BTA204-800C

3Q Hi-Com Triac

Rev. 3 — 9 May 2011 **Product data sheet**

1. Product profile

1.1 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 C" triac will commutate the full rated RMS current at the maximum rated junction temperature without the aid of a snubber.

1.2 Features and benefits

- 3Q technology for improved noise immunity
- High blocking voltage capability
- High commutation capability with maximum false trigger immunity
- High immunity to false turn-on by dV/dt
- Less sensitive gate for high noise immunity
- Planar passivated for voltage ruggedness and reliability
- Triggering in three quadrants only

1.3 Applications

- General purpose motor control circuits
- Home appliances
- Rectifier-fed DC inductive loads e.g. DC motors and solenoids

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; $T_{j(init)}$ = 25 °C; t_p = 20 ms; see Figure 4; see Figure 5	-	-	25	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 107$ °C; see Figure 1; see Figure 2; see Figure 3	-	-	4	A

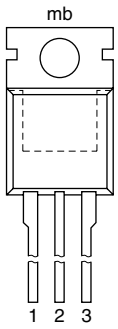
Table 1. Quick reference data *...continued*

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	-	-	35	mA
		V_D = 12 V; I_T = 0.1 A; T2+ G-; T_j = 25 °C; see Figure 7	-	-	35	mA
		V_D = 12 V; I_T = 0.1 A; T2- G-; T_j = 25 °C; see Figure 7	-	-	35	mA

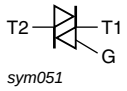
2. Pinning information

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
BTA204-800C	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78
BTA204-800C/DG	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

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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; $T_{mb} \leq 107$ °C; see Figure 1; see Figure 2; see Figure 3	-	4	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	-	25	A
		full sine wave; $T_{j(init)} = 25$ °C; $t_p = 16.7$ ms	-	27	A
I^2t	I^2t for fusing	$t_p = 10$ ms; sine-wave pulse	-	3.1	A^2s
dI_T/dt	rate of rise of on-state current	$I_T = 6$ A; $I_G = 0.2$ A; $dI_G/dt = 0.2$ A/µs	-	100	A/µs
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	°C
T_j	junction temperature		-	125	°C

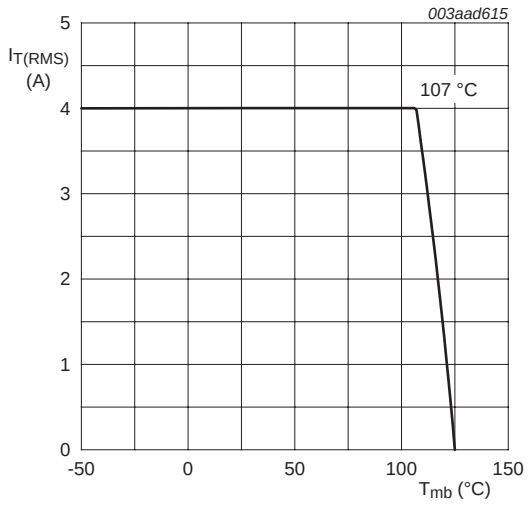
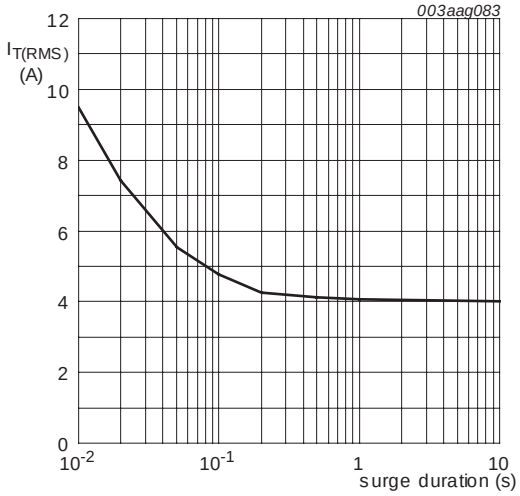


