

1. General description

Planar passivated four 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 triac will commute the full RMS current at the maximum rated junction temperature ($T_{j(max)} = 150\text{ °C}$). It is used in applications where "high junction operating temperature capability" is required.

2. Features and benefits

- High current TRIAC
- Low thermal resistance
- High junction operating temperature capability ($T_{j(max)} = 150\text{ °C}$)
- High voltage capability
- Planar passivated for voltage ruggedness and reliability
- Insulated tab rated at 2500 V rms

3. Applications

- High current / high surge applications
- High power / industrial controls -- e.g. heating, motors, lighting

4. Quick reference data

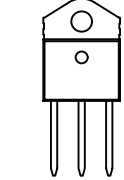
Table 1. Quick reference data

Symbol	Parameter	Conditions	Values	Unit
Absolute maximum rating				
V_{DRM}	repetitive peak off-state voltage		600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 105\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	40	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $t_p = 20\text{ ms}$; $T_{j(init)} = 25\text{ °C}$; Fig. 4 ; Fig. 5	400	A
		full sine wave; $t_p = 16.7\text{ ms}$; $T_{j(init)} = 25\text{ °C}$	440	A
T_j	junction temperature		150	°C

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G+$ $T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$		-	-	50	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G-$ $T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$		-	-	50	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- G-$ $T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$		-	-	50	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- G+$ $T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$		-	-	70	mA
I_H	holding current	$V_D = 12\text{ V}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 9}$		-	-	80	mA
V_T	on-state voltage	$I_T = 56.6\text{ A}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 10}$		-	1.2	1.5	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}; T_j = 125\text{ }^\circ\text{C}; (V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit		750	-	-	V/ μ s
		$V_{DM} = 536\text{ V}; T_j = 150\text{ }^\circ\text{C}; (V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit		500	-	-	V/ μ s
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}; T_j = 125\text{ }^\circ\text{C}; I_{T(RMS)} = 20\text{ A};$ $dV_{com}/dt = 20\text{ V}/\mu\text{s}; \text{gate open circuit}$		20	-	-	A/ms
		$V_D = 400\text{ V}; T_j = 150\text{ }^\circ\text{C}; I_{T(RMS)} = 20\text{ A};$ $dV_{com}/dt = 20\text{ V}/\mu\text{s}; \text{gate open circuit}$		10	-	-	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
BTA41-600B	IITO3P	BTA41-600BQ	Tube	30	SOT1292	21-Jul-2017

7. Marking

Table 4. Marking codes

Type number	Marking codes
BTA41-600B	BTA41-600B

8. Limiting values

Table 4. Limiting values

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

Symbol	Parameter	Conditions	Values	Unit
V_{DRM}	repetitive peak off-state voltage		600	V
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{mb}} \leq 105^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	40	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $t_p = 20 \text{ ms}$; $T_{\text{j(init)}} = 25^{\circ}\text{C}$; Fig. 4 ; Fig. 5	400	A
		full sine wave; $t_p = 16.7 \text{ ms}$; $T_{\text{j(init)}} = 25^{\circ}\text{C}$	440	A
I^2t	I^2t for fusing	$t_p = 10 \text{ ms}$; sine wave	800	A^2/s
dI_{T}/dt	rate of rise of on-state current	$I_{\text{G}} = 150 \text{ mA}$	150	$\text{A}/\mu\text{s}$
I_{GM}	peak gate current	$t_p = 20 \mu\text{s}$	8	A
P_{GM}	peak gate power	$t_p = 20 \mu\text{s}$	40	W
$P_{\text{G(AV)}}$	average gate power	over any 20 ms period	1	W
T_{stg}	storage temperature		-40 to 150	$^{\circ}\text{C}$
T_{j}	junction temperature		150	$^{\circ}\text{C}$

