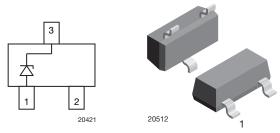


Single-Line ESD Protection in SOT-23



MARKING (example only)



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

DESIGN SUPPORT TOOLS AVAILABLE





FEATURES

- Single-line ESD protection device
- ESD immunity acc. IEC 61000-4-2
 - ± 30 kV contact discharge
 - ± 30 kV air discharge
- ESD capability according to AEC-Q101: human body model: class H3B: > 8 kV
- Space saving SOT-23 package
- e3 Sn
- AEC-Q101 qualified available
- Material categorization: for definitions of compliance please see www.vishav.com/doc?99912





ROHS COMPLIANT HALOGEN FREE

GREEN (5-2008)

ORDERING INFORMATION								
PART NUMBER (EXAMPLE)	ENVIR	ONMENTAL AN	D QUALITY C	ODE	PACKAG	ING CODE		
	AEC-Q101 QUALIFIED	RoHS-COM LEAD (P	MPLIANT + b)-FREE	TIN PLATED	3K PER 7" REEL (8 mm TAPE),	10K PER 13" REEL (8 mm TAPE),	ORDERING CODE (EXAMPLE)	
	QUALIFIED	STANDARD GREEN PLATED 15K/BOX = MOQ		10K/BOX = MOQ				
GSOT05-		E		3	-08		GSOT05-E3-08	
GSOT05-			G	3	-08		GSOT05-G3-08	
GSOT05-	Н	E		3	-08		GSOT05-HE3-08	
GSOT05-	Н		G	3	-08		GSOT05-HG3-08	
GSOT05-		E		3		-18	GSOT05-E3-18	
GSOT05-			G	3		-18	GSOT05-G3-18	
GSOT05-	Н	E		3		-18	GSOT05-HE3-18	
GSOT05-	Н		G	3		-18	GSOT05-HG3-18	

PACKA	PACKAGE DATA								
DEVICE NAME	PACKAGE NAME	TYPE CODE	ENVIRONMENTAL STATUS	WEIGHT	MOLDING COMPOUND FLAMMABILITY RATING	MOISTURE SENSITIVITY LEVEL	SOLDERING CONDITIONS		
GSOT03	SOT-23	03	Standard	8.8 mg	UL 94 V-0	MSL level 1	Peak temperature max. 260 °C		
430103	301-23	03G	Green	8.1 mg	OL 94 V-0	(according J-STD-020)	Teak temperature max. 200 G		
GSOT04	SOT-23	04	Standard	8.8 mg	UL 94 V-0	MSL level 1	Peak temperature max. 260 °C		
400104	001 20	04G	Green	8.1 mg	02 34 7 0	(according J-STD-020)	T cak temperature max. 200 G		
GSOT05	SOT-23	05	Standard	8.8 mg	UL 94 V-0	MSL level 1	Peak temperature max. 260 °C		
400103	001 20	05G	Green	8.1 mg	02 34 7 0	(according J-STD-020)	T cak temperature max. 200 G		
GSOT08	SOT-23	08	Standard	8.8 mg	UL 94 V-0	MSL level 1	Peak temperature max. 260 °C		
400100	001 20	08G	Green	8.1 mg	02 34 7 0	(according J-STD-020)	T cak temperature max. 200 G		
GSOT12	SOT-23	12	Standard	8.8 mg	UL 94 V-0	MSL level 1	Peak temperature max. 260 °C		
430112	301-23	12G	Green	8.1 mg	OL 94 V-0	(according J-STD-020)	Teak temperature max. 200 G		
GSOT15	SOT-23	15	Standard	8.8 mg	UL 94 V-0	MSL level 1	Peak temperature max. 260 °C		
430113	301-23	15G	Green	8.1 mg	OL 94 V-0	(according J-STD-020)	Teak temperature max. 200 G		
GSOT24	SOT-23	24	Standard	8.8 mg	UL 94 V-0	MSL level 1	Peak temperature max. 260 °C		
G50124	301-23	24G	Green	8.1 mg	OL 34 V-0	(according J-STD-020)	i ear temperature max. 200 C		
GSOT36	SOT-23	36	Standard	8.8 mg	UL 94 V-0	MSL level 1	Peak temperature max. 260 °C		
430130	30130 301-23		Green	8.1 mg	OL 34 V-0	(according J-STD-020)	i ear temperature max. 200 C		



