

1. General description

Planar passivated high commutation three quadrant triac in a SOT78D (IITO-220) internally insulated plastic package. This triac is intended for use in motor control circuits where high blocking voltage, high static and dynamic dV_D/dt as well as high dI_{com}/dt can occur. This "series C0T" triac will commute the full rated RMS current at the maximum rated junction temperature without the aid of a snubber. This device has high operating capability ($T_{j(max)} = 150\text{ °C}$) and an internally isolated mounting base.

2. Features and benefits

- 3Q technology for improved noise immunity
- High commutation capability with maximum false trigger immunity
- High junction operating temperature capability ($T_{j(max)} = 150\text{ °C}$)
- High immunity to false turn-on by dV/dt
- High voltage capability
- Less sensitive gate for very high noise immunity
- 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

- Applications subject to high temperature ($T_{j(max)} = 150\text{ °C}$)
- Compressor starting control circuits
- General purpose motor controls
- Reversing induction motor controls e.g. vertical axis washing machines

4. Quick reference data

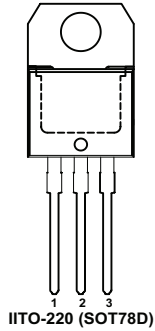
Table 1. Quick reference data

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; $T_{mb} \leq 121\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	8	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	60	A
		full sine wave; $t_p = 16.7\text{ ms}$; $T_{j(init)} = 25\text{ °C}$	65	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	5	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G- $T_j = 25\text{ }^\circ\text{C}$; Fig. 7	5	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G- $T_j = 25\text{ }^\circ\text{C}$; Fig. 7	5	-	35	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 9	-	-	50	mA
V_T	on-state voltage	$I_T = 10\text{ A}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 10	-	1.3	1.65	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	2000	-	-	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	1500	-	-	V/ μs
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_j = 150\text{ }^\circ\text{C}$; $I_{T(RMS)} = 8\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; gate open circuit; snubberless condition	7	-	-	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	Description	Version
BTA308Y-800C0T	IITO-220	Plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3 leads TO-220	IITO-220E

7. Marking

Table 4. Marking codes

Type number	Marking codes
BTA308Y-800C0T	BTA308Y-800C0T

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; $T_{\text{mb}} \leq 121^\circ\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	8	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	60	A
		full sine wave; $t_p = 16.7\text{ ms}$; $T_{\text{j(init)}} = 25^\circ\text{C}$	65	A
I^2t	I^2t for fusing	$t_p = 10\text{ms}$; sine wave	18	A^2s
dI_{T}/dt	rate of rise of on-state current	$I_{\text{G}} = 70\text{mA}$	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	$^\circ\text{C}$

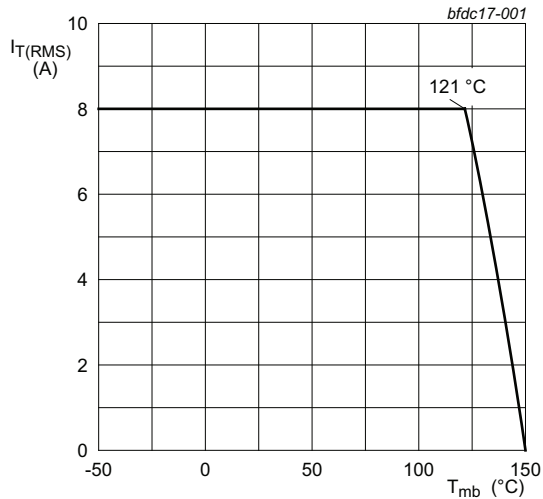
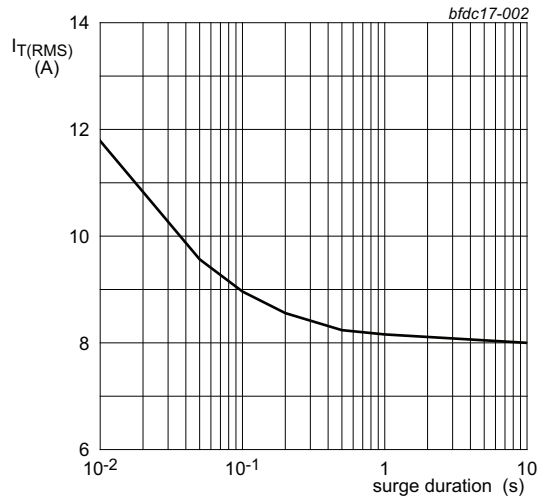


