5	-	-	V
Reverse current	At V_R = 22.5 V	I_R	-	-	1	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	25.6	27.7	29.5	V
Reverse clamping voltage	At I_{PP} = 1 A, t_p = 8/20 µs	V_C	-	29	33.2	V
	At I_{PP} = I_{PPM} = 9.4 A, t_p = 8/20 µs		-	-	-	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	35	43	pF
	At V_R = 11 V; f = 1 MHz		-	20	-	pF

ELECTRICAL CHARACTERISTICS VGSOT24C (T_{amb} = 25 °C unless otherwise specified)
between pin 1 to pin 2 or pin 2 to pin1; pin 3 not connected

PARAMETER	TEST CONDITIONS / REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	1	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	24.5	V
Reverse voltage	At I_R = 1 µA	V_R	24.5	-	-	V
Reverse current	At V_R = 24.5 V	I_R	-	-	1	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	27.5	30.7	33.7	V
Reverse clamping voltage	At I_{PP} = 1 A, t_p = 8/20 µs	V_C	-	34	41	V
	At I_{PP} = I_{PPM} = 8.4 A, t_p = 8/20 µs		-	40	48	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	33	40	pF
	At V_R = 12 V; f = 1 MHz		-	17	-	pF

ELECTRICAL CHARACTERISTICS VGSOT36C (T_{amb} = 25 °C unless otherwise specified)
between pin 1 to pin 2 or pin 2 to pin1; pin 3 not connected

PARAMETER	TEST CONDITIONS / REMARKS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Protection paths	Number of lines which can be protected	$N_{channel}$	-	-	1	lines
Reverse stand-off voltage	Max. reverse working voltage	V_{RWM}	-	-	36.5	V
Reverse voltage	At I_R = 1 µA	V_R	36.5	-	-	V
Reverse current	At V_R = 36.5 V	I_R	-	-	1	µA
Reverse breakdown voltage	At I_R = 1 mA	V_{BR}	39.5	43.7	47.7	V
Reverse clamping voltage	At I_{PP} = 1 A, t_p = 8/20 µs	V_C	-	50	60	V
	At I_{PP} = I_{PPM} = 5.6 A, t_p = 8/20 µs		-	60	72	V
Capacitance	At V_R = 0 V; f = 1 MHz	C_D	-	23	33	pF
	At V_R = 18 V; f = 1 MHz		-	10	-	pF

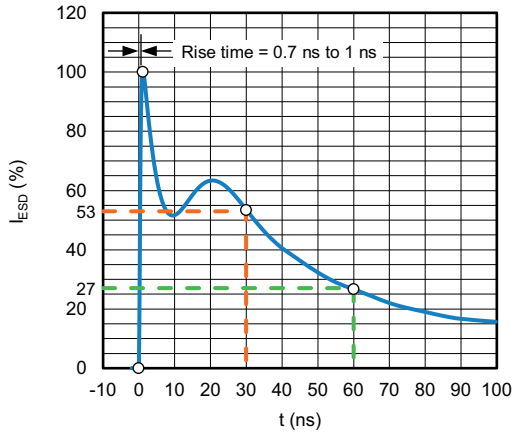


Fig. 1 - ESD Discharge Current Waveform
According to IEC 61000-4-2 (330 Ω / 150 pF)

