

## 1. General description

Planar passivated Silicon Controlled Rectifier (SCR) with sensitive gate in a SOT89 surface mountable plastic package. This SCR is designed to be interfaced directly to microcontrollers, logic integrated circuits and other low power gate trigger circuits.

## 2. Features and benefits

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

## 3. Applications

- Ground Fault Circuit Interrupters (GFCI)
- General purpose switching and phase control
- Ignition circuits, CDI for 2- and 3-wheelers
- Motor control-e.g. small kitchen appliances

## 4. Quick reference data

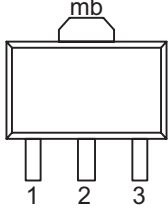

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values	Unit
<b>Absolute maximum rating</b>				
$V_{RRM}$	repetitive peak reverse voltage		600	V
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq 109\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	0.8	A
$I_{TSM}$	non-repetitive peak 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
		half sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 8.3\text{ ms}$	9	A
$T_j$	junction temperature		125	°C

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	15	-	100	$\mu\text{A}$
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ °C}$ ; $R_{GK(\text{ext})} = 1\text{ k}\Omega$ ; <a href="#">Fig. 9</a>	-	-	5	$\text{mA}$
$V_T$	on-state voltage	$I_T = 1.6\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 10</a>	-	1.4	1.7	$\text{V}$
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 600\text{ V}$ ; $T_j = 125\text{ °C}$ ; $R_{GK} = 1\text{ k}\Omega$ ; exponential waveform	100	-	-	$\text{V}/\mu\text{s}$

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate		
2	A	anode		
3	K	cathode		
mb	mb	mounting base; connected to anode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
NCR100Q-6M	SOT89	NCR100Q-6MJ	Reel	1000	SOT89L	8-Mar-2019

## 7. Marking

Table 4. Marking codes

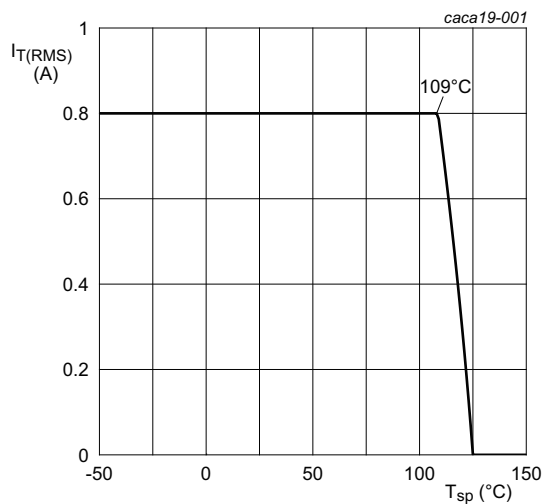
Type number	Marking codes
NCR100Q-6M	NCR1006M

## 8. Limiting values

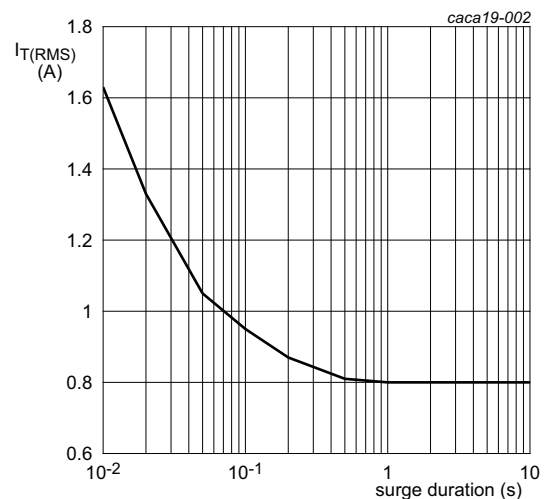
**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	Values	Unit
$V_{DRM}$	repetitive peak off-state voltage		600	V
$V_{RRM}$	repetitive peak reverse voltage		600	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{sp} \leq 109\text{ }^{\circ}\text{C}$	0.51	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq 109\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	0.8	A
$I_{TSM}$	non-repetitive peak on-state current	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
		half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 8.3\text{ ms}$	9	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ms}$ ; sine wave	0.32	$\text{A}^2\text{s}$
$di_T/dt$	rate of rise of on-state current	$I_G = 0.2\text{ mA}$	50	$\text{A}/\mu\text{s}$
$I_{GM}$	peak gate current		1	A
$V_{GM}$	peak 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 to 150	$^{\circ}\text{C}$
$T_j$	junction temperature		125	$^{\circ}\text{C}$

