

NXP BT169H SCR datasheet

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

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BT169H

SCR

20 March 2014

Product data sheet

1. General description

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

2. Features and benefits

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

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

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; $T_{j(init)} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$	-	-	10	A
		half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 10\text{ ms}$; Fig. 4 ; Fig. 5	-	-	9	A
$I_{T(AV)}$	average on-state current	half sine wave; $T_{lead} \leq 83\text{ °C}$; Fig. 1	-	-	0.5	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{lead} \leq 83\text{ °C}$; Fig. 2 ; Fig. 3	-	-	0.8	A
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 10\text{ mA}$; $T_j = 25\text{ °C}$; Fig. 7	1	50	100	μA

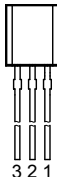



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5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	 <p>TO-92 (SOT54)</p>	 <p>sym037</p>
2	G	gate		
3	K	cathode		

6. Ordering information

Table 3. Ordering information

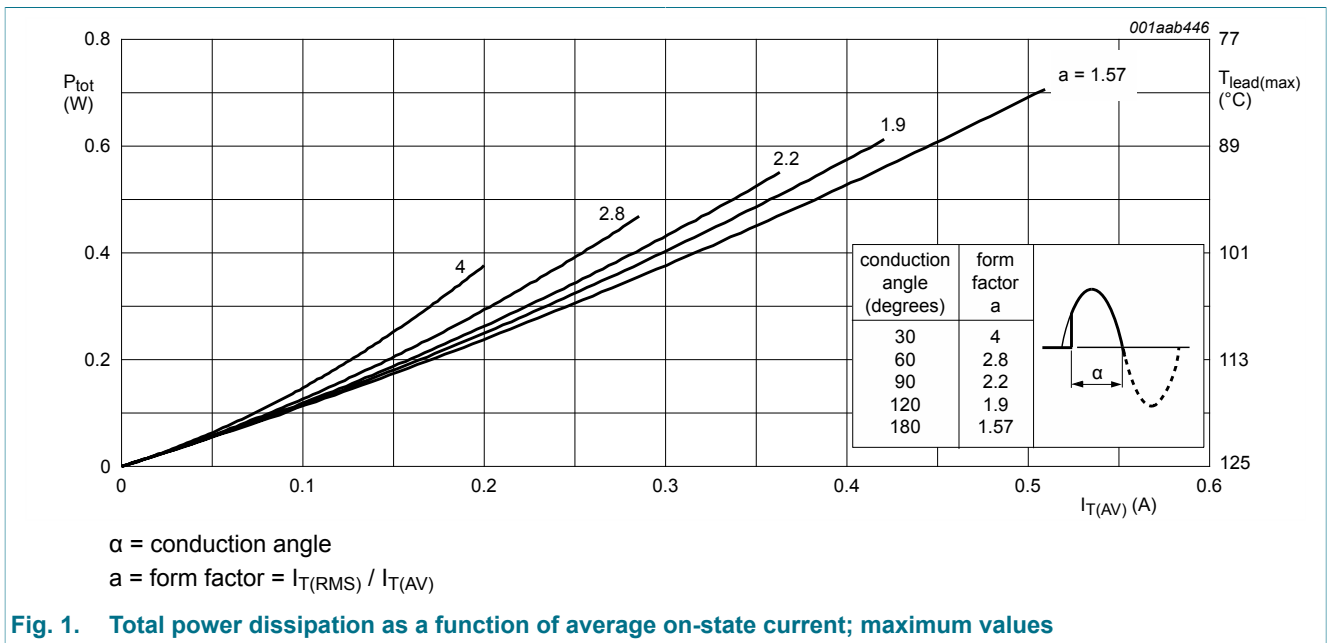
Type number	Package		
	Name	Description	Version
BT169H	TO-92	plastic single-ended leaded (through hole) package; 3 leads	SOT54
BT169H/01	TO-92	plastic single-ended leaded (through hole) package; 3 leads	SOT54
BT169H/L01	TO-92	plastic single-ended leaded (through hole) package; 3 leads	SOT54

