



**THE DATASHEET OF  
BTA203-800CTEP**





# BTA203-800CT

3Q Hi-Com Triac

Rev - 01 16 April 2018

Product data sheet

## 1. General description

Planar passivated high commutation three quadrant triac in a SOT54 (TO-92) plastic package intended for use in circuits where high static and dynamic  $dV/dt$  and high  $dI/dt$  can occur. This series triac will commute the full rated RMS current at the maximum rated junction temperature without the aid of a snubber.

## 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

## 3. Applications

- General purpose motor control circuits
- Home appliances
- Solenoid drivers

## 4. Quick reference data

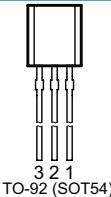

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values	Unit
<b>Absolute maximum rating</b>				
$V_{DRM}$	repetitive peak off-state voltage		800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	3	A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $t_p = 16.7$ ms; $T_{j(imit)} = 25$ °C;	30	A
		full sine wave; $t_p = 20$ ms; $T_{j(imit)} = 25$ °C <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	27	A
$T_j$	junction temperature		150	°C

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G+$ $T_j = 25\text{ }^\circ\text{C};$ <a href="#">Fig. 7</a>	-	-	30	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2+ G-$ $T_j = 25\text{ }^\circ\text{C};$ <a href="#">Fig. 7</a>	-	-	30	mA
		$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_2- G-$ $T_j = 25\text{ }^\circ\text{C};$ <a href="#">Fig. 7</a>	-	-	30	mA
$V_T$	on-state voltage	$I_T = 5\text{ A}; T_j = 25\text{ }^\circ\text{C};$ <a href="#">Fig. 10</a>	-	1.4	1.7	V
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}; T_j = 125\text{ }^\circ\text{C}; (V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit	2000	-	-	V/ $\mu\text{s}$
		$V_{DM} = 536\text{ V}; T_j = 150\text{ }^\circ\text{C}; (V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit	1500	-	-	V/ $\mu\text{s}$
$dI_{com}/dt$	rate of change of commutating current	$V_D = 400\text{ V}; T_j = 150\text{ }^\circ\text{C}; I_{T(RMS)} = 3\text{ A};$ $dV_{com}/dt = 20\text{ V}/\mu\text{s};$ (snubberless condition); gate open circuit	5	-	-	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
BTA203-800CT	TO-92	plastic single-ended leaded (through hole) package; 3 leads	SOT54

## 7. Marking

Table 4. Marking codes

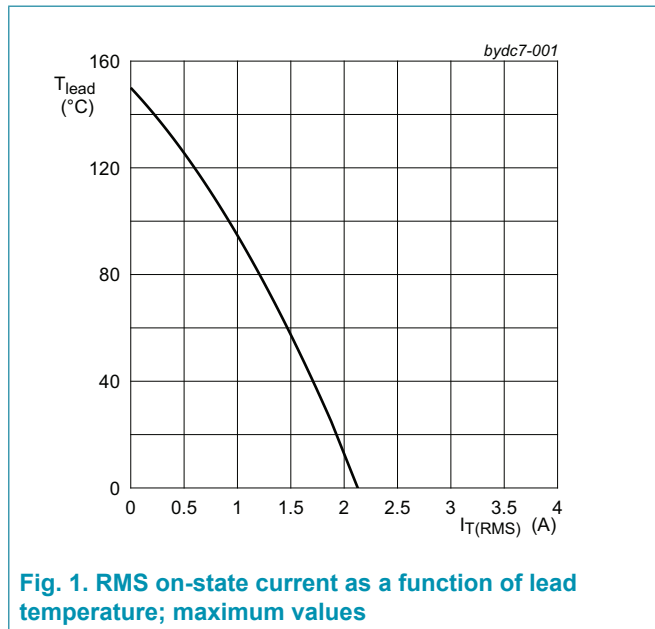
Type number	Marking codes
BTA203-800CT	BTA203-800CT

