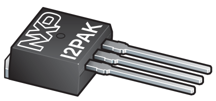


ACTT6G-800E

AC Thyristor Triac power switch

Rev. 1 — 1 November 2011 **Product data sheet**

1. Product profile

1.1 General description

AC Thyristor Triac power switch in a SOT226A (I2PAK) plastic package with self-protective clamping capabilities against low and high energy transients.

1.2 Features and benefits

- Clamping structure ensuring safe high over-voltage withstand capability
- Direct interfacing with low power drivers and microcontrollers
- 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
- Sensitive gate for easy logic level triggering
- Triggering in three quadrants only
- Very high immunity to false turn-on by dV/dt

1.3 Applications

- AC Fan controllers
- Highly inductive, resistive and safety loads
- Large and small appliances (White Goods)
- Loads such as contactors, circuit breakers, valves, dispensers and door locks
- Pump motor circuits
- Reversing induction motor control

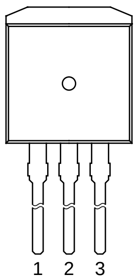
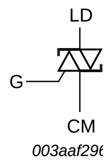
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	800	V
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)}$ = 25 °C; t_p = 20 ms; see Figure 5; see Figure 6	-	-	51	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; T_{mb} ≤ 108 °C; see Figure 1; see Figure 2; see Figure 4	-	-	6	A
V_{CL}	clamping voltage	I_{CL} = 0.1 mA; t_p = 1 ms; T_j = 25 °C	850	-	-	V
V_{PP}	peak pulse voltage	T_j = 25 °C; non-repetitive, off-state; see Figure 3	-	-	2	kV

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	CM	common	 SOT226A (I2PAK)	
2	LD	load		
3	G	gate		
mb	LD	mounting base; load		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
ACTT6G-800E	I2PAK	plastic single-ended package (I2PAK); TO-262	SOT226A

4. 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
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 108$ °C; see Figure 1; see Figure 2; see Figure 4	-	6	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(init)} = 25$ °C; $t_p = 16.7$ ms	-	56	A
		full sine wave; $T_{j(init)} = 25$ °C; $t_p = 20$ ms; see Figure 5; see Figure 6	-	51	A
I^2t	I^2t for fusing	$t_p = 10$ ms; sine-wave pulse	-	13	A^2s
dI_T/dt	rate of rise of on-state current	$I_T = 9$ A; $I_G = 0.2$ A; $dI_G/dt = 0.2$ A/µs	-	100	A/µs
I_{GM}	peak gate current	t = 20 µs	-	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	150	°C
T_j	junction temperature		-	125	°C
V_{PP}	peak pulse voltage	$T_j = 25$ °C; non-repetitive, off-state; see Figure 3	-	2	kV

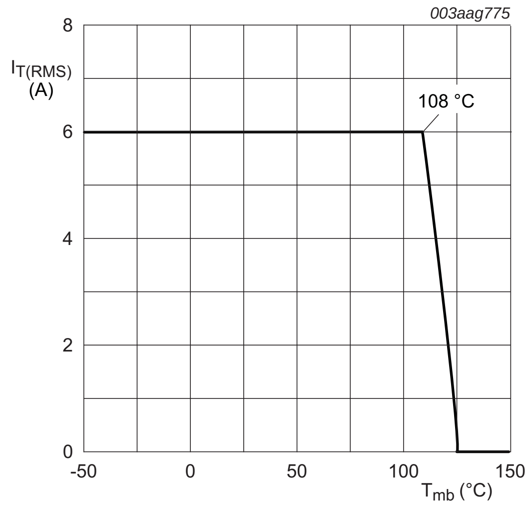


Fig 1. RMS on-state current as a function of mounting base temperature; maximum values