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		-	800	V
V_{RRM}	repetitive peak reverse voltage		-	800	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{lead} \leq 83 \text{ }^\circ\text{C}$; Fig. 1	-	0.5	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{lead} \leq 83 \text{ }^\circ\text{C}$; Fig. 2; Fig. 3	-	0.8	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25 \text{ }^\circ\text{C}$; $t_p = 8.3 \text{ ms}$	-	10	A
		half sine wave; $T_{j(init)} = 25 \text{ }^\circ\text{C}$; $t_p = 10 \text{ ms}$; Fig. 4; Fig. 5	-	9	A
I^2t	I^2t for fusing	$t_p = 10 \text{ ms}$; SIN	-	0.41	A^2s
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	$^\circ\text{C}$



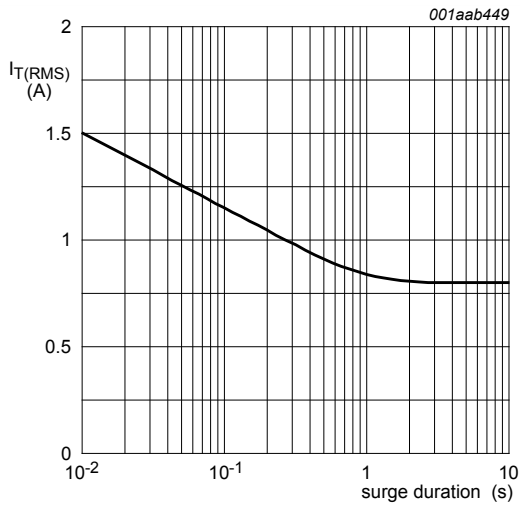


Fig. 2. RMS on-state current as a function of surge duration for sinusoidal currents

