

1. General description

Planar passivated high commutation three quadrant triac in a PDFN5X6 plastic package intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. This "series CT" triac will commute the full RMS current at the maximum rated junction temperature ($T_j = 150\text{ °C}$) without the aid of a snubber. It is used in applications where "high junction operating temperature capability" is required.

2. Features and benefits

- 3Q technology for improved noise immunity
- High commutation capability with maximum false trigger immunity
- High immunity to false turn-on by dV/dt
- High junction operating temperature capability
- High voltage capability
- Less sensitive gate for high noise immunity
- Planar passivated for voltage ruggedness and reliability
- Triggering in three quadrants only

3. Applications

- Applications subject to high temperature
- 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 solenoids

4. Quick reference data

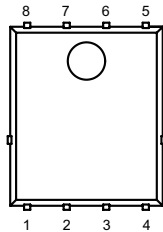

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
V_{DRM}	repetitive peak off-state voltage			800			V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 127\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3		12			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		100			A
		full sine wave; $T_{J(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$		110			A
T_j	operating junction temperature			-40 to 150			°C
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G+; $T_j = 25\text{ °C}$; Fig. 7		-	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_j = 25\text{ °C}$; Fig. 7		-	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_j = 25\text{ °C}$; Fig. 7		-	-	35	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; Fig. 9		-	-	35	mA
V_T	on-state voltage	$I_T = 15\text{ A}$; $T_j = 25\text{ °C}$; Fig. 10		-	-	1.6	V

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$; $T_j = 150\text{ °C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit		300	-	-	V/ μ s
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_j = 150\text{ °C}$; $I_{T(RMS)} = 12\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; (snubberless condition); gate open circuit		8	-	-	A/ms
		$V_D = 400\text{ V}$; $T_j = 150\text{ °C}$; $I_{T(RMS)} = 12\text{ A}$; $dV_{com}/dt = 10\text{ V}/\mu\text{s}$; gate open circuit		13	-	-	A/ms
		$V_D = 400\text{ V}$; $T_j = 150\text{ °C}$; $I_{T(RMS)} = 12\text{ A}$; $dV_{com}/dt = 1\text{ V}/\mu\text{s}$; gate open circuit		20	-	-	A/ms

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1-3	T1	main terminal 1		 sym051
4	G	gate		
5-8	T2	main terminal 2		
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
BTA312V-800CT	PDFN5X6	BTA312V-800CTJ	Reel	4000	PDFN5X6N	21-Jul-2022

7. Marking

Table 4. Marking codes

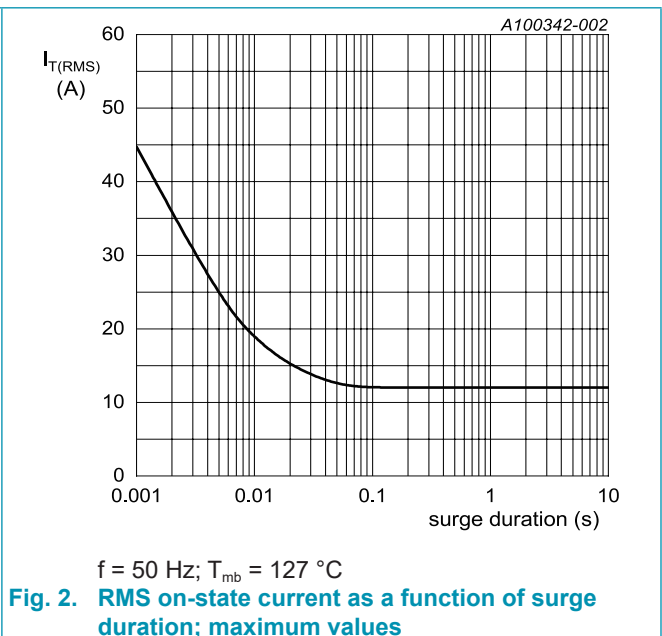
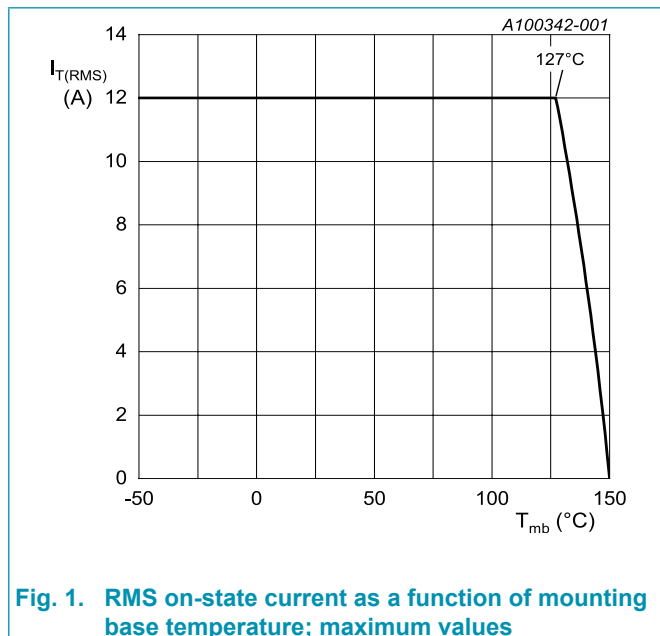
Type number	Marking codes
BTA312V-800CT	BTA312V 800CT

