

1. General description

Planar passivated SCR with sensitive gate in a TO92 plastic package. This SCR is designed to be interfaced directly to microcontrollers, logic integrated circuits or other low power gate trigger circuits



2. Features and benefits

- On-state RMS current, 1.25 A
- Repetitive peak off-state voltage, 1000 V
- High surge current capability
- Direct triggering from low power drivers and logic ICs
- Planar passivated for voltage ruggedness or reliability

3. Applications

- GFCI (Ground Fault Circuit Interrupter)
- AFCI (Arc Fault Circuit Interrupter)
- RCD (Residual Current Device)
- RCBO (Residual Current circuit Breaker with Overload protection)
- AFDD (Arc Fault Detection Device)

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
V_{DRM}	repetitive peak off-state voltage			1000			V
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_C \leq 66\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3		1.25			A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 10\text{ ms}$; Fig. 4 ; Fig. 5		23			A
		half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$		25			A
T_j	junction temperature			-40 to 125			°C
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $R_L = 100\text{ }\Omega$; $T_j = 25\text{ °C}$; Fig. 7		20	-	50	μA
I_H	holding current	$V_D = 12\text{ V}$; $R_{GK} = 1\text{ k}\Omega$; $T_j = 25\text{ °C}$; Fig. 9		-	-	3	mA
V_T	on-state voltage	$I_T = 2.5\text{ A}$; $T_j = 25\text{ °C}$; Fig. 10		-	-	1.45	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 670\text{ V}$; $T_j = 125\text{ °C}$; $R_{GK} = 1\text{ k}\Omega$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform		100	-	-	V/ μs

5. Pinning information

Table 2. Pinning information

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

6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
WCR03-10LR	TO92	WCR03-10LREP	Bulk	1000	TO92L	10-May-2021
		WCR03-10LRQP	Reel	2000		

7. Marking

Table 4. Marking codes

Type number	Marking codes
WCR03-10LR	WCR03R

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			1000	V
V_{RRM}	repetitive peak reverse voltage			1000	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_C \leq 66\text{ }^\circ\text{C}$;		0.8	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_C \leq 66\text{ }^\circ\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3		1.25	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; $t_p = 10\text{ ms}$; Fig. 4 ; Fig. 5		23	A
		half sine wave; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; $t_p = 8.3\text{ ms}$		25	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; sine-wave pulse		2.645	A^2s
di_T/dt	rate of rise of on-state current	$I_G = 0.1\text{ mA}$		100	$\text{A}/\mu\text{s}$
I_{GM}	peak gate current			1.2	A
P_{GM}	peak gate power			2	W
$P_{G(AV)}$	average gate power	over any 20 ms period		0.2	W
T_{stg}	storage temperature			-40 to 150	$^\circ\text{C}$
T_j	junction temperature			-40 to 125	$^\circ\text{C}$

