BTA208-600F

3Q Hi-Com Triac

Rev. 05 — 12 April 2011 Product data sheet

1. Product profile

1.1 General description

Planar passivated high commutation three quadrant triac in a SOT78 plastic package. This "series F" triac balances the requirements of commutation performance and gate sensitivity. The "less sensitive gate" "series F" is intended for interfacing with low power drivers including microcontrollers.

1.2 Features and benefits

- 3Q technology for improved noise immunity
- Good immunity to false turn-on by dV/dt
- High commutation capability with less sensitive gate
- High voltage capability
- Less sensitive gate suitable for higher "noise" applications
- Planar passivated for voltage ruggedness and reliability
- Triggering in three quadrants only

1.3 Applications

- Electronic thermostats
- General purpose motor controls

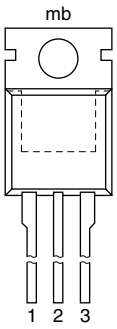
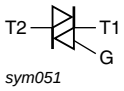
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	600	V
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)}$ = 25 °C; t_p = 20 ms; see Figure 4; see Figure 5	-	-	65	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq$ 102 °C; see Figure 1; see Figure 2; see Figure 3	-	-	8	A
Static characteristics						
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T2+ G+; T_j = 25 °C; see Figure 7	-	-	25	mA
		V_D = 12 V; I_T = 0.1 A; T2+ G-; T_j = 25 °C; see Figure 7	-	-	25	mA
		V_D = 12 V; I_T = 0.1 A; T2- G-; T_j = 25 °C; see Figure 7	-	-	25	mA

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1		
2	T2	main terminal 2		
3	G	gate		
mb	T2	mounting base; main terminal 2		

SOT78 (TO-220AB)

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BTA208-600F	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

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		-	600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 102$ °C; see Figure 1; see Figure 2; see Figure 3	-	8	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25$ °C; $t_p = 20$ ms; see Figure 4; see Figure 5	-	65	A
		full sine wave; $T_{j(init)} = 25$ °C; $t_p = 16.7$ ms	-	72	A
I^2t	I^2t for fusing	$t_p = 10$ ms; sine-wave pulse	-	21	A^2s
dI_T/dt	rate of rise of on-state current	$I_T = 12$ A; $I_G = 0.2$ A; $dI_G/dt = 0.2$ A/µs	-	100	A/µs
I_{GM}	peak gate current		-	2	A
V_{GM}	peak gate voltage		-	5	V
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	°C
T_j	junction temperature		-	125	°C

