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BTA410-800CT

3Q Hi-Com Triac

13 June 2014

Product data sheet

1. General description

Planar passivated high commutation three quadrant triac in a SOT78 (TO-220AB) plastic package intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. This "series CT" 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

- 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
- High voltage capability
- Less sensitive gate for high noise immunity
- Planar passivated for voltage ruggedness and reliability
- Triggering in three quadrants only

3. Applications

- Applications subject to high temperature
- Electronic thermostats (heating and cooling)
- Motor controls e.g. washing machines and vacuum cleaners
- Rectifier-fed DC inductive loads e.g. DC motors and solenoids

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	800	V
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	-	-	100	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 131\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	10	A
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_2 + G+$; $T_j = 25\text{ °C}$; Fig. 7	2	-	35	mA



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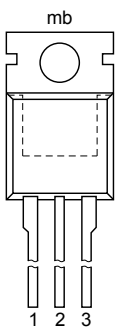

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Symbol	Parameter	Conditions	Min	Typ	Max	Unit
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ °C}$; Fig. 7	2	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; Fig. 7	2	-	35	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$; $T_j = 150\text{ °C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit	500	-	-	V/ μ s
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_j = 150\text{ °C}$; $I_{T(RMS)} = 10\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; (snubberless condition); gate open circuit	8	-	-	A/ms

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	 <p>TO-220AB (SOT78)</p>	 <p>sym051</p>
2	T2	main terminal 2		
3	G	gate		
mb	T2	mounting base; main terminal 2		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BTA410-800CT	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

7. Limiting values

Table 4. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 131\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	10	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	100	A
		full sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$	-	110	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; sine-wave pulse	-	50	A^2s
di_T/dt	rate of rise of on-state current	$I_T = 20\text{ A}$; $I_G = 0.2\text{ A}$; $dI_G/dt = 0.2\text{ A}/\mu s$	-	100	$A/\mu s$
I_{GM}	peak gate current		-	2	A
P_{GM}	peak gate power		-	5	W
$P_{G(AV)}$	average gate power	over any 20 ms period	-	0.5	W
T_{stg}	storage temperature		-40	150	$^{\circ}C$
T_j	junction temperature		-	125	$^{\circ}C$

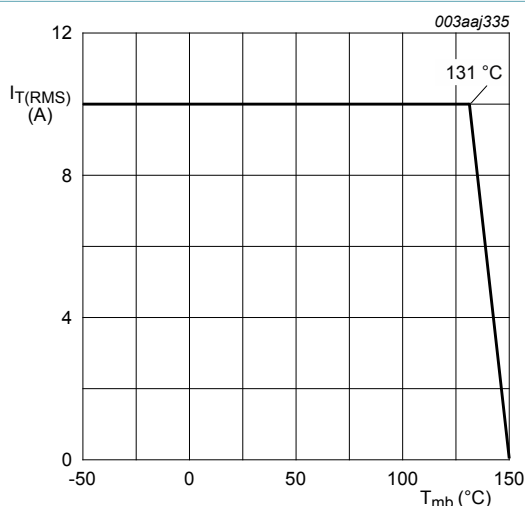
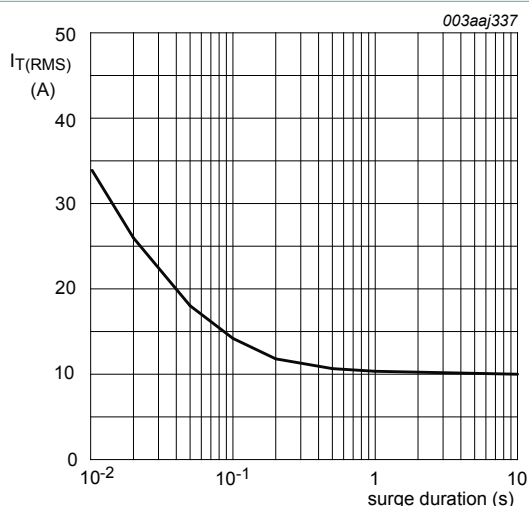


