BT152B-800R

Thyristor

Rev.02 - 26 November 2019 Product data sheet

1. General description

Passivated thyristors in a plastic envelope suitable for surface mounting, intended for use in applications requiring high bidirectional blocking voltage capability and high thermal cycling performance.

2. Features and benefits

- High blocking voltage suitable for high voltage applications
- High thermal cycling performance

3. Applications

- General purpose switching
- Protection Circuits
- Motor control
- Industrial and domestic lighting

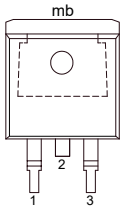
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage			-	-	800	V
V_{RRM}	repetitive peak reverse voltage			-	-	800	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq$ 104 °C; Fig. 1; Fig. 2; Fig. 3		-	-	13	A
$I_{T(RMS)}$	RMS on-state current			-	-	20	A
I_{TSM}	non-repetitive peak on-state current	$T_{j(init)}$ = 25 °C; t_p = 10 ms; Fig. 4; Fig. 5		-	-	200	A
		$T_{j(init)}$ = 25 °C; t_p = 8.3 ms		-	-	220	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. 7		-	3	32	mA
V_T	on-state voltage	I_T = 40 A; T_j = 25 °C; Fig. 10		-	1.45	1.75	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 536 V; T_j = 125 °C; R_{GK} = 100 Ω; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit		200	300	-	V/µs

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 D2PAK (SOT404)	
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
BT152B-800R	TO263	BT152B-800R,118	Reel	800	TO263N	26-Sep-2016

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			-	800	V
V_{RRM}	repetitive peak reverse voltage			-	800	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq$ 104 °C; Fig. 1; Fig. 2; Fig. 3		-	13	A
$I_{T(RMS)}$	RMS on-state current			-	20	A
I_{TSM}	non-repetitive peak on-state current	$T_{j(init)}$ = 25 °C; t_p = 10 ms; Fig. 4; Fig. 5		-	200	A
		$T_{j(init)}$ = 25 °C; t_p = 8.3 ms		-	220	A
I^2t	I^2t for fusing	t_p = 10 ms; SIN		-	200	A^2s
dI_T/dt	rate of rise of on-state current	I_G = 65 mA		-	200	A/µs
I_{GM}	peak gate current			-	5	A
V_{RGM}	peak reverse 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	150	°C
T_j	junction temperature			-	125	°C

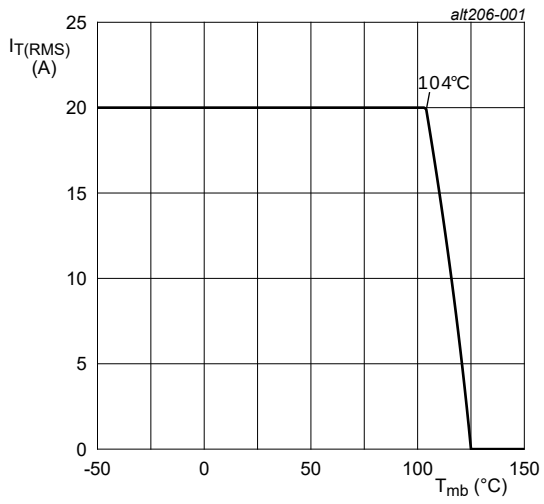
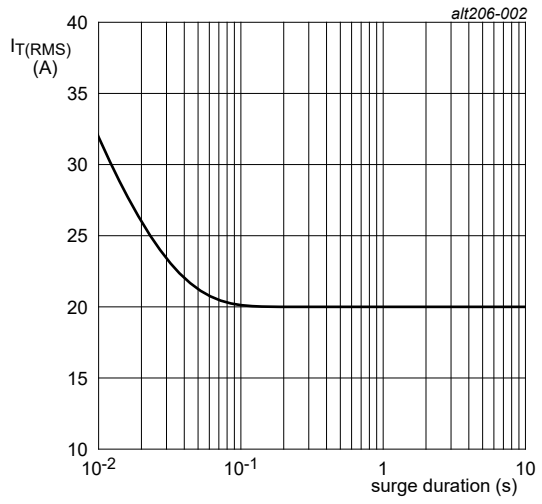
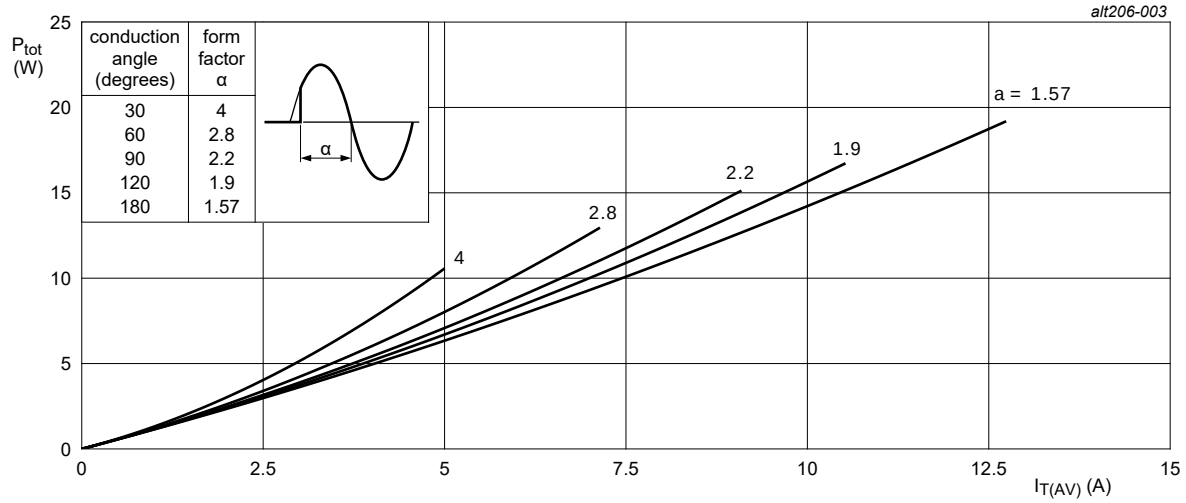