## 8. Limiting values

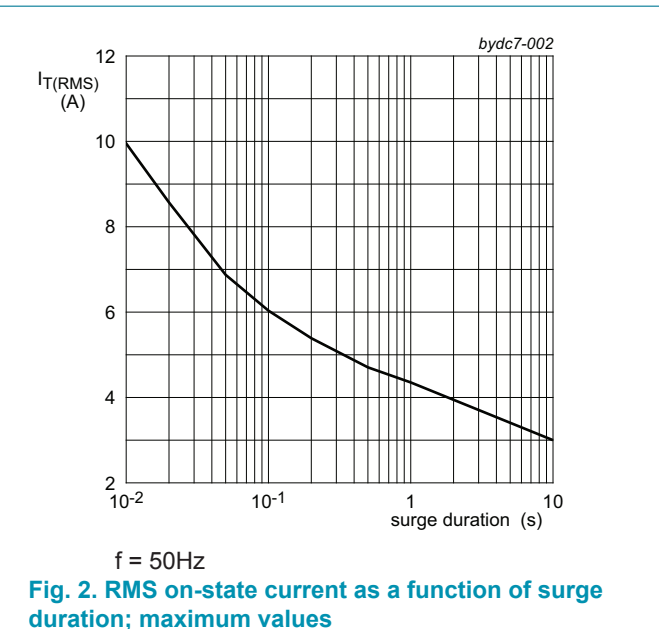
**Table 4. Limiting values**

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

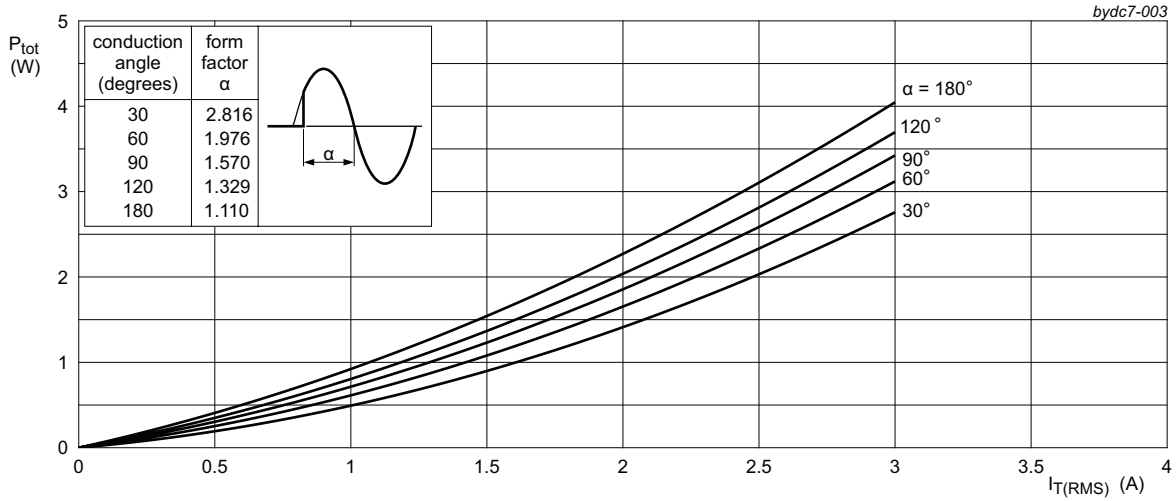
Symbol	Parameter	Conditions	Values	Unit
$V_{DRM}$	repetitive peak off-state voltage		800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	3	A
$I_{TSM}$	non-repetitive peak on-state current	full sine wave; $t_p = 16.7$ ms; $T_{j(init)} = 25$ °C;	30	A
		full sine wave; $t_p = 20$ ms; $T_{j(init)} = 25$ °C <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	27	A
$I^2t$	$I^2t$ for fusing	$t_p = 10$ ms; sine wave	3.7	A <sup>2</sup> s
$dI_T/dt$	rate of rise of on-state current	$I_G = 60$ mA	100	A/ $\mu$ 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	0.3	W
$T_{stg}$	storage temperature		-40 to 150	°C
$T_j$	junction temperature		150	°C



