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IMPORTANT NOTICE

10 December 2015

1. Global joint venture starts operations as WeEn Semiconductors

Dear customer,

As from November 9th, 2015 NXP Semiconductors N.V. and Beijing JianGuang Asset Management Co. Ltd established Bipolar Power joint venture (JV), **WeEn Semiconductors**, which will be used in future Bipolar Power documents together with new contact details.

In this document where the previous NXP references remain, please use the new links as shown below.

WWW - For www.nxp.com use www.ween-semi.com
Email - For salesaddresses@nxp.com use salesaddresses@ween-semi.com

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Thank you for your cooperation and understanding,

WeEn Semiconductors

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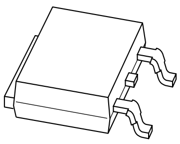


BT151S series L and R

Thyristors

Rev. 05 — 9 October 2006 | Product data sheet

1. Product profile

1.1 General description

Passivated thyristors in a SOT428 plastic package.

1.2 Features

- High thermal cycling performance
- High bidirectional blocking voltage capability
- Surface-mounted package

1.3 Applications

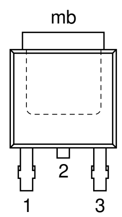
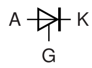
- Motor control
- Ignition circuits
- Static switching
- Protection circuits

1.4 Quick reference data

- $V_{DRM} \leq 500$ V (BT151S-500L/R)
- $V_{RRM} \leq 500$ V (BT151S-500L/R)
- $V_{DRM} \leq 650$ V (BT151S-650L/R)
- $V_{RRM} \leq 650$ V (BT151S-650L/R)
- $V_{DRM} \leq 800$ V (BT151S-800R)
- $V_{RRM} \leq 800$ V (BT151S-800R)
- $I_{TSM} \leq 120$ A (t = 10 ms)
- $I_{T(RMS)} \leq 12$ A
- $I_{T(AV)} \leq 7.5$ A
- $I_{GT} \leq 5$ mA (BT151S series L)
- $I_{GT} \leq 15$ mA (BT151S series R)

2. Pinning information

Table 1. Pinning

Pin	Description	Simplified outline	Symbol
1	cathode (K)	 SOT428 (DPAK)	
2	anode (A)		
3	gate (G)		
mb	mounting base; connected to anode		

founded by Philips

3. Ordering information

Table 2. Ordering information

Type number	Package		
	Name	Description	Version
BT151S-500L	DPAK	plastic single-ended surface-mounted package; 3 leads (one lead cropped)	SOT428
BT151S-500R			
BT151S-650L			
BT151S-650R			
BT151S-800R			

