



**THE DATASHEET OF  
BT153B-1200T-AJ**



## 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 ( $T_{j(max)} = 150\text{ }^{\circ}\text{C}$ )
- 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

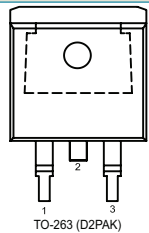

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values	Unit
<b>Absolute maximum rating</b>				
$V_{RRM}$	repetitive peak reverse voltage		1200	V
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 119\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	47	A
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 10\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	350	A
		half sine wave; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 8.3\text{ ms}$	385	A
$T_j$	junction temperature		150	$^{\circ}\text{C}$

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> ; <a href="#">Fig. 8</a>	-	-	50	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 10</a>	-	-	80	mA
$V_T$	on-state voltage	$I_T = 30\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 11</a>	-	-	1.3	V
<b>Dynamic characteristics</b>						
$dV_D/dt$	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/ $\mu$ 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

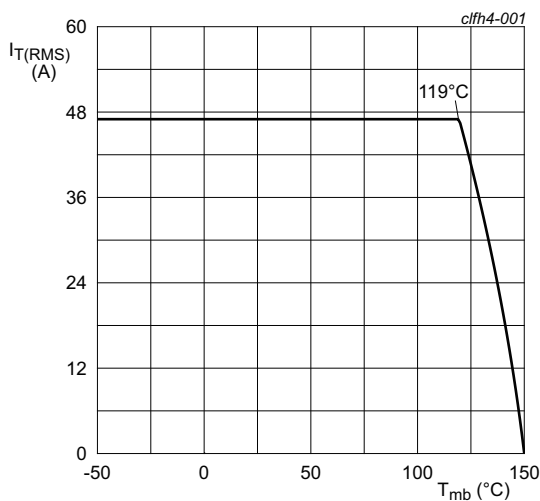
Type number	Marking codes
BT153B-1200T-A	BT153B-1200T-A

