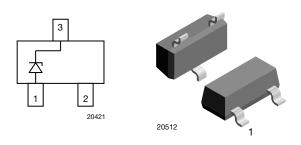


## **Single-Line ESD Protection in SOT-23**



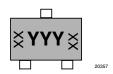
#### **FEATURES**

- Single-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



 Material categorization: For definitions of compliance please see <a href="https://www.vishay.com/doc?99912">www.vishay.com/doc?99912</a>

#### MARKING (example only)



YYY = type code (see table below)

XX = date code

ORDERIN	ORDERING INFORMATION							
	ENV	/IRONMENTAL AN	ID QUALITY CODI	E	PACKAG	ING CODE		
PART NUMBER (EXAMPLE)	AEC-Q101	LEAD (I D) I HEE I EHMINAHONO		TIN	3K PER 7" REEL (8 mm TAPE),	10K PER 13" REEL (8 mm TAPE),	ORDERING CODE (EXAMPLE)	
(250 22)	QUALIFIED	STANDARD	GREEN			10K/BOX = MOQ		
GSOT05-		Е		3	-08		GSOT05-E3-08	
GSOT05-			G	3	-08		GSOT05-G3-08	
GSOT05-	Н	Е		3	-08		GSOT05-HE3-08	
GSOT05-	Н		G	3	-08		GSOT05-HG3-08	
GSOT05-		Е		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	GE 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	260 °C/10 s at terminals
400100	001 20	03G	Green	8.1 mg	0234 0	(according J-STD-020)	200 0/10 3 at terrimais
GSOT04	SOT-23	04	Standard	8.8 mg	UL 94 V-0	MSL level 1	260 °C/10 s at terminals
G50104	301-23	04G	Green	8.1 mg	OL 94 V-0	(according J-STD-020)	200 O/10's at terminals
GSOT05	SOT-23	05	Standard	8.8 mg	UL 94 V-0	MSL level 1	260 °C/10 s at terminals
G30103	301-23	05G	Green	8.1 mg	OL 94 V-0	(according J-STD-020)	200 C/10 S at terrilinais
GSOT08	SOT-23	08	Standard	8.8 mg	UL 94 V-0	MSL level 1	260 °C/10 s at terminals
G30100	301-23	08G	Green	8.1 mg	OL 94 V-0	(according J-STD-020)	200 C/10 S at terrilinais
GSOT12	SOT-23	12	Standard	8.8 mg	UL 94 V-0	MSL level 1	260 °C/10 s at terminals
G30112	301-23	12G	Green	8.1 mg	OL 94 V-0	(according J-STD-020)	200 C/10 S at terrilinais
GSOT15	SOT-23	15	Standard	8.8 mg	UL 94 V-0	MSL level 1	260 °C/10 s at terminals
G30113	301-23	15G	Green	8.1 mg	OL 94 V-0	(according J-STD-020)	200 C/10 S at terminals
GSOT24	SOT-23	24	Standard	8.8 mg	UL 94 V-0	MSL level 1	260 °C/10 s at terminals
G30124	301-23	24G	Green	8.1 mg	OL 34 V-0	(according J-STD-020)	200 O/ TO S at terminals
GSOT36	SOT-23	36	Standard	8.8 mg	UL 94 V-0	MSL level 1	260 °C/10 s at terminals
430130	301-23	36G	Green	8.1 mg	UL 94 V-U	(according J-STD-020)	200 C/ TO S at terrificals

