

DATA SHEET

BTA204S series D, E and F
BTA204M series D, E and F
Three quadrant triacs guaranteed
commutation

Product specification

December 1998

Three quadrant triacs guaranteed commutation

BTA204S series D, E and F BTA204M series D, E and F

GENERAL DESCRIPTION

Passivated guaranteed commutation triacs in a plastic envelope suitable for surface mounting, intended for use in motor control circuits or with other highly inductive loads. These devices balance the requirements of commutation performance and gate sensitivity. The "sensitive gate" E series and "logic level" D series are intended for interfacing with low power drivers, including micro controllers.

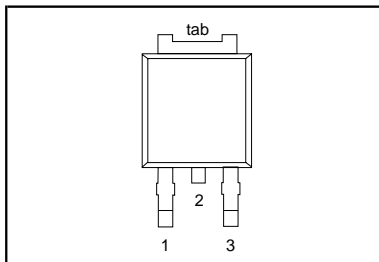
QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	MAX.	UNIT
V_{DRM}	BTA204S (or BTA204M)-	500D	600D	-	V
	BTA204S (or BTA204M)-	500E	600E	800E	
	BTA204S (or BTA204M)-	500F	600F	800F	
	Repetitive peak off-state voltages	500	600	800	
$I_{\text{T(RMS)}}$	RMS on-state current	4	4	4	A
I_{TSM}	Non-repetitive peak on-state current	25	25	25	A

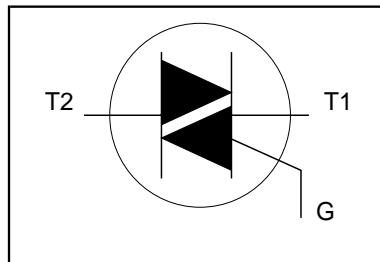
PINNING - SOT428

PIN NUMBER	Standard S	Alternative M
1	MT1	gate
2	MT2	MT2
3	gate	MT1
tab	MT2	MT2

PIN CONFIGURATION



SYMBOL



LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.			UNIT
				-500 500 ¹	-600 600 ¹	-800 800	
V_{DRM}	Repetitive peak off-state voltages		-				V
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{mb}} \leq 107^\circ\text{C}$	-	4			A
I_{TSM}	Non-repetitive peak on-state current	full sine wave; $T_j = 25^\circ\text{C}$ prior to surge	-	25			A
		$t = 20\text{ ms}$	-	27			A
		$t = 16.7\text{ ms}$	-	3.1			A ² s
		$t = 10\text{ ms}$	-	100			A/μs
I_{GM}	Peak gate current	$I_{\text{TM}} = 6\text{ A}; I_{\text{G}} = 0.2\text{ A};$ $dI_{\text{G}}/dt = 0.2\text{ A}/\mu\text{s}$	-	2			A
V_{GM}	Peak gate voltage		-	5			V
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	150			°C
T_j	Operating junction temperature		-	125			°C

¹ Although not recommended, off-state voltages up to 800V may be applied without damage, but the triac may switch to the on-state. The rate of rise of current should not exceed 6 A/μs.

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THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Thermal resistance junction to mounting base	full cycle	-	-	3.0	K/W
		half cycle	-	-	3.7	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	pcb (FR4) mounted; footprint as in Fig.14	-	75	-	K/W

STATIC CHARACTERISTICS

$T_j = 25\text{ }^\circ\text{C}$ unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.			UNIT
		BTA204S (or BTA204M)-			...D	...E	...F	
I_{GT}	Gate trigger current ²	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$ T2+ G+ T2+ G- T2- G-	-	-	5	10	25	mA
			-	-	5	10	25	mA
			-	-	5	10	25	mA
I_L	Latching current	$V_D = 12\text{ V}$; $I_{GT} = 0.1\text{ A}$ T2+ G+ T2+ G- T2- G-	-	-	6	12	20	mA
			-	-	9	18	30	mA
			-	-	6	12	20	mA
I_H	Holding current	$V_D = 12\text{ V}$; $I_{GT} = 0.1\text{ A}$	-	-	6	12	20	mA
V_T	On-state voltage	$I_T = 5\text{ A}$	-	1.4	1.7			V
V_{GT}	Gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$	-	0.7	1.5			V
		$V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 125\text{ }^\circ\text{C}$	0.25	0.4	-			V
I_D	Off-state leakage current	$V_D = V_{DRM(max)}$; $T_j = 125\text{ }^\circ\text{C}$	-	0.1	0.5			mA

