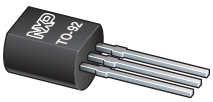


BT169H

SCR

Rev. 3 — 7 November 2011 **Product data sheet**

1. Product profile

1.1 General description

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

1.2 Features and benefits

- High voltage capability
- Planar passivated for voltage ruggedness and reliability
- Sensitive gate

1.3 Applications

- Earth leakage circuit breakers or Ground Fault Circuit Interrupters (GFCI)
- Ignition circuits
- Low power latching circuits
- Protection circuits / shut-down circuits: lighting ballasts
- Protection circuits / shut-down circuits: Switched Mode Power Supplies

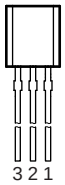
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	800	V
V_{RRM}	repetitive peak reverse voltage		-	-	800	V
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)}$ = 25 °C; t_p = 8.3 ms	-	-	10	A
		half sine wave; $T_{j(init)}$ = 25 °C; t_p = 10 ms; see Figure 4; see Figure 5	-	-	9	A
$I_{T(AV)}$	average on-state current	half sine wave; T_{lead} ≤ 83 °C; see Figure 3	-	-	0.5	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; T_{lead} ≤ 83 °C; see Figure 1; see Figure 2	-	-	0.8	A
Static characteristics						
I_{GT}	gate trigger current	V_D = 12 V; I_T = 10 mA; T_j = 25 °C; see Figure 7	1	50	100	µA

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode		
2	G	gate		
3	K	cathode		

SOT54 (TO-92)

3. Ordering information

Table 3. Ordering information

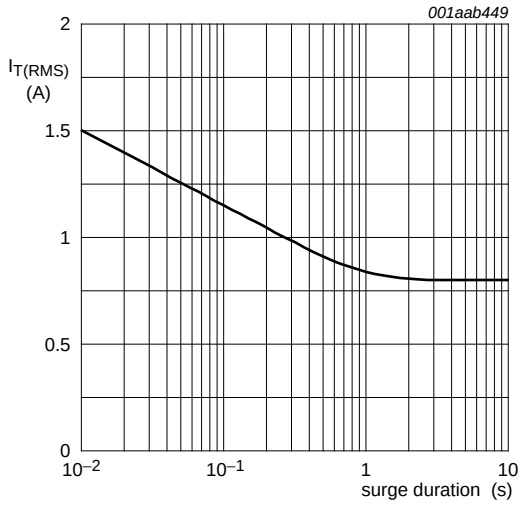
Type number	Package		
	Name	Description	Version
BT169H	TO-92	plastic single-ended leaded (through hole) package; 3 leads	SOT54

4. Limiting values

Table 4. Limiting values

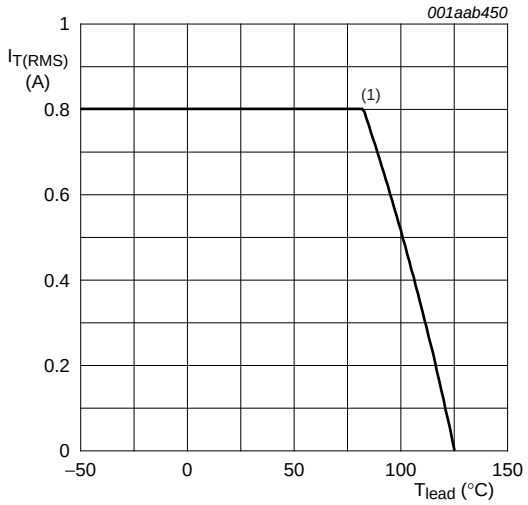
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	800	V
V_{RRM}	repetitive peak reverse voltage		-	800	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{lead} \leq 83$ °C; see Figure 3	-	0.5	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{lead} \leq 83$ °C; see Figure 1; see Figure 2	-	0.8	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25$ °C; $t_p = 8.3$ ms	-	10	A
		half sine wave; $T_{j(init)} = 25$ °C; $t_p = 10$ ms; see Figure 4; see Figure 5	-	9	A
I^2t	I^2t for fusing	$t_p = 10$ ms; sine-wave pulse	-	0.41	A^2s
dI_T/dt	rate of rise of on-state current	$I_T = 2$ A; $I_G = 10$ mA; $dI_G/dt = 100$ mA/µs	-	50	A/µs
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	°C
T_j	junction temperature		-	125	°C



