

BTA312B-800ET

3Q Hi-Com Triac

4 October 2012

Product data sheet

1. Product profile

1.1 General description

Planar passivated high commutation three quadrant triac in a SOT404 (D2PAK) surface mountable plastic package. This "series ET" triac balances the requirements of commutation performance and gate sensitivity and is intended for interfacing with low power drivers including microcontrollers. It is used in applications where "high junction operating temperature" capability is required.

1.2 Features and benefits

- 3Q technology for improved noise immunity
- Direct interfacing with low power drivers and microcontrollers
- Good immunity to false turn-on by dV/dt
- High commutation capability with sensitive gate
- High junction operating temperature capability
- High voltage capability
- Planar passivated for voltage ruggedness and reliability
- Sensitive gate for easy logic level triggering
- Surface mountable package
- Triggering in three quadrants only

1.3 Applications

- Applications subject to high temperature
- Electronic thermostats (heating and cooling)
- High power motor controls e.g. washing machines and vacuum cleaners
- Refrigeration and air-conditioner compressor controls

1.4 Quick reference data

Table 1. Quick reference data

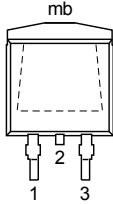

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	800	V
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{\text{j(Init)}} = 25\text{ }^{\circ}\text{C}$; $t_{\text{p}} = 20\text{ ms}$; Fig. 4 ; Fig. 5	-	-	100	A
T_{j}	junction temperature		-	-	150	$^{\circ}\text{C}$
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{mb}} \leq 125\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	12	A



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	-	-	10	mA
		V _D = 12 V; I _T = 0.1 A; T2+ G-; T _j = 25 °C; Fig. 7	-	-	10	mA
		V _D = 12 V; I _T = 0.1 A; T2- G-; T _j = 25 °C; Fig. 7	-	-	10	mA

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1	 <p>D2PAK (SOT404)</p>	 <p>sym051</p>
2	T2	main terminal 2		
3	G	gate		
mb	T2	mounting base; main terminal 2		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BTA312B-800ET	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

4. 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} ≤ 125 °C; Fig. 1 ; Fig. 2 ; Fig. 3	-	12	A
I _{TSM}	non-repetitive peak on-state current	full sine wave; T _{j(init)} = 25 °C; t _p = 20 ms; Fig. 4 ; Fig. 5	-	100	A
		full sine wave; T _{j(init)} = 25 °C; t _p = 16.7 ms	-	110	A

Symbol	Parameter	Conditions	Min	Max	Unit
I^2t	I^2t for fusing	$t_p = 10$ ms; SIN	-	50	A^2s
di_T/dt	rate of rise of on-state current	$I_T = 20$ A; $I_G = 0.2$ A; $di_G/dt = 0.2$ A/ μ s	-	100	A/ μ 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		-	150	$^{\circ}C$

