

ACTT2S-800E

AC Thyristor Triac power switch

Rev. 2 — 25 October 2011

Product data sheet

1. Product profile

1.1 General description

AC Thyristor Triac power switch in a SOT428 (DPAK) surface mountable 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
- Surface mountable package
- 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



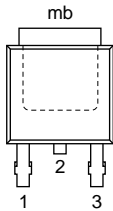
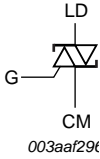
1.4 Quick reference data

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; $T_{j(init)} = 25\text{ °C}$; $t_p = 20\text{ ms}$; see Figure 5 ; see Figure 6	-	-	14	A
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 115\text{ °C}$; see Figure 1 ; see Figure 2 ; see Figure 4	-	-	2	A
V_{CL}	clamping voltage	$I_{CL} = 0.1\text{ mA}$; $t_p = 1\text{ ms}$; $T_j = 25\text{ °C}$	850	-	-	V
V_{PP}	peak pulse voltage	$T_j = 25\text{ °C}$; 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		
2	LD	load		
3	G	gate		
mb	LD	mounting base; load		

SOT428 (DPAK)

3. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
ACTT2S-800E	DPAK	plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)	SOT428

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; $T_{mb} \leq 115\text{ °C}$; see Figure 1 ; see Figure 2 ; see Figure 4	-	2	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 16.7\text{ ms}$	-	15.4	A
		full sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 20\text{ ms}$; see Figure 5 ; see Figure 6	-	14	A
I^2t	I_2t for fusing	$t_p = 10\text{ ms}$; sine-wave pulse	-	0.98	A ² s
di_T/dt	rate of rise of on-state current	$I_T = 3\text{ A}$; $I_G = 0.2\text{ A}$; $di_G/dt = 0.2\text{ A}/\mu\text{s}$	-	100	A/ μs
I_{GM}	peak gate current	$t = 20\text{ }\mu\text{s}$	-	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	$T_j = 25\text{ °C}$; non-repetitive, off-state; see Figure 3	-	2	kV

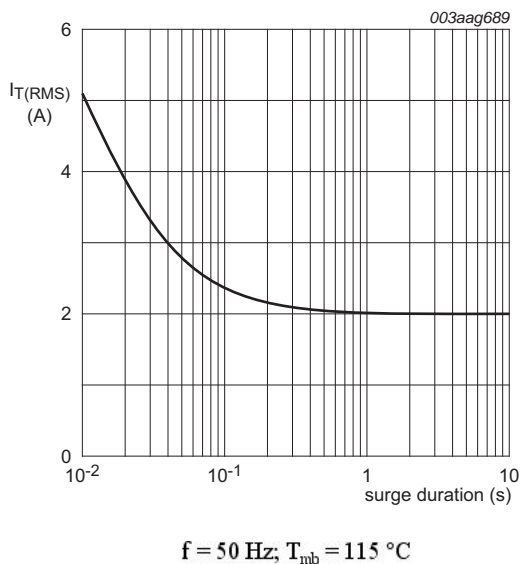


Fig 1. RMS on-state current as a function of surge duration; maximum values

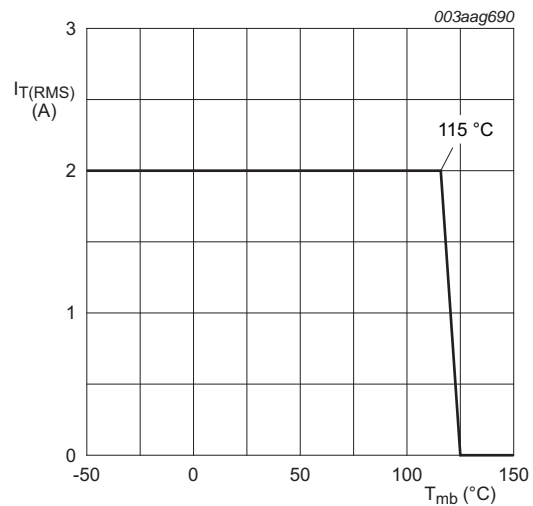


Fig 2. RMS on-state current as a function of mounting base temperature; maximum values

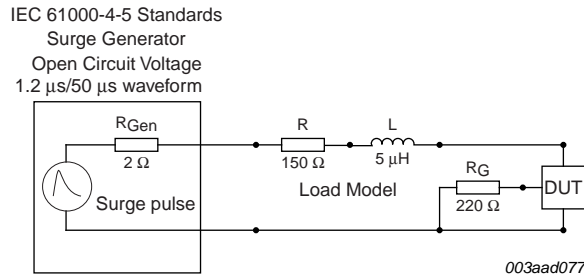


Fig 3. Test circuit for inductive and resistive loads with conditions equivalent to IEC 61000-4-5

