EC103D1W

SCR

21 August 2018 Product data sheet

1. General description

Planar passivated ultra sensitive gate Silicon Controlled Rectifier in a SOT223 surface mountable plastic package.

2. Features and benefits

- Planar passivated for voltage ruggedness and reliability
- Ultra sensitive gate
- Surface mountable package

3. Applications

- Electronic ballasts
- Safety shut down and protection circuits
- Sensing circuits
- Smoke detectors
- Switched Mode Power Supplies

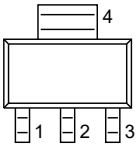
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	-	400	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{sp} \leq$ 114 °C; Fig. 1		-	-	0.5	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq$ 114 °C; 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			-	-	125	°C
Static characteristics							
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 9		-	3	12	µA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 268 V; T_j = 125 °C; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit		-	150	-	V/µs

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 SC-73 (SOT223)	
2	A	anode		
3	G	gate		
4	mb	mounting base; connected to anode		

6. Ordering information

Table 3. Ordering information

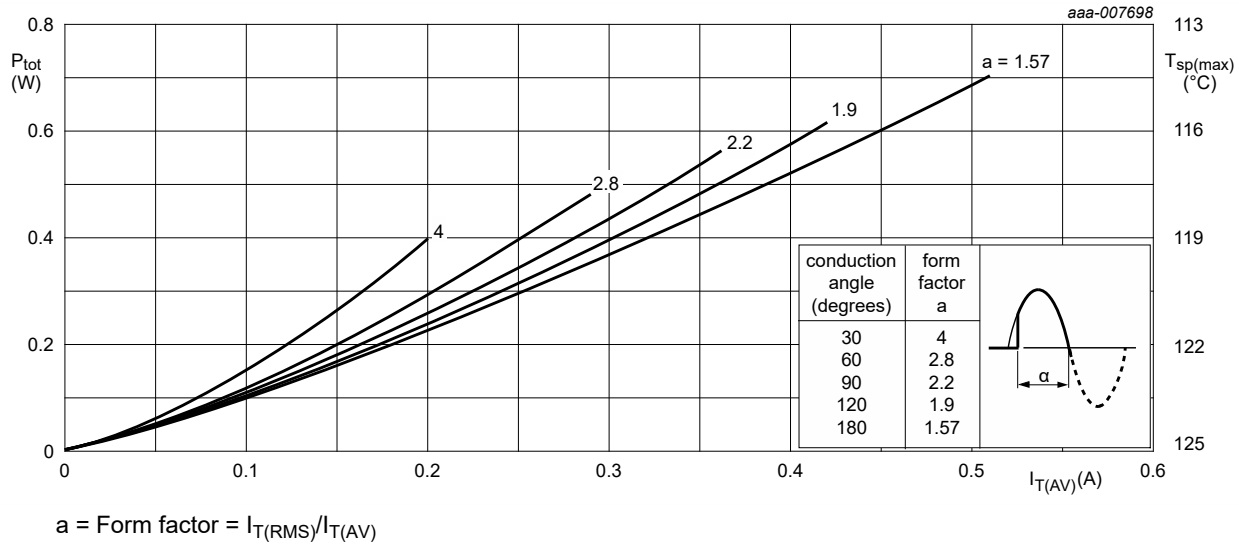
Type number	Package		
	Name	Description	Version
EC103D1W	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223

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; $T_{sp} \leq$ 114 °C; Fig. 1		-	0.5	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq$ 114 °C; 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		-	0.32	A²s
dI_T/dt	rate of rise of on-state current	I_T = 2 A; I_G = 0.01 A; dI_G/dt = 0.1 A/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



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

Fig. 1. Total power dissipation as a function of average on-state current; maximum values