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



f = 50 Hz; T_{mb} = 104 °C

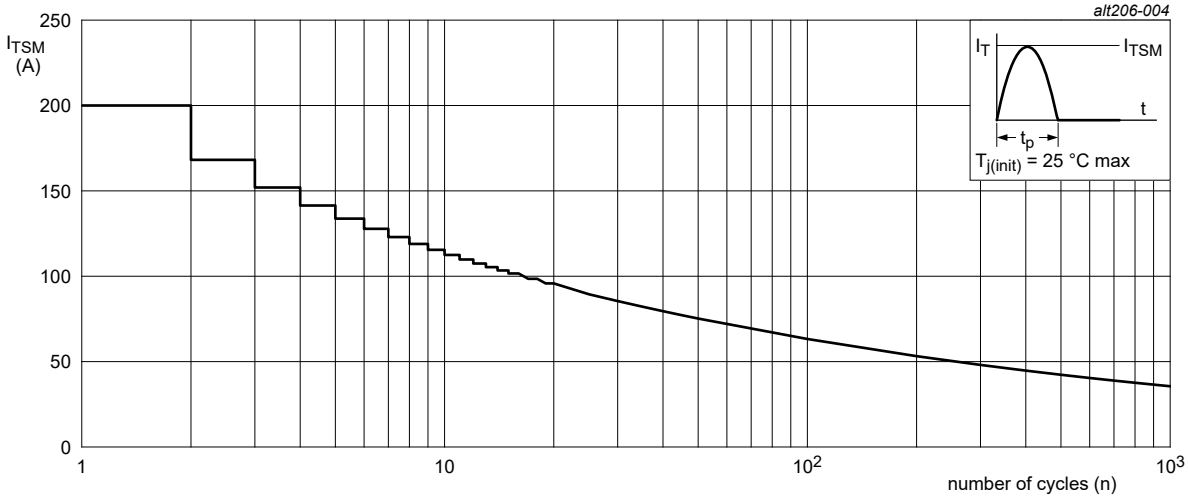
Fig. 2. RMS on-state current as a function of surge duration; maximum values



