

1. General description

Planar passivated Silicon Controlled Rectifier (SCR) in a TO-263 surface mountable plastic package intended for use in applications requiring very high inrush current capability and high bidirectional blocking voltage capability. This product is qualified to AEC-Q101 standard for use in automotive applications.



AEC - Q101 Qualified



2. Features and benefits

- High junction operating temperature capability ($T_{j(max)} = 150\text{ °C}$)
- AEC-Q101 compliant
- Planar passivated for voltage ruggedness and reliability
- High voltage capacity
- Very high current surge capability
- Surface mountable package

3. Applications

- Automotive battery charger, On Board Charger & Off Board Charger
- DC motor control
- Power converter
- Solid State Relay (SSR)
- Uninterruptible Power Supply (UPS)

4. Quick reference data

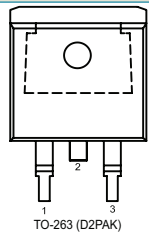

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values	Unit
Absolute maximum rating				
V_{RRM}	repetitive peak reverse voltage		1200	V
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 119\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	47	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	350	A
		half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$	385	A
T_j	junction temperature		150	°C

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 7 ; Fig. 8	-	-	50	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; Fig. 10	-	-	80	mA
V_T	on-state voltage	$I_T = 30\text{ A}$; $T_j = 25\text{ °C}$; Fig. 11	-	-	1.3	V
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 804\text{ V}$; $T_j = 150\text{ °C}$; ($V_{DM} = 67\%$ of V_{DRM}); gate open; exponential waveform;	1000	-	-	V/ μ s

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p>TO-263 (D2PAK)</p>	 <p>sym037</p>
2	A	anode		
3	G	gate		
mb	A	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
BT153B-1200T-A	TO263	BT153B-1200T-AJ	Reel	800	TO263N	26-Sep-2016

7. Marking

Table 4. Marking codes

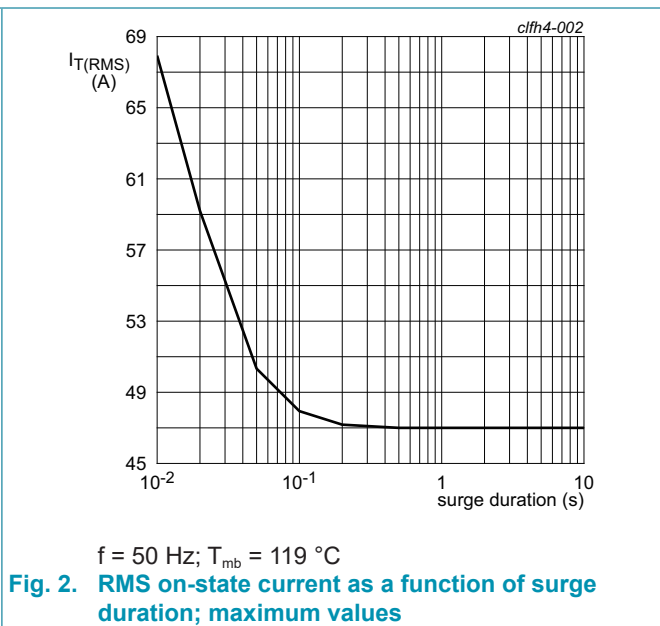
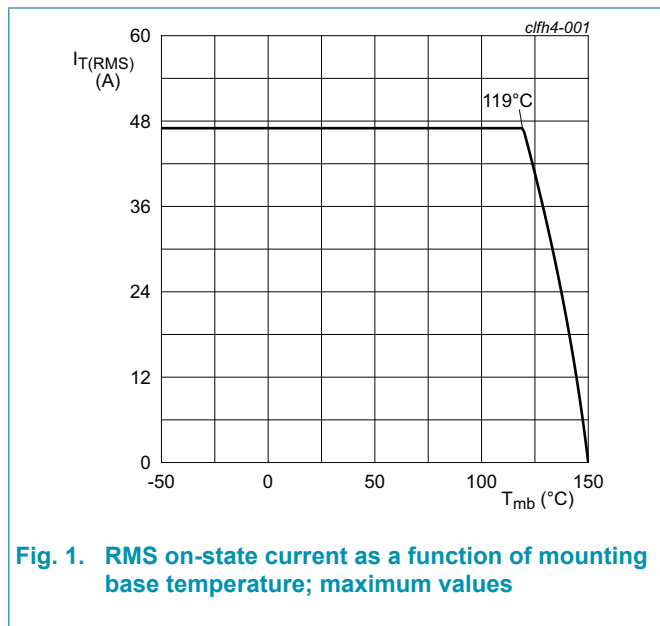
Type number	Marking codes
BT153B-1200T-A	BT153B-1200T-A