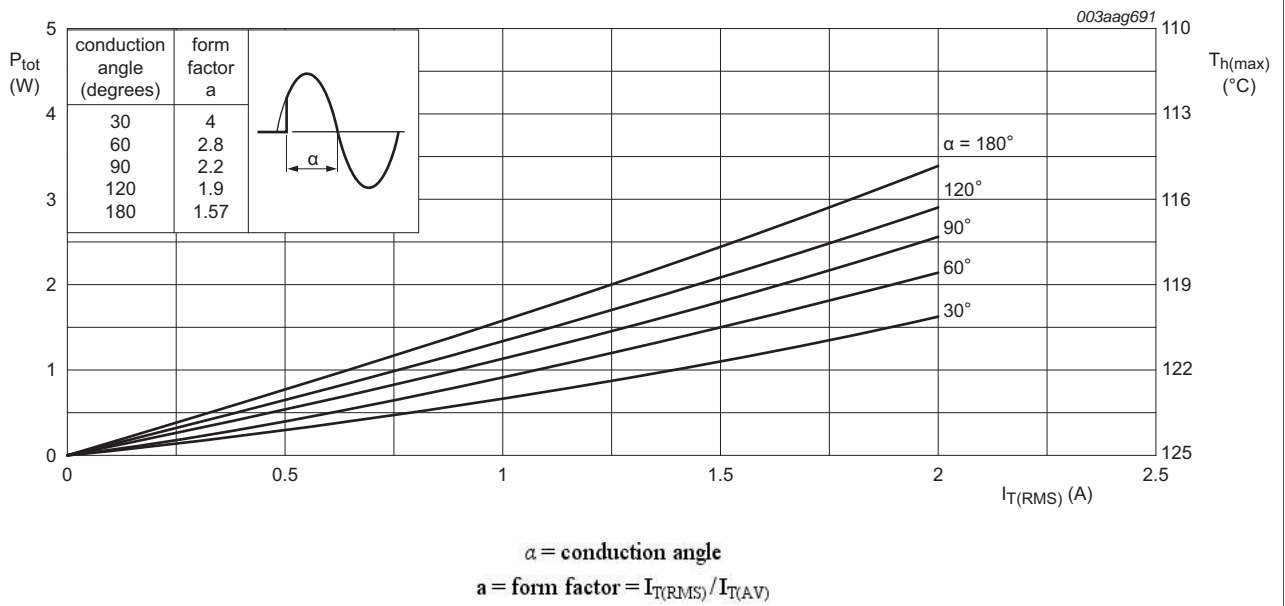


Fig 4. Total power dissipation as a function of RMS on-state current; maximum values

