NCR100K-6R

SCR

Rev.01 - 24 April 2024 Product data sheet

1. General description

Planar passivated SCR with sensitive gate in surface mountable SOT23 (TO-236AB) 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 (<100µA)
- High dv/dt noise immunity
- Planar passivated for voltage ruggedness and reliability
- Miniature SOT23 package for high density PCB
- RoHS compliant, Halogen free and lead free

3. Applications

- Earth leakage circuit breakers or Ground Fault Circuit Interrupters (GFCI)
- Low power latching circuits
- Valve/locker control

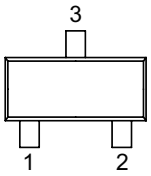
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
V_{DRM}	repetitive peak off-state voltage			600			V
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq 108$ °C; Fig. 1; Fig. 2; Fig. 3		0.8			A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25$ °C; $t_p = 10$ ms; Fig. 4; Fig. 5		8			A
		half sine wave; $T_{j(init)} = 25$ °C; $t_p = 8.3$ ms		9			A
T_j	junction temperature			-40 to 125			°C
Symbol	**Parameter**	**Conditions**	**Notes**	**Min**	**Typ**	**Max**	**Unit**
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12$ V; $I_T = 10$ mA; $T_j = 25$ °C; Fig. 7		1	-	100	µA
I_H	holding current	$V_D = 12$ V; $R_{GK} = 1$kΩ; $T_j = 25$ °C; Fig. 9		-	-	3	mA
V_T	on-state voltage	$I_T = 1.2$ A; $T_j = 25$ °C; Fig. 10		-	1.25	1.70	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 402$ V ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; $R_{GK} = 1$kΩ; $T_j = 125$ °C		100	-	-	V/µs
		$V_{DM} = 200$ V; exponential waveform; $R_{GK} = 1$kΩ; $T_j = 125$ °C		200	-	-	V/µs

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate		
2	K	cathode		
3	A	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
NCR100K-6R	SOT23	NCR100K-6RX	Reel	3000	SOT23L	22-Aug-2022

7. Marking

Table 4. Marking codes

Type number	Marking codes
NCR100K-6R	TB

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions	Notes	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; $T_{sp} \leq 108$ °C;		0.5	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq 108$ °C; Fig. 1; Fig. 2; Fig. 3		0.8	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25$ °C; $t_p = 10$ ms; Fig. 4; Fig. 5		8	A
		half sine wave; $T_{j(init)} = 25$ °C; $t_p = 8.3$ ms		9	A
I^2t	I^2t for fusing	$t_p = 10$ ms; sine-wave pulse		0.36	A^2s
dI_T/dt	rate of rise of on-state current	$I_G = 200$ µA		50	A/µs
I_{GM}	peak gate current			1	A
V_{GM}	peak gate voltage			5	V
V_{GRM}	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 to 150	°C
T_j	junction temperature			-40 to 125	°C