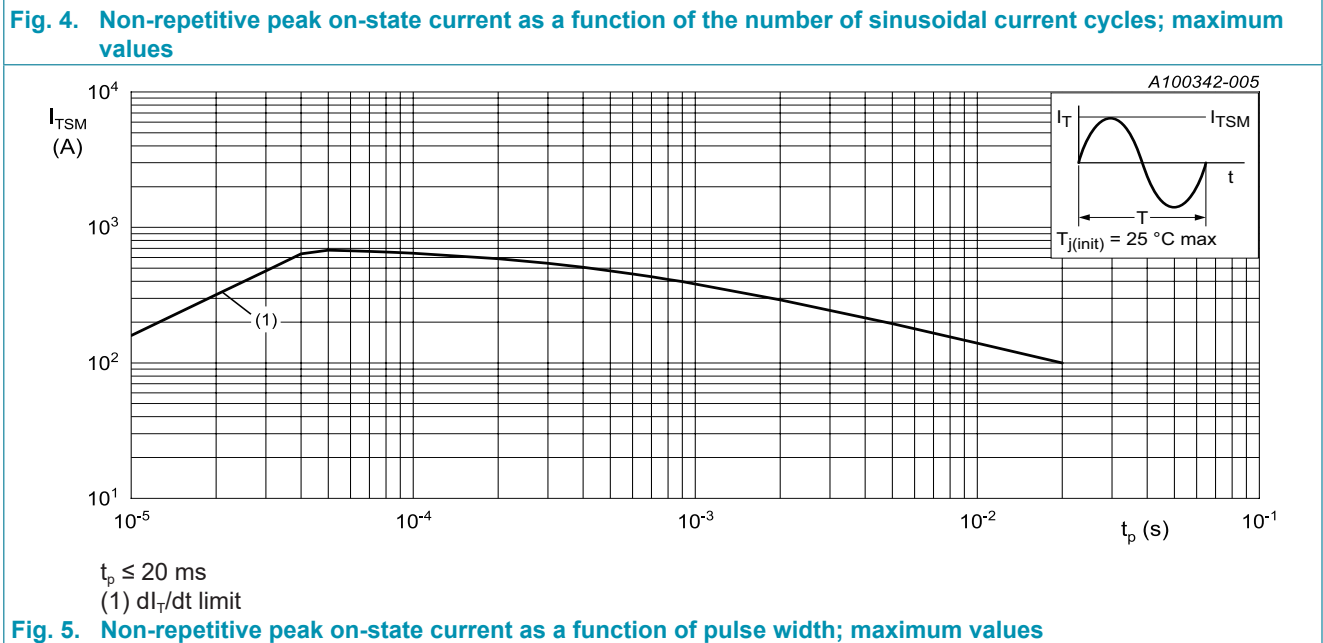
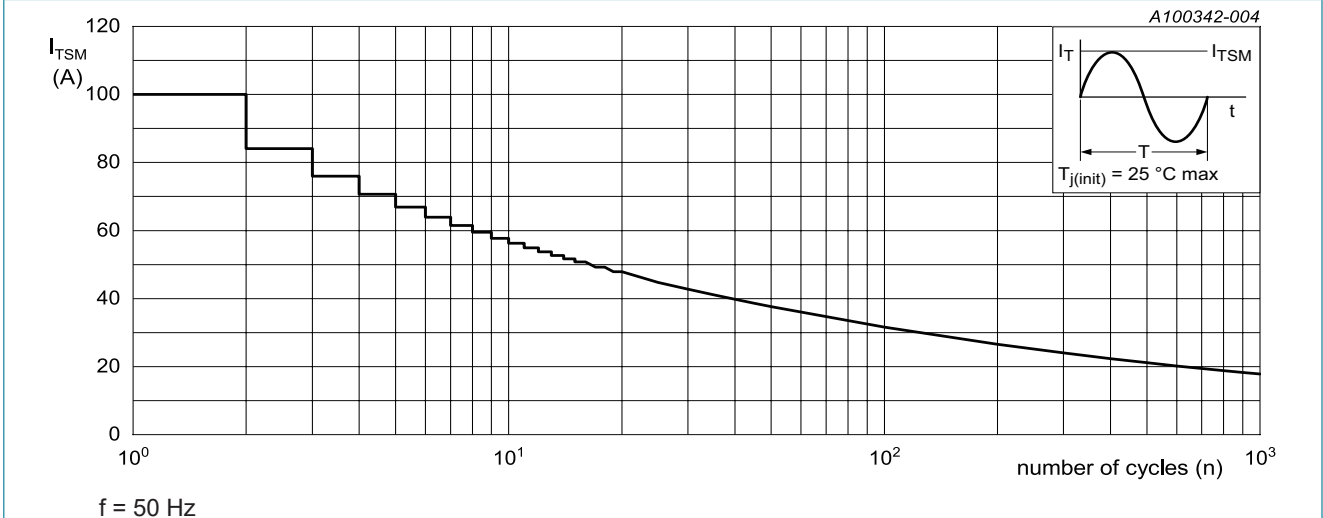
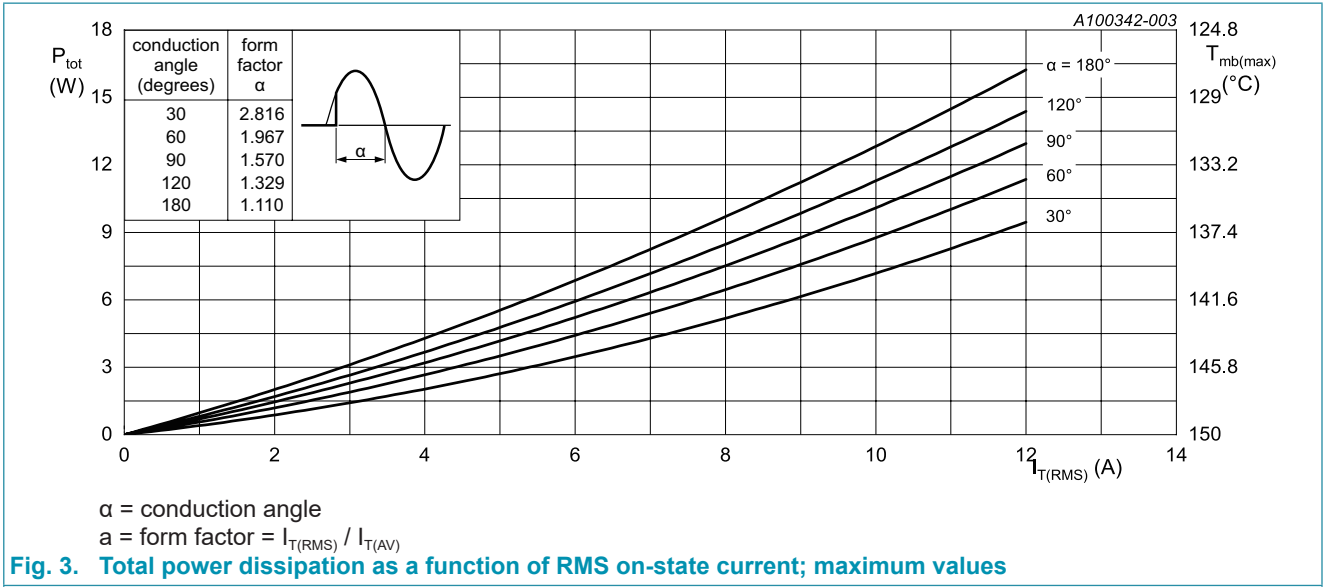
8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions	Notes	Values	Unit
V_{DRM}	repetitive peak off-state voltage			800	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 127\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3		12	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 20\text{ ms}$; Fig 4 ; Fig 5		100	A
		full sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$		110	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN		50	A^2s
di_T/dt	rate of rise of on-state current	$I_G = 70\text{ mA}$		100	$A/\mu s$
I_{GM}	peak gate current			2	A
P_{GM}	peak gate power			5	W
$P_{G(AV)}$	average gate power	over any 20 ms period		0.5	W
T_{stg}	storage temperature			-40 to 150	$^{\circ}C$
T_j	operating junction temperature			-40 to 150	$^{\circ}C$