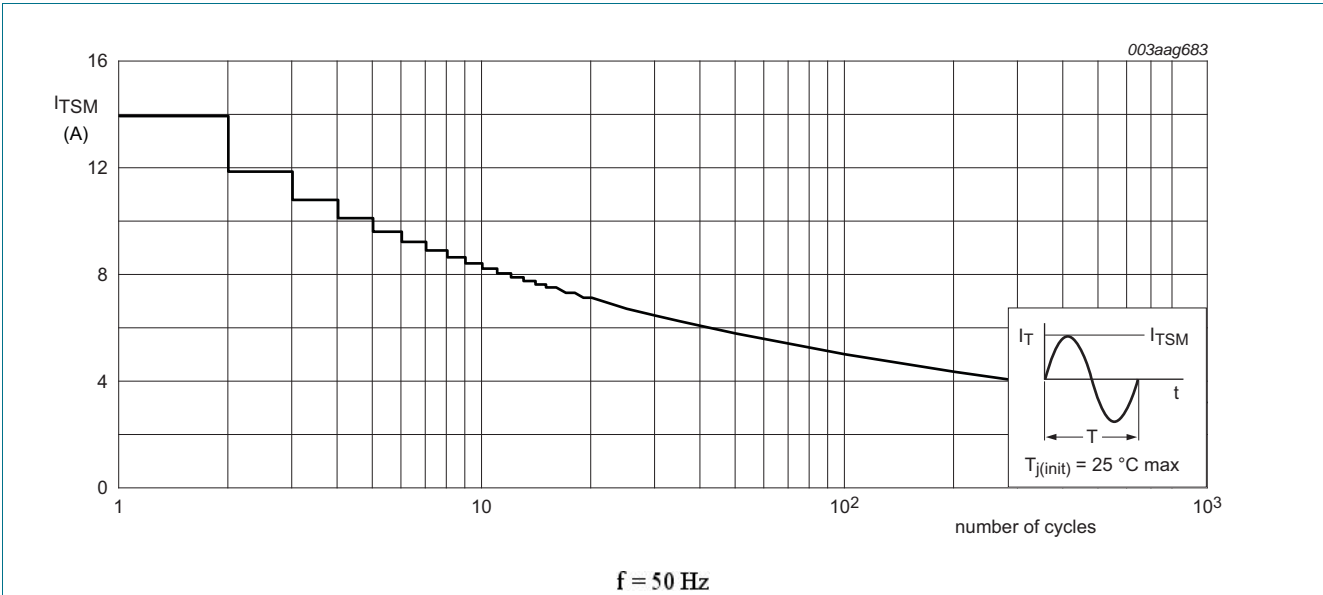


Fig 5. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