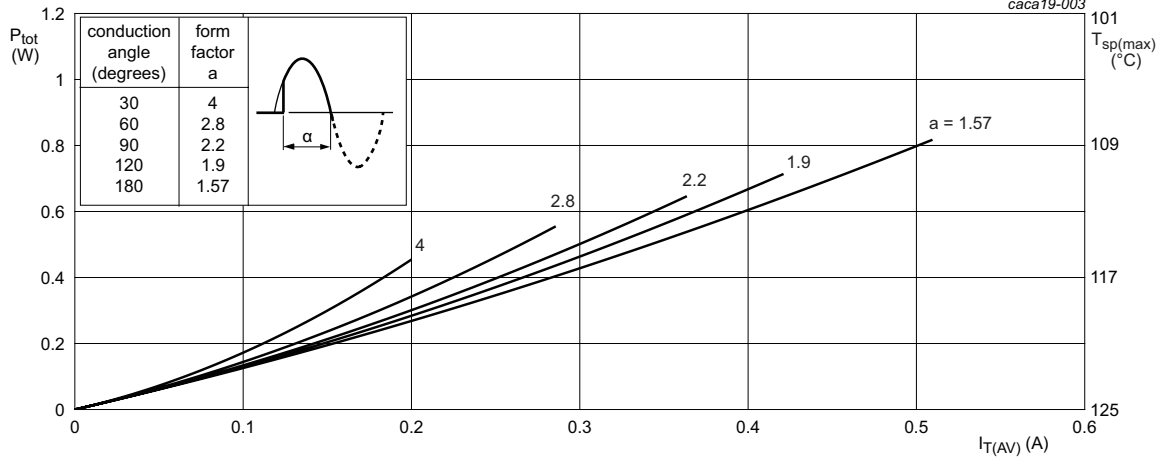


**Fig. 1. RMS on-state current as a function of solder point temperature; maximum values**



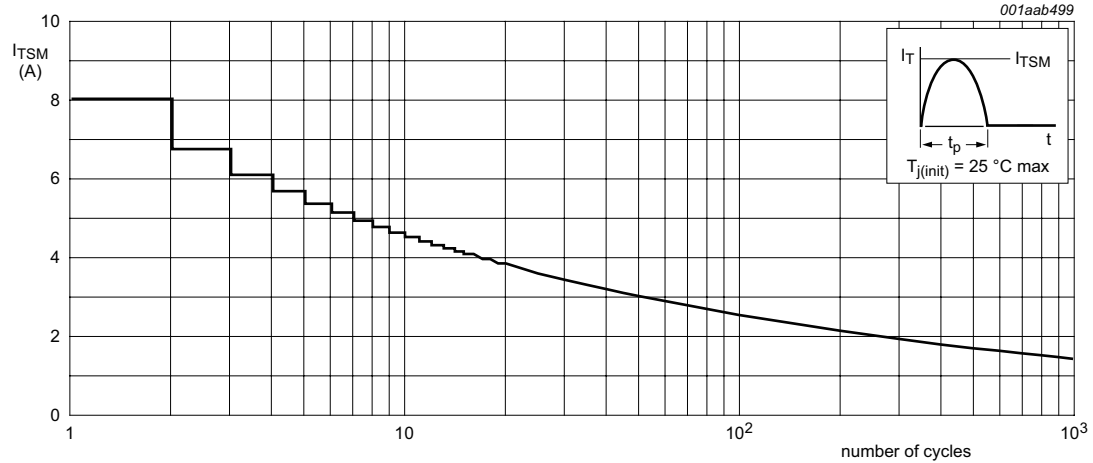
$f = 50\text{Hz}$ ;  $T_{sp} = 109\text{ }^{\circ}\text{C}$