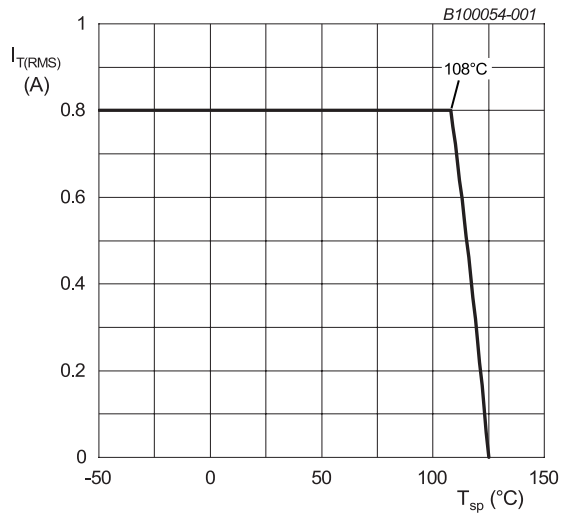
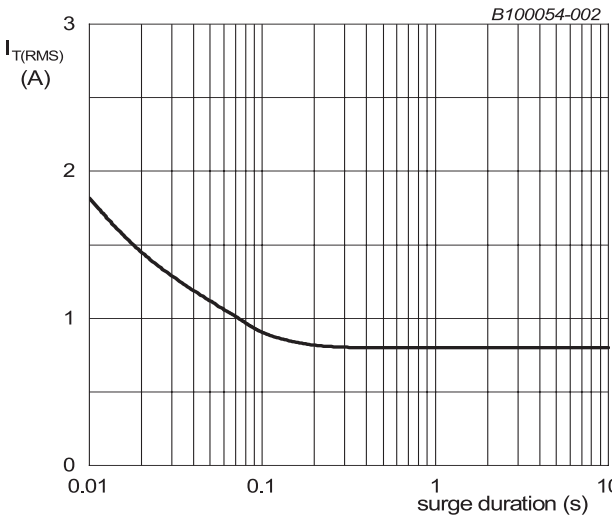
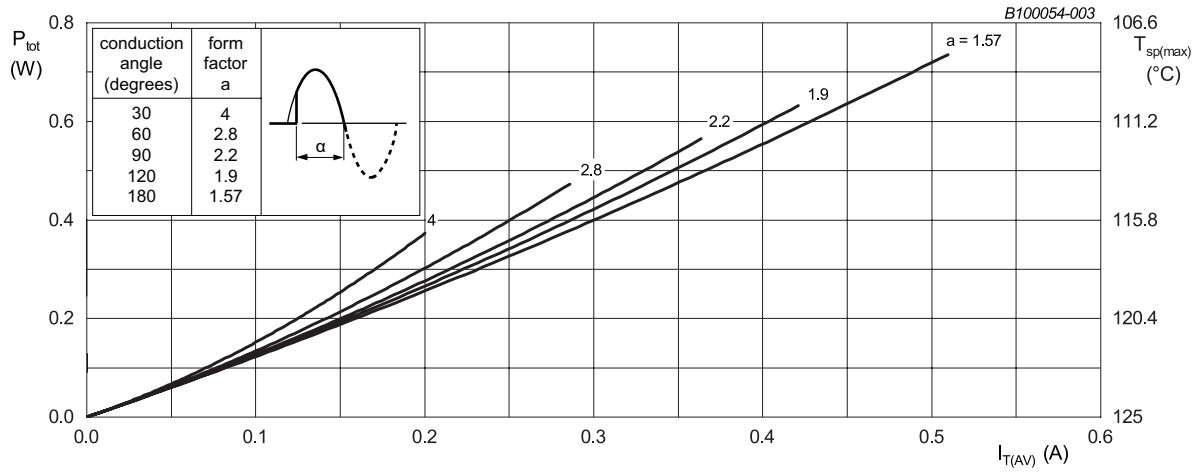


Fig. 1. RMS on-state current as a function of solder point temperature; maximum values



f = 50 Hz; T_{sp} = 108 °C

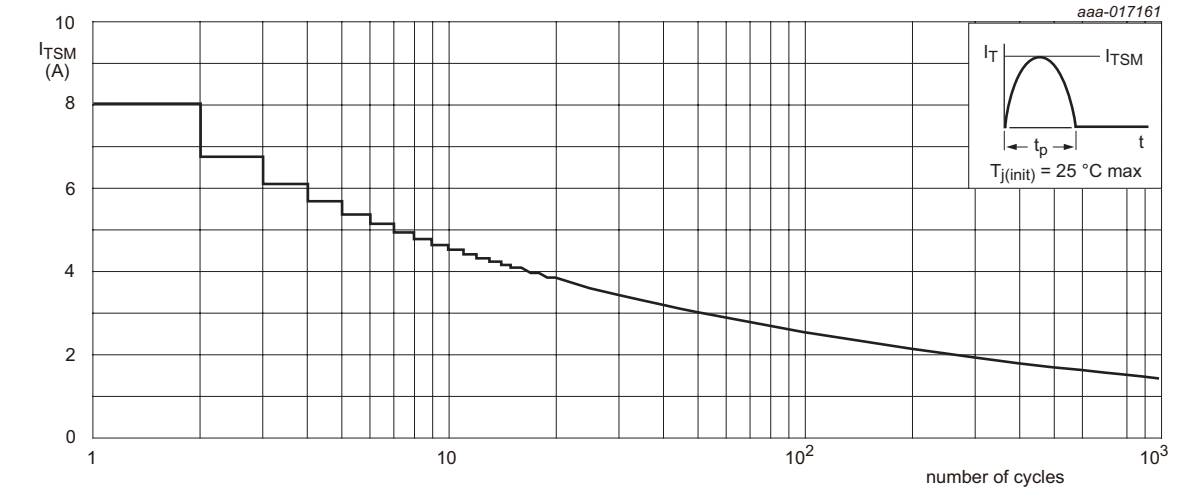
Fig. 2. RMS on-state current as a function of surge duration; maximum values