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



$f = 50\text{Hz}$; $T_{\text{mb}} = 121^\circ\text{C}$

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

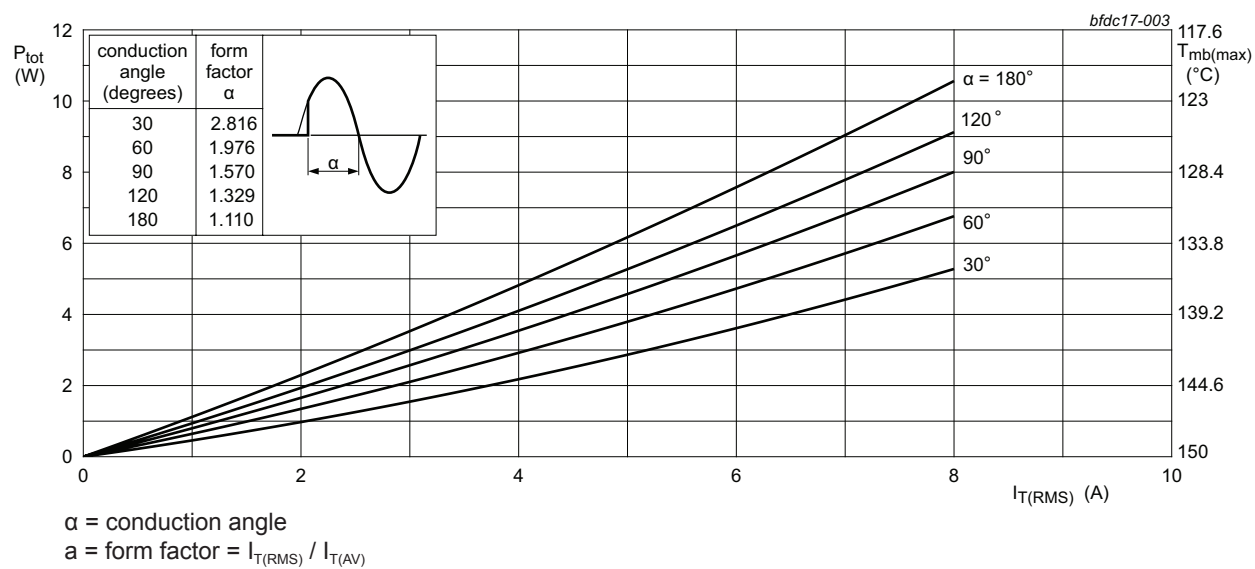