α = conduction angle

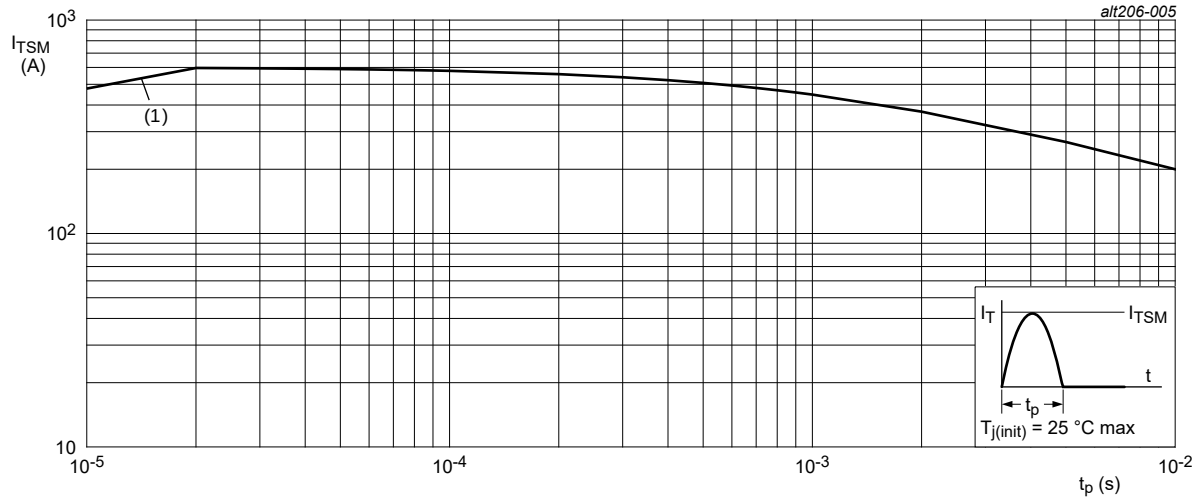
a = form factor = $I_{T(RMS)}$ / $I_{T(AV)}$

Fig. 3. Total power dissipation as a function of average 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



$t_p \leq 20$ ms

(1) dI_T/dt limit

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

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 6		-	-	1.1	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	minimum footprint, FR4 board		-	-	55	K/W

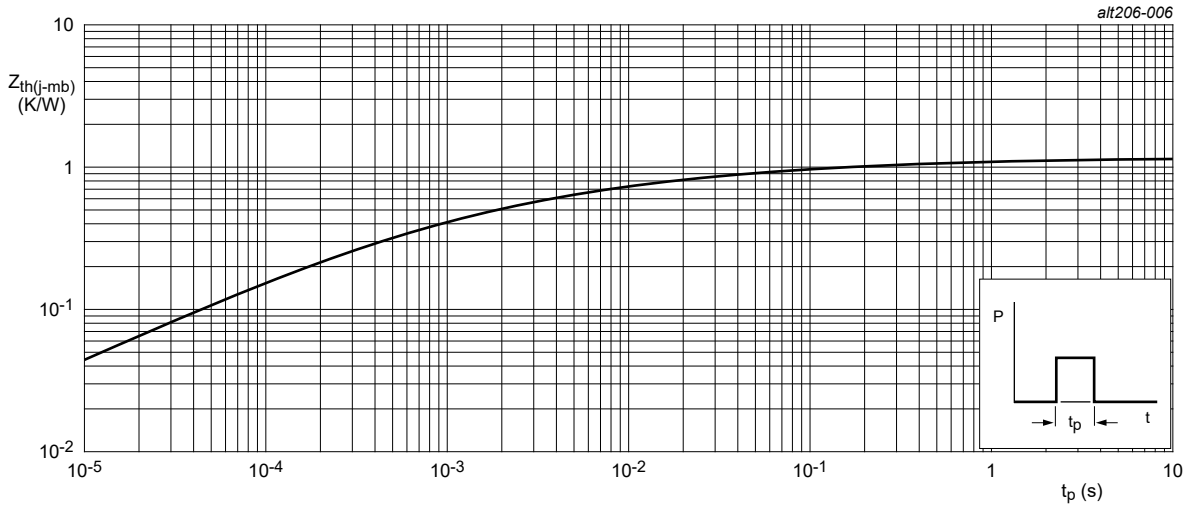


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

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. 7		-	3	32	mA
I_L	latching current	V_D = 12 V; I_G = 0.1 A; T_j = 25 °C; Fig. 8		-	-	80	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; Fig. 9		-	-	60	mA
V_T	on-state voltage	I_T = 40 A; T_j = 25 °C; Fig. 10		-	1.45	1.75	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 11		-	0.6	1.5	V
		V_D = 800 V; I_T = 0.1 A; T_j = 125 °C; Fig. 11		0.25	0.4	-	V
I_D	off-state current	V_D = 800 V; T_j = 125 °C		-	0.2	1	mA
I_R	reverse current	V_R = 800 V; T_j = 125 °C		-	0.2	1	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 536 V; T_j = 125 °C; R_{GK} = 100 Ω; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit		200	300	-	V/µs
t_{gt}	gate-controlled turn-on time	I_{TM} = 40 A; V_D = 800 V; I_G = 0.1 A; dI_G/dt = 5 A/µs; T_j = 25 °C		-	2	-	µs
t_q	commutated turn-off time	V_{DM} = 800 V; T_j = 125 °C; I_{TM} = 50 A; V_R = 25 V; $(dI_T/dt)_M$ = 30 A/µs; dV_D/dt = 50 V/µs; $R_{GK(ext)}$ = 100 Ω; V_{DM} = 67% of V_{DRM}		-	70	-	µs