ABSOLUTE MAXIMUM RATINGS GSOT03						
PARAMETER	TEST CONDITIONS	SYMBOL	VALUE	UNIT		
Peak pulse current	Pin 3 to 1 acc. IEC 61000-4-5, t <sub>p</sub> = 8/20 μs; single shot	I <sub>PPM</sub>	30	А		
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, t <sub>p</sub> = 8/20 μs; single shot	P <sub>PP</sub>	369	W		
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V	± 30	kV		
ESD initiduity	Air discharge acc. IEC 61000-4-2; 10 pulses	$V_{ESD}$	± 30	kV		
Operating temperature	Junction temperature	TJ	- 40 to + 125	°C		
Storage temperature		T <sub>STG</sub>	- 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 <sub>p</sub> = 8/20 μs; single shot	I <sub>PPM</sub>	30	Α		
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, t <sub>p</sub> = 8/20 μs; single shot	P <sub>PP</sub>	429	W		
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V	± 30	kV		
ESD immunity	Air discharge acc. IEC 61000-4-2; 10 pulses	$V_{ESD}$	± 30	kV		
Operating temperature	Junction temperature	TJ	- 40 to + 125	°C		
Storage temperature		T <sub>STG</sub>	- 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 <sub>PPM</sub>	30	А		
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, $t_p = 8/20 \mu s$ ; single shot	P <sub>PP</sub>	480	W		
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	$V_{ESD}$	± 30	kV		
LSD IIIIIIdility	Air discharge acc. IEC 61000-4-2; 10 pulses	VESD	± 30	kV		
Operating temperature	Junction temperature	T <sub>J</sub>	- 40 to + 125	°C		
Storage temperature		T <sub>STG</sub>	- 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 <sub>p</sub> = 8/20 μs; single shot	I <sub>PPM</sub>	18	Α		
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, t <sub>p</sub> = 8/20 μs; single shot	P <sub>PP</sub>	345	W		
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V	± 30	kV		
ESD Illillidrity	Air discharge acc. IEC 61000-4-2; 10 pulses	$V_{ESD}$	± 30	kV		
Operating temperature	Junction temperature	T <sub>J</sub>	- 40 to + 125	°C		
Storage temperature		T <sub>STG</sub>	- 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, $t_p = 8/20 \mu s$ ; single shot	I <sub>PPM</sub>	12	А		
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, $t_p = 8/20 \mu s$ ; single shot	P <sub>PP</sub>	312	W		
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	$V_{ESD}$	± 30	kV		
LSD IIIIIIdility	Air discharge acc. IEC 61000-4-2; 10 pulses	VESD	± 30	kV		
Operating temperature	Junction temperature	$T_J$	- 40 to + 125	°C		
Storage temperature		T <sub>STG</sub>	- 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 <sub>p</sub> = 8/20 μs; single shot	I <sub>PPM</sub>	8	Α		
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, t <sub>p</sub> = 8/20 μs; single shot	P <sub>PP</sub>	230	W		
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V	± 30	kV		
ESD immunity	Air discharge acc. IEC 61000-4-2; 10 pulses	$V_{ESD}$	± 30	kV		
Operating temperature	Junction temperature	TJ	- 40 to + 125	°C		
Storage temperature		T <sub>STG</sub>	- 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 <sub>p</sub> = 8/20 μs; single shot	I <sub>PPM</sub>	5	Α		
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, t <sub>p</sub> = 8/20 μs; single shot	P <sub>PP</sub>	235	W		
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	V	± 30	kV		
ESD illillidrity	Air discharge acc. IEC 61000-4-2; 10 pulses	$V_{ESD}$	± 30	kV		
Operating temperature	Junction temperature	TJ	- 40 to + 125	°C		
Storage temperature		T <sub>STG</sub>	- 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 <sub>p</sub> = 8/20 μs; single shot	I <sub>PPM</sub>	3.5	Α		
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, t <sub>p</sub> = 8/20 μs; single shot	P <sub>PP</sub>	248	W		
ESD immunity	Contact discharge acc. IEC 61000-4-2; 10 pulses	$V_{ESD}$	± 30	kV		
ESD immunity	Air discharge acc. IEC 61000-4-2; 10 pulses	VESD	± 30	kV		
Operating temperature	Junction temperature	TJ	- 40 to + 125	°C		
Storage temperature		T <sub>STG</sub>	- 55 to + 150	°C		

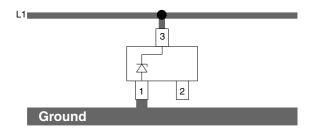
#### **BIAs-MODE** (1-line Bidirectional Asymmetrical protection mode)

