

1. General description

Planar passivated high commutation three quadrant triac in a TO263 (D2PAK) plastic package intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. This "series C" triac will commute the full RMS current at the maximum rated junction temperature without the aid of a snubber.

2. Features and benefit

- 3Q technology for improved noise immunity
- High commutation capability with maximum false trigger immunity
- High immunity to false turn-on by dV/dt
- High voltage capability
- Planar passivated for voltage ruggedness and reliability
- Surface mountable package
- Triggering in three quadrants only

3. Applications

- Electronic thermostats (heating and cooling)
- High power motor controls e.g. washing machines and vacuum cleaners
- Rectifier-fed DC inductive loads e.g. DC motors and solenoid

4. Quick reference data

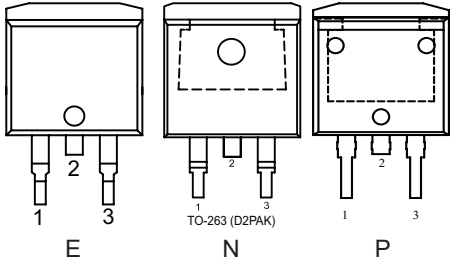
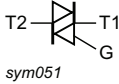
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Absolute maximum rating							
V_{DRM}	repetitive peak off-state voltage			-	-	800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 101\text{ °C}$ Fig. 1 ; Fig. 2 ; Fig. 3		-	-	16	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$ Fig. 4 ; Fig. 5		-	-	140	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$		-	-	150	A
T_j	junction temperature			-	-	125	°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_2+ G+; $T_j = 25\text{ °C}$; Fig. 7		2	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T_2+ G-; $T_j = 25\text{ °C}$; Fig. 7		2	-	35	mA

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I _{GT}	gate trigger current	V _D = 12 V; I _T = 0.1 A; T2- G-; T _j = 25 °C; Fig. 7	2	-	35	mA
I _H	holding current	V _D = 12 V; T _j = 25 °C; Fig. 9	-	-	35	mA
V _T	on-state voltage	I _T = 18 A; T _j = 25 °C; Fig. 10	-	1.3	1.5	V
Dynamic characteristics						
dV _D /dt	rate of rise of off-stat voltage	V _{DM} = 536 V; T _j = 125 °C; (V _{DM} = 67% of V _{DRM}); exponential waveform; gate open circuit	500	-	-	V/μs
dI _{com} /dt	rate of change of commutating current	V _D = 400 V; T _j = 125 °C; I _{T(RMS)} = 16 A; dV _{com} /dt = 20 V/μs; (snubberless condition); gate open circuit	15	-	-	A/ms

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	T1	main terminal 1		
2	T2	main terminal 2		
3	G	gate		
mb	T2	mounting base; main terminal 2		

6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BTA316B-800C	TO263	BTA316B-800C,118	Reel	800	TO263E (E)	26-May-2017
					TO263N (N)	26-Sep-2016
					TO263P (P)	12-Jun-2023