## 8. Limiting values

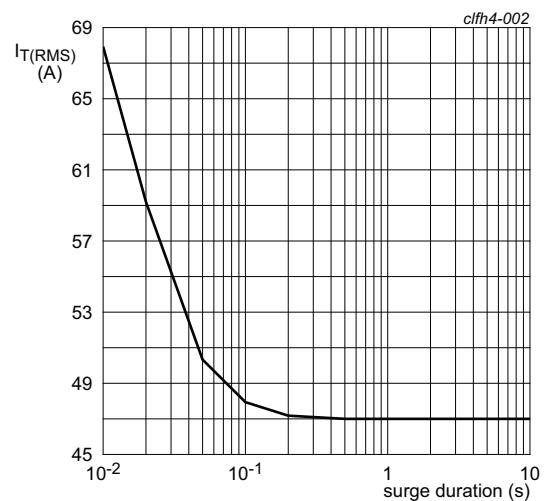
**Table 5. Limiting values**

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

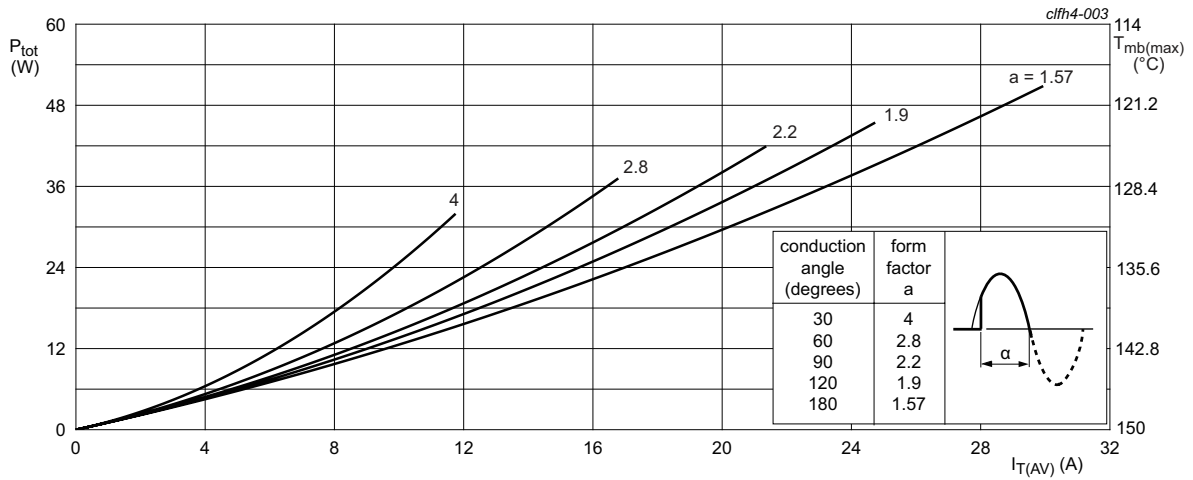
Symbol	Parameter	Conditions	Values	Unit
$V_{DRM}$	repetitive peak off-state voltage		1200	V
$V_{RRM}$	repetitive peak reverse voltage		1200	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq 119\text{ }^{\circ}\text{C}$ ;	30	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 119\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	47	A
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 10\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	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	$\text{A}^2\text{s}$
$di_T/dt$	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	$^{\circ}\text{C}$



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

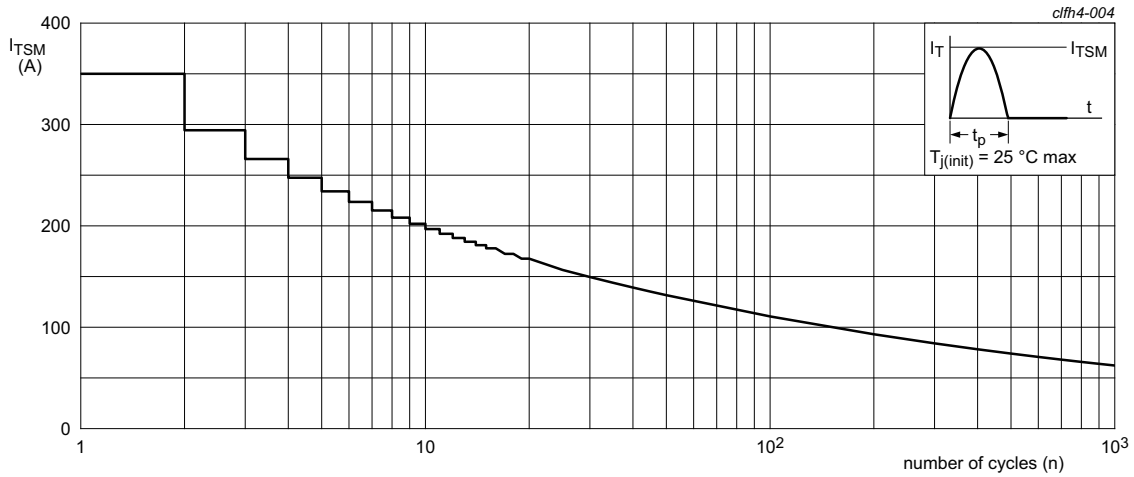


$f = 50\text{ Hz}$ ;  $T_{mb} = 119\text{ }^{\circ}\text{C}$   
**Fig. 2. RMS on-state current as a function of surge duration; maximum values**