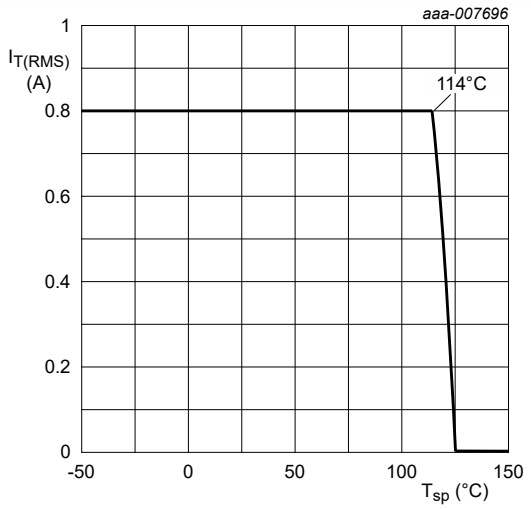
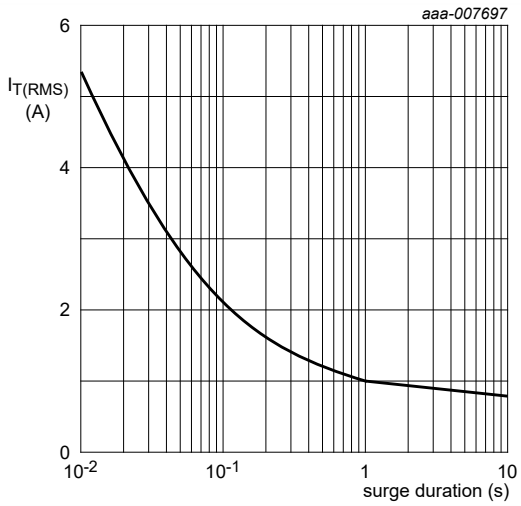
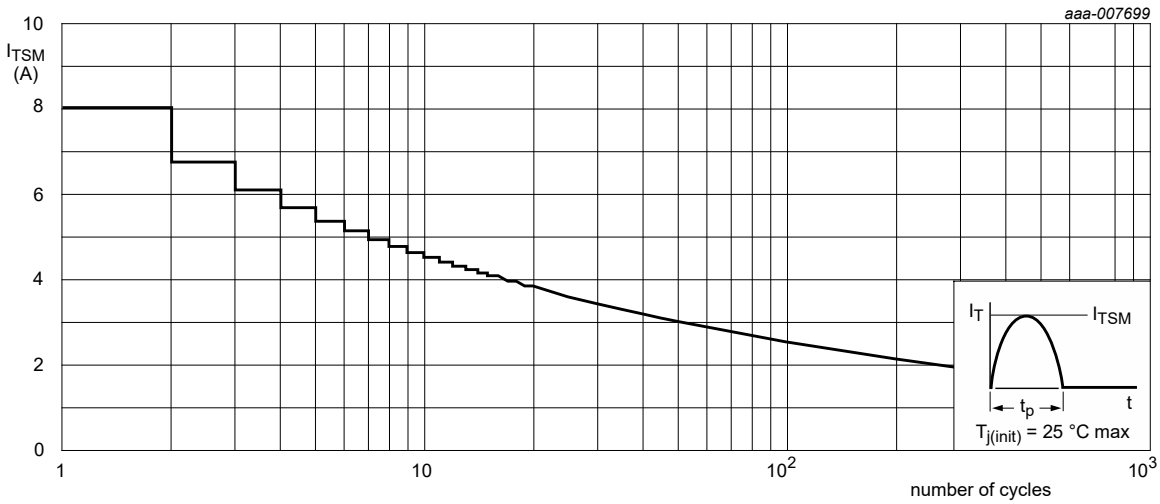


Fig. 2. RMS on-state current as a function of solder point temperature; maximum values



f = 50 Hz; T_{sp} = 114 °C

Fig. 3. RMS on-state current as a function of surge duration; 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