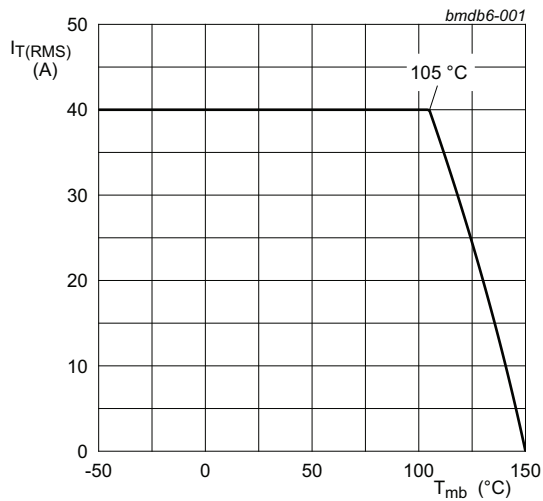
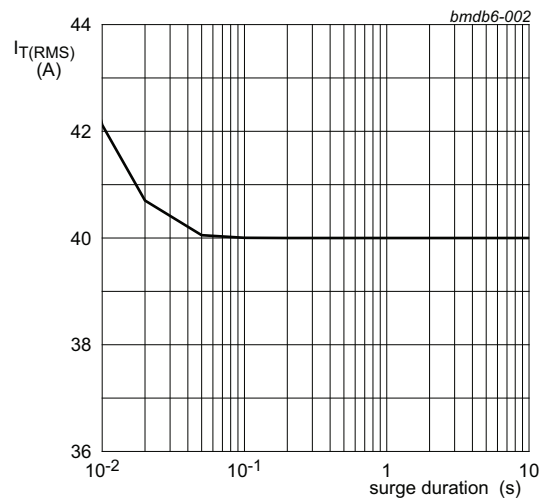


