

# BT258S-800LT

SCR logic level, high temperature

19 March 2014

Product data sheet

## 1. General description

Passivated sensitive gate Silicon Controlled Rectifier (SCR) in a SOT428 (DPAK) surface mountable plastic package intended for use in applications requiring high bidirectional blocking voltage capability and high thermal cycling performance. These devices are intended to be interfaced directly to microcontrollers, logic integrated circuits and other low power gate trigger circuits.

## 2. Features and benefits

- Direct interfacing with low power drivers and microcontrollers
- High bidirectional blocking voltage capability
- High junction operating temperature capability
- High thermal cycling performance
- Planar passivated for voltage ruggedness and reliability
- Surface mountable package
- Very sensitive gate for logic level controls

## 3. Applications

- General purpose switching and phase control
- Ignition circuits, CDI for 2- and 3-wheelers
- Motor control - e.g. small kitchen appliances
- Protection circuits for Switched-Mode Power Supplies (SMPS)
- Protection circuits in lighting ballasts

## 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
$V_{RRM}$	repetitive peak reverse voltage		-	-	800	V
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 10\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>	-	-	75	A
$T_j$	junction temperature		[1]	-	150	°C
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 135\text{ °C}$ ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	-	8	A

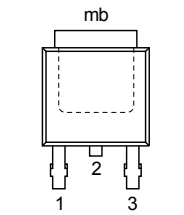



Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 8</a>	20	-	50	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$ ; $T_j = 150\text{ °C}$ ; $R_{GK} = 100\ \Omega$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; <a href="#">Fig. 13</a>	35	70	-	$\text{V}/\mu\text{s}$

[1] Operation above junction temperatures of 110 °C may require the use of a gate to cathode resistor of 1 k $\Omega$  or less.

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p>DPAK (SOT428)</p>	 <p>sym037</p>
2	A	anode		
3	G	gate		
mb	A	mounting base; connected to anode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BT258S-800LT	DPAK	plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)	SOT428

