



# IMPORTANT NOTICE

10 December 2015

## 1. Global joint venture starts operations as WeEn Semiconductors

Dear customer,

As from November 9th, 2015 NXP Semiconductors N.V. and Beijing JianGuang Asset Management Co. Ltd established Bipolar Power joint venture (JV), **WeEn Semiconductors**, which will be used in future Bipolar Power documents together with new contact details.

In this document where the previous NXP references remain, please use the new links as shown below.

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Thank you for your cooperation and understanding,

WeEn Semiconductors





# BT169D-L

SCR

20 March 2014

Product data sheet

## 1. General description

Planar passivated very sensitive gate Silicon Controlled Rectifier in a SOT54 (TO-92) plastic package.

## 2. Features and benefits

- Planar passivated for voltage ruggedness and reliability
- Very sensitive gate

## 3. Applications

- Ignition circuits
- Low power latching circuits
- Protection / shut-down circuits: lighting ballasts
- Protection / shut-down circuits: Switched Mode Power Supplies

## 4. Quick reference data

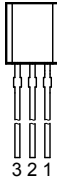

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage		-	-	400	V
$V_{RRM}$	repetitive peak reverse voltage		-	-	400	V
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 10\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	-	8	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{lead} \leq 83\text{ °C}$ ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	-	0.8	A
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 10\text{ mA}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	-	-	50	$\mu\text{A}$
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 9</a>	-	0.4	1	mA
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_G = 0.5\text{ mA}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 8</a>	-	2	4	mA



## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	 <p>TO-92 (SOT54)</p>	
2	G	gate		
3	K	cathode		

## 6. Ordering information

Table 3. Ordering information

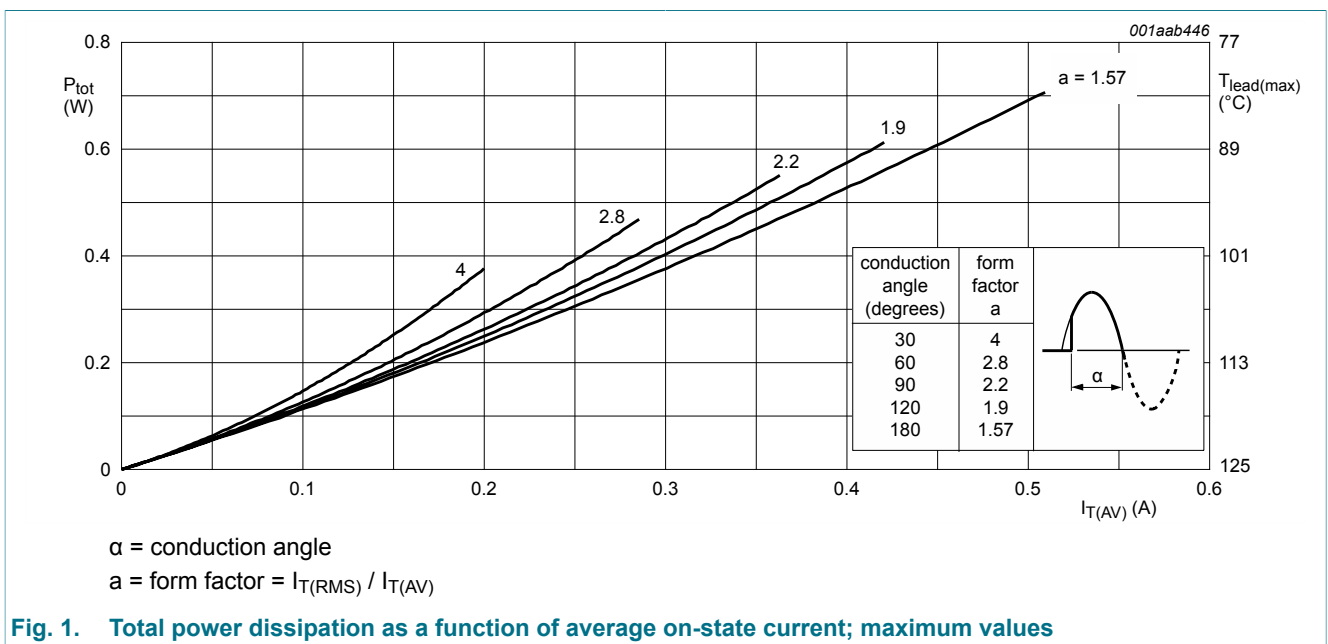
Type number	Package		
	Name	Description	Version
BT169D-L	TO-92	plastic single-ended leaded (through hole) package; 3 leads	SOT54