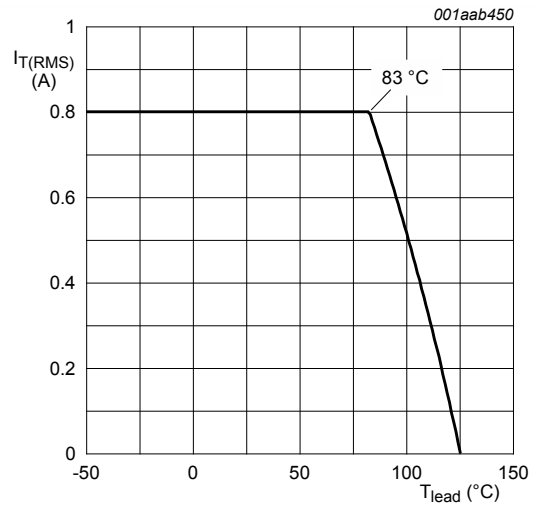


Fig. 3. RMS on-state current as a function of lead temperature; maximum values

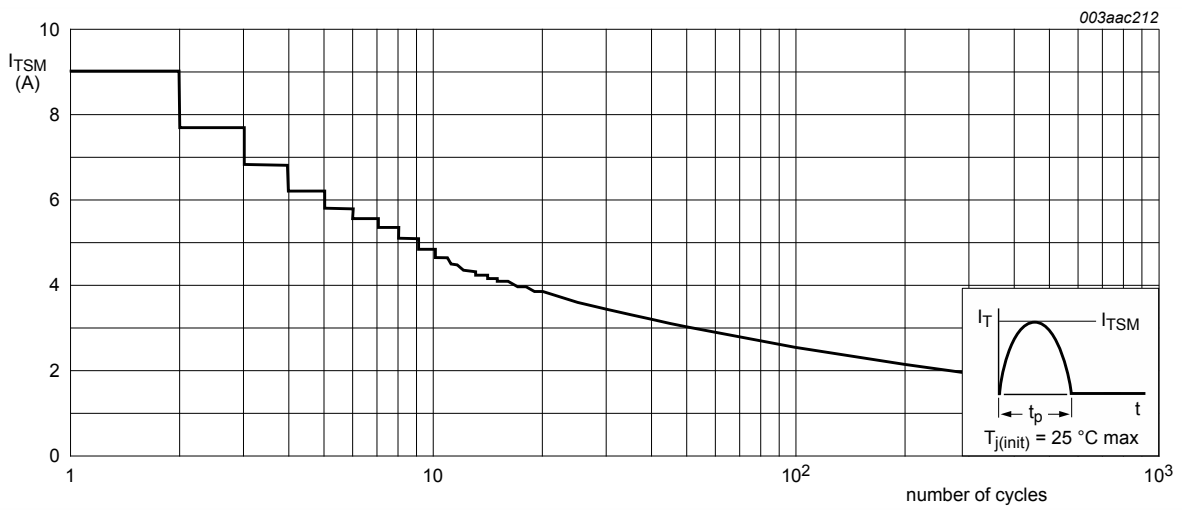
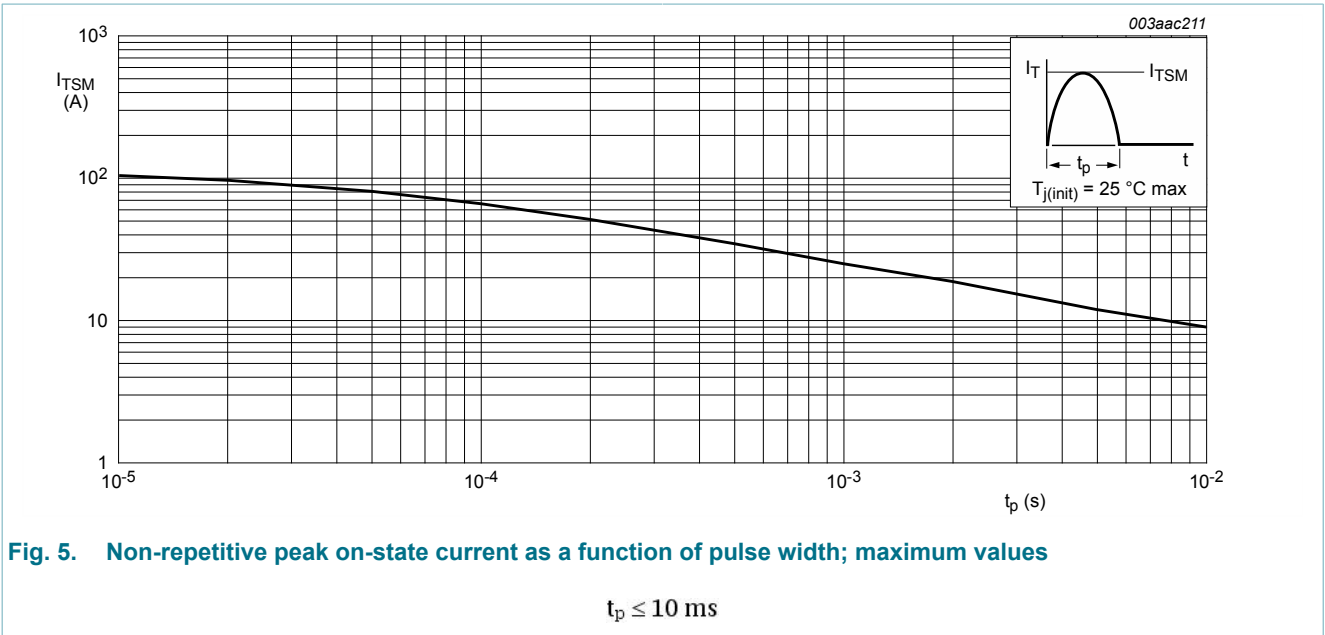


