BT153B-1200T-A

Automotive Grade SCR

Rev.01 - 25 July 2019

Product data sheet

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 °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

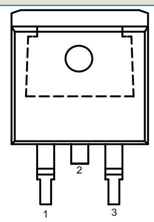
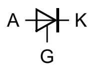
Table 1. Quick reference data

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} ≤ 119 °C; Fig. 1; Fig. 2; Fig. 3	47	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	350	A
		half sine wave; $T_{j(init)}$ = 25 °C; t_p = 8.3 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 V; I_T = 0.1 A; T_j = 25 °C; Fig. 7; Fig. 8		-	-	50	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; Fig. 10		-	-	80	mA
V_T	on-state voltage	I_T = 30 A; T_j = 25 °C; Fig. 11		-	-	1.3	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 804 V; T_j = 150 °C; (V_{DM} = 67% of V_{DRM}); gate open; exponential waveform;		1000	-	-	V/µs

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 TO-263 (D2PAK)	 *sym037*
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} ≤ 119 °C;	30	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; T_{mb} ≤ 119 °C; Fig. 1; Fig. 2; Fig. 3	47	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	350	A
		half sine wave; $T_{j(init)}$ = 25 °C; t_p = 8.3 ms	385	A
I^2t	I^2t for fusing	t_p = 10ms; sine wave	612.5	A^2s
dI_T/dt	rate of rise of on-state current	I_G = 100mA	150	A/μs
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	°C
T_j	junction temperature		150	°C

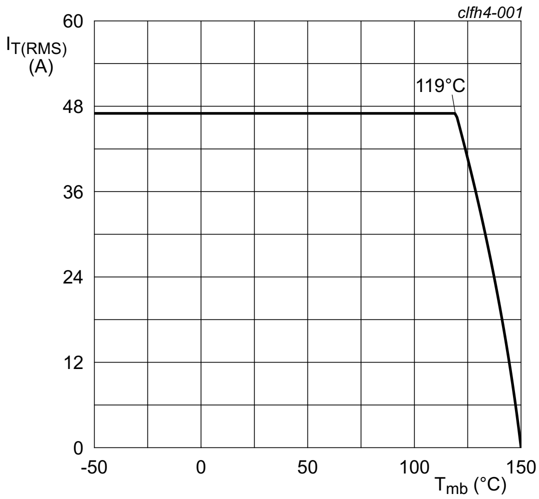
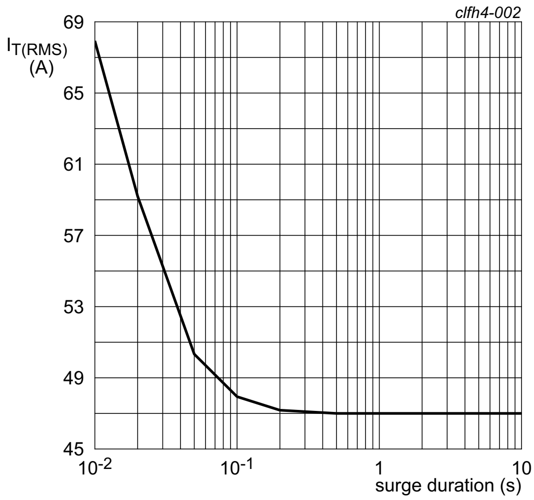
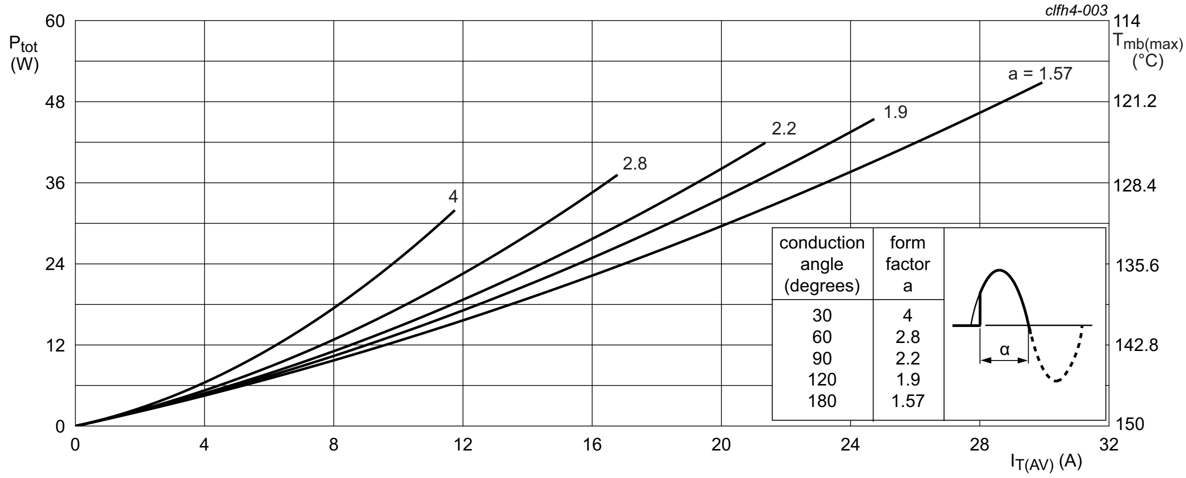