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



$f = 50 \text{ Hz}$; $T_{\text{mb}} = 105^{\circ}\text{C}$

Fig. 2. RMS on-state current as a function of surge duration; maximum values

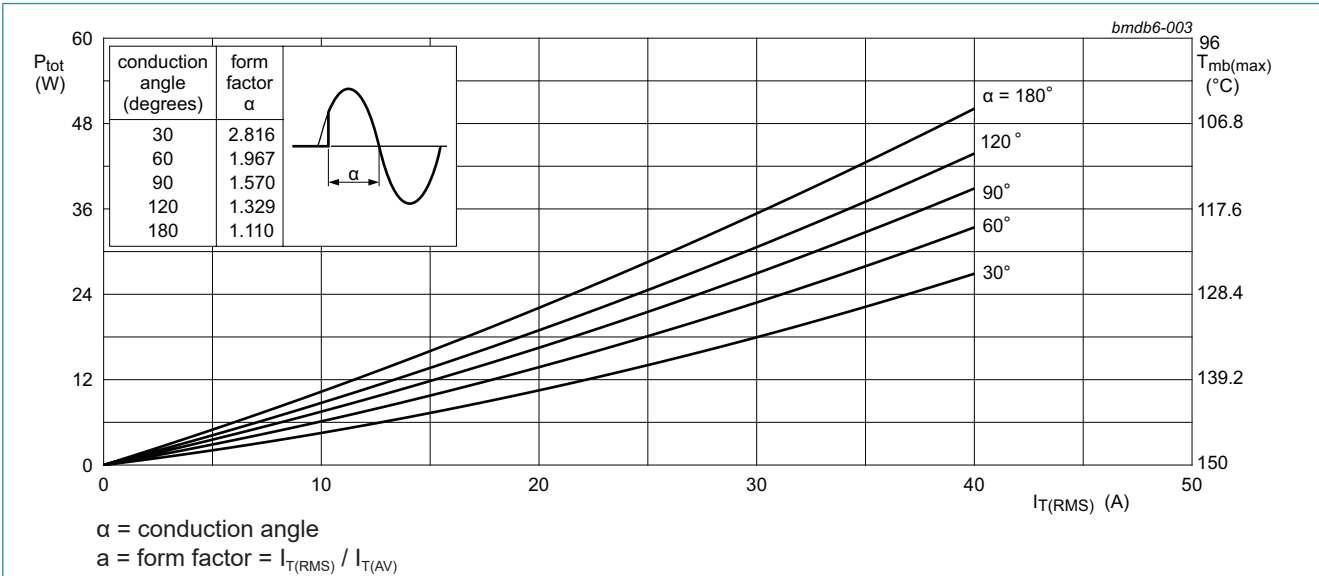


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

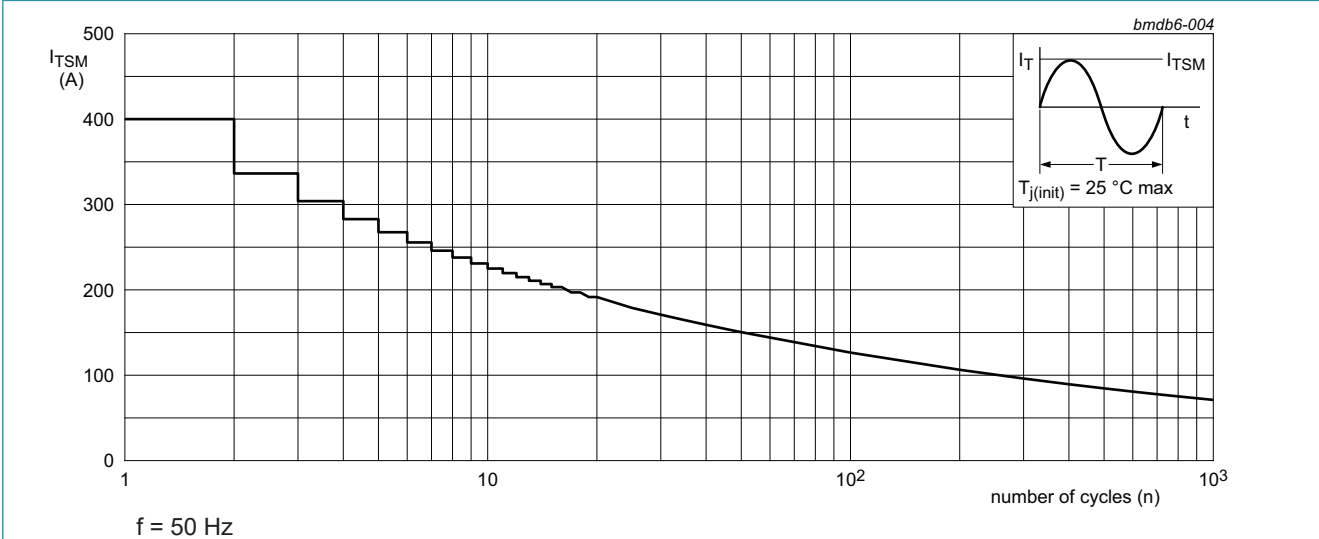