7. Marking

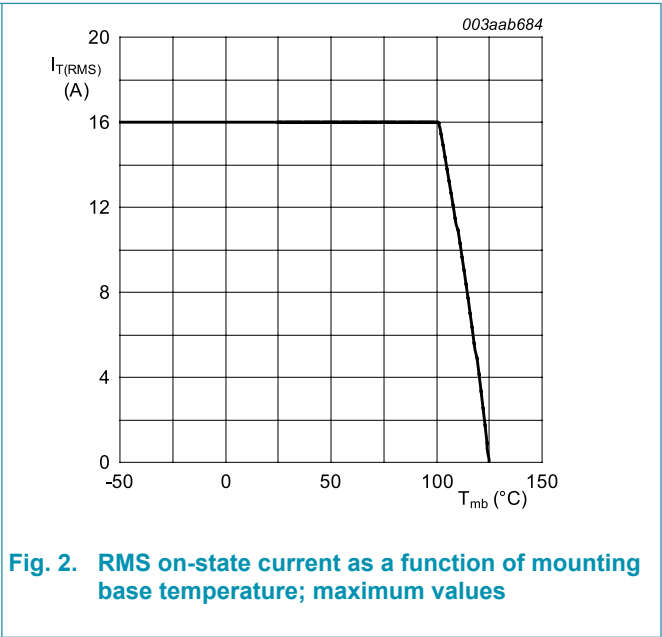
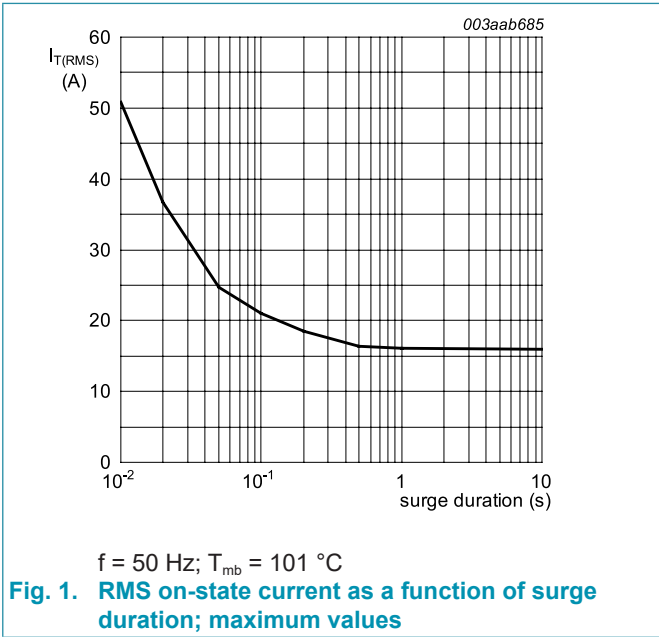
Table 4. Marking codes

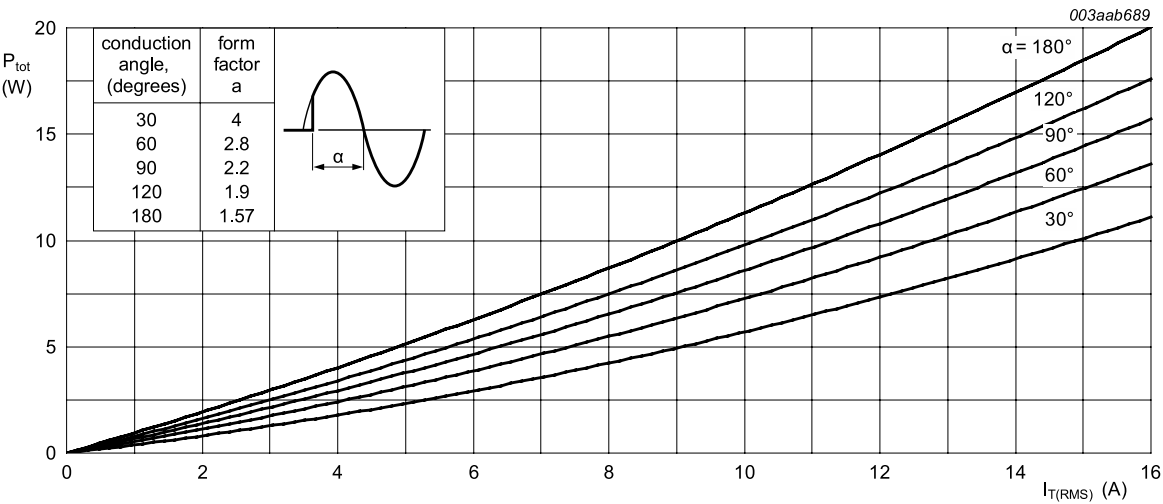
Type number	Marking codes		
	Assembly factory: E	Assembly factory: N	Assembly factory: P
BTA316B-800C	BTA316B 800C PJExxxx xx	BTA316B 800C PJNxxxx xx	BTA316B 800C PJPxxxx xx

8. Limiting values

Table 5. Limiting values
In accordance with the Absolute Maximum Rating System (IEC 60134).