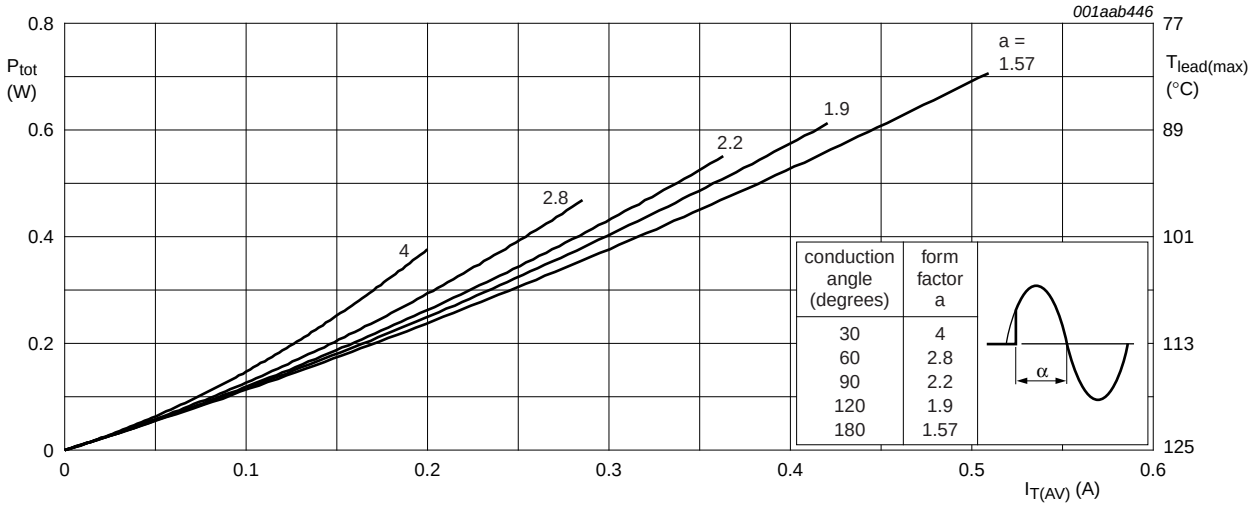
$f = 50Hz; T_{lead} \leq 83\,°C$

Fig 1. RMS on-state current as a function of surge duration for sinusoidal currents



