

## 1. General description

Planar passivated high commutation three quadrant triac in a SOT54 (TO-92) plastic package. This "series DN" triac balances the requirements of commutation performance and gate sensitivity and is intended for interfacing with low power drivers and logic ICs including microcontrollers.

## 2. Features and benefits

- 3Q technology for improved noise immunity
- Direct gate triggering from low power drivers and logic ICs
- High commutation capability with very sensitive gate
- High voltage capability
- Planar passivated for voltage ruggedness and reliability
- Triggering in three quadrants only
- Very sensitive gate for easy logic level triggering

## 3. Applications

- Low power motor controls
- Small inductive loads e.g. solenoids, door locks, water valves
- Small loads in large white goods

## 4. Quick reference data

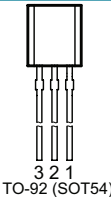

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values	Unit
<b>Absolute maximum rating</b>				
$V_{DRM}$	repetitive peak off-state voltage		1000	V
$I_{T(RMS)}$	RMS on-state current	square-wave pulse; $T_{lead} \leq 57\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	0.8	A
$I_{TSM}$	non-repetitive peak forward current	full sine wave; $t_p = 20\text{ ms}$ ; $T_{j(init)} = 25\text{ °C}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	9	A
		full sine wave; $t_p = 16.7\text{ ms}$ ; $T_{j(init)} = 25\text{ °C}$	9.9	A
$T_j$	junction temperature		125	°C

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G+$ $T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$	0.25	-	5	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G-$ $T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$	0.25	-	5	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- G-$ $T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$	0.25	-	5	mA
$I_H$	holding current	$V_D = 12\text{ V}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 9}$	-	-	10	mA
$V_T$	on-state voltage	$I_T = 0.85\text{ A}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 10}$	-	1.3	1.6	V
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 670\text{ V}; T_j = 125\text{ }^\circ\text{C}; (V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit	-	150	-	V/ $\mu\text{s}$
$dI_{com}/dt$	rate of change of commutating current	$V_D = 400\text{ V}; T_j = 125\text{ }^\circ\text{C}; I_{T(RMS)} = 0.8\text{ A};$ $dV_{com}/dt = 10\text{ V}/\mu\text{s}; \text{gate open circuit};$	0.5	-	-	A/ms
		$V_D = 400\text{ V}; T_j = 125\text{ }^\circ\text{C}; I_{T(RMS)} = 0.8\text{ A};$ $dV_{com}/dt = 1\text{ V}/\mu\text{s}; \text{gate open circuit}$	1	-	-	A/ms

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T2	main terminal 2	 <p>TO-92 (SOT54)</p>	 <p>sym051</p>
2	G	gate		
3	T1	main terminal 1		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BTA2008-1000DN	TO-92	plastic single-ended leaded (through hole) package; 3 leads	SOT54

## 7. Marking

Table 4. Marking codes

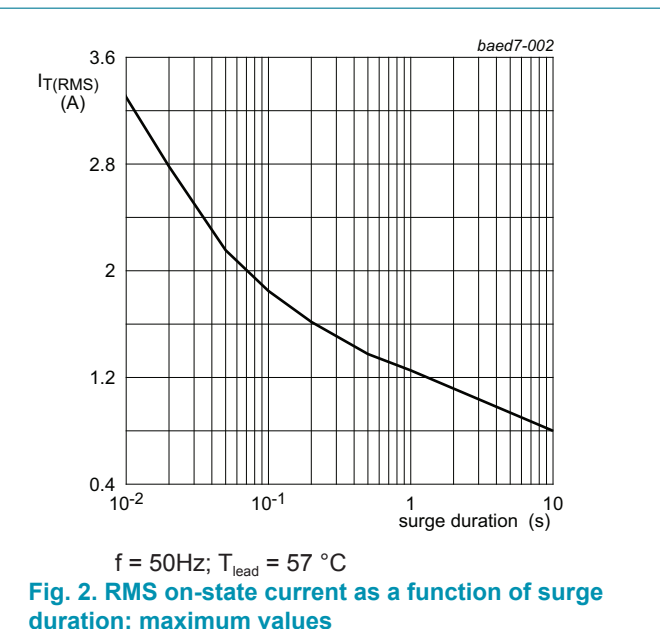
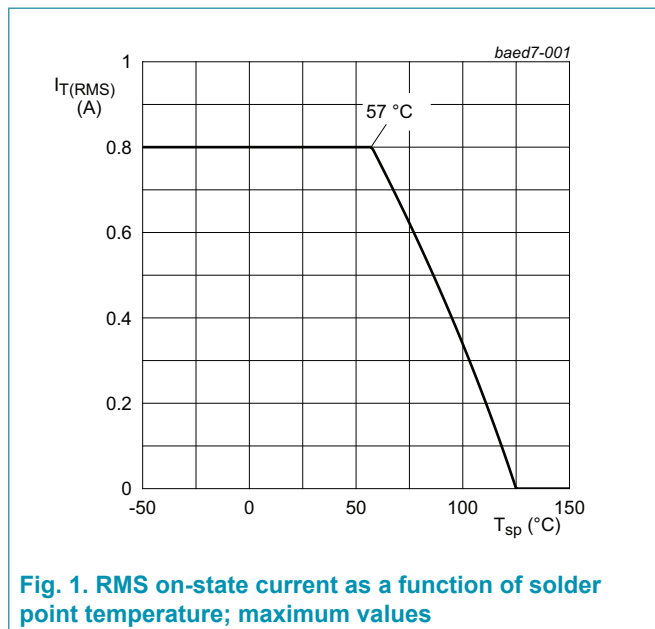
Type number	Marking codes
BTA2008-1000DN	BTA2008-1000DN