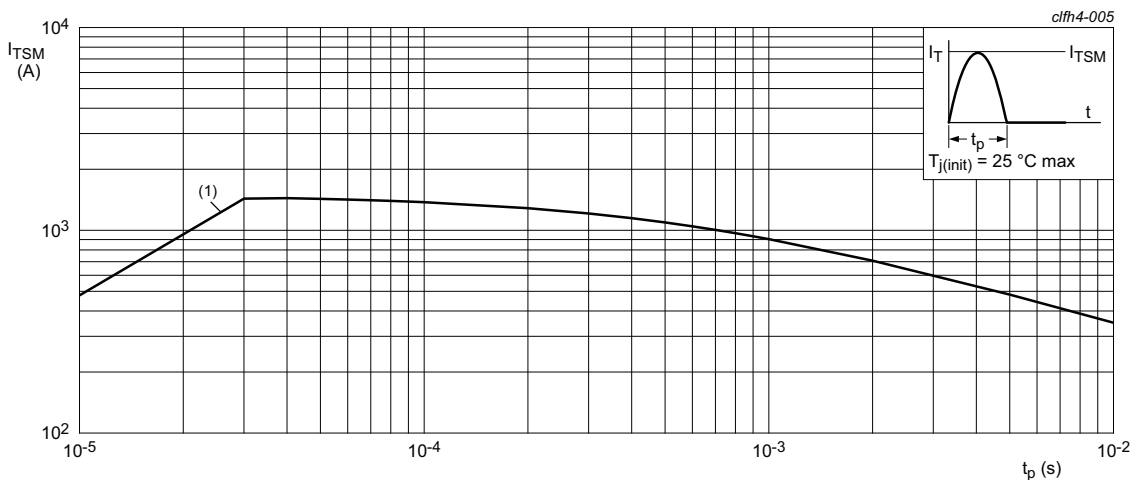
$\alpha$  = conduction angle  
 $a$  = form factor =  $I_{T(RMS)} / I_{T(AV)}$

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



$f = 50 \text{ Hz}$

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	<a href="#">Fig. 6</a>	-	-	0.6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	55	-	K/W