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

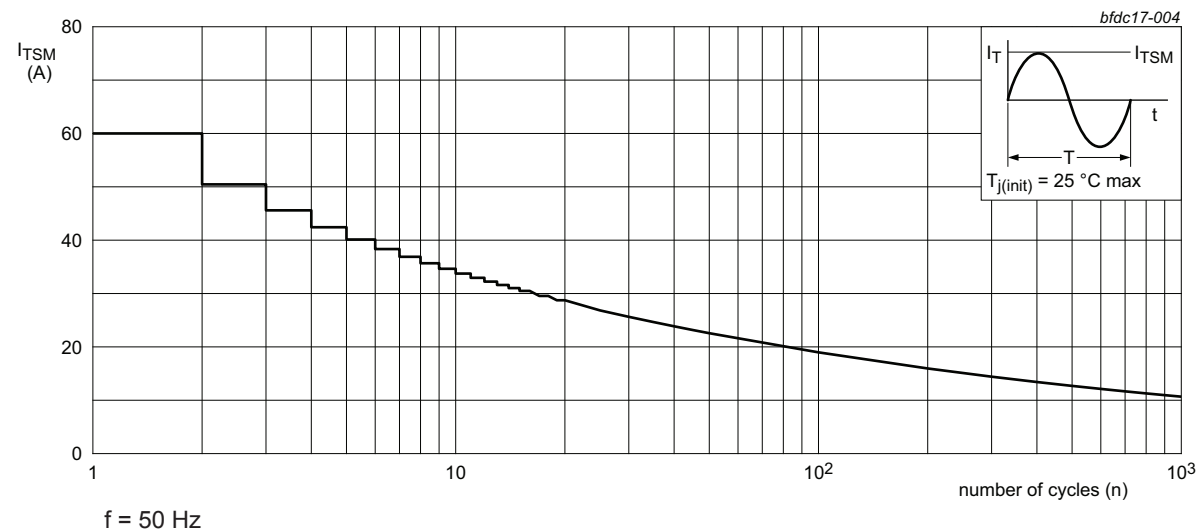


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

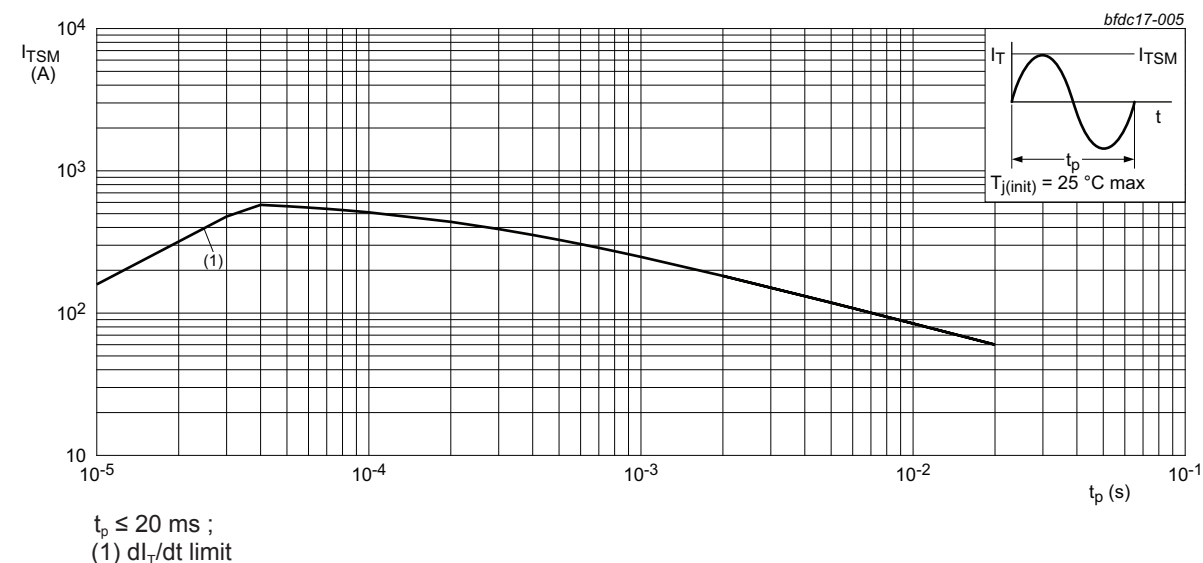
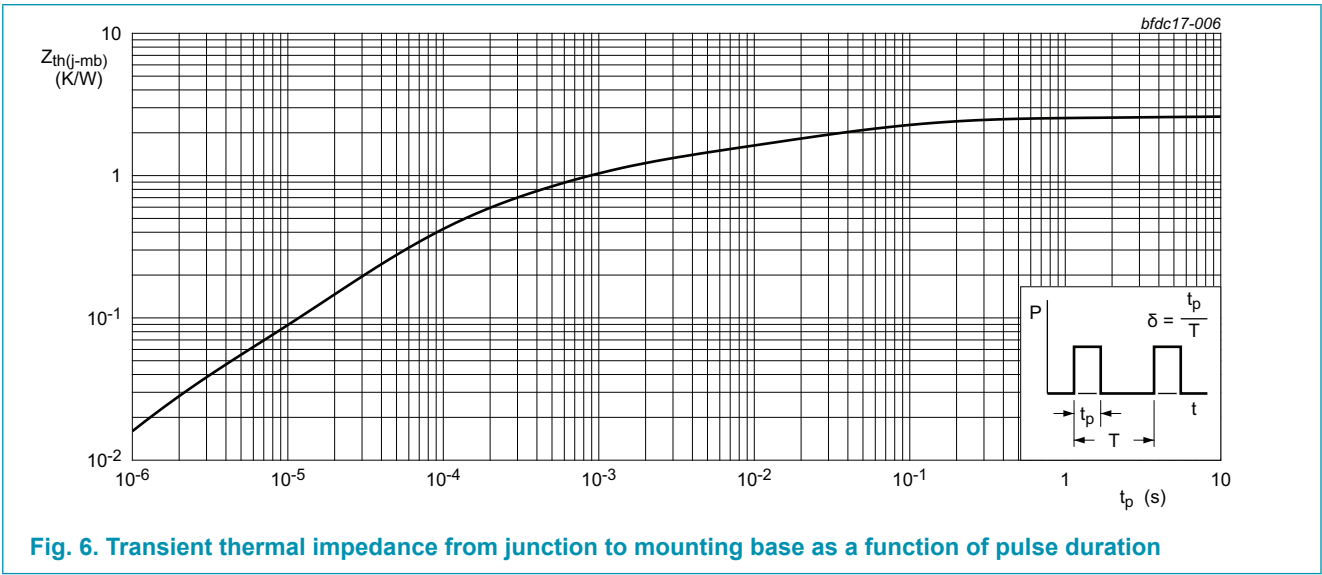