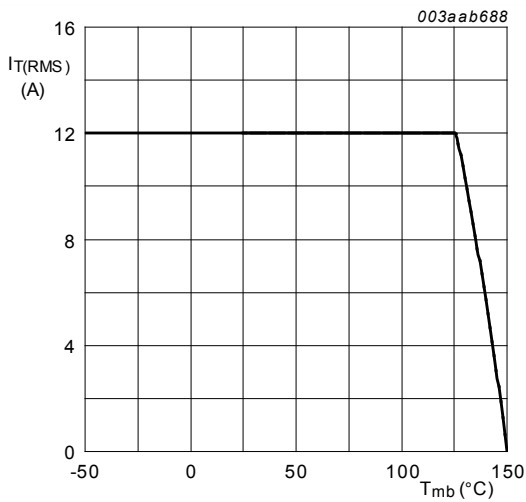
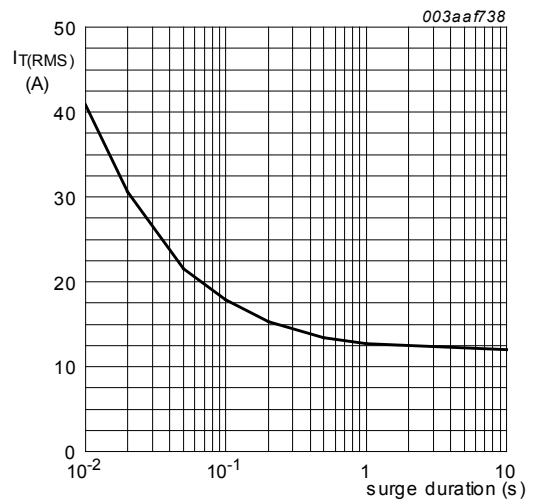
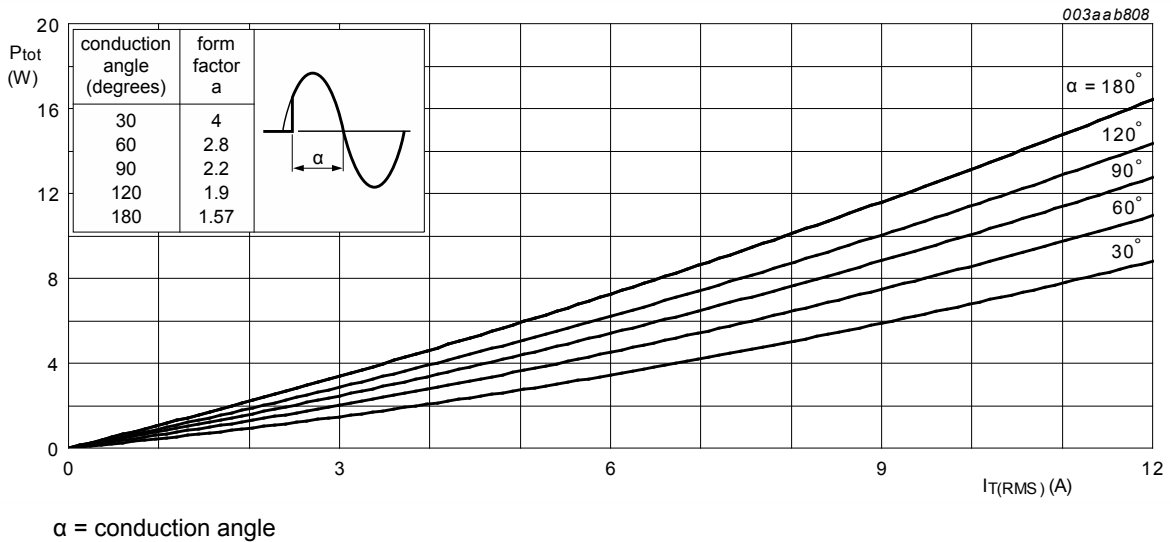