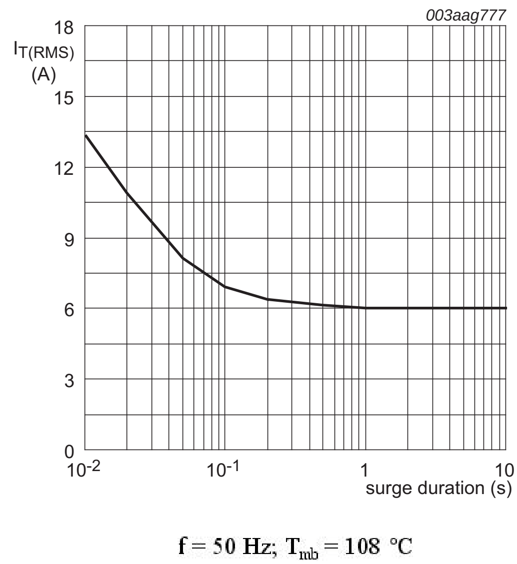


Fig 2. RMS on-state current as a function of surge duration; maximum values

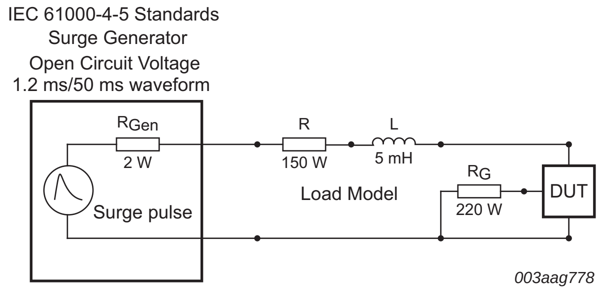
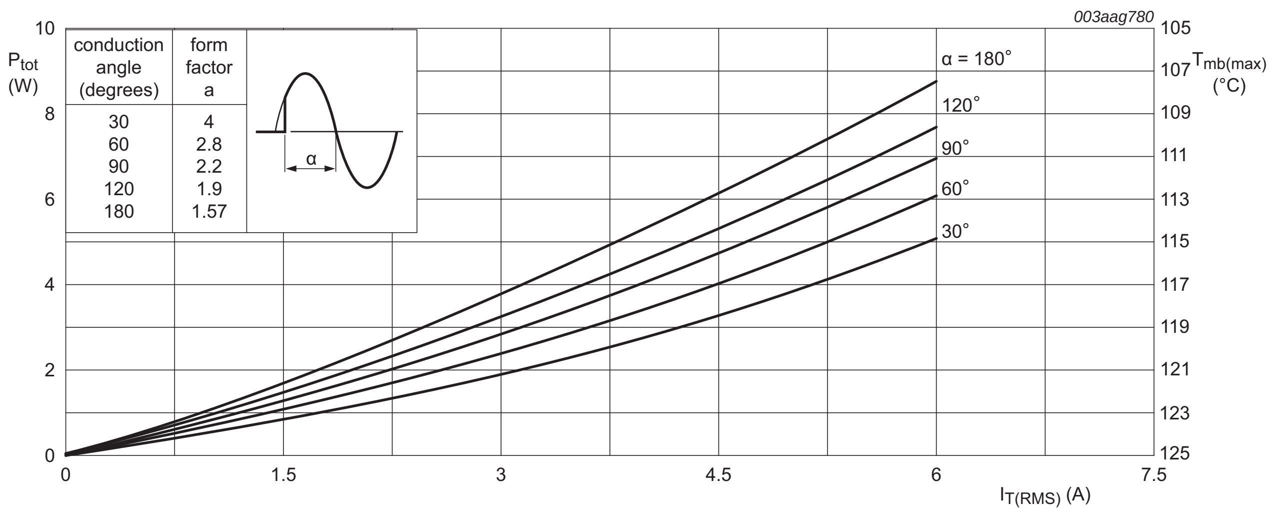