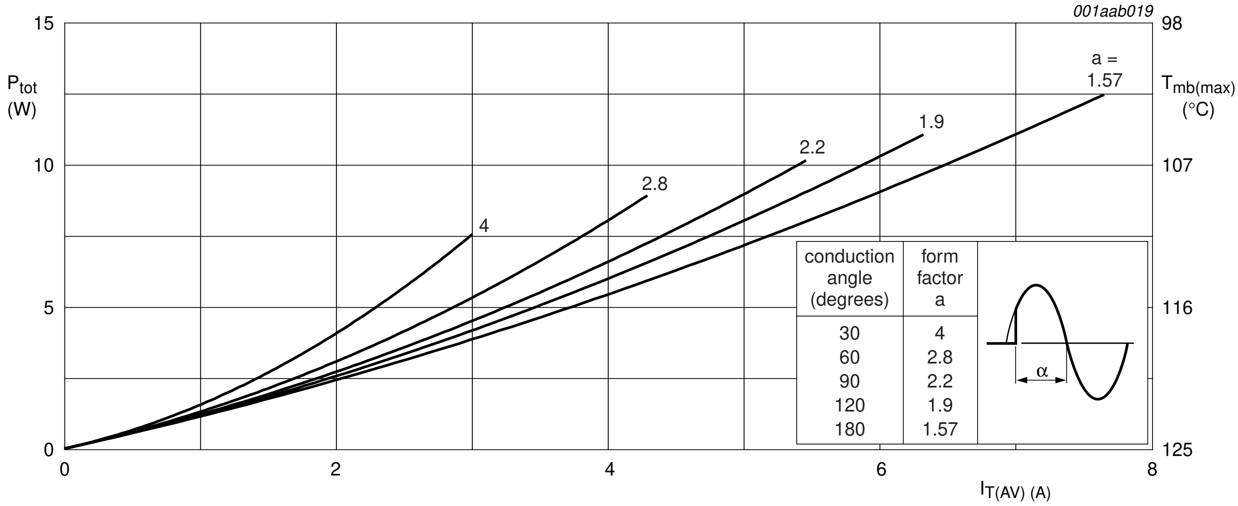
4. Limiting values

Table 3. Limiting values

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

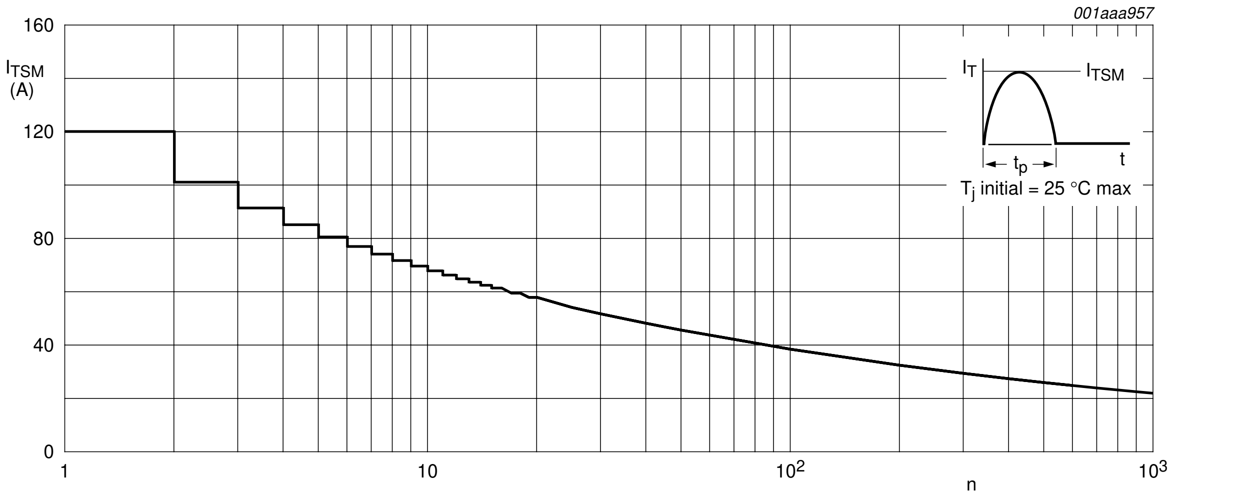
Symbol	Parameter	Conditions		Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage	BT151S-500L; BT151S-500R	[1]	-	500	V
		BT151S-650L; BT151S-650R	[1]	-	650	V
		BT151S-800R		-	800	V
V_{RRM}	repetitive peak reverse voltage	BT151S-500L; BT151S-500R	[1]	-	500	V
		BT151S-650L; BT151S-650R	[1]	-	650	V
		BT151S-800R		-	800	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq 103$ °C; see Figure 1		-	7.5	A
$I_{T(RMS)}$	RMS on-state current	all conduction angles; see Figure 4 and 5		-	12	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_j = 25$ °C prior to surge; see Figure 2 and 3				
		t = 10 ms		-	120	A
		t = 8.3 ms		-	132	A
I^2t	I^2t for fusing	t = 10 ms		-	72	A^2s
dI_T/dt	rate of rise of on-state current	$I_{TM} = 20$ A; $I_G = 50$ mA; $dI_G/dt = 50$ mA/µs		-	50	A/µs
I_{GM}	peak gate current			-	2	A
V_{RGM}	peak reverse gate voltage			-	5	V
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

[1] Although not recommended, off-state voltages up to 800 V may be applied without damage, but the thyristor may switch to the on-state. The rate of rise of current should not exceed 15A/µs.