## 7. Limiting values

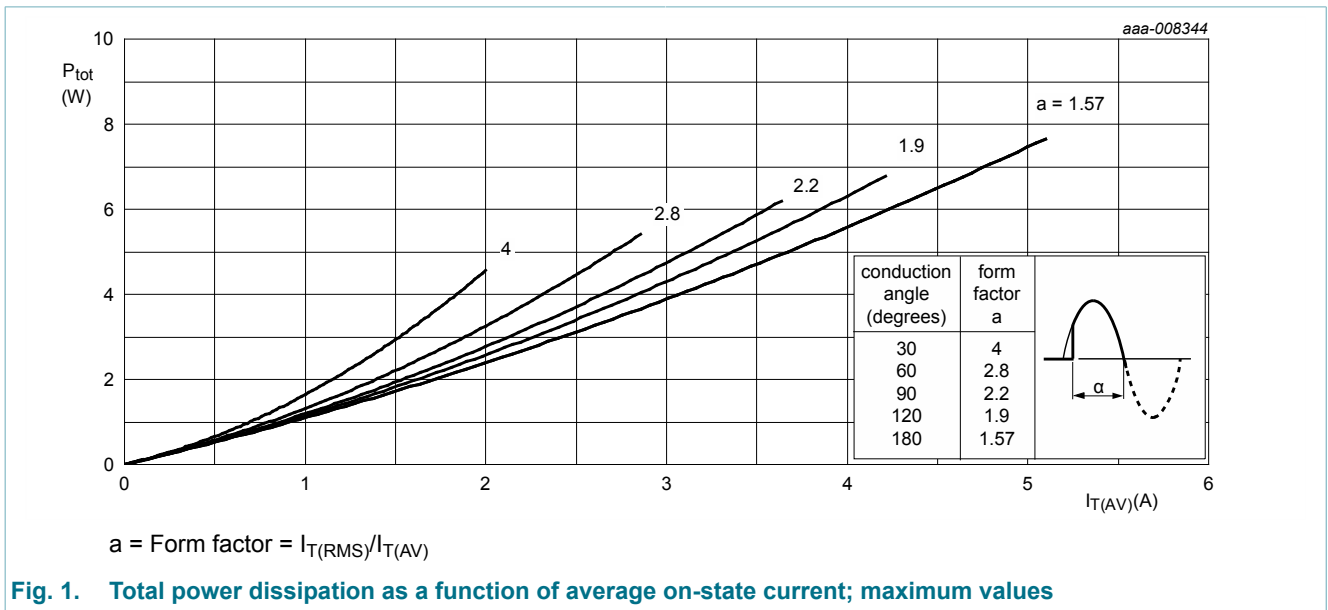
Table 4. Limiting values

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
$V_{RRM}$	repetitive peak reverse voltage		-	800	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq 135\text{ °C}$ ; <a href="#">Fig. 1</a>	-	5	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 135\text{ °C}$ ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	8	A

Symbol	Parameter	Conditions	Min	Max	Unit
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; $t_p = 10\text{ ms}$ ; Fig. 4; Fig. 5	-	75	A
		half sine wave; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; $t_p = 8.3\text{ ms}$	-	82	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; sine-wave pulse	-	28	$\text{A}^2\text{s}$
$dl_T/dt$	rate of rise of on-state current	$I_T = 10\text{ A}$ ; $I_G = 50\text{ mA}$ ; $dl_G/dt = 50\text{ mA}/\mu\text{s}$	-	50	$\text{A}/\mu\text{s}$
$I_{GM}$	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	150	$^\circ\text{C}$
$T_j$	junction temperature		[1]	150	$^\circ\text{C}$

[1] Operation above junction temperatures of 110 °C may require the use of a gate to cathode resistor of 1 kΩ or less.



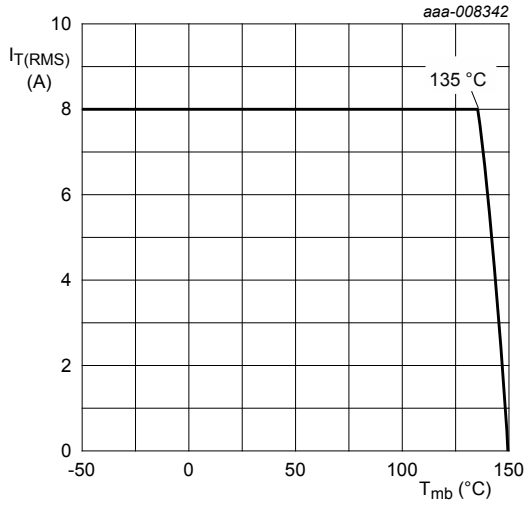
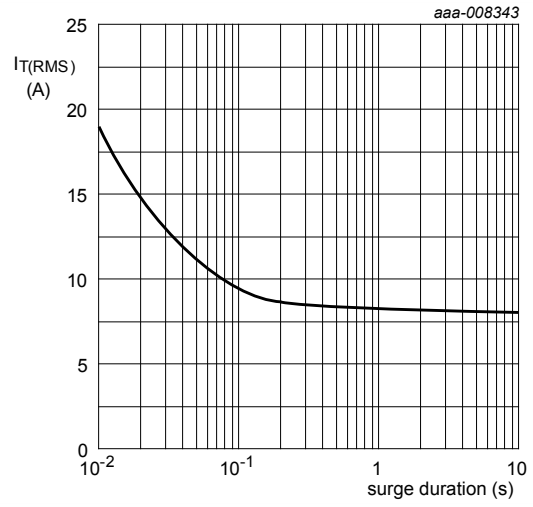
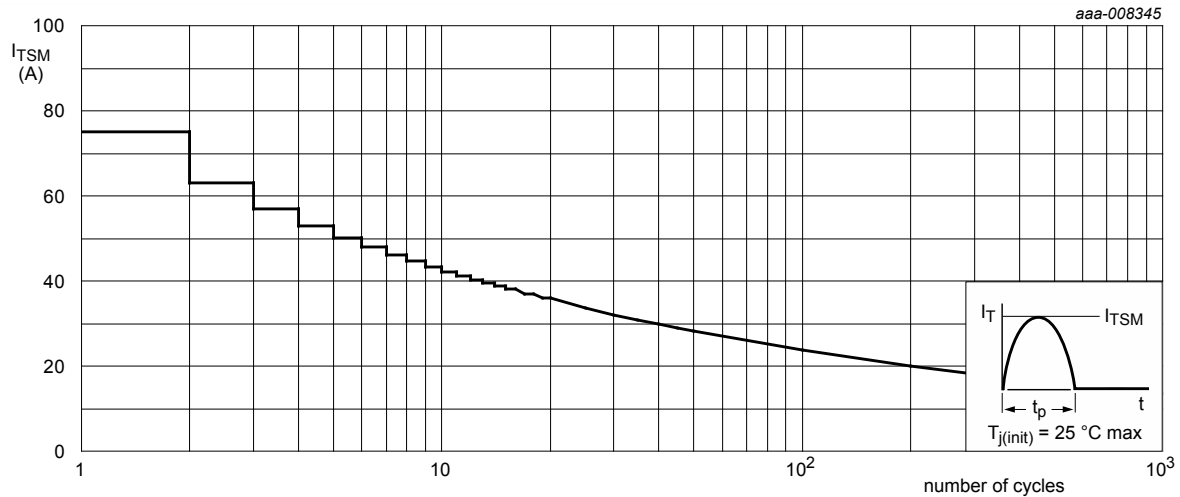