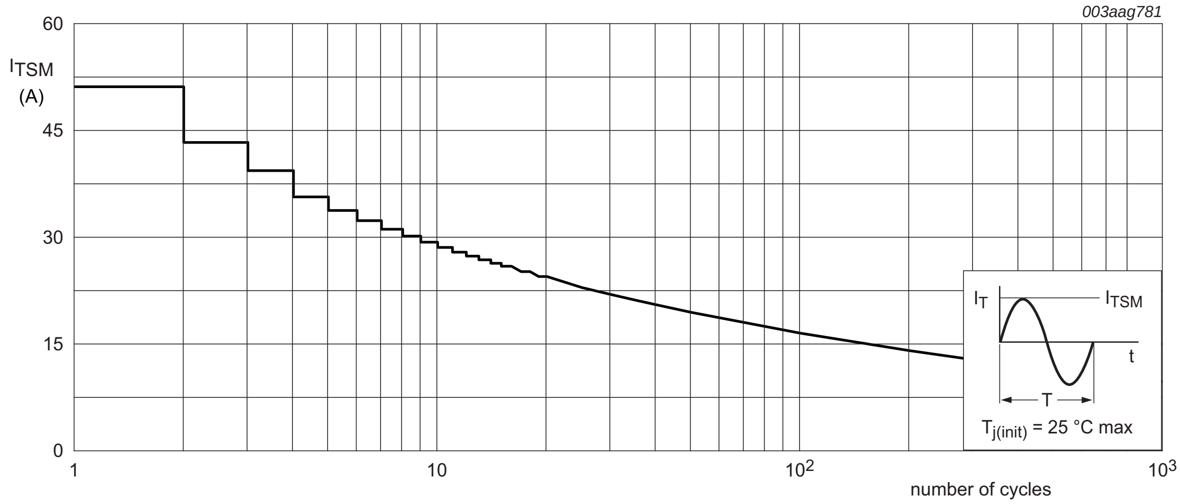
Fig 3. Test circuit for inductive and resistive loads with conditions equivalent to IEC 61000-4-5



α = conduction angle

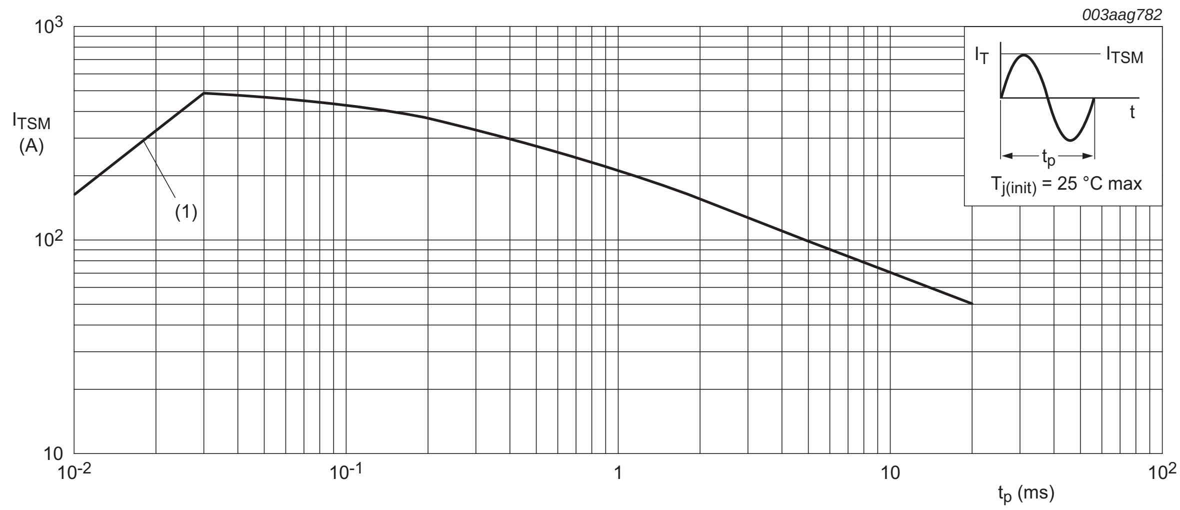
a = form factor = $I_{T(RMS)} / I_{T(AV)}$