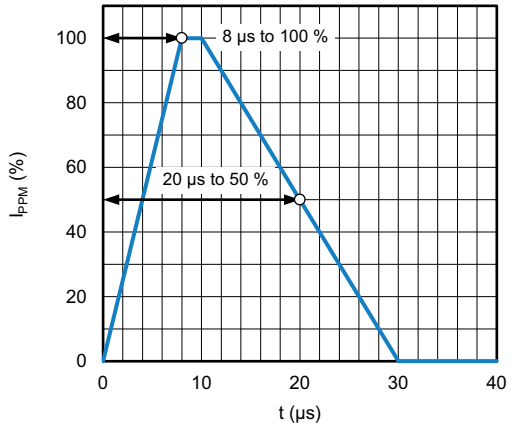


Fig. 2 - 8/20 µs Peak Pulse Current Waveform
According to IEC 61000-4-5

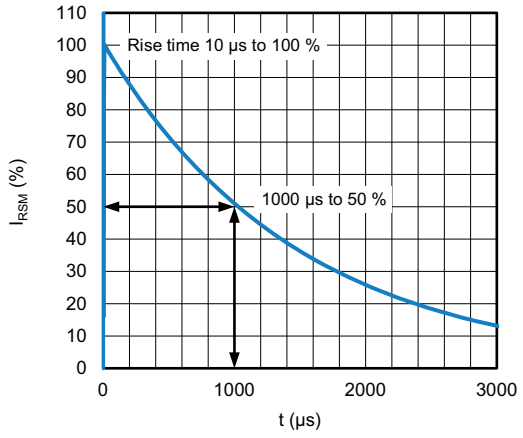


Fig. 3 - 10/1000 µs Peak Pulse Current Wave Form

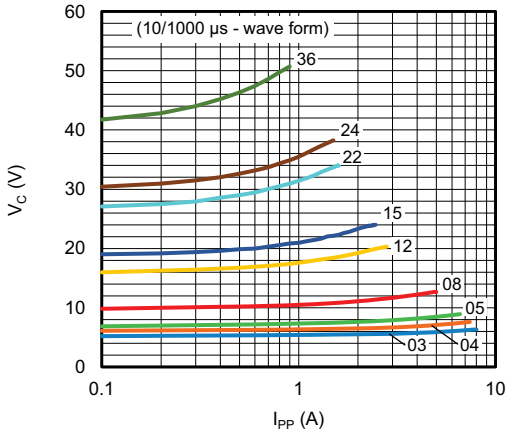


Fig. 4 - Typical Peak Clamping Voltage vs. Peak Pulse Current

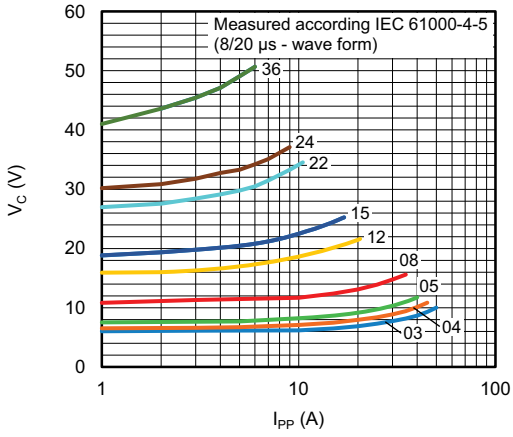


Fig. 5 - Typical Peak Clamping Voltage vs. Peak Pulse Current

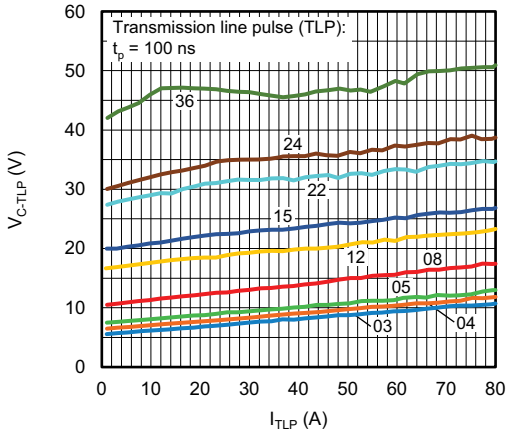


Fig. 6 - Typical Clamping Voltage vs. Peak Pulse Current

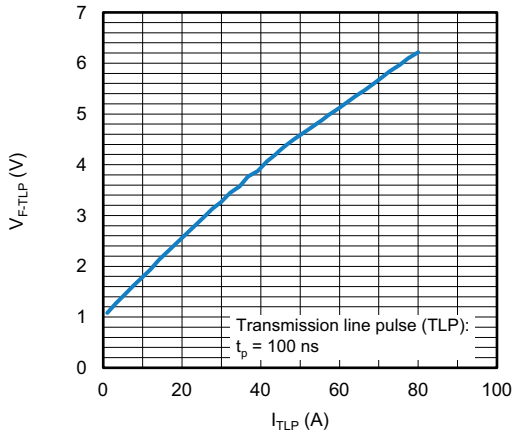