Fig. 2. RMS on-state current as a function of mounting base temperature; maximum values



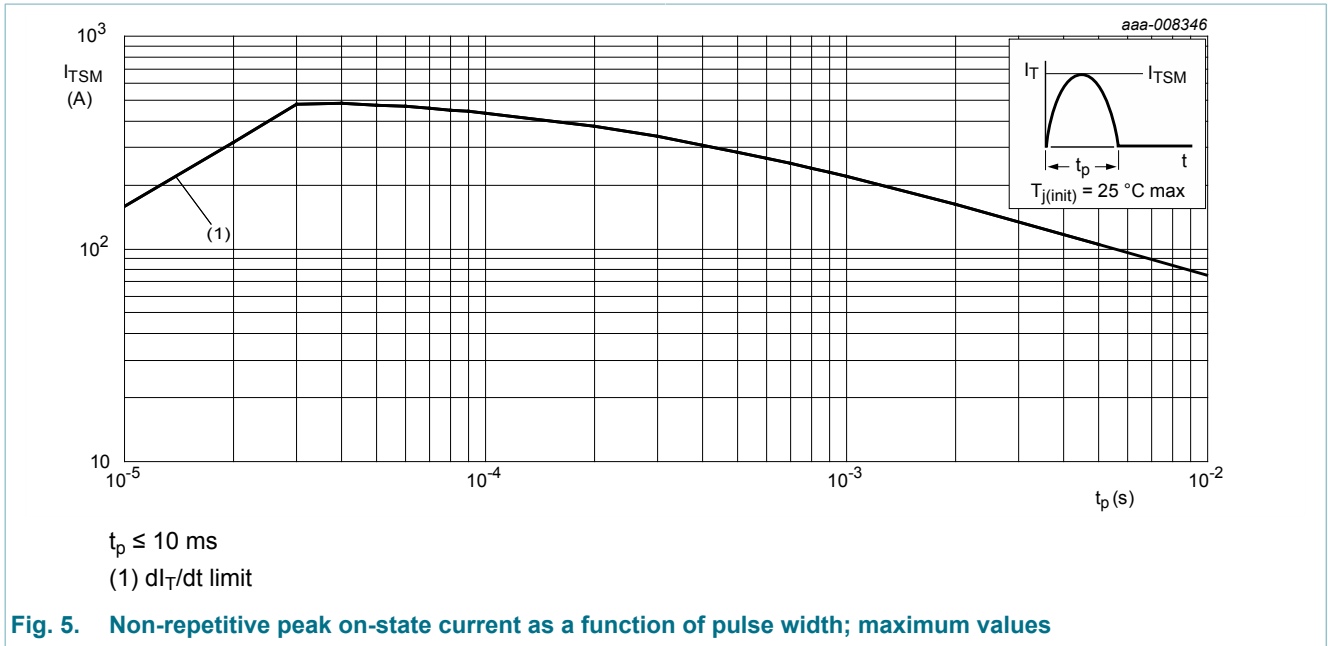
f = 50 Hz;  $T_{mb} = 135\text{ °C}$

Fig. 3. RMS on-state current as a function of surge duration; maximum values



f = 50 Hz

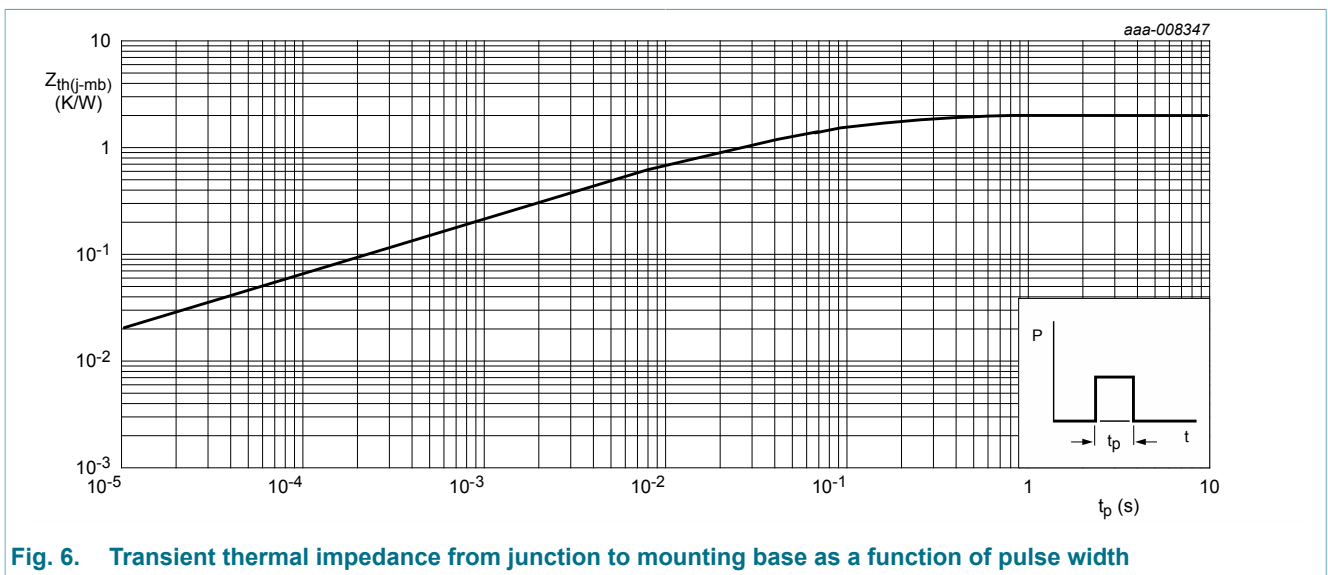
Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

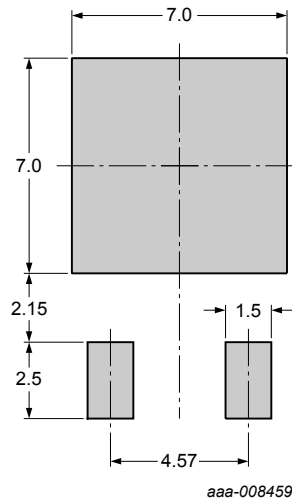


## 8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	<a href="#">Fig. 6</a>	-	-	2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated and standard footprint; <a href="#">Fig. 7</a>	-	75	-	K/W





All dimensions are in mm  
 Plastic meets requirements of UL94 V-O at 3.175 mm

Fig. 7. SOT428: minimum pad sizes for surface-mounting

## 9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; Fig. 8	20	-	50	$\mu\text{A}$
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; Fig. 9	-	0.4	10	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; Fig. 10	-	0.3	6	mA
$V_T$	on-state voltage	$I_T = 16\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; Fig. 11	-	1.3	1.6	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. 12	-	0.4	1	V
		$V_D = 800\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 110\text{ }^\circ\text{C}$ ; Fig. 12	0.1	0.2	-	V
$I_D$	off-state current	$V_D = 800\text{ V}$ ; $T_j = 150\text{ }^\circ\text{C}$	-	0.5	2.5	mA
$I_R$	reverse current	$V_R = 800\text{ V}$ ; $T_j = 150\text{ }^\circ\text{C}$	-	0.5	2.5	mA
<b>Dynamic characteristics</b>						
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$ ; $T_j = 150\text{ }^\circ\text{C}$ ; $R_{GK} = 100\ \Omega$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; Fig. 13	35	70	-	V/ $\mu\text{s}$
$t_{gt}$	gate-controlled turn-on time	$I_{TM} = 10\text{ A}$ ; $V_D = 800\text{ V}$ ; $I_G = 5\text{ mA}$ ; $dI_G/dt = 0.2\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ }^\circ\text{C}$	-	2	-	$\mu\text{s}$