α = conduction angle

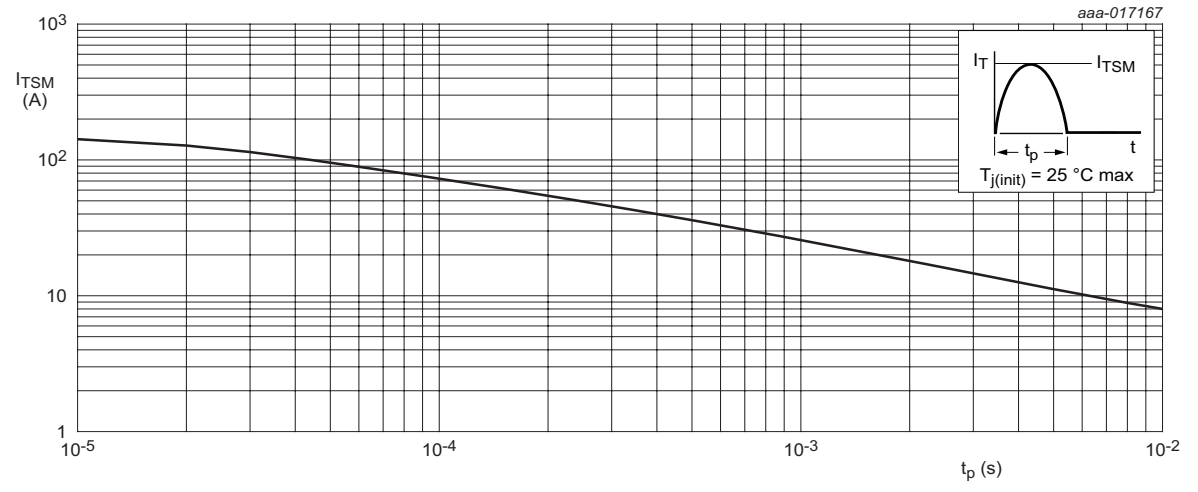
a = form factor = $I_{T(RMS)}$ / $I_{T(AV)}$

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	Notes	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	Fig. 6		-	-	23	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	105	-	K/W