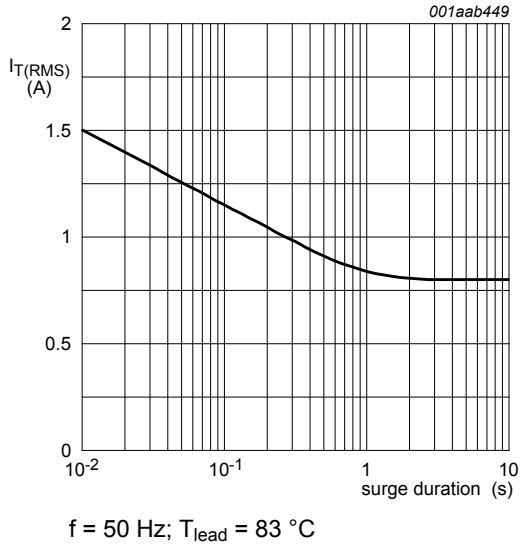
## 7. Limiting values

**Table 4. Limiting values**

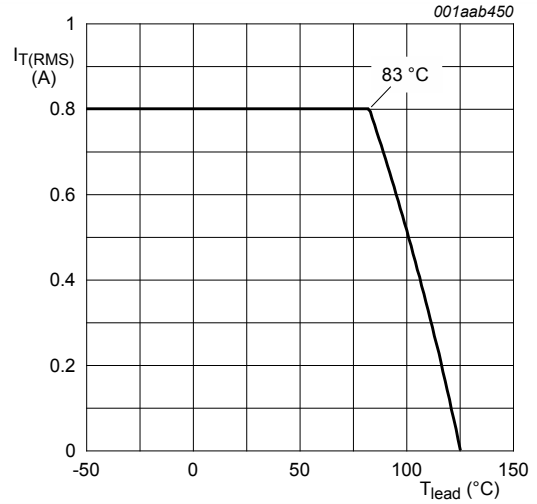
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DRM}$	repetitive peak off-state voltage		-	400	V
$V_{RRM}$	repetitive peak reverse voltage		-	400	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{lead} \leq 83\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 1</a>	-	0.5	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{lead} \leq 83\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	0.8	A
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 8.3\text{ ms}$	-	9	A
		half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 10\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	8	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; SIN	-	0.32	$\text{A}^2\text{s}$
$di_T/dt$	rate of rise of on-state current	$I_T = 2\text{ A}$ ; $I_G = 10\text{ mA}$ ; $di_G/dt = 100\text{ mA}/\mu\text{s}$	-	50	$\text{A}/\mu\text{s}$
$I_{GM}$	peak gate current		-	1	A
$V_{RGM}$	peak reverse gate voltage		-	5	V
$P_{GM}$	peak gate power		-	2	W
$P_{G(AV)}$	average gate power	over any 20 ms period	-	0.1	W
$T_{stg}$	storage temperature		-40	150	$^{\circ}\text{C}$
$T_j$	junction temperature		-	125	$^{\circ}\text{C}$