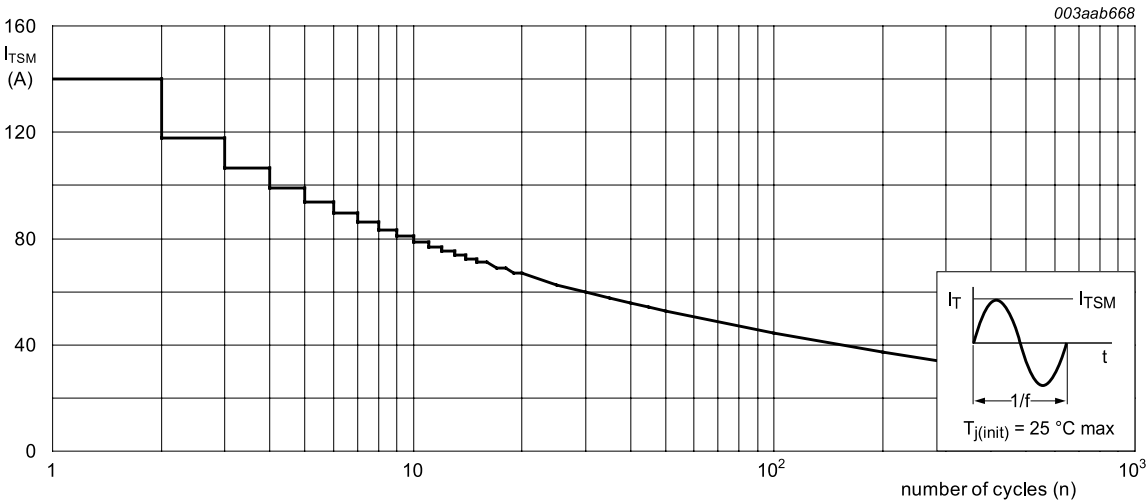
Symbol	Parameter	Conditions		Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage			-	800	V
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{mb}} \leq 101\text{ }^{\circ}\text{C}$ Fig 1 ; Fig 2 ; Fig 3		-	16	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{\text{j(init)}} = 25\text{ }^{\circ}\text{C}$; $t_{\text{p}} = 20\text{ ms}$ Fig 4 ; Fig 5		-	140	A
		full sine wave; $T_{\text{j(init)}} = 25\text{ }^{\circ}\text{C}$; $t_{\text{p}} = 16.7\text{ ms}$		-	150	A
I^2t	I^2t for fusing	$t_{\text{p}} = 10\text{ ms}$; SIN		-	98	A^2s
di_{T}/dt	rate of rise of on-state current	$I_{\text{G}} = 70\text{ mA}$		-	100	$\text{A}/\mu\text{s}$
I_{GM}	peak gate current			-	2	A
P_{GM}	peak gate power			-	5	W
$P_{\text{G(AV)}}$	average gate power	over any 20 ms period		-	0.5	W
T_{stg}	storage temperature			-40	150	$^{\circ}\text{C}$
T_{j}	junction temperature			-	125	$^{\circ}\text{C}$





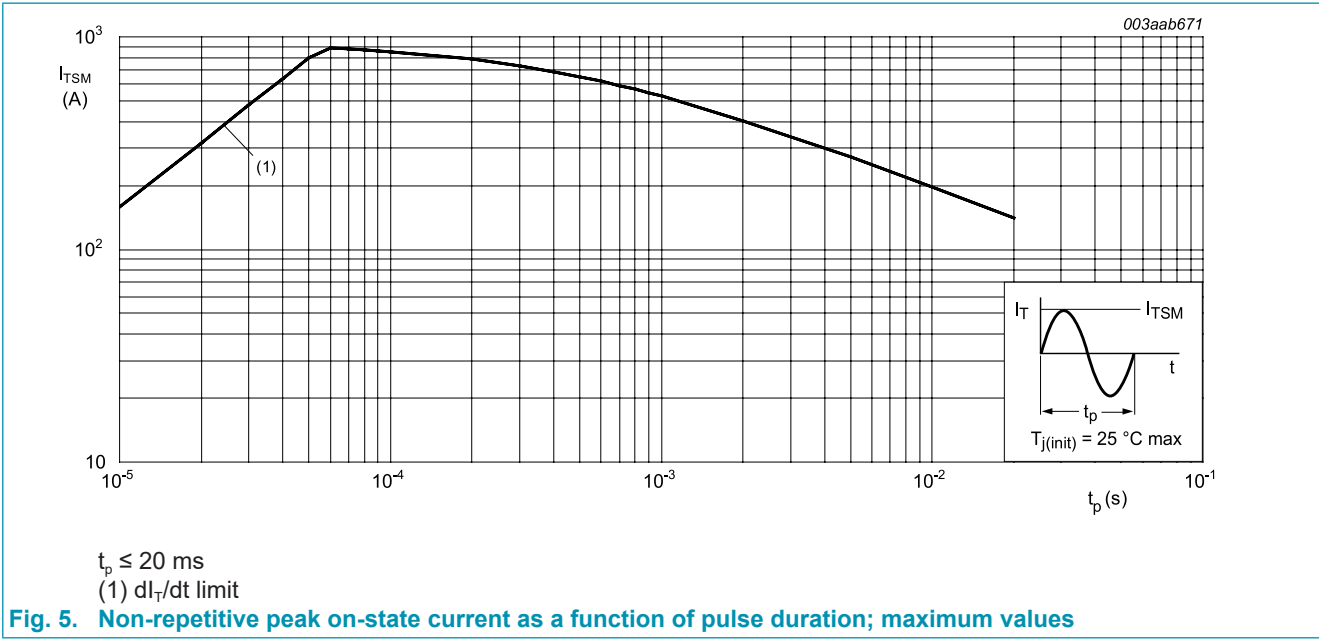
α = conduction angle
 a = form factor = $I_{T(RMS)} / I_{T(AV)}$