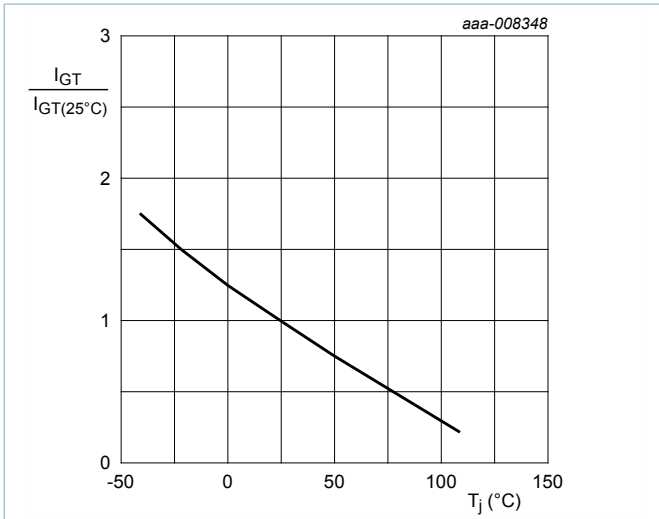


Fig. 8. Normalized gate trigger current as a function of junction temperature

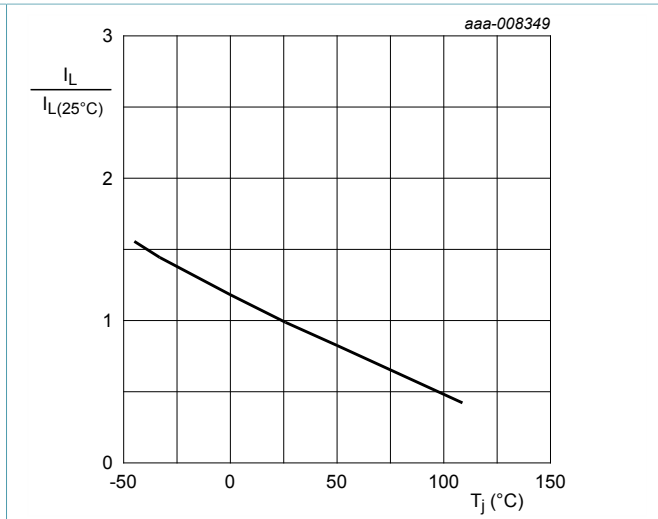


Fig. 9. Normalized latching current as a function of junction temperature

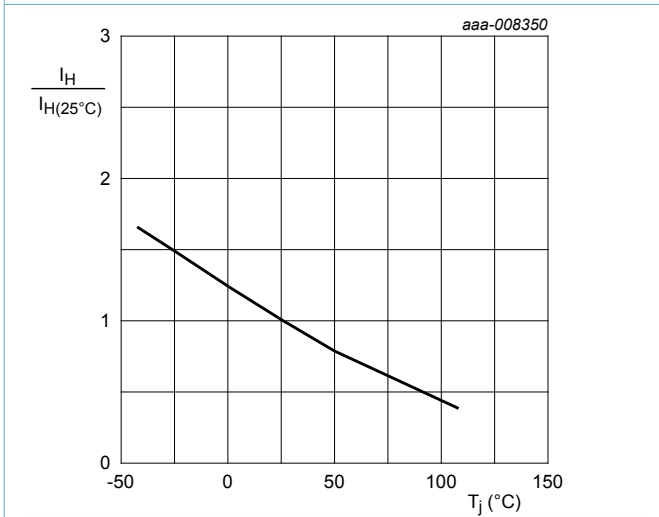
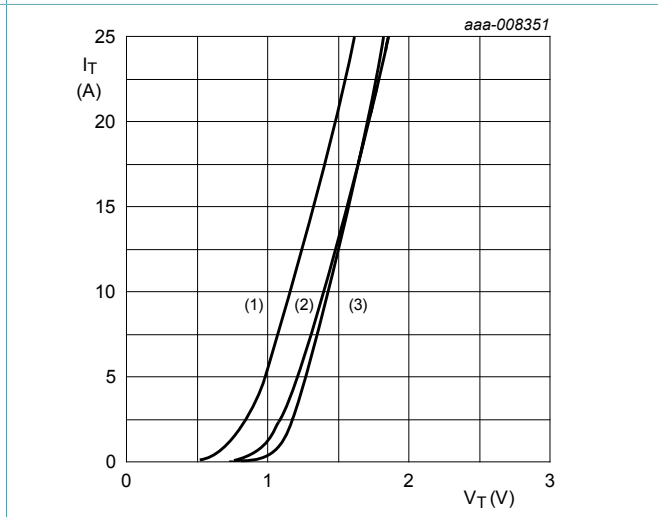