Fig. 7 - Typical Forward Voltage vs. Peak Pulse Current

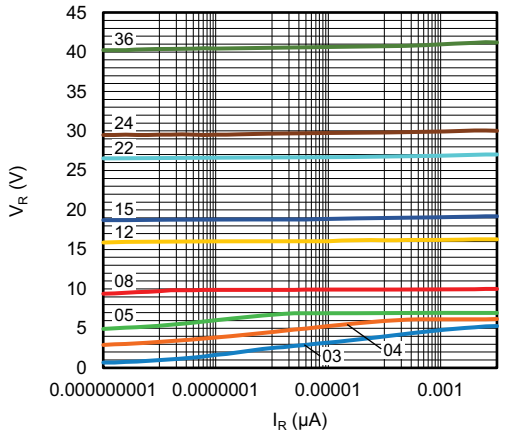


Fig. 8 - Typical Reverse Voltage vs. Reverse Current

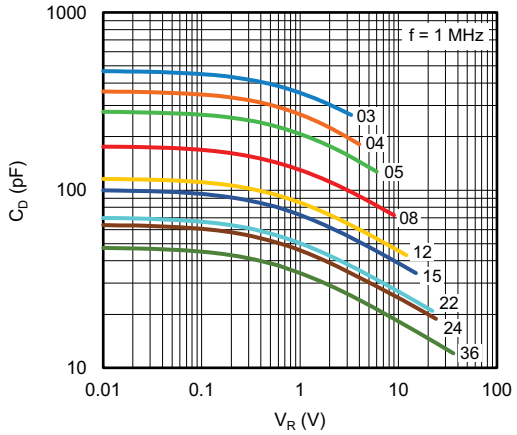
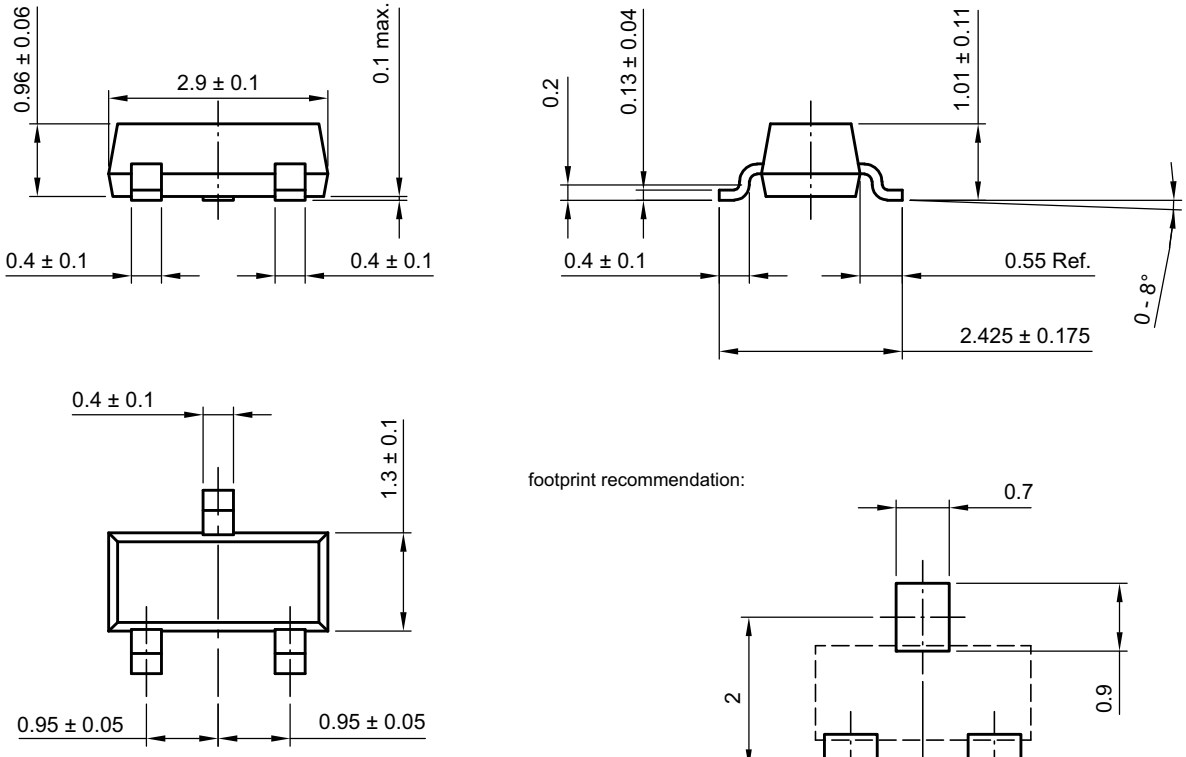


Fig. 9 - Typical Capacitance vs. Reverse Voltage

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



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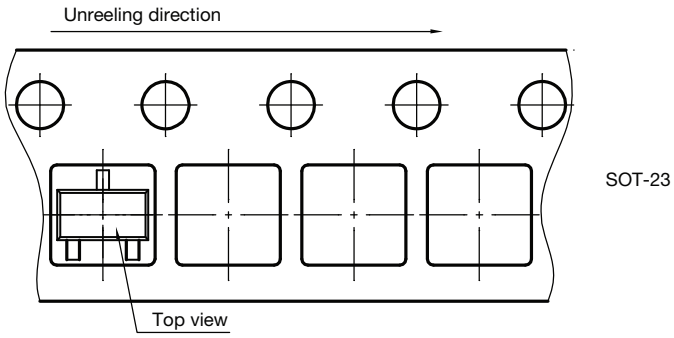
ORIENTATION IN CARRIER TAPE SOT-23



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SOT-23
S8-V-3929.01-006 (4)
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