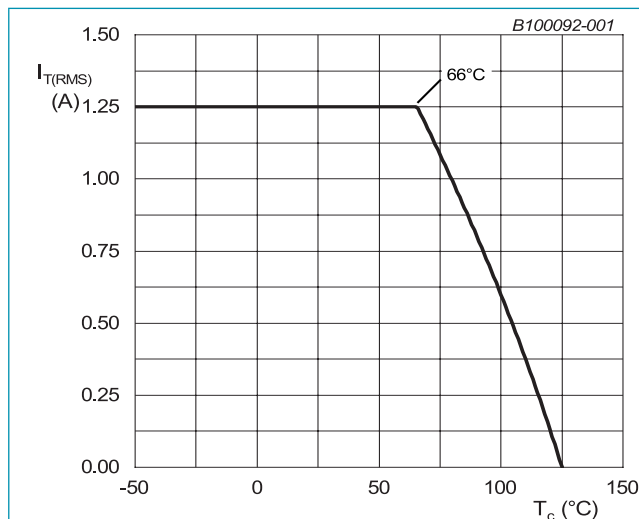


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values

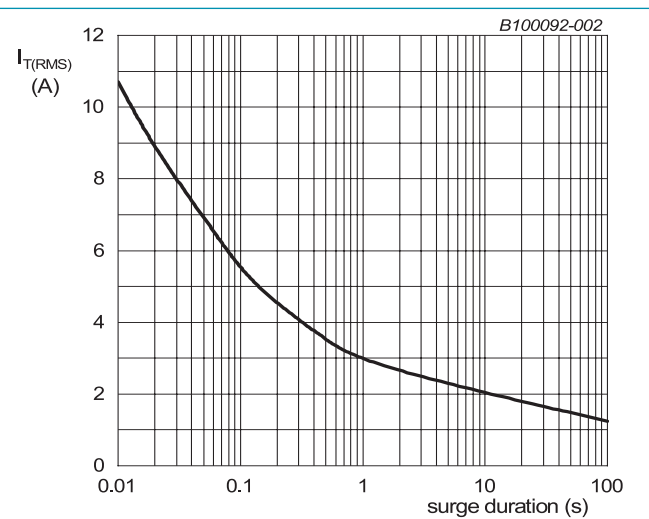