Fig 1. RMS on-state current as a function of mounting base temperature; maximum values



f = 50 Hz; T_{mb} = 107 °C

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

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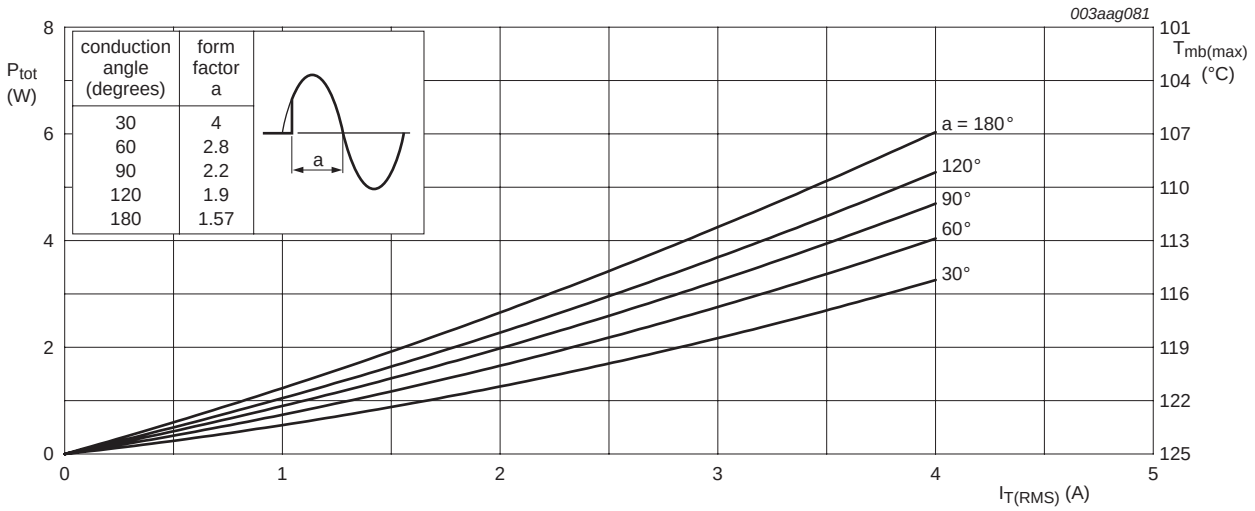
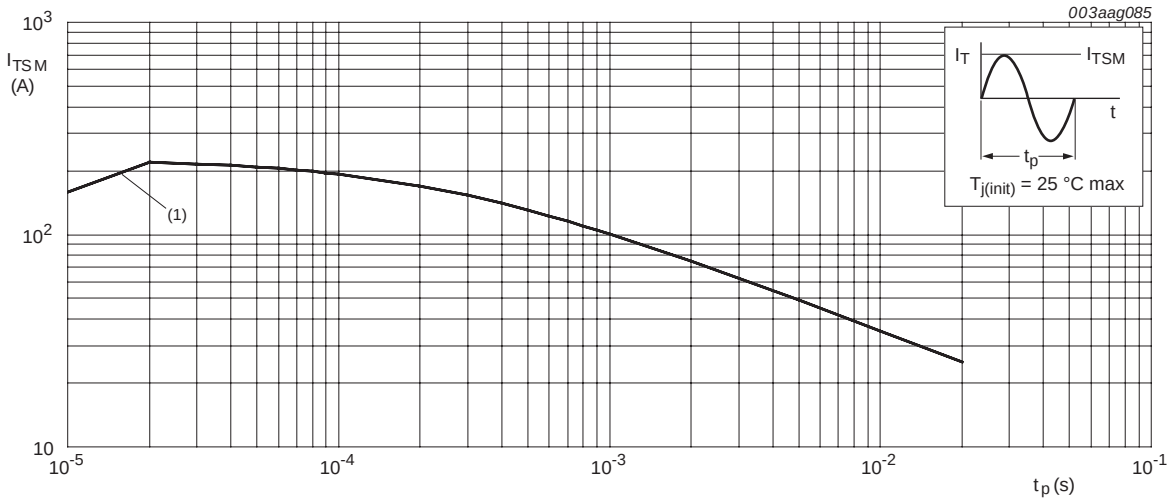


Fig 3. Total power dissipation as a function of RMS on-state current; maximum values