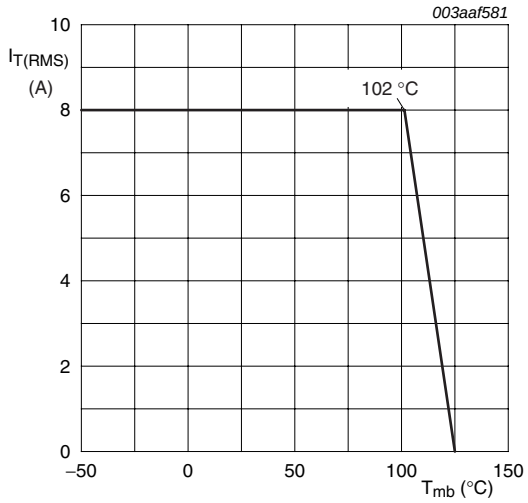
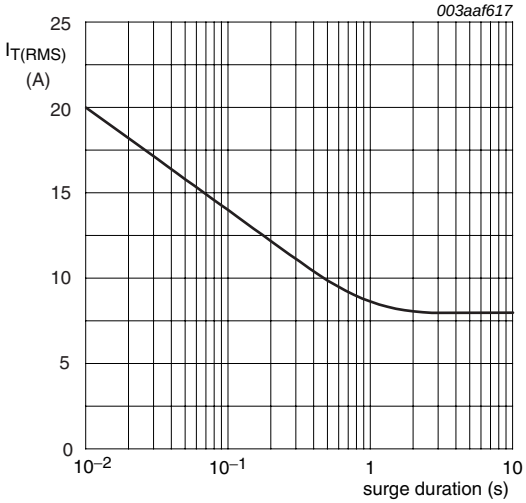
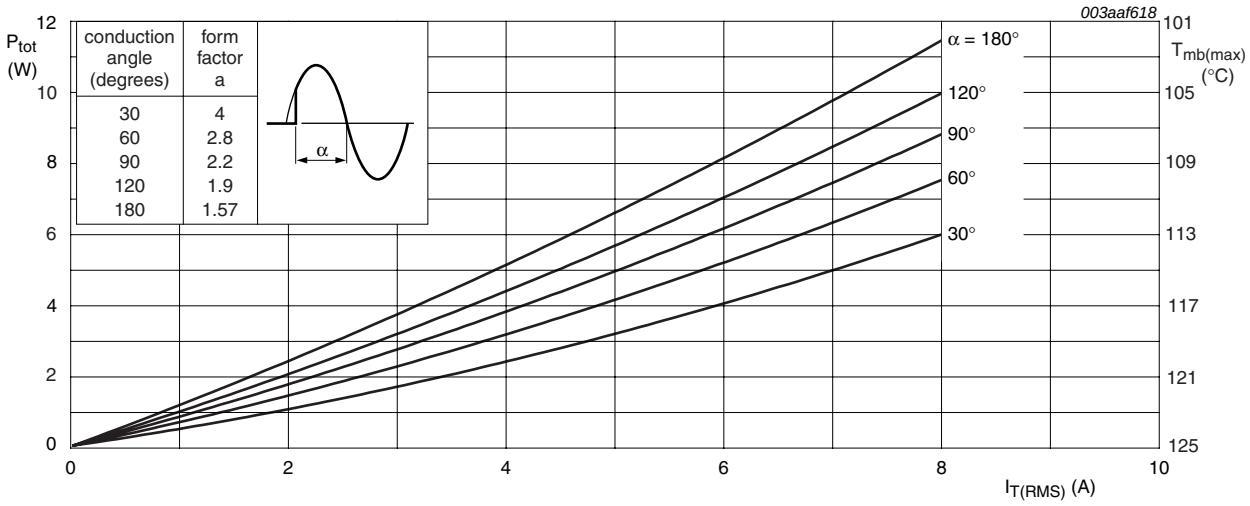


Fig 1. RMS on-state current as a function of heatsink temperature; maximum values



