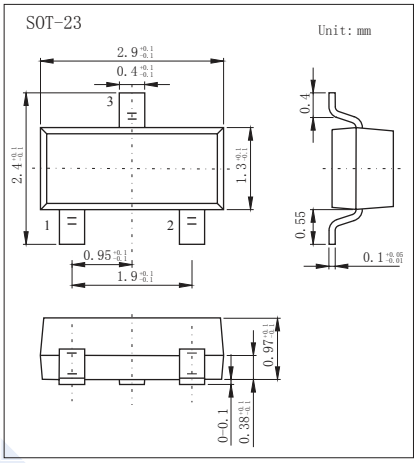
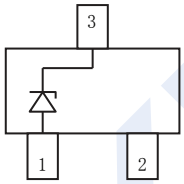
ESD Protection Diodes

GSOT03 ~ GSOT36



■ Features

- Single-line ESD-protection device
- ESD-protection 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



■ 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 µs; single shot	I_{PPM}	30	A
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_{ESD}	± 30	kV
	Air discharge acc. IEC 61000-4-2; 10 pulses		± 30	
Operating temperature	Junction temperature	T_j	-40 to +125	℃
Storage temperature		T_{stg}	-55 to +150	

■ 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	A
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, t_p = 8/20 µs; single shot	P_{PP}	429	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	
Operating temperature	Junction temperature	T_j	-40 to +125	℃
Storage temperature		T_{stg}	-55 to +150	

ESD Protection Diodes

GSOT03 ~ GSOT36

■ 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 μs; single shot	I_{PPM}	30	A
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, t_p = 8/20 μs; single shot	P_{PP}	480	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	
Operating temperature	Junction temperature	T_j	-40 to +125	℃
Storage temperature		T_{stg}	-55 to +150	

■ 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 μs; single shot	I_{PPM}	18	A
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, t_p = 8/20 μs; single shot	P_{PP}	345	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	
Operating temperature	Junction temperature	T_j	-40 to +125	℃
Storage temperature		T_{stg}	-55 to +150	

■ 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	A
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, t_p = 8/20 μs; single shot	P_{PP}	312	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	
Operating temperature	Junction temperature	T_j	-40 to +125	℃
Storage temperature		T_{stg}	-55 to +150	

■ 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	A
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, t_p = 8/20 μs; single shot	P_{PP}	230	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	
Operating temperature	Junction temperature	T_j	-40 to +125	℃
Storage temperature		T_{stg}	-55 to +150	

ESD Protection Diodes

GSOT03 ~ GSOT36

■ 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	A
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, t_p = 8/20 μs; single shot	P_{PP}	235	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	
Operating temperature	Junction temperature	T_j	-40 to +125	℃
Storage temperature		T_{stg}	-55 to +150	

■ 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 μs; single shot	I_{PPM}	3.5	A
Peak pulse power	Pin 3 to 1 acc. IEC 61000-4-5, t_p = 8/20 μs; single shot	P_{PP}	248	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	
Operating temperature	Junction temperature	T_j	-40 to +125	℃
Storage temperature		T_{stg}	-55 to +150	

■ Electrical Characteristics GSOT03 (T_{amb} = 25 °C unless otherwise specified)

between pin 3 and pin 1

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Protection paths	$N_{channel}$	Number of lines which can be protected			1	lines
Reverse stand-off voltage	V_{RWM}	Max. reverse working voltage			3.3	V
Reverse voltage	V_R	at I_R = 100 μA	3.3			
Reverse current	I_R	at V_R = 3.3 V			100	μA
Reverse breakdown voltage	V_{BR}	at I_R = 1 mA	4	4.6	5.5	V
Reverse clamping voltage	V_C	at I_{PP} = 1 A		5.7	7.5	
		at I_{PP} = I_{PPM} = 30 A		10	12.3	
Forward clamping voltage	V_F	at I_{PP} = 1 A		1	1.2	
		at I_{PP} = I_{PPM} = 30 A		4.5		
Capacitance	C_D	at V_R = 0 V; f = 1 MHz		420	600	pF
		at V_R = 1.6 V; f = 1 MHz		260		

ESD Protection Diodes

GSOT03 ~ GSOT36

■ Electrical Characteristics GSOT04 (T_{amb} = 25 °C unless otherwise specified)

between pin 3 and pin 1

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Protection paths	$N_{channel}$	Number of lines which can be protected			1	lines
Reverse stand-off voltage	V_{RWM}	Max. reverse working voltage			4	V
Reverse voltage	V_R	at I_R = 20 μA	4			
Reverse current	I_R	at V_R = 4 V			20	μA
Reverse breakdown voltage	V_{BR}	at I_R = 1 mA	5	6.1	7	V
Reverse clamping voltage	V_C	at I_{PP} = 1 A		7.5	9	
		at I_{PP} = I_{PPM} = 30 A		11.2	14.3	
Forward clamping voltage	V_F	at I_{PP} = 1 A		1	1.2	
		at I_{PP} = I_{PPM} = 30 A		4.5		
Capacitance	C_D	at V_R = 0 V; f = 1 MHz		310	450	pF
		at V_R = 2 V; f = 1 MHz		200		