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



f = 50 Hz; T_{mb} = 119 °C

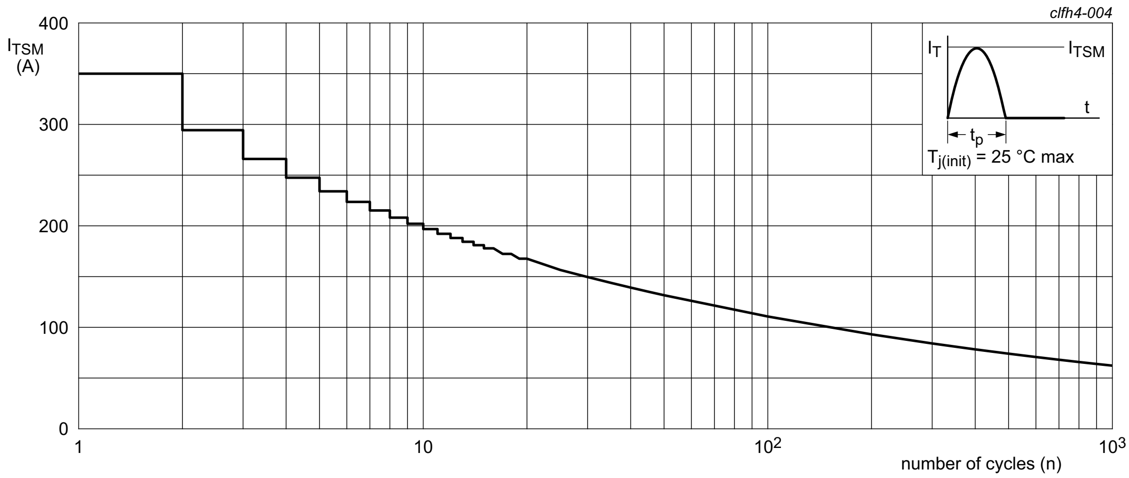
Fig. 2. RMS on-state current as a function of surge duration; maximum values



α = conduction angle

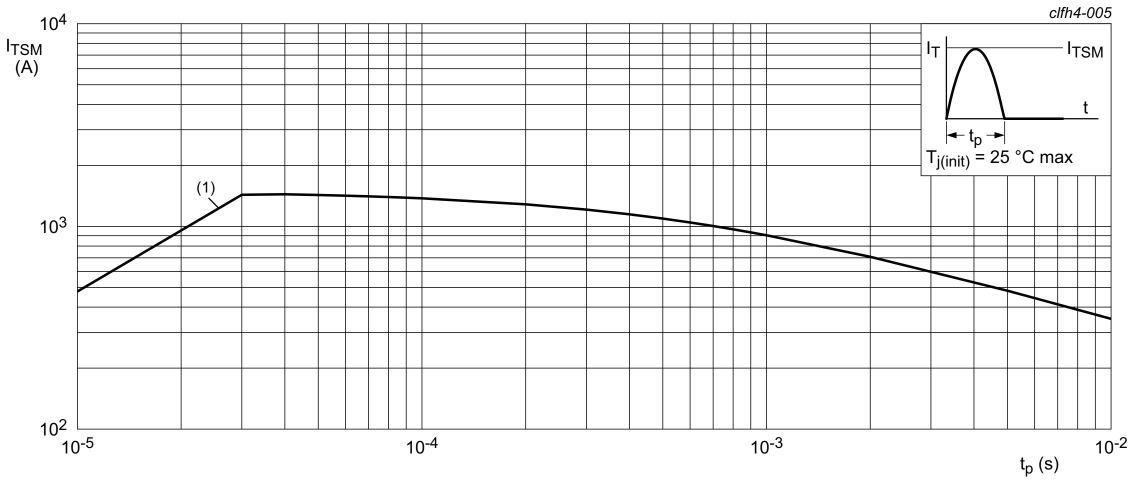
a = form factor = $I_{T(RMS)}$ / $I_{T(AV)}$