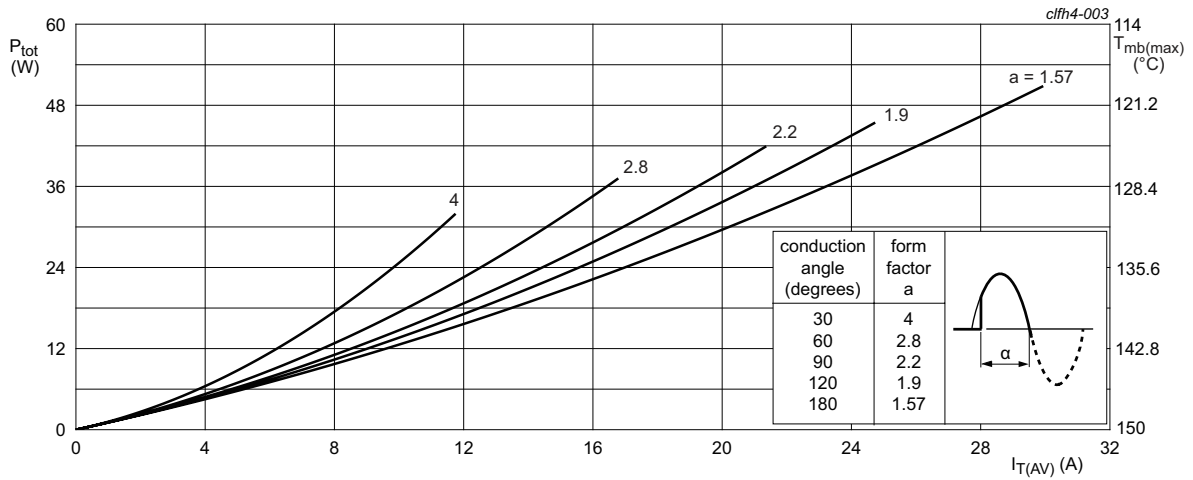
8. Limiting values

Table 5. Limiting values

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

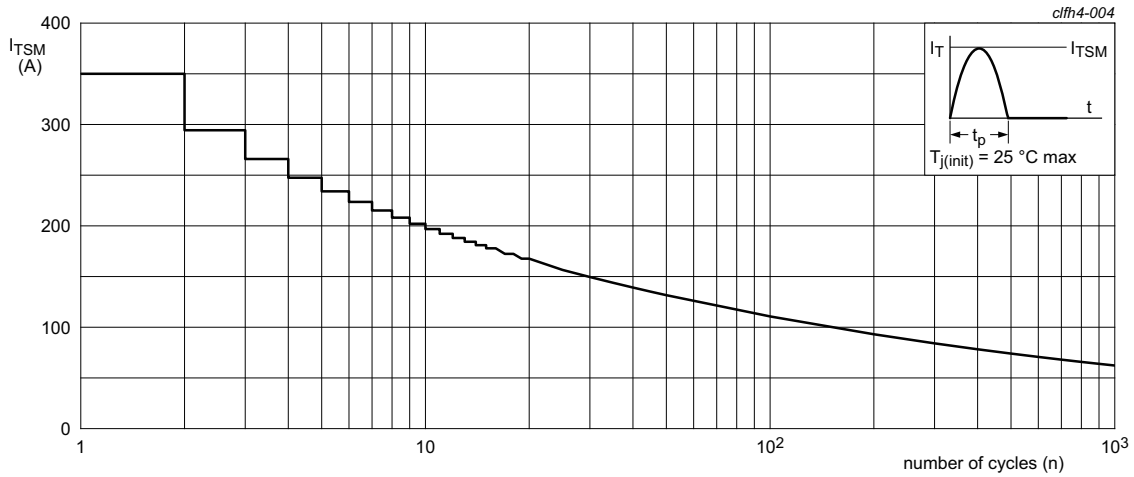
Symbol	Parameter	Conditions	Values	Unit
V_{DRM}	repetitive peak off-state voltage		1200	V
V_{RRM}	repetitive peak reverse voltage		1200	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq 119\text{ }^{\circ}\text{C}$;	30	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 119\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	47	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 10\text{ ms}$;	350	A
		half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 8.3\text{ ms}$	385	A
I^2t	I^2t for fusing	$t_p = 10\text{ms}$; sine wave	612.5	A^2s