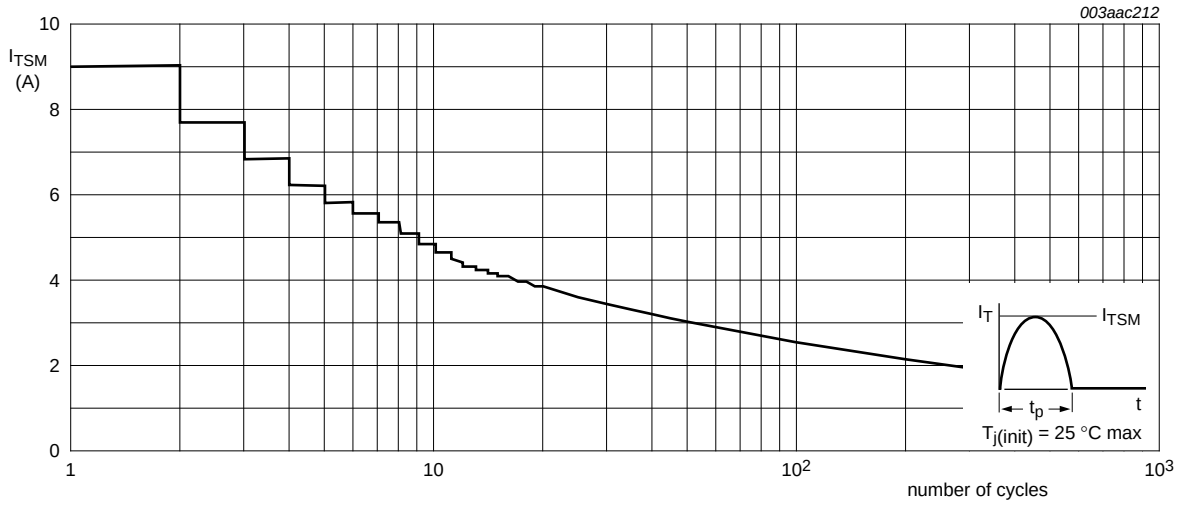
(1) $T_{lead} = 83\,°C$

Fig 2. RMS on-state current as a function of lead temperature; maximum values



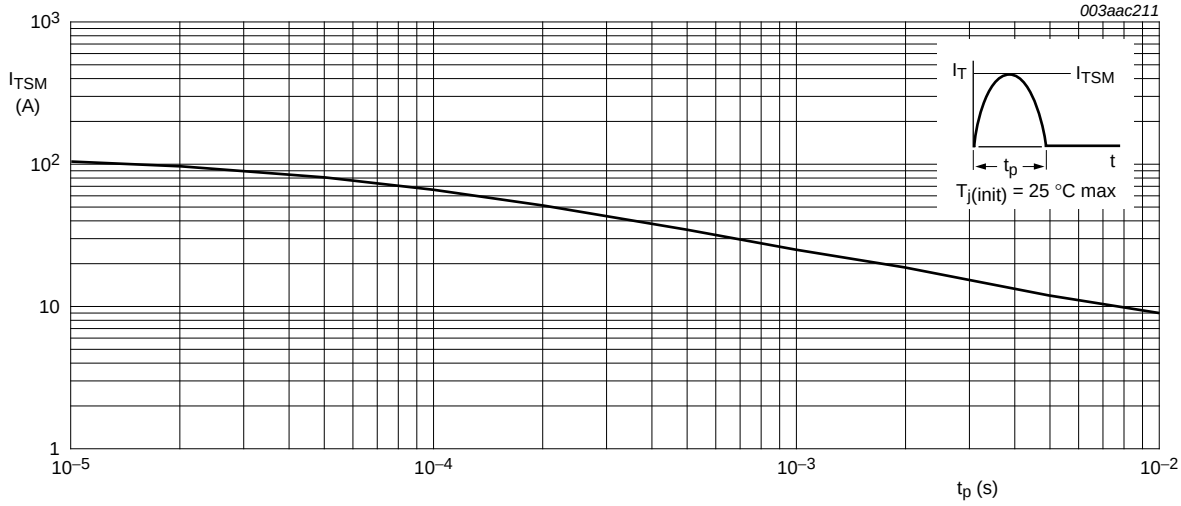
$$\text{Form factor } a = \frac{I_{T(RMS)}}{I_{T(AV)}}$$

Fig 3. Total power dissipation as a function of average 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



$t_p \leq 10$ ms

Fig 5. Non-repetitive peak on-state current as a function of pulse width; maximum values

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j\text{-}lead)}$	thermal resistance from junction to lead	see Figure 6	-	-	60	K/W
$R_{th(j\text{-}a)}$	thermal resistance from junction to ambient	printed circuit board mounted: lead length = 4 mm	-	150	-	K/W