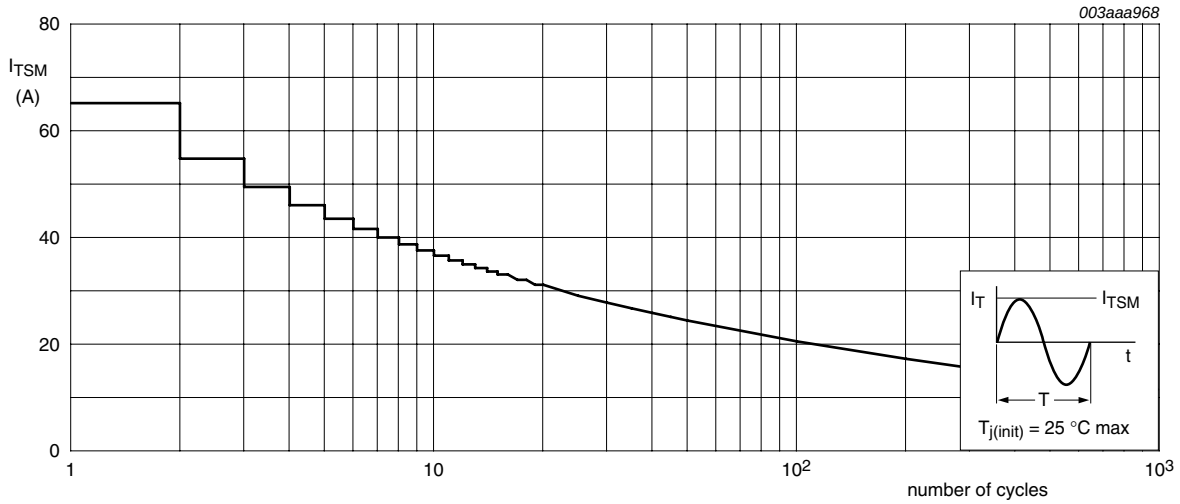
$f = 50\ Hz;\ T_{mb} = 102\ °C$

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



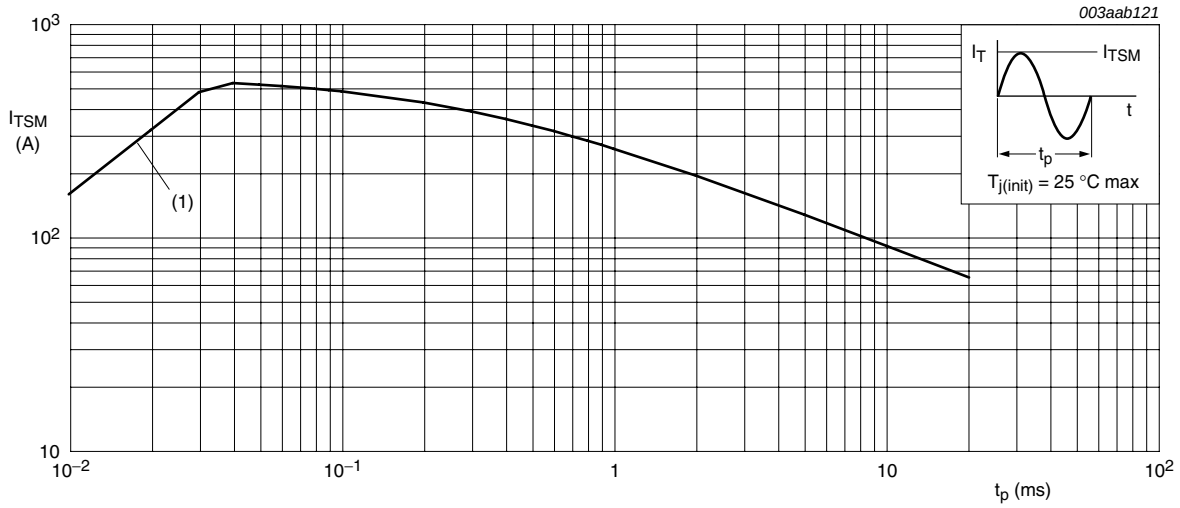
α = conduction angle

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



f = 50 Hz

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



$t_p \leq 20\,\text{ms}$; (1) dI_T/dt limit

Fig 5. Non-repetitive peak on-state current as a function of pulse width; 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; see Figure 6	-	-	2	K/W
		half cycle; see Figure 6	-	-	2.4	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W