## 8. Limiting values

**Table 4. Limiting values**

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

Symbol	Parameter	Conditions	Values	Unit
$V_{DRM}$	repetitive peak off-state voltage		1000	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{lead} \leq 57^{\circ}C$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	0.8	A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $t_p = 20\text{ ms}$ ; $T_{j(init)} = 25^{\circ}C$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	9	A
		full sine wave; $t_p = 16.7\text{ ms}$ ; $T_{j(init)} = 25^{\circ}C$	9.9	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ms}$ ; sine wave	0.41	$A^2/s$
$dI_T/dt$	rate of rise of on-state current	$I_G = 10\text{mA}$	100	$A/\mu s$
$I_{GM}$	peak gate current		1	A
$P_{GM}$	peak gate power		2	W
$P_{G(AV)}$	average gate power	over any 20 ms period	0.1	W
$T_{stg}$	storage temperature		-40 to 150	$^{\circ}C$
$T_j$	junction temperature		125	$^{\circ}C$



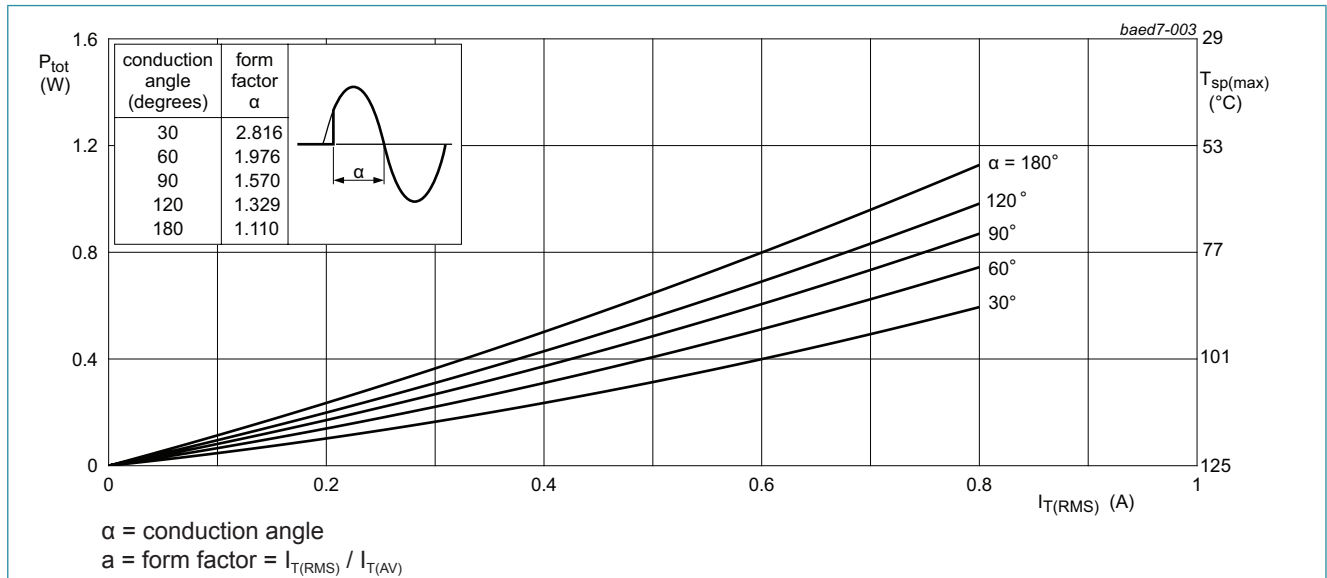


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