di_T/dt	rate of rise of on-state current	$I_G = 100\text{mA}$	150	$\text{A}/\mu\text{s}$
I_{GM}	peak gate current		5	A
V_{GM}	peak gate voltage		5	V
P_{GM}	peak gate power		20	W
$P_{G(AV)}$	average gate power	over any 20 ms period	0.5	W
T_{stg}	storage temperature		-40 to 150	$^{\circ}\text{C}$
T_j	junction temperature		150	$^{\circ}\text{C}$





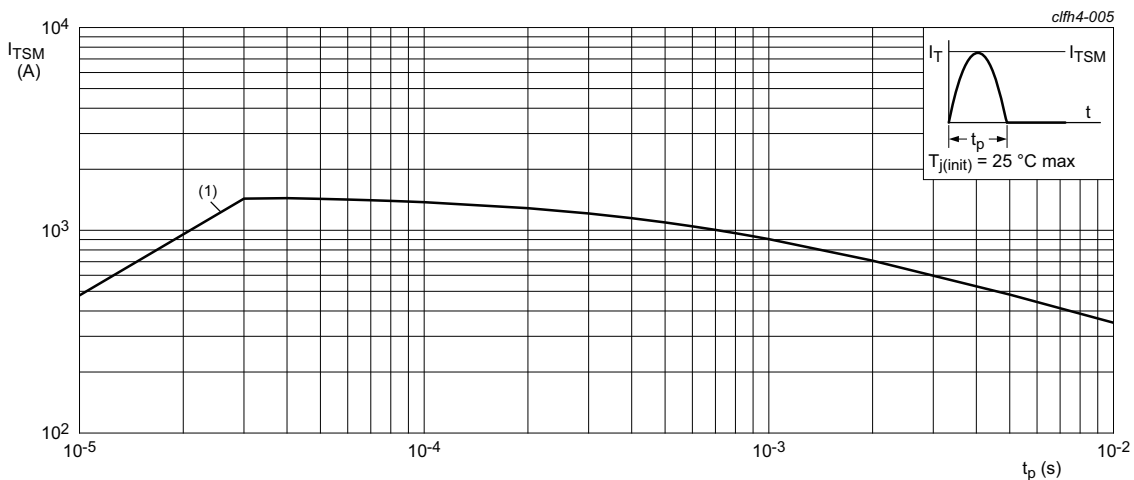
α = conduction angle
 a = form factor = $I_{T(RMS)} / I_{T(AV)}$

Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values



$f = 50 \text{ Hz}$

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



$t_p \leq 10 \text{ ms}$;
 (1) di_T/dt limit

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
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 6	-	-	0.6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	55	-	K/W

