

1. General description

Planar passivated high commutation three quadrant triac in a SOT78D (IITO-220) internally insulated plastic package intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. This "series BT" triac will commutate the full RMS current at the maximum rated junction temperature without the aid of a snubber where "high junction operating temperature capability" is required.

2. Features and benefits

- 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
- Planar passivated for voltage ruggedness and reliability
- Triggering in three quadrants only
- Internally insulated package
- Isolated mounting base with 2500 V (RMS) isolation

3. Applications

- Electronic thermostats (heating and cooling)
- High power motor controls e.g washing machine and vacuum cleaners
- Rectifier-fed DC inductive loads e.g DC motors and solenoids
- Refrigeration and air conditioning compressors

4. Quick reference data

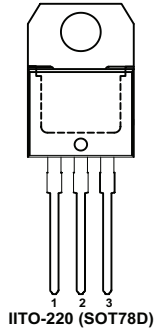
Table 1. Quick reference data

Symbol	Parameter	Conditions	Values	Unit
Absolute maximum rating				
V_{DRM}	repetitive peak off-state voltage		800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 112\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	16	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	160	A
		full sine wave; $t_p = 16.7\text{ ms}$; $T_{j(init)} = 25\text{ °C}$	176	A
T_j	junction temperature		150	°C

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G+ $T_j = 25\text{ }^\circ\text{C}$; Fig. 7	-	-	50	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G- $T_j = 25\text{ }^\circ\text{C}$; Fig. 7	-	-	50	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G- $T_j = 25\text{ }^\circ\text{C}$; Fig. 7	-	-	50	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 9	-	-	60	mA
V_T	on-state voltage	$I_T = 20\text{ A}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 10	-	-	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	1000	-	-	V/ μs
		$V_{DM} = 536\text{ V}$; $T_j = 150\text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit	600	-	-	V/ μs
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_j = 150\text{ }^\circ\text{C}$; $I_{T(RMS)} = 16\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; gate open circuit; snubberless condition	15	-	-	A/ms

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	 ITO-220 (SOT78D)	 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
BTA316Y-800BT	IITO-220	BTA316Y-800BTQ	Tube	50	IITO-220E	15-Dec-2017