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



$f = 50\text{ Hz}$; $T_{mb} = 131\text{ °C}$

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

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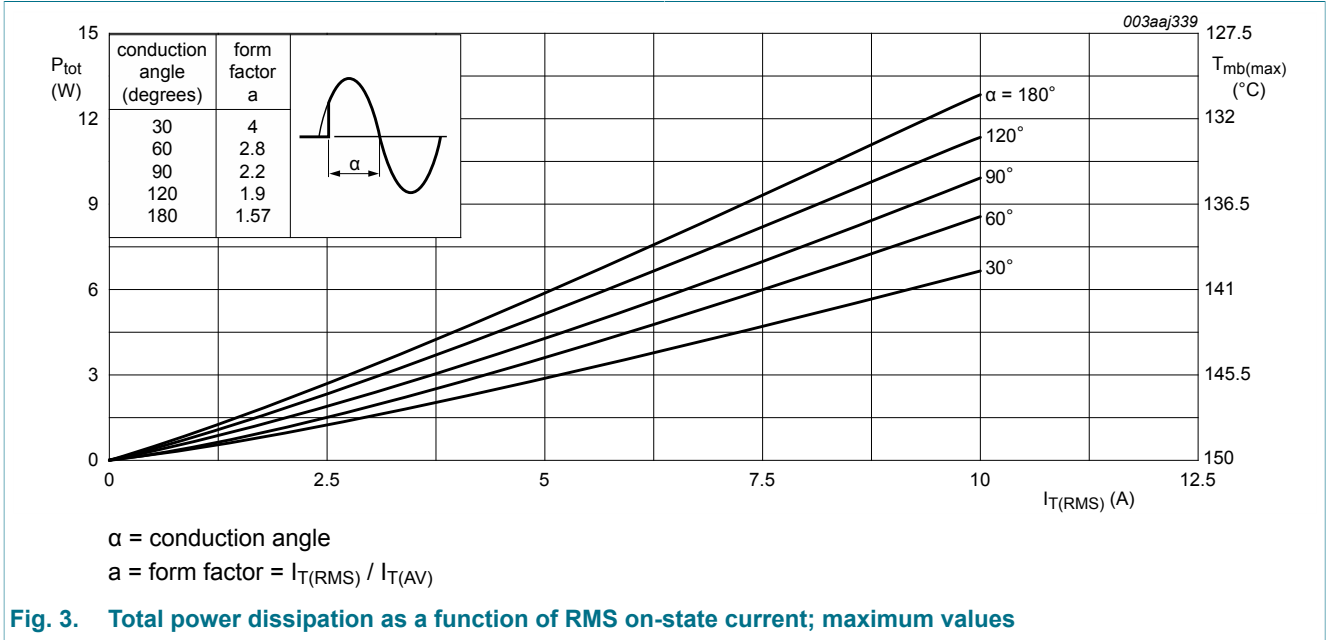