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



$f = 50\text{ Hz}$

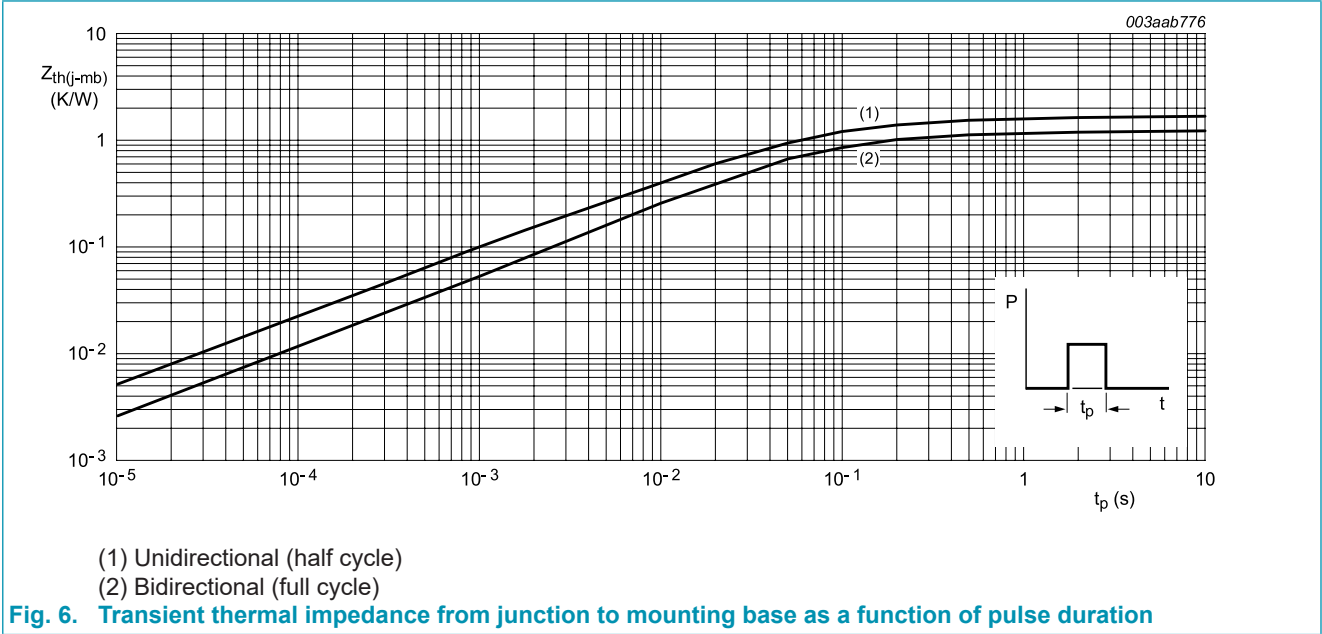
Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