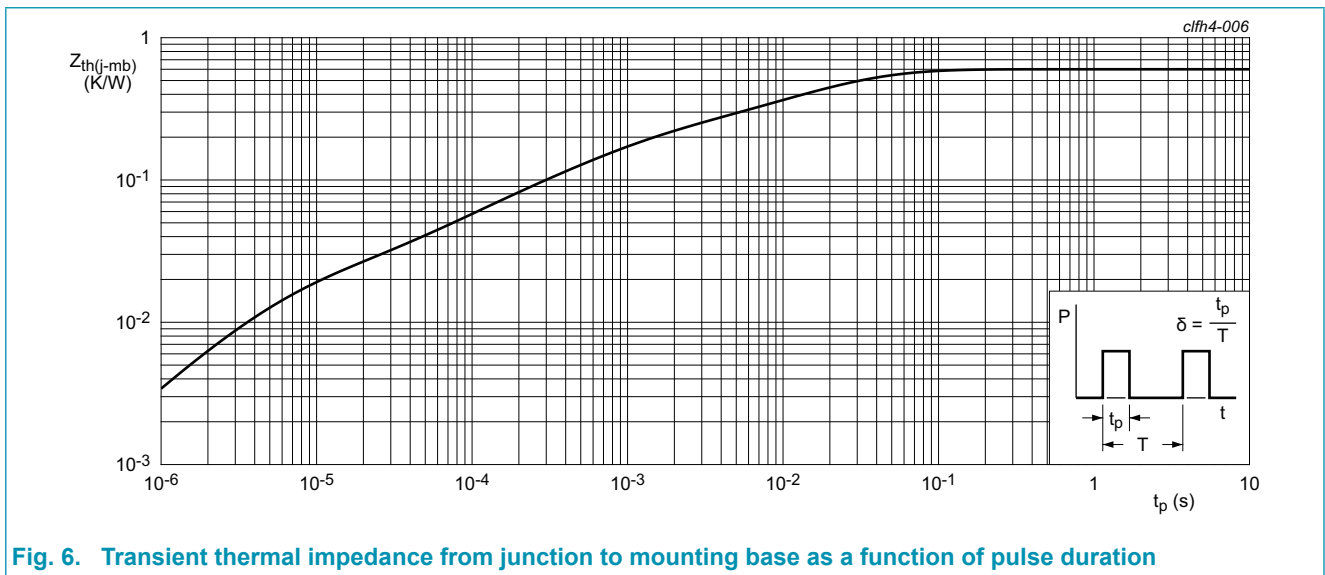
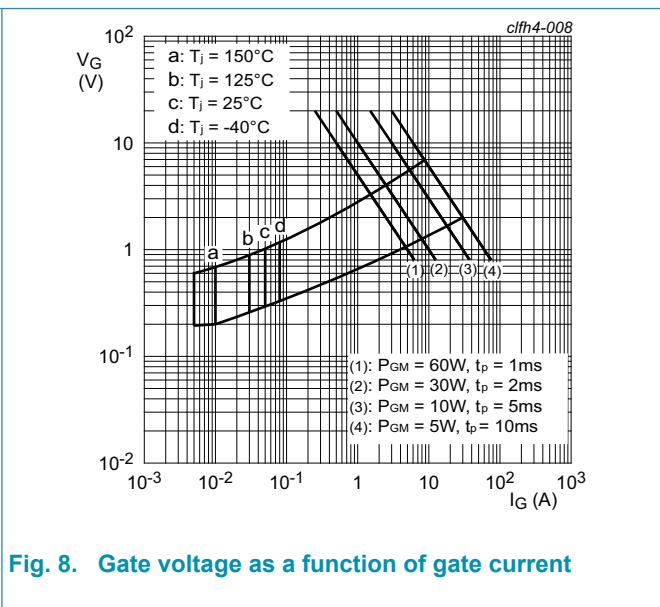
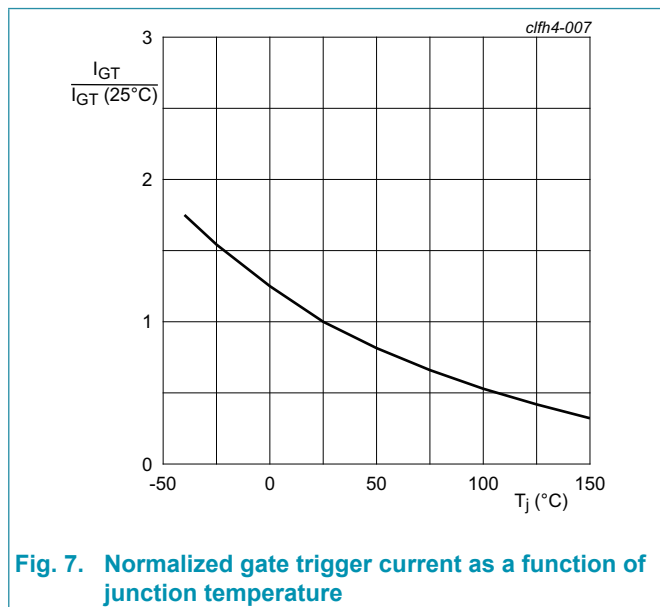