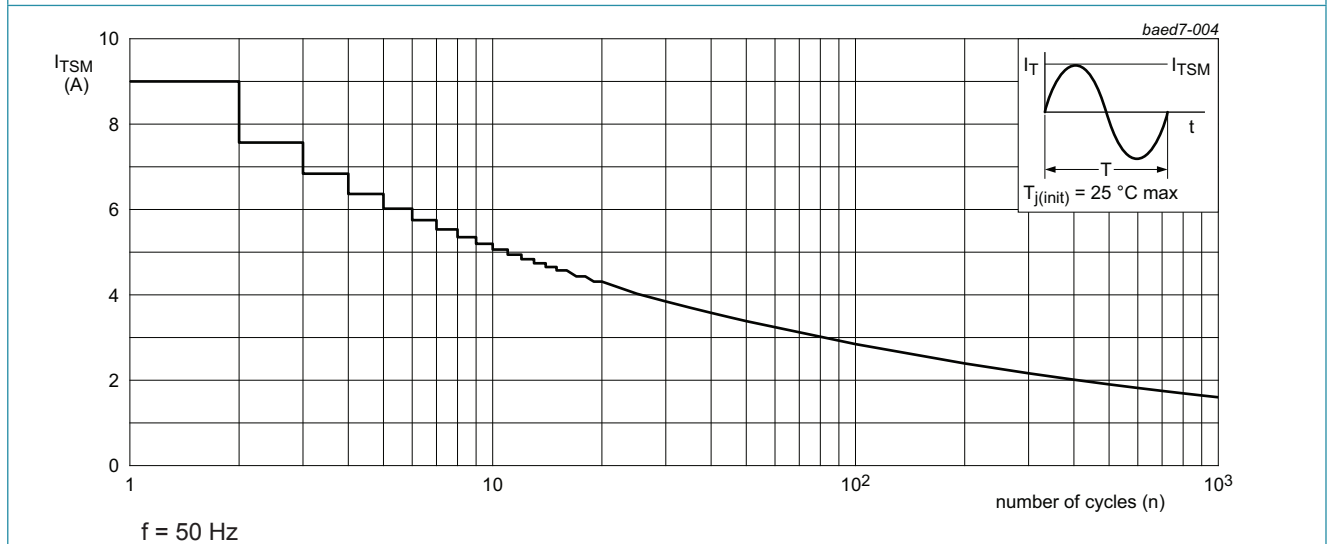


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

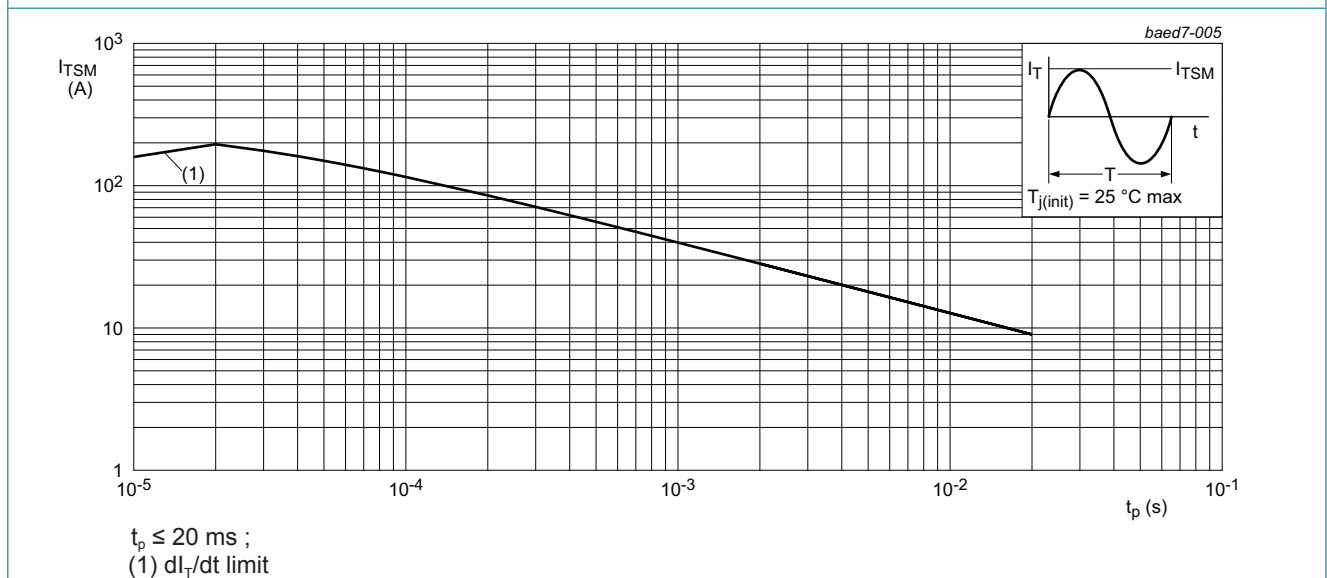


Fig. 5. Total power dissipation as a function of RMS on-state current; maximum values

## 9. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-lead)}$	thermal resistance from junction to lead	<a href="#">Fig. 6</a>	-	-	60	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	150	-	K/W

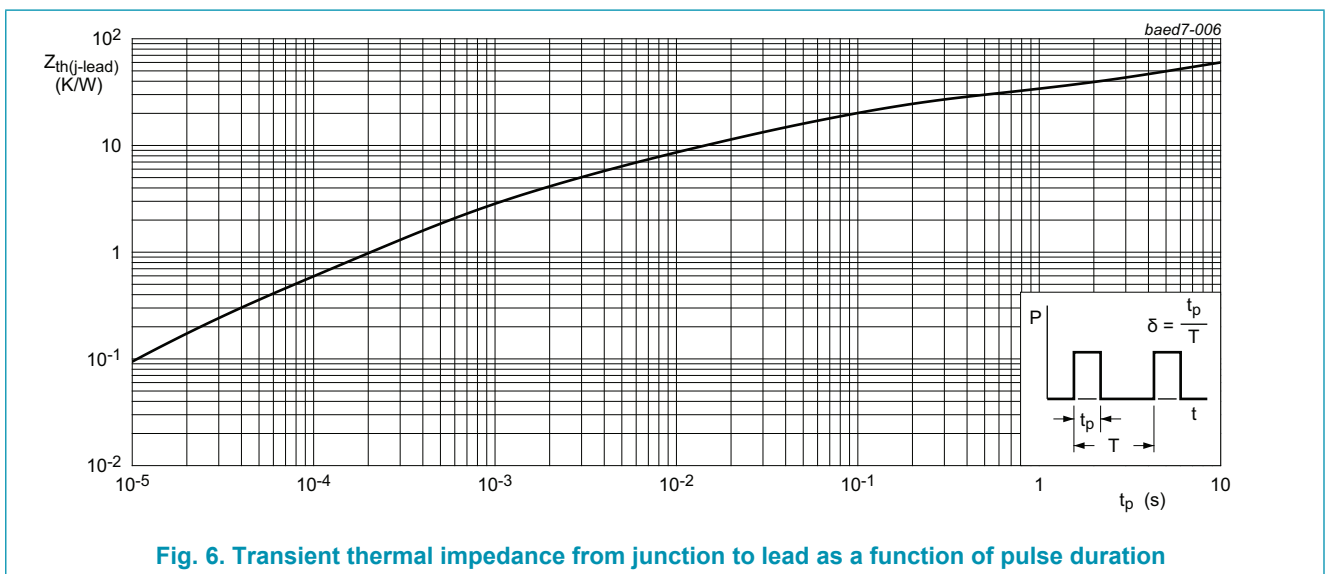
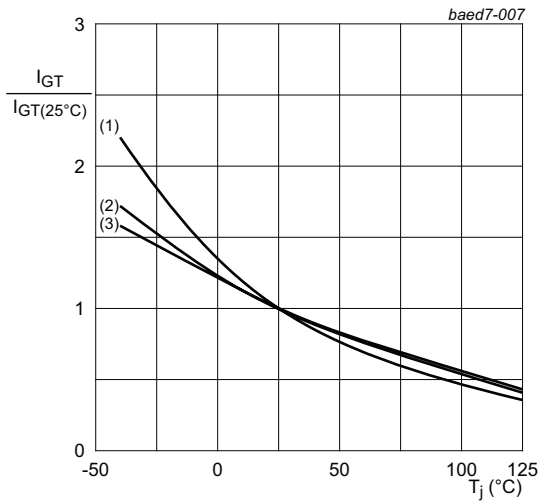