DYNAMIC CHARACTERISTICS

$T_j = 25\text{ }^\circ\text{C}$ unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.			TYP.	MAX.	UNIT
		BTA204S (or BTA204M)-	...D	...E	...F			
dV_D/dt	Critical rate of rise of off-state voltage	$V_{DM} = 67\% V_{DRM(max)}$; $T_j = 125\text{ }^\circ\text{C}$; exponential waveform; gate open circuit	20	30	50	-	-	V/ μs
dI_{com}/dt	Critical rate of change of commutating current	$V_{DM} = 400\text{ V}$; $T_j = 125\text{ }^\circ\text{C}$; $I_{T(RMS)} = 4\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; gate open circuit	1.0	2.0	2.5	-	-	A/ms
dI_{com}/dt	Critical rate of change of commutating current	$V_{DM} = 400\text{ V}$; $T_j = 125\text{ }^\circ\text{C}$; $I_{T(RMS)} = 4\text{ A}$; $dV_{com}/dt = 0.1\text{ V}/\mu\text{s}$; gate open circuit	5.0	-	-	-	-	A/ms
t_{gt}	Gate controlled turn-on time	$I_{TM} = 12\text{ A}$; $V_D = V_{DRM(max)}$; $I_G = 0.1\text{ A}$; $dI_G/dt = 5\text{ A}/\mu\text{s}$	-	-	-	2	-	μs

² Device does not trigger in the T2-, G+ quadrant.

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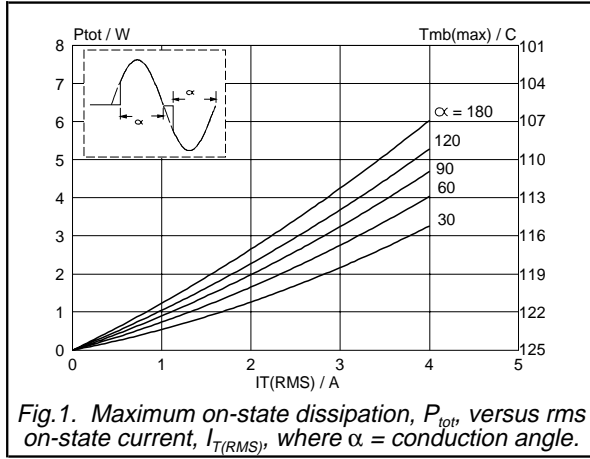


Fig.1. Maximum on-state dissipation, P_{tot} , versus rms on-state current, $I_{T(RMS)}$, where α = conduction angle.

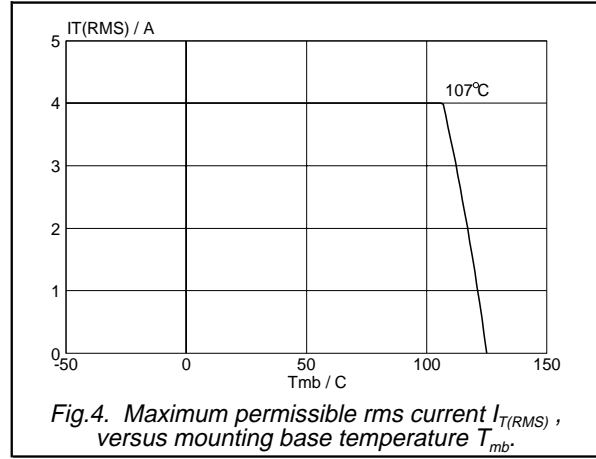


Fig.4. Maximum permissible rms current $I_{T(RMS)}$, versus mounting base temperature T_{mb} .