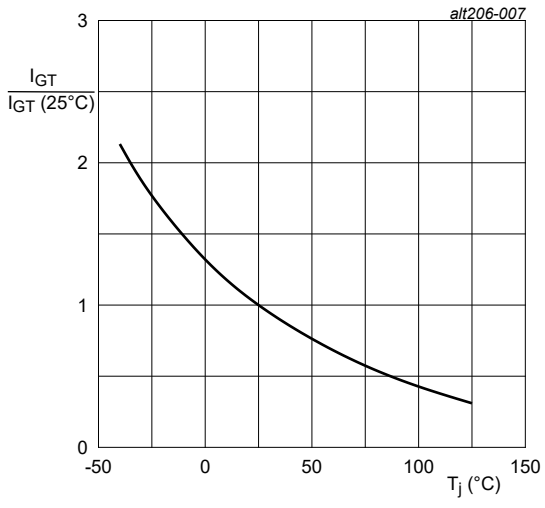


Fig. 7. Normalized gate trigger current as a function of junction temperature

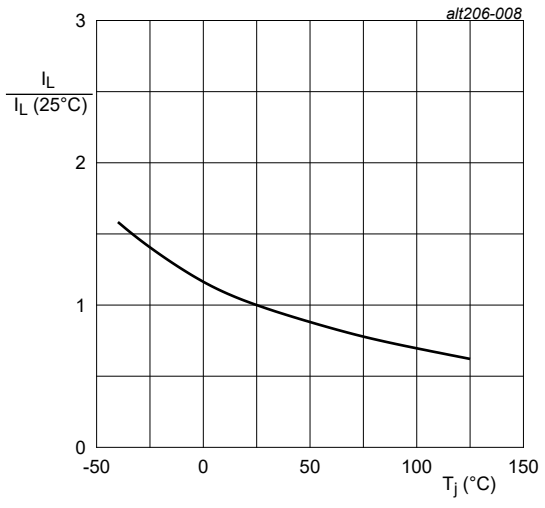


Fig. 8. Normalized latching current as a function of junction temperature

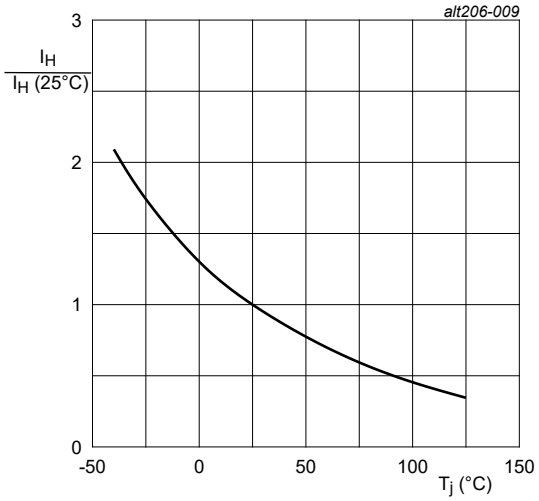
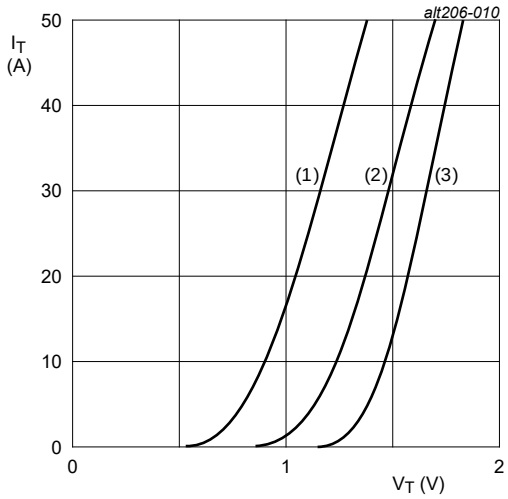


Fig. 9. Normalized holding current as a function of junction temperature



V_o = 1.114 V; R_s = 0.0125 Ω
(1) T_j = 125 °C; typical values
(2) T_j = 125 °C; maximum values
(3) T_j = 25 °C; maximum values