Fig. 5. Total power dissipation as a function of RMS on-state current; maximum values

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		-	-	2.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W



10. Isolation characteristics

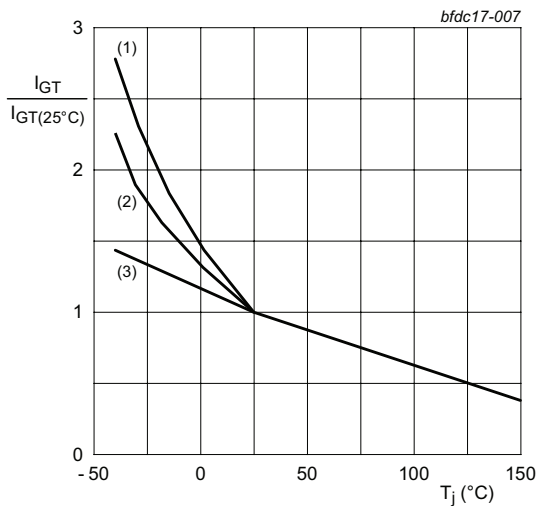
Table 6. Isolation characteristics

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		5	-	35	mA
		V _D = 12 V; I _T = 0.1 A; T2+ G-; T _J = 25 °C; Fig. 7		5	-	35	mA
		V _D = 12 V; I _T = 0.1 A; T2- G-; T _J = 25 °C; Fig. 7		5	-	35	mA
I _L	latching current	V _D = 12 V; I _T = 0.1 A; T2+ G+; T _J = 25 °C; Fig. 8		-	-	50	mA
		V _D = 12 V; I _T = 0.1 A; T2+ G-; T _J = 25 °C; Fig. 8		-	-	75	mA
		V _D = 12 V; I _T = 0.1 A; T2- G-; T _J = 25 °C; Fig. 8		-	-	50	mA
I _H	holding current	V _D = 12 V; T _J = 25 °C; Fig. 9		-	-	50	mA
V _T	on-state voltage	I _T = 10 A; T _J = 25 °C; Fig. 10		-	1.3	1.65	V
V _{GT}	gate trigger voltage	V _D = 12 V; I _T = 0.1 A; T _J = 25 °C; Fig. 11		-	0.7	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		-	-	10	μA
		V _D = 800 V; T _J = 150 °C		-	-	1	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		2000	-	-	V/μs
		V _{DM} = 536 V; T _J = 150 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit		1500	-	-	V/μs
dI _{com} /dt	rate of change of commutating current	V _D = 400 V; T _J = 150 °C; I _{T(RMS)} = 8 A; dV _{com} /dt = 20 V/μs; gate open circuit; snubberless condition; Fig. 12		7	-	-	A/ms