9. Thermal characteristics

Table 6. Thermal characteristics

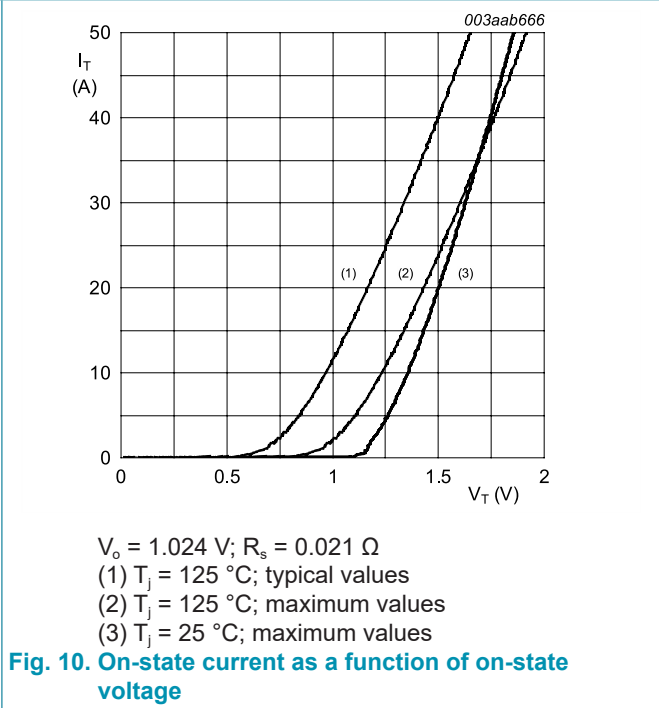
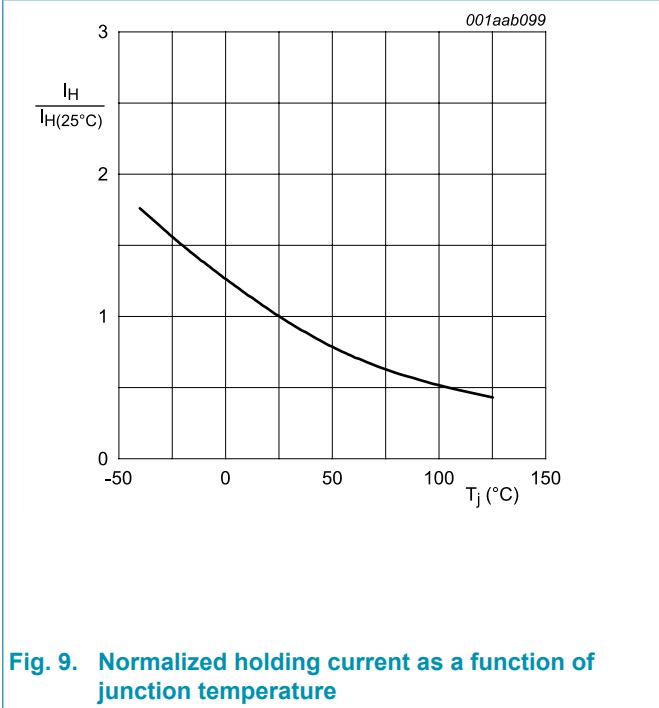
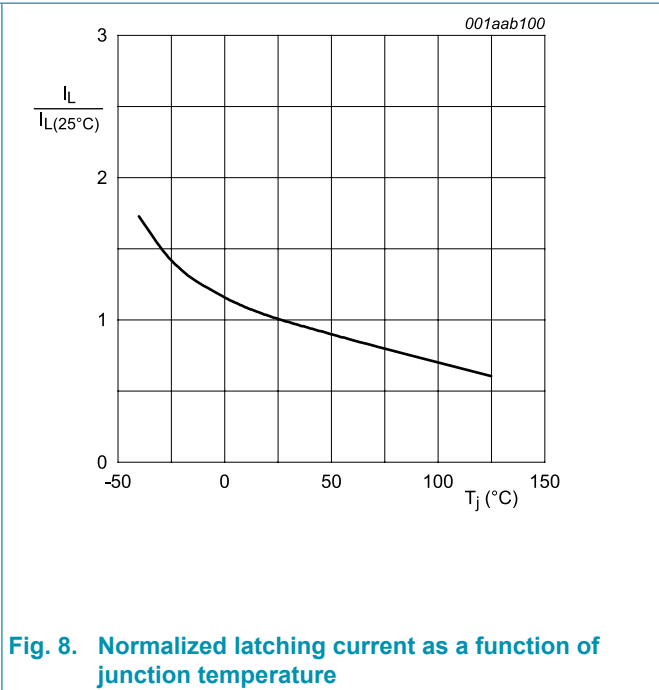
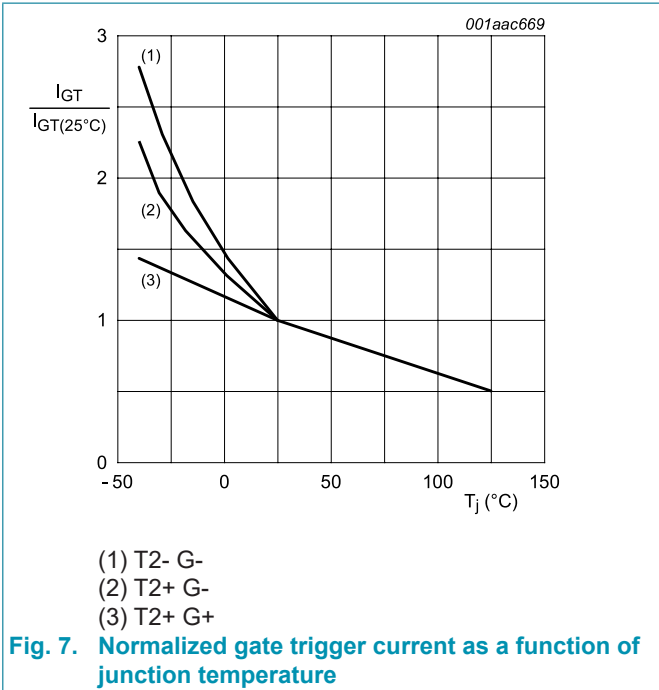
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle; Fig.6	-	-	1.2	K/W
		half cycle; Fig.6	-	-	1.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	printed circuit board mounted; minimum footprint	-	55	-	K/W