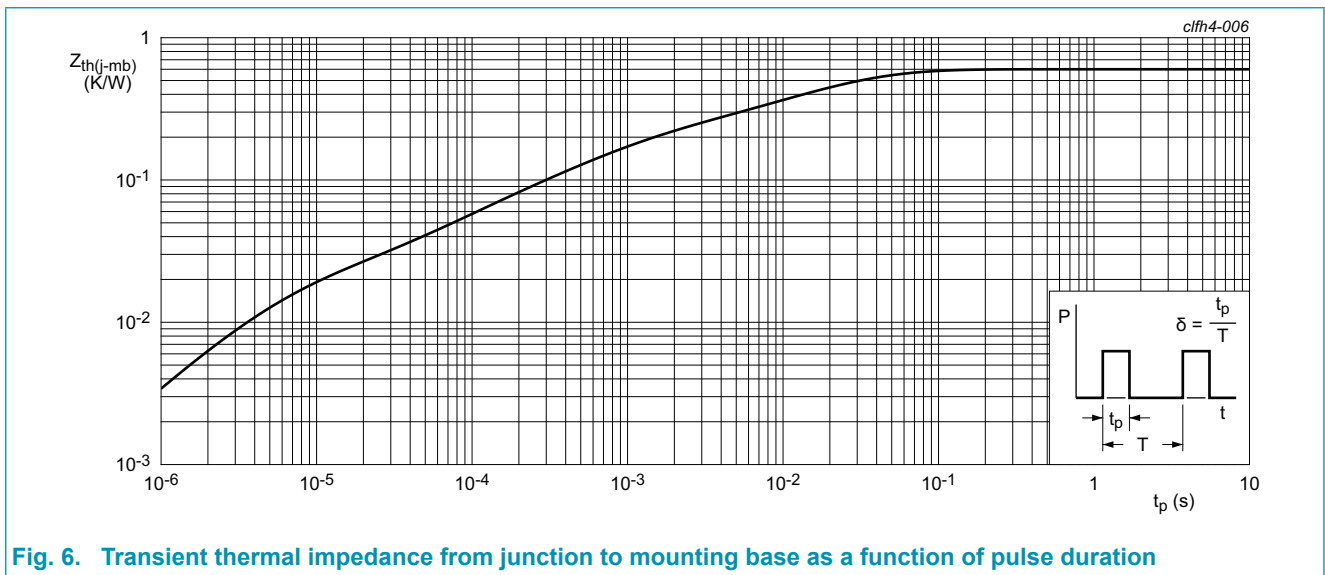
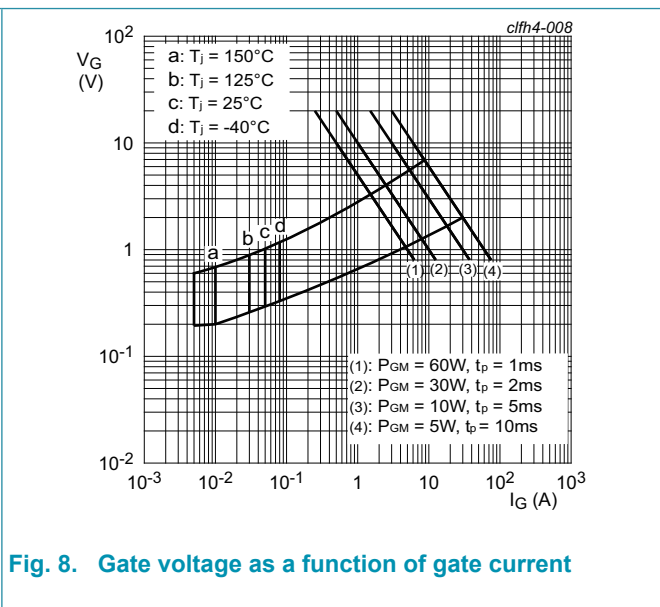
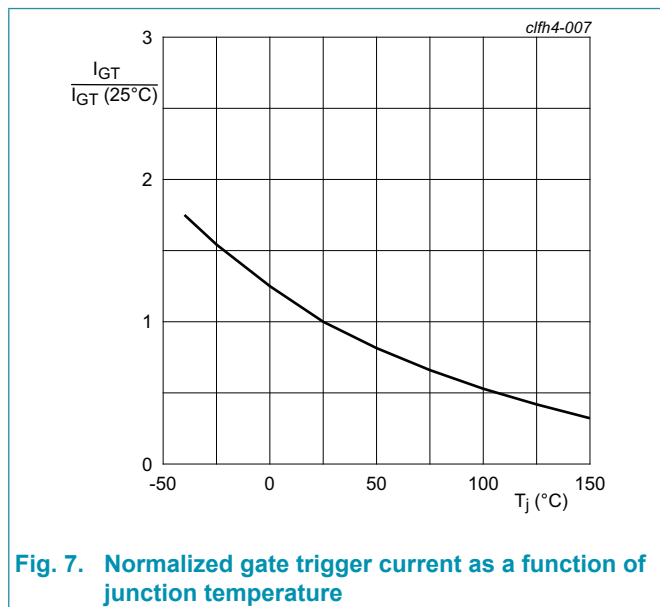


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

### 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_j = 25\text{ }^\circ\text{C};$ <a href="#">Fig.7; Fig. 8</a>	-	-	50	mA
$I_L$	latching current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_j = 25\text{ }^\circ\text{C};$ <a href="#">Fig. 9</a>	-	-	100	mA
$I_H$	holding current	$V_D = 12\text{ V}; T_j = 25\text{ }^\circ\text{C};$ <a href="#">Fig. 10</a>	-	-	80	mA
$V_T$	on-state voltage	$I_T = 30\text{ A}; T_j = 25\text{ }^\circ\text{C};$ <a href="#">Fig. 11</a>	-	-	1.3	V
$V_{GT}$	gate trigger voltage	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_j = 25\text{ }^\circ\text{C};$ <a href="#">Fig. 12</a>	-	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
<b>Dynamic characteristics</b>						
$dV_D/dt$	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/ $\mu$ 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	-	$\mu$ s
$t_q$	commutated turn-off time	$V_{DM} = 804\text{ V}; T_j = 125\text{ }^\circ\text{C}; I_{TM} = 30\text{ A}; V_R = 25\text{ V};$ $dV_D/dt = 50\text{ V}/\mu\text{s}; (dI_T/dt)_M = 30\text{ A}/\mu\text{s}; (V_{DM} = 67\%$ of $V_{DRM})$	-	70	-	$\mu$ s