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



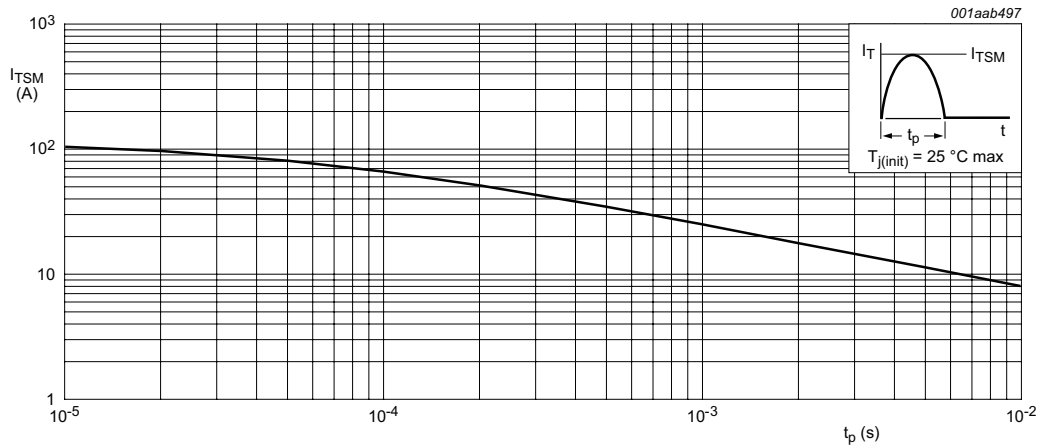
$\alpha$  = conduction angle  
 $a$  = form factor =  $I_{T(RMS)} / I_{T(AV)}$

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



$t_p \leq 10$  ms

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

## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	<a href="#">Fig. 6</a>	-	-	20	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	90	-	K/W