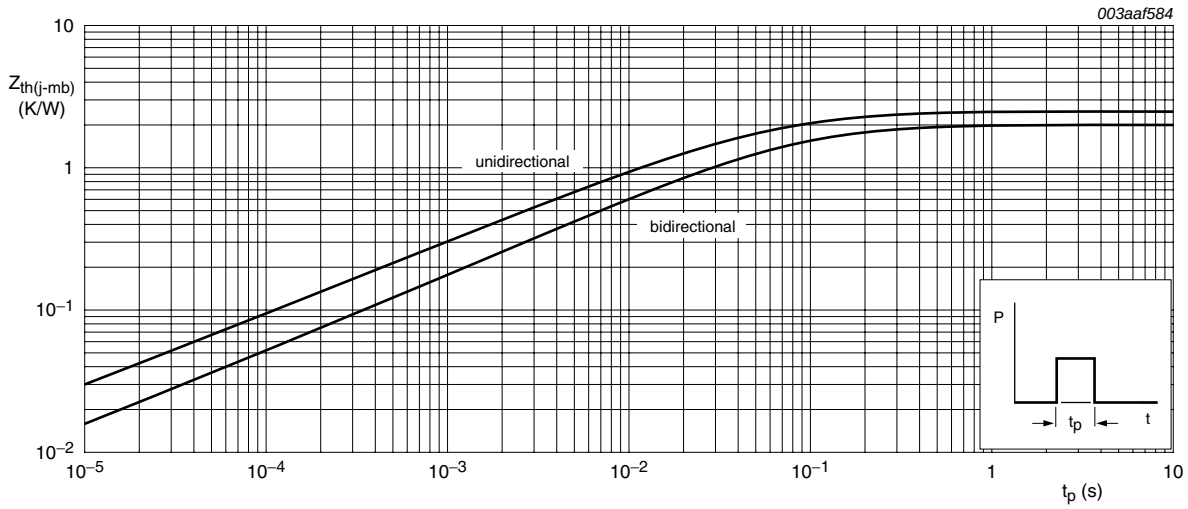
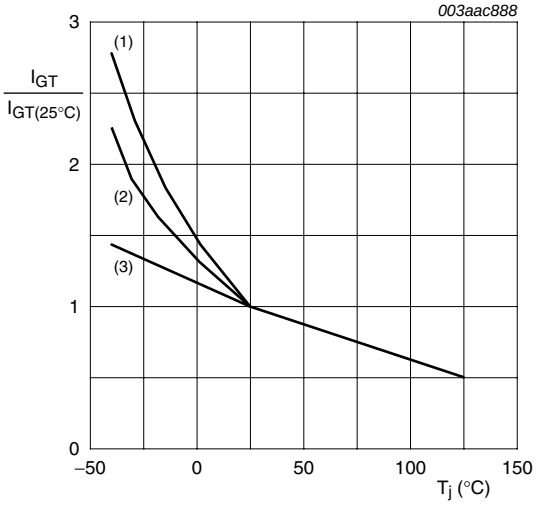


Fig 6. Transient thermal impedance from junction to mounting base as a function of pulse width

6. 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; see Figure 7	-	-	25	mA
		V_D = 12 V; I_T = 0.1 A; T2+ G-; T_j = 25 °C; see Figure 7	-	-	25	mA
		V_D = 12 V; I_T = 0.1 A; T2- G-; T_j = 25 °C; see Figure 7	-	-	25	mA
I_L	latching current	V_D = 12 V; I_G = 0.1 A; T2+ G+; T_j = 25 °C; see Figure 8	-	-	30	mA
		V_D = 12 V; I_G = 0.1 A; T2+ G-; T_j = 25 °C; see Figure 8	-	-	30	mA
		V_D = 12 V; I_G = 0.1 A; T2- G-; T_j = 25 °C; see Figure 8	-	-	40	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; see Figure 9	-	-	30	mA
V_T	on-state voltage	I_T = 10 A; T_j = 25 °C; see Figure 10	-	-	1.65	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; see Figure 11	-	-	1.5	V
		V_D = 400 V; I_T = 0.1 A; T_j = 125 °C; see Figure 11	0.25	-	-	V
I_D	off-state current	V_D = 600 V; T_j = 125 °C	-	0.1	0.5	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 402 V; T_j = 110 °C; exponential waveform; gate open circuit	70	-	-	V/µs
dI_{com}/dt	rate of change of commutating current	V_D = 400 V; T_j = 125 °C; $I_{T(RMS)}$ = 8 A; dV_{com}/dt = 0.1 V/µs; gate open circuit	20	-	-	A/ms
		V_D = 400 V; T_j = 125 °C; $I_{T(RMS)}$ = 8 A; dV_{com}/dt = 10 V/µs; gate open circuit; see Figure 12	14	-	-	A/ms