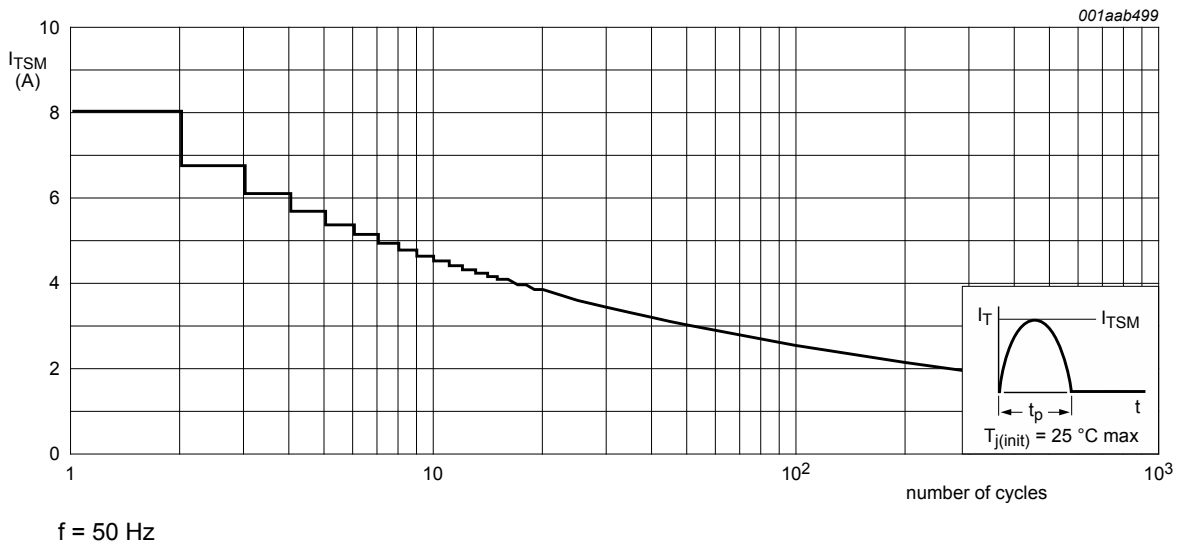




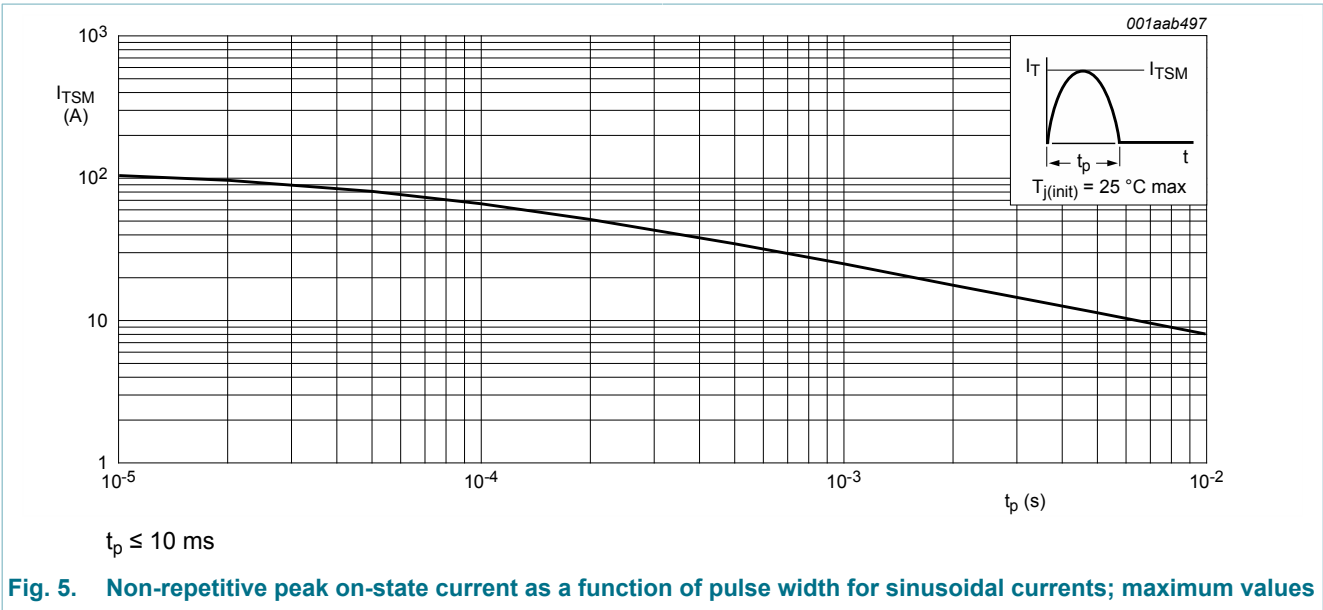
**Fig. 2. RMS on-state current as a function of surge duration for sinusoidal currents**