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 ≤ 10 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

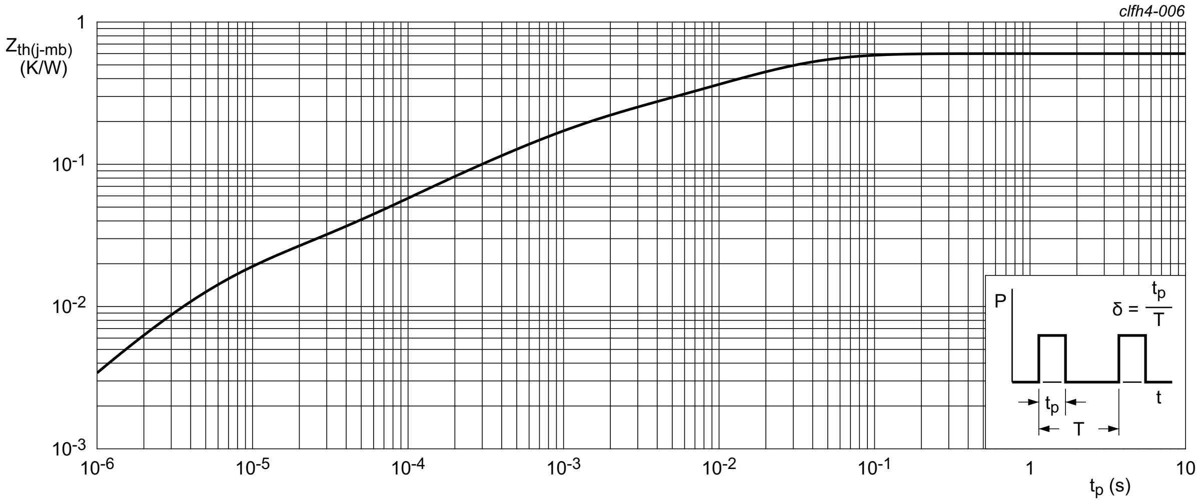


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

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

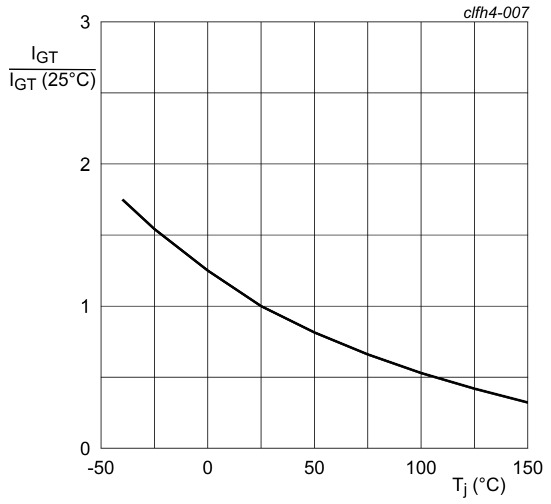


Fig. 7. Normalized gate trigger current as a function of junction temperature

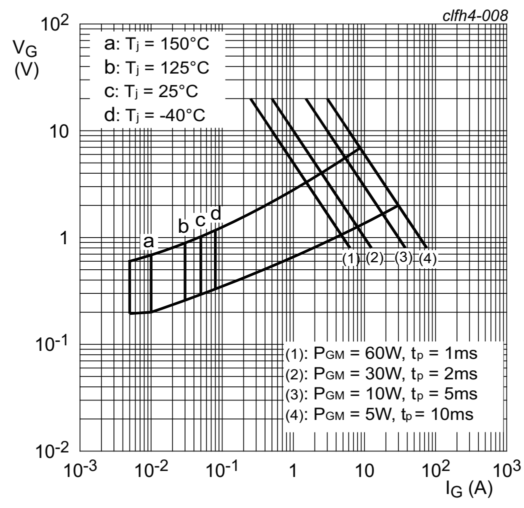