- (1) T2- G-
- (2) T2+ G-
- (3) T2+ G+

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

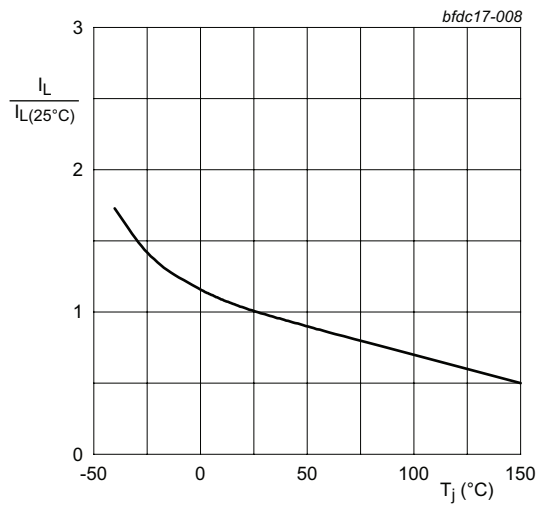


Fig. 8. Normalized latching current as a function of junction temperature

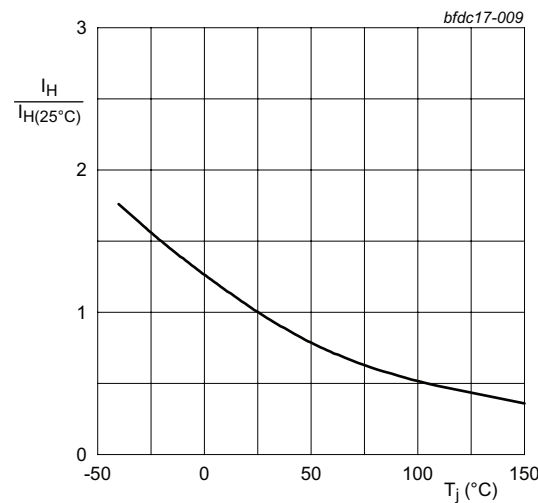
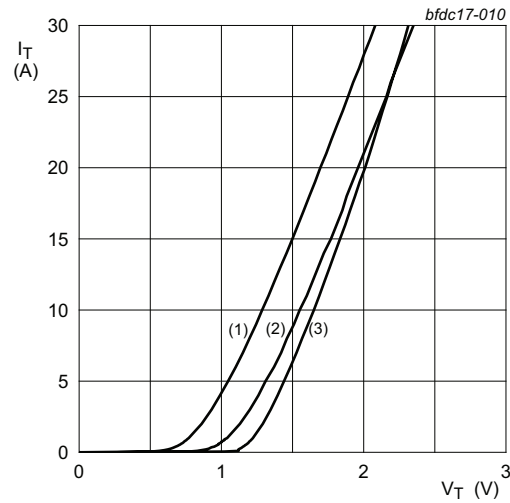
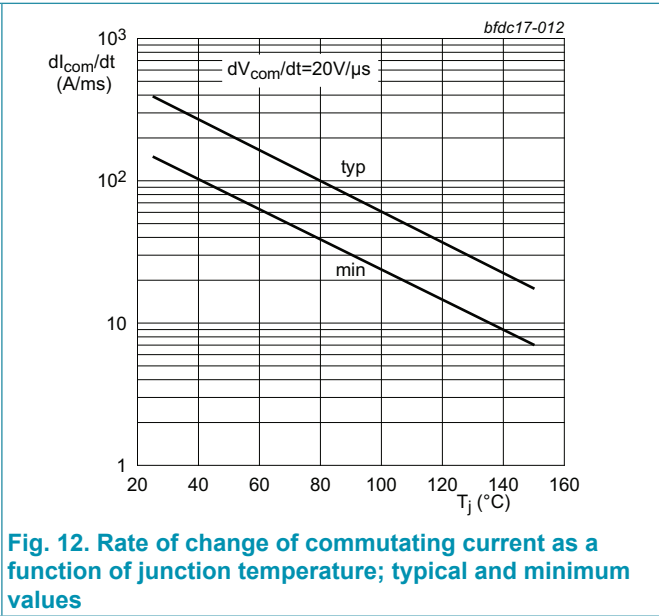
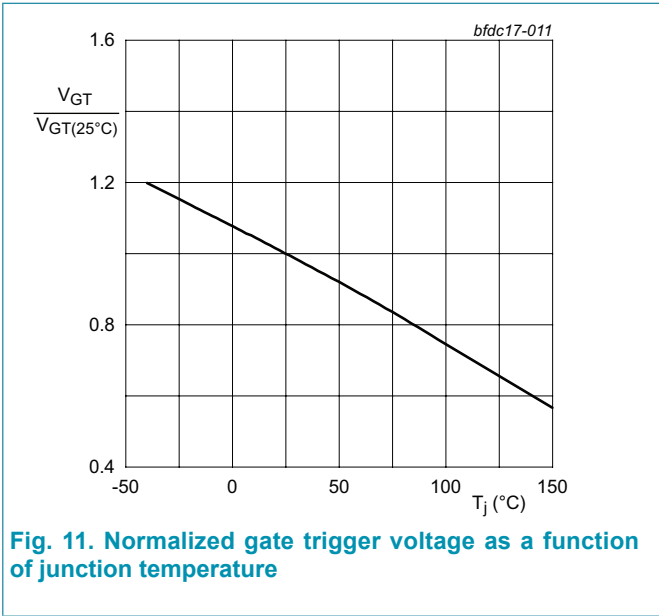