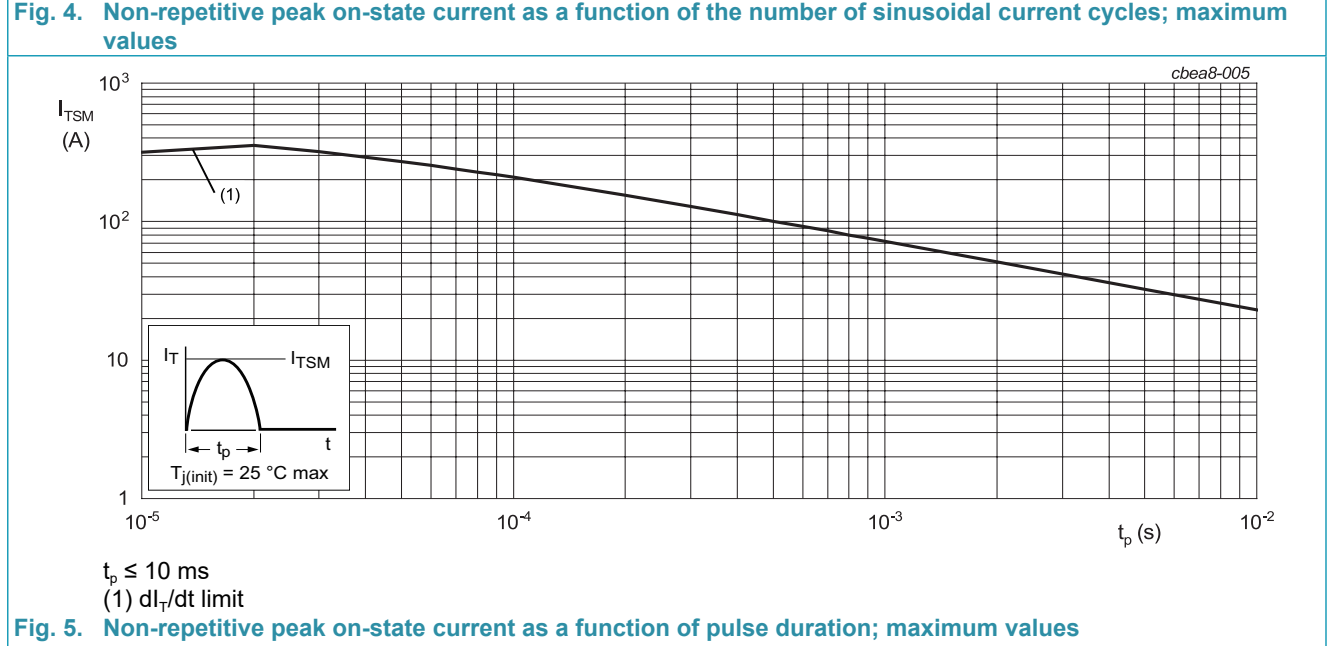
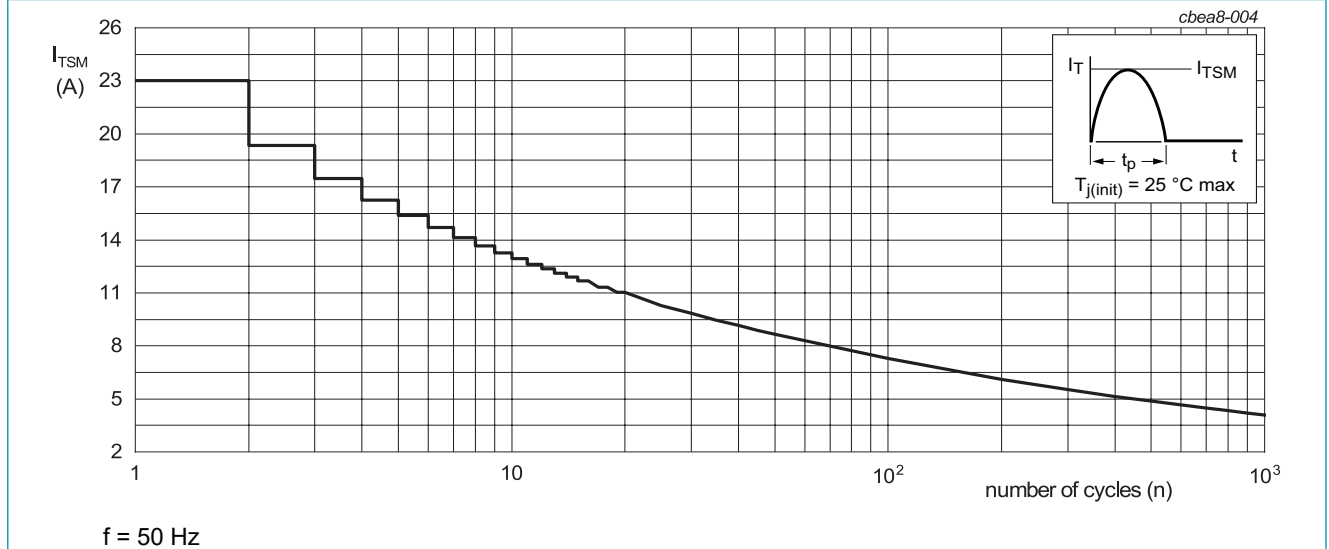
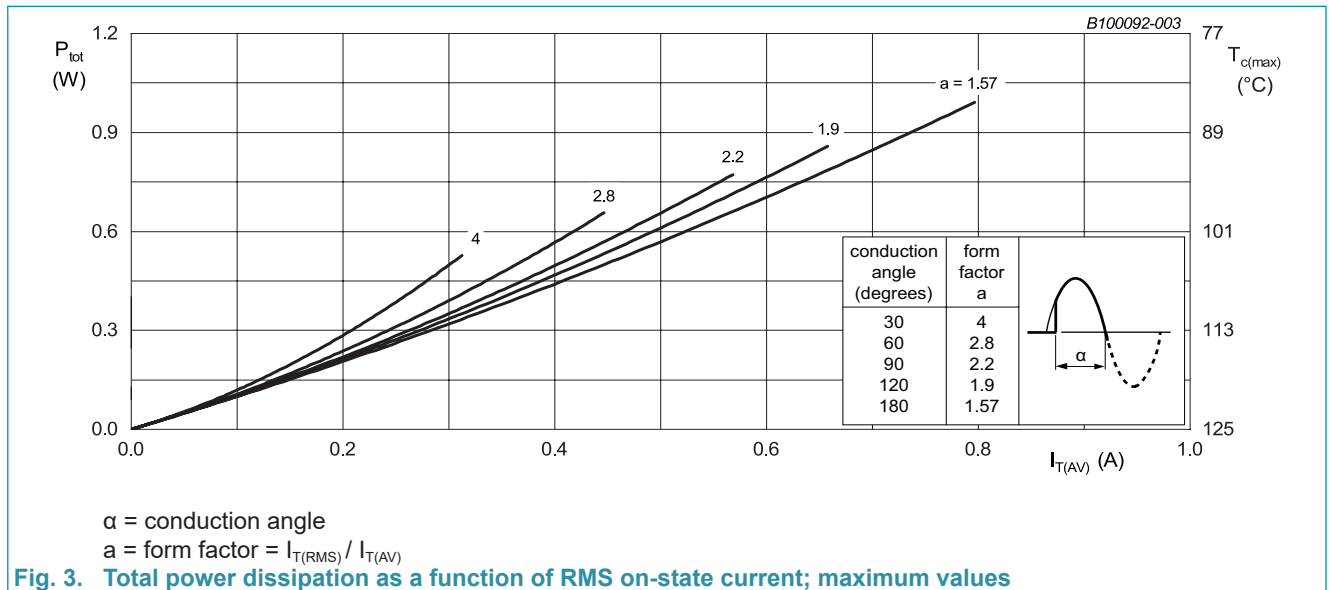