**Fig. 3. RMS on-state current as a function of lead temperature; maximum values**



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



## 8. 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	printed circuit board mounted: lead length = 4 mm	-	150	-	K/W

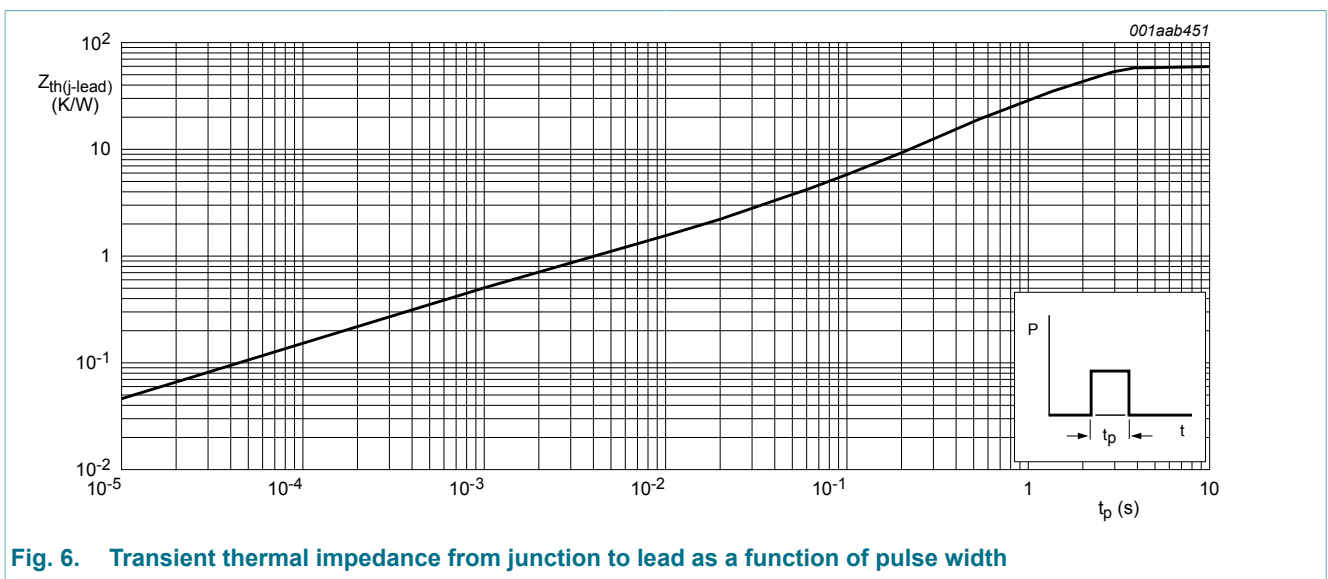


Fig. 6. Transient thermal impedance from junction to lead as a function of pulse width

## 9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 10\text{ mA}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	-	-	50	$\mu\text{A}$
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_G = 0.5\text{ mA}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 8</a>	-	2	4	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 9</a>	-	0.4	1	mA
$V_T$	on-state voltage	$I_T = 1.2\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 10</a>	-	1.25	1.7	V
$V_{GT}$	gate trigger voltage	$V_D = 12\text{ V}$ ; $I_T = 10\text{ mA}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 11</a>	-	0.5	0.8	V
		$V_D = 12\text{ V}$ ; $I_T = 10\text{ mA}$ ; $T_j = 125\text{ °C}$ ; <a href="#">Fig. 11</a>	0.2	0.3	-	V
$I_D$	off-state current	$V_D = 400\text{ V}$ ; $T_j = 25\text{ °C}$ ; $R_{GK} = 1\text{ k}\Omega$	-	-	2	$\mu\text{A}$
		$V_D = 400\text{ V}$ ; $T_j = 125\text{ °C}$ ; $R_{GK} = 1\text{ k}\Omega$	-	0.05	0.1	mA
$I_R$	reverse current	$V_R = 400\text{ V}$ ; $T_j = 25\text{ °C}$ ; $R_{GK} = 1\text{ k}\Omega$	-	0.05	2	$\mu\text{A}$
		$V_R = 400\text{ V}$ ; $T_j = 125\text{ °C}$ ; $R_{GK} = 1\text{ k}\Omega$	-	0.05	0.1	mA
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 268\text{ V}$ ; $T_j = 125\text{ °C}$ ; $R_{GK} = 1\text{ k}\Omega$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; <a href="#">Fig. 12</a>	500	800	-	$\text{V}/\mu\text{s}$
		$V_{DM} = 268\text{ V}$ ; $T_j = 125\text{ °C}$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit; <a href="#">Fig. 12</a>	-	25	-	$\text{V}/\mu\text{s}$