■ Electrical Characteristics GSOT05 (T_{amb} = 25 °C unless otherwise specified)

between pin 3 and pin 1

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Protection paths	$N_{channel}$	Number of lines which can be protected			1	lines
Reverse stand-off voltage	V_{RWM}	Max. reverse working voltage			5	V
Reverse voltage	V_R	at I_R = 10 μA	5			
Reverse current	I_R	at V_R = 5 V			10	μA
Reverse breakdown voltage	V_{BR}	at I_R = 1 mA	6	6.8	8	V
Reverse clamping voltage	V_C	at I_{PP} = 1 A		7	8.7	
		at I_{PP} = I_{PPM} = 30 A		12	16	
Forward clamping voltage	V_F	at I_{PP} = 1 A		1	1.2	
		at I_{PP} = I_{PPM} = 30 A		4.5		
Capacitance	C_D	at V_R = 0 V; f = 1 MHz		260	350	pF
		at V_R = 2.5 V; f = 1 MHz		150		

■ Electrical Characteristics GSOT08 (T_{amb} = 25 °C unless otherwise specified)

between pin 3 and pin 1

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Protection paths	$N_{channel}$	Number of lines which can be protected			1	lines
Reverse stand-off voltage	V_{RWM}	Max. reverse working voltage			8	V
Reverse voltage	V_R	at I_R = 5 μA	8			
Reverse current	I_R	at V_R = 8 V			5	μA
Reverse breakdown voltage	V_{BR}	at I_R = 1 mA	9	10	11	V
Reverse clamping voltage	V_C	at I_{PP} = 1 A		10.7	13	
		at I_{PP} = I_{PPM} = 18 A		15.2	19.2	
Forward clamping voltage	V_F	at I_{PP} = 1 A		1	1.2	
		at I_{PP} = I_{PPM} = 18 A		3		
Capacitance	C_D	at V_R = 0 V; f = 1 MHz		160	250	pF
		at V_R = 4 V; f = 1 MHz		80		

ESD Protection Diodes

GSOT03 ~ GSOT36

■ Electrical Characteristics GSOT12 (T_{amb} = 25 °C unless otherwise specified)

between pin 3 and pin 1

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Protection paths	$N_{channel}$	Number of lines which can be protected			1	lines
Reverse stand-off voltage	V_{RWM}	Max. reverse working voltage			12	V
Reverse voltage	V_R	at I_R = 1 μA	12			
Reverse current	I_R	at V_R = 12 V			1	μA
Reverse breakdown voltage	V_{BR}	at I_R = 1 mA	13.5	15	16.5	V
Reverse clamping voltage	V_C	at I_{PP} = 1 A		15.4	18.7	
		at I_{PP} = I_{PPM} = 12 A		21.2	26	
Forward clamping voltage	V_F	at I_{PP} = 1 A		1	1.2	
		at I_{PP} = I_{PPM} = 12 A		2.2		
Capacitance	C_D	at V_R = 0 V; f = 1 MHz		115	150	pF
		at V_R = 6 V; f = 1 MHz		50		

■ Electrical Characteristics GSOT15 (T_{amb} = 25 °C unless otherwise specified)

between pin 3 and pin 1

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Protection paths	$N_{channel}$	Number of lines which can be protected			1	lines
Reverse stand-off voltage	V_{RWM}	Max. reverse working voltage			15	V
Reverse voltage	V_R	at I_R = 1 μA	15			
Reverse current	I_R	at V_R = 15 V			1	μA
Reverse breakdown voltage	V_{BR}	at I_R = 1 mA	16.5	18	20	V
Reverse clamping voltage	V_C	at I_{PP} = 1 A		19.4	23.5	
		at I_{PP} = I_{PPM} = 8 A		24.8	28.8	
Forward clamping voltage	V_F	at I_{PP} = 1 A		1	1.2	
		at I_{PP} = I_{PPM} = 8 A		1.8		
Capacitance	C_D	at V_R = 0 V; f = 1 MHz		90	120	pF
		at V_R = 7.5 V; f = 1 MHz		35		