10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G+; $T_J = 25\text{ }^\circ\text{C}$; Fig. 7		2	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_J = 25\text{ }^\circ\text{C}$; Fig. 7		2	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_J = 25\text{ }^\circ\text{C}$; Fig. 7		2	-	35	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G+; $T_J = 25\text{ }^\circ\text{C}$; Fig. 8		-	-	50	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G-; $T_J = 25\text{ }^\circ\text{C}$; Fig. 8		-	-	60	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2- G-; $T_J = 25\text{ }^\circ\text{C}$; Fig. 8		-	-	50	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_J = 25\text{ }^\circ\text{C}$; Fig. 9		-	-	35	mA
V_T	on-state voltage	$I_T = 18\text{ A}$; $T_J = 25\text{ }^\circ\text{C}$; Fig. 10		-	1.3	1.5	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. 11		-	0.8	1	V
		$V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_J = 125\text{ }^\circ\text{C}$; Fig. 11		0.25	0.4	-	V
I_D	off-state curren	$V_D = 800\text{ V}$; $T_J = 125\text{ }^\circ\text{C}$		-	0.1	0.5	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-stat voltage	$V_{DM} = 536\text{ V}$; $T_J = 125\text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit		500	-	-	V/ μs
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_J = 125\text{ }^\circ\text{C}$; $I_{T(RMS)} = 16\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; (snubberless condition); gate open circuit		15	-	-	A/ms



