

1. General description

Planar passivated high commutation three quadrant triac in a ITO3P package intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. This "series AT" triac will commute the full RMS current at the maximum rated junction temperature ($T_{j(max)} = 150\text{ °C}$) without the aid of a snubber. It is used in applications where "high junction operating temperature capability" is required.

2. Features and benefits

- High current TRIAC
- 3Q technology for improved noise immunity
- High commutation capability with maximum false trigger immunity
- High immunity to false turn-on by dV/dt
- High junction operating temperature capability ($T_{j(max)} = 150\text{ °C}$)
- High voltage capability
- Least sensitive gate for highest noise immunity
- Low thermal resistance
- Planar passivated for voltage ruggedness and reliability
- Triggering in three quadrants only
- Insulated tab rated at 2500Vrms

3. Applications

- Applications subject to high temperature ($T_{j(max)} = 150\text{ °C}$)
- High current / high surge applications
- High power / industrial controls - e.g. heating, motors, lighting

4. Quick reference data

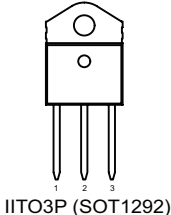
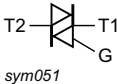
Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
V_{DRM}	repetitive peak off-state voltage			1200			V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 106\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3		40			A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5		400			A
		full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$		440			A
T_j	operating junction temperature			-40 to 150			°C
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ °C}$; Fig. 7		-	-	75	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ °C}$; Fig. 7		-	-	75	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; Fig. 7		-	-	75	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; Fig. 9		-	-	80	mA
V_T	on-state voltage	$I_T = 40\text{ A}$; $T_j = 25\text{ °C}$; Fig. 10		-	-	1.4	V

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Dynamic characteristics							
dV _D /dt	rate of rise of off-state voltage	V _{DM} = 804 V; T _j = 125 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit		1500	-	-	V/μs
		V _{DM} = 804 V; T _j = 150 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit		1000	-	-	V/μs
dI _{com} /dt	rate of change of commutating current	V _D = 400 V; T _j = 125 °C; I _{T(RMS)} = 20 A; dV _{com} /dt = 200 V/μs; gate open circuit; Fig. 12		35	-	-	A/ms
		V _D = 400 V; T _j = 125 °C; I _{T(RMS)} = 20 A; dV _{com} /dt = 10 V/μs; gate open circuit; Fig. 12		180		-	A/ms

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	 ITO3P (SOT1292)	 sym051
2	T2	main terminal 2		
3	G	gate		
mb	n.c.	mounting base; isolated		

6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BTA440Z-1200AT	IITO3P	BTA440Z-1200ATQ	Tube	30	SOT1292	21-Jun-2017

7. Marking

Table 4. Marking codes

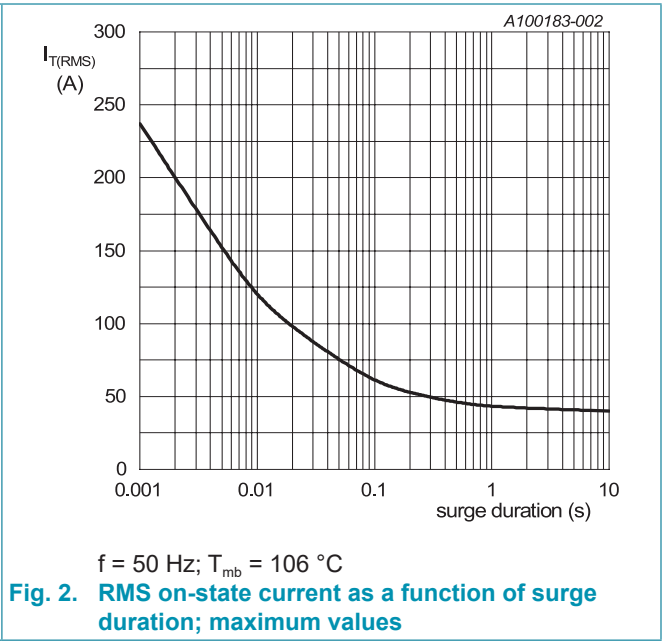
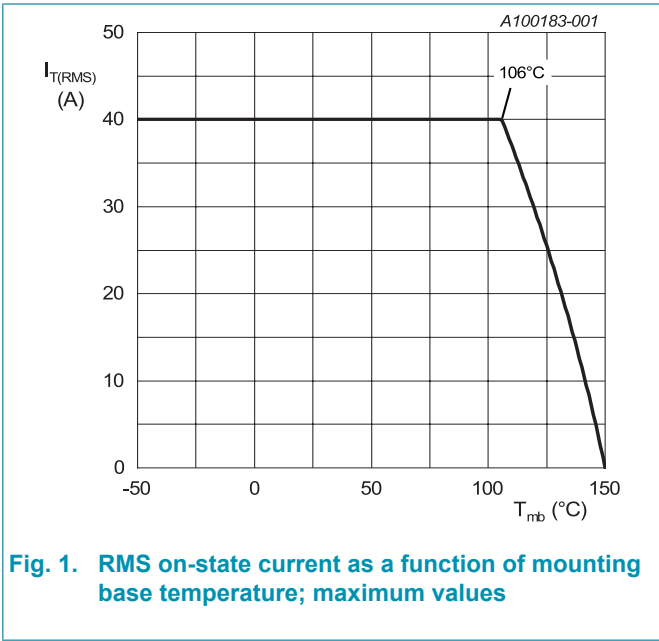
Type number	Marking codes
BTA440Z-1200AT	BTA440Z 1200AT