9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle; Fig. 6		-	-	1.4	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	45	-	K/W

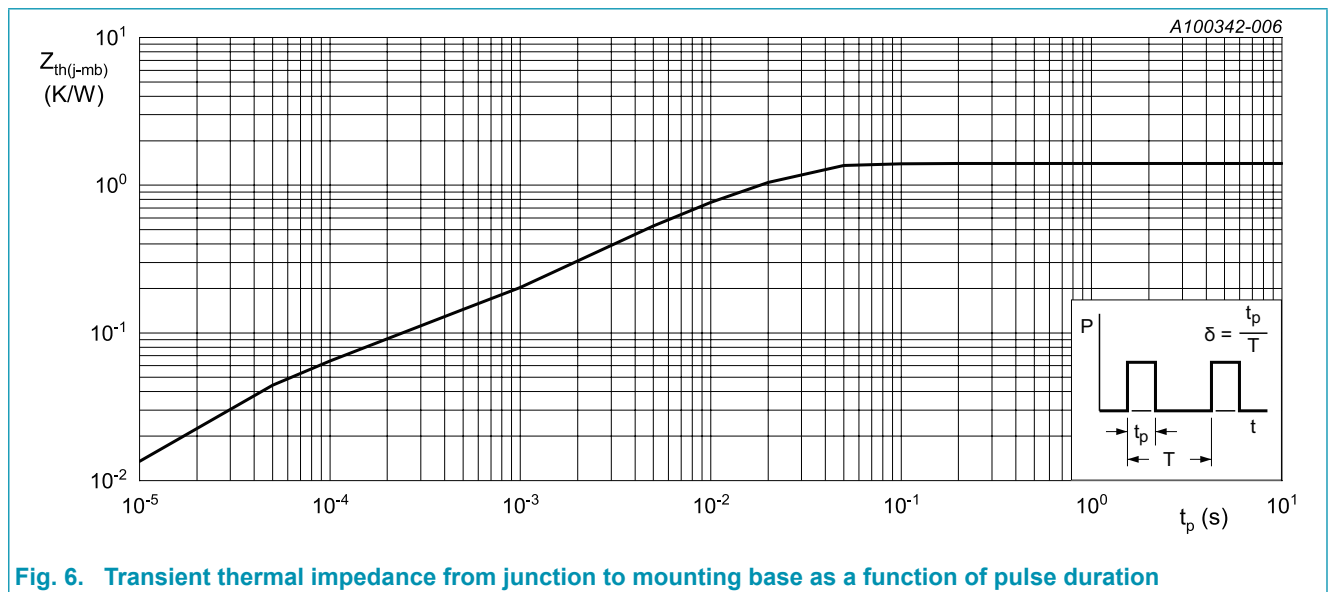


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G+; $T_J = 25\text{ °C}$; Fig. 7		-	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2+ G-; $T_J = 25\text{ °C}$; Fig. 7		-	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; T2- G-; $T_J = 25\text{ °C}$; Fig. 7		-	-	35	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G+; $T_J = 25\text{ °C}$; Fig. 8		-	-	50	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2+ G-; $T_J = 25\text{ °C}$; Fig. 8		-	-	60	mA
		$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; T2- G-; $T_J = 25\text{ °C}$; Fig. 8		-	-	50	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_J = 25\text{ °C}$; Fig. 9		-	-	35	mA
V_T	on-state voltage	$I_T = 15\text{ A}$; $T_J = 25\text{ °C}$; Fig. 10		-	-	1.6	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_J = 25\text{ °C}$; Fig. 11		-	-	1	V
		$V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_J = 150\text{ °C}$		0.25	-	-	V
I_D	off-state current	$V_D = 800\text{ V}$; $T_J = 25\text{ °C}$		-	-	10	μA
		$V_D = 800\text{ V}$; $T_J = 150\text{ °C}$		-	-	2	mA
I_R	reverse current	$V_R = 800\text{ V}$; $T_J = 25\text{ °C}$		-	-	10	μA
		$V_R = 800\text{ V}$; $T_J = 150\text{ °C}$		-	-	2	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	VDM = 536 V; $T_J = 125\text{ °C}$; (VDM = 67% of VDRM); exponential waveform; gate open circuit		500	-	-	V/ μs
		VDM = 536 V; $T_J = 150\text{ °C}$; (VDM = 67% of VDRM); exponential waveform; gate open circuit		300	-	-	V/ μs
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_J = 150\text{ °C}$; $I_{T(RMS)} = 12\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; (snubberless condition); gate open circuit		8	-	-	A/ms
		$V_D = 400\text{ V}$; $T_J = 150\text{ °C}$; $I_{T(RMS)} = 12\text{ A}$; $dV_{com}/dt = 10\text{ V}/\mu\text{s}$; gate open circuit		13	-	-	A/ms
		$V_D = 400\text{ V}$; $T_J = 150\text{ °C}$; $I_{T(RMS)} = 12\text{ A}$; $dV_{com}/dt = 1\text{ V}/\mu\text{s}$; gate open circuit		20	-	-	A/ms