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

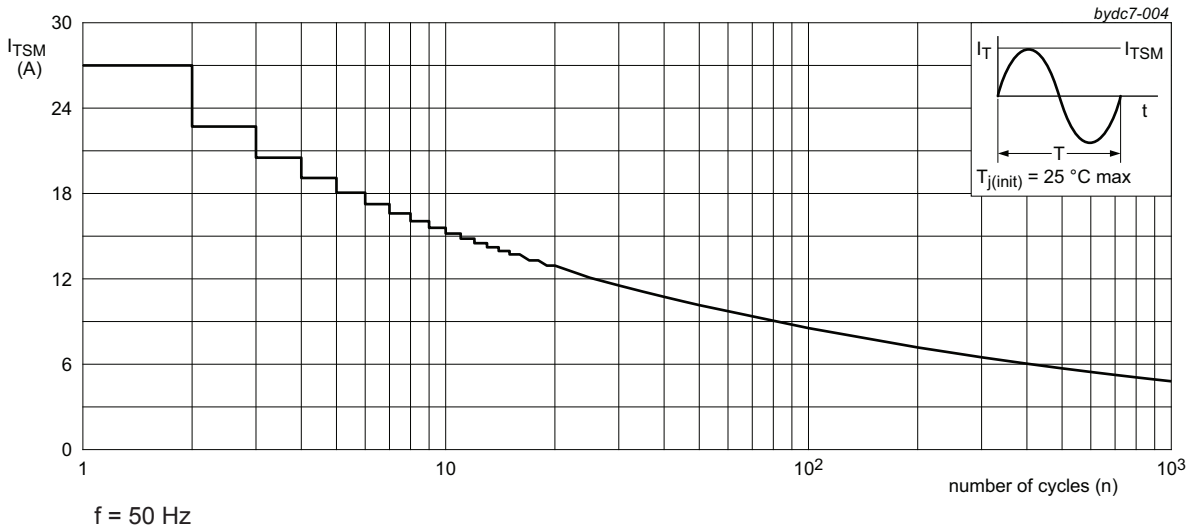


**Fig. 2. RMS on-state current as a function of surge duration; maximum values**



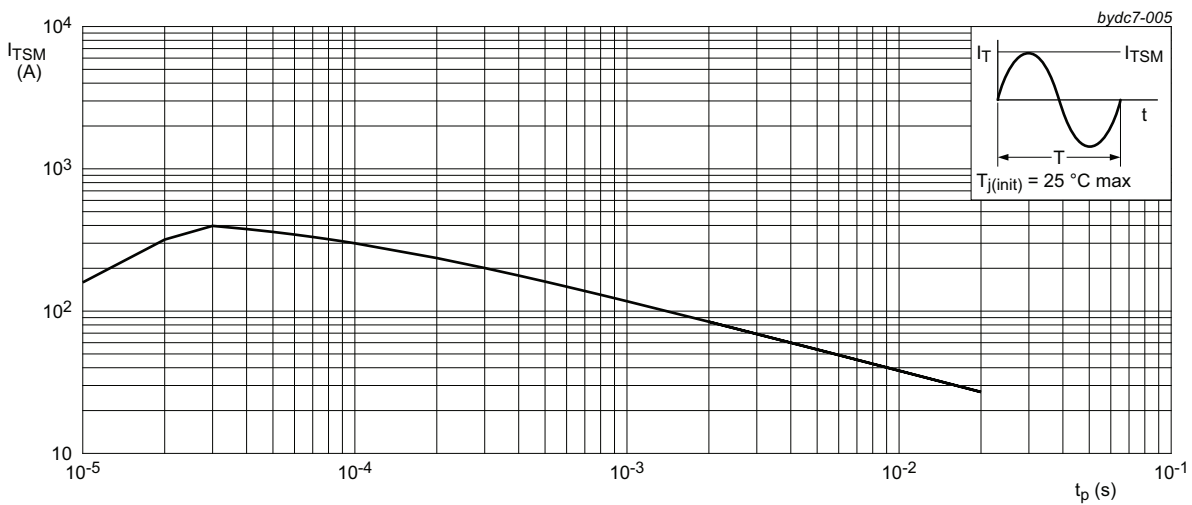
$\alpha$  = conduction angle  
 $a$  = form factor =  $I_{T(RMS)} / I_{T(AV)}$