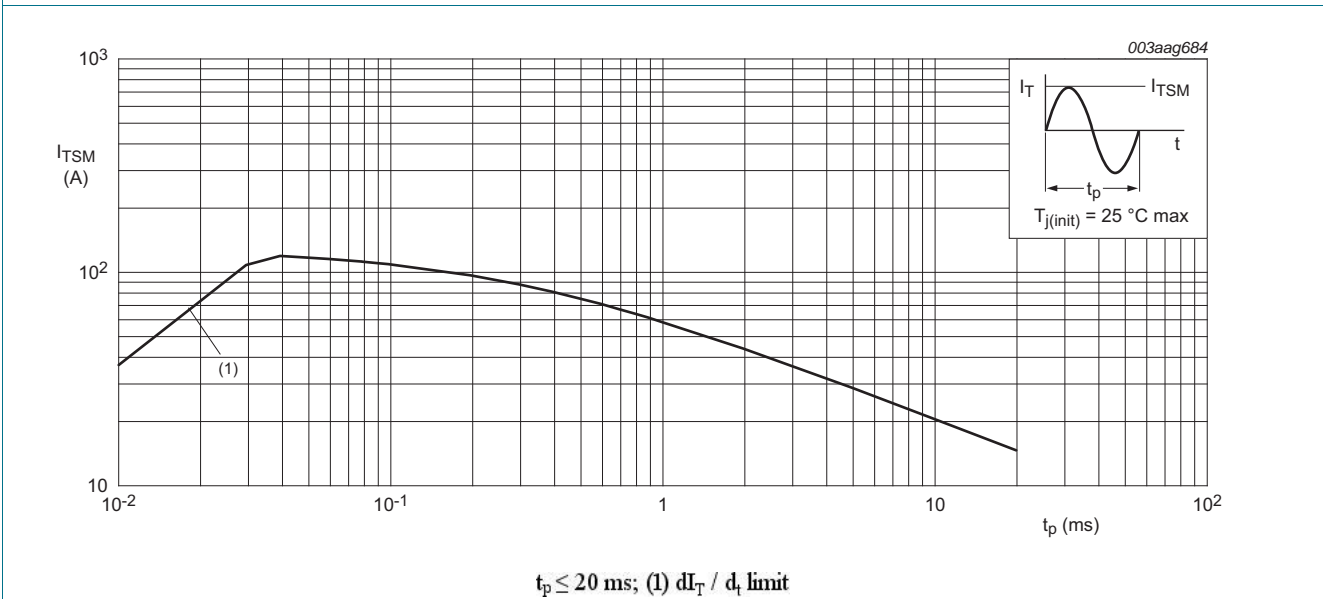
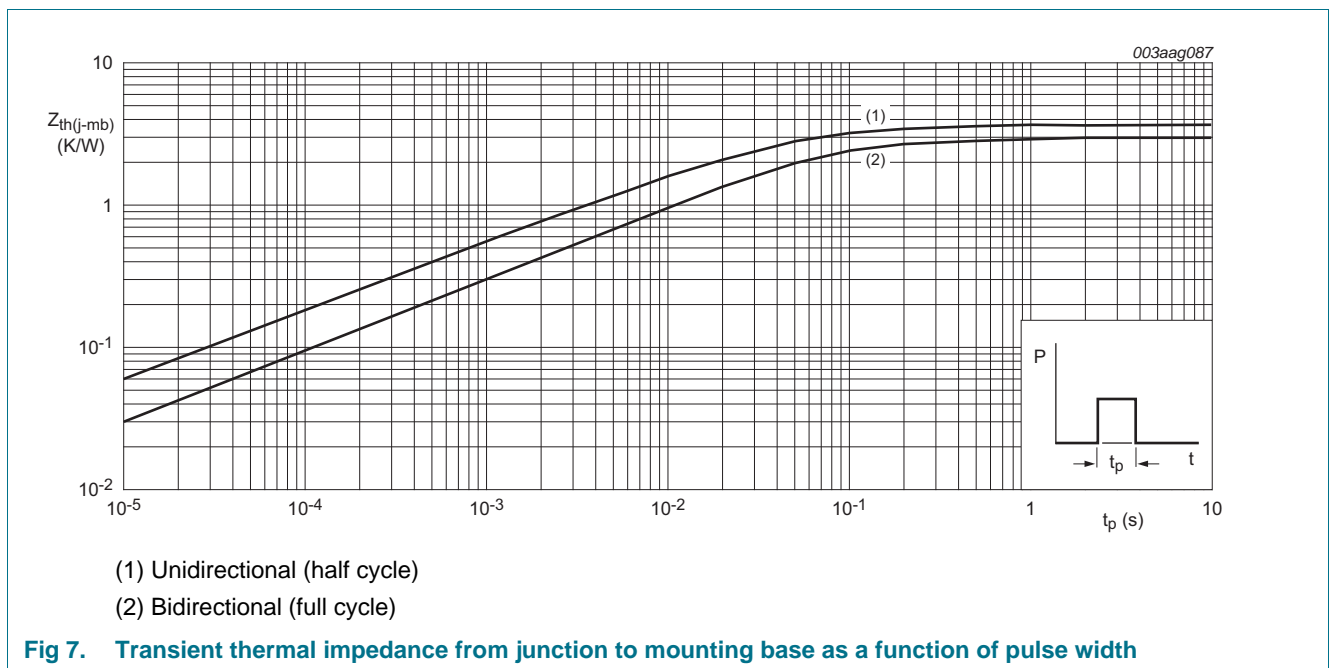