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig.7; Fig. 8	-	-	50	mA
I_L	latching current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 9	-	-	100	mA
I_H	holding current	$V_D = 12\text{ V}; T_j = 25\text{ }^\circ\text{C};$ Fig. 10	-	-	80	mA
V_T	on-state voltage	$I_T = 30\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 11	-	-	1.3	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 12	-	0.75	1	V
		$V_D = 1200\text{ V}; I_T = 0.1\text{ A}; T_j = 150\text{ }^\circ\text{C}$	0.2	0.45	-	V
I_D	off-state current	$V_D = 1200\text{ V}; T_j = 125\text{ }^\circ\text{C}$	-	-	2	mA
I_R	reverse current	$V_D = 1200\text{ V}; T_j = 125\text{ }^\circ\text{C}$	-	-	2	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 804\text{ V}; T_j = 150\text{ }^\circ\text{C}; (V_{DM} = 67\%$ of V_{DRM}); gate open; exponential waveform	1000	-	-	V/ μ s
t_{gt}	gate-controlled turn-on time	$I_{TM} = 30\text{ A}; V_D = 800\text{ V}; I_G = 100\text{ mA};$ $(dI_G/dt)_M = 5\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}$	-	2	-	μ s
t_q	commutated turn-off time	$V_{DM} = 804\text{ V}; T_j = 125\text{ }^\circ\text{C}; I_{TM} = 30\text{ A}; V_R =$ $25\text{ V}; dV_D/dt = 50\text{ V}/\mu\text{s}; (dI_T/dt)_M = 30$ $\text{A}/\mu\text{s}; (V_{DM} = 67\% \text{ of } V_{DRM})$	-	70	-	μ s