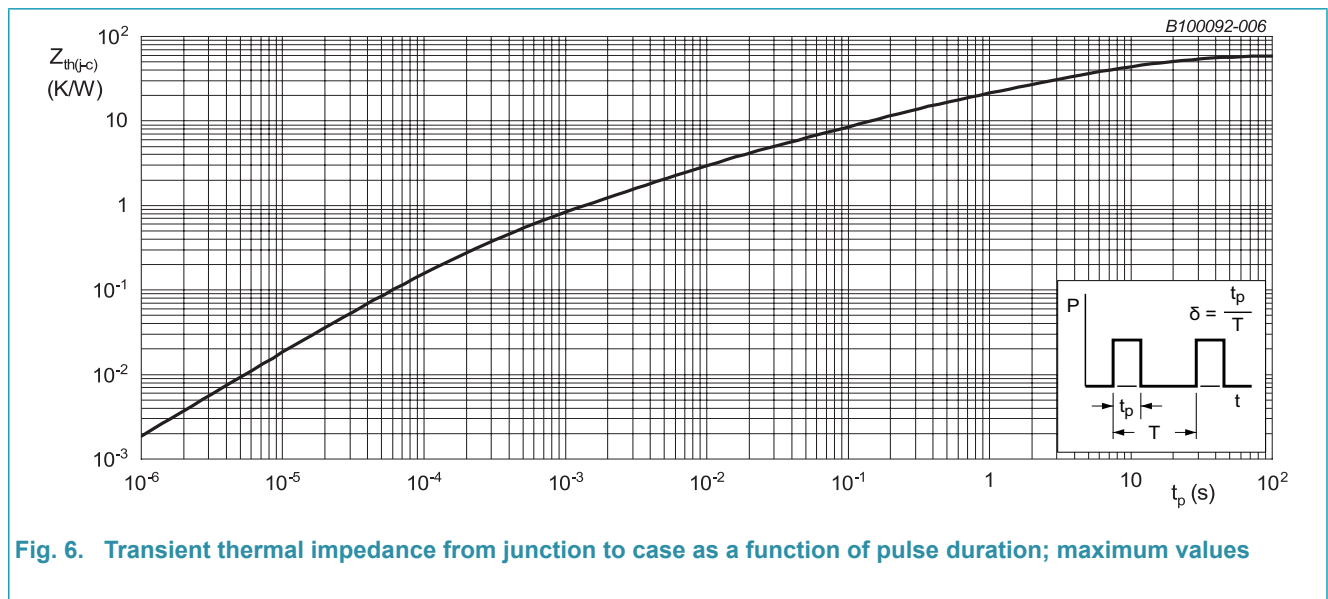
Fig. 2. RMS on-state current as a function of surge duration; maximum values
 $f = 50\text{ Hz}$; $T_C = 66\text{ }^\circ\text{C}$