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

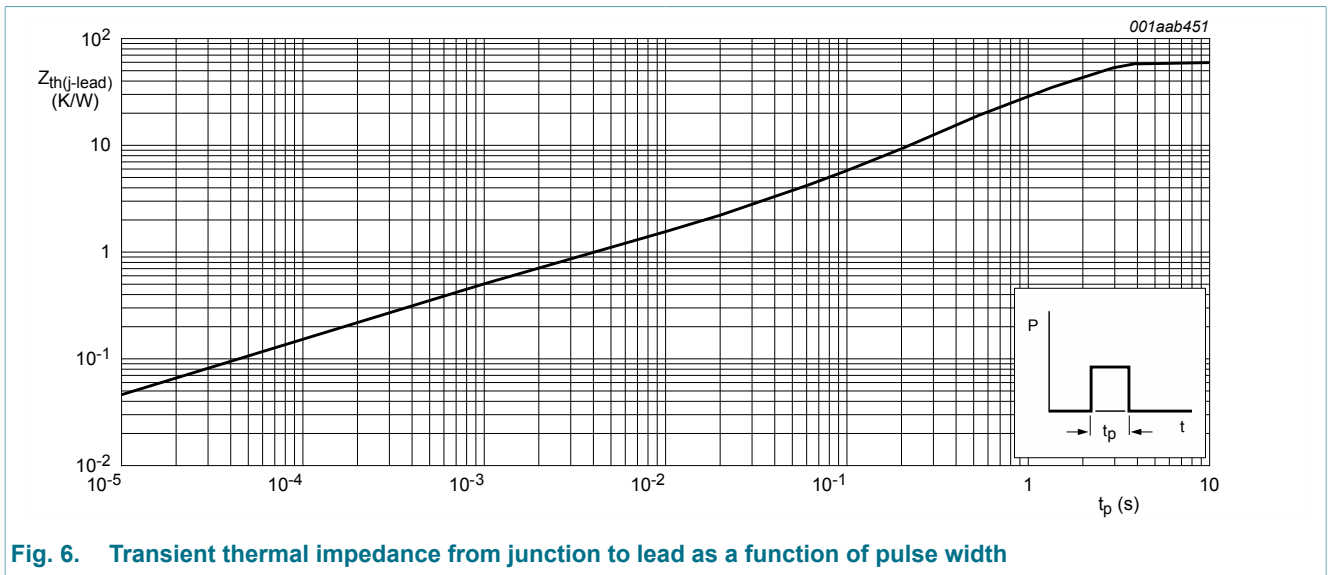
$f = 50 \text{ Hz}$



8. Thermal characteristics

Table 5. Thermal characteristics

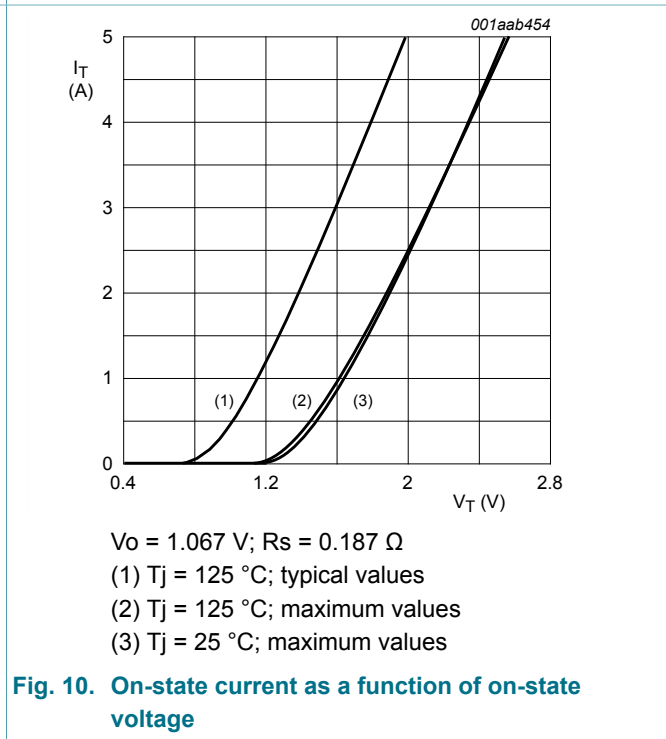
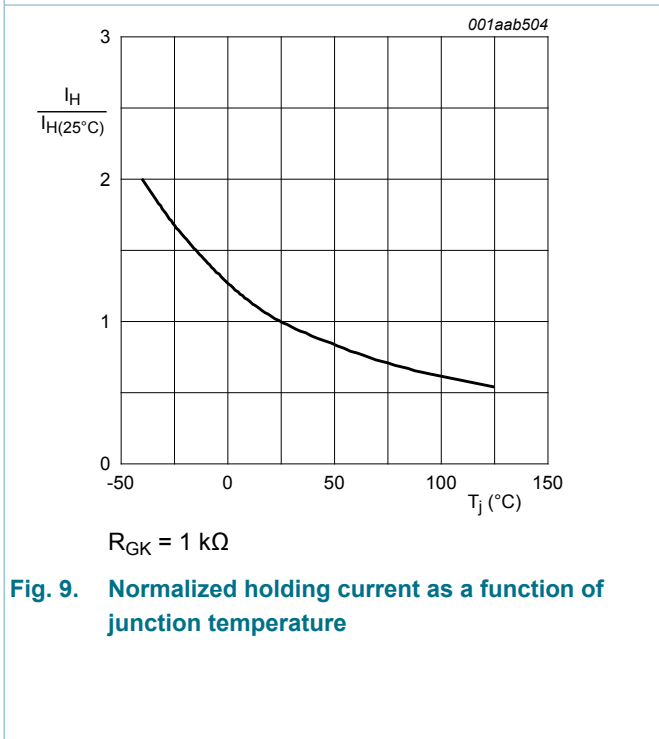
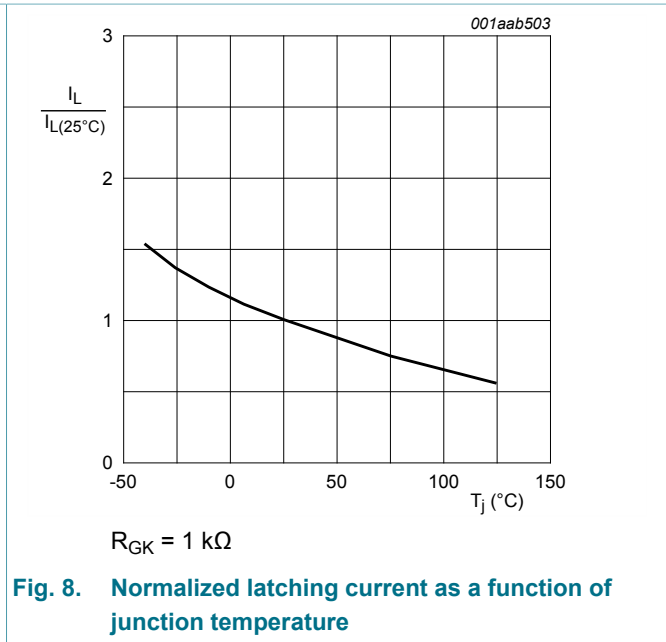