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



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

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

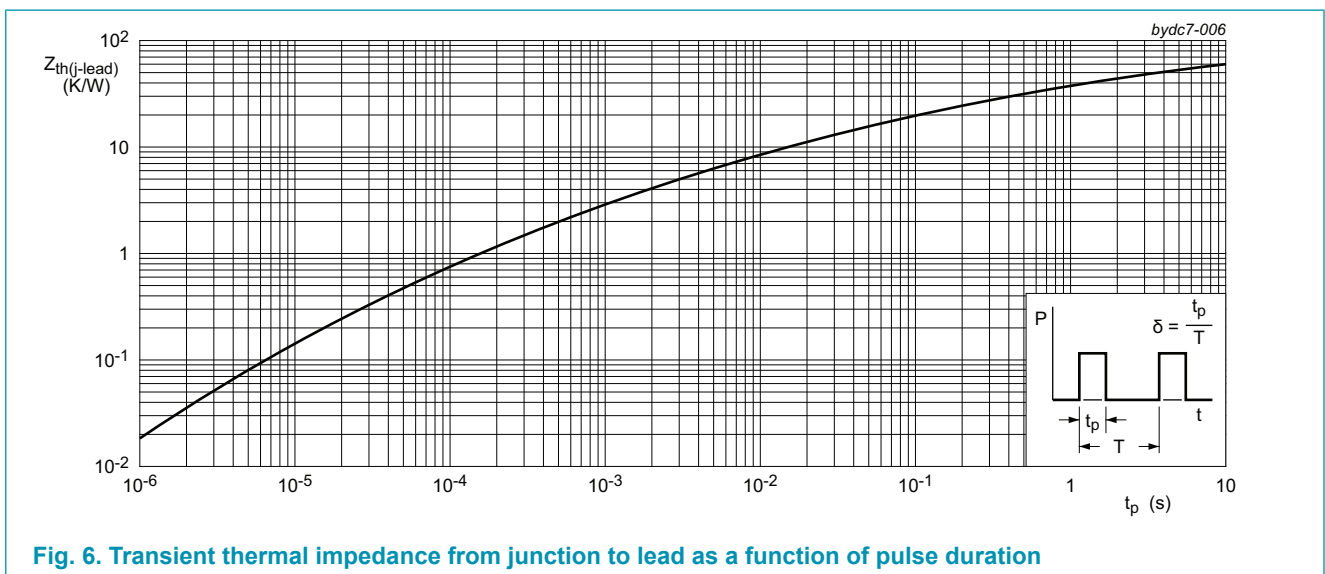
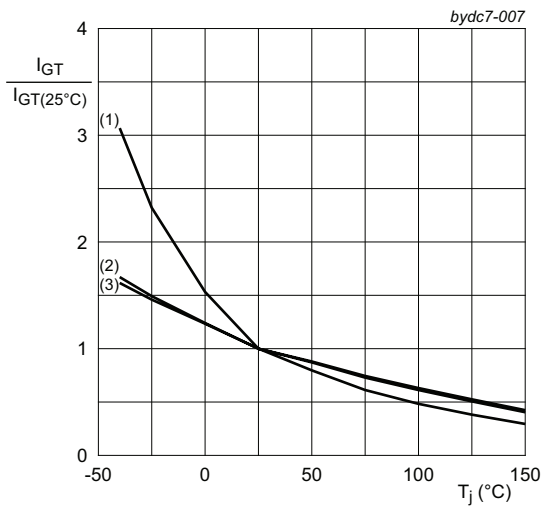