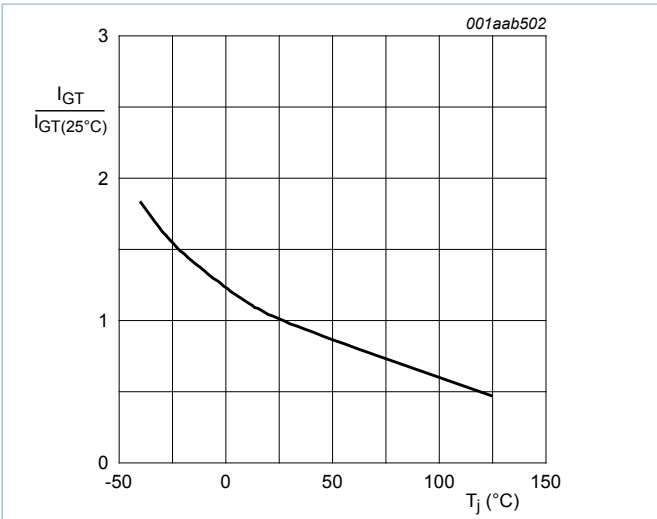


Fig. 7. Normalized gate trigger current as a function of junction temperature

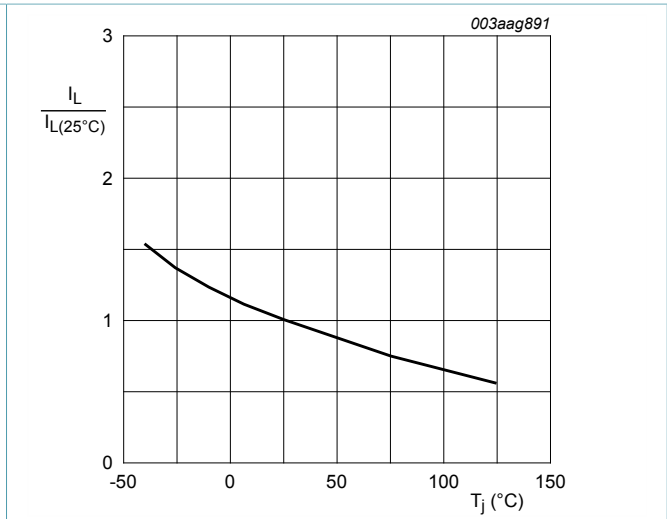


Fig. 8. Normalized latching current as a function of junction temperature

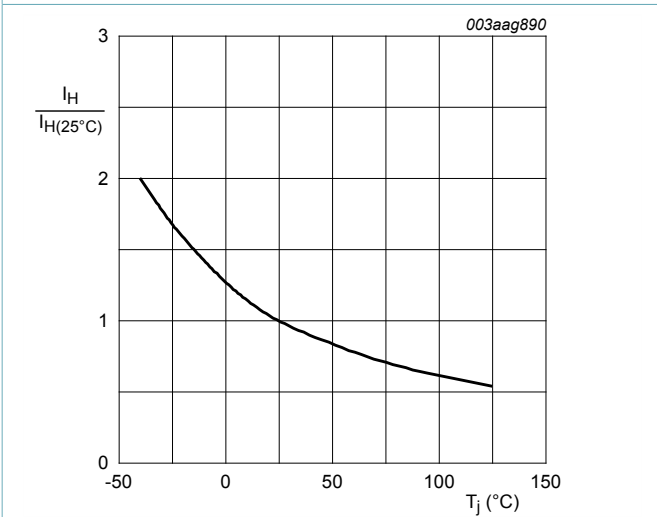
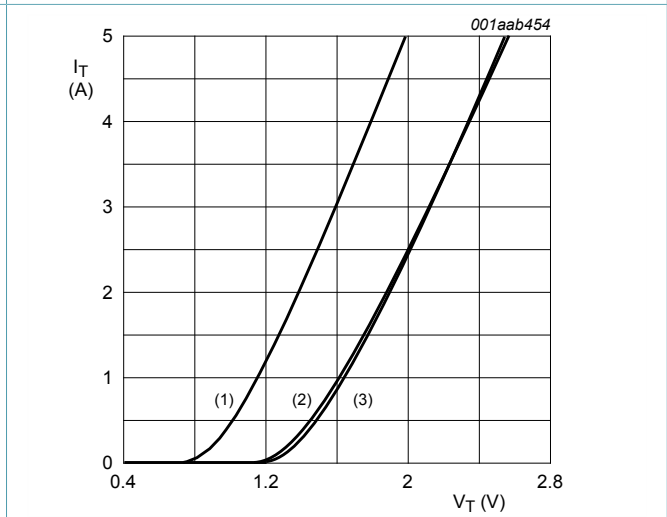