■ Electrical Characteristics GSOT24 (T_{amb} = 25 °C unless otherwise specified)

between pin 3 and pin 1

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Protection paths	$N_{channel}$	Number of lines which can be protected			1	lines
Reverse stand-off voltage	V_{RWM}	Max. reverse working voltage			24	V
Reverse voltage	V_R	at I_R = 1 μA	24			
Reverse current	I_R	at V_R = 24 V			1	μA
Reverse breakdown voltage	V_{BR}	at I_R = 1 mA	27	30	33	V
Reverse clamping voltage	V_C	at I_{PP} = 1 A		34	41	
		at I_{PP} = I_{PPM} = 5 A		41	47	
Forward clamping voltage	V_F	at I_{PP} = 1 A		1	1.2	
		at I_{PP} = I_{PPM} = 5 A		1.4		
Capacitance	C_D	at V_R = 0 V; f = 1 MHz		65	80	pF
		at V_R = 12 V; f = 1 MHz		20		

ESD Protection Diodes

GSOT03 ~ GSOT36

■ Electrical Characteristics GSOT36 (T_{amb} = 25 °C unless otherwise specified)

between pin 3 and pin 1

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Protection paths	$N_{channel}$	Number of lines which can be protected			1	lines
Reverse stand-off voltage	V_{RWM}	Max. reverse working voltage			36	V
Reverse voltage	V_R	at I_R = 1 µA	36			
Reverse current	I_R	at V_R = 36 V			1	µA
Reverse breakdown voltage	V_{BR}	at I_R = 1 mA	39	43	47	V
Reverse clamping voltage	V_C	at I_{PP} = 1 A		49	60	
		at I_{PP} = I_{PPM} = 3.5 A		59	71	
Forward clamping voltage	V_F	at I_{PP} = 1 A		1	1.2	
		at I_{PP} = I_{PPM} = 3.5 A		1.3		
Capacitance	C_D	at V_R = 0 V; f = 1 MHz		52	65	pF
		at V_R = 18 V; f = 1 MHz		12		

■ Typical Characterisitics

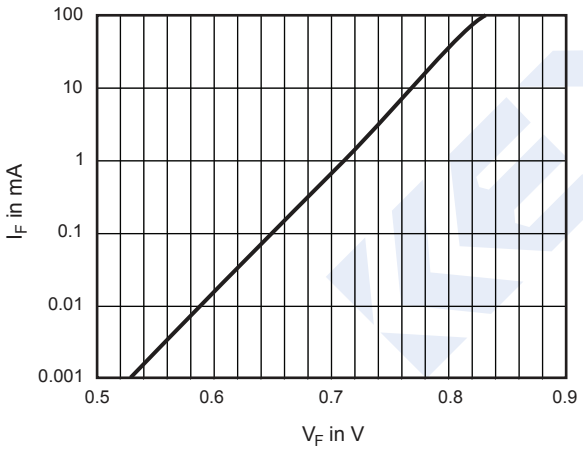


Fig. 1 - Typical Forward Current I_F vs. Forward Voltage V_F

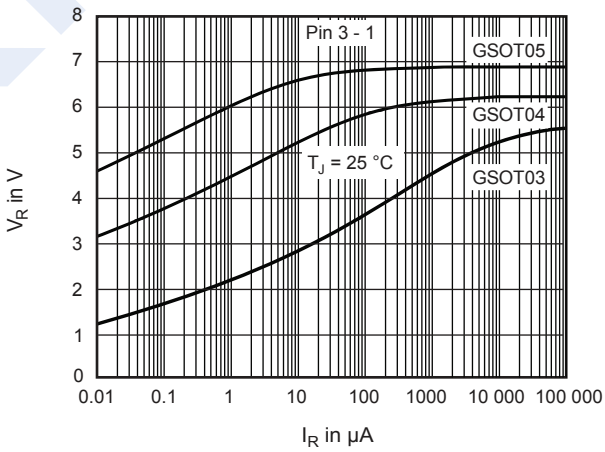


Fig. 3 - Typical Reverse Voltage V_R vs. Reverse Current I_R

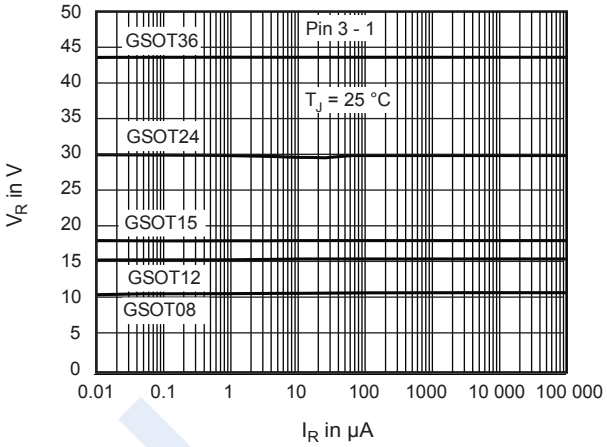


Fig. 2 - Typical Reverse Voltage V_R vs. Reverse Current I_R