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



$f = 50$ Hz; $T_{mb} = 125$ $^{\circ}C$

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



α = conduction angle

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

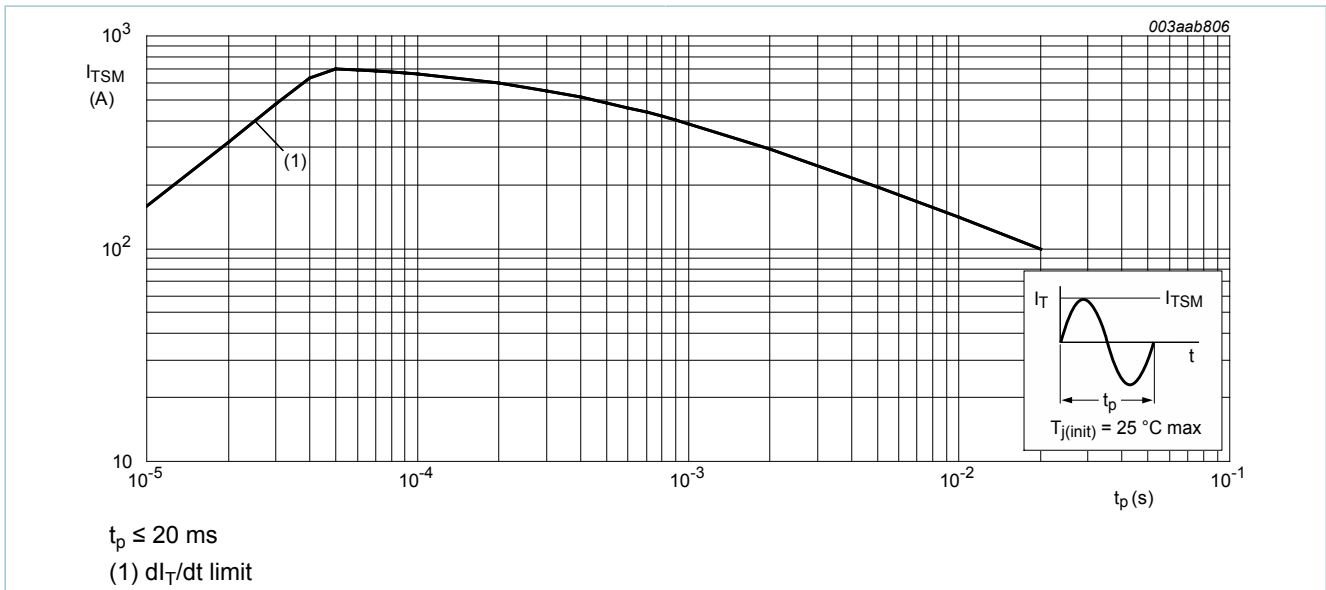


Fig. 4. Non-repetitive peak on-state current as a function of pulse duration; maximum values