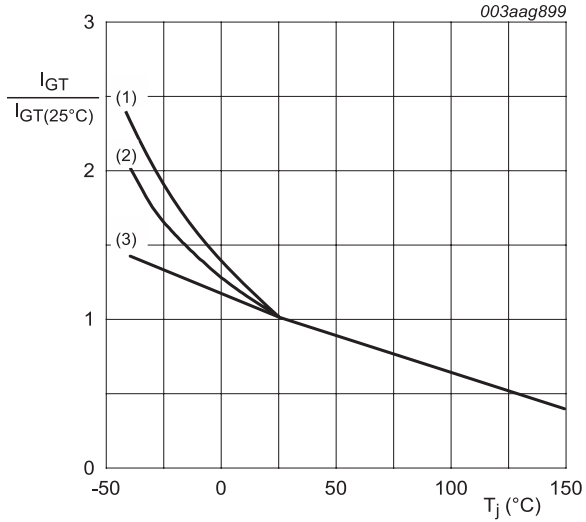


Fig. 7. Normalized gate trigger current as a function of junction temperature

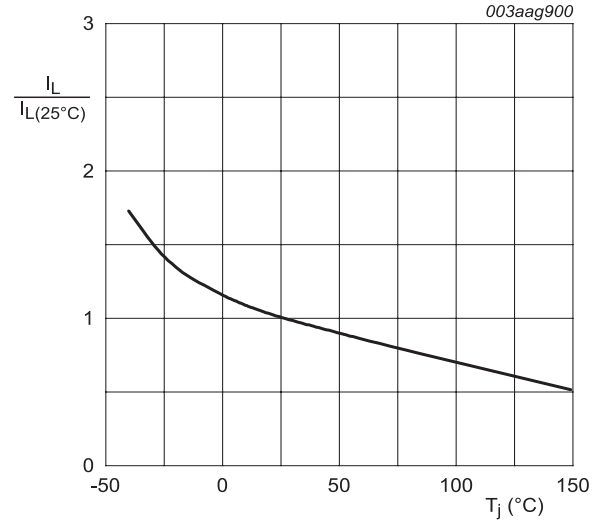


Fig. 8. Normalized latching current as a function of junction temperature

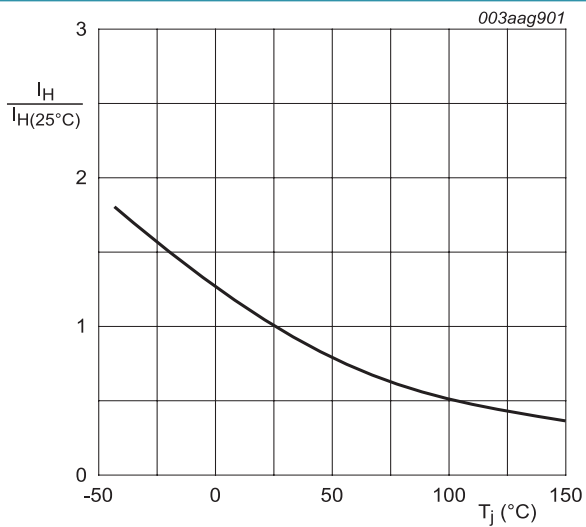


Fig. 9. Normalized holding current as a function of junction temperature

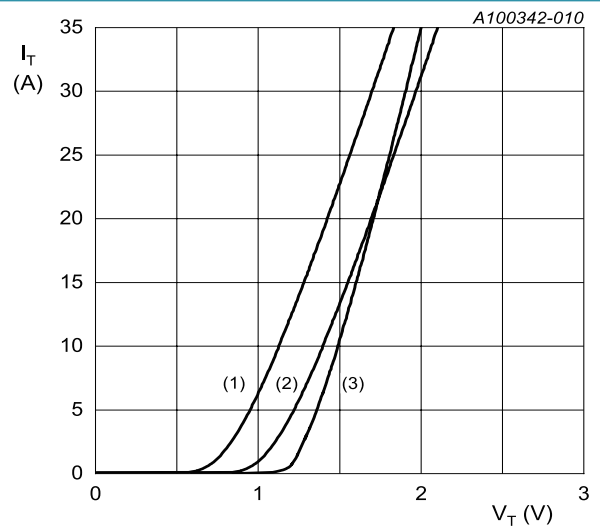


Fig. 10. On-state current as a function of on-state voltage

$V_o = 1.035 V$; $R_s = 0.035 \Omega$
 (1) $T_j = 150^\circ C$; typical values
 (2) $T_j = 150^\circ C$; maximum values
 (3) $T_j = 25^\circ C$; maximum values