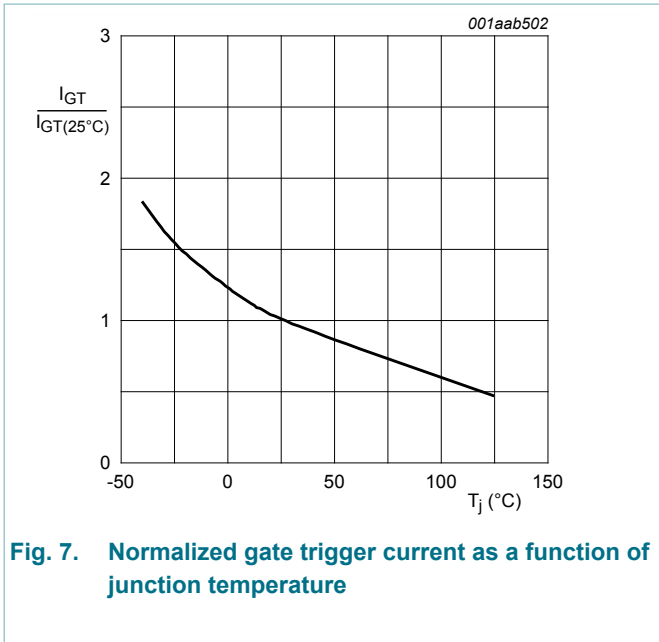
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-lead)}$	thermal resistance from junction to lead	Fig. 6	-	-	60	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	printed circuit board mounted: lead length = 4 mm	-	150	-	K/W