Fig 4. Total power dissipation as a function of RMS on-state current; maximum values



f = 50 Hz

Fig 5. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



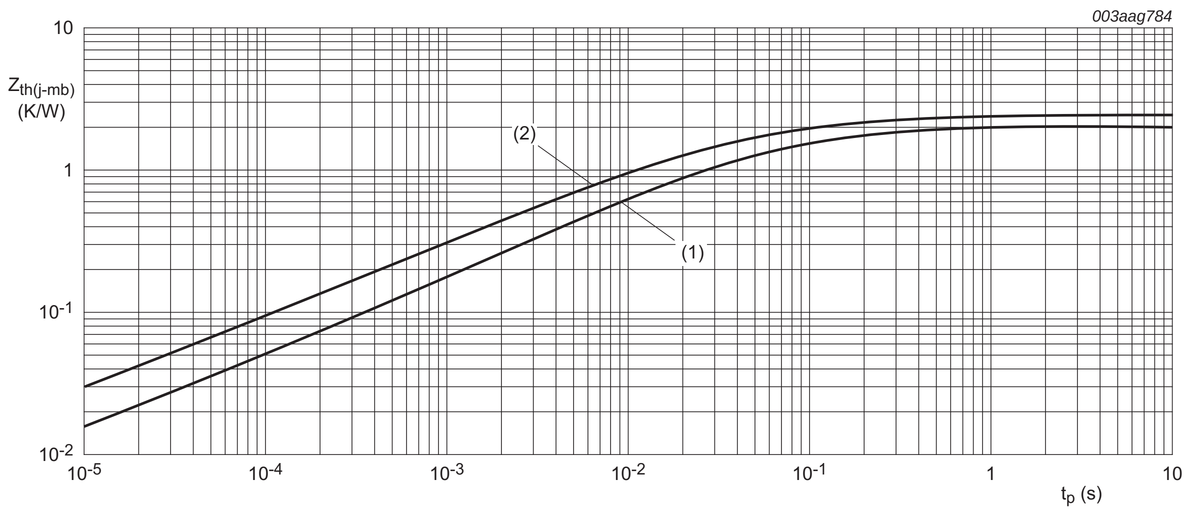
$t_p \leq 20$ ms; (1) dI_T / d_t limit

Fig 6. Non-repetitive peak on-state current as a function of pulse width; maximum values

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	half cycle; see Figure 7	-	-	2.4	K/W
		full cycle; see Figure 7	-	-	2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W



(1) Bidirectional (full cycle)

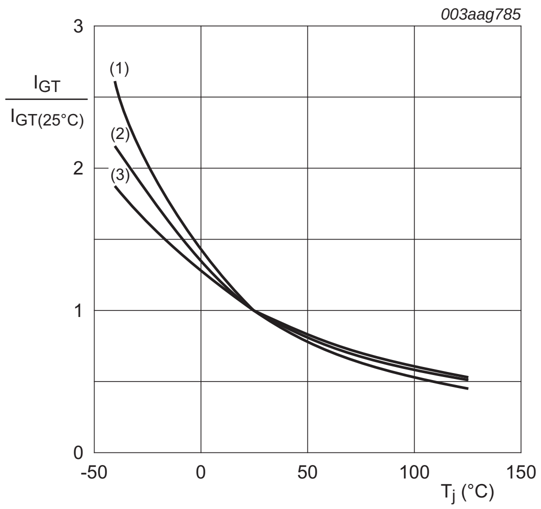
(2) Unidirectional (half cycle)

Fig 7. Transient thermal impedance from junction to mounting base as a function of pulse width