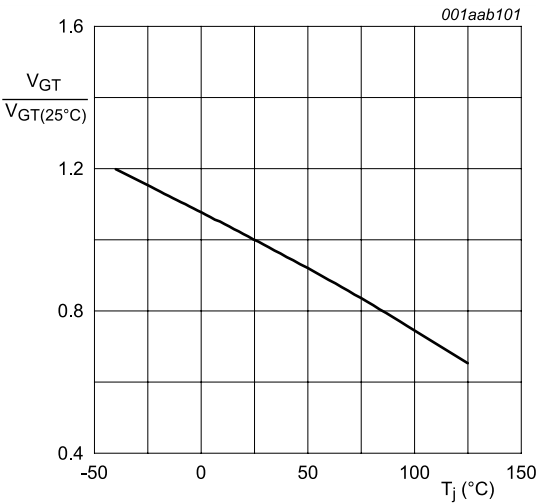


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

Assembly factory: P

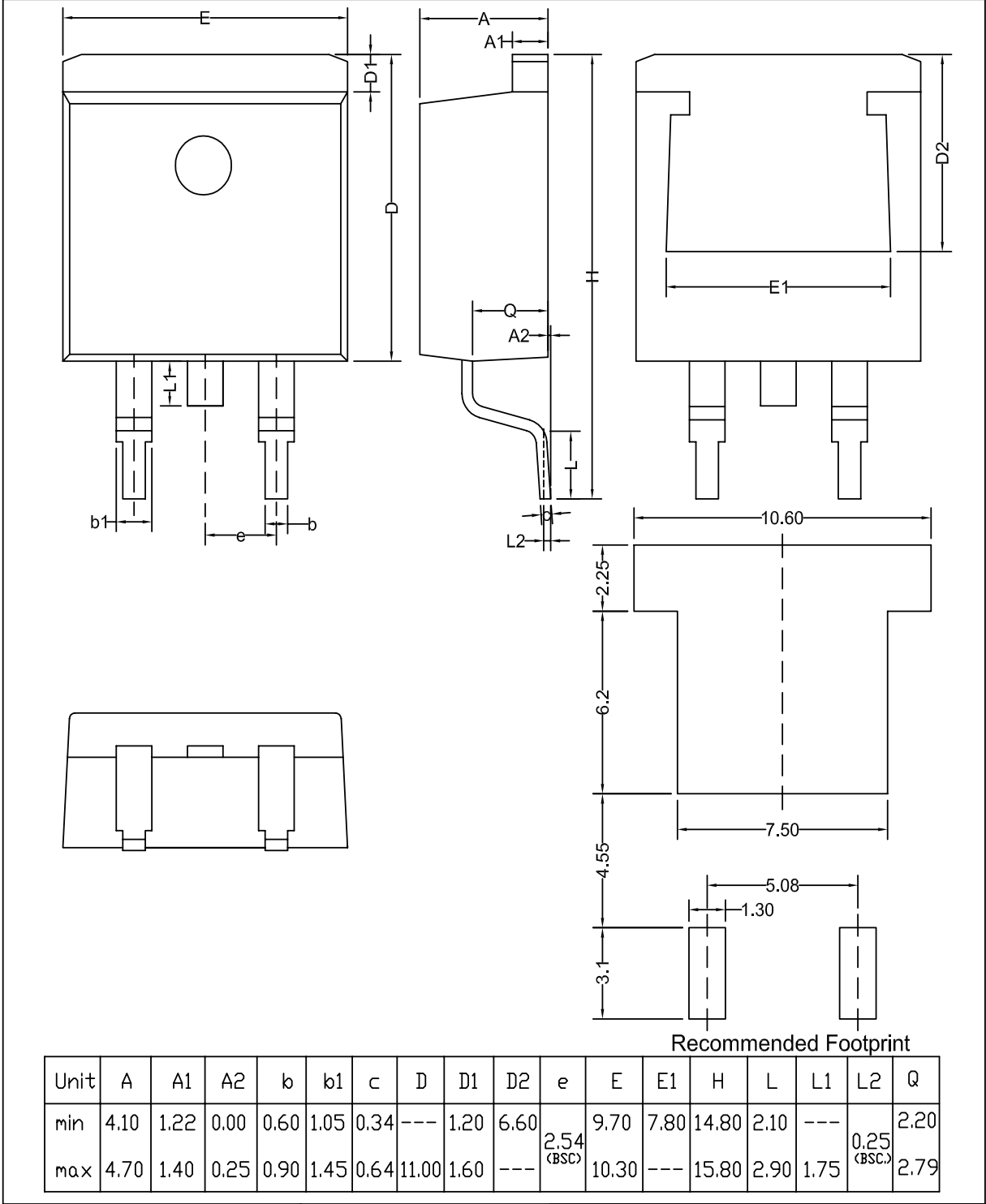
Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)