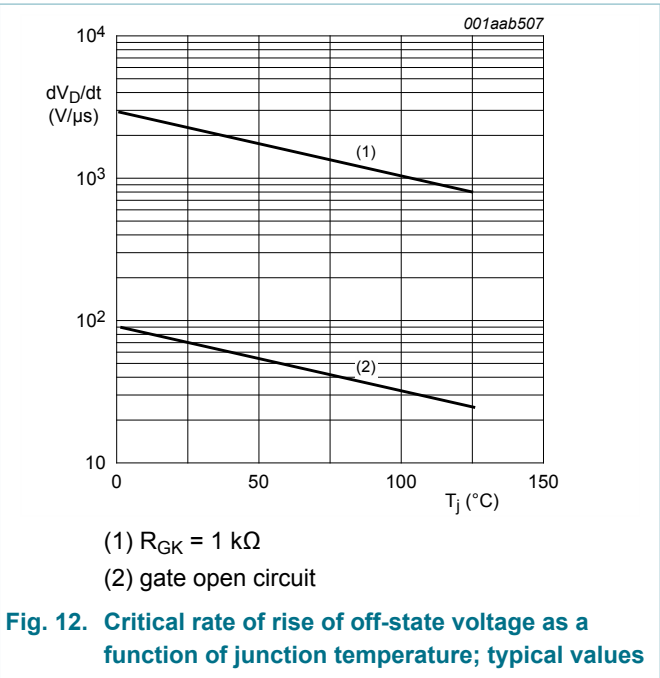
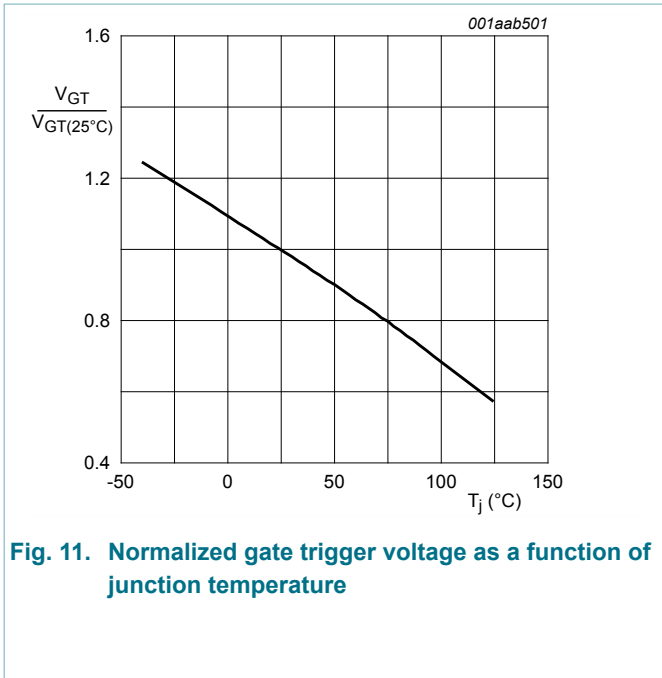
Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 1.067 \text{ V}$ ;  $R_s = 0.187 \text{ } \Omega$