(1) T2- G-

(2) T2+ G-

(3) T2+ G+

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

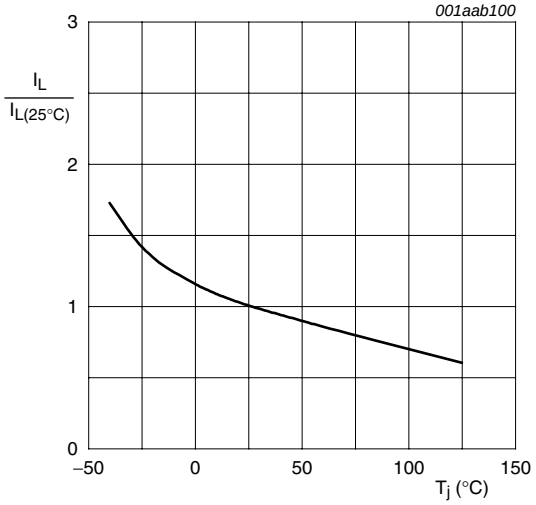


Fig 8. Normalized latching current as a function of junction temperature

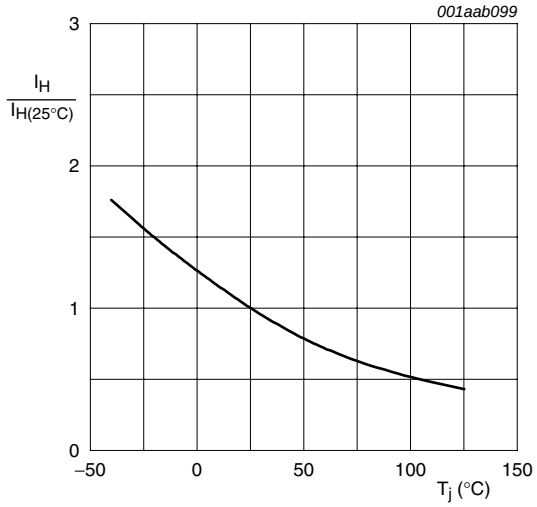
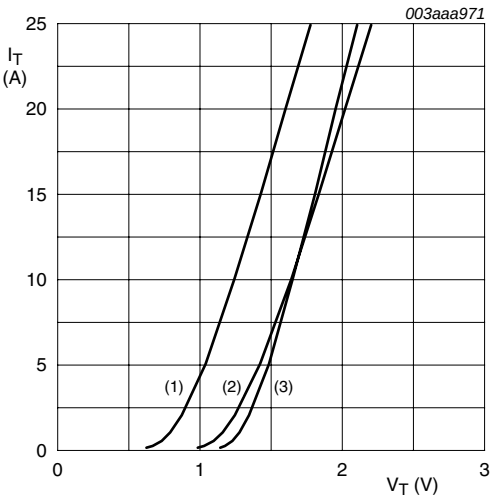