ABSOLUTE MAXIMUM RATINGS GSOT03						
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT		
Peak pulse current	Pin 3 to 1 acc. IEC 61000-4-5, $t_p = 8/20 \mu s$; single shot	I _{PPM}	30	Α		
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, t _p = 8/20 μs; single shot	P _{PP}	369	W		
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V	± 30	kV		
ESD initiditity	Air discharge acc. IEC 61000-4-2; 10 pulses	V _{ESD}	30	kV		
Operating temperature	Junction temperature	T_J	-40 to +125	°C		
Storage temperature		T _{STG}	-55 to +150	°C		

ABSOLUTE MAXIMUM RATINGS GSOT04					
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT	
Peak pulse current	Pin 3 to 1 acc. IEC 61000-4-5, t _p = 8/20 μs; single shot	I _{PPM}	30	А	
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, $t_p = 8/20 \mu s$; single shot	P _{PP}	429	W	
CCD improvements.	Contact discharge acc. IEC 61000-4-2; 10 pulses	V	± 30	kV	
ESD immunity	Air discharge acc. IEC 61000-4-2; 10 pulses	V_{ESD}	30 429	kV	
Operating temperature	Junction temperature	T _J	-40 to +125	°C	
Storage temperature		T _{STG}	-55 to +150	°C	

ABSOLUTE MAXIMUM RATINGS GSOT05						
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT		
Peak pulse current	Pin 3 to 1 acc. IEC 61000-4-5, $t_p = 8/20 \mu s$; single shot	I _{PPM}	30	Α		
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, $t_p = 8/20 \mu s$; single shot	P _{PP}	480	W		
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V	± 30	kV		
ESD infillidity	Air discharge acc. IEC 61000-4-2; 10 pulses	V _{ESD}	30 480 ± 30 ± 30 -40 to +125	kV		
Operating temperature	Junction temperature	TJ	-40 to +125	°C		
Storage temperature		T _{STG}	-55 to +150	°C		

ABSOLUTE MAXIMUM RATINGS GSOT08						
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT		
Peak pulse current	Pin 3 to 1 acc. IEC 61000-4-5, $t_p = 8/20 \mu s$; single shot	I _{PPM}	18	А		
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, $t_p = 8/20 \mu s$; single shot	P_{PP}	345	W		
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V	± 30	kV		
ESD Illillurilly	Air discharge acc. IEC 61000-4-2; 10 pulses	V_{ESD}	± 30 ± 30	kV		
Operating temperature	Junction temperature	TJ	-40 to +125	°C		
Storage temperature		T _{STG}	-55 to +150	°C		



ABSOLUTE MAXIMUM RATINGS GSOT12					
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT	
Peak pulse current	Pin 3 to 1 acc. IEC 61000-4-5, t _p = 8/20 μs; single shot	I _{PPM}	12	А	
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, $t_p = 8/20 \mu s$; single shot	P _{PP}	312	W	
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V	± 30	kV	
ESD initiditity	Air discharge acc. IEC 61000-4-2; 10 pulses	V _{ESD}	12	kV	
Operating temperature	Junction temperature	T_J	-40 to +125	°C	
Storage temperature		T _{STG}	-55 to +150	°C	

ABSOLUTE MAXIMUM RATINGS GSOT15						
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT		
Peak pulse current	Pin 3 to 1 acc. IEC 61000-4-5, t _p = 8/20 μs; single shot	I _{PPM}	8	Α		
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, t _p = 8/20 μs; single shot	P _{PP}	230	W		
ECD image units	Contact discharge acc. IEC 61000-4-2; 10 pulses	V	± 30	kV		
ESD immunity	Air discharge acc. IEC 61000-4-2; 10 pulses	V_{ESD}	230 ± 30 ± 30	kV		
Operating temperature	Junction temperature	T _J	-40 to +125	°C		
Storage temperature		T _{STG}	-55 to +150	°C		

ABSOLUTE MAXIMUM RATINGS GSOT24					
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT	
Peak pulse current	Pin 3 to 1 acc. IEC 61000-4-5, t _p = 8/20 μs; single shot	I _{PPM}	5	А	
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, t _p = 8/20 μs; single shot	P _{PP}	235	W	
CCD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V	± 30	kV	
ESD immunity	Air discharge acc. IEC 61000-4-2; 10 pulses	V_{ESD}	5 235	kV	
Operating temperature	Junction temperature	T_J	-40 to +125	°C	
Storage temperature		T _{STG}	-55 to +150	°C	