Fig. 6. Transient thermal impedance from junction to lead as a function of pulse duration

## 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>	-	-	30	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G-; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	-	-	30	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2- G-; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	-	-	30	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>	-	-	30	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2+ G-; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 8</a>	-	-	60	mA
		$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; T2- G-; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 8</a>	-	-	30	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 9</a>	-	-	30	mA
$V_T$	on-state voltage	$I_T = 5\text{ A}$ ; $T_J = 25\text{ °C}$ ; <a href="#">Fig. 10</a>	-	1.4	1.7	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>	-	0.7	1	V
		$V_D = 400\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_J = 150\text{ °C}$ ; <a href="#">Fig. 11</a>	0.25	0.45	-	V
$I_D$	off-state current	$V_D = 800\text{ V}$ ; $T_J = 25\text{ °C}$	-	-	10	$\mu\text{A}$
		$V_D = 800\text{ V}$ ; $T_J = 150\text{ °C}$	-	-	0.5	mA
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$ ; $T_J = 125\text{ °C}$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit	2000	-	-	V/ $\mu\text{s}$
		$V_{DM} = 536\text{ V}$ ; $T_J = 150\text{ °C}$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit	1500	-	-	V/ $\mu\text{s}$
$dI_{com}/dt$	rate of change of commutating current	$V_D = 400\text{ V}$ ; $T_J = 150\text{ °C}$ ; $I_{T(RMS)} = 3\text{ A}$ ; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$ ; (snubberless condition); gate open circuit	5	-	-	A/ms