7. Marking

Table 4. Marking codes

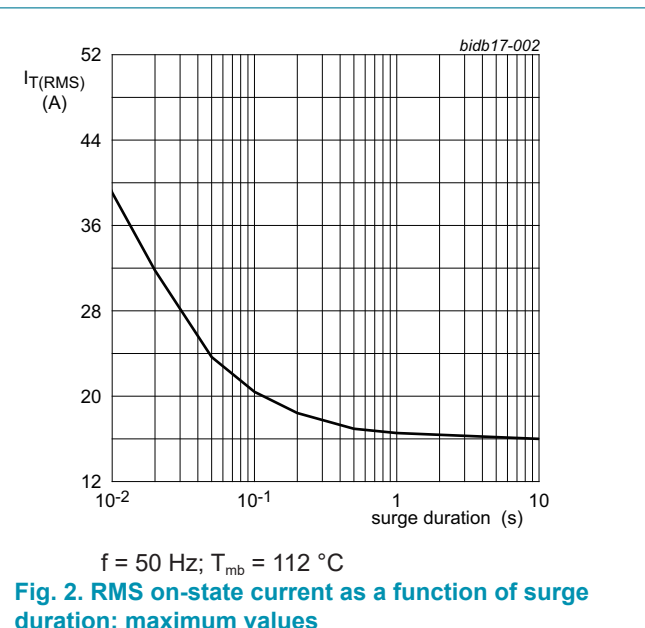
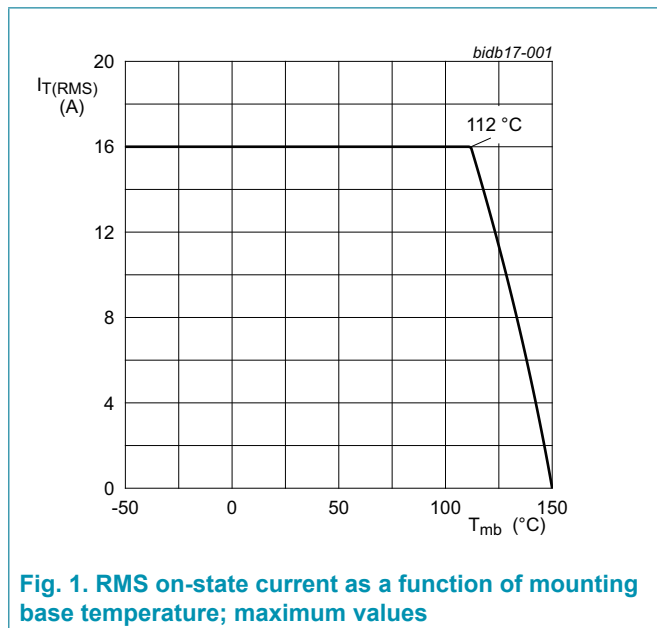
Type number	Marking codes