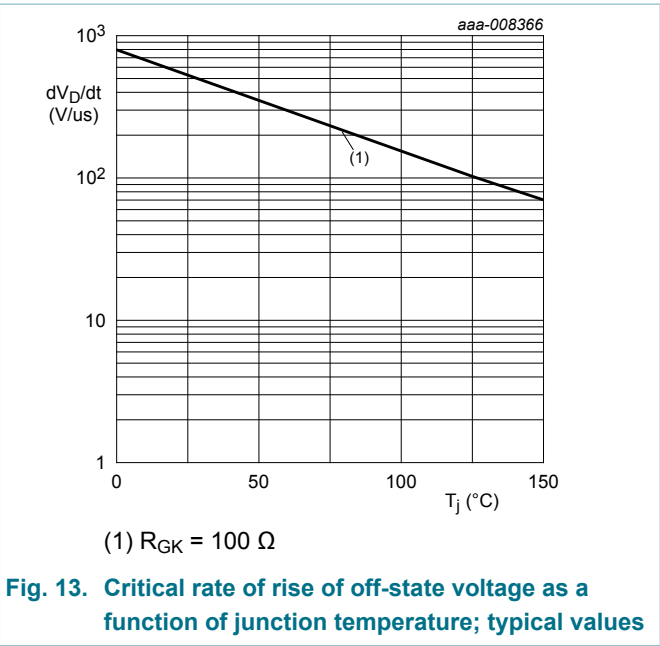
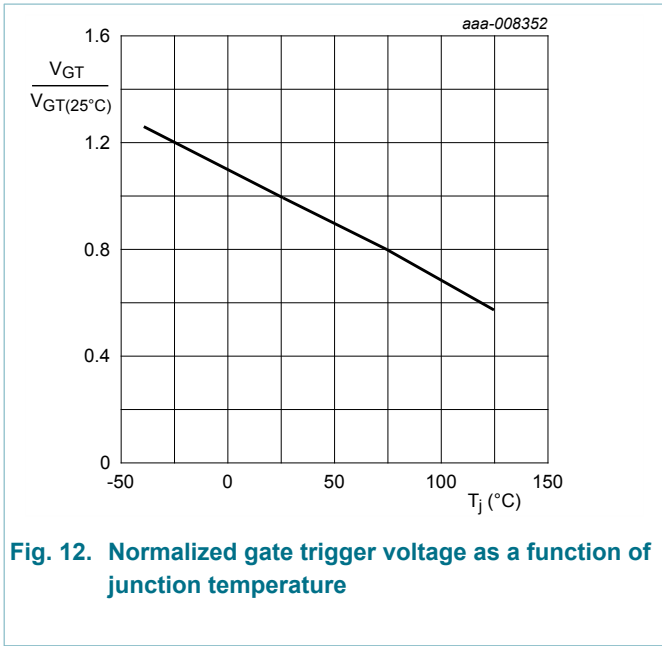
Fig. 10. Normalized holding current as a function of junction temperature



$V_o = 1.0 \text{ V}; R_s = 0.04 \ \Omega$

- (1)  $T_j = 150 \text{ }^\circ\text{C}$ ; typical values
- (2)  $T_j = 150 \text{ }^\circ\text{C}$ ; maximum values
- (3)  $T_j = 25 \text{ }^\circ\text{C}$ ; maximum values