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

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



### 10. Package outline

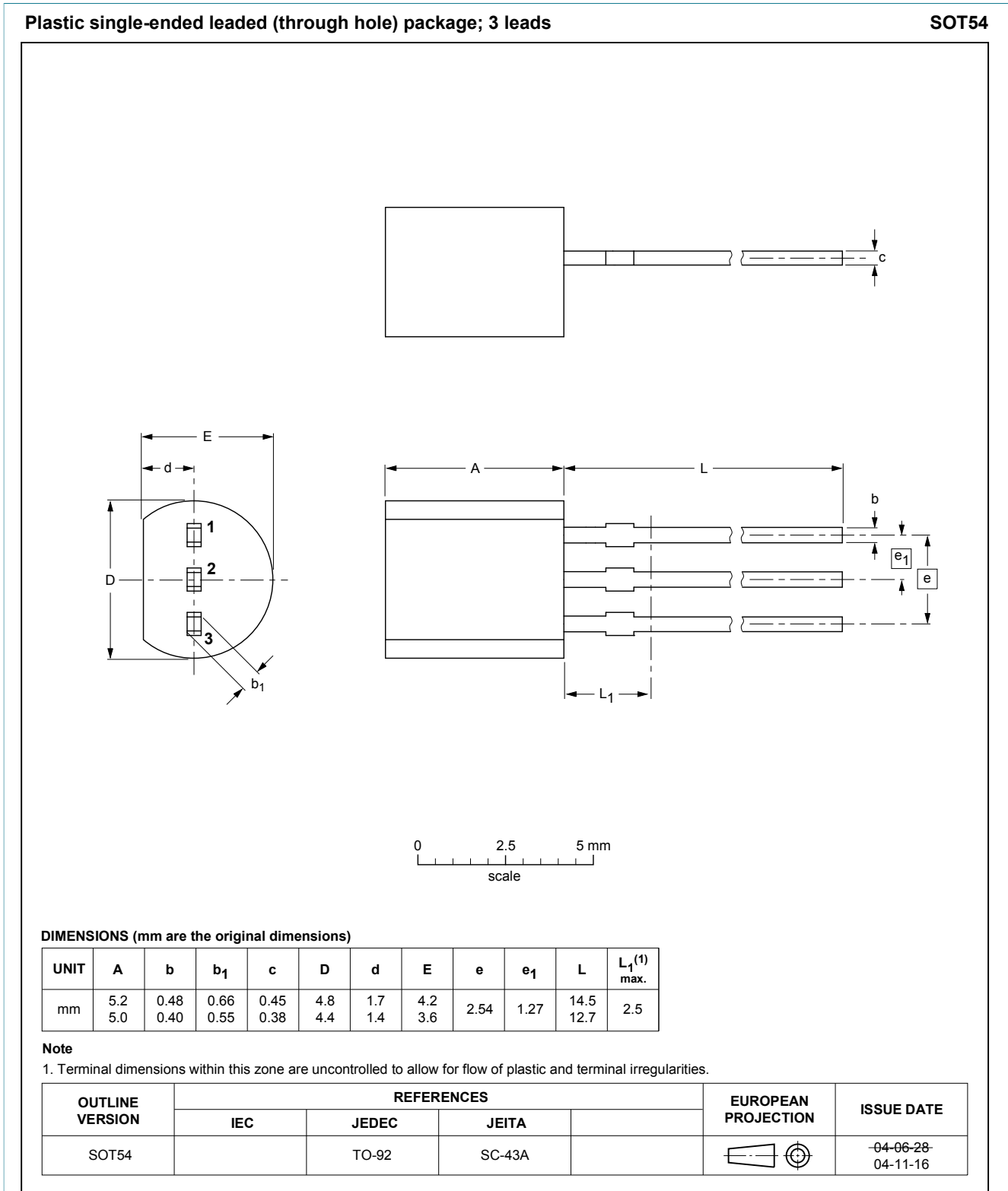


Fig. 13. Package outline TO-92 (SOT54)

## 11. 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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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Date of release: 20 March 2014

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