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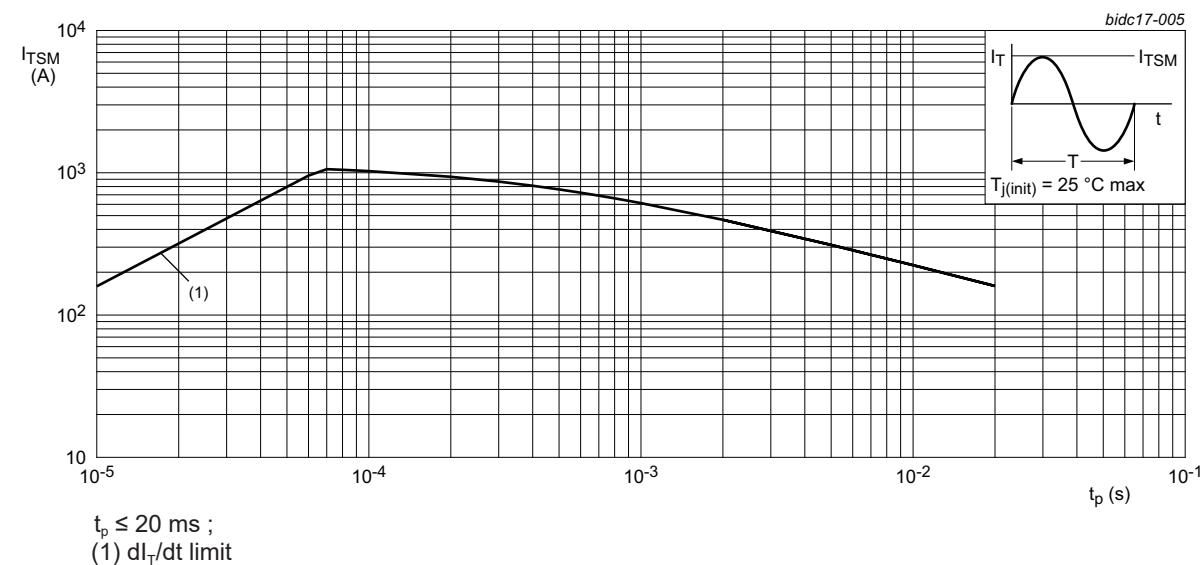
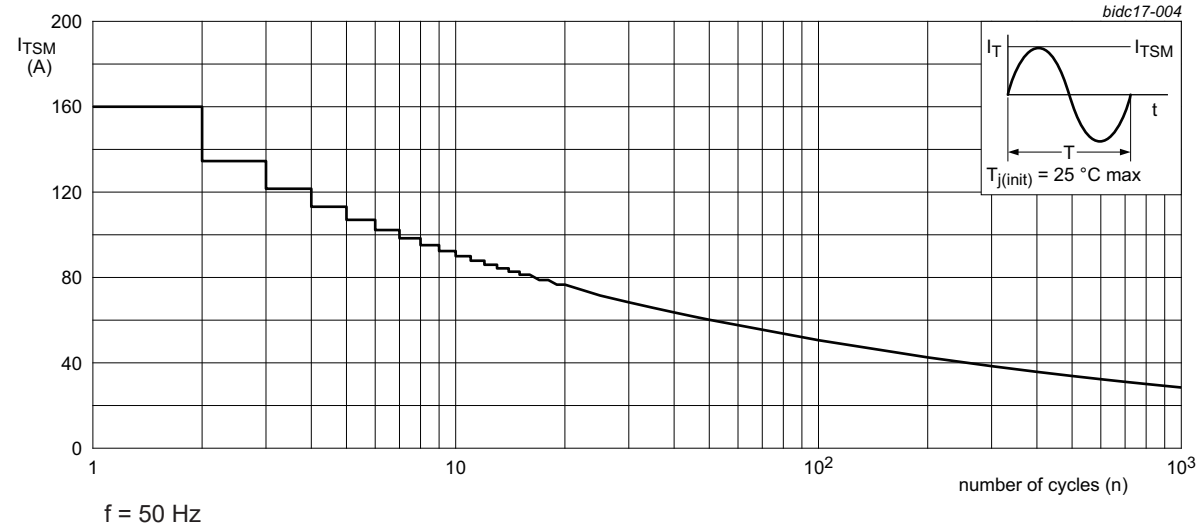
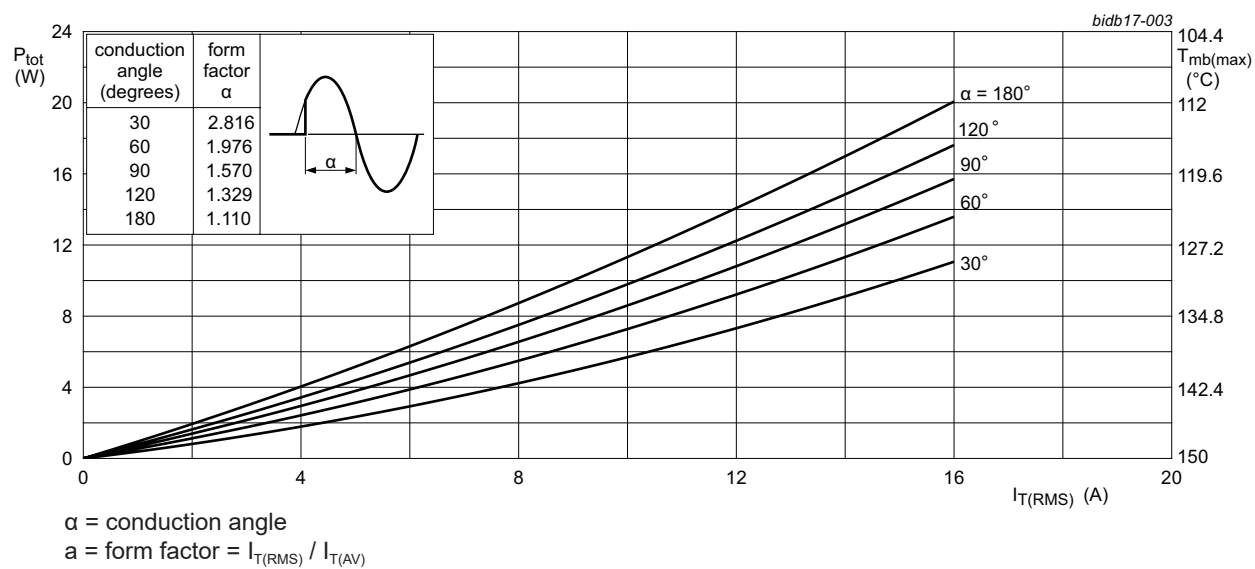
8. Limiting values