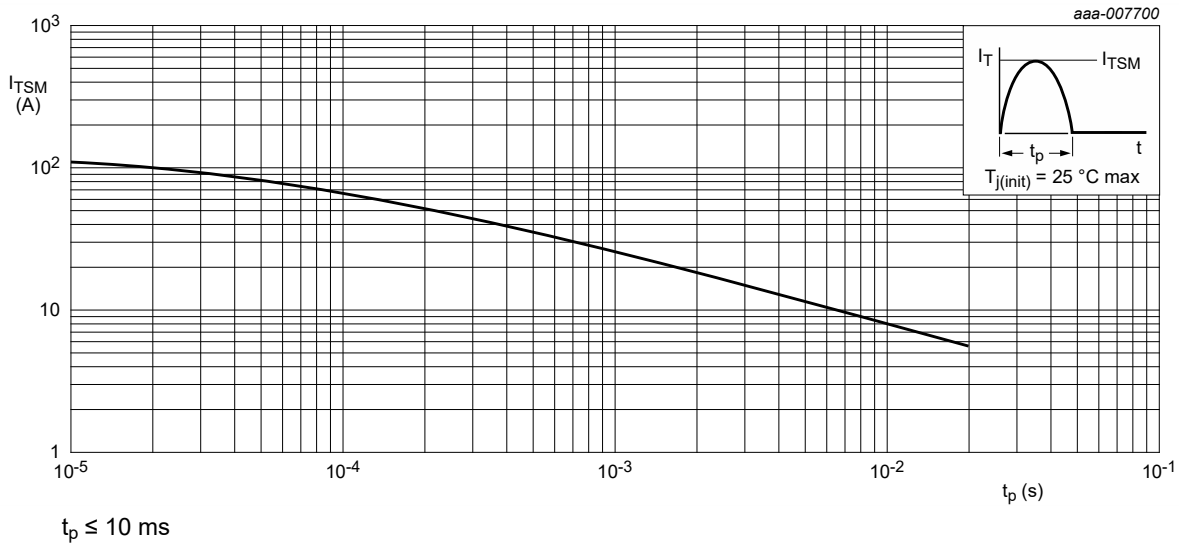


Fig. 5. Non-repetitive peak on-state current as a function of pulse width for sinusoidal currents; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	Fig. 6		-	-	15	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	printed circuit board mounted; minimum pad area; in free air; Fig. 7		-	70	-	K/W
		printed circuit board mounted; minimum footprint; in free air; Fig. 8		-	156	-	K/W