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Notes	Values	Unit
V_{DRM}	repetitive peak off-state voltage			1200	V
V_{RRM}	repetitive peak reverse voltage			1200	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 106\text{ }^{\circ}\text{C}$; Fig 1 ; Fig 2 ; Fig 3		40	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$; $t_p = 20\text{ ms}$; Fig 4 ; Fig 5		400	A
		full sine wave; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$; $t_p = 16.7\text{ ms}$		440	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN		800	A^2s
di_T/dt	rate of rise of on-state current	$I_G = 150\text{ mA}$		150	$\text{A}/\mu\text{s}$
I_{GM}	peak gate current			8	A
P_{GM}	peak gate power	$t_p = 25\text{ }\mu\text{s}$; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$		40	W
$P_{G(AV)}$	average gate power	over any 20 ms period		1	W
T_{stg}	storage temperature			-40 to 150	$^{\circ}\text{C}$
T_j	operating junction temperature			-40 to 150	$^{\circ}\text{C}$



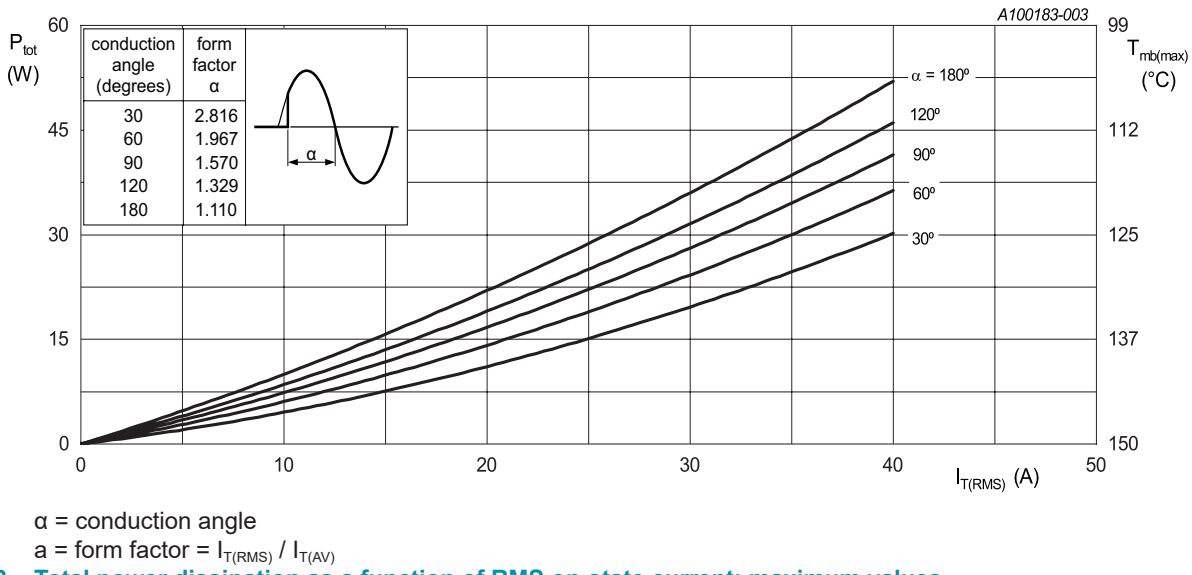


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

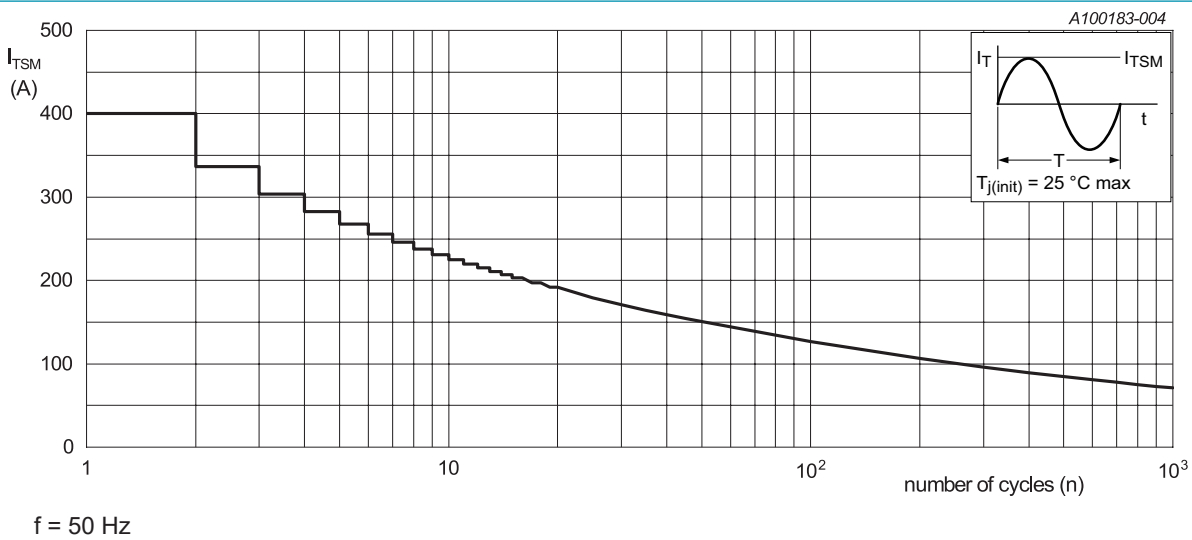


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

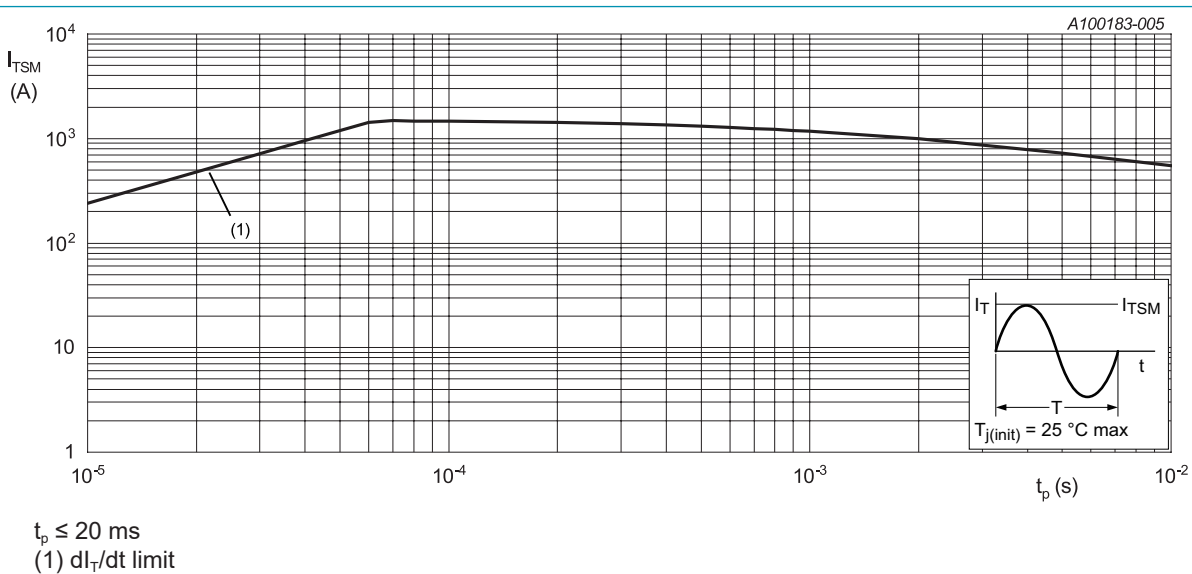


Fig. 5. Non-repetitive peak on-state current as a function of pulse duration; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle; Fig. 6		-	-	0.85	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	50	-	K/W