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		800	V
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{mb}} \leq 112^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	16	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	160	A
		full sine wave; $t_p = 16.7 \text{ ms}$; $T_{\text{j(init)}} = 25^{\circ}\text{C}$	176	A
I^2t	I^2t for fusing	$t_p = 10\text{ms}$; sine wave	128	A^2s
dI_{T}/dt	rate of rise of on-state current	$I_{\text{G}} = 150\text{mA}$	100	$\text{A}/\mu\text{s}$
I_{GM}	peak gate current		2	A
P_{GM}	peak gate power		5	W
$P_{\text{G(AV)}}$	average gate power	over any 20 ms period	0.5	W
T_{stg}	storage temperature		-40 to 150	$^{\circ}\text{C}$
T_{j}	junction temperature		150	$^{\circ}\text{C}$

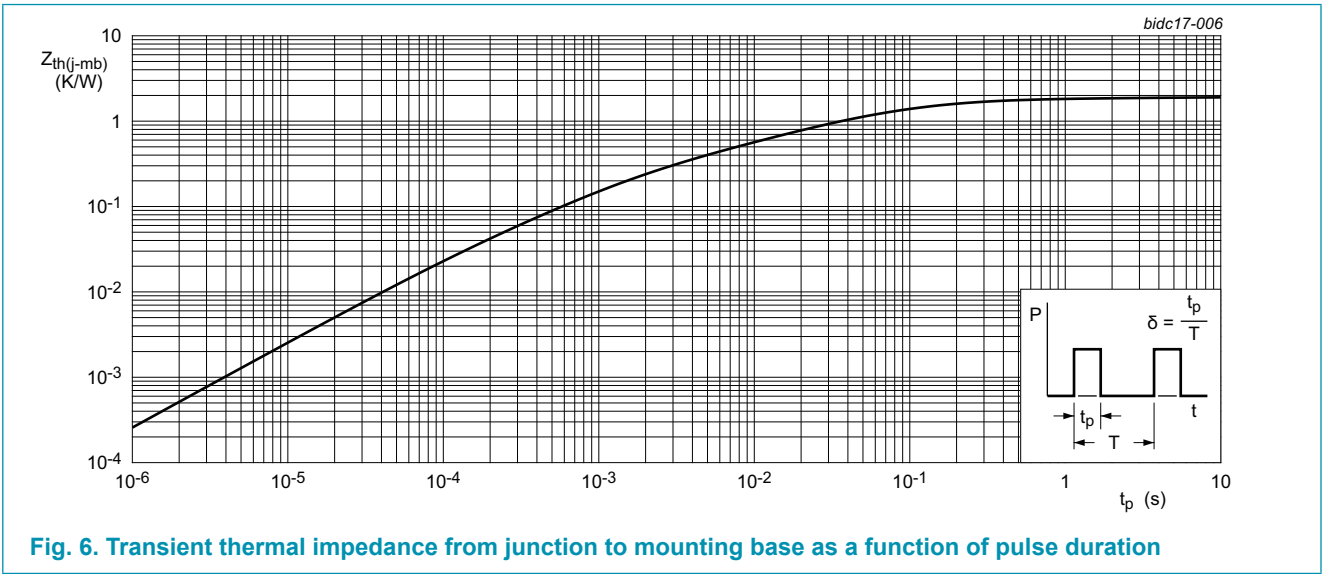




9. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 6	-	-	1.9	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W