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

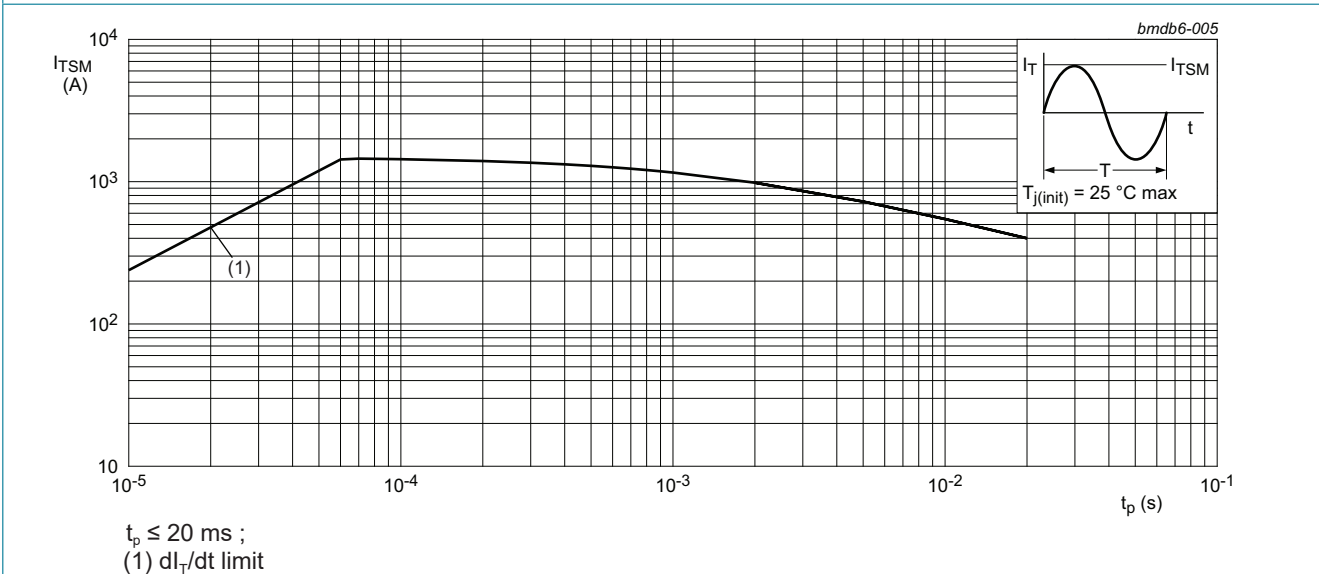
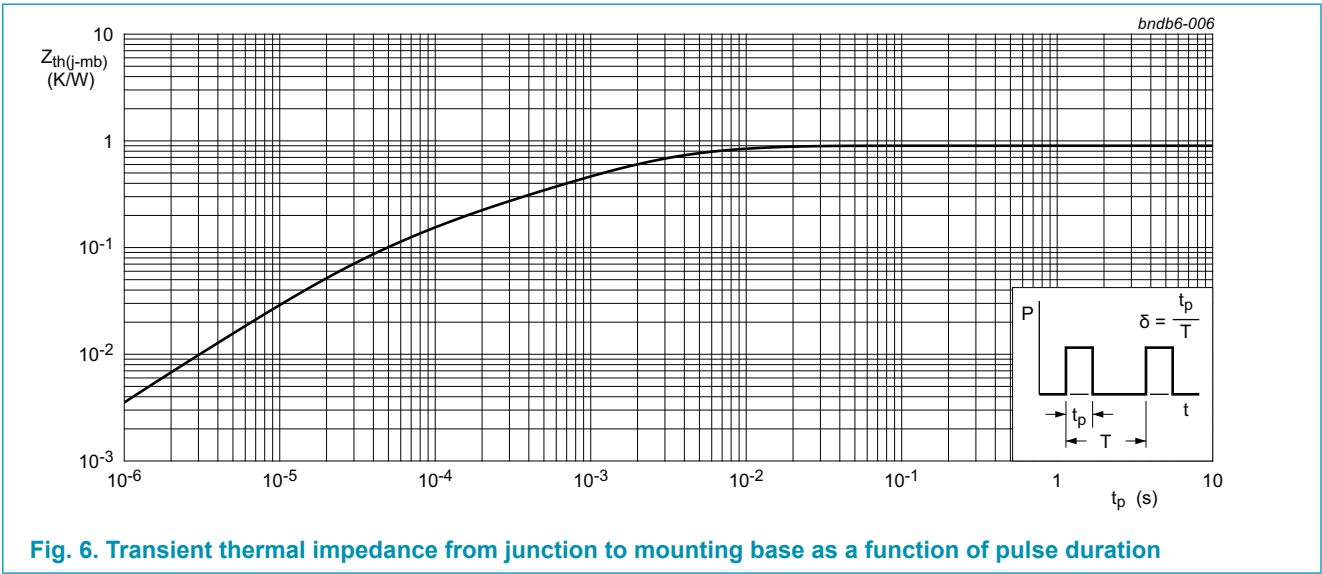


Fig. 5. Total power dissipation as a function of RMS on-state current; maximum values

9. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 6		-	-	0.9	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	50	-	K/W