$t_p \leq 20\ ms$; (1) dI_T/dt limit

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

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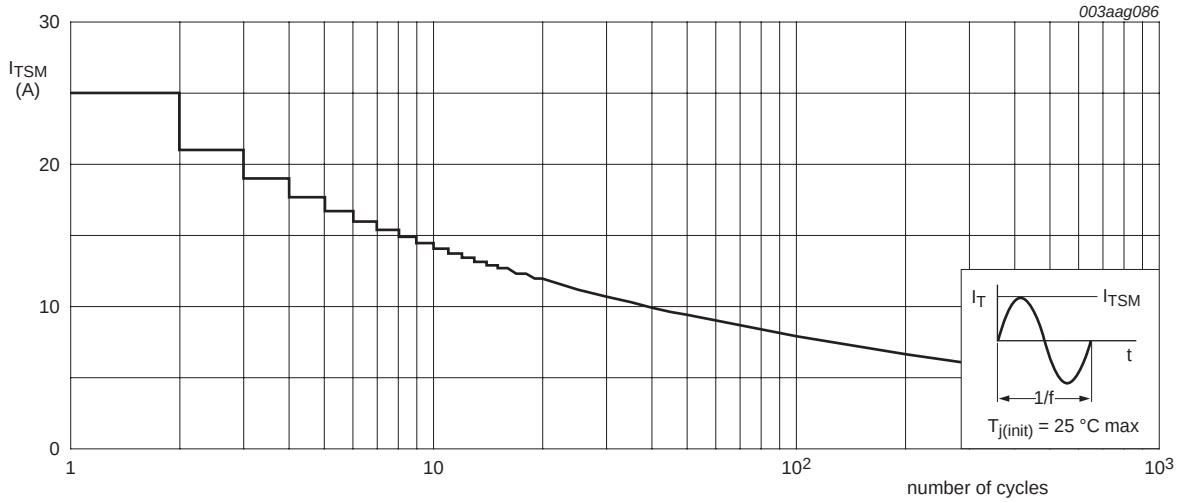

f = 50 Hz

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

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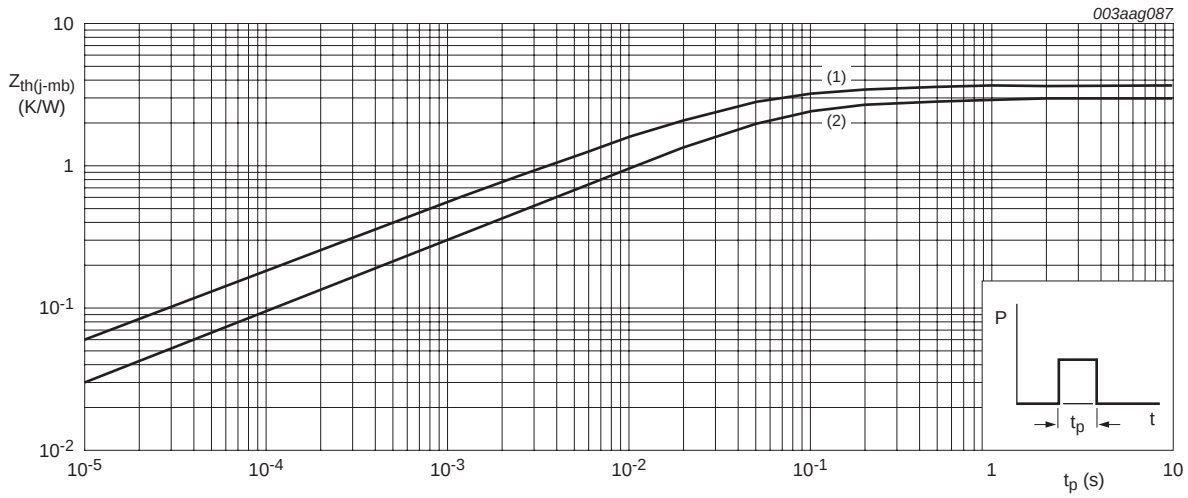
5. Thermal characteristics

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	-	-	3	K/W
		half cycle; see Figure 6	-	-	3.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W



(1) Unidirectional (half cycle)

(2) Bidirectional (full cycle)