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

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

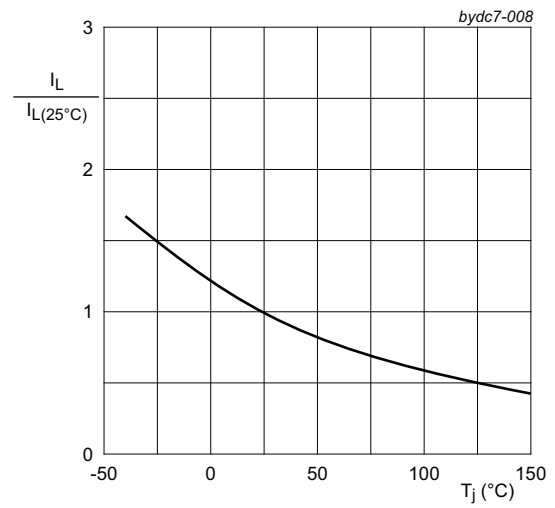


Fig. 8. Normalized latching current as a function of junction temperature

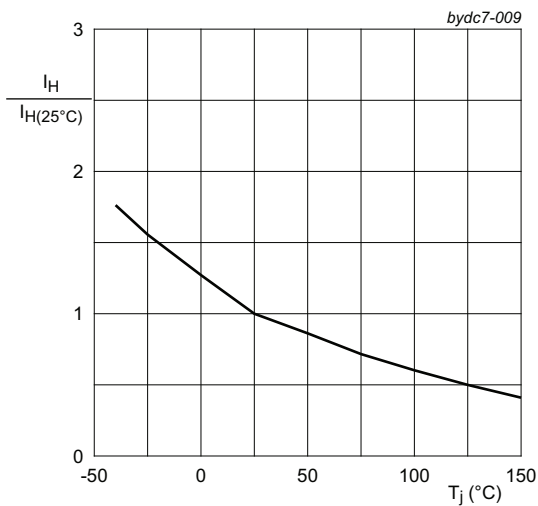
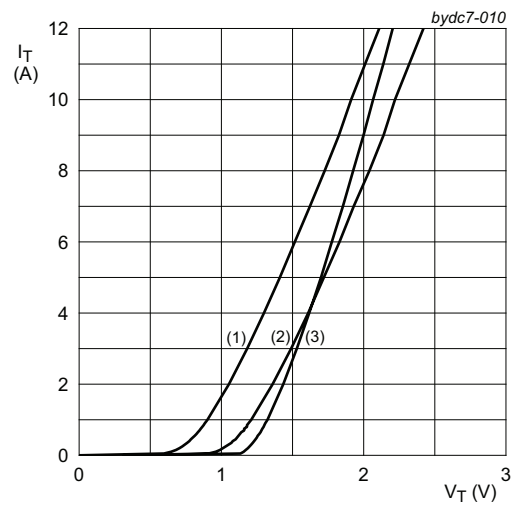


Fig. 9. Normalized holding current as a function of junction temperature



- $V_o = 0.787 \text{ V}; R_s = 0.2133 \text{ } \Omega$
- (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. 10. On-state current as a function of on-state voltage

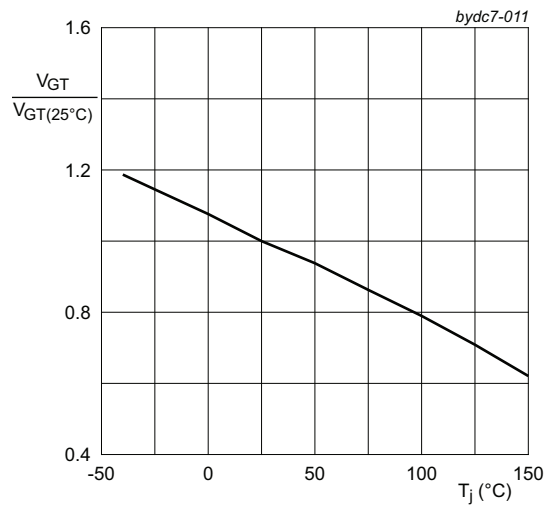
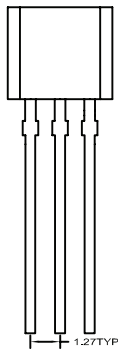


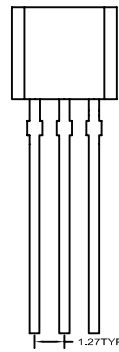
Fig. 11. Normalized gate trigger voltage as a function of junction temperature

## 11. Package outline

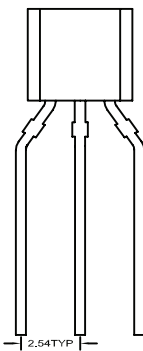
### SOT54 PACKAGE OUTLINE



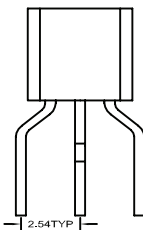
SOT54  
Bulk Pack - 412



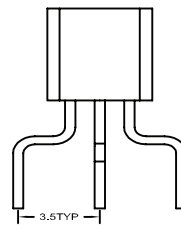
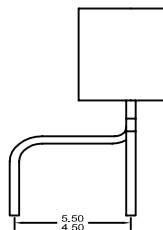
SOT54 LEADS ON CIRCLE  
Bulk Pack - 112



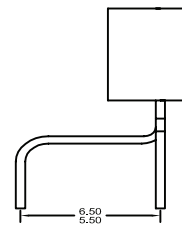
SOT54 WIDE PITCH  
Tape/ Reel Pack - 116  
Ammo Pack - 126



SOT54 LEAD BEND L01  
Bulk Pack - 412



SOT54 LEAD BEND L02  
Bulk Pack - 412



Remark: Detailed dimensions refer to POD drawing.

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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