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

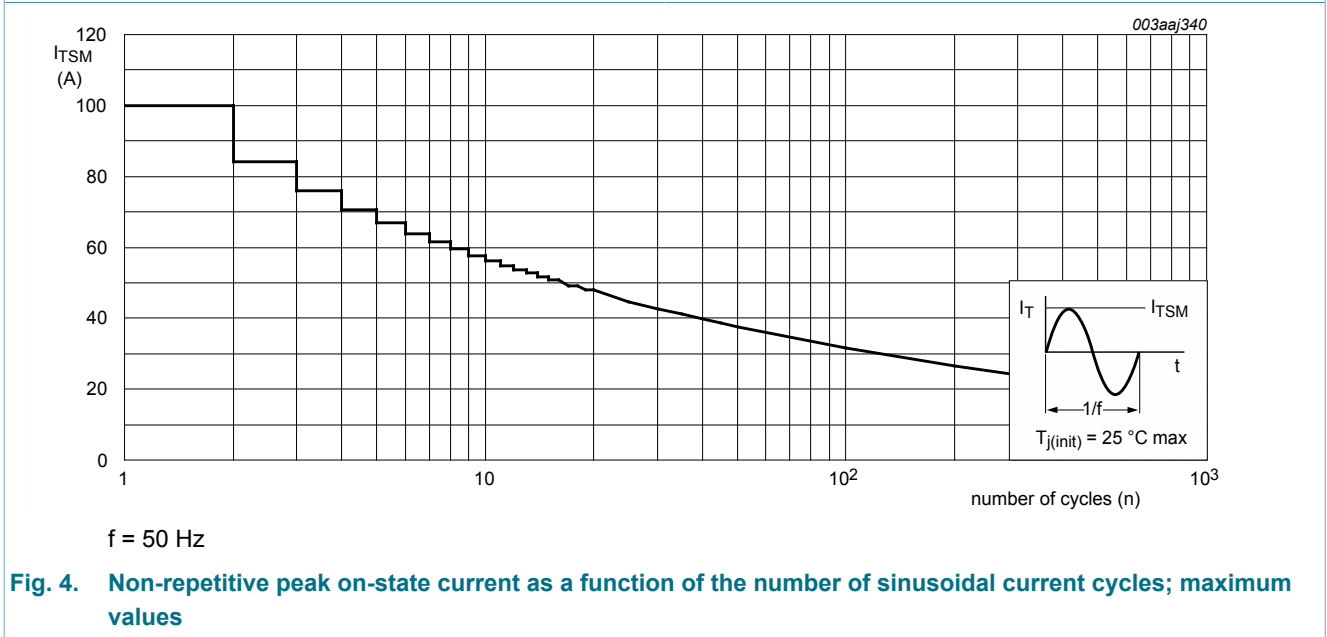
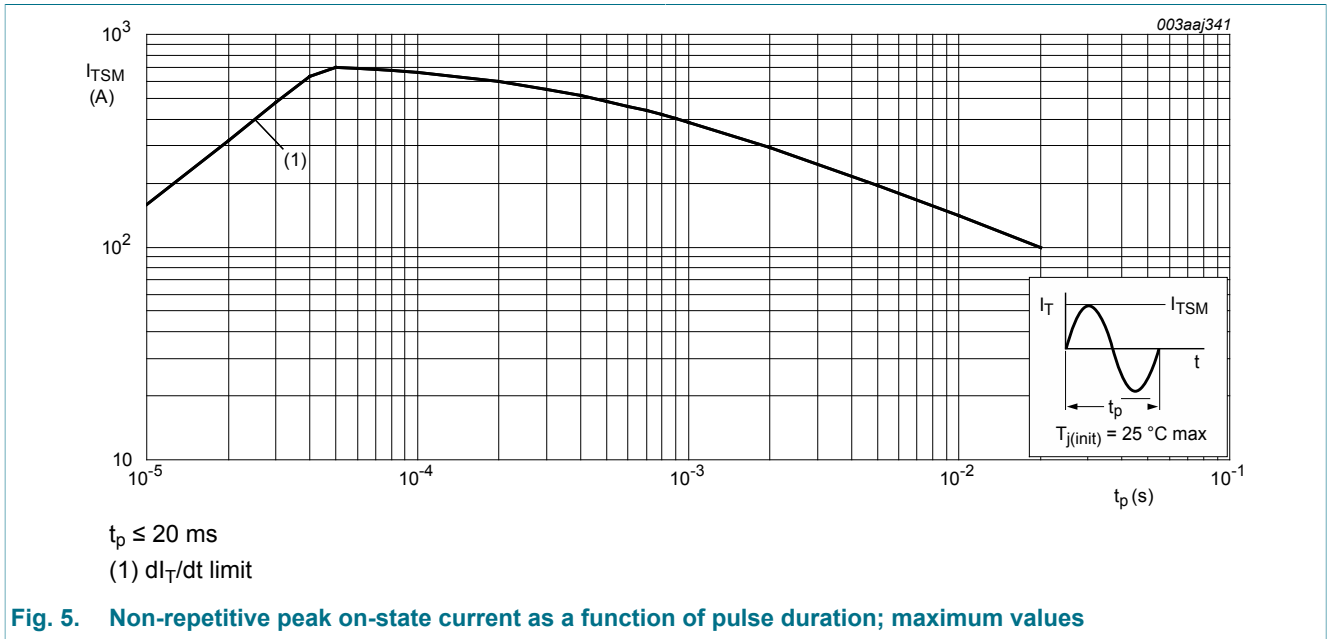