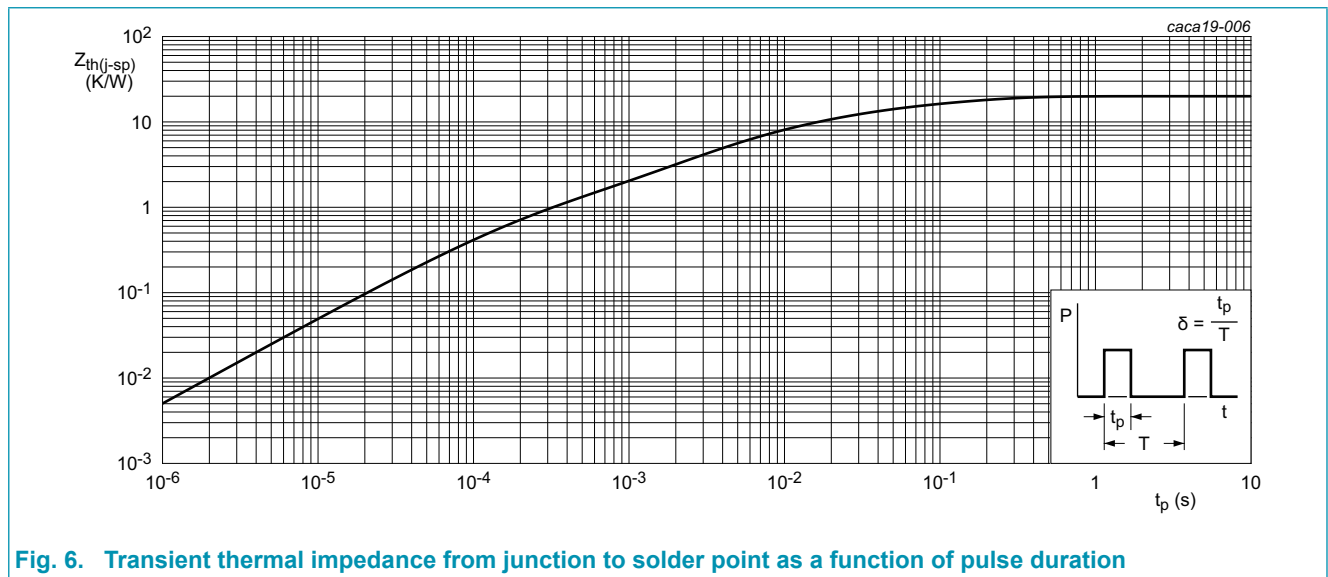


Fig. 6. Transient thermal impedance from junction to solder point as a function of pulse duration

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	15	-	100	$\mu\text{A}$
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ °C}$ ; $R_{GK(ext)} = 1\text{ k}\Omega$ ; <a href="#">Fig. 8</a>	-	-	6	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ °C}$ ; $R_{GK(ext)} = 1\text{ k}\Omega$ ; <a href="#">Fig. 9</a>	-	-	5	mA
$V_T$	on-state voltage	$I_T = 1.6\text{ A}$ ; $T_j = 25\text{ °C}$ ; <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
		$V_D = 600\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 125\text{ °C}$	0.2	0.5	-	V
$I_D$	off-state current	$V_D = 600\text{ V}$ ; $T_j = 125\text{ °C}$	-	-	0.1	mA
$I_R$	reverse current	$V_D = 600\text{ V}$ ; $T_j = 125\text{ °C}$	-	-	0.1	mA
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 600\text{ V}$ ; $T_j = 125\text{ °C}$ ; $R_{GK} = 1\text{ k}\Omega$ ; exponential waveform	100	-	-	$\text{V}/\mu\text{s}$
$t_{gt}$	gate-controlled turn-on time	$I_{TM} = 2\text{ A}$ ; $V_D = 600\text{ V}$ ; $I_G = 1\text{ mA}$ ; $(dI_G/dt)_M = 0.1\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$	-	2	-	$\mu\text{s}$
$t_q$	commutated turn-off time	$V_{DM} = 402\text{ V}$ ; $T_j = 125\text{ °C}$ ; $I_{TM} = 1.6\text{ A}$ ; $V_R = 35\text{ V}$ ; $dV_D/dt = 2\text{ V}/\mu\text{s}$ ; $(dI_T/dt)_M = 30\text{ A}/\mu\text{s}$ ; $R_{GK(ext)} = 1\text{ k}\Omega$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ )	-	100	-	$\mu\text{s}$