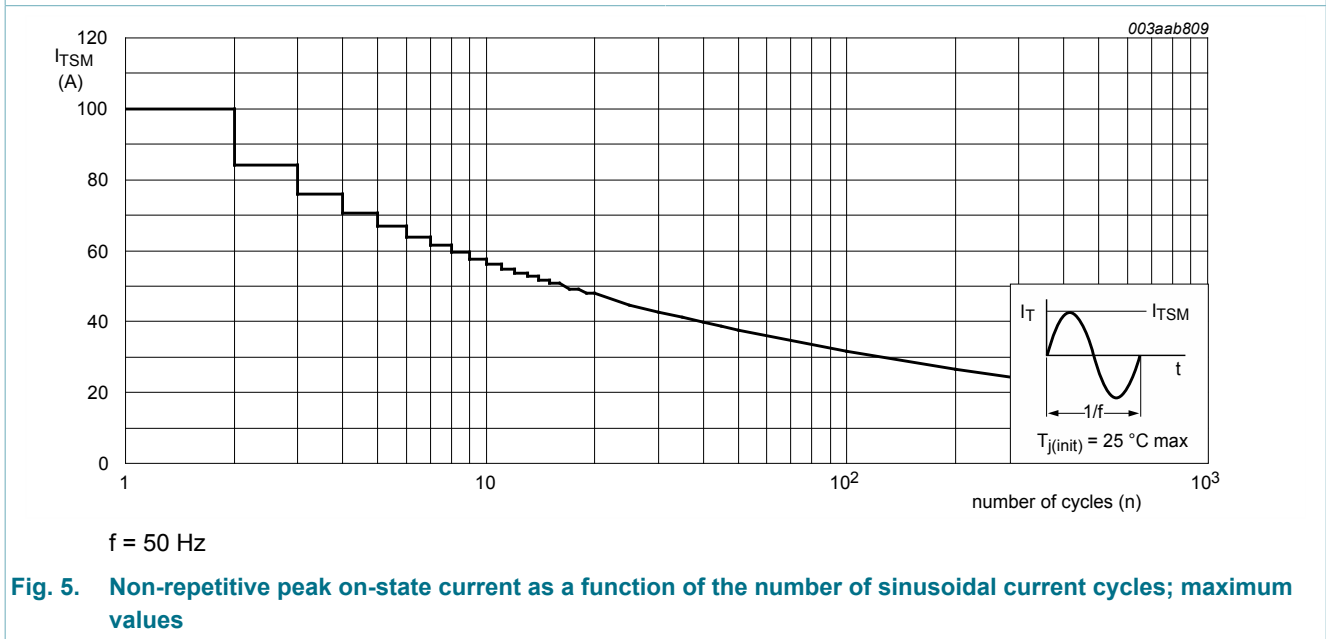
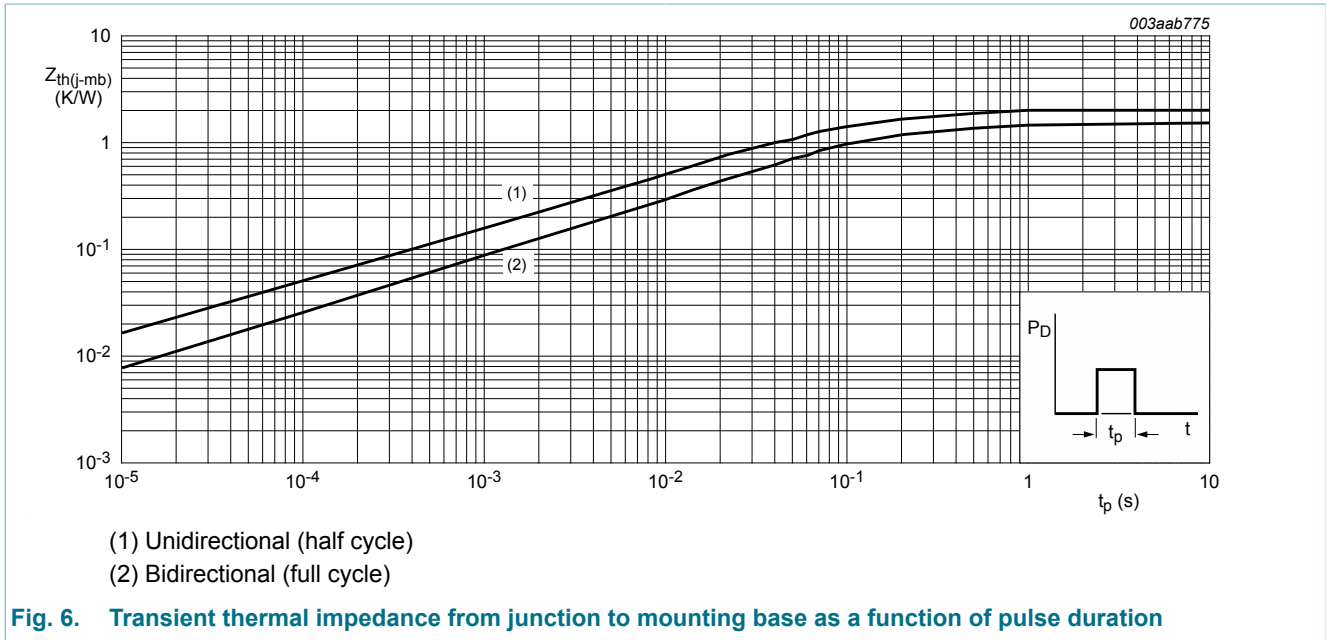


Fig. 5. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

5. 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	printed circuit board mounted; minimum footprint	-	55	-	K/W