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

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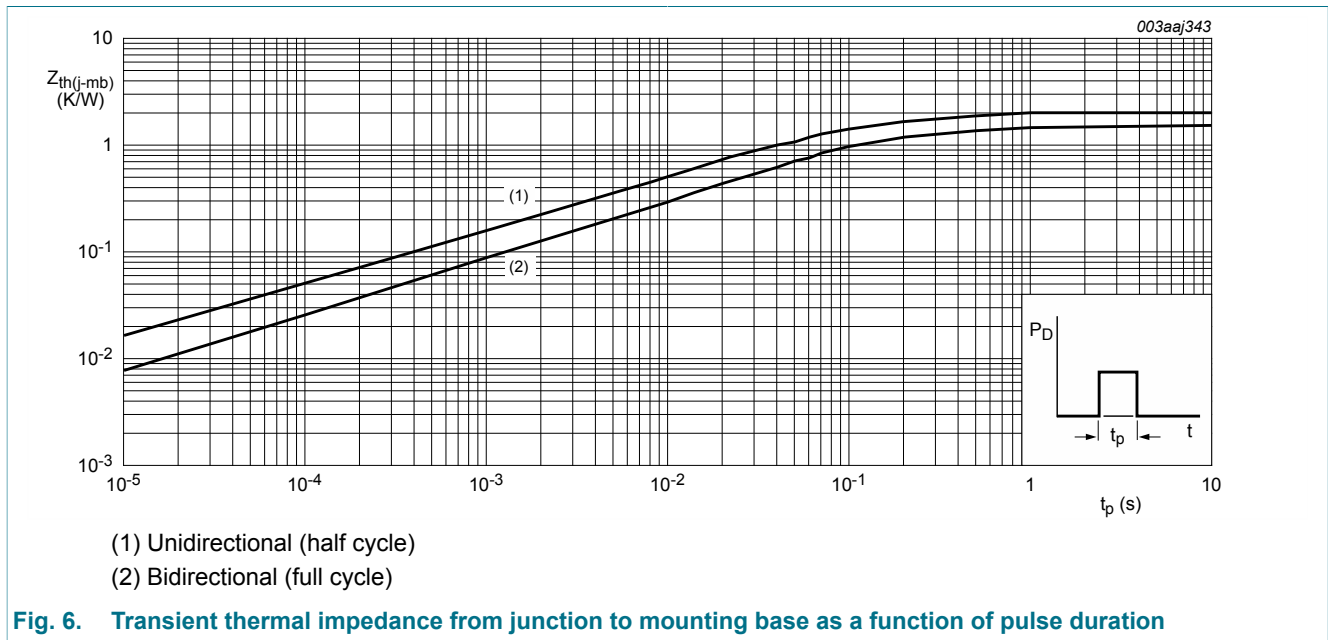
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8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle; Fig. 6	-	-	1.5	K/W
		half cycle; Fig. 6	-	-	2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W



9. Characteristics

Table 6. 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	2	-	35	mA
		V _D = 12 V; I _T = 0.1 A; T2+ G-; T _j = 25 °C; Fig. 7	2	-	35	mA
		V _D = 12 V; I _T = 0.1 A; T2- G-; T _j = 25 °C; Fig. 7	2	-	35	mA
I _L	latching current	V _D = 12 V; I _G = 0.1 A; T2+ G+; T _j = 25 °C; Fig. 8	-	-	50	mA
		V _D = 12 V; I _G = 0.1 A; T2+ G-; T _j = 25 °C; Fig. 8	-	-	60	mA
		V _D = 12 V; I _G = 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	-	-	35	mA
V _T	on-state voltage	I _T = 15 A; T _j = 25 °C; Fig. 10	-	1.3	1.6	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	0.25	0.4	-	V
I _D	off-state current	V _D = 800 V; T _j = 150 °C	-	0.4	2	mA
Dynamic characteristics						
dV _D /dt	rate of rise of off-state voltage	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 = 150 °C; I _{T(RMS)} = 10 A; dV _{com} /dt = 20 V/μs; (snubberless condition); gate open circuit	8	-	-	A/ms
		V _D = 400 V; T _j = 150 °C; I _{T(RMS)} = 10 A; dV _{com} /dt = 10 V/μs; gate open circuit	13	-	-	A/ms
		V _D = 400 V; T _j = 150 °C; I _{T(RMS)} = 10 A; dV _{com} /dt = 1 V/μs; gate open circuit	20	-	-	A/ms

