

1. General description

AC Thyristor Triac power switch in a DPAK surface mountable plastic package with self-protective clamping capabilities against low and high energy transients. This "series CTN" triac will commute the full RMS current at the maximum rated junction temperature ($T_{j(max)} = 150\text{ °C}$) without the aid of a snubber. It is used in applications where "high junction operating temperature capability" is required.

2. Features and benefits

- Clamping structure ensuring safe high over-voltage withstand capability
- High junction operating temperature capability ($T_{j(max)} = 150\text{ °C}$)
- High minimum I_{GT} for guaranteed immunity to gate noise
- Full cycle AC conduction
- Over-voltage withstand capability to IEC 61000-4-5
- Pin compatible with standard triacs
- Planar passivated for voltage ruggedness and reliability
- Protective self turn-on capability for high energy transients
- Safe clamping capability for low energy over-voltage transients
- Less sensitive gate for high noise immunity
- Surface mountable package
- Triggering in three quadrants only
- Very high immunity to false turn-on by dV/dt and IEC 61000-4-4 fast transient
- Package meets UL94V0 flammability requirement
- Package is RoHS compliant

3. Applications

- AC fan, pump and compressor controls
- Highly inductive, resistive and safety loads
- Large and small appliances (White Goods)
- Reversing induction motor controls
- Applications subject to high temperature ($T_{j(max)} = 150\text{ °C}$)

4. Quick reference data

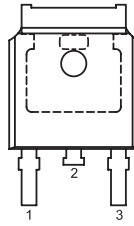
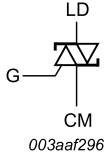
Table 1. Quick reference data

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; $T_{mb} \leq 134\text{ °C}$; 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		120	A
		full sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$		132	A
T_j	junction temperature			-40 to 150	°C
V_{PP}	peak pulse voltage	$T_j = 25\text{ °C}$; non-repetitive off-state; Fig. 6		2	kV

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 100\text{ mA}$; LD+ G+; $T_J = 25\text{ }^\circ\text{C}$; Fig. 7		5	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 100\text{ mA}$; LD+ G-; $T_J = 25\text{ }^\circ\text{C}$; Fig. 7		5	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 100\text{ mA}$; LD- G-; $T_J = 25\text{ }^\circ\text{C}$; Fig. 7		5	-	35	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_J = 25\text{ }^\circ\text{C}$; Fig. 10		-	-	30	mA
V_T	on-state voltage	$I_T = 17\text{ A}$; $T_J = 25\text{ }^\circ\text{C}$; Fig. 11		-	-	1.5	V
V_{CL}	clamping voltage	$I_{CL} = 0.1\text{ mA}$; $t_p = 1\text{ ms}$; $T_J = 25\text{ }^\circ\text{C}$		850	-	-	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$; $T_J = 150\text{ }^\circ\text{C}$; exponential waveform; gate open circuit		2000	-	-	V/ μs
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_J = 150\text{ }^\circ\text{C}$; $I_{T(RMS)} = 12\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; gate open circuit; snubberless condition		12	-	-	A/ms

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	CM	common		
2	LD	load		
3	G	gate		
mb	LD	mounting base; load		

6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
ACTT12S-800CTN	TO252	ACTT12S-800CTNJ	Reel	2500	TO252N	14-Nov-2016

7. Marking

Table 4. Marking codes

Type number	Marking codes
ACTT12S-800CTN	ACTT12S 800CTN

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
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{mb}} \leq 134\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3		12	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		120	A
		full sine wave; $T_{\text{J(init)}} = 25\text{ }^{\circ}\text{C}$; $t_{\text{p}} = 16.7\text{ ms}$		132	A
I^2t	I^2t for fusing	$t_{\text{p}} = 10\text{ ms}$; sine-wave pulse		72	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	$t_{\text{p}} = 20\text{ }\mu\text{s}$		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 to 150	$^{\circ}\text{C}$
T_{J}	junction temperature			-40 to 150	$^{\circ}\text{C}$
V_{pp}	peak pulse voltage	$T_{\text{J}} = 25\text{ }^{\circ}\text{C}$; non-repetitive, off-state; Fig 6		2	kV

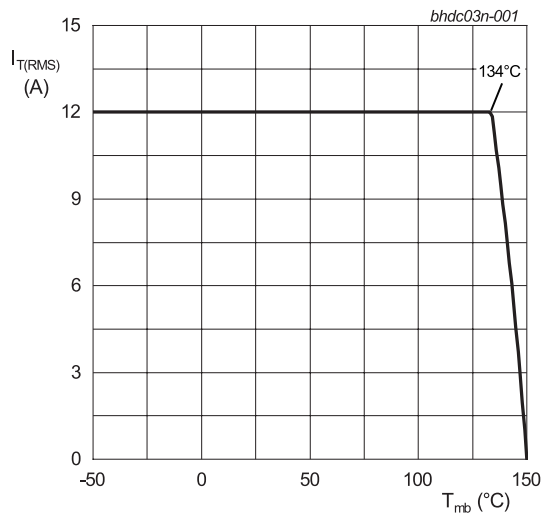
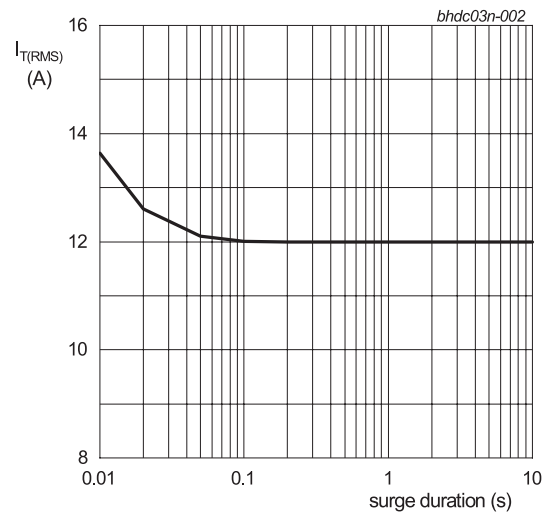


Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values



$f = 50\text{ Hz}$; $T_{\text{mb}} = 134\text{ }^{\circ}\text{C}$

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

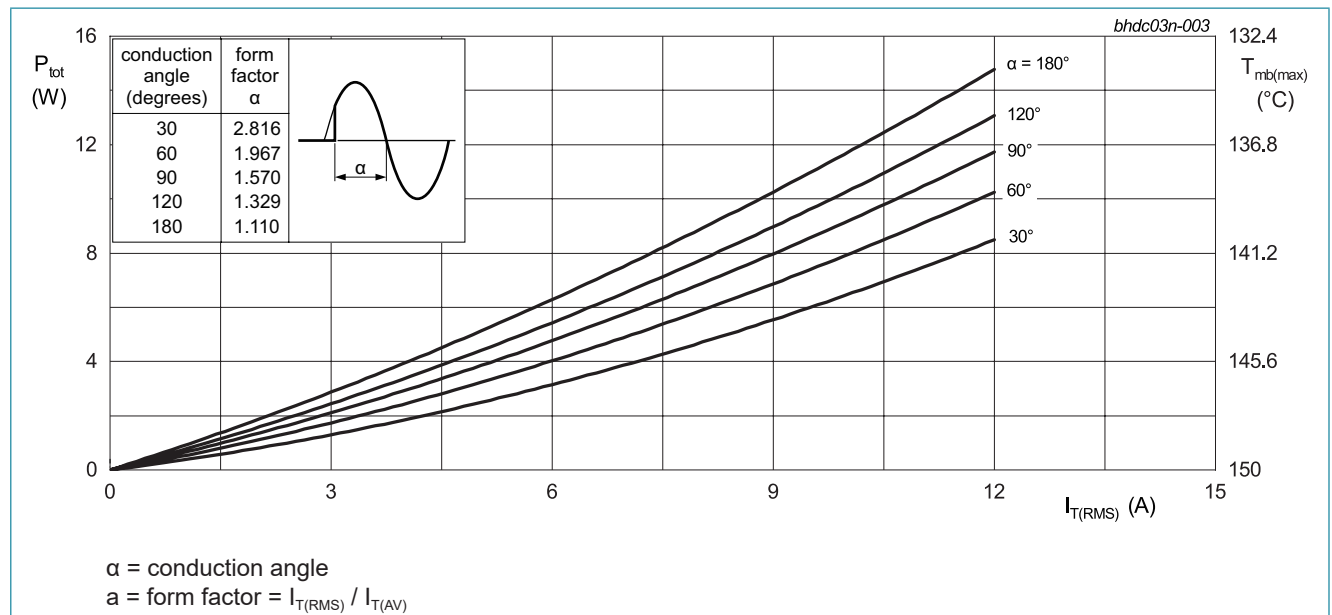


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

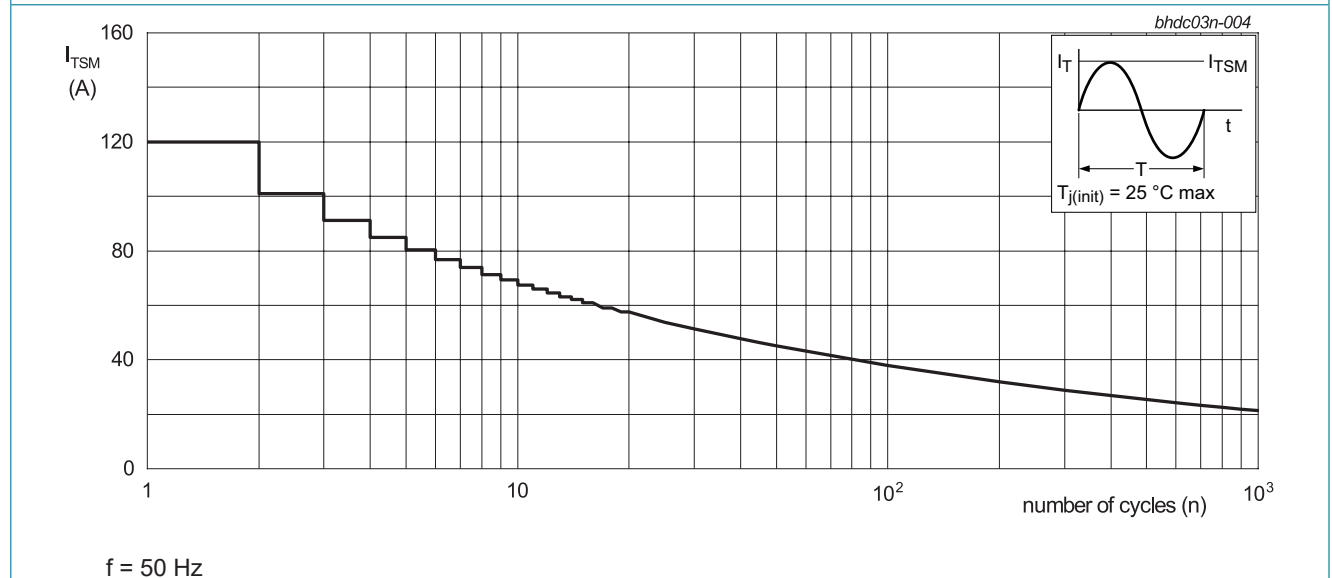


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

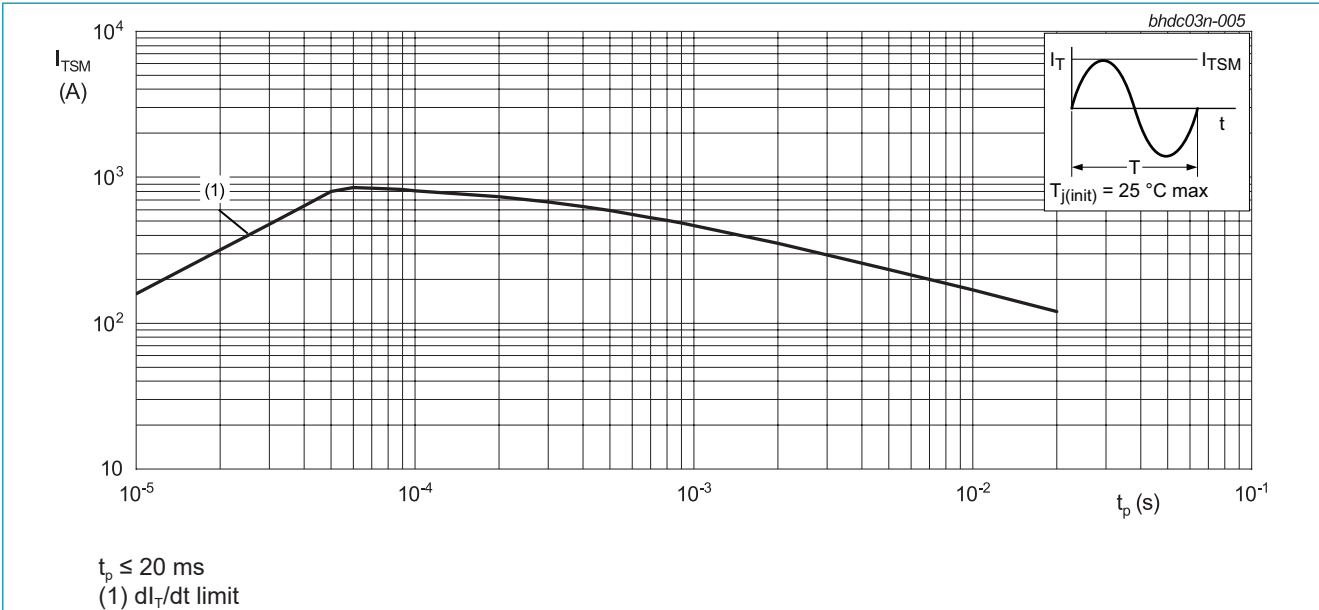


Fig. 5. Non-repetitive peak on-state current as a function of pulse width; maximum values

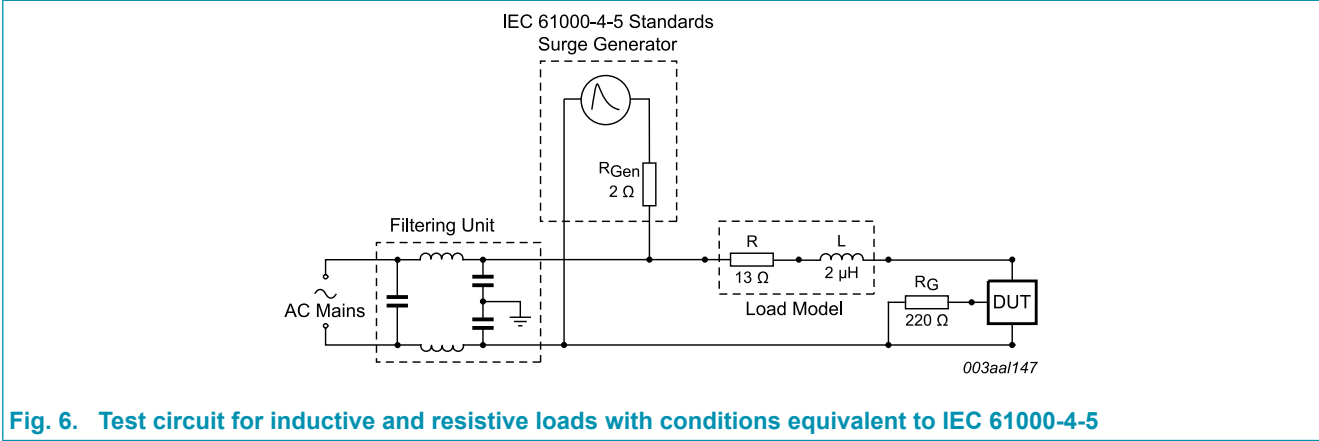
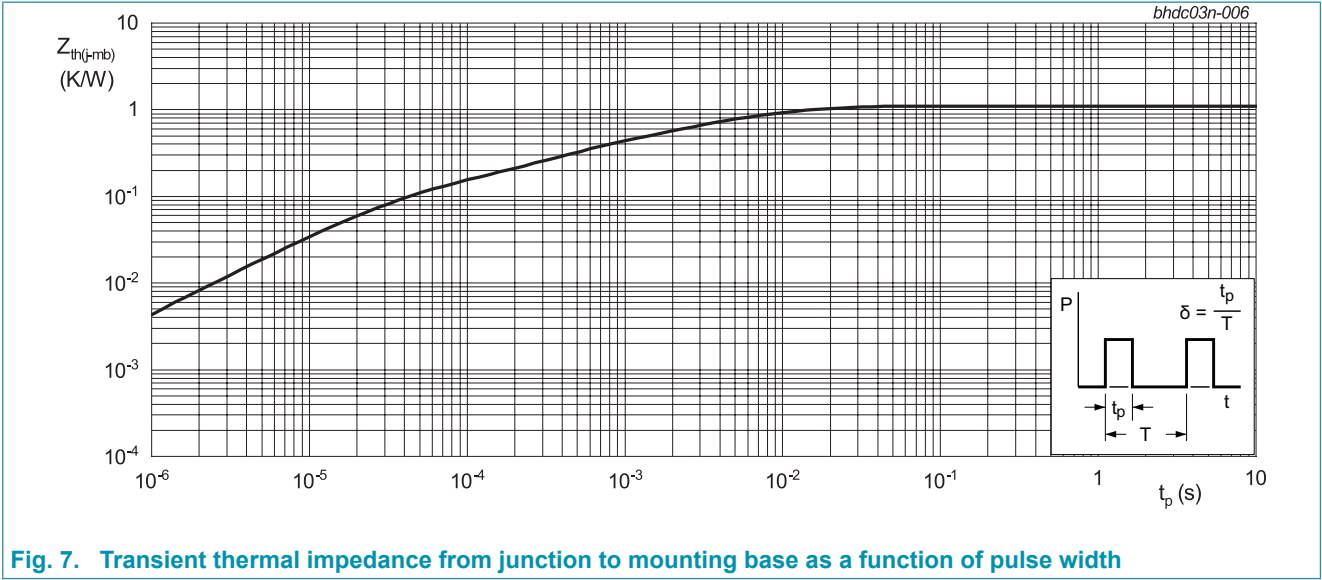


Fig. 6. Test circuit for inductive and resistive loads with conditions equivalent to IEC 61000-4-5

9. Thermal characteristics

Table 6. Thermal characteristics

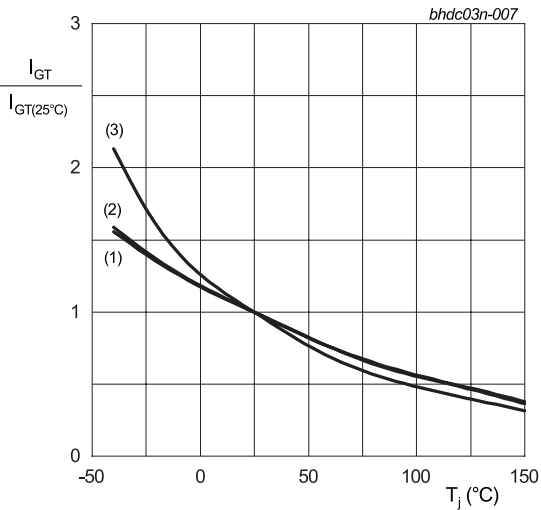
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle; Fig. 7		-	-	1.1	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air; printed circuit board (FR4) mounted		-	70	-	K/W



10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 100\text{ mA}$; LD+ G+; $T_J = 25\text{ }^\circ\text{C}$; Fig. 8		5	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 100\text{ mA}$; LD+ G-; $T_J = 25\text{ }^\circ\text{C}$; Fig. 8		5	-	35	mA
		$V_D = 12\text{ V}$; $I_T = 100\text{ mA}$; LD- G-; $T_J = 25\text{ }^\circ\text{C}$; Fig. 8		5	-	35	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 100\text{ mA}$; LD+ G+; $T_J = 25\text{ }^\circ\text{C}$; Fig. 9		-	-	40	mA
		$V_D = 12\text{ V}$; $I_G = 100\text{ mA}$; LD+ G-; $T_J = 25\text{ }^\circ\text{C}$; Fig. 9		-	-	60	mA
		$V_D = 12\text{ V}$; $I_G = 100\text{ mA}$; LD- G-; $T_J = 25\text{ }^\circ\text{C}$; Fig. 9		-	-	40	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_J = 25\text{ }^\circ\text{C}$; Fig. 10		-	-	30	mA
V_T	on-state voltage	$I_T = 17\text{ A}$; $T_J = 25\text{ }^\circ\text{C}$; Fig. 11		-	-	1.5	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 100\text{ mA}$; $T_J = 25\text{ }^\circ\text{C}$; Fig. 12		-	0.75	1	V
		$V_D = 400\text{ V}$; $I_T = 100\text{ mA}$; $T_J = 150\text{ }^\circ\text{C}$		0.2	0.45	-	V
I_D	off-state current	$V_D = 800\text{ V}$; $T_J = 25\text{ }^\circ\text{C}$		-	-	1	μA
		$V_D = 800\text{ V}$; $T_J = 150\text{ }^\circ\text{C}$		-	-	1	mA
I_R	reverse current	$V_R = 800\text{ V}$; $T_J = 25\text{ }^\circ\text{C}$		-	-	1	μA
		$V_R = 800\text{ V}$; $T_J = 150\text{ }^\circ\text{C}$		-	-	1	mA
V_{CL}	clamping voltage	$I_{CL} = 0.1\text{ mA}$; $t_p = 1\text{ ms}$; $T_J = 25\text{ }^\circ\text{C}$		850	-	-	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$; $T_J = 150\text{ }^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit		2000	-	-	V/ μs
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_J = 150\text{ }^\circ\text{C}$; $I_{T(RMS)} = 12\text{ A}$; $dV_{com}/dt = 20\text{ V}/\mu\text{s}$; gate open circuit; snubberless condition		12	-	-	A/ms



- (1) LD+ G+
- (2) LD+ G-
- (3) LD- G-

Fig. 8. Normalized gate trigger current as a function of junction temperature

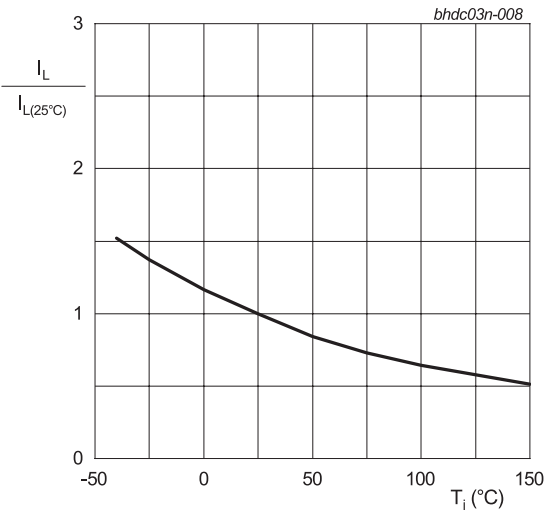


Fig. 9. Normalized latching current as a function of junction temperature

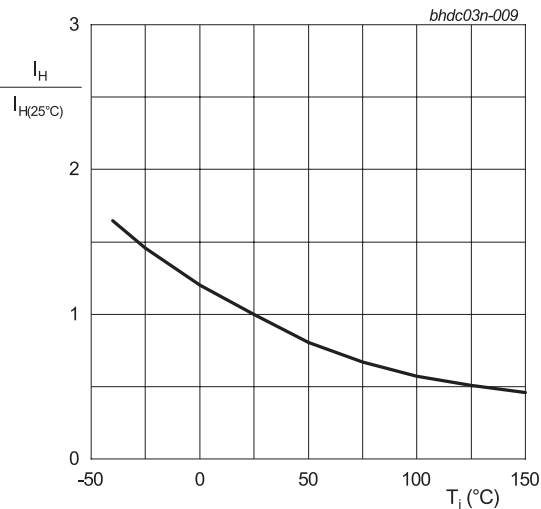
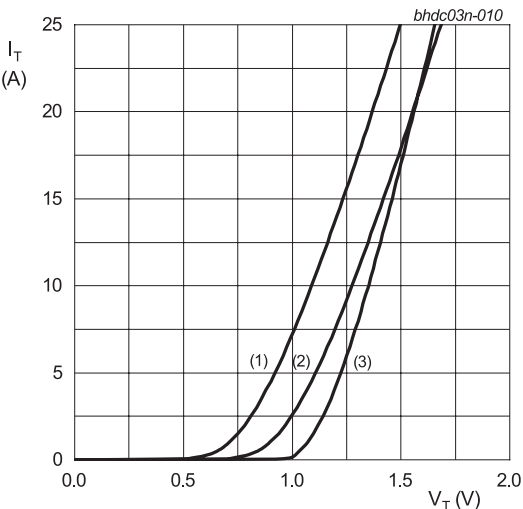


Fig. 10. Normalized holding current as a function of junction temperature



- $V_o = 0.959\text{ V}$; $R_s = 0.0306\ \Omega$
- (1) $T_j = 150^\circ\text{C}$; typical values
 - (2) $T_j = 150^\circ\text{C}$; maximum values
 - (3) $T_j = 25^\circ\text{C}$; maximum values

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

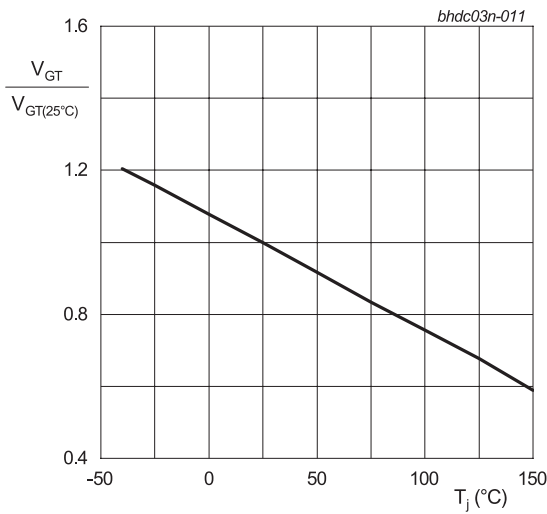
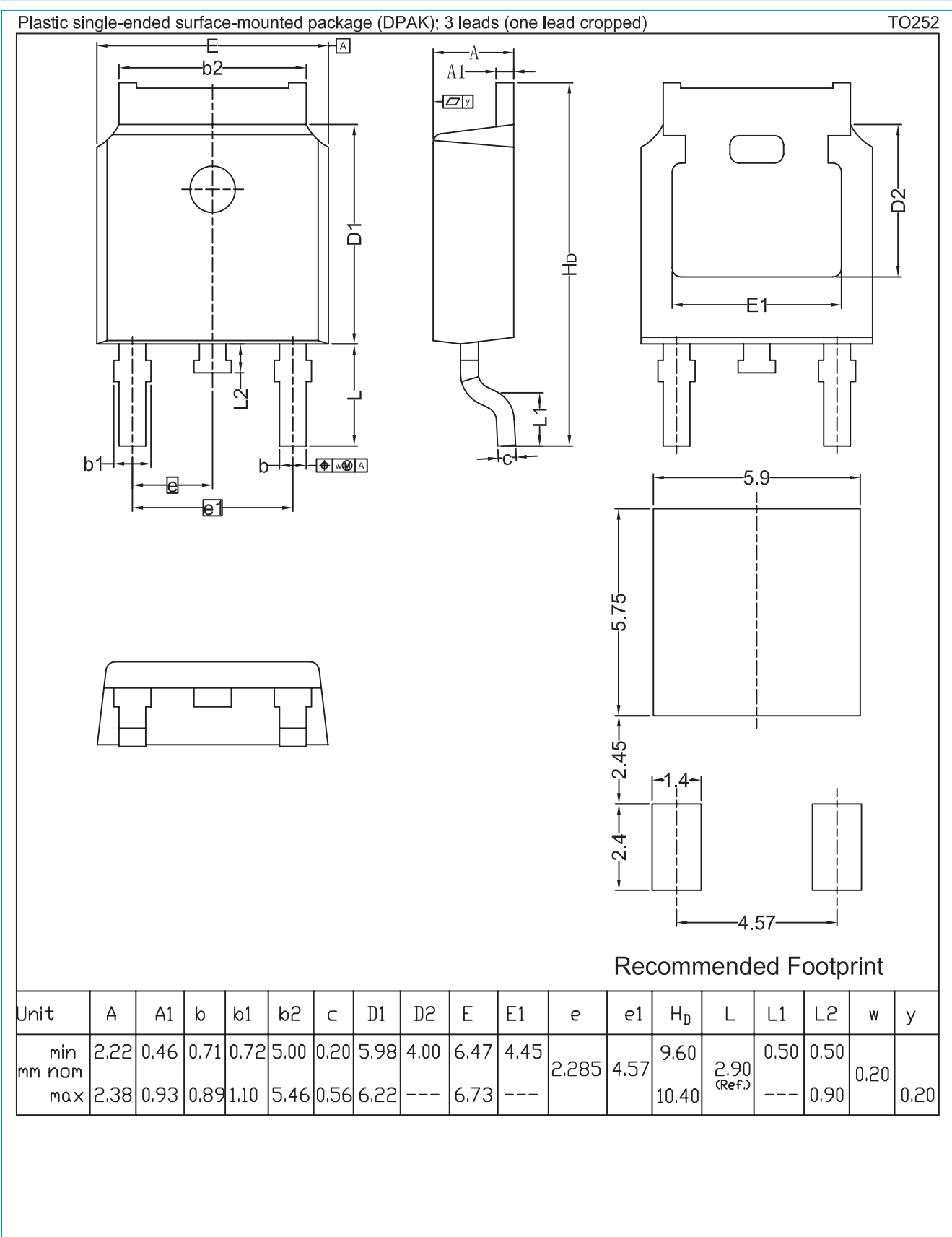


Fig. 12. Normalized gate trigger voltage as a function of junction temperature

11. Package outline



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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