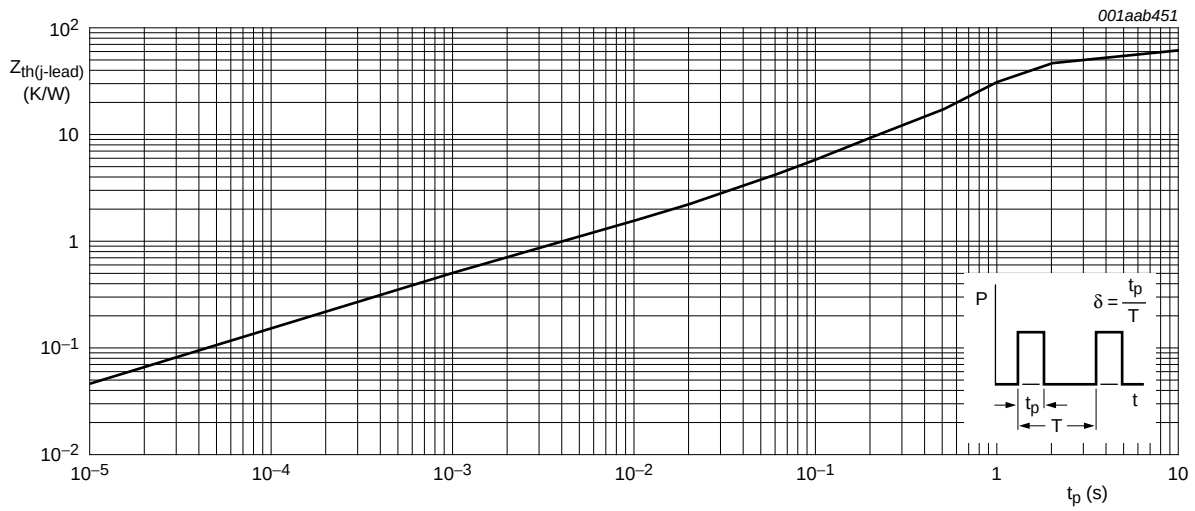


Fig 6. Transient thermal impedance from junction to lead as a function of pulse width

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 = 10 mA; T_j = 25 °C; see Figure 7	1	50	100	µA
I_L	latching current	V_D = 12 V; I_G = 0.5 mA; R_{GK} = 1 kΩ; T_j = 25 °C; see Figure 8	-	2	6	mA
I_H	holding current	V_D = 12 V; R_{GK} = 1 kΩ; T_j = 25 °C; see Figure 9	-	1.5	3	mA
V_T	on-state voltage	I_T = 1.2 A; T_j = 25 °C; see Figure 10	-	1.25	1.7	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 10 mA; T_j = 25 °C; see Figure 11	-	0.5	0.8	V
		V_D = 800 V; I_T = 10 mA; T_j = 125 °C; see Figure 11	0.3	0.5	-	V
I_D	off-state current	V_D = 800 V; T_j = 125 °C; R_{GK} = 1 kΩ	-	0.05	0.1	mA
I_R	reverse current	T_j = 125 °C; R_{GK} = 1 kΩ; V_R = 800 V	-	0.05	0.1	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 536 V; T_j = 125 °C; R_{GK} = 1 kΩ; exponential waveform; see Figure 12	150	350	-	V/µs
t_{gt}	gate-controlled turn-on time	I_{TM} = 2 A; V_D = 800 V; I_G = 10 mA; dI_G/dt = 0.1 A/µs; T_j = 25 °C	-	2	-	µs
t_q	commutated turn-off time	V_{DM} = 402 V; T_j = 125 °C; I_{TM} = 1.6 A; V_R = 35 V; $(dI_T/dt)_M$ = 30 A/µs; dV_D/dt = 2 V/µs; R_{GK} = 1 kΩ	-	100	-	µs