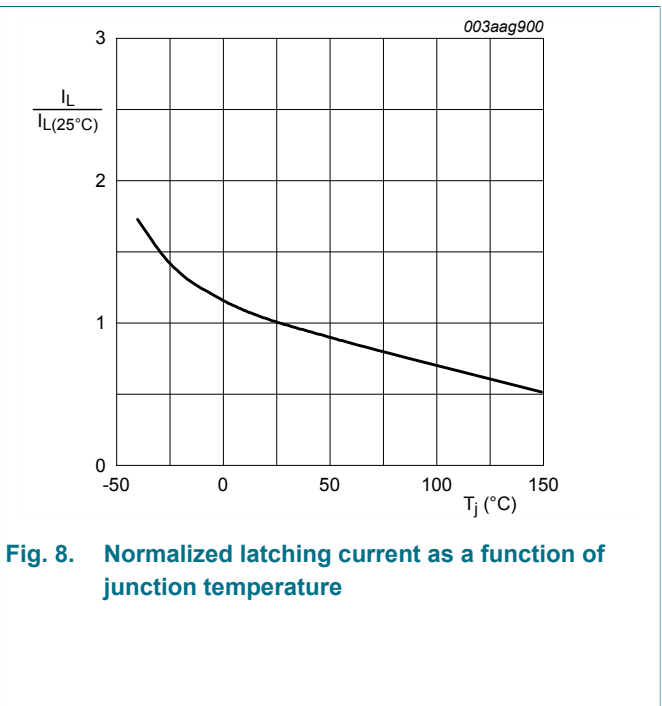
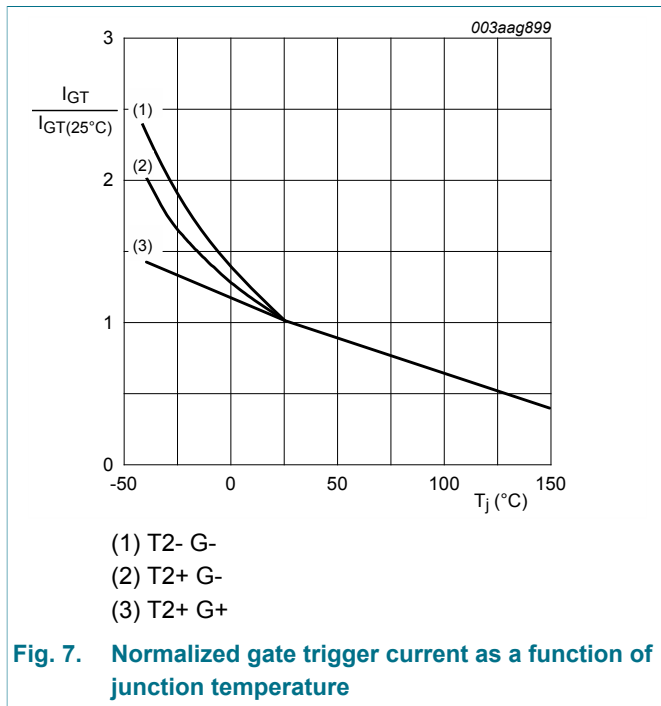


6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G+;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 7	-	-	10	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 7	-	-	10	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 7	-	-	10	mA
I_L	latching current	$V_D = 12\text{ V}; I_G = 0.1\text{ A}; T_2+ G+;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 8	-	-	25	mA
		$V_D = 12\text{ V}; I_G = 0.1\text{ A}; T_2+ G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 8	-	-	30	mA
		$V_D = 12\text{ V}; I_G = 0.1\text{ A}; T_2- G-;$ $T_j = 25\text{ }^\circ\text{C};$ Fig. 8	-	-	25	mA
I_H	holding current	$V_D = 12\text{ V}; T_j = 25\text{ }^\circ\text{C};$ Fig. 9	-	-	15	mA
V_T	on-state voltage	$I_T = 15\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 11	-	1.3	1.6	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 10	-	0.7	1.5	V
		$V_D = 400\text{ V}; I_T = 0.1\text{ A}; T_j = 150\text{ }^\circ\text{C};$ Fig. 10	0.25	-	-	V
I_D	off-state current	$V_D = 800\text{ V}; T_j = 150\text{ }^\circ\text{C}$	-	0.4	2	mA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536 \text{ V}$; $T_j = 150 \text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit	30	-	-	V/ μs
di_{com}/dt	rate of change of commutating current	$V_D = 400 \text{ V}$; $T_j = 150 \text{ }^\circ\text{C}$; $I_{T(RMS)} = 12 \text{ A}$; $dV_{com}/dt = 20 \text{ V}/\mu\text{s}$; (without snubber condition); gate open circuit	2	-	-	A/ms
		$V_D = 400 \text{ V}$; $T_j = 150 \text{ }^\circ\text{C}$; $I_{T(RMS)} = 12 \text{ A}$; $dV_{com}/dt = 10 \text{ V}/\mu\text{s}$; gate open circuit	3.5	-	-	A/ms
		$V_D = 400 \text{ V}$; $T_j = 150 \text{ }^\circ\text{C}$; $I_{T(RMS)} = 12 \text{ A}$; $dV_{com}/dt = 1 \text{ V}/\mu\text{s}$; gate open circuit	5	-	-	A/ms