10. Isolation characteristics

Table 6. Isolation characteristics

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

11. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		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		-	-	50	mA
		V _D = 12 V; I _T = 0.1 A; T2+ G-; T _J = 25 °C; Fig. 7		-	-	50	mA
		V _D = 12 V; I _T = 0.1 A; T2- G-; T _J = 25 °C; Fig. 7		-	-	50	mA
		V _D = 12 V; I _T = 0.1 A; T2- G+; T _J = 25 °C; Fig. 7		-	-	70	mA
I _L	latching current	V _D = 12 V; I _T = 0.1 A; T2+ G+; T _J = 25 °C; Fig. 8		-	-	100	mA
		V _D = 12 V; I _T = 0.1 A; T2+ G-; T _J = 25 °C; Fig. 8		-	-	160	mA
		V _D = 12 V; I _T = 0.1 A; T2- G-; T _J = 25 °C; Fig. 8		-	-	100	mA
		V _D = 12 V; I _T = 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 = 56.6 A; T _J = 25 °C; Fig. 10		-	1.2	1.5	V
V _{GT}	gate trigger voltage	V _D = 12 V; I _T = 0.1 A; T _J = 25 °C; Fig. 11		-	0.8	1.3	V
		V _D = 400 V; I _T = 0.1 A; T _J = 150 °C; Fig. 11		0.2	0.45	-	V
I _D	off-state current	V _D = 600 V; T _J = 25 °C		-	-	10	μA
		V _D = 600 V; T _J = 150 °C		-	-	2.5	mA
Dynamic characteristics							
dV _D /dt	rate of rise of off-state voltage	V _{DM} = 536 V; T _J = 125 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit		750	-	-	V/μs
		V _{DM} = 536 V; T _J = 150 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit		500	-	-	V/μs
dI _{com} /dt	rate of change of commutating current	V _D = 400 V; T _J = 125 °C; I _{T(RMS)} = 20A; dV _{com} /dt = 20 V/μs; gate open circuit		20	-	-	A/ms
		V _D = 400 V; T _J = 150 °C; I _{T(RMS)} = 20A; dV _{com} /dt = 20 V/μs; gate open circuit		10	-	-	A/ms