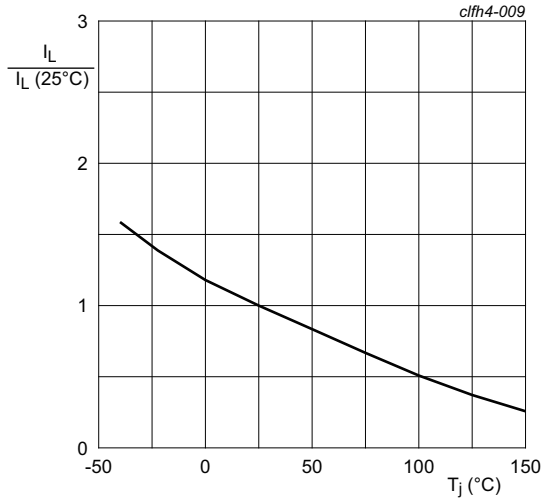


Fig. 9. Normalized latching current as a function of junction temperature

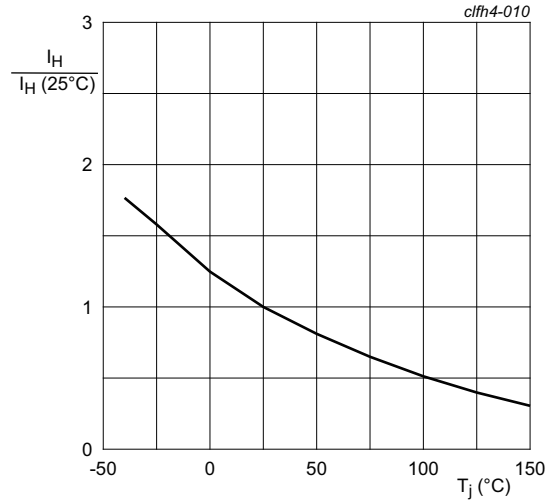
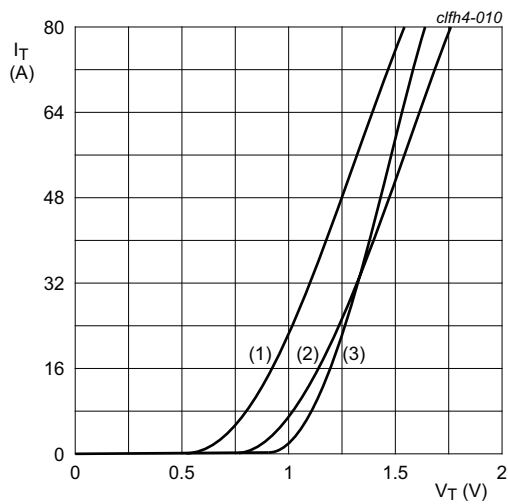


Fig. 10. Normalized holding current as a function of junction temperature



$V_o = 1.039 \text{ V}; R_s = 0.0089 \ \Omega$
 (1) $T_j = 150 \text{ }^\circ\text{C}$; typical values
 (2) $T_j = 150 \text{ }^\circ\text{C}$; maximum values
 (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