9. Thermal characteristics

Table 6. Thermal characteristics

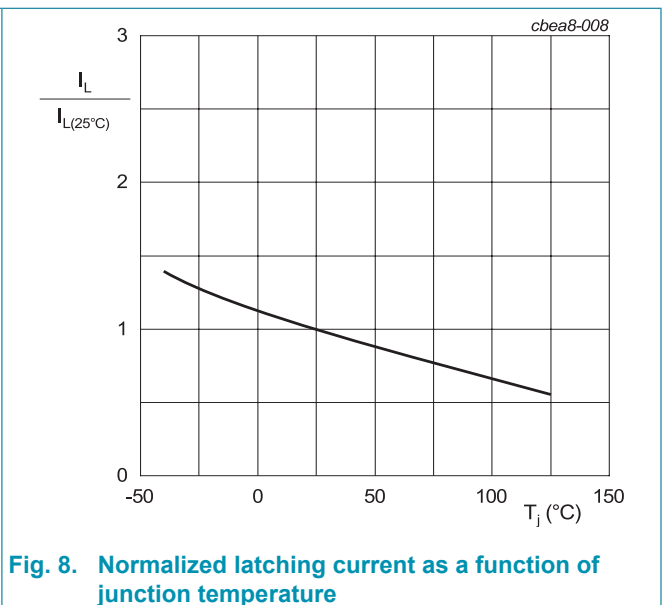
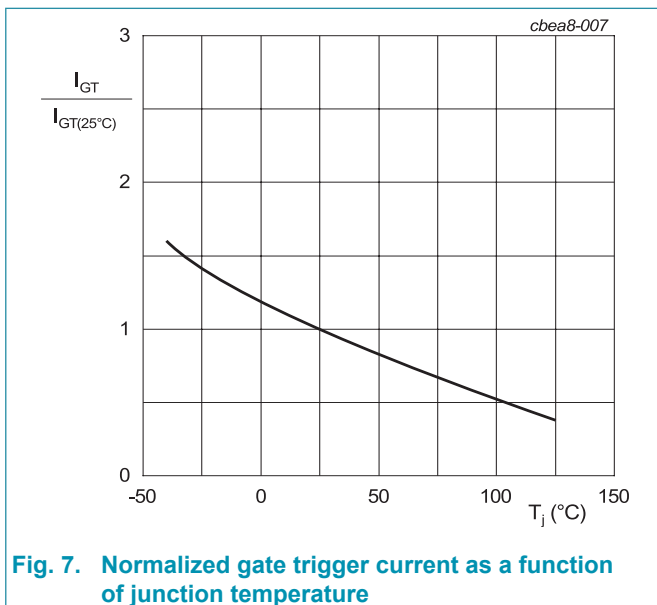
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	Fig. 6		-	-	60	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	150	-	K/W



10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}; R_L = 100\ \Omega; T_j = 25\text{ }^\circ\text{C};$ Fig. 7		20	-	50	μA
I_L	latching current	$V_D = 12\text{ V}; R_{GK} = 1\text{ k}\Omega; T_j = 25\text{ }^\circ\text{C};$ Fig. 8		-	-	5	mA
I_H	holding current	$V_D = 12\text{ V}; R_{GK} = 1\text{ k}\Omega; T_j = 25\text{ }^\circ\text{C};$ Fig. 9		-	-	3	mA
V_T	on-state voltage	$I_T = 2.5\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 10		-	-	1.45	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}; R_L = 100\ \Omega; T_j = 25\text{ }^\circ\text{C};$ Fig. 11		-	0.6	0.8	V
		$V_D = 800\text{ V}; I_T = 0.1\text{ A}; T_j = 125\text{ }^\circ\text{C}$		0.25	0.4	-	V
V_{RG}	gate reverse voltage	$I_{RG} = 2\text{ mA}$		10	-	-	V
I_{DRM}	off-state current	$V_D = V_{DRM}; T_j = 25\text{ }^\circ\text{C}$		-	-	1	μA
		$V_D = V_{DRM}; T_j = 125\text{ }^\circ\text{C}$		-	-	100	μA
I_{RRM}	reverse current	$V_D = V_{RRM}; T_j = 25\text{ }^\circ\text{C}$		-	-	1	μA
		$V_D = V_{RRM}; T_j = 125\text{ }^\circ\text{C}$		-	-	100	μA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 670\text{ V}; T_j = 125\text{ }^\circ\text{C}; R_{GK} = 1\text{ k}\Omega;$ ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform		100	-	-	V/ μs