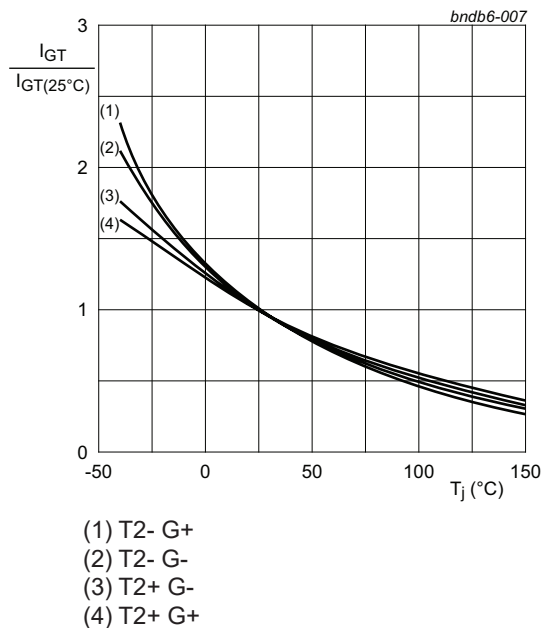


Fig. 7. Normalized gate trigger current as a function of junction temperature

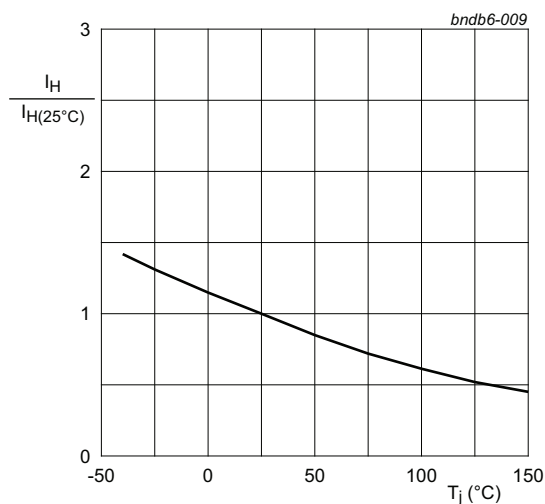


Fig. 9. Normalized holding current as a function of junction temperature

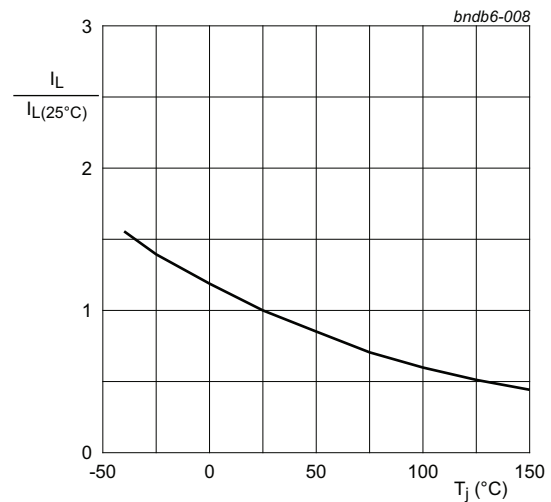
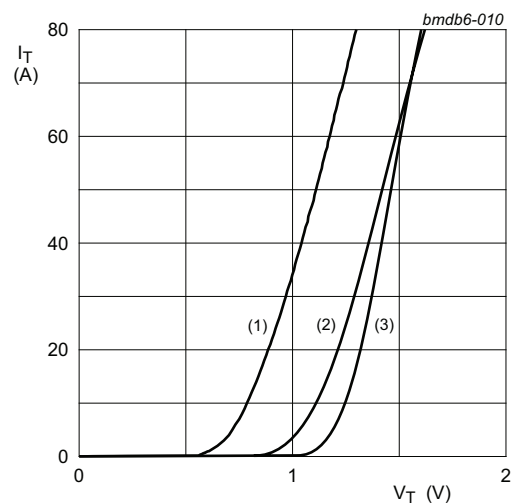


Fig. 8. Normalized latching current as a function of junction temperature



$V_o = 1.063 \text{ V}$; $R_s = 0.0074 \text{ } \Omega$

(1) $T_J = 150 \text{ } ^\circ\text{C}$; typical values

(2) $T_J = 150 \text{ } ^\circ\text{C}$; maximum values

(3) $T_J = 25 \text{ } ^\circ\text{C}$; maximum values

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

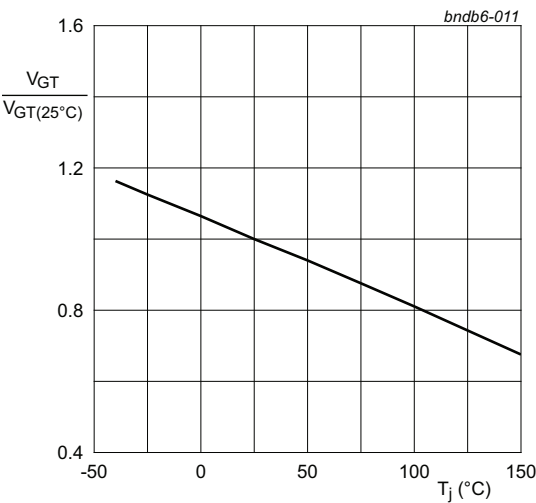


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

12. Package outline

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

SOT1292

The image shows a mechanical drawing of a TO3P package. The top view (left) shows a rectangular body with a circular mounting hole of diameter ØL. Dimensions include H (total width), R (radius of the mounting hole), K (width of the mounting tab), L (height of the body), and J (lead spacing). The side view (right) shows the package profile with dimensions A (total height), B (height of the mounting tab), E (height of the body), D (lead thickness), and a 0.6mm dimension at the base of the leads.

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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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