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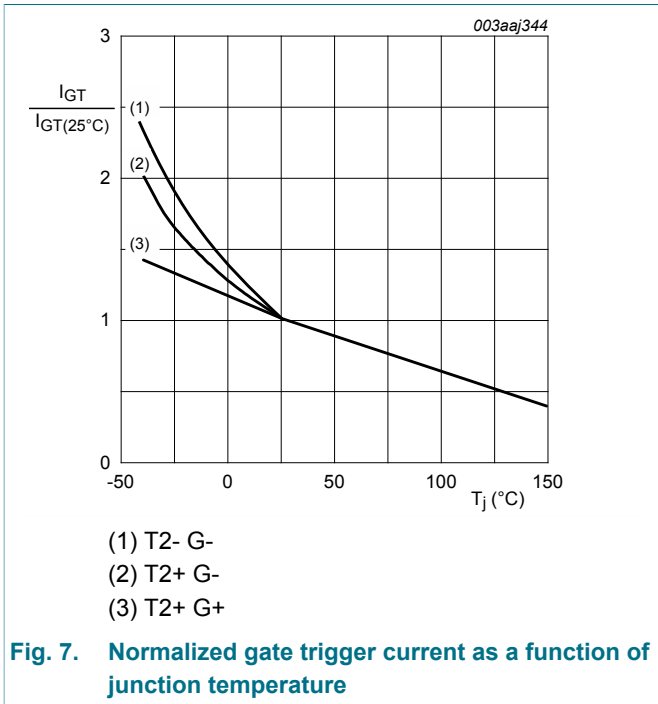