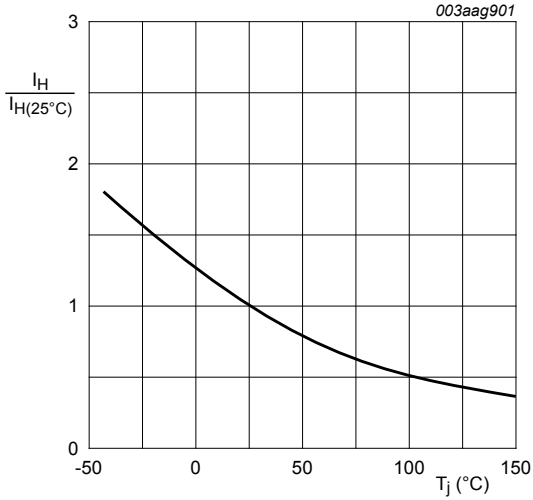


Fig. 9. Normalized holding current as a function of junction temperature

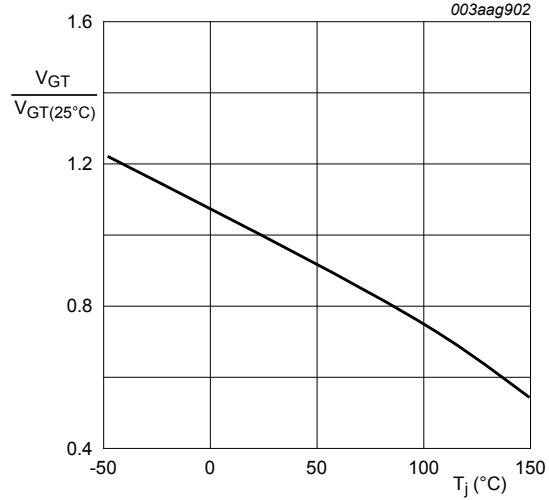
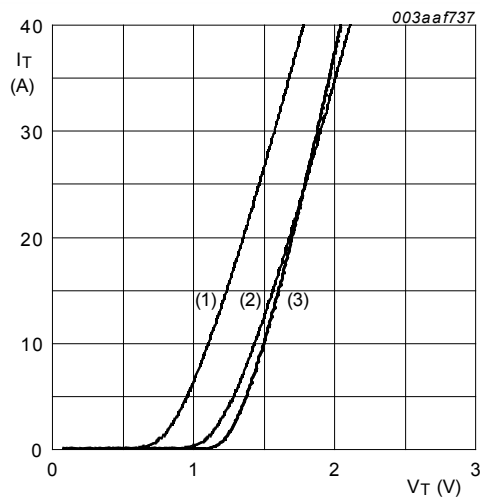


Fig. 10. Normalized gate trigger voltage as a function of junction temperature



$V_o = 1.127 \text{ V}$; $R_s = 0.027 \text{ } \Omega$
 (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. 11. On-state current as a function of on-state voltage