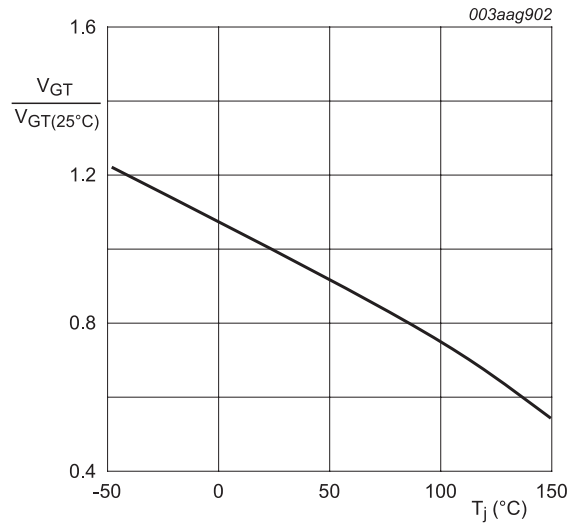
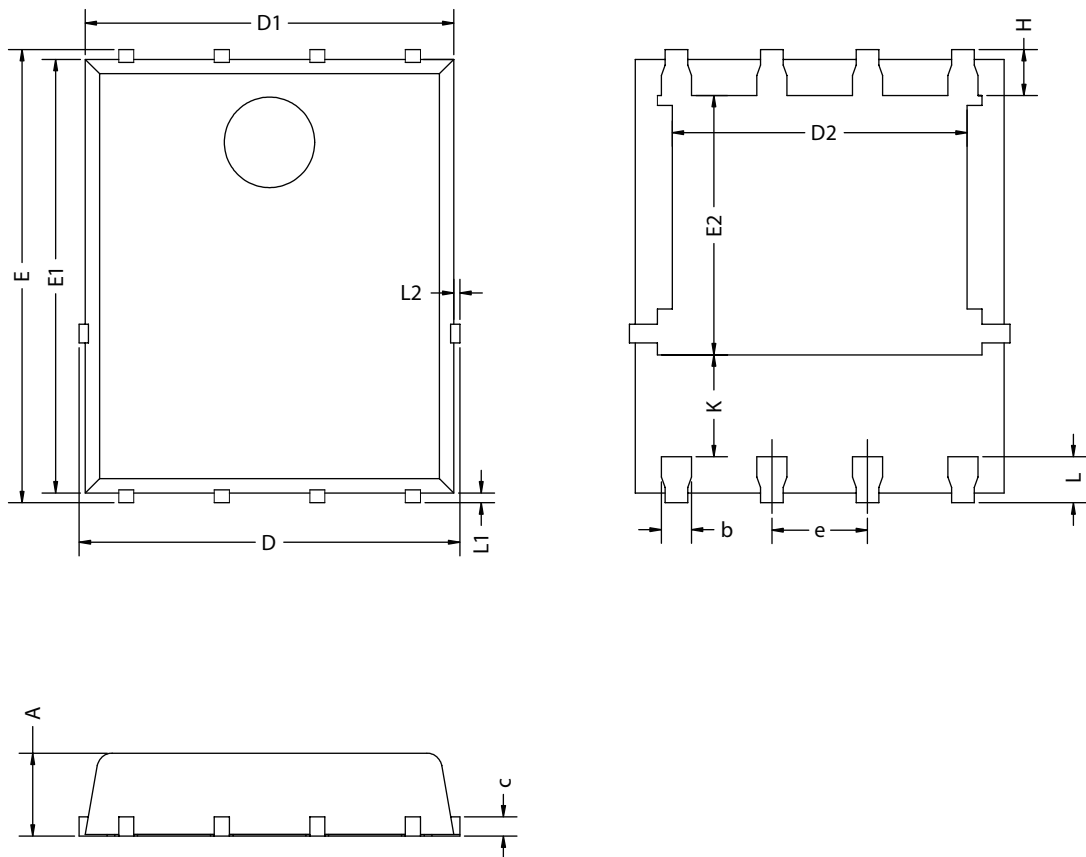


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

11. Package outline

PDFN5X6



Unit	A	b	c	D	D1	D2	E	E1	E2	e	H	K	L	L1	L2
MM	min	1.00	0.35	0.21		4.80	3.91	5.90	5.70	3.34	0.51	1.10	0.51	0.06	
	max	1.20	0.45	0.34	5.10	5.00	4.11	6.10	5.80	3.54	0.71		0.71	0.20	0.10

Note:

1. All dimensions don't include mold flash and metal protrusion.

12. Legal information

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