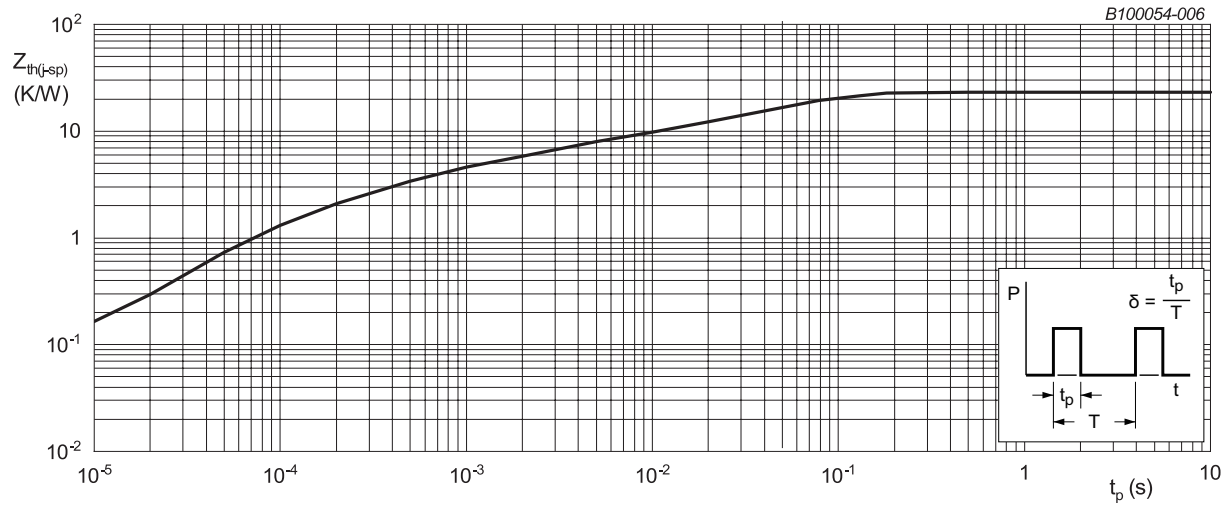


Fig. 6. Transient thermal impedance from junction to solder point as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	V_D = 12 V; I_T = 10 mA; T_j = 25 °C; Fig. 7		-	-	100	µA
I_L	latching current	V_D = 12 V; I_G = 10 mA; R_{GK} = 1kΩ; T_j = 25 °C; Fig. 8		-	-	6	mA
I_H	holding current	V_D = 12 V; R_{GK} = 1kΩ; T_j = 25 °C; Fig. 9		-	-	3	mA
V_T	on-state voltage	I_T = 1.2 A; T_j = 25 °C; Fig. 10		-	1.25	1.70	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 10 mA; T_j = 25 °C; Fig. 11		-	0.5	0.8	V
		V_D = 400 V; I_T = 10 m A; T_j = 125 °C		0.3	0.5	-	V
I_D	off-state current	V_D = 600 V; R_{GK} = 1kΩ; T_j = 25 °C		-	-	10	µA
		V_D = 600 V; R_{GK} = 1kΩ; T_j = 125 °C		-	0.05	0.1	mA
I_R	reverse current	V_D = 600 V; R_{GK} = 1kΩ; T_j = 25 °C		-	-	10	µA
		V_D = 600 V; R_{GK} = 1kΩ; T_j = 125 °C		-	0.05	0.1	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 402 V (V_{DM} = 67% of V_{DRM}); exponential waveform; R_{GK} = 1kΩ; T_j = 125 °C		100	-	-	V/µs
		V_{DM} = 200 V; exponential waveform; R_{GK} = 1kΩ; T_j = 125 °C		200	-	-	V/µs
t_{gt}	gate-controlled turn-on time	I_{TM} = 0.8 A; V_D = 600 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 (V_{DM} = 67% of V_{DRM}); I_{TM}=0.8A; V_R = 35 V; $(dI_T/dt)_M$ = 30 A/µs; dV_D/dt=2V/µs; R_{GK} = 1 kΩ; T_j = 125 °C		-	100	-	µs