7. Package outline

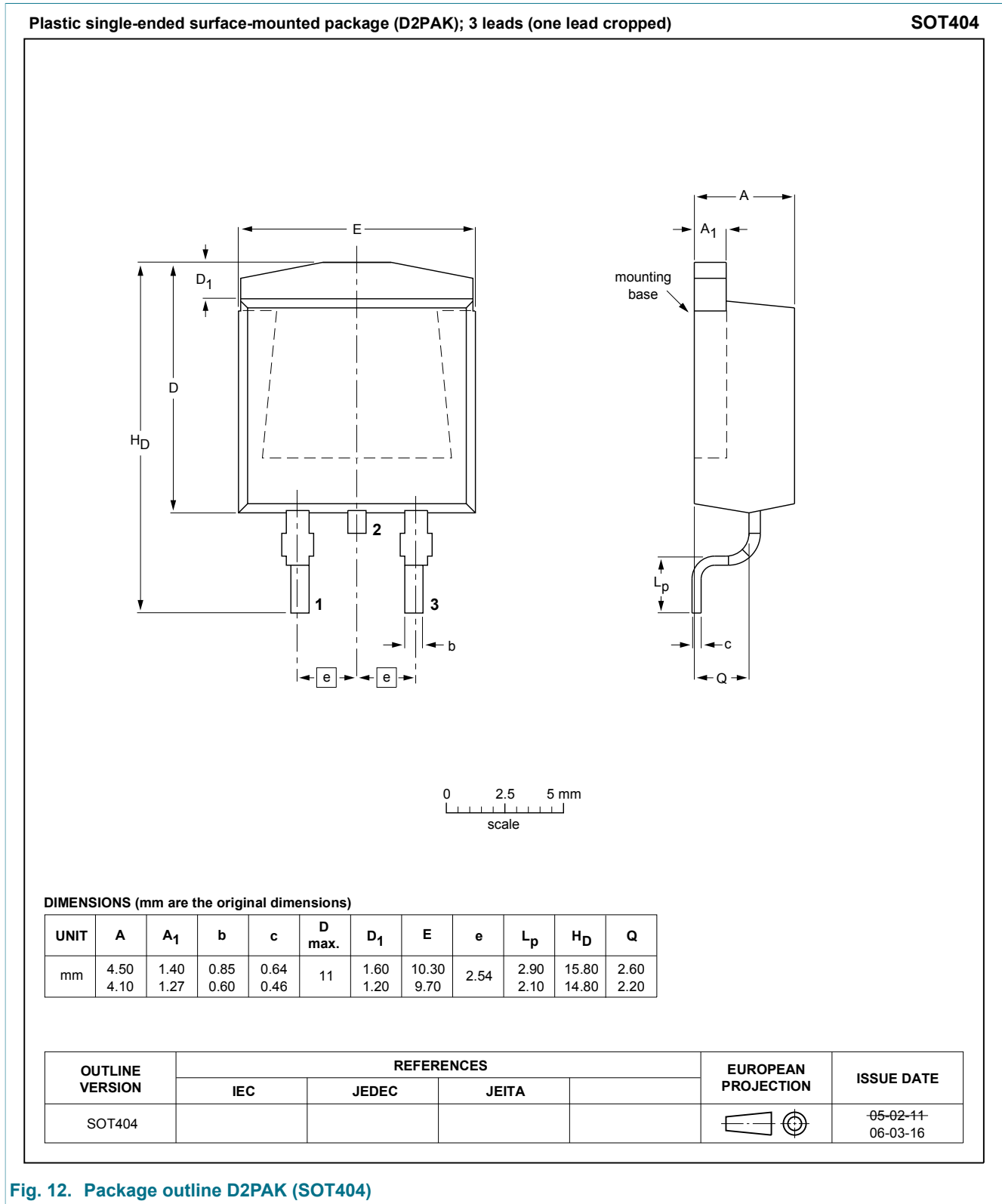


Fig. 12. Package outline D2PAK (SOT404)