Fig 9. Normalized holding current as a function of junction temperature



Vo = 1.264 V; Rs = 0.0378 Ω

(1) Tj = 125 °C; typical values

(2) Tj = 125 °C; maximum values

(3) Tj = 25 °C; maximum values

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

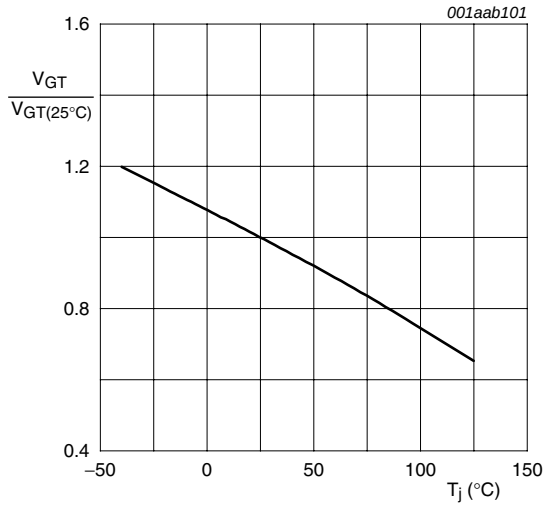


Fig 11. Normalized gate trigger voltage as a function of junction temperature

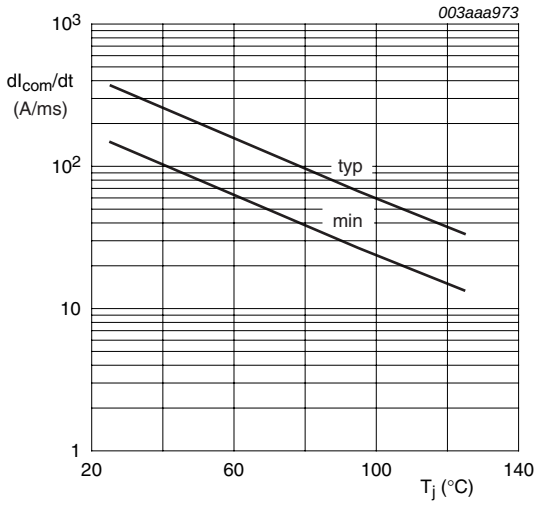
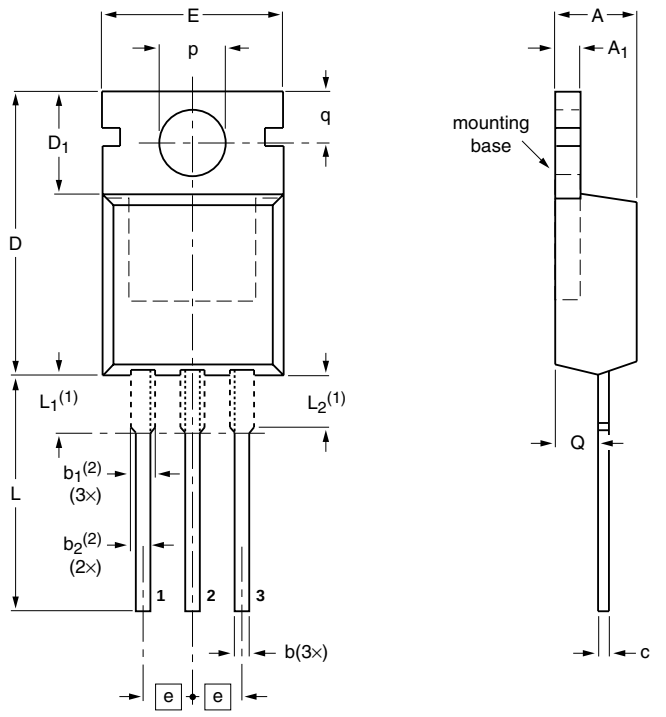


Fig 12. Rate of change of commutating current as a function of junction temperature; typical and minimum values

7. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB **SOT78**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1(2)	b_2(2)	c	D	D_1	E	e	L	L_1(1)	L_2(1) max.	p	q	Q
mm	4.7 4.1	1.40 1.25	0.9 0.6	1.6 1.0	1.3 1.0	0.7 0.4	16.0 15.2	6.6 5.9	10.3 9.7	2.54	15.0 12.8	3.30 2.79	3.0	3.8 3.5	3.0 2.7	2.6 2.2

Notes
1. Lead shoulder designs may vary.
2. Dimension includes excess dambar.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT78		3-lead TO-220AB	SC-46			~~08-04-23~~ 08-06-13

Fig 13. Package outline SOT78 (TO-220AB)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BTA208-600F v.5	20110412	Product data sheet	-	BTA208_SERIES_D_E_F v.4
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Type number BTA208-600F separated from data sheet BTA208_SERIES_D_E_F v.4.			
BTA208_SERIES_D_E_F v.4	20020301	Product specification	-	BTA208_SERIES_D_E_F v.3

9. Legal information

9.1 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.

[1] Please consult the most recently issued document before initiating or completing a design.

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

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11. Contents

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