6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{GT}	gate trigger current	V_D = 12 V; I_T = 100 mA; LD+ G+; T_j = 25 °C; see Figure 8	-	-	10	mA
		V_D = 12 V; I_T = 100 mA; LD+ G-; T_j = 25 °C; see Figure 8	-	-	10	mA
		V_D = 12 V; I_T = 100 mA; LD- G-; T_j = 25 °C; see Figure 8	-	-	10	mA
I_L	latching current	V_D = 12 V; I_G = 100 mA; LD+ G+; T_j = 25 °C; see Figure 9	-	-	30	mA
		V_D = 12 V; I_G = 100 mA; LD+ G-; T_j = 25 °C; see Figure 9	-	-	40	mA
		V_D = 12 V; I_G = 100 mA; LD- G-; T_j = 25 °C; see Figure 9	-	-	30	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; see Figure 10	-	-	25	mA
V_T	on-state voltage	I_T = 8 A; see Figure 11	-	-	1.7	V
V_{GT}	gate trigger voltage	V_D = 400 V; I_T = 100 mA; T_j = 125 °C; see Figure 12	0.2	-	-	V
		V_D = 12 V; I_T = 100 mA; T_j = 25 °C; see Figure 12	-	-	1.5	V
I_D	off-state current	V_D = 800 V; T_j = 25 °C	-	-	10	µA
		V_D = 800 V; T_j = 125 °C	-	-	0.5	mA
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 536 V; T_j = 125 °C; gate open circuit; exponential waveform; see Figure 13	500	-	-	V/µs
dI_{com}/dt	rate of change of commutating current	V_D = 400 V; T_j = 125 °C; $I_{T(RMS)}$ = 6 A; dV_{com}/dt = 20 V/µs; (snubberless condition); gate open circuit; see Figure 14; see Figure 15	3.5	-	-	A/ms
		V_D = 400 V; T_j = 125 °C; $I_{T(RMS)}$ = 6 A; dV_{com}/dt = 10 V/µs; gate open circuit; see Figure 14; see Figure 15	5	-	-	A/ms
		V_D = 400 V; T_j = 125 °C; $I_{T(RMS)}$ = 6 A; dV_{com}/dt = 1 V/µs; gate open circuit; see Figure 14; see Figure 15	10	-	-	A/ms
V_{CL}	clamping voltage	I_{CL} = 0.1 mA; t_p = 1 ms; T_j = 25 °C	850	-	-	V



(1) LD- G-

(2) LD+ G+

(3) LD+ G-

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

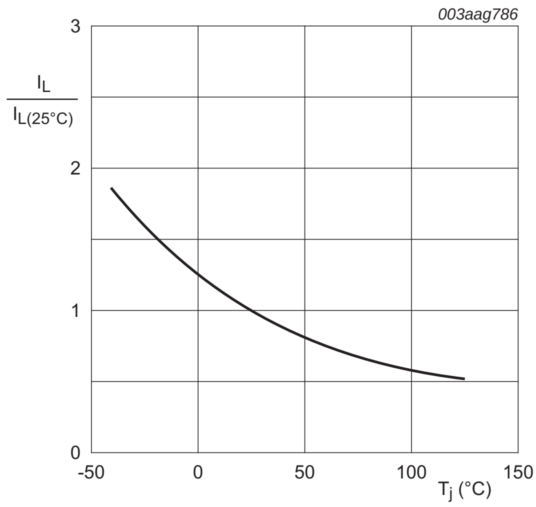


Fig 9. Normalized latching current as a function of junction temperature

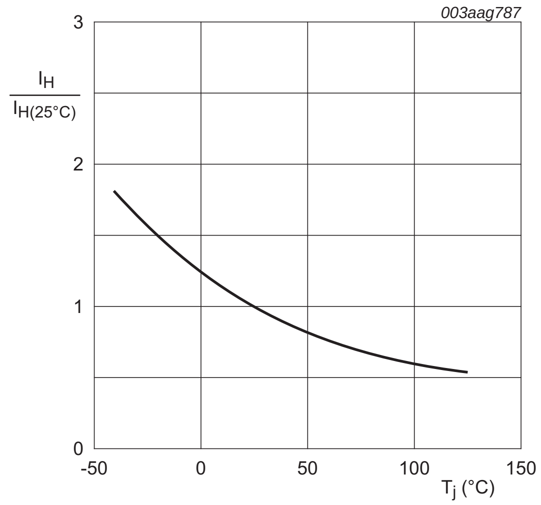
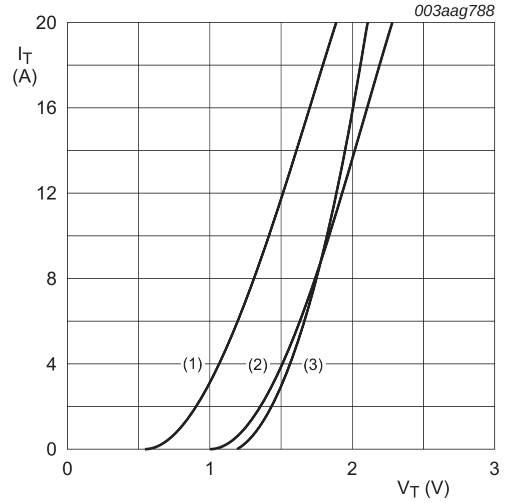