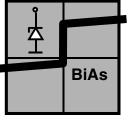
With the GSOTxx one signal- or data-lines (L1) can be protected against voltage transients. With pin 1 connected to ground and pin 3 connected to a signal- or data-line which has to be protected. As long as the voltage level on the data- or signal-line is between 0 V (ground level) and the specified maximum reverse working voltage (V<sub>RWM</sub>) 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<sub>F</sub>) 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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<b>ELECTRICAL CHARACTERISTICS GSOT03</b> (T <sub>amb</sub> = 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 <sub>channel</sub>	-	-	1	lines	
Reverse stand-off voltage	at I <sub>R</sub> = 100 μA	$V_{RWM}$	-	-	3.3	V	
Reverse current	at V <sub>R</sub> = 3.3 V	I <sub>R</sub>	-	-	100	μΑ	
Reverse breakdown voltage	at I <sub>R</sub> = 1 mA	$V_{BR}$	4	4.6	-	V	
Reverse clamping voltage	at I <sub>PP</sub> = 1 A	- V <sub>C</sub>	-	5.7	7.5	V	
neverse clamping voltage	at I <sub>PP</sub> = I <sub>PPM</sub> = 30 A	v <sub>C</sub>	-	10	12.3	V	
Forward clamping voltage	at I <sub>PP</sub> = 1 A	V	-	1	1.2	V	
Forward clamping voltage	at I <sub>PP</sub> = I <sub>PPM</sub> = 30 A	V <sub>F</sub>	-	4.5	-	V	
Capacitance	at V <sub>R</sub> = 0 V; f = 1 MHz		-	420	600	pF	
	at V <sub>R</sub> = 1.6 V; f = 1 MHz	- C <sub>D</sub>	-	260	-	pF	



<b>ELECTRICAL CHARACTERISTICS GSOT04</b> (T <sub>amb</sub> = 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 <sub>channel</sub>	-	-	1	lines	
Reverse stand-off voltage	at I <sub>R</sub> = 20 μA	$V_{RWM}$	-	-	4	V	
Reverse current	at V <sub>R</sub> = 4 V	I <sub>R</sub>	-	-	20	μΑ	
Reverse breakdown voltage	at I <sub>R</sub> = 1 mA	$V_{BR}$	5	6.1	-	V	
Reverse clamping voltage	at I <sub>PP</sub> = 1 A	V <sub>C</sub>	-	7.5	9	V	
heverse ciamping voltage	at I <sub>PP</sub> = I <sub>PPM</sub> = 30 A	v <sub>C</sub>	-	11.2	14.3	V	
Forward elemping voltage	at I <sub>PP</sub> = 1 A	V <sub>F</sub>	-	1	1.2	V	
Forward clamping voltage	at I <sub>PP</sub> = I <sub>PPM</sub> = 30 A	VF	-	4.5	-	V	
Capacitance	at V <sub>R</sub> = 0 V; f = 1 MHz		-	310	450	pF	
Оараспансе	at V <sub>R</sub> = 2 V; f = 1 MHz	- C <sub>D</sub>	-	200	-	pF	

<b>ELECTRICAL CHARACTERISTICS GSOT05</b> (T <sub>amb</sub> = 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 <sub>channel</sub>	-	-	1	lines
Reverse stand-off voltage	at I <sub>R</sub> = 10 μA	$V_{RWM}$	-	-	5	V
Reverse current	at V <sub>R</sub> = 5 V	I <sub>R</sub>	-	-	10	μΑ
Reverse breakdown voltage	at I <sub>R</sub> = 1 mA	$V_{BR}$	6	6.8	-	V
Reverse clamping voltage	at I <sub>PP</sub> = 1 A	V <sub>C</sub>	-	7	8.7	V
	at I <sub>PP</sub> = I <sub>PPM</sub> = 30 A		-	12	16	V
Forward clamping voltage	at I <sub>PP</sub> = 1 A	V <sub>F</sub>	-	1	1.2	V
	at I <sub>PP</sub> = I <sub>PPM</sub> = 30 A		-	4.5	-	V
Capacitance	at V <sub>R</sub> = 0 V; f = 1 MHz	0	-	260	350	pF
	at V <sub>R</sub> = 2.5 V; f = 1 MHz	- C <sub>D</sub>	-	150	-	pF