Fig 6. Non-repetitive peak on-state current as a function of pulse width; maximum values

5. Thermal characteristics

Table 5. Thermal characteristics

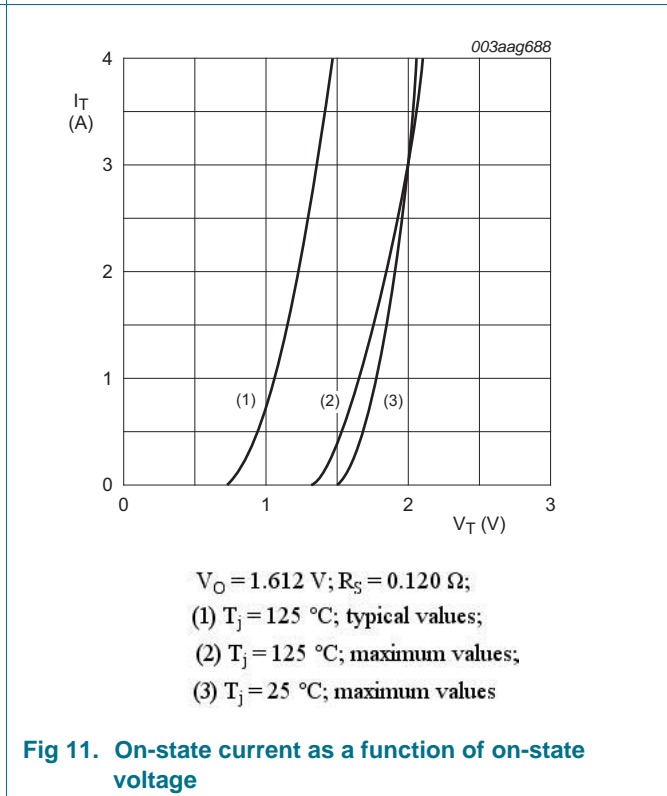
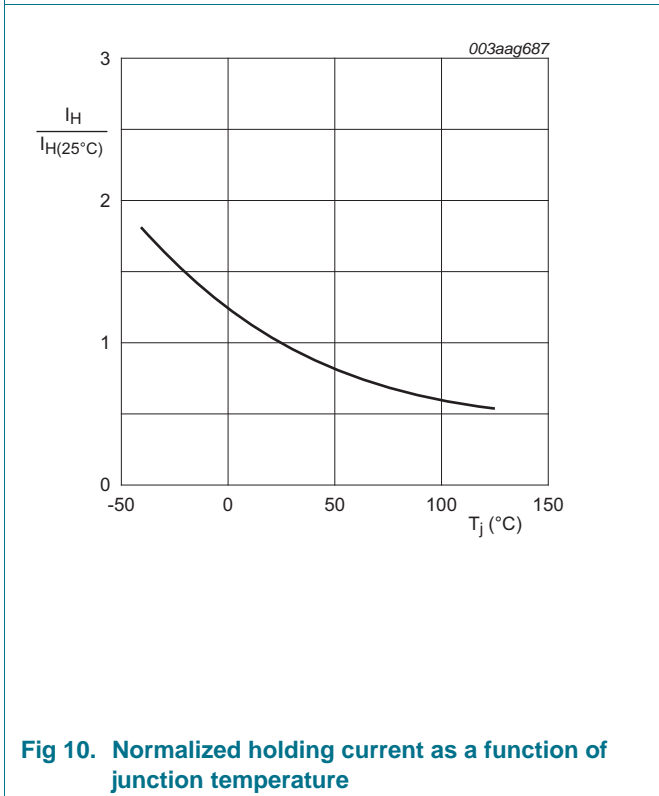
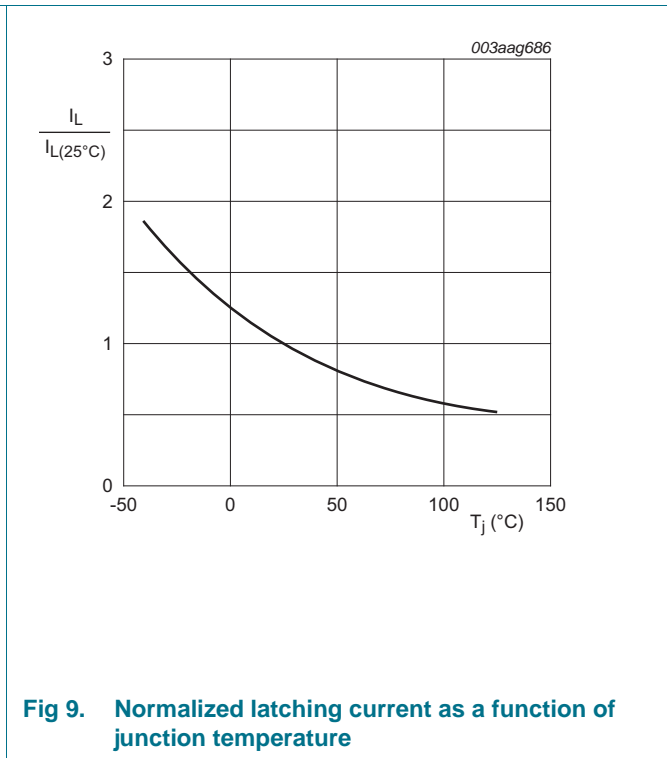
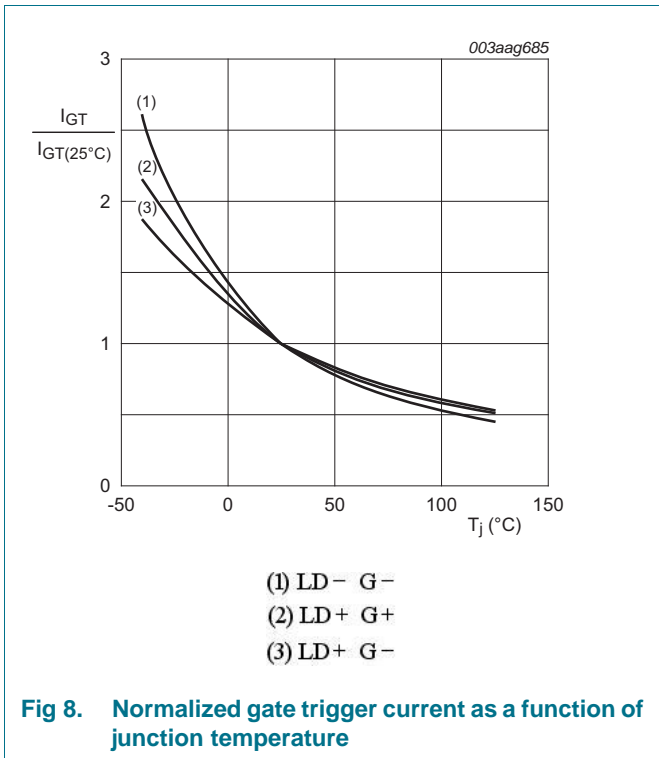
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle; see Figure 7	-	-	3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	printed circuit board (FR4) mounted	-	75	-	K/W