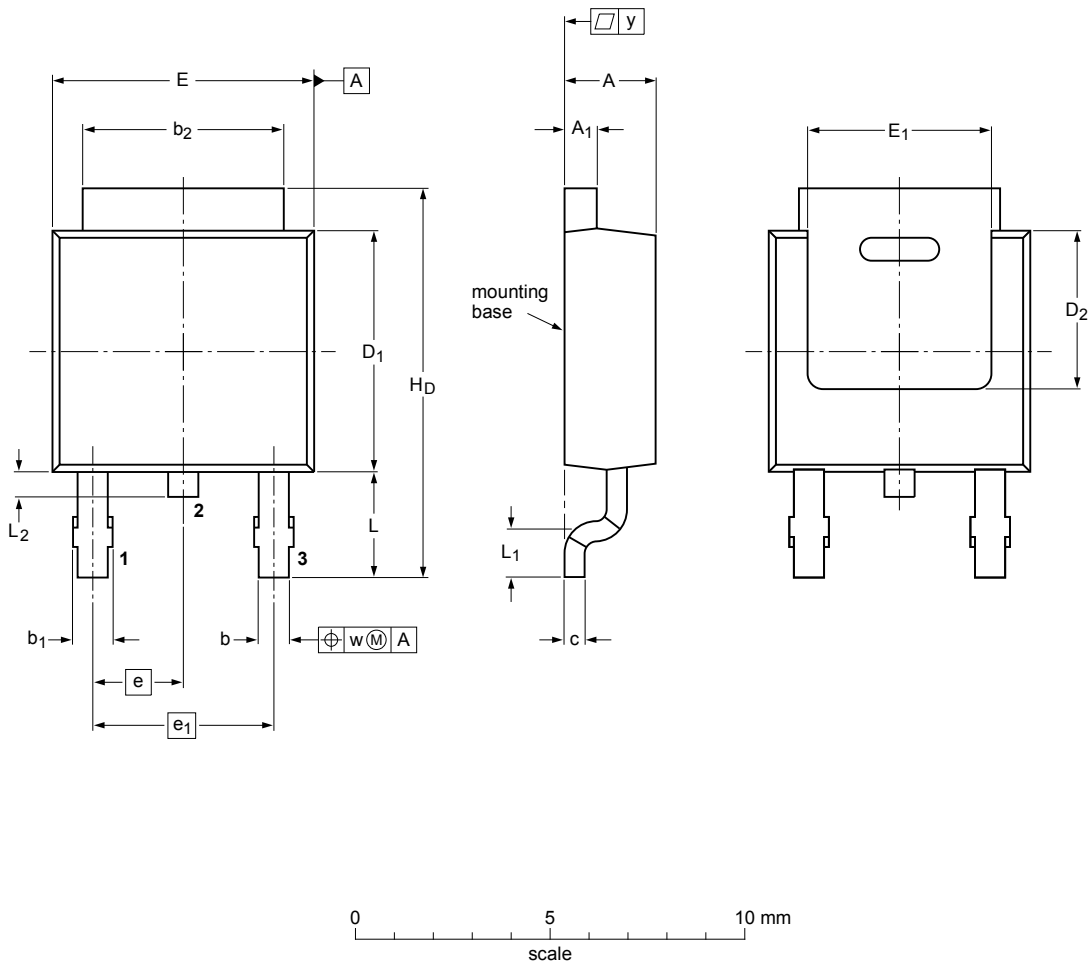
Fig. 11. On-state current as a function of on-state voltage





### 10. Package outline

Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped) SOT428



**DIMENSIONS** (mm are the original dimensions)

UNIT	A	A <sub>1</sub>	b	b <sub>1</sub>	b <sub>2</sub>	c	D <sub>1</sub>	D <sub>2</sub> min	E	E <sub>1</sub> min	e	e <sub>1</sub>	H <sub>D</sub>	L	L <sub>1</sub> min	L <sub>2</sub>	w	y max
mm	2.38 2.22	0.93 0.46	0.89 0.71	1.1 0.9	5.46 5.00	0.56 0.20	6.22 5.98	4.0	6.73 6.47	4.45	2.285	4.57	10.4 9.6	2.95 2.55	0.5	0.9 0.5	0.2	0.2