Fig. 8. Gate voltage as a function of gate current

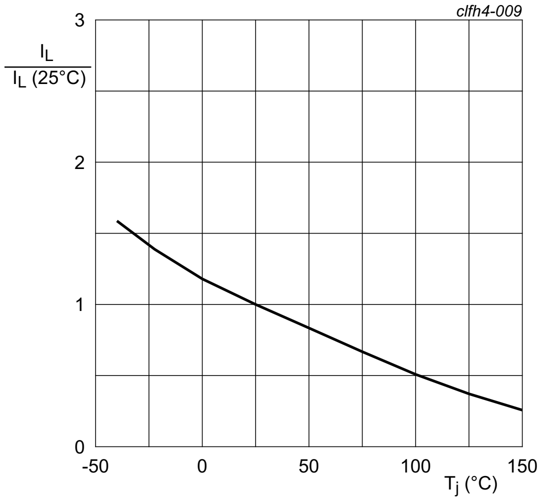


Fig. 9. Normalized latching current as a function of junction temperature

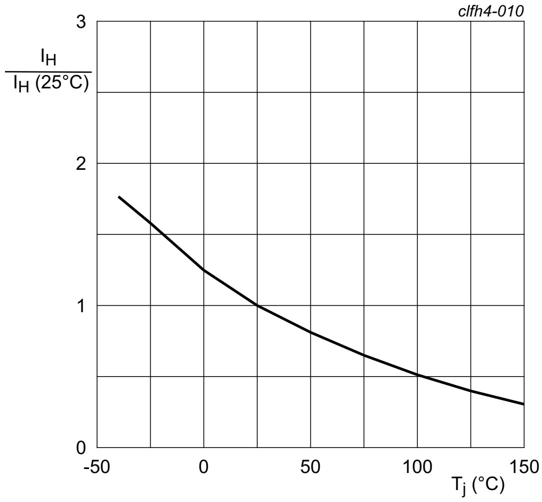
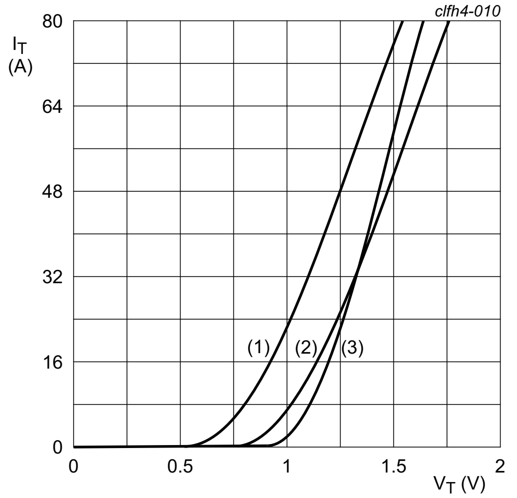


Fig. 10. Normalized holding current as a function of junction temperature



V_o = 1.039 V; R_s = 0.0089 Ω
(1) T_j = 150 °C; typical values
(2) T_j = 150 °C; maximum values
(3) T_j = 25 °C; maximum values