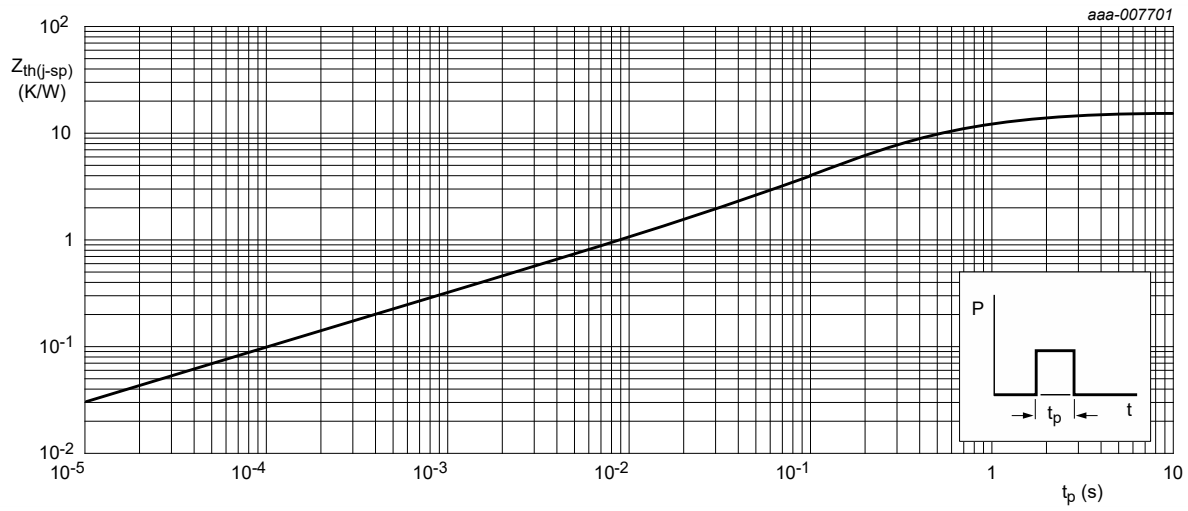
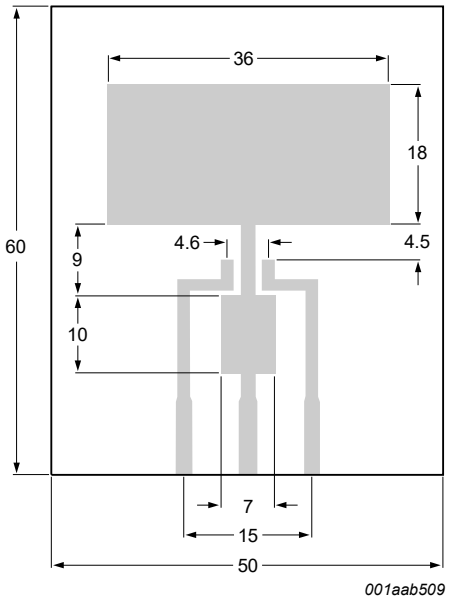
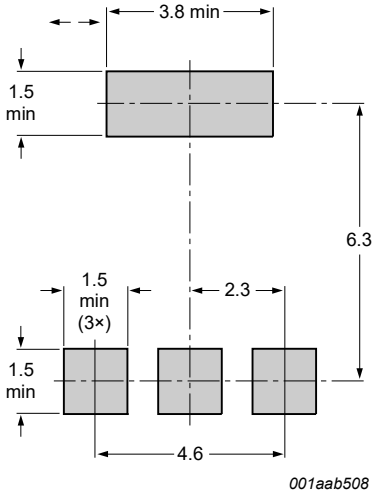


Fig. 6. Transient thermal impedance from junction to solder point as a function of pulse width



All dimensions are in mm
Printed circuit board:
FR4 epoxy glass (1.6 mm thick), copper laminate (35 um thick)

Fig. 7. Printed circuit board pad area: SOT223



All dimensions are in mm

Fig. 8. Minimum footprint SOT223

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 9		-	3	12	µA
I_L	latching current	V_D = 12 V; I_G = 0.1 A; T_j = 25 °C; Fig. 10		-	2	6	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; Fig. 11		-	2	5	mA
V_T	on-state voltage	I_T = 1 A; T_j = 25 °C; Fig. 12		-	1.2	1.35	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 13		-	0.5	0.8	V
		V_D = 400 V; I_T = 0.1 A; T_j = 125 °C; Fig. 13		0.2	0.3	-	V
I_D	off-state current	V_D = 400 V; T_j = 125 °C		-	0.05	0.1	mA
I_R	reverse current	V_R = 400 V; T_j = 125 °C		-	0.05	0.1	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 268 V; T_j = 125 °C; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit		-	150	-	V/µs