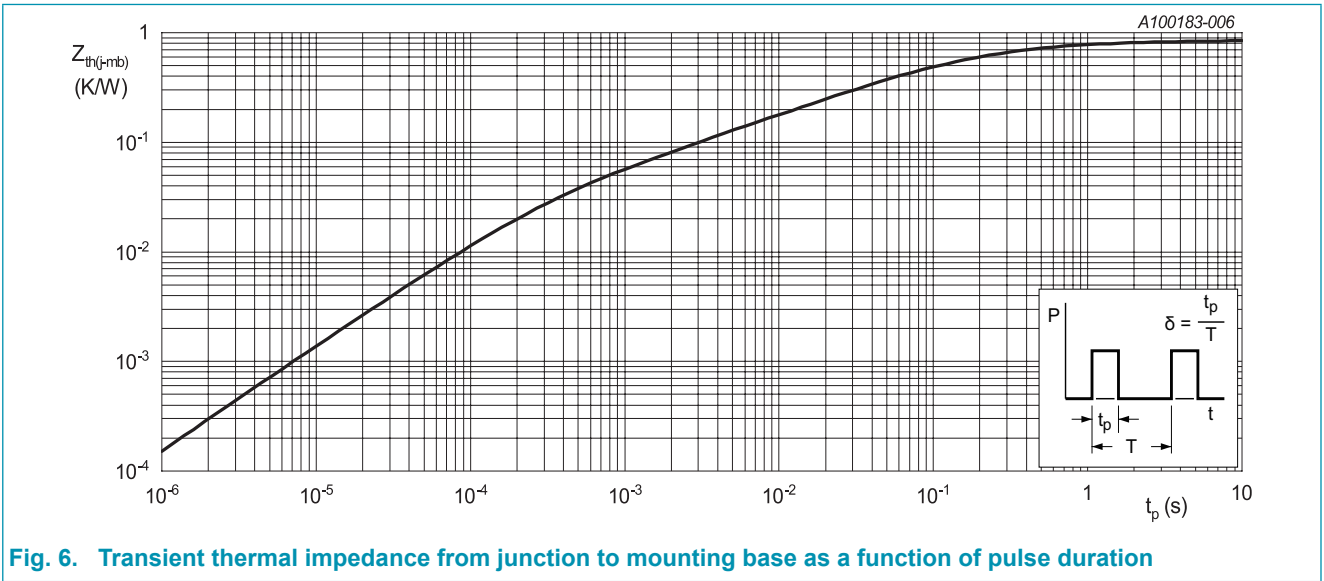


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Isolation characteristics

Table 7. Isolation characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	from all terminals to external heatsink; sinusoidal waveform; clean and dust free; $50\text{ Hz} \leq f \leq 60\text{ Hz}$; $RH \leq 65\%$; $T_{mb} = 25\text{ }^{\circ}\text{C}$		-	-	2500	V

11. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I _{GT}	gate trigger current	V _D = 12 V; I _T = 0.1 A; T2+ G+; T _J = 25 °C; Fig. 7		-	-	75	mA
		V _D = 12 V; I _T = 0.1 A; T2+ G-; T _J = 25 °C; Fig. 7		-	-	75	mA
		V _D = 12 V; I _T = 0.1 A; T2- G-; T _J = 25 °C; Fig. 7		-	-	75	mA
I _L	latching current	V _D = 12 V; I _G = 0.1 A; T2+ G+; T _J = 25 °C; Fig. 8		-	-	100	mA
		V _D = 12 V; I _G = 0.1 A; T2+ G-; T _J = 25 °C; Fig. 8		-	-	200	mA
		V _D = 12 V; I _G = 0.1 A; T2- G-; T _J = 25 °C; Fig. 8		-	-	100	mA
I _H	holding current	V _D = 12 V; T _J = 25 °C; Fig. 9		-	-	80	mA
V _T	on-state voltage	I _T = 40 A; T _J = 25 °C; Fig. 10		-	-	1.4	V
V _{GT}	gate trigger voltage	V _D = 12 V; I _T = 0.1 A; T _J = 25 °C; Fig. 11		-	-	1.2	V
		V _D = 400 V; I _T = 0.1 A; T _J = 150 °C		0.3	-	-	V
I _D	off-state current	V _D = 1200 V; T _J = 25 °C		-	-	10	μA
		V _D = 1200 V; T _J = 125 °C		-	-	2	mA
		V _D = 1200 V; T _J = 150 °C		-	-	5	mA
I _R	reverse current	V _R = 1200 V; T _J = 25 °C		-	-	10	μA
		V _R = 1200 V; T _J = 125 °C		-	-	2	mA
		V _R = 1200 V; T _J = 150 °C		-	-	5	mA
Dynamic characteristics							
dV _D /dt	rate of rise of off-state voltage	V _{DM} = 804 V; T _J = 125 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit		1500	-	-	V/μs
		V _{DM} = 804 V; T _J = 150 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit		1000	-	-	V/μs
dI _{com} /dt	rate of change of commutating current	V _D = 400 V; T _J = 125 °C; I _{T(RMS)} = 20 A; dV _{com} /dt = 200 V/μs; gate open circuit; Fig. 12		35	-	-	A/ms
		V _D = 400 V; T _J = 125 °C; I _{T(RMS)} = 20 A; dV _{com} /dt = 10 V/μs; gate open circuit; Fig. 12		180		-	A/ms