TO263

Dim	All Dimensions in Millimeters		
	Min	Typ	Max
A	4.30	4.46	4.60
A1	0	0.13	0.25
A2	2.50	2.60	2.70
b	0.70	0.80	0.90
b1	1.10	1.27	1.45
C	0.40	0.52	0.60
C1	1.17	1.30	1.40
D	9.10	9.25	9.40
D1	1.00	1.10	1.30
D2	7.40	7.70	8.00
E	9.80	10.00	10.20
E1	7.60	7.80	8.00
e	2.54 BSC		
H	14.80	15.30	15.80
L	2.10	2.47	2.80
L1	1.30	1.50	1.70

Assembly factory: N

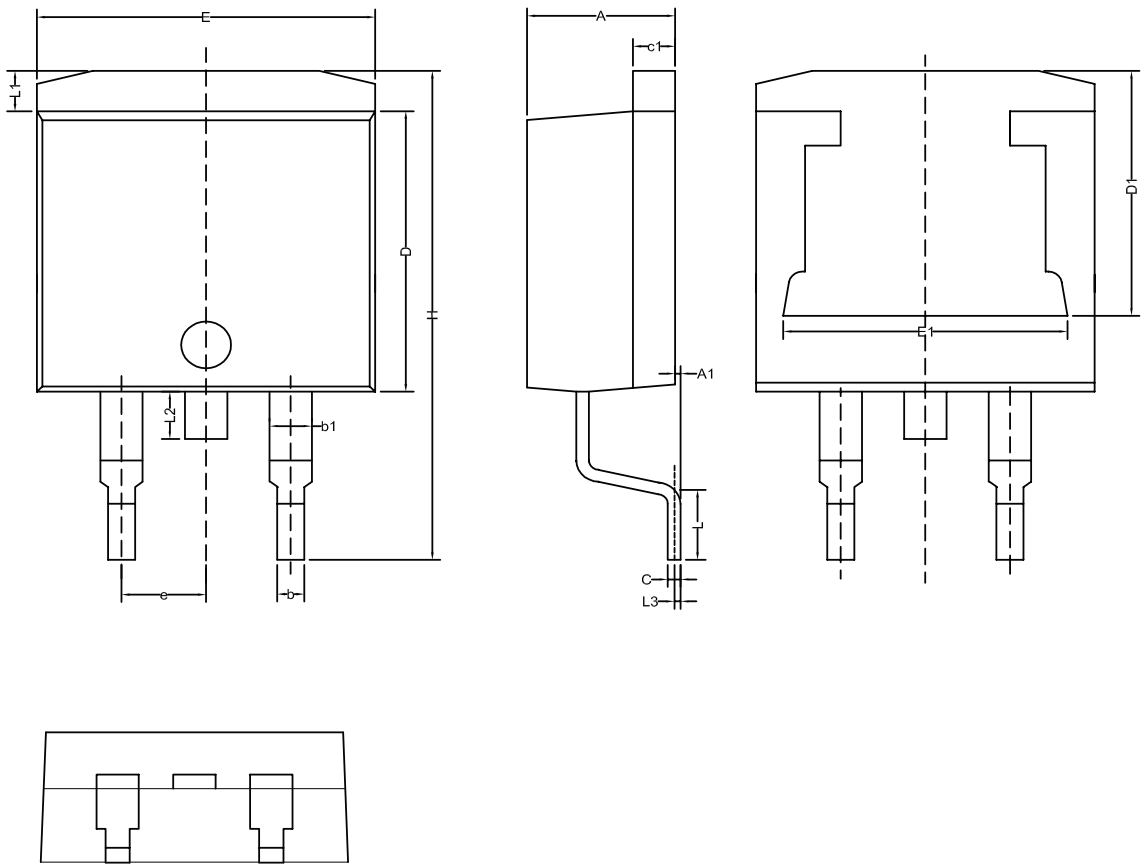
Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped) TO263



Assembly factory: E

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

TO263



Unit	A	A1	b	b1	c	c1	D	D1	E	E1	e	H	L	L1	L2	L3
MM	4.35	0.00	0.69	1.14	0.38	1.14	8.50	7.50	10.00	8.25	2.54	14.60	2.50	1.00	1.27	0.25
	max	4.75	0.15	0.99	1.73	0.61	1.40	9.02	8.00	10.40	8.80	15.60	2.79	1.65	1.78	0.25

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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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