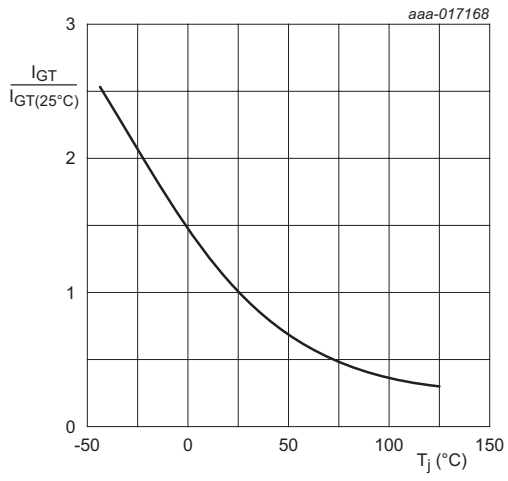


Fig. 7. Normalized gate trigger current as a function of junction temperature

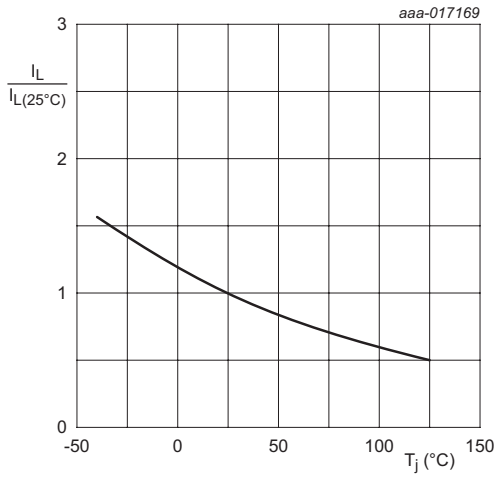


Fig. 8. Normalized latching current as a function of junction temperature

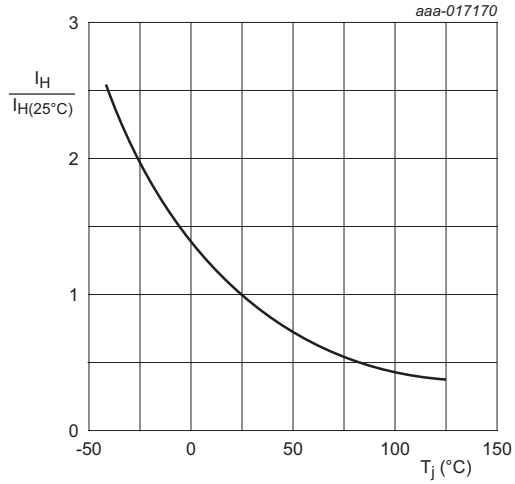
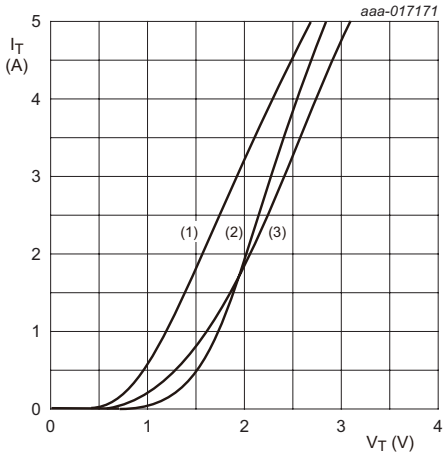


Fig. 9. Normalized holding current as a function of junction temperature



V_o = 1.173 V; R_s = 0.2156 Ω
(1) T_j = 125 °C; typical values
(2) T_j = 25 °C; maximum values
(3) T_j = 125 °C; maximum values