10. Isolation characteristics

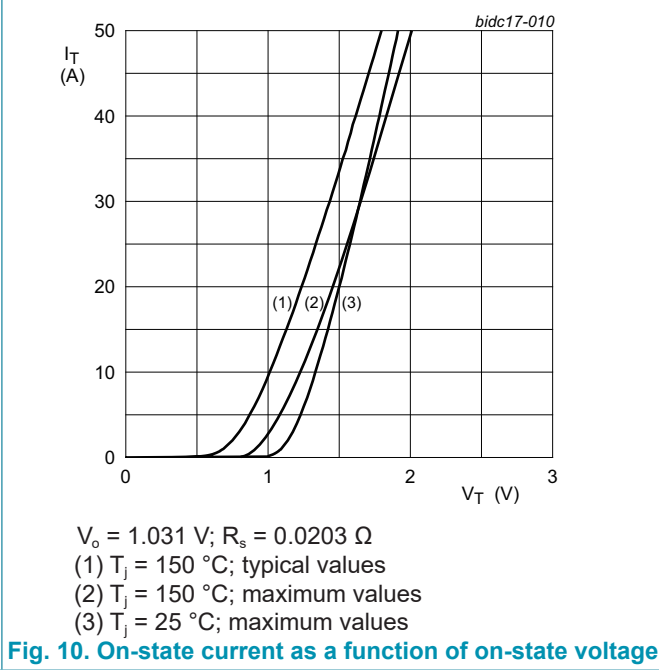
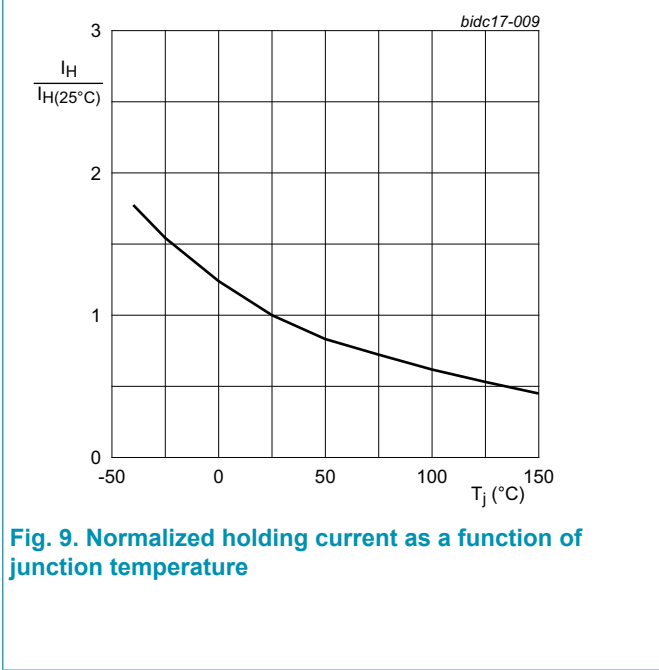
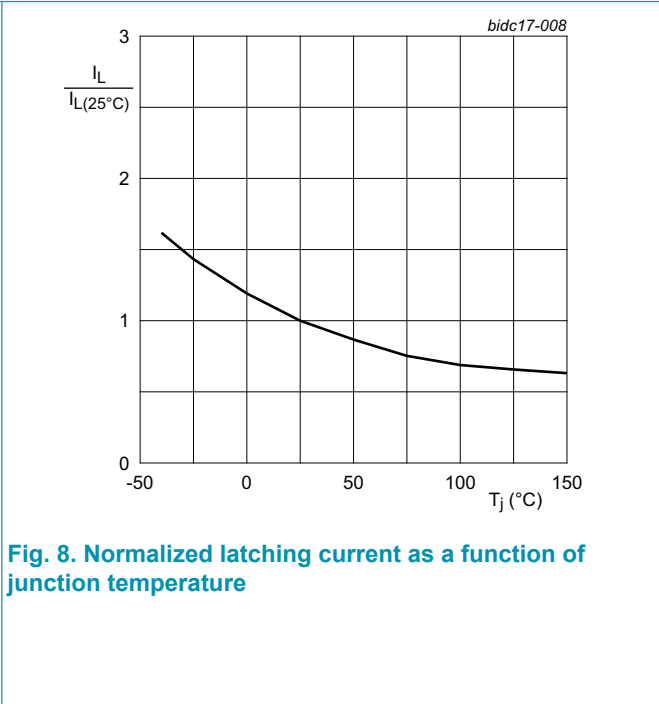
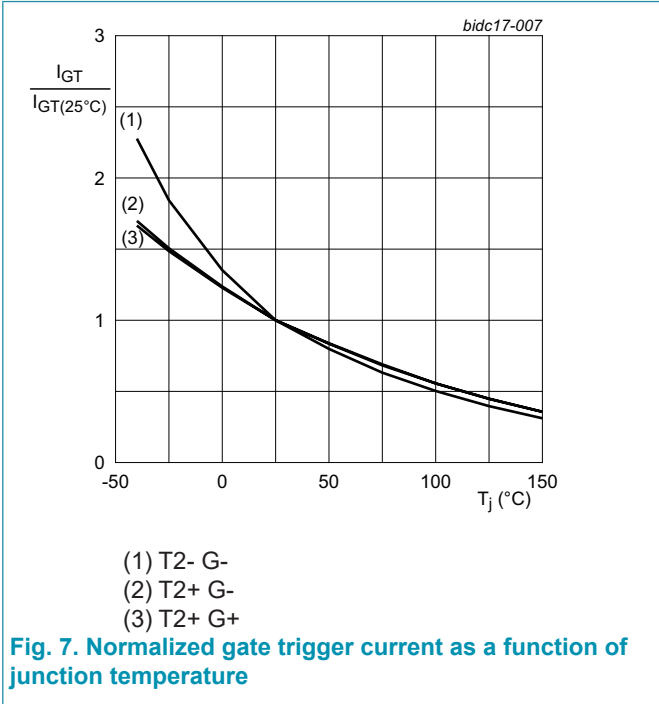
Table 6. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	50 Hz $\leq$ f $\leq$ 60 Hz; RH $\leq$ 65 %; from all pins to external heatsink; sinusoidal waveform; clean and dust free	-	-	2500	V
C_{isol}	isolation capacitance	from cathode to external heatsink	-	10	-	PF