ABSOLUTE MAXIMUM RATINGS GSOT36						
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT		
Peak pulse current	Pin 3 to 1 acc. IEC 61000-4-5, t_p = 8/20 μ s; single shot	I _{PPM}	3.5	Α		
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, $t_p = 8/20 \mu s$; single shot	P _{PP}	248	W		
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V	± 30	kV		
ESD IIIIIIdility	Air discharge acc. IEC 61000-4-2; 10 pulses	V _{ESD}	3.5	kV		
Operating temperature	Junction temperature	T_J	-40 to +125	°C		
Storage temperature		T _{STG}	-55 to +150	°C		



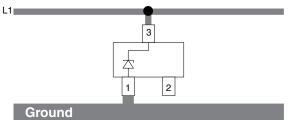
BIAs-MODE (1-line Bidirectional Asymmetrical protection mode)

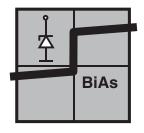
With the GSOTxx one signal- or data-lines (L1) can be protected against voltage transients. With pin 1 connected to ground and pin 3 connected to a signal- or data-line which has to be protected. As long as the voltage level on the data- or signal-line is between 0 V (ground level) and the specified maximum reverse working voltage (V_{RWM}) the protection diode between pin 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 GSOTxx clamping behavior is Bidirectional and Asymmetrical (BiAs).





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ELECTRICAL CHARACTERISTICS GSOT03 (T _{amb} = 25 °C unless otherwise specified) between pin 3 and pin 1							
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}	-	-	3.3	V	
Reverse voltage	at I _R = 100 μA	V_R	3.3	-	-	V	
Reverse current	at V _R = 3.3 V	I _R	-	-	100	μΑ	
Reverse breakdown voltage	at I _R = 1 mA	V_{BR}	4	4.6	5.5	V	
Deverge elemning veltage	at I _{PP} = 1 A	V	-	5.7	1 3.3 - 100 5.5 7.5 12.3 1.2	V	
Reverse clamping voltage	at I _{PP} = I _{PPM} = 30 A	V _C	-	10		V	
Converd elemning veltage	at I _{PP} = 1 A	M	-	1	1.2	V	
Forward clamping voltage	at I _{PP} = I _{PPM} = 30 A	V _F	-	4.5	-	V	
Consoitance	at V _R = 0 V; f = 1 MHz		-	420	600	pF	
Capacitance	at V _R = 1.6 V; f = 1 MHz	C _D	-	260	-	pF	

ELECTRICAL CHARACTERISTICS GSOT04 (T _{amb} = 25 °C unless otherwise specified) between pin 3 and pin 1							
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	V	
Reverse voltage	at I _R = 20 μA	V_R	4	-	-	V	
Reverse current	at V _R = 4 V	I _R	=	-	20	μΑ	
Reverse breakdown voltage	at I _R = 1 mA	V_{BR}	5	6.1	7	V	
Payaraa alampina valtaga	at I _{PP} = 1 A	W	-	7.5	9	V	
Reverse clamping voltage	at I _{PP} = I _{PPM} = 30 A	V _C	-	11.2	14.3	V	
Famusard alamaina valtaga	at I _{PP} = 1 A		=	1	1.2	V	
Forward clamping voltage	at I _{PP} = I _{PPM} = 30 A	V _F	-	4.5	-	V	
Constitute	at V _R = 0 V; f = 1 MHz		-	310	450	pF	
Capacitance	at $V_R = 2 V$; $f = 1 MHz$	C _D	-	200	-	pF	



ELECTRICAL CHARACTERISTICS GSOT05 (T _{amb} = 25 °C unless otherwise specified) between pin 3 and pin 1						
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	V
Reverse voltage	at I _R = 10 μA	V_R	5	-	-	V
Reverse current	at V _R = 5 V	I _R	=	-	10	μΑ
Reverse breakdown voltage	at I _R = 1 mA	V_{BR}	6	6.8	8	V
	at I _{PP} = 1 A	V _C	=	7	8.7	V
Reverse clamping voltage	at I _{PP} = I _{PPM} = 30 A		=	12	16	V
Forward clamping voltage	at I _{PP} = 1 A	V _F	-	1	1.2	V
	at I _{PP} = I _{PPM} = 30 A		-	4.5	-	V
Capacitance	at V _R = 0 V; f = 1 MHz	- C _D	-	260	350	pF
	at V _R = 2.5 V; f = 1 MHz		-	150	-	pF