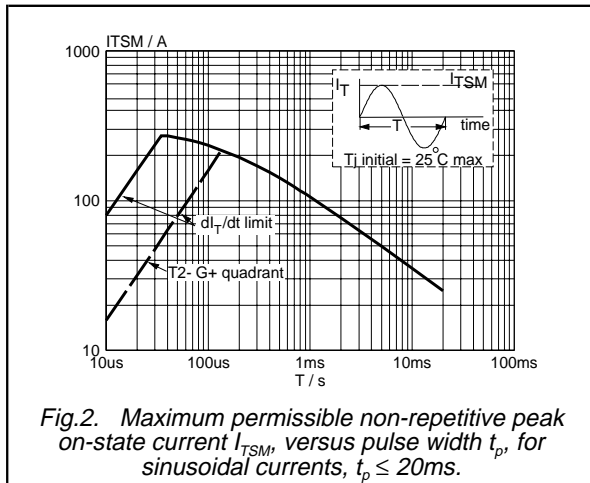


Fig.2. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus pulse width t_p , for sinusoidal currents, $t_p \leq 20ms$.

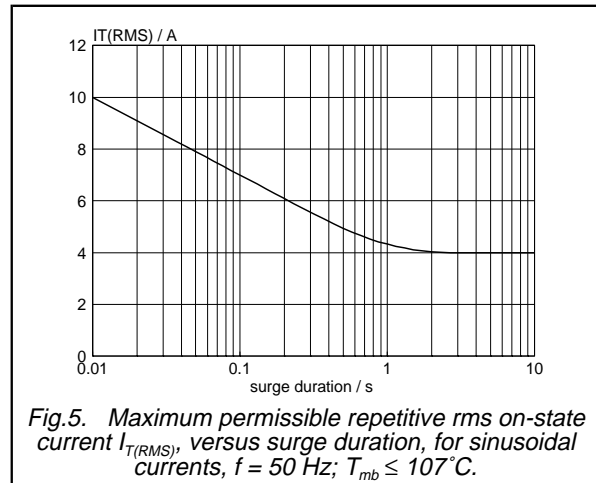


Fig.5. Maximum permissible repetitive rms on-state current $I_{T(RMS)}$, versus surge duration, for sinusoidal currents, $f = 50 Hz$; $T_{mb} \leq 107^\circ C$.

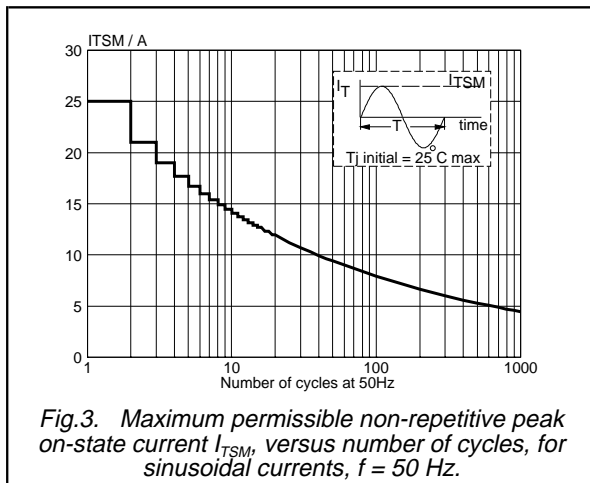


Fig.3. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus number of cycles, for sinusoidal currents, $f = 50 Hz$.

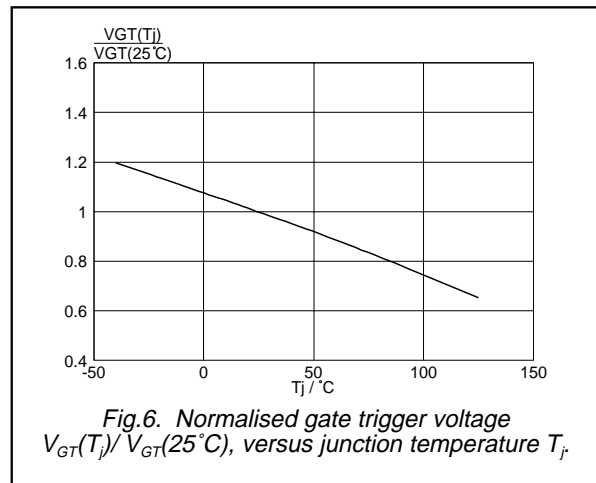


Fig.6. Normalised gate trigger voltage $V_{GT}(T_j)/V_{GT}(25^\circ C)$, versus junction temperature T_j .