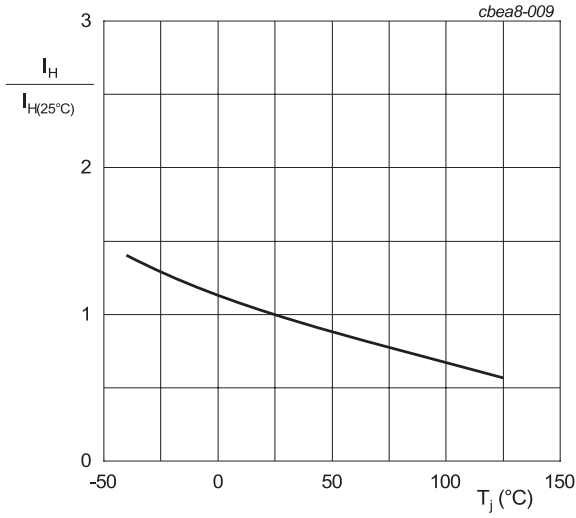
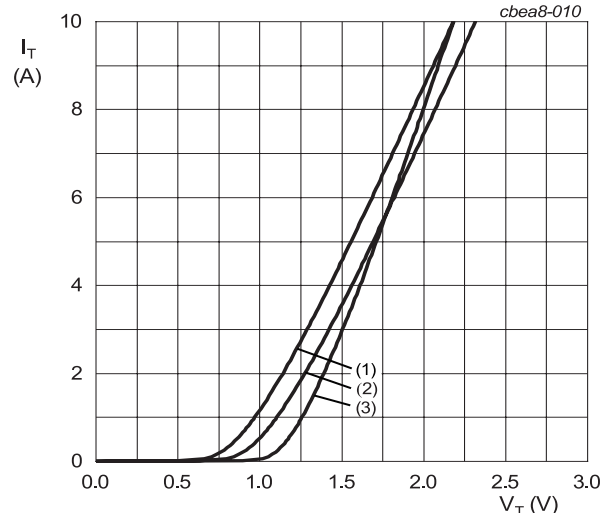


Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 0.957 \text{ V}; R_s = 0.1464 \Omega$
 (1) $T_j = 150^\circ\text{C}$; typical values
 (2) $T_j = 150^\circ\text{C}$; maximum values
 (3) $T_j = 25^\circ\text{C}$; maximum values

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

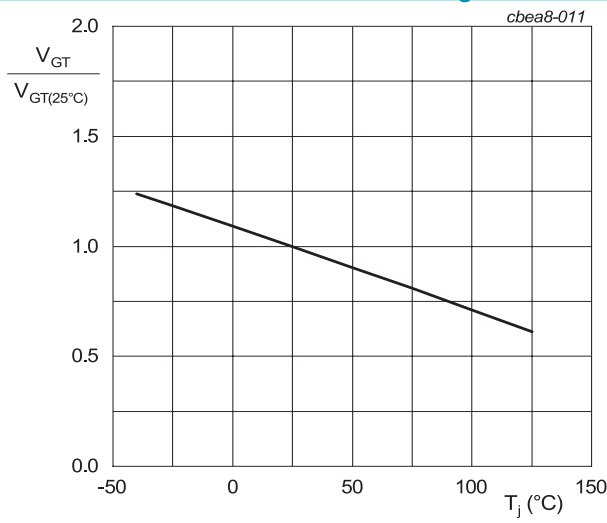
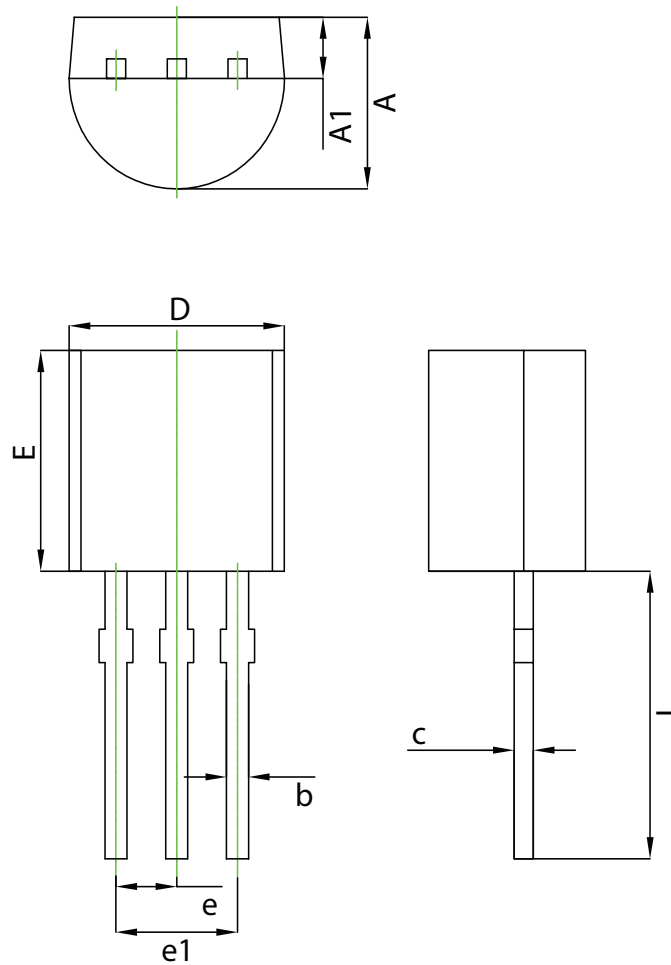