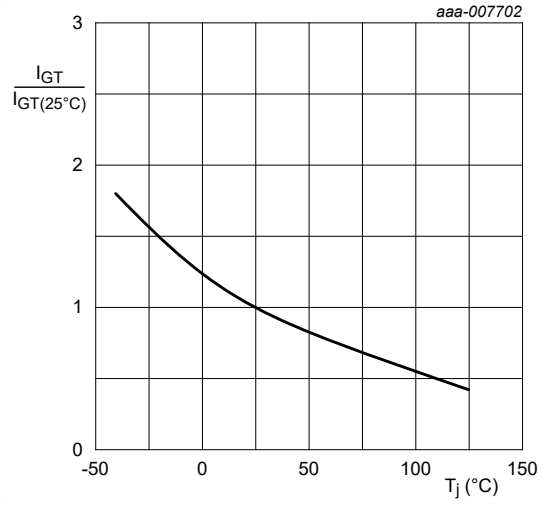


Fig. 9. Normalized gate trigger current as a function of junction temperature

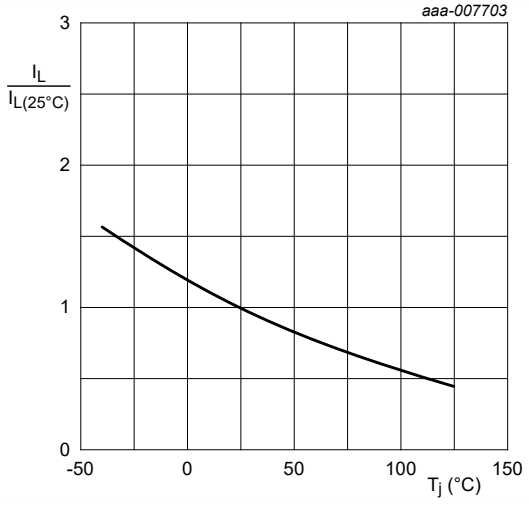


Fig. 10. Normalized latching current as a function of junction temperature

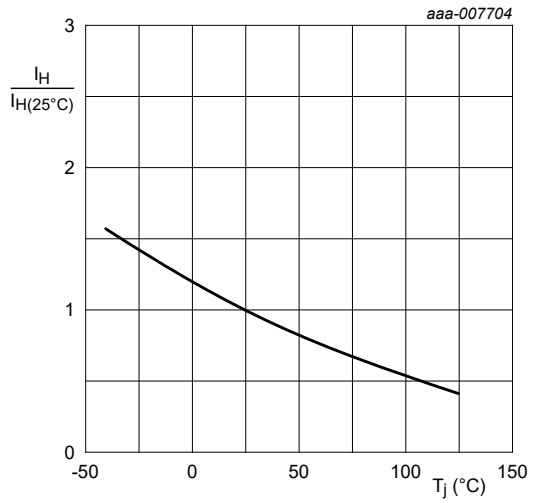
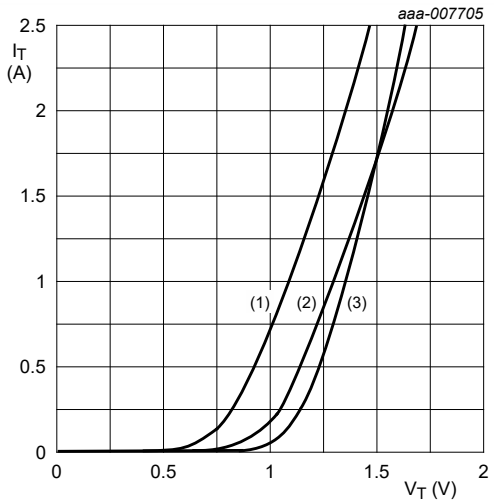


Fig. 11. Normalized holding current as a function of junction temperature



V_o = 0.987 V; R_s = 0.3125 Ω
(1) T_j = 125 °C; typical values
(2) T_j = 125 °C; maximum values
(3) T_j = 25 °C; maximum values