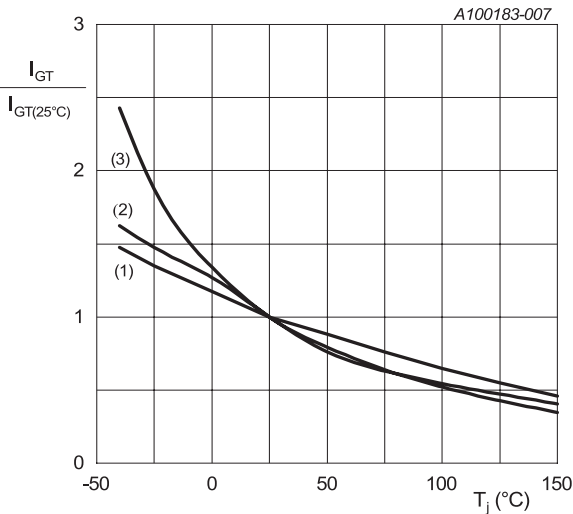


Fig. 7. Normalized gate trigger current as a function of junction temperature

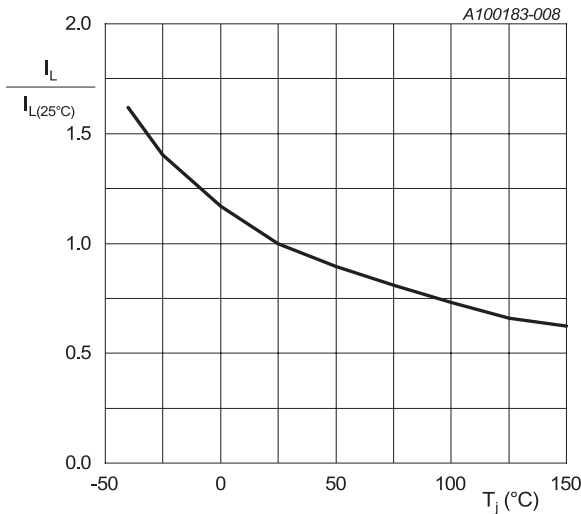


Fig. 8. Normalized latching current as a function of junction temperature

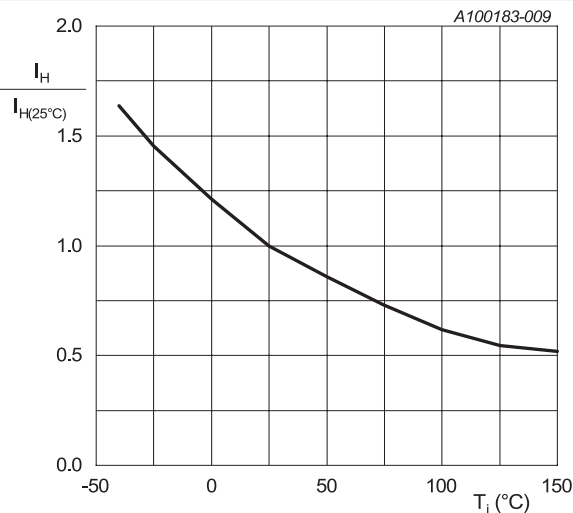


Fig. 9. Normalized holding current as a function of junction temperature

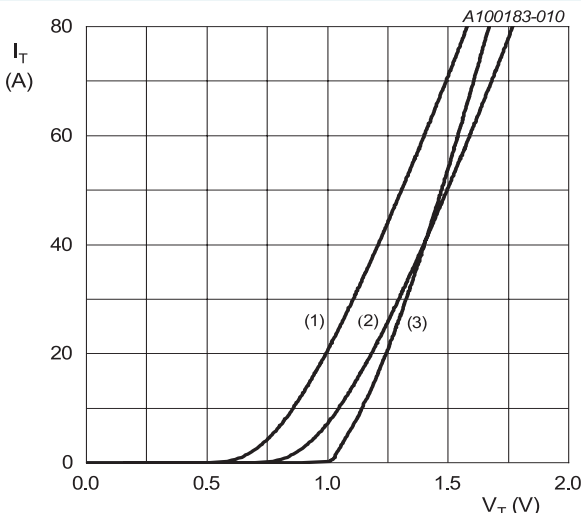


Fig. 10. On-state current as a function of on-state voltage

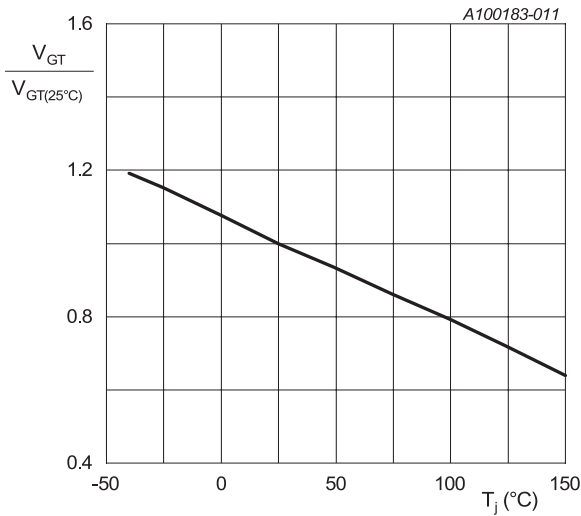


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

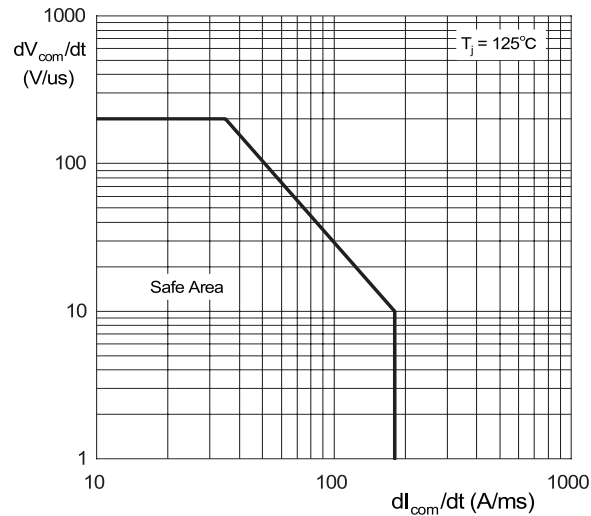


Fig. 12. Safe operating area

12. Package outline

Plastic single-ended through-hole package; isolated heatsink mounted; 1 mounting hole; 3 -lead TO3P

SOT1292

The diagram shows the mechanical specifications of the SOT1292 package. The top view includes dimensions H (width), R (radius of the mounting hole), ØL (hole diameter), K (lead spacing), L (lead length), and J (lead width). The side view includes dimensions A (total height), B (lead height), E (lead thickness), D (lead diameter), and a 0.6mm reference dimension at the base.

Unit		A	B	C	D	E	F	G	H	J	K	L	P	R
mm	min	4.75	1.45	14.35	0.50	2.70	15.80	20.40	15.10	5.40	3.40	4.08	1.20	4,6 (typ.)
	max	4.95	1.55	15.60	0.70	2.90	16.50	21.10	15.50	5.65	3.65	4.17	1.40	

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT1292		-				

13. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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