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

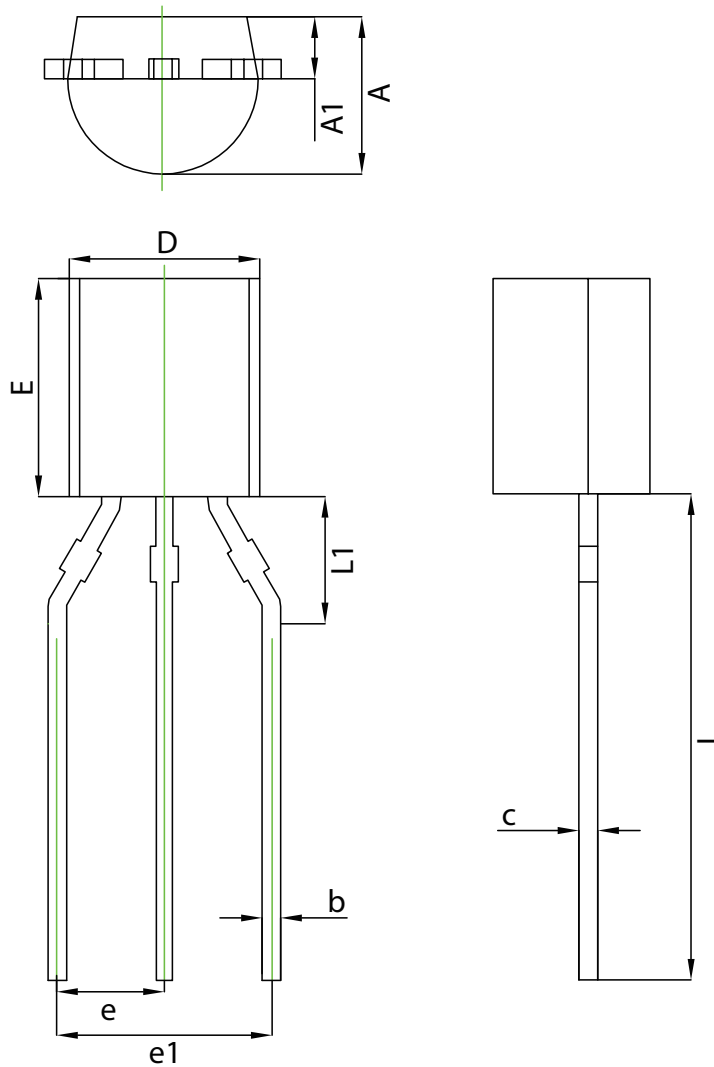
11. Package outline

TO92L 412



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.300	3.700	0.130	0.146
A1	1.100	1.400	0.043	0.055
b	0.380	0.550	0.015	0.022
c	0.360	0.510	0.014	0.020
D	4.300	4.700	0.169	0.185
E	4.300	4.700	0.169	0.185
e	1.270 TYP.		0.050 TYP.	
e1	2.440	2.640	0.096	0.104
L	14.100	14.500	0.555	0.571

TO92L 116&126



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	3.300	3.700	0.130	0.146
A1	1.100	1.400	0.043	0.055
b	0.380	0.550	0.015	0.022
c	0.360	0.510	0.014	0.020
D	4.300	4.700	0.169	0.185
E	4.300	4.700	0.169	0.185
e	2.500B S.C.		0.098B S.C.	
e1	5.000B S.C.		0.197B S.C.	
L	13.300	13.700	0.524	0.539
L1	3.00TYP.		0.118TYP.	

12. Legal information

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.
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- [2] The term 'short data sheet' is explained in section "Definitions".
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