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT428		TO-252	SC-63		06-02-14 06-03-16

**Fig. 14. Package outline DPAK (SOT428)**

# 11. Soldering

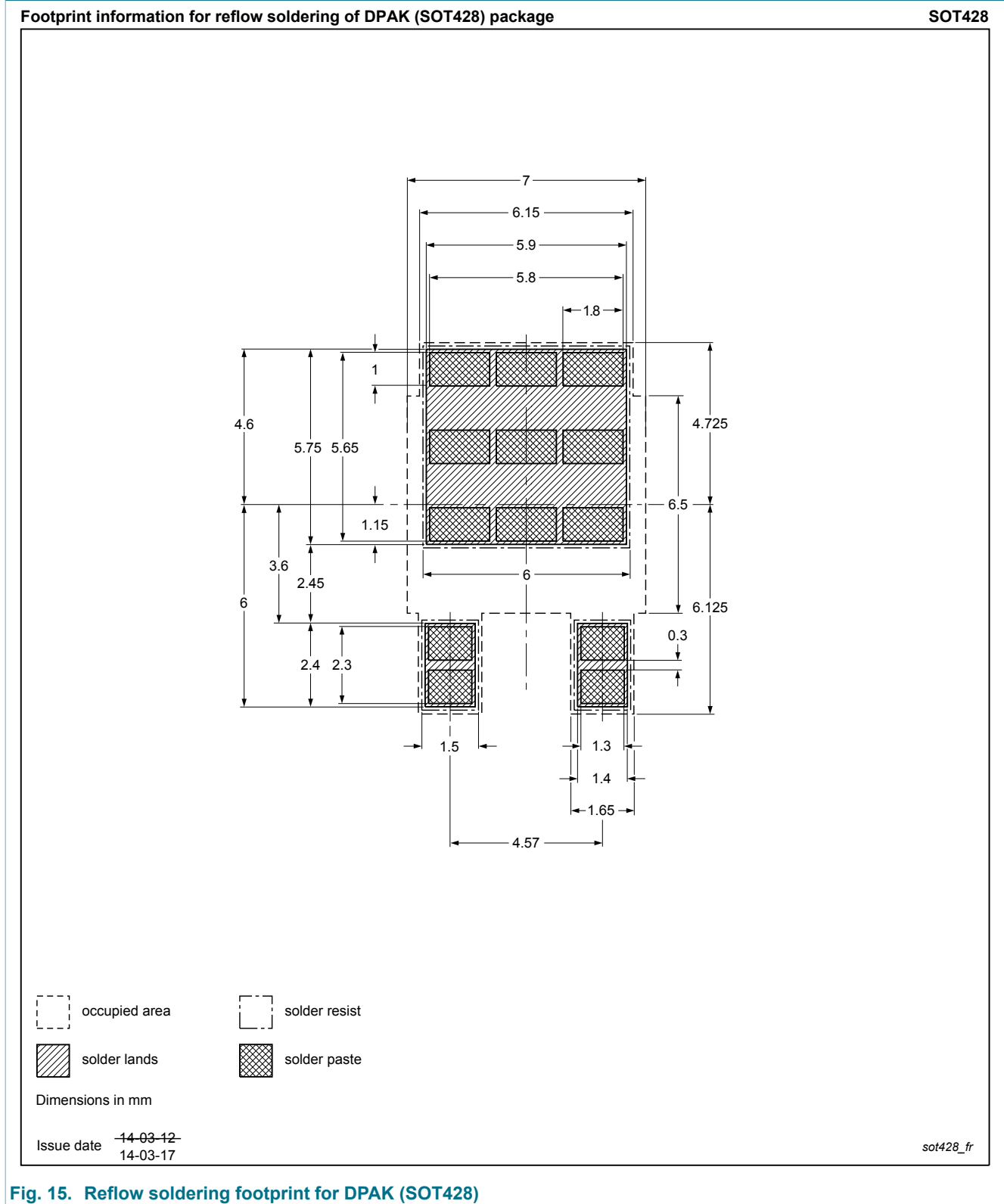


Fig. 15. Reflow soldering footprint for DPAK (SOT428)

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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.
Product [short] data sheet	Production	This document contains the product specification.

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