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

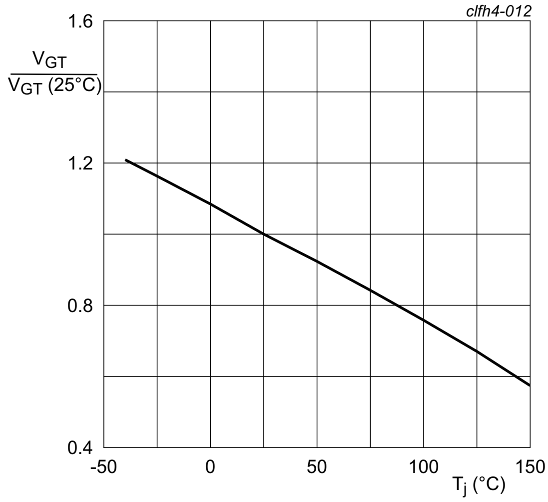
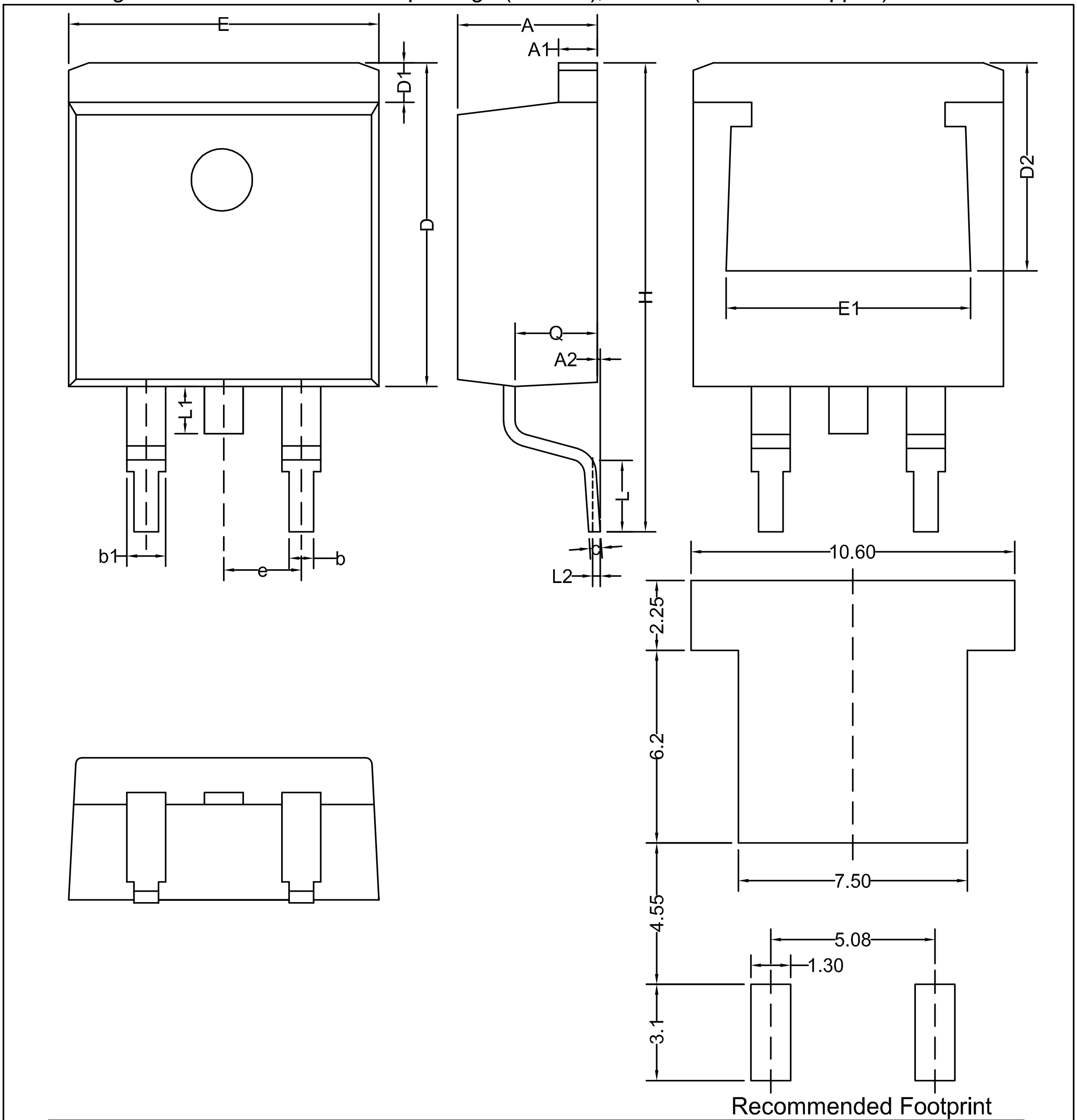


Fig. 12. Normalized gate trigger voltage as a function of junction temperature

11. Package outline

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



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

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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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