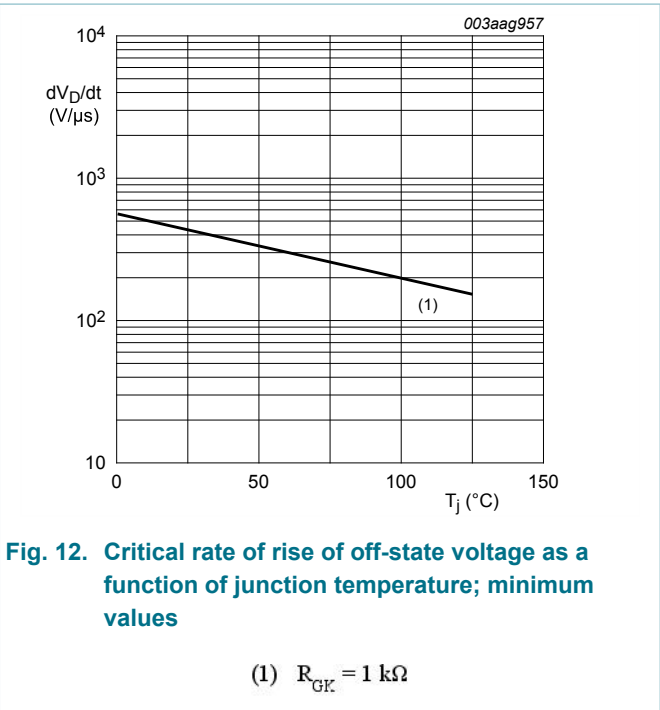
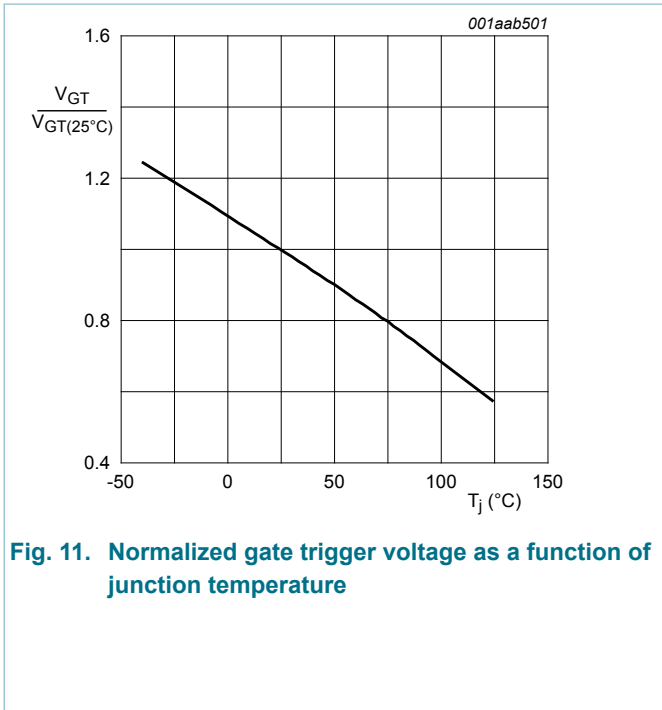


9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 10\text{ mA}$; $T_j = 25\text{ °C}$; Fig. 7	1	50	100	μA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.5\text{ mA}$; $R_{GK} = 1\text{ k}\Omega$; $T_j = 25\text{ °C}$; Fig. 8	-	2	6	mA
I_H	holding current	$V_D = 12\text{ V}$; $R_{GK} = 1\text{ k}\Omega$; $T_j = 25\text{ °C}$; Fig. 9	-	1.5	3	mA
V_T	on-state voltage	$I_T = 1.2\text{ A}$; $T_j = 25\text{ °C}$; Fig. 10	-	1.25	1.7	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 10\text{ mA}$; $T_j = 25\text{ °C}$; Fig. 11	-	0.5	0.8	V
		$V_D = 800\text{ V}$; $I_T = 10\text{ mA}$; $T_j = 125\text{ °C}$; Fig. 11	0.3	0.5	-	V
I_D	off-state current	$V_D = 800\text{ V}$; $T_j = 125\text{ °C}$; $R_{GK} = 1\text{ k}\Omega$	-	0.05	0.1	mA
I_R	reverse current	$V_R = 800\text{ V}$; $T_j = 125\text{ °C}$; $R_{GK} = 1\text{ k}\Omega$	-	0.05	0.1	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$; $T_j = 125\text{ °C}$; $R_{GK} = 1\text{ k}\Omega$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; Fig. 12	150	350	-	$\text{V}/\mu\text{s}$
t_{gt}	gate-controlled turn-on time	$I_{TM} = 2\text{ A}$; $V_D = 800\text{ V}$; $I_G = 10\text{ mA}$; $dI_G/dt = 0.1\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$	-	2	-	μs
t_q	commutated turn-off time	$V_{DM} = 536\text{ V}$; $T_j = 125\text{ °C}$; $I_{TM} = 1.6\text{ A}$; $V_R = 35\text{ V}$; $(dI_T/dt)_M = 30\text{ A}/\mu\text{s}$; $dV_D/dt = 2\text{ V}/\mu\text{s}$; $R_{GK} = 1\text{ k}\Omega$; ($V_{DM} = 67\%$ of V_{DRM})	-	100	-	μs