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
I _L	latching current	V _D = 12 V; I _T = 0.1 A; T2+ G+; T _J = 25 °C; Fig. 8		-	-	70	mA
		V _D = 12 V; I _T = 0.1 A; T2+ G-; T _J = 25 °C; Fig. 8		-	-	80	mA
		V _D = 12 V; I _T = 0.1 A; T2- G-; T _J = 25 °C; Fig. 8		-	-	70	mA
I _H	holding current	V _D = 12 V; T _J = 25 °C; Fig. 9		-	-	60	mA
V _T	on-state voltage	I _T = 20 A; T _J = 25 °C; Fig. 10		-	-	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	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 = 800 V; T _J = 25 °C		-	-	5	μA
		V _D = 800 V; T _J = 150 °C		-	-	2	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		1000	-	-	V/μs
		V _{DM} = 536 V; T _J = 150 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit		600	-	-	V/μs
dI _{com} /dt	rate of change of commutating current	V _D = 400 V; T _J = 150 °C; I _{T(RMS)} = 16 A; dV _{com} /dt = 20 V/μs; gate open circuit; snubberless condition		15	-	-	A/ms
		V _D = 400 V; T _J = 150 °C; I _{T(RMS)} = 16 A; dV _{com} /dt = 10 V/μs; gate open circuit		18	-	-	A/ms
		V _D = 400 V; T _J = 150 °C; I _{T(RMS)} = 16 A; dV _{com} /dt = 1 V/μs; gate open circuit		22	-	-	A/ms