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

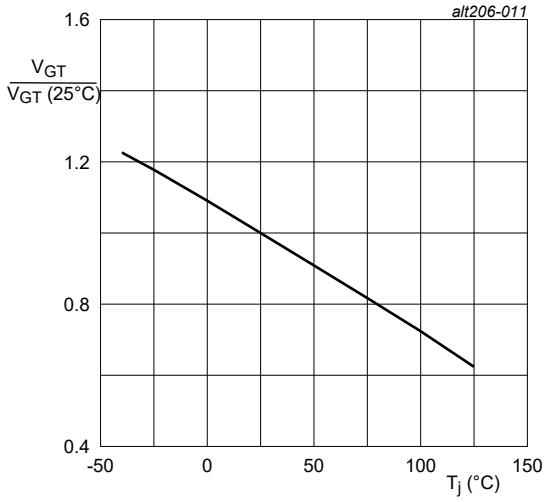
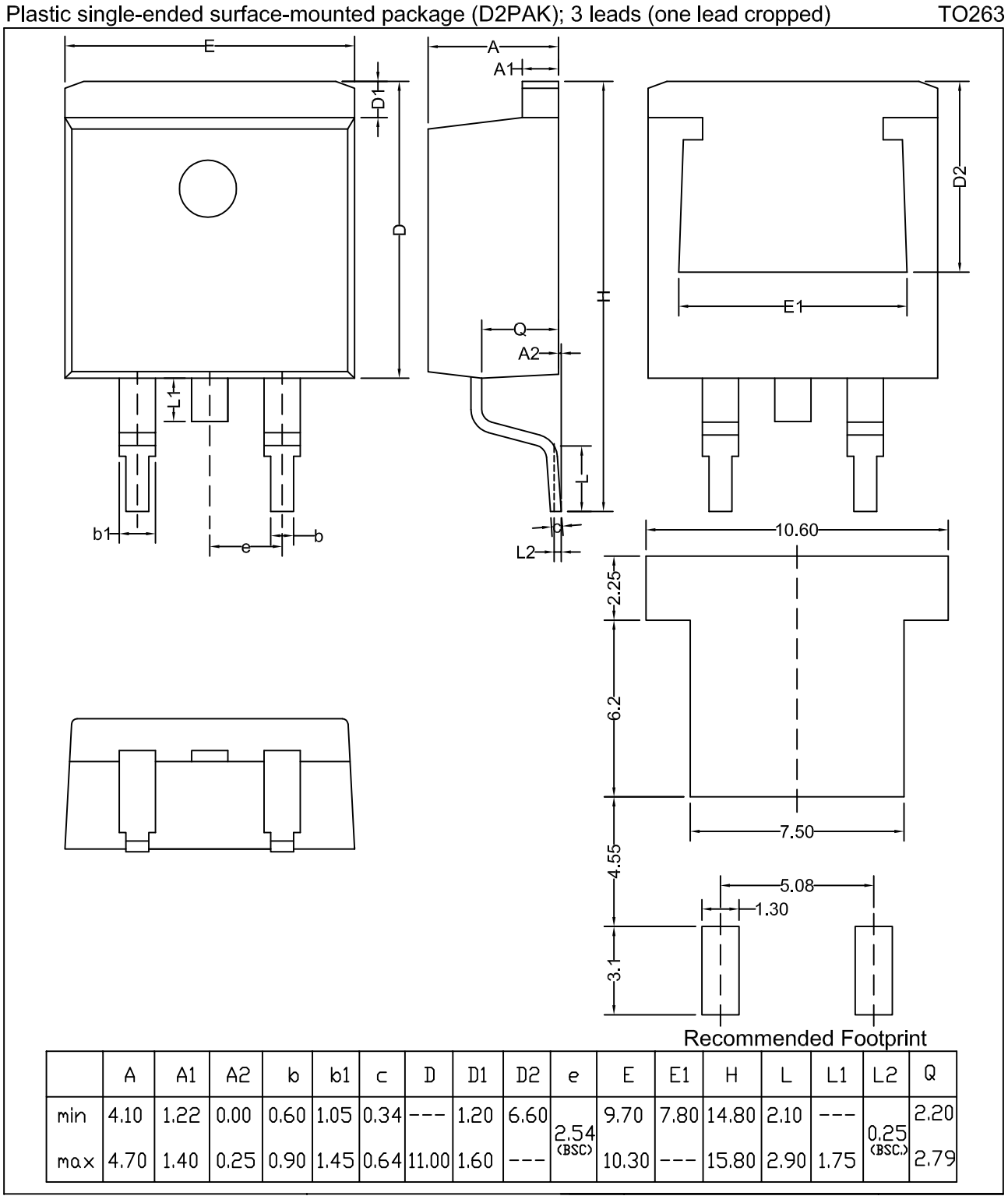


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

10. Package outline



	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

Fig. 12. Package outline D2PAK (SOT404)

11. 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.
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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12. Contents

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