6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 100\text{ mA}$; LD+ G+; $T_j = 25\text{ °C}$; see Figure 8	-	-	10	mA
		$V_D = 12\text{ V}$; $I_T = 100\text{ mA}$; LD+ G-; $T_j = 25\text{ °C}$; see Figure 8	-	-	10	mA
		$V_D = 12\text{ V}$; $I_T = 100\text{ mA}$; LD- G-; $T_j = 25\text{ °C}$; see Figure 8	-	-	10	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 100\text{ mA}$; LD+ G+; $T_j = 25\text{ °C}$; see Figure 9	-	-	25	mA
		$V_D = 12\text{ V}$; $I_G = 100\text{ mA}$; LD+ G-; $T_j = 25\text{ °C}$; see Figure 9	-	-	35	mA
		$V_D = 12\text{ V}$; $I_G = 100\text{ mA}$; LD- G-; $T_j = 25\text{ °C}$; see Figure 9	-	-	25	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; see Figure 10	-	-	25	mA
V_T	on-state voltage	$I_T = 3\text{ A}$; see Figure 11	-	-	2	V
V_{GT}	gate trigger voltage	$V_D = 400\text{ V}$; $I_T = 100\text{ mA}$; $T_j = 125\text{ °C}$; see Figure 12	0.2	-	-	V
		$V_D = 12\text{ V}$; $I_T = 100\text{ mA}$; $T_j = 25\text{ °C}$; see Figure 12	-	-	1.5	V
I_D	off-state current	$V_D = 800\text{ V}$; $T_j = 25\text{ °C}$	-	-	10	μA
		$V_D = 800\text{ V}$; $T_j = 125\text{ °C}$	-	-	0.5	mA
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$; $T_j = 125\text{ °C}$; gate open circuit; exponential waveform; see Figure 13	500	-	-	V/ μs
dI_{com}/dt	rate of change of commutating current	$V_D = 400\text{ V}$; $T_j = 125\text{ °C}$; $I_{T(RMS)} = 2\text{ A}$; $dV_{com}/dt = 10\text{ V}/\mu\text{s}$; gate open circuit; see Figure 14 ; see Figure 15	3	-	-	A/ms
V_{CL}	clamping voltage	$I_{CL} = 0.1\text{ mA}$; $t_p = 1\text{ ms}$; $T_j = 25\text{ °C}$	850	-	-	V



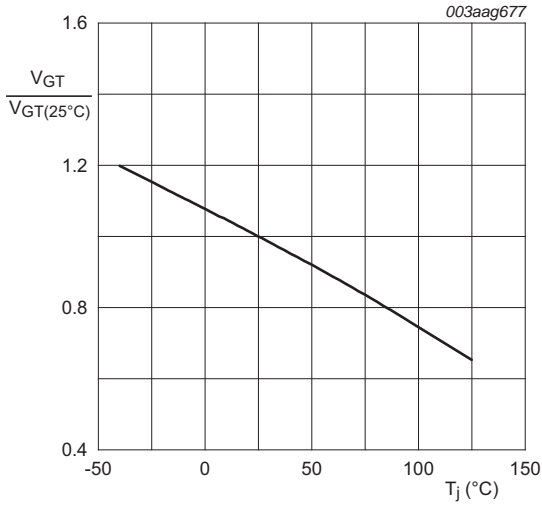
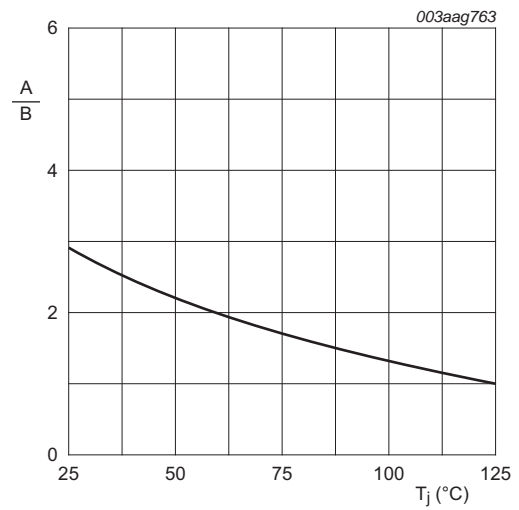
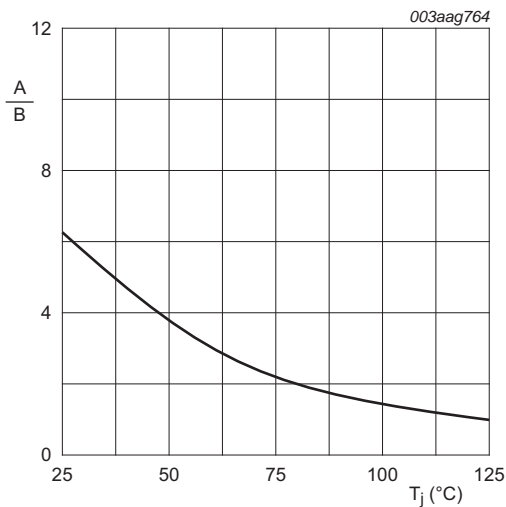