<b>ELECTRICAL CHARACTERISTICS GSOT08</b> (T <sub>amb</sub> = 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 <sub>channel</sub>	-	-	1	lines
Reverse stand-off voltage	at I <sub>R</sub> = 5 μA	$V_{RWM}$	-	-	8	V
Reverse current	at V <sub>R</sub> = 8 V	I <sub>R</sub>	-	-	5	μA
Reverse breakdown voltage	at I <sub>R</sub> = 1 mA	$V_{BR}$	9	10	-	V
Reverse clamping voltage	at I <sub>PP</sub> = 1 A	V <sub>C</sub>	-	10.7	13	V
	at I <sub>PP</sub> = I <sub>PPM</sub> = 18 A		-	15.2	19.2	V
Forward clamping voltage	at I <sub>PP</sub> = 1 A	V <sub>F</sub>	-	1	1.2	V
	at I <sub>PP</sub> = I <sub>PPM</sub> = 18 A		-	3	-	V
Capacitance	at V <sub>R</sub> = 0 V; f = 1 MHz	0	-	160	250	pF
	at V <sub>R</sub> = 4 V; f = 1 MHz	- C <sub>D</sub>	-	80	-	pF



<b>ELECTRICAL CHARACTERISTICS GSOT12</b> ( $T_{amb} = 25  ^{\circ}\text{C}$ 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 <sub>channel</sub>	1	-	1	lines
Reverse stand-off voltage	at I <sub>R</sub> = 1 μA	$V_{RWM}$	=	-	12	V
Reverse current	at V <sub>R</sub> = 12 V	I <sub>R</sub>	-	-	1	μΑ
Reverse breakdown voltage	at I <sub>R</sub> = 1 mA	$V_{BR}$	13.5	15	-	V
Reverse clamping voltage	at I <sub>PP</sub> = 1 A	V <sub>C</sub>	=	15.4	18.7	V
	at I <sub>PP</sub> = I <sub>PPM</sub> = 12 A		-	21.2	26	V
Forward clamping voltage	at I <sub>PP</sub> = 1 A	V <sub>F</sub>	-	1	1.2	V
	at Ipp = IppM = 12 A		-	2.2	-	V
Capacitance	at V <sub>R</sub> = 0 V; f = 1 MHz		-	115	150	pF
	at V <sub>R</sub> = 6 V; f = 1 MHz	- C <sub>D</sub>	-	50	-	pF

<b>ELECTRICAL CHARACTERISTICS GSOT15</b> (T <sub>amb</sub> = 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 <sub>channel</sub>	-	-	1	lines
Reverse stand-off voltage	at I <sub>R</sub> = 1 μA	$V_{RWM}$	-	-	15	V
Reverse current	at V <sub>R</sub> = 15 V	I <sub>R</sub>	-	-	1	μA
Reverse breakdown voltage	at I <sub>R</sub> = 1 mA	$V_{BR}$	16.5	18	-	V
B landing allows	at I <sub>PP</sub> = 1 A	V <sub>C</sub>	-	19.4	23.5	V
Reverse clamping voltage	at I <sub>PP</sub> = I <sub>PPM</sub> = 8 A		-	24.8	28.8	V
Forward clamping voltage	at I <sub>PP</sub> = 1 A	V <sub>F</sub>	-	1	1.2	V
	at I <sub>PP</sub> = I <sub>PPM</sub> = 8 A		-	1.8	-	V
Capacitance	at V <sub>R</sub> = 0 V; f = 1 MHz	- C <sub>D</sub>	-	90	120	pF
	at V <sub>R</sub> = 7.5 V; f = 1 MHz		-	35	-	pF