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

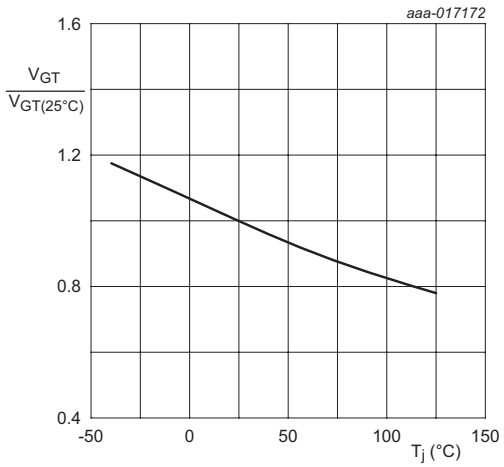
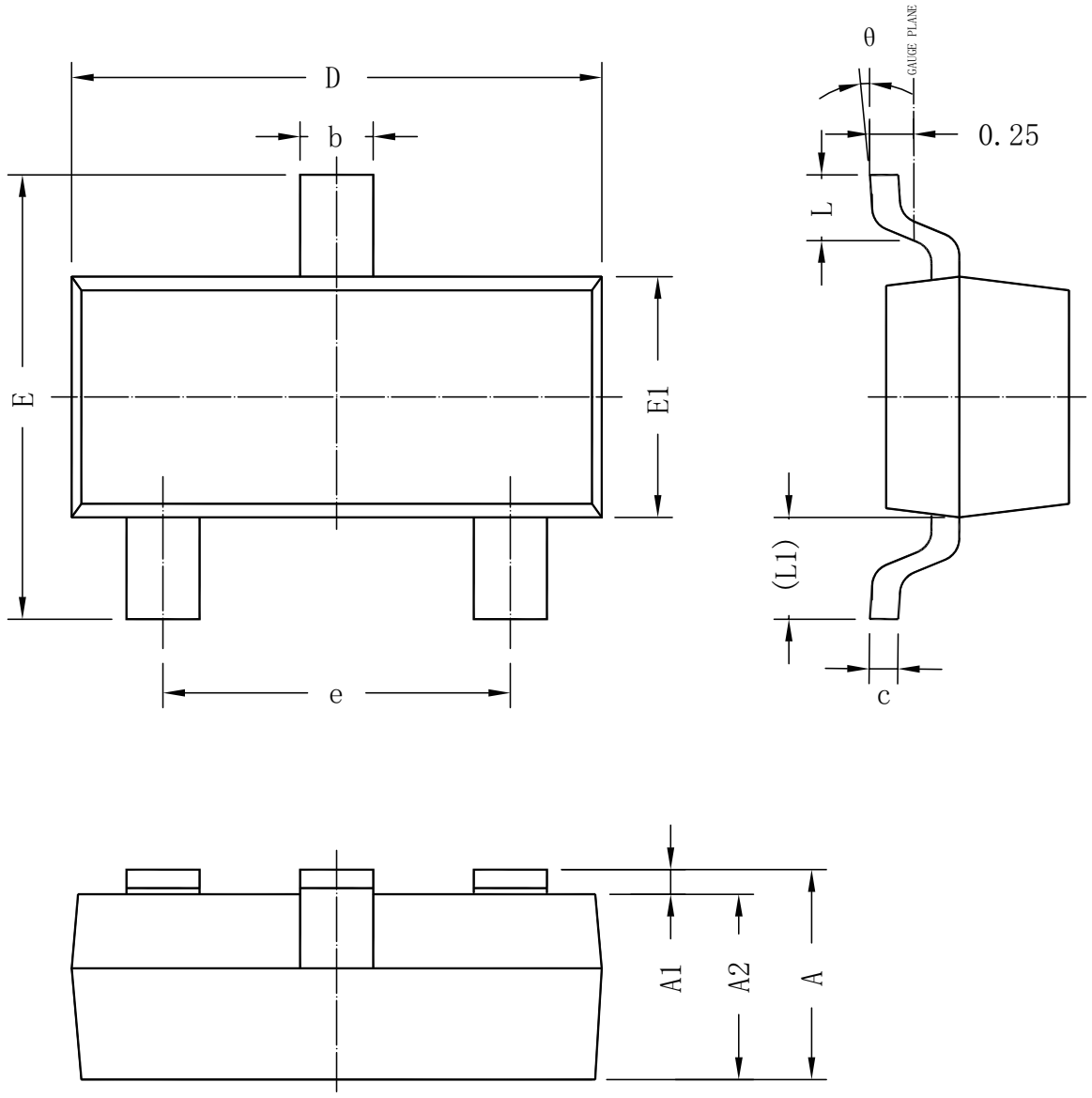


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

11. Package outline



UNIT		A	A1	A2	b	c	D	E	E1	e	L	L1	θ
mm	Min	0.90	0.00	0.90	0.30	0.13	2.80	2.25	1.20	1.80	0.30	(0.55)	0°
	Max	1.20	0.10	1.10	0.50	0.20	3.00	2.55	1.40	2.00	0.50		8°

Note:

1. All dimensions don't include mold flash and metal protrusion.

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.
Product [short] data sheet	Production	This document contains the product specification.

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13. Contents

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