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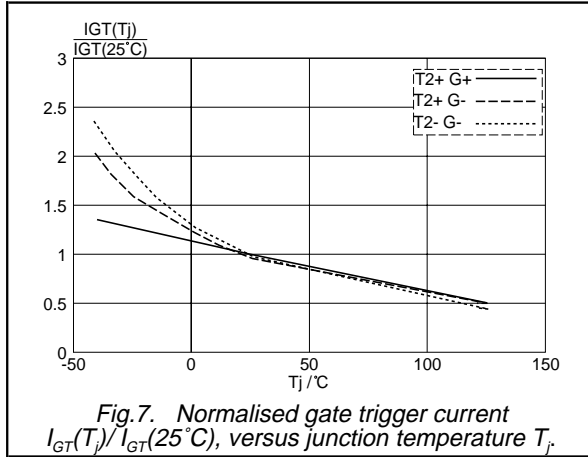


Fig. 7. Normalised gate trigger current $I_{GT}(T_j)/I_{GT}(25^\circ\text{C})$, versus junction temperature T_j .

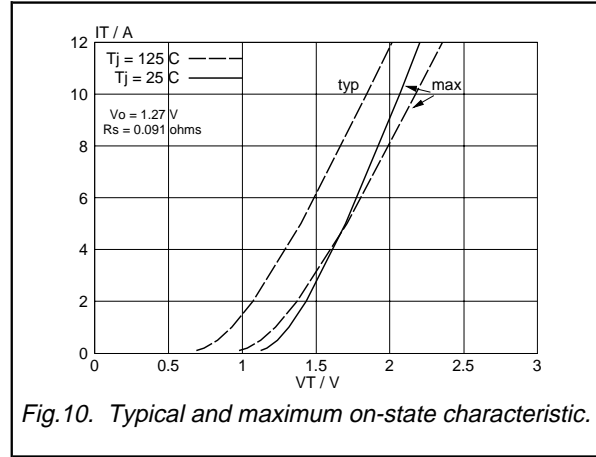


Fig. 10. Typical and maximum on-state characteristic.

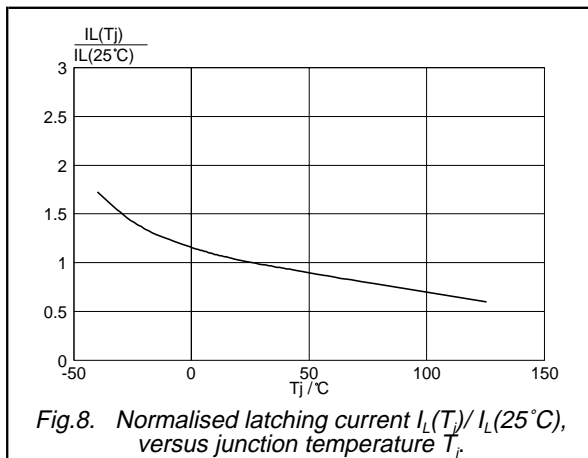


Fig. 8. Normalised latching current $I_L(T_j)/I_L(25^\circ\text{C})$, versus junction temperature T_j .