ELECTRICAL CHARACTERISTICS GSOT08 (T _{amb} = 25 °C unless otherwise specified) between pin 3 and pin 1						
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	V
Reverse voltage	at I _R = 5 μA	V_R	8	-	-	V
Reverse current	at $V_R = 8 V$	I _R	-	-	5	μΑ
Reverse breakdown voltage	at I _R = 1 mA	V_{BR}	9	10	11	V
Payaraa alamping valtaga	at I _{PP} = 1 A	V _C	-	10.7	13	V
Reverse clamping voltage	at I _{PP} = I _{PPM} = 18 A		-	15.2	19.2	V
Forward clamping voltage	at I _{PP} = 1 A	V _F	-	1	1.2	V
	at I _{PP} = I _{PPM} = 18 A		-	3	-	V
Capacitance	at V _R = 0 V; f = 1 MHz	- C _D	-	160	250	pF
	at V _R = 4 V; f = 1 MHz		-	80	-	pF

ELECTRICAL CHARACTERISTICS GSOT12 (T _{amb} = 25 °C unless otherwise specified) between pin 3 and pin 1							
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	V	
Reverse voltage	at I _R = 1 μA	V_R	12	-	-	V	
Reverse current	at V _R = 12 V	I _R	-	-	1	μΑ	
Reverse breakdown voltage	at I _R = 1 mA	V_{BR}	13.5	15	16.5	V	
Deverse elemning veltage	at I _{PP} = 1 A	- V _C	-	15.4	18.7	V	
Reverse clamping voltage	at I _{PP} = I _{PPM} = 12 A		-	21.2	26	V	
Forward clamping voltage	at I _{PP} = 1 A	.,	-	1	1.2	V	
	at I _{PP} = I _{PPM} = 12 A	V _F	-	2.2	-	V	
Capacitance	at V _R = 0 V; f = 1 MHz	- C _D	-	115	150	pF	
	at V _R = 6 V; f = 1 MHz		-	50	-	pF	



ELECTRICAL CHARACTERISTICS GSOT15 (T _{amb} = 25 °C unless otherwise specified) between pin 3 and pin 1							
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	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	
	at I _{PP} = 1 A	V _C	=	19.4	23.5	V	
Reverse clamping voltage	at I _{PP} = I _{PPM} = 8 A		-	24.8	28.8	V	
Forward clamping voltage	at I _{PP} = 1 A	V _F	-	1	1.2	V	
	at I _{PP} = I _{PPM} = 8 A		-	1.8	=	V	
Capacitance	at V _R = 0 V; f = 1 MHz	- C _D	-	90	120	pF	
	at V _R = 7.5 V; f = 1 MHz		=	35	-	pF	

ELECTRICAL CHARACTERISTICS GSOT24 (T _{amb} = 25 °C unless otherwise specified) between pin 3 and pin 1						
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	V
Reverse voltage	at I _R = 1 μA	V_R	24	-	-	V
Reverse current	at V _R = 24 V	I _R	-	-	1	μΑ
Reverse breakdown voltage	at I _R = 1 mA	V_{BR}	27	30	33	V
Deverse elemning veltage	at I _{PP} = 1 A	V _C	-	34	41	V
Reverse clamping voltage	at I _{PP} = I _{PPM} = 5 A		-	41	47	V
Forward clamping voltage	at I _{PP} = 1 A		-	1	1.2	V
	at I _{PP} = I _{PPM} = 5 A	V _F	-	1.4	-	V
Capacitance	at V _R = 0 V; f = 1 MHz	- C _D	-	65	80	pF
	at V _R = 12 V; f = 1 MHz		-	20	=	pF

ELECTRICAL CHARACTERISTICS GSOT36 (T _{amb} = 25 °C unless otherwise specified) between pin 3 and pin 1						
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	V
Reverse voltage	at I _R = 1 μA	V_R	36	-	-	V
Reverse current	at V _R = 36 V	I _R	-	-	1	μΑ
Reverse breakdown voltage	at I _R = 1 mA	V_{BR}	39	43	47	V
D	at I _{PP} = 1 A	V _C	=	49	60	V
Reverse clamping voltage	at I _{PP} = I _{PPM} = 3.5 A		-	59	71	V
Forward clamping voltage	at I _{PP} = 1 A	V _F	-	1	1.2	V
	at I _{PP} = I _{PPM} = 3.5 A		=	1.3	-	V
Capacitance	at V _R = 0 V; f = 1 MHz	- C _D	-	52	65	pF
	at V _R = 18 V; f = 1 MHz		-	12	-	pF