Fig. 7. Normalized gate trigger current as a function of junction temperature

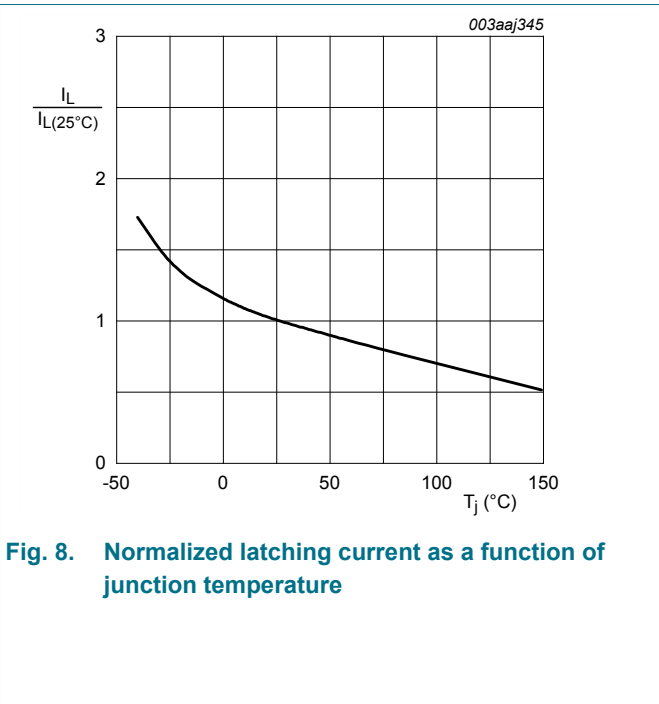


Fig. 8. Normalized latching current as a function of junction temperature

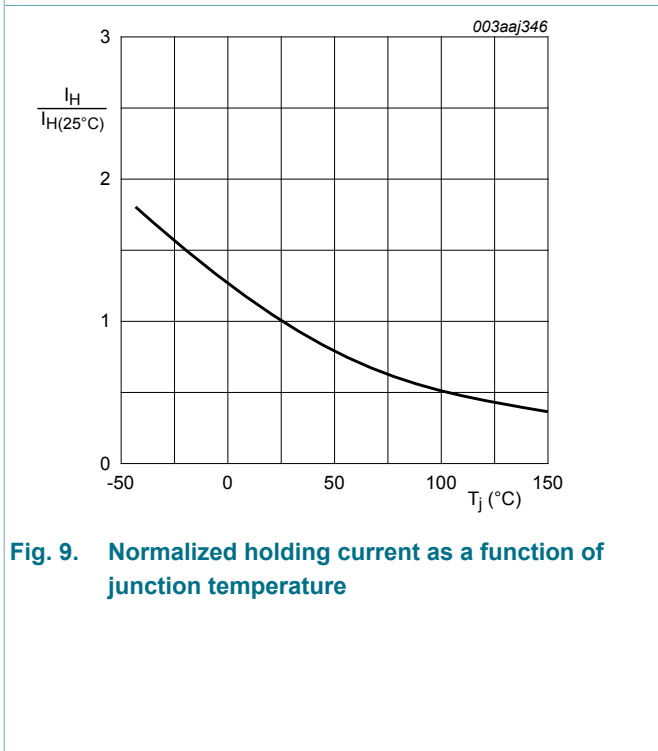


Fig. 9. Normalized holding current as a function of junction temperature

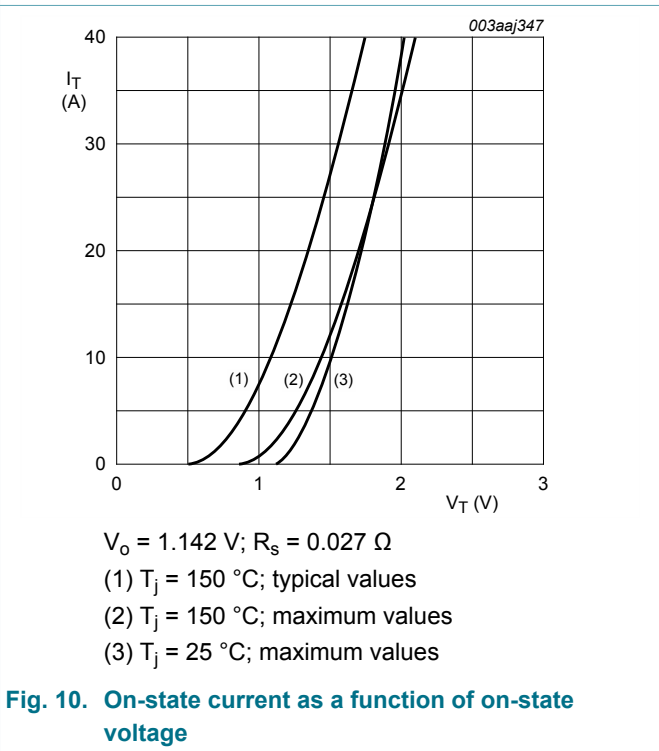


Fig. 10. On-state current as a function of on-state voltage