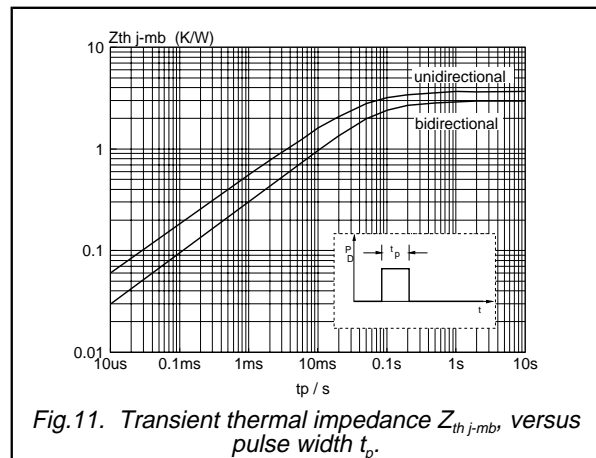


Fig. 11. Transient thermal impedance $Z_{th\ j-mb}$, versus pulse width t_p .

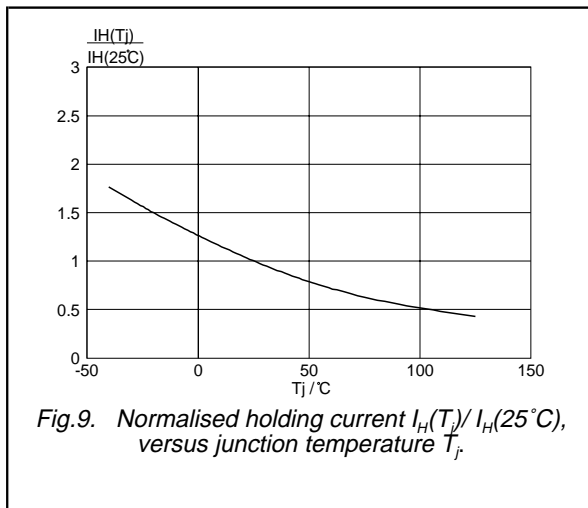


Fig. 9. Normalised holding current $I_H(T_j)/I_H(25^\circ\text{C})$, versus junction temperature T_j .

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MECHANICAL DATA

Dimensions in mm

Net Mass: 1.1 g

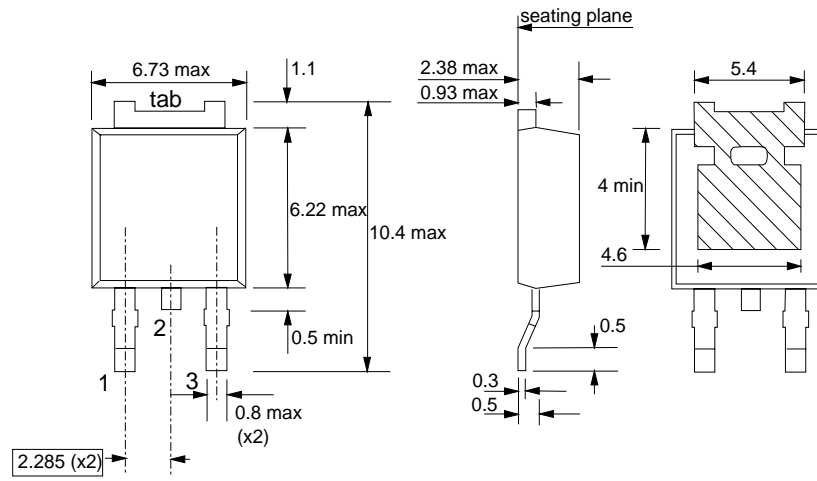


Fig.12. SOT428 : centre pin connected to tab.

MOUNTING INSTRUCTIONS

Dimensions in mm

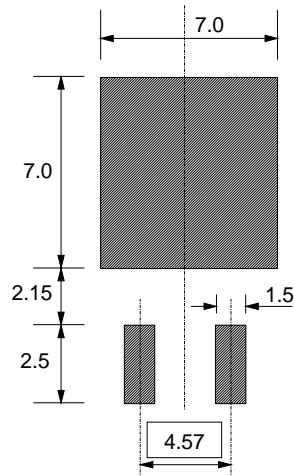


Fig.13. SOT428 : minimum pad sizes for surface mounting.

Notes

1. Plastic meets UL94 V0 at 1/8".

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DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values are given in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of this specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
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