Fig 12. Normalized gate trigger voltage as a function of junction temperature



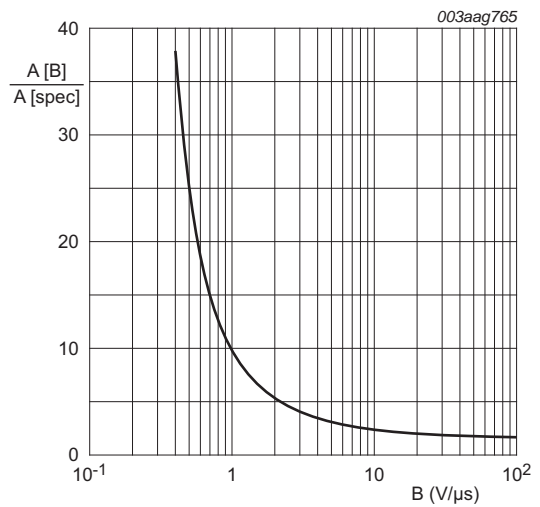
A is dV_D/dt at condition T_j $^{\circ}\text{C}$
 B is dV_D/dt at condition T_j 125 $^{\circ}\text{C}$

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 $^{\circ}\text{C}$
 B is dI_{com}/dt at condition T_j 125 $^{\circ}\text{C}$
 $V_D = 400$ 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 less than 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 surface-mounted package (DPAK); 3 leads (one lead cropped)

SOT428

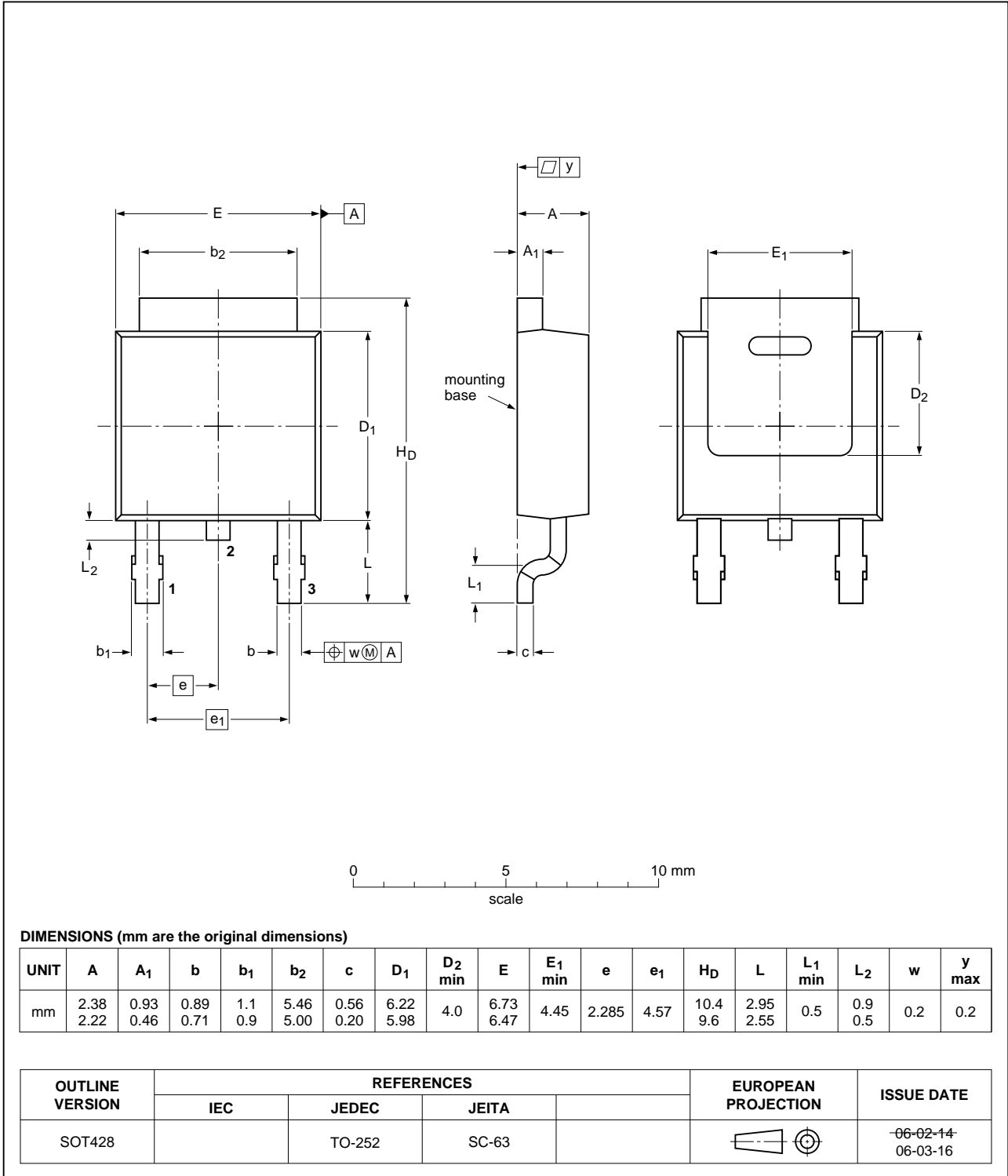


Fig 16. Package outline SOT428 (DPAK)