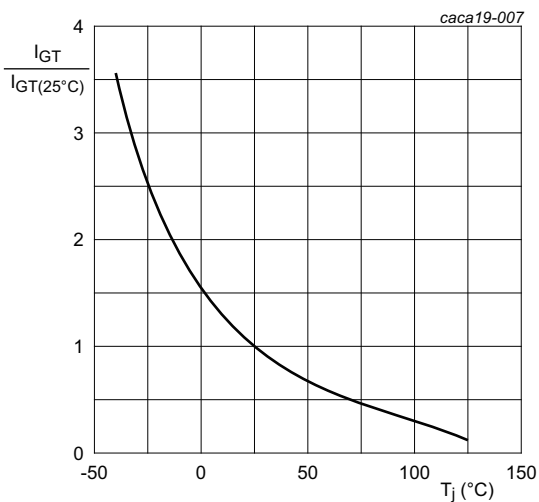


Fig. 7. Normalized gate trigger current as a function of junction temperature

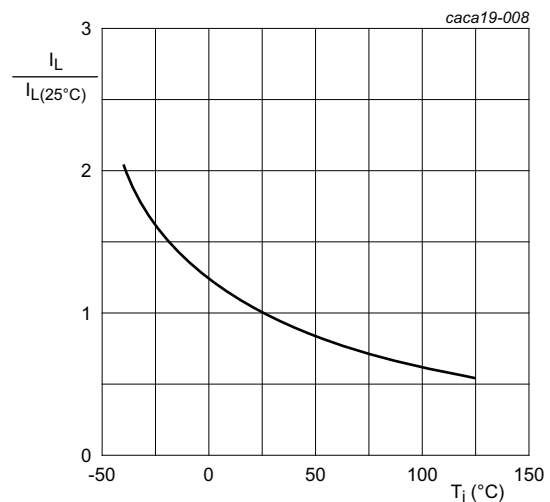
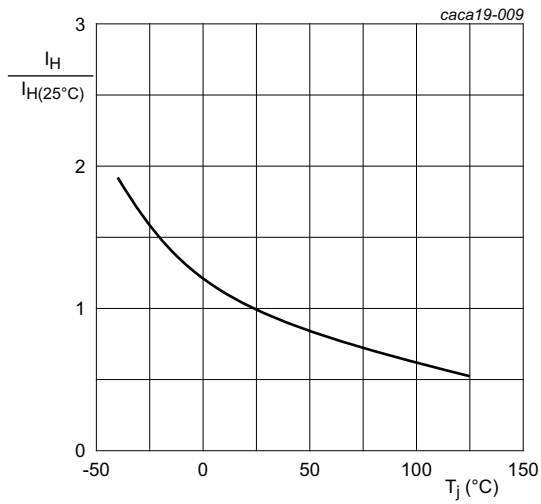
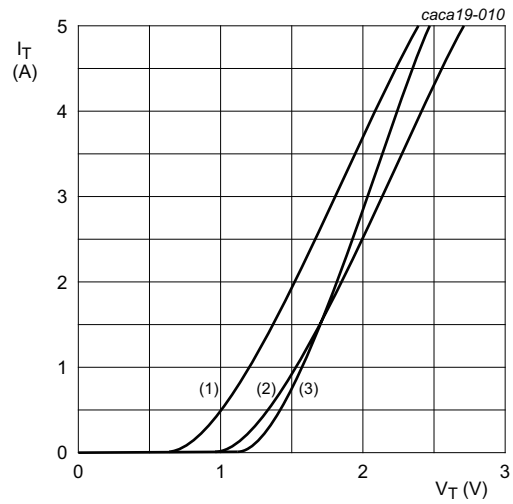