Fig. 9. Normalized holding current as a function of junction temperature



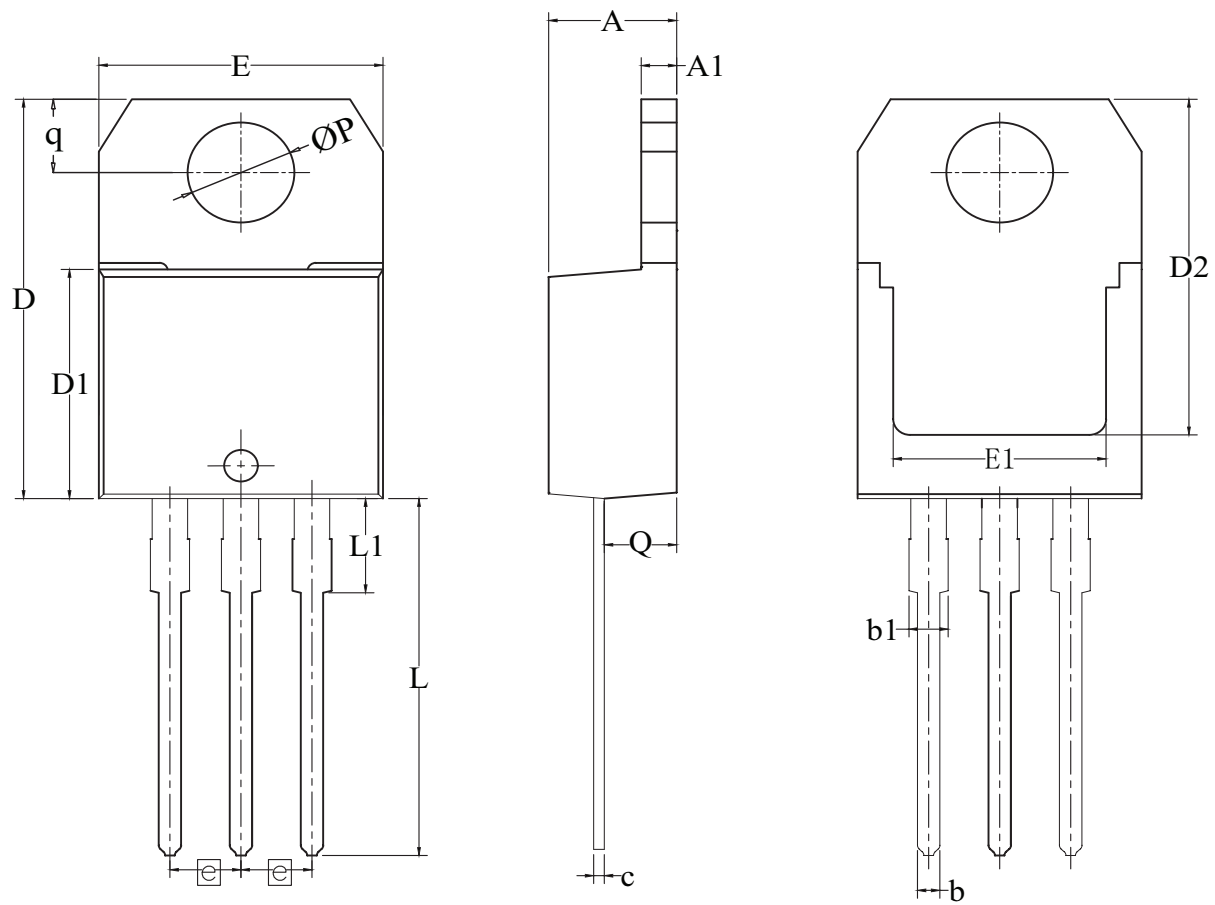
- $V_o = 1.210\text{ V}; R_s = 0.0288\ \Omega$
- (1) $T_j = 150\text{ }^\circ\text{C}$; typical values
 - (2) $T_j = 150\text{ }^\circ\text{C}$; maximum values
 - (3) $T_j = 25\text{ }^\circ\text{C}$; maximum values

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



12. Package outline

Plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3 leads TO-220 IITO220



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	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

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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- [2] The term 'short data sheet' is explained in section "Definitions".
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14. Contents

1. General description.....	1
2. Features and benefits	1
3. Applications	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values	3
9. Thermal characteristics	5
10. Isolation characteristics	5
11. Characteristics.....	6
12. Package outline	9
13. Legal information	10
14. Contents	12

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