Fig. 11. On-state current as a function of on-state voltage

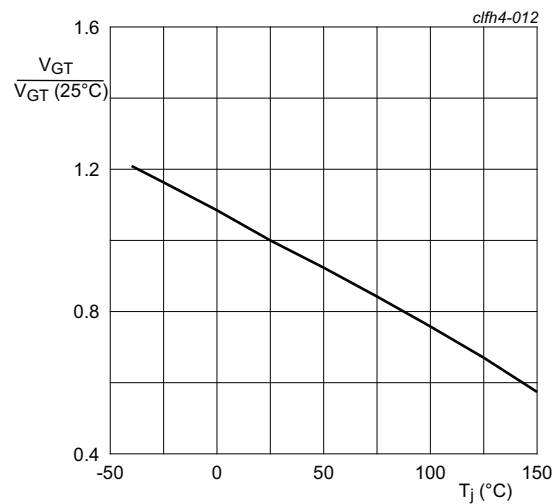
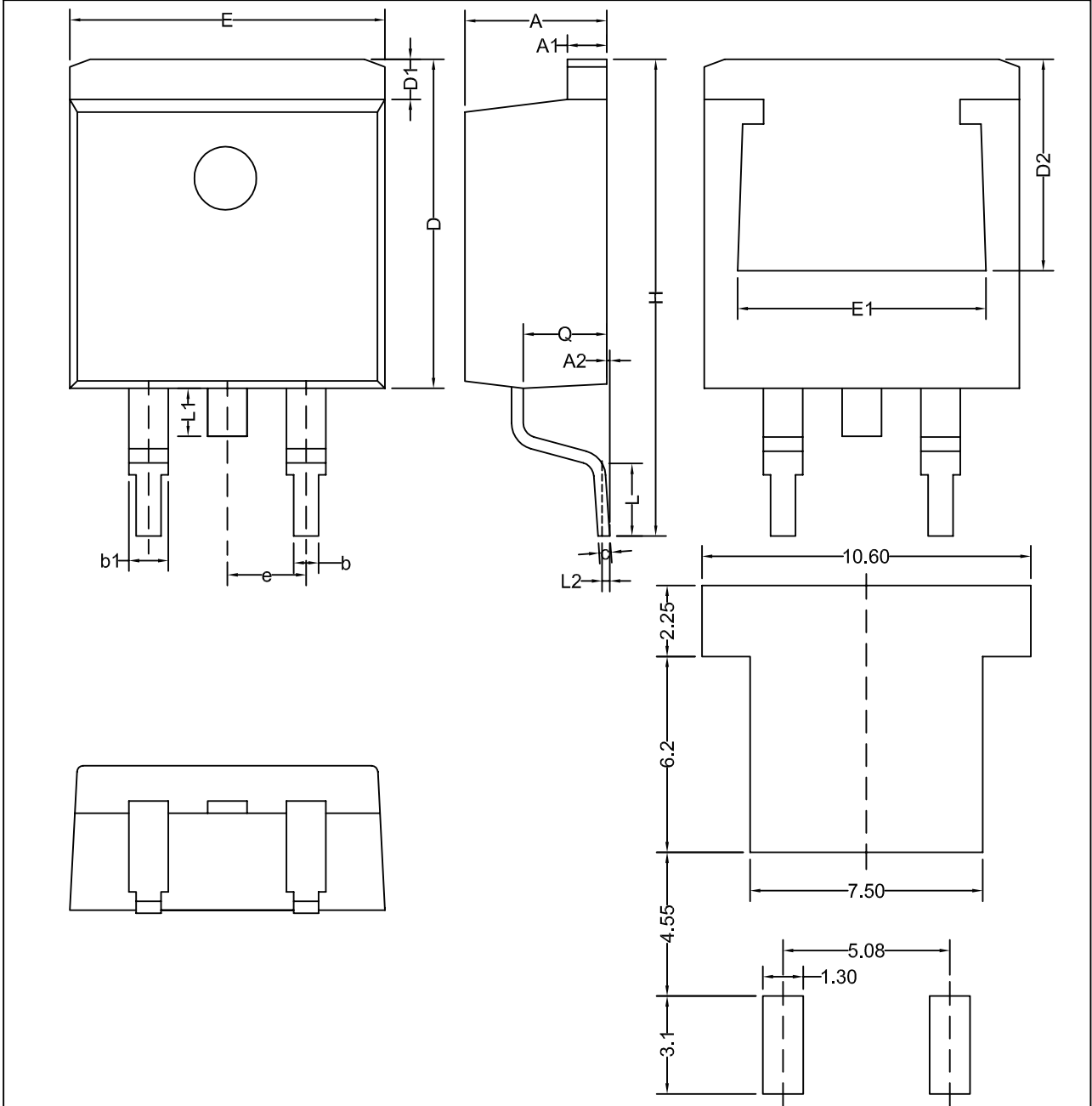


Fig. 12. Normalized gate trigger voltage as a function of junction temperature

11. Package outline

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped) TO263



Recommended Footprint

Unit	A	A1	A2	b	b1	c	D	D1	D2	e	E	E1	H	L	L1	L2	Q
min	4.10	1.22	0.00	0.60	1.05	0.34	---	1.20	6.60	2.54 (BSC)	9.70	7.80	14.80	2.10	---	0.25 (BSC)	2.20
max	4.70	1.40	0.25	0.90	1.45	0.64	11.00	1.60	---	---	10.30	---	15.80	2.90	1.75	---	2.79

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

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