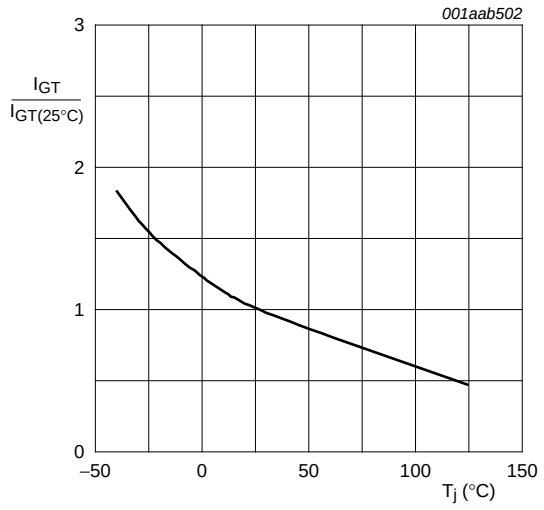


Fig 7. Normalized gate trigger current as a function of junction temperature

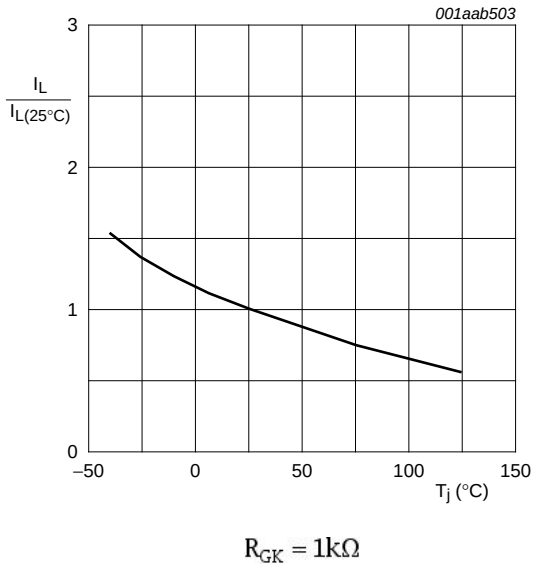
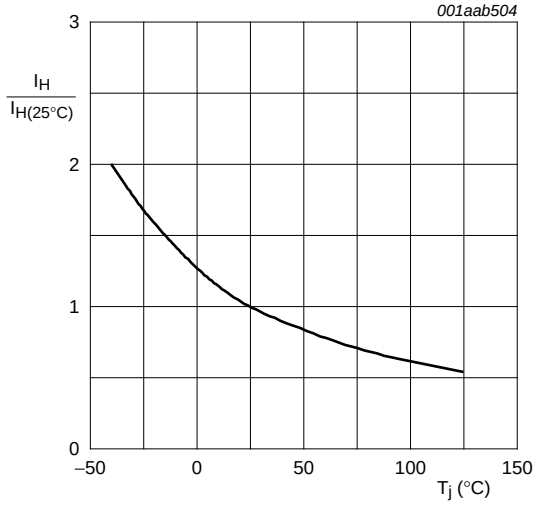
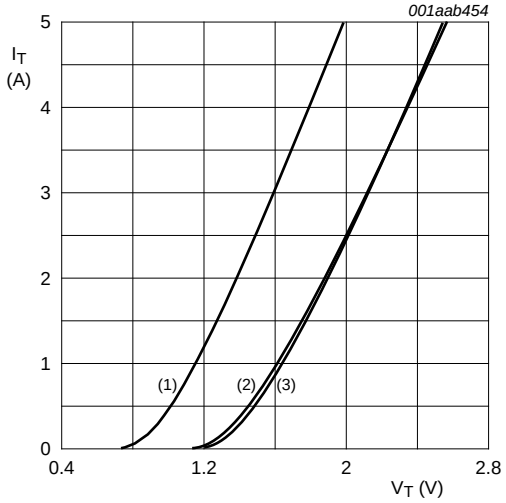


Fig 8. Normalized latching current as a function of junction temperature



$R_{GK} = 1k\Omega$

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



Vo = 1.067 V; Rs = 0.187 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

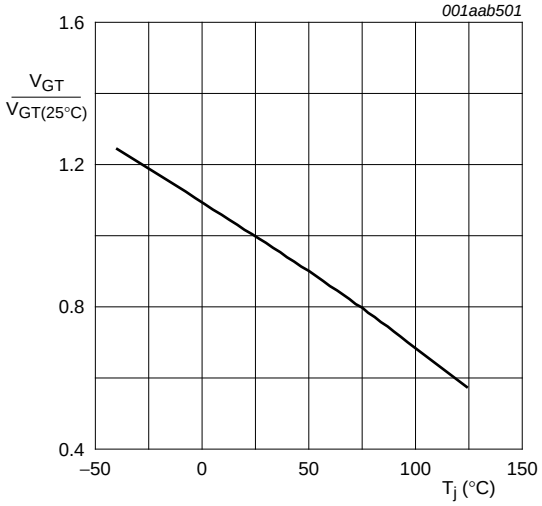
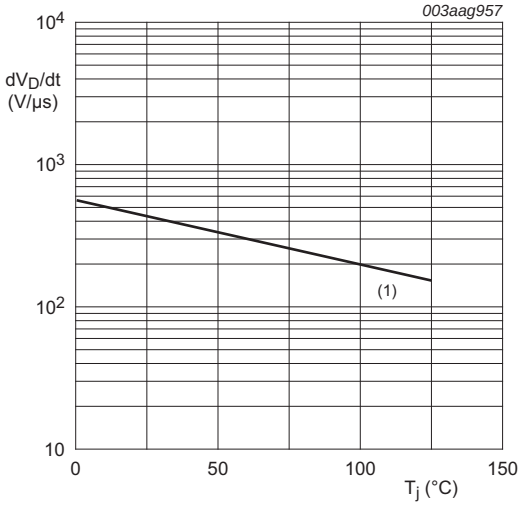