8. Soldering

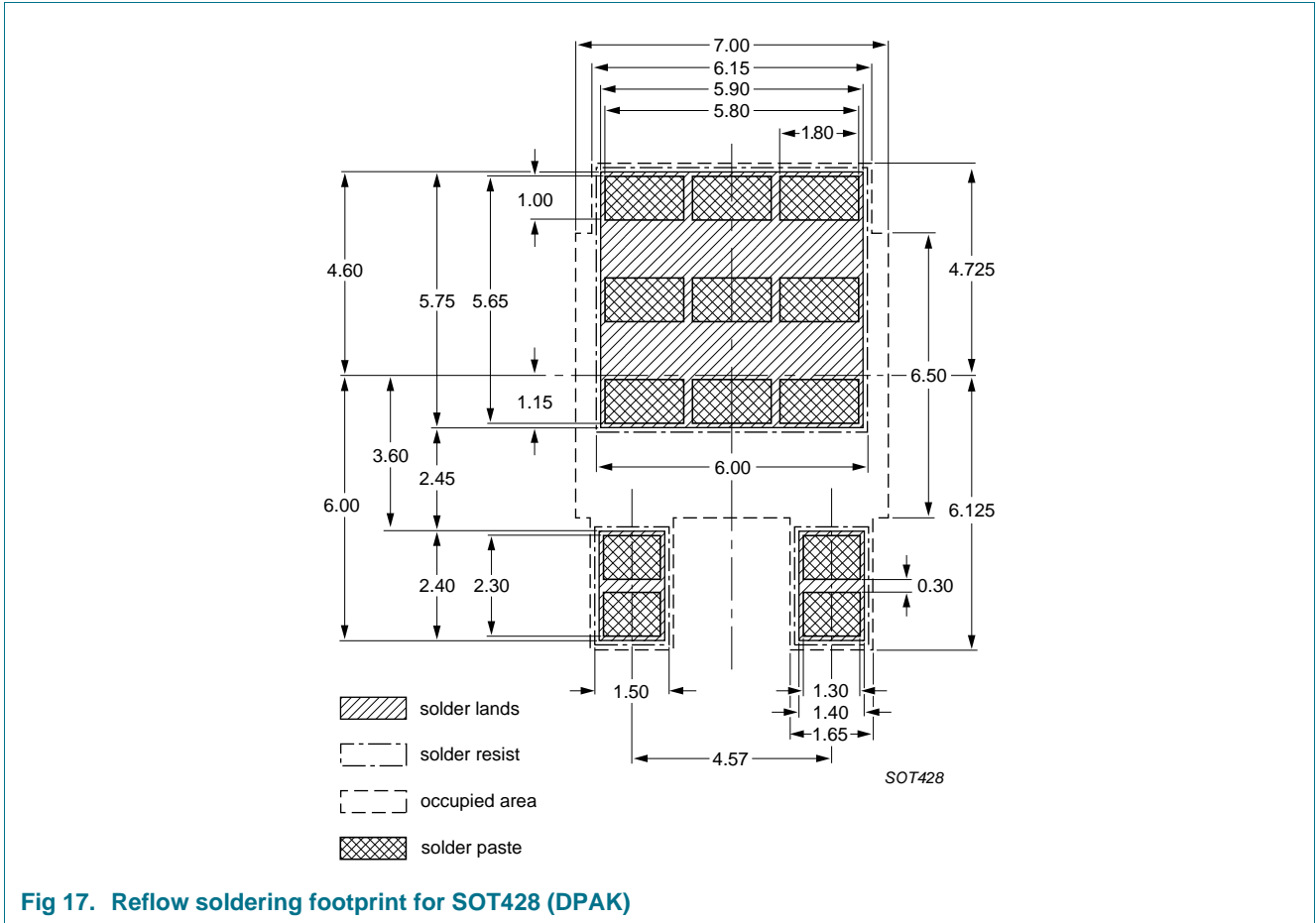


Fig 17. Reflow soldering footprint for SOT428 (DPAK)

9. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
ACTT2S-800E v.2	20111025	Product data sheet	-	ACTT2S-800E v.1
Modifications:	• Various changes to content.			
ACTT2S-800E v.1	20110919	Product data sheet	-	-

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10.1 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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