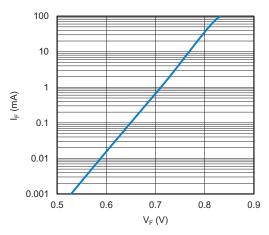


Fig. 1 - Typical Forward Current I_F vs. Forward Voltage V_F

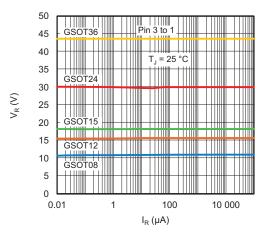


Fig. 2 - Typical Reverse Voltage V_R vs. Reverse Current I_R

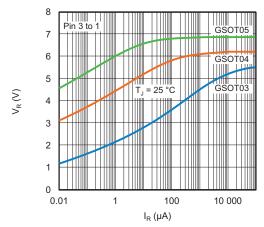


Fig. 3 - Typical Reverse Voltage V_{R} vs. Reverse Current I_{R}

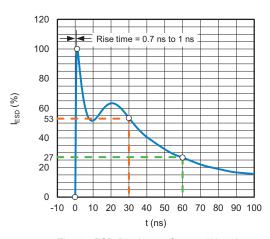


Fig. 4 - ESD Discharge Current Waveform According to IEC 61000-4-2 (330 $\Omega\,/$ 150 pF)

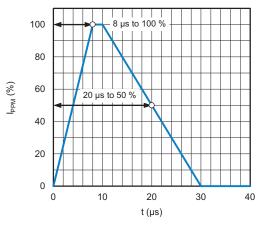


Fig. 5 - 8/20 µs Peak Pulse Current Waveform According to IEC 61000-4-5

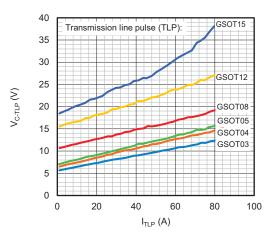


Fig. 6 - Typical Clamping Voltage vs. Peak Pulse Current

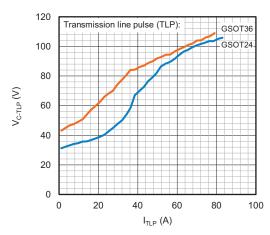
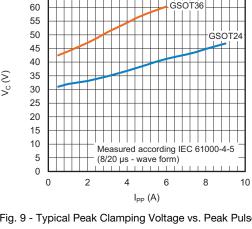


Fig. 7 - Typical Clamping Voltage vs. Peak Pulse Current



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Fig. 9 - Typical Peak Clamping Voltage vs. Peak Pulse Current

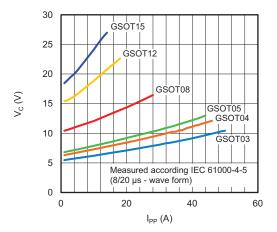


Fig. 8 - Typical Peak Clamping Voltage vs. Peak Pulse Current

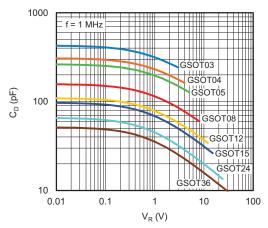
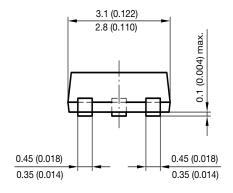
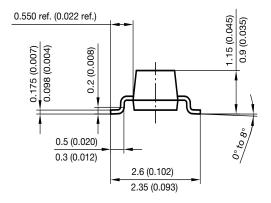
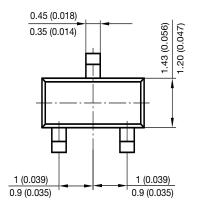


Fig. 10 - Typical Capacitance vs. Reverse Voltage

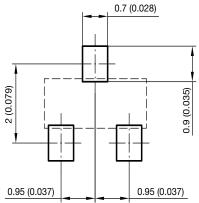
PACKAGE DIMENSIONS in millimeters (inches): SOT-23





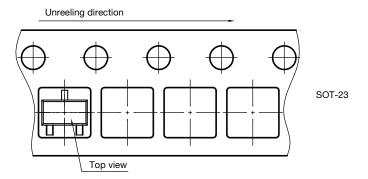






Document no.: 6.541-5014.01-4 Rev. 8 - Date: 23. Sep. 2009

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Orientation in carrier tape SOT-23 S8-V-3929.01-006 (4) 04.02.2010 22607



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Vishay

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