Fig. 6. Transient thermal impedance from junction to lead as a function of pulse duration

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G+; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	0.25	-	5	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G-; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	0.25	-	5	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2- G-; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	0.25	-	5	mA
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G+; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 8</a>	-	-	10	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G-; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 8</a>	-	-	20	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2- G-; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 8</a>	-	-	10	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 9</a>	-	-	10	mA
$V_T$	on-state voltage	$I_T = 0.85\text{ A}$ ; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 10</a>	-	1.3	1.6	V
$V_{GT}$	gate trigger voltage	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 11</a>	-	0.85	1	V
		$V_D = 400\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_J = 125\text{ °C}$ ; <a href="#">Fig. 11</a>	0.2	0.3	-	V
$I_D$	off-state current	$V_D = 1000\text{ V}$ ; $T_J = 25\text{ °C}$	-	-	10	$\mu\text{A}$
		$V_D = 1000\text{ V}$ ; $T_J = 125\text{ °C}$	-	0.1	0.5	mA
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 670\text{ V}$ ; $T_J = 125\text{ °C}$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit	-	150	-	V/ $\mu\text{s}$
$dI_{com}/dt$	rate of change of commutating current	$V_D = 400\text{ V}$ ; $T_J = 125\text{ °C}$ ; $I_{T(RMS)} = 0.85\text{ A}$ ; $dV_{com}/dt = 10\text{ V}/\mu\text{s}$ ; gate open circuit	0.5	-	-	A/ms
		$V_D = 400\text{ V}$ ; $T_J = 125\text{ °C}$ ; $I_{T(RMS)} = 0.85\text{ A}$ ; $dV_{com}/dt = 1\text{ V}/\mu\text{s}$ ; gate open circuit	1	-	-	A/ms



- (1) T2- G-
- (2) T2+ G-
- (3) T2+ G+

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

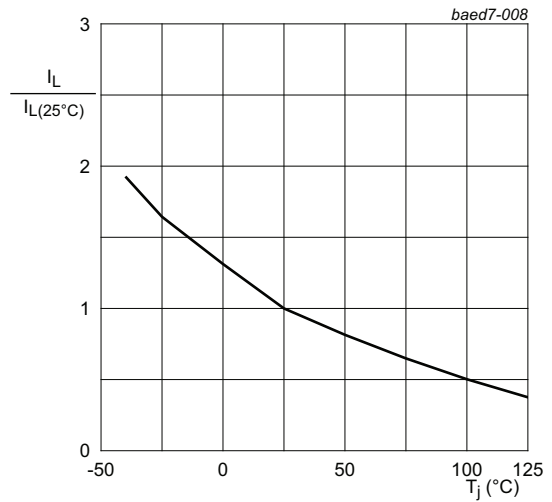


Fig. 8. Normalized latching current as a function of junction temperature

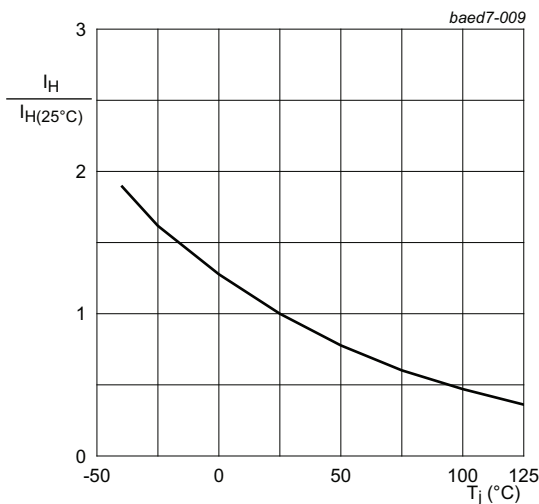
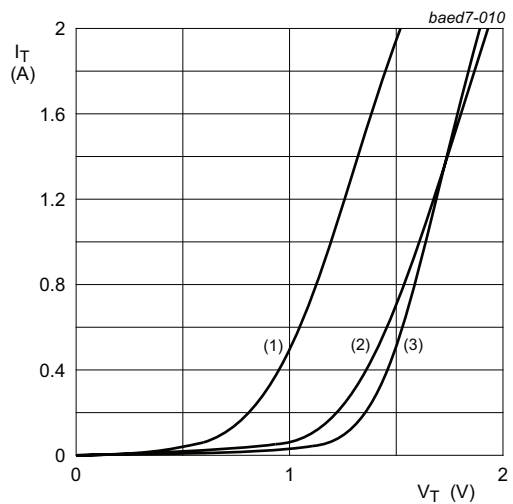


Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 1.220 \text{ V}$ ;  $R_s = 0.3875 \Omega$

- (1)  $T_j = 125^\circ\text{C}$ ; typical values
- (2)  $T_j = 125^\circ\text{C}$ ; maximum values
- (3)  $T_j = 25^\circ\text{C}$ ; maximum values

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

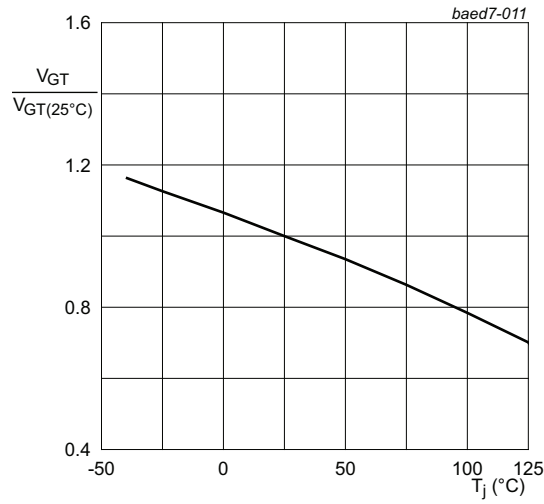
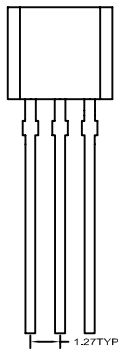


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

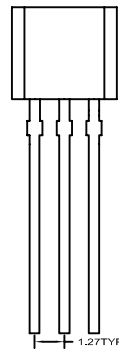
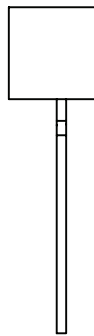


### 11. Package outline

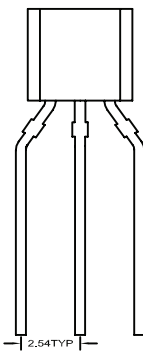
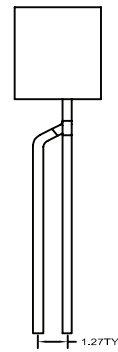
#### SOT54 PACKAGE OUTLINE



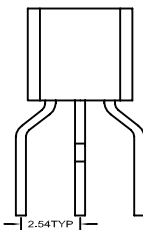
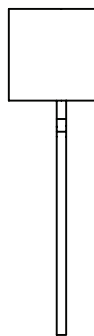
SOT54  
Bulk Pack - 412



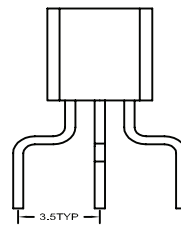
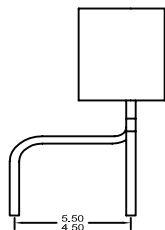
SOT54 LEADS ON CIRCLE  
Bulk Pack - 112



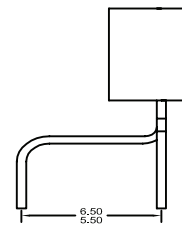
SOT54 WIDE PITCH  
Tape/ Reel Pack - 116  
Ammo Pack - 126



SOT54 LEAD BEND L01  
Bulk Pack - 412



SOT54 LEAD BEND L02  
Bulk Pack - 412



Remark: Detailed dimensions refer to POD drawing.

## 12. 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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## 13. Contents

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1. General description.....	1
2. Features and benefits .....	1
3. Applications .....	1
4. Quick reference data .....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values .....	3
9. Thermal characteristics .....	5
10. Characteristics.....	6
11. Package outline .....	9
12. Legal information .....	10
13. Contents .....	12

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Date of release: 24 July 2017

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