10. Package outline

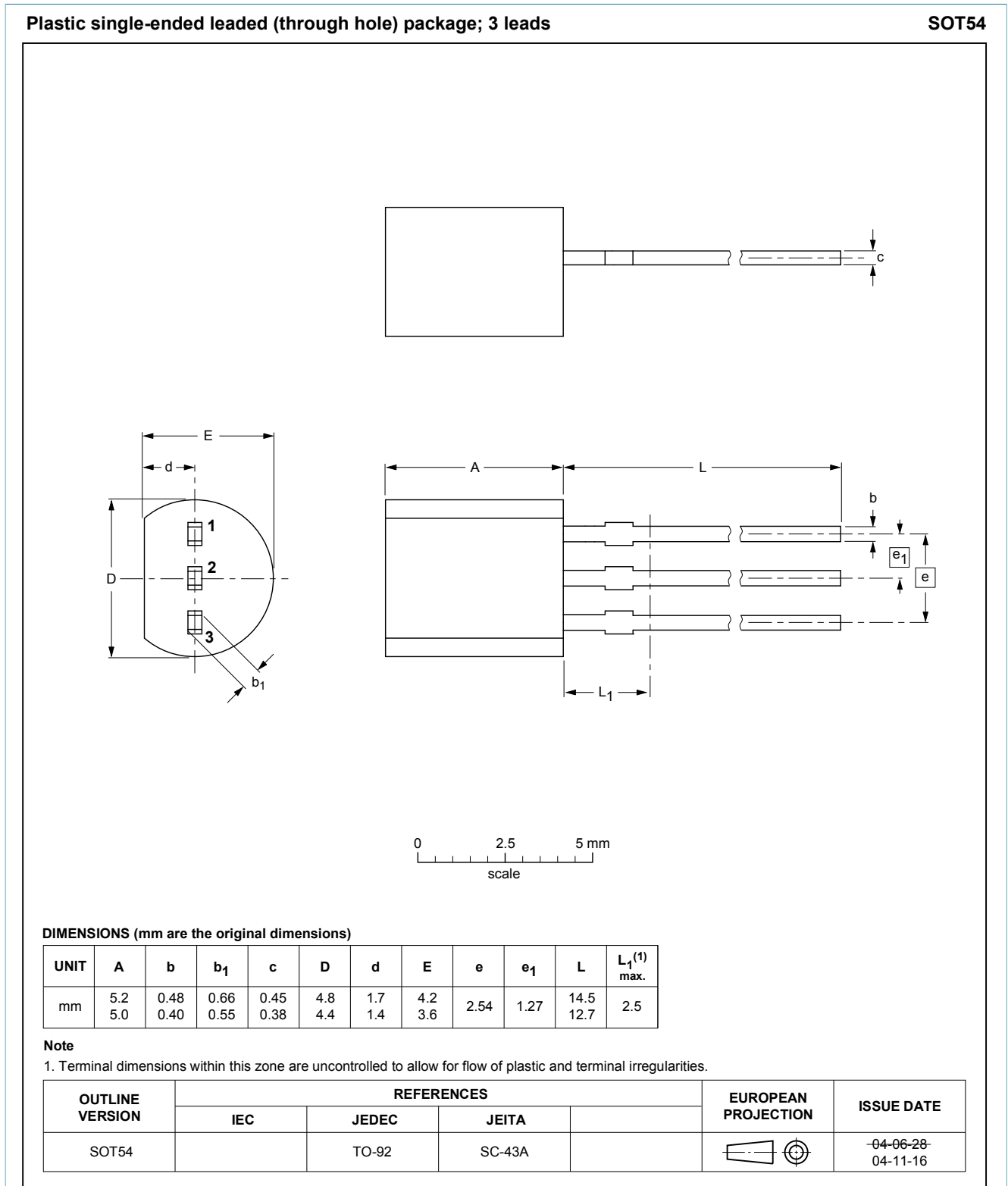


Fig. 13. Package outline TO-92 (SOT54)

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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.
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