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

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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	-	-	35	mA
		V_D = 12 V; I_T = 0.1 A; T2+ G-; T_j = 25 °C; see Figure 7	-	-	35	mA
		V_D = 12 V; I_T = 0.1 A; T2- G-; T_j = 25 °C; see Figure 7	-	-	35	mA
I_L	latching current	V_D = 12 V; I_G = 0.1 A; T2+ G+; T_j = 25 °C; see Figure 8	-	-	20	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	-	-	20	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; see Figure 9	-	-	20	mA
V_T	on-state voltage	I_T = 5 A; T_j = 25 °C; see Figure 10	-	1.4	1.7	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; see Figure 11	-	0.7	1.5	V
		V_D = 400 V; I_T = 0.1 A; T_j = 125 °C; see Figure 11	0.25	0.4	-	V
I_D	off-state current	V_D = 800 V; T_j = 125 °C	-	0.1	0.5	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 536 V; T_j = 125 °C; exponential waveform; gate open circuit	1000	-	-	V/µs
dI_{com}/dt	rate of change of commutating current	V_D = 400 V; T_j = 125 °C; $I_{T(RMS)}$ = 4 A; dV_{com}/dt = 20 V/µs; snubberless condition; gate open circuit	3	-	-	A/ms
t_{gt}	gate-controlled turn-on time	I_{TM} = 12 A; V_D = 800 V; I_G = 0.1 A; dI_G/dt = 5 A/µs	-	2	-	µs

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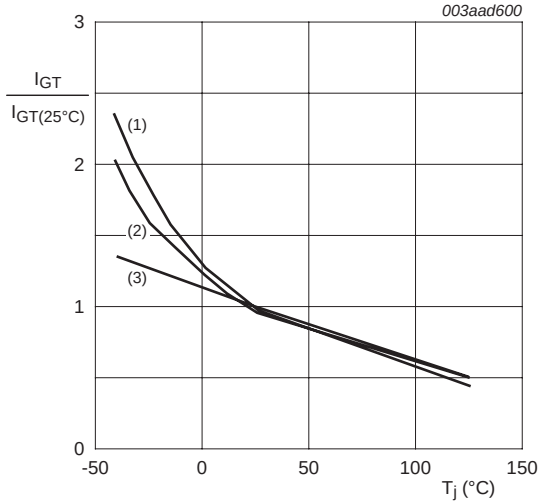