Fig. 12. On-state current as a function of on-state voltage

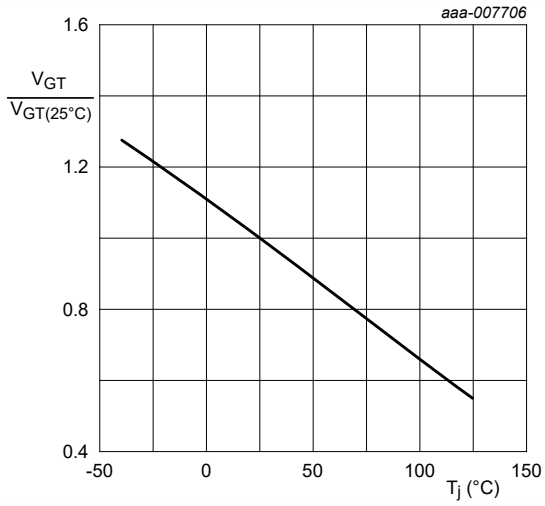
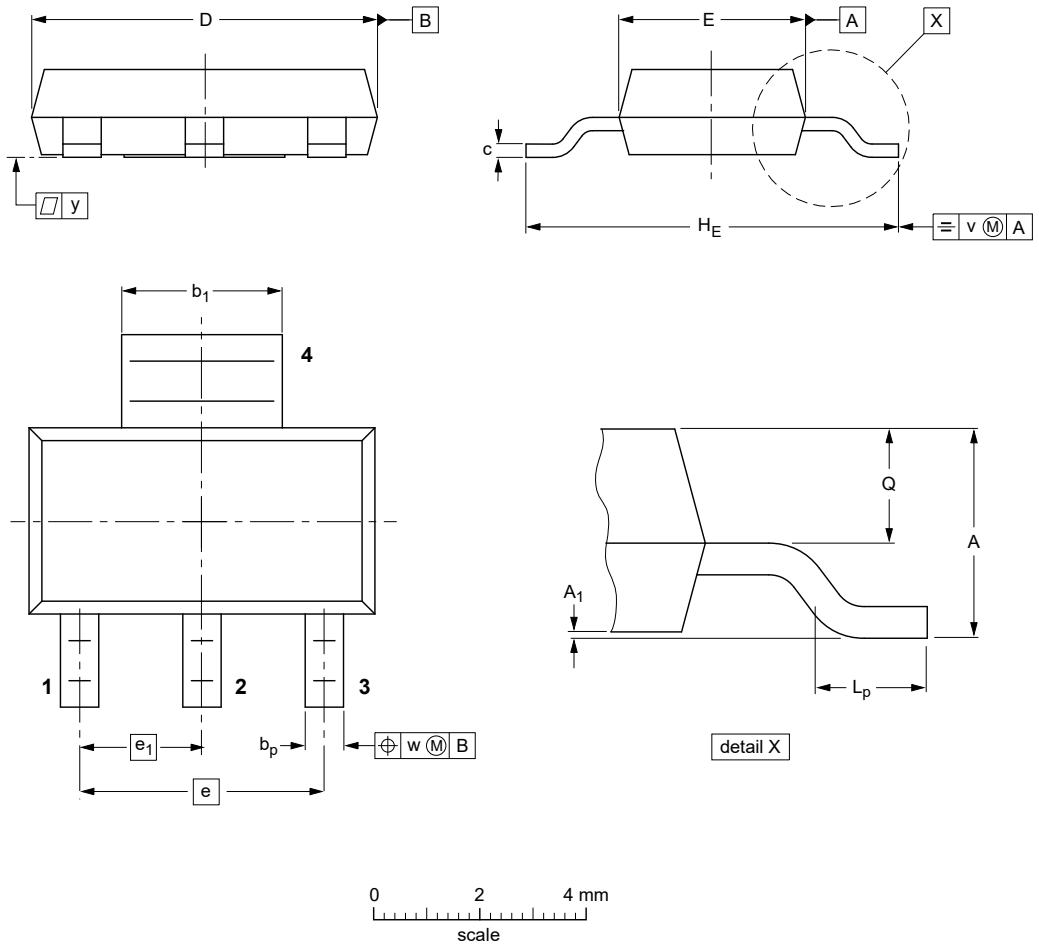


Fig. 13. Normalized gate trigger voltage as a function of junction temperature

10. Package outline

Plastic surface-mounted package with increased heatsink; 4 leads **SOT223**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.8 1.5	0.10 0.01	0.80 0.60	3.1 2.9	0.32 0.22	6.7 6.3	3.7 3.3	4.6	2.3	7.3 6.7	1.1 0.7	0.95 0.85	0.2	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT223			SC-73			~~04-11-10~~ 06-03-16

Fig. 14. Package outline SC-73 (SOT223)

11. Legal information

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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