Fig 10. Normalized holding current as a function of junction temperature



V_o = 1.109 V; R_s = 0.076 Ω

(1) T_j = 125 °C; typical values

(2) T_j = 125 °C; maximum values

(3) T_j = 25 °C; maximum values

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

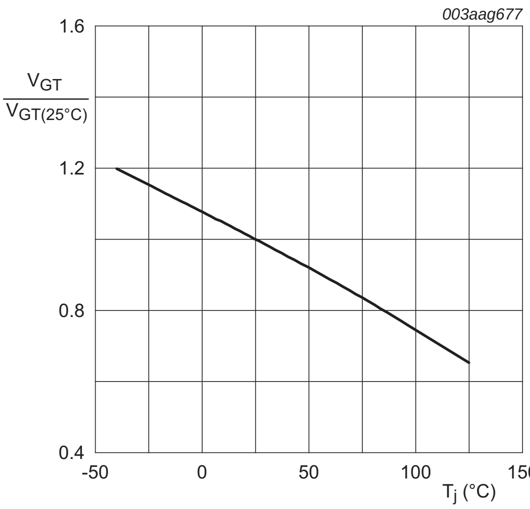
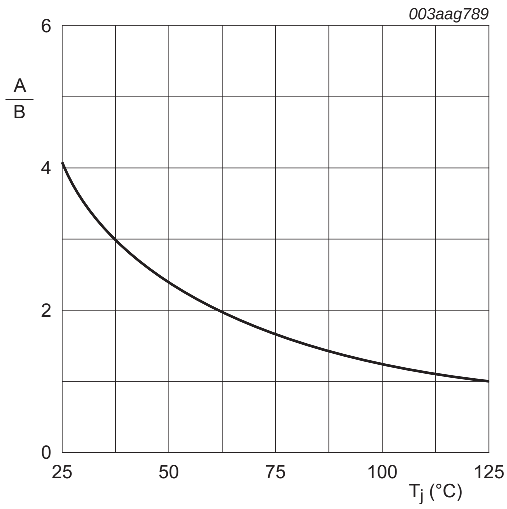


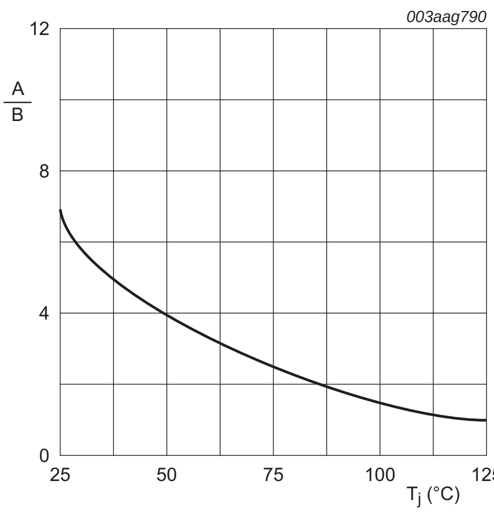
Fig 12. Normalized gate trigger voltage as a function of junction temperature



A is dV_D/dt at condition T_j °C

B is dV_D/dt at condition T_j 125 °C

Fig 13. Normalized rate of rise of off-state voltage as a function of junction temperature