<b>ELECTRICAL CHARACTERISTICS GSOT24</b> (T <sub>amb</sub> = 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 <sub>channel</sub>	-	-	1	lines	
Reverse stand-off voltage	at I <sub>R</sub> = 1 μA	$V_{RWM}$	-	-	24	V	
Reverse current	at V <sub>R</sub> = 24 V	I <sub>R</sub>	-	-	1	μΑ	
Reverse breakdown voltage	at I <sub>R</sub> = 1 mA	$V_{BR}$	27	30	-	V	
Reverse clamping voltage	at I <sub>PP</sub> = 1 A	V <sub>C</sub>	-	34	41	V	
	at I <sub>PP</sub> = I <sub>PPM</sub> = 5 A		-	41	47	V	
Forward clamping voltage	at I <sub>PP</sub> = 1 A	V <sub>F</sub>	-	1	1.2	V	
	at I <sub>PP</sub> = I <sub>PPM</sub> = 5 A		-	1.4	-	V	
Capacitance	at V <sub>R</sub> = 0 V; f = 1 MHz	- C <sub>D</sub>	-	65	80	pF	
	at V <sub>R</sub> = 12 V; f = 1 MHz		1	20	-	pF	

<b>ELECTRICAL CHARACTERISTICS GSOT36</b> (T <sub>amb</sub> = 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 <sub>channel</sub>	-	-	1	lines
Reverse stand-off voltage	at I <sub>R</sub> = 1 μA	$V_{RWM}$	-	-	36	V
Reverse current	at V <sub>R</sub> = 36 V	I <sub>R</sub>	-	-	1	μΑ
Reverse breakdown voltage	at I <sub>R</sub> = 1 mA	$V_{BR}$	39	43	-	V
Reverse clamping voltage	at I <sub>PP</sub> = 1 A	V <sub>C</sub>	-	49	60	V
	at I <sub>PP</sub> = I <sub>PPM</sub> = 3.5 A		-	59	71	V
Forward clamping voltage	at I <sub>PP</sub> = 1 A		-	1	1.2	V
	at I <sub>PP</sub> = I <sub>PPM</sub> = 3.5 A	V <sub>F</sub>	-	1.3	-	V
Capacitance	at V <sub>R</sub> = 0 V; f = 1 MHz	- C <sub>D</sub>	-	52	65	pF
	at V <sub>R</sub> = 18 V; f = 1 MHz		-	12	-	pF

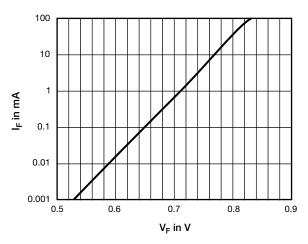


Fig. 1 - Typical Forward Current  $I_F$  vs. Forward Voltage  $V_F$ 

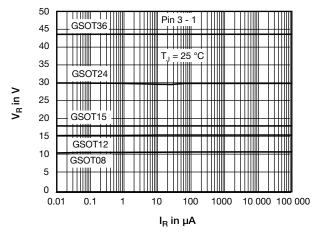


Fig. 2 - Typical Reverse Voltage  $V_{\text{R}}$  vs. Reverse Current  $I_{\text{R}}$ 

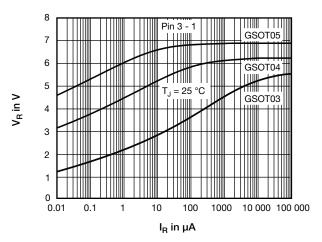
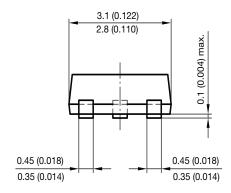
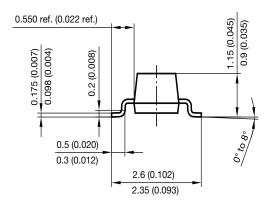
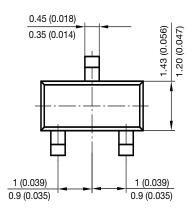


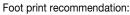
Fig. 3 - Typical Reverse Voltage  $V_{\mathsf{R}}$  vs. Reverse Current  $I_{\mathsf{R}}$ 

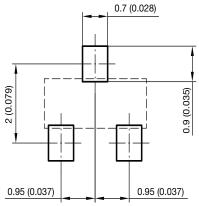
#### PACKAGE DIMENSIONS in millimeters (inches): SOT-23





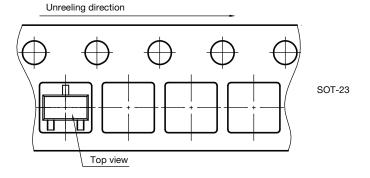






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