Fig. 8. Normalized latching current as a function of junction temperature

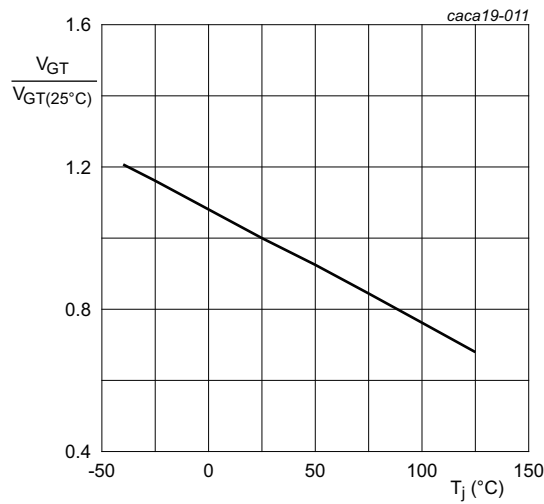


**Fig. 9. Normalized holding current as a function of junction temperature**



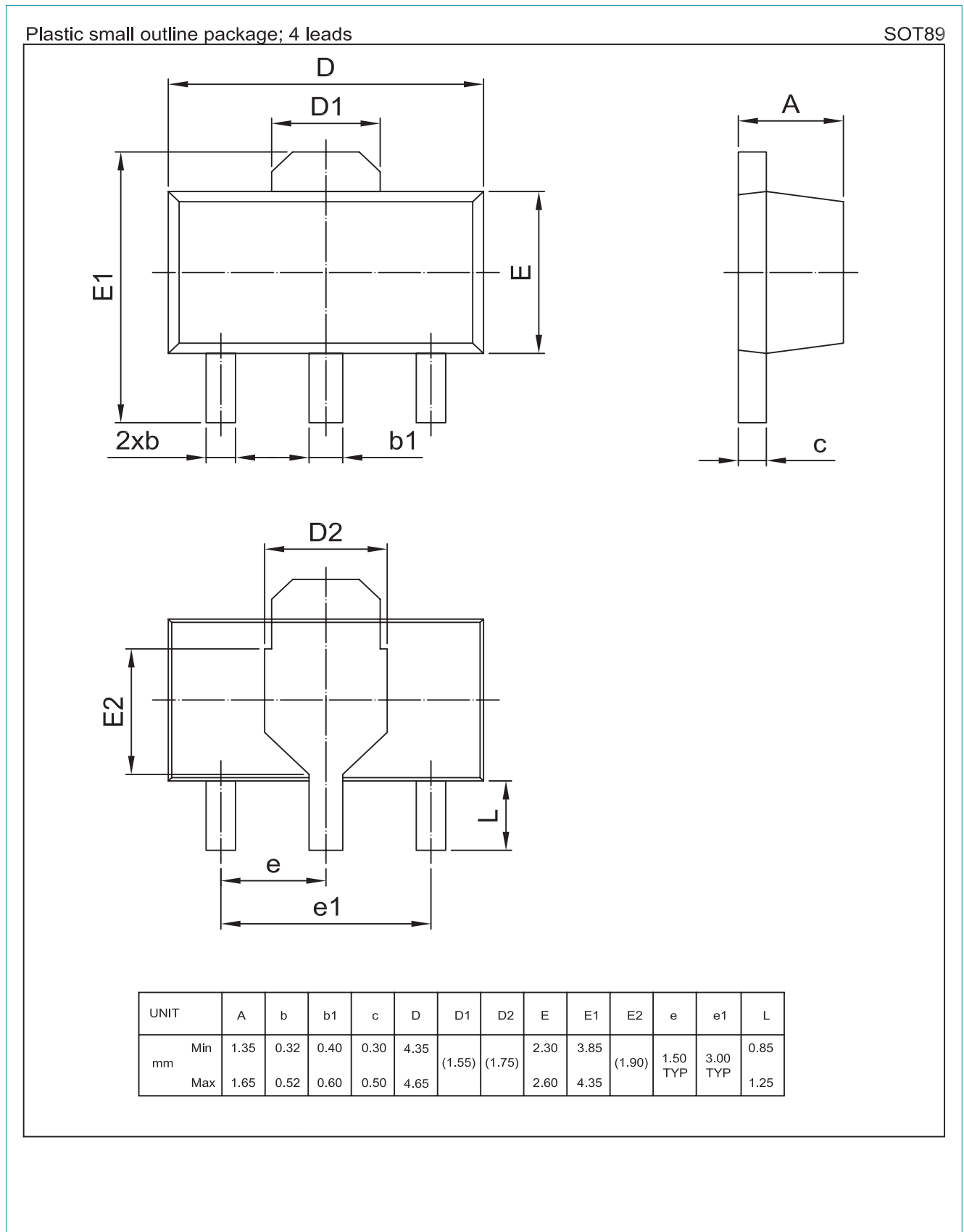
$V_o = 1.173 \text{ V}; R_s = 0.3437 \ \Omega$   
 (1)  $T_j = 125 \text{ }^\circ\text{C}$ ; typical values  
 (2)  $T_j = 125 \text{ }^\circ\text{C}$ ; maximum values  
 (3)  $T_j = 25 \text{ }^\circ\text{C}$ ; maximum values

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



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

### 11. Package outline





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