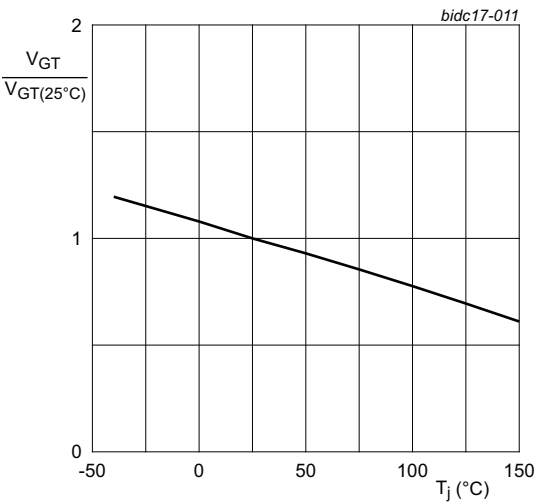
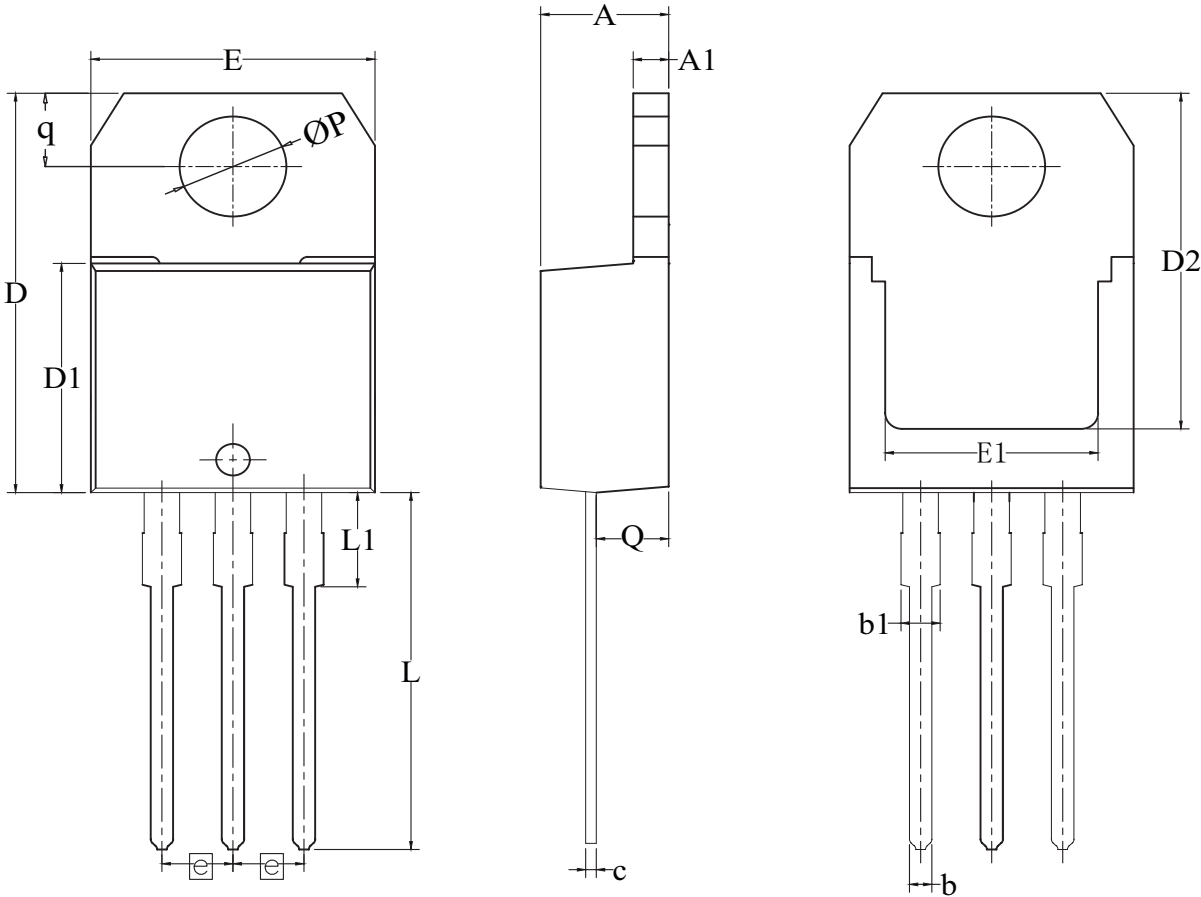


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

12. Package outline

Plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3 leads TO-220 ITO220



Unit	A	A1	b	b1	c	D	D1	D2	E	E1	e	L	L1	P	Q	q	
MM	min	4.30	1.25	0.69	1.20	0.40	15.20	8.50	12.20	10.00	6.86	2.54 (BSC)	12.80	2.70	3.70	2.40	2.70
	max	4.70	1.40	0.90	1.72	0.60	16.00	9.02	12.88	10.40	8.89		14.00	3.30	3.95	2.80	3.00

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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