(1) T2- G-

(2) T2+ G-

(3) T2+ G+

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

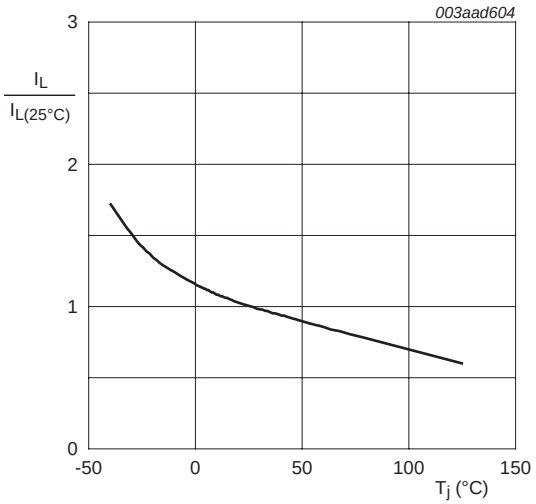


Fig 8. Normalized latching current as a function of junction temperature

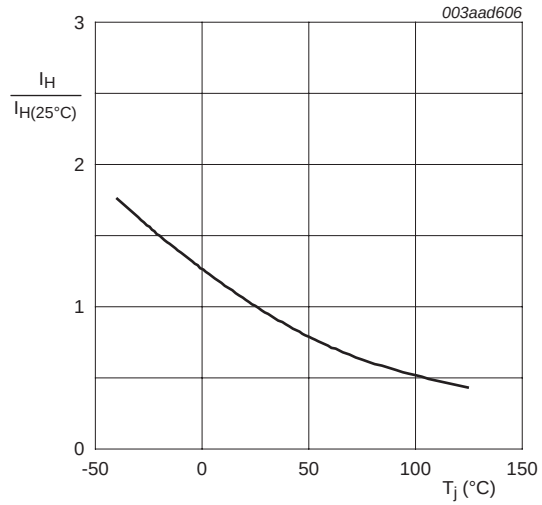
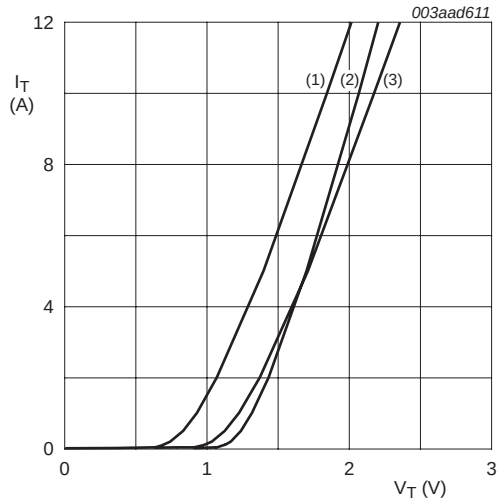


Fig 9. Normalized holding current as a function of junction temperature



Vo = 1.27 V; Rs = 0.091 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

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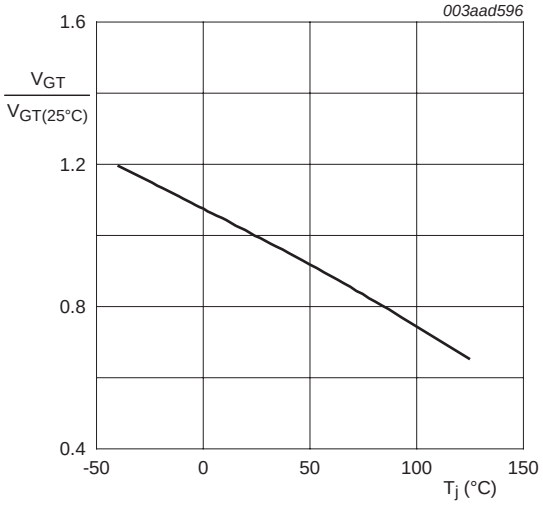

Fig 11. Normalized gate trigger voltage as a function of junction temperature

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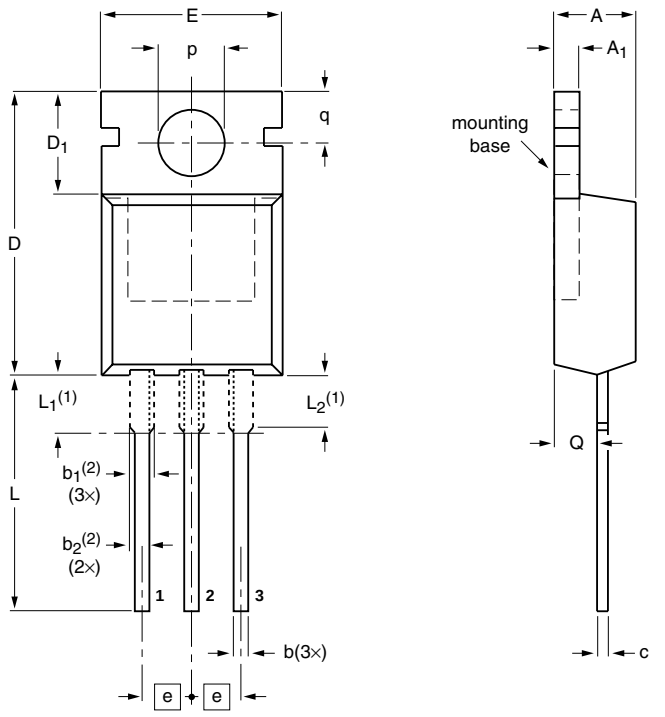
7. Package outline

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 12. Package outline SOT78 (TO-220AB)

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8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BTA204-800C v.3	20110509	Product data sheet	-	BTA204_SERIES_B_C v.2
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 BTA204-800C separated from data sheet BTA204_SERIES_B_C v.2.			
BTA204_SERIES_B_C v.2	19981201	Product specification	-	BTA204_SERIES_B_C v.1

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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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