Fig 11. Normalized gate trigger voltage as a function of junction temperature

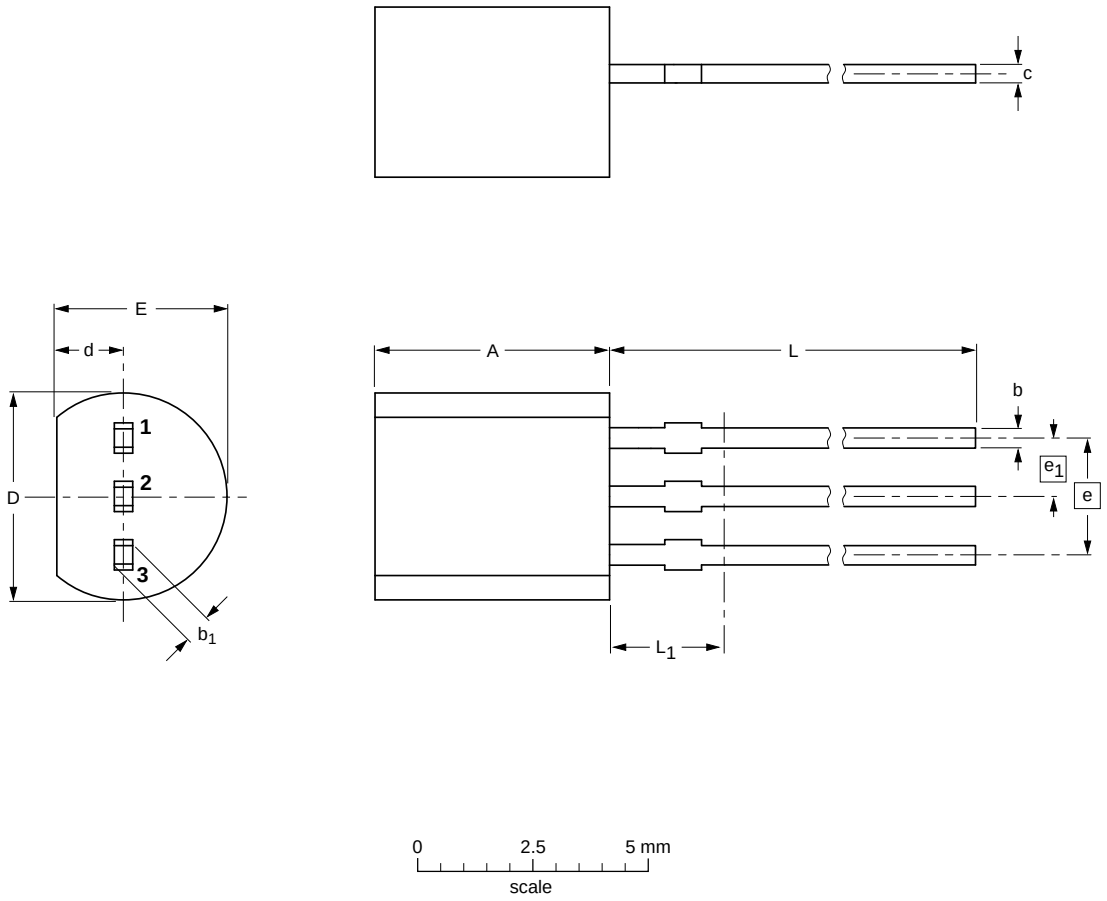


(1) $R_{GK} = 1\ k\Omega$

Fig 12. Critical rate of rise of off-state voltage as a function of junction temperature; minimum values

7. Package outline

Plastic single-ended leaded (through hole) package; 3 leads **SOT54**



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b_1	c	D	d	E	e	e_1	L	L_1 (1) max.
mm	5.2 5.0	0.48 0.40	0.66 0.55	0.45 0.38	4.8 4.4	1.7 1.4	4.2 3.6	2.54	1.27	14.5 12.7	2.5

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT54		TO-92	SC-43A			~~04-06-28~~ 04-11-16

Fig 13. Package outline SOT54 (TO-92)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BT169H v.3	20111107	Product data sheet	-	BT169H v.2
Modifications:	• Various changes to content.			
BT169H v.2	20110526	Product data sheet	-	BT169H v.1

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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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11. Contents

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