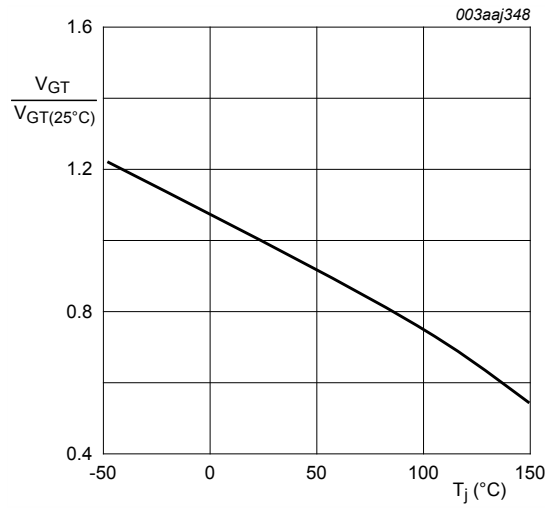


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

10. Package outline

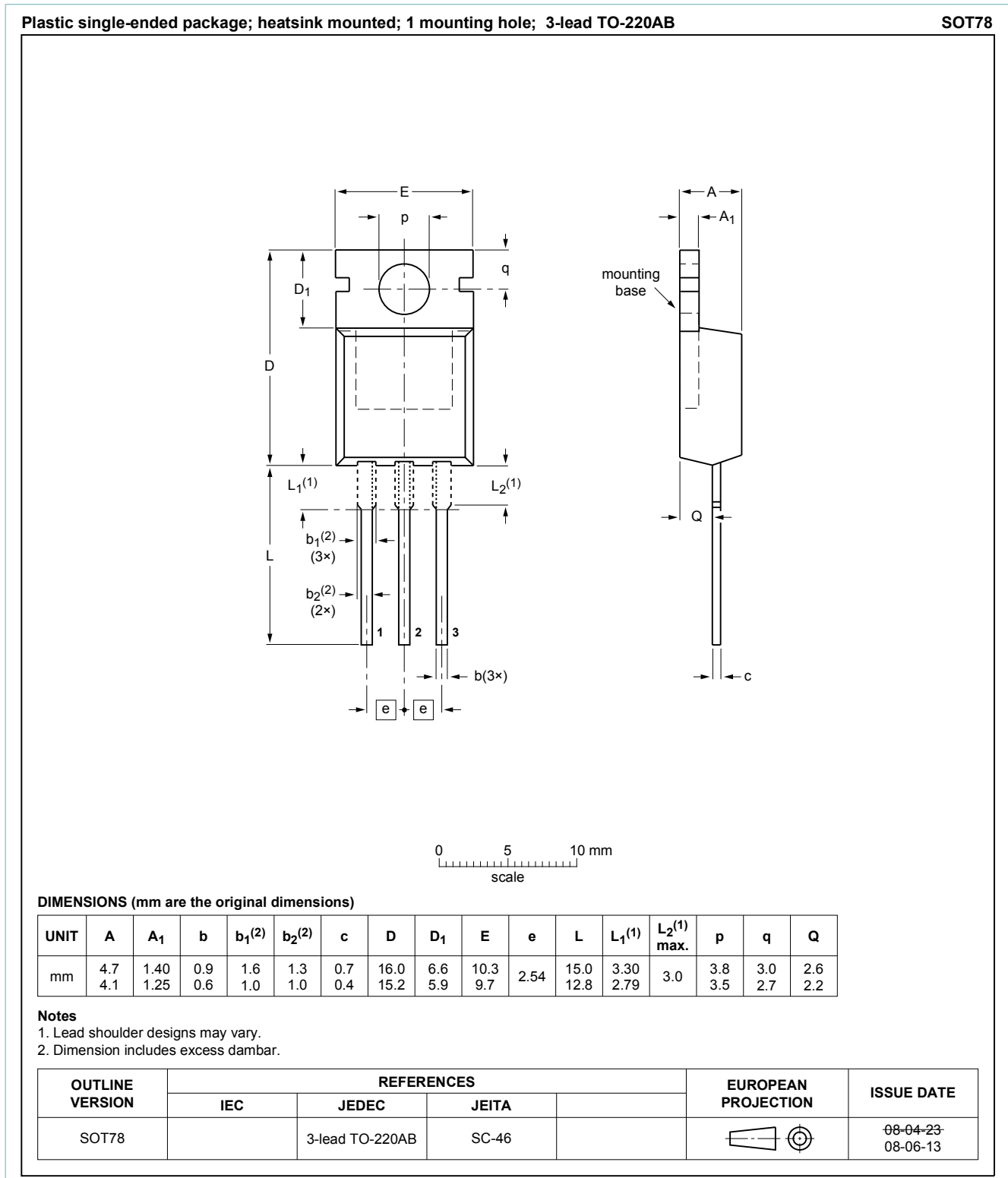


Fig. 12. Package outline TO-220AB (SOT78)

11. 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.
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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Date of release: 13 June 2014