8. Soldering

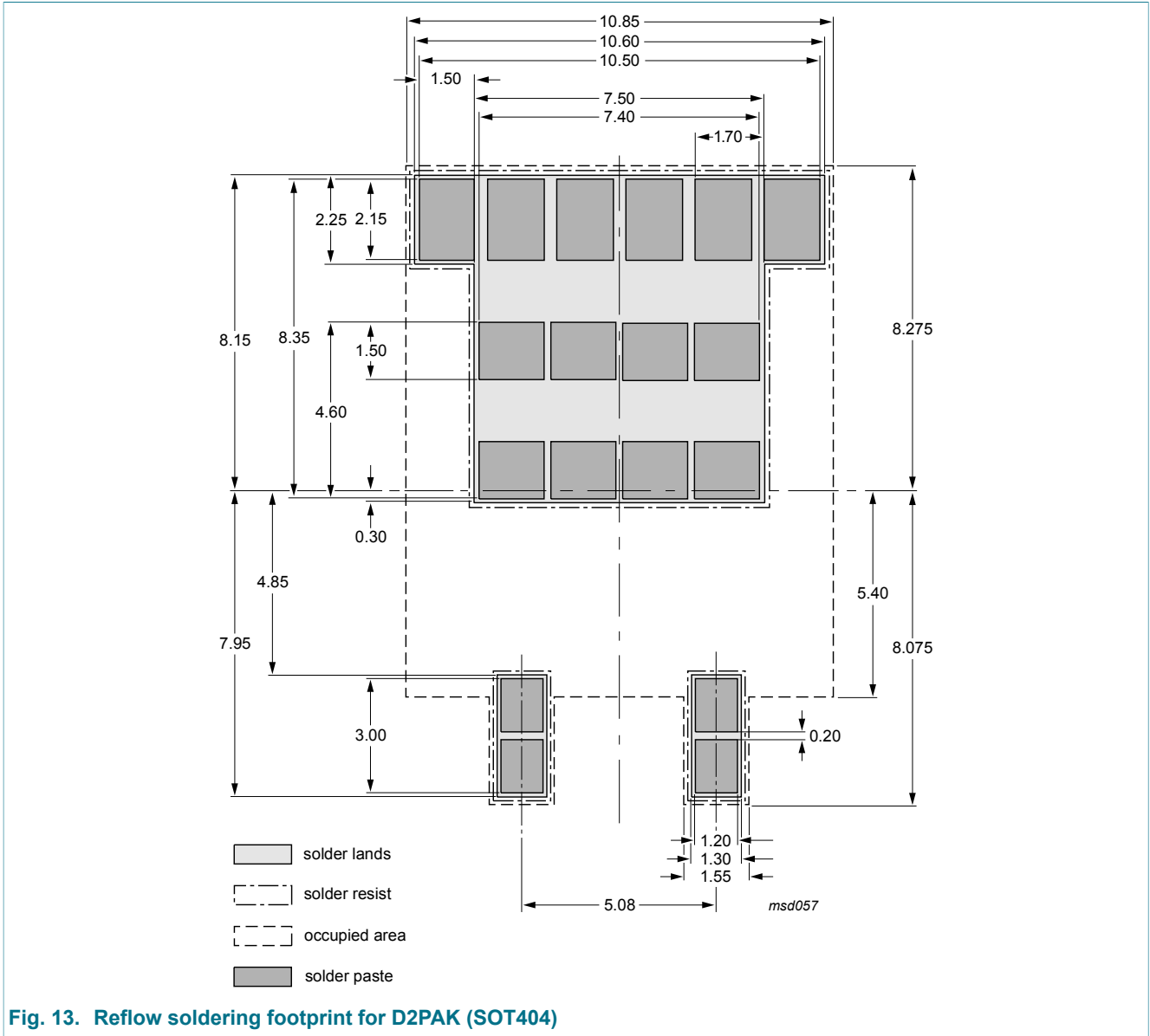


Fig. 13. Reflow soldering footprint for D2PAK (SOT404)

9. 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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10. Contents

1	Product profile	1
1.1	General description	1
1.2	Features and benefits	1
1.3	Applications	1
1.4	Quick reference data	1
2	Pinning information	2
3	Ordering information	2
4	Limiting values	2
5	Thermal characteristics	4
6	Characteristics	5
7	Package outline	8
8	Soldering	9
9	Legal information	10
9.1	Data sheet status	10
9.2	Definitions	10
9.3	Disclaimers	10
9.4	Trademarks	11

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