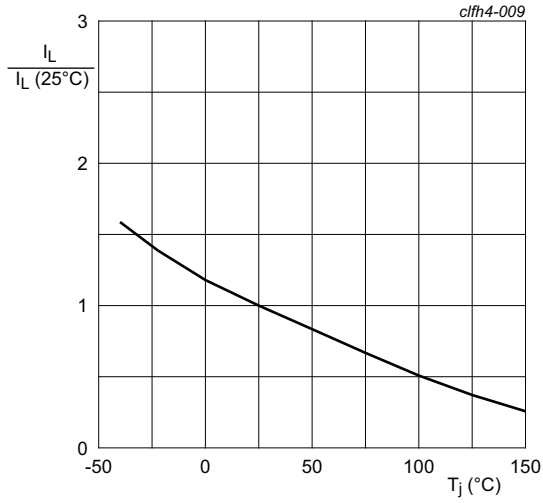


Fig. 9. Normalized latching current as a function of junction temperature

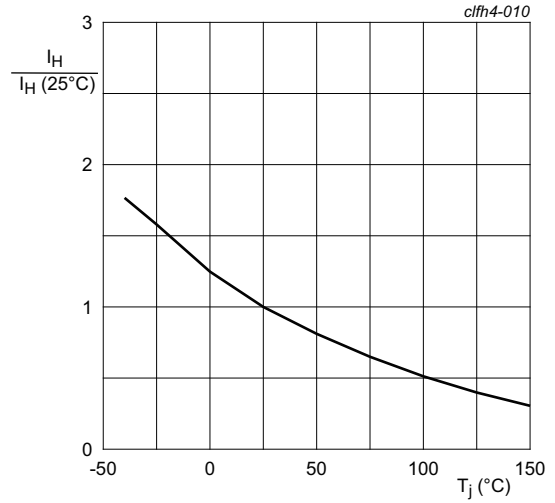
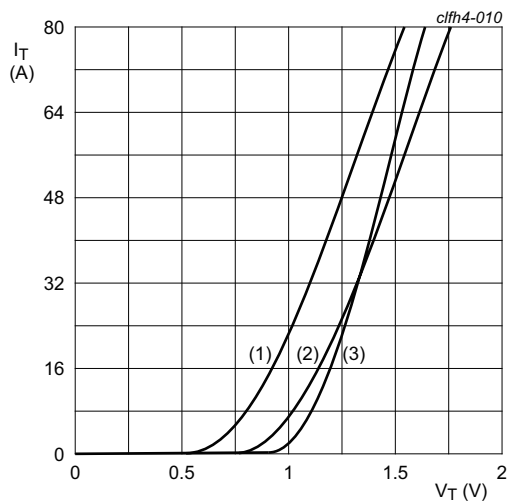


Fig. 10. Normalized holding current as a function of junction temperature



$V_o = 1.039 \text{ V}; R_s = 0.0089 \ \Omega$   
 (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

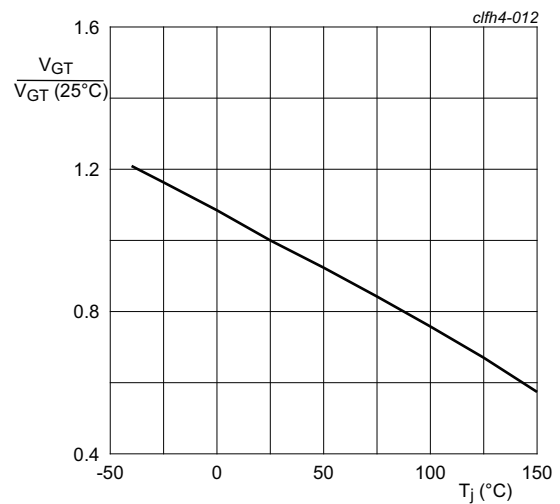
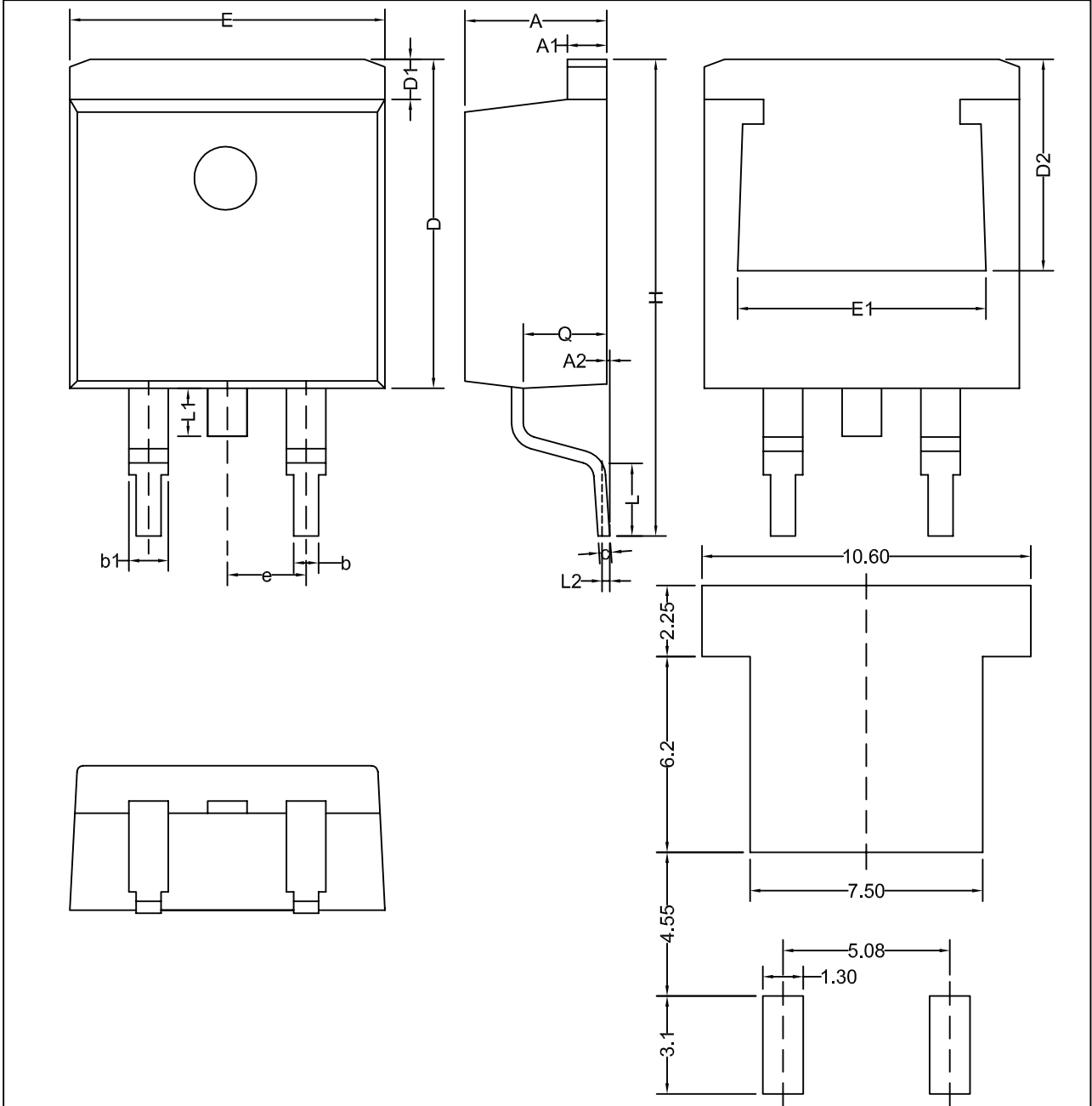


Fig. 12. Normalized gate trigger voltage as a function of junction temperature

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

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Date of release: 25 July 2019

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