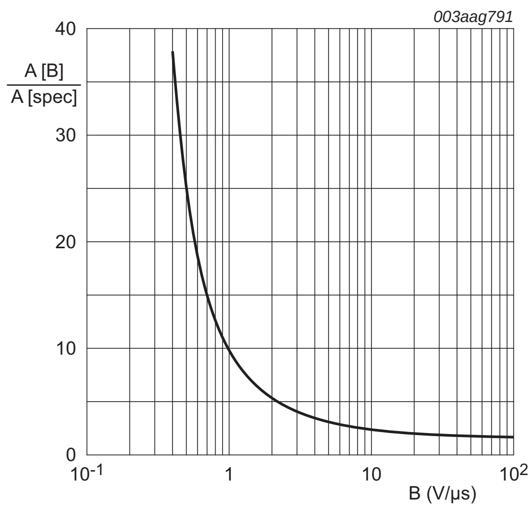


A is dI_{com}/dt at condition T_j °C

B is dI_{com}/dt at condition T_j 125 °C

V_D = 400 V

Fig 14. Normalized critical rate of rise of commutating current as a function of junction temperature



A[B] is dI_{com}/dt at condition B, dV_{com}/dt

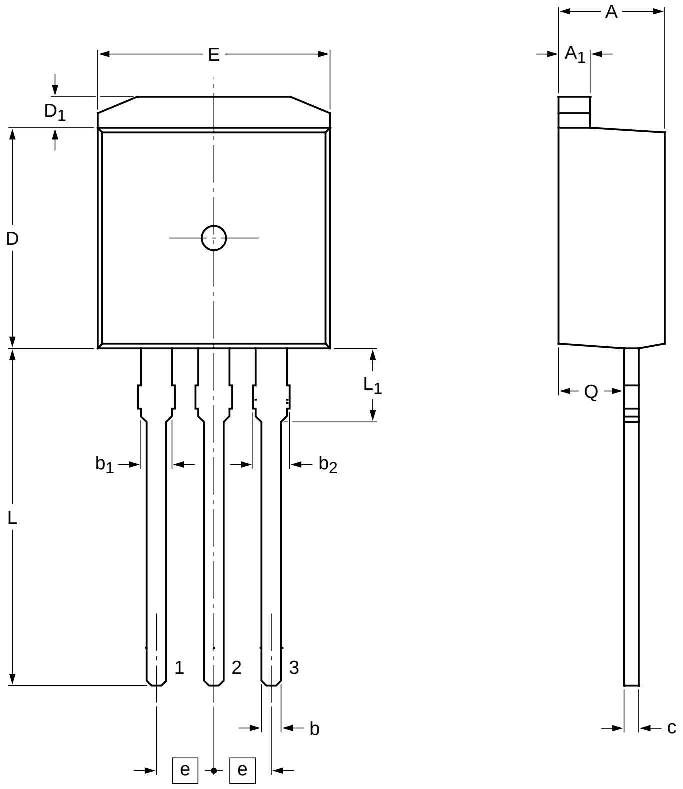
A[spec] is the specified data sheet value of dI_{com}/dt

turn-off time < 20 ms

Fig 15. Normalized critical rate of change of commutating current as a function of critical rate of change of commutating voltage; minimum values

7. Package outline

Plastic single-ended package (I2PAK); low-profile 3-lead TO-262 **SOT226A**



0 5 10 mm
scale

Dimensions

Unit		A	A1	b	b1	b2	c	D	D1	E	e	L	L1	Q
mm	max	4.7	1.40	0.95	1.40	1.7	0.65	9.4	1.32	10.30		15.0		2.6
	nom										2.54 (REF)		3.0 (REF)	
	min	4.3	1.15	0.70	1.14	1.3	0.45	8.6	1.02	9.65		12.5		2.2

sot226a_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT226A		TO-262				~~09-08-17~~ 09-08-25

Fig 16. Package outline SOT226A (I2PAK)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
ACTT6G-800E v.1	20111101	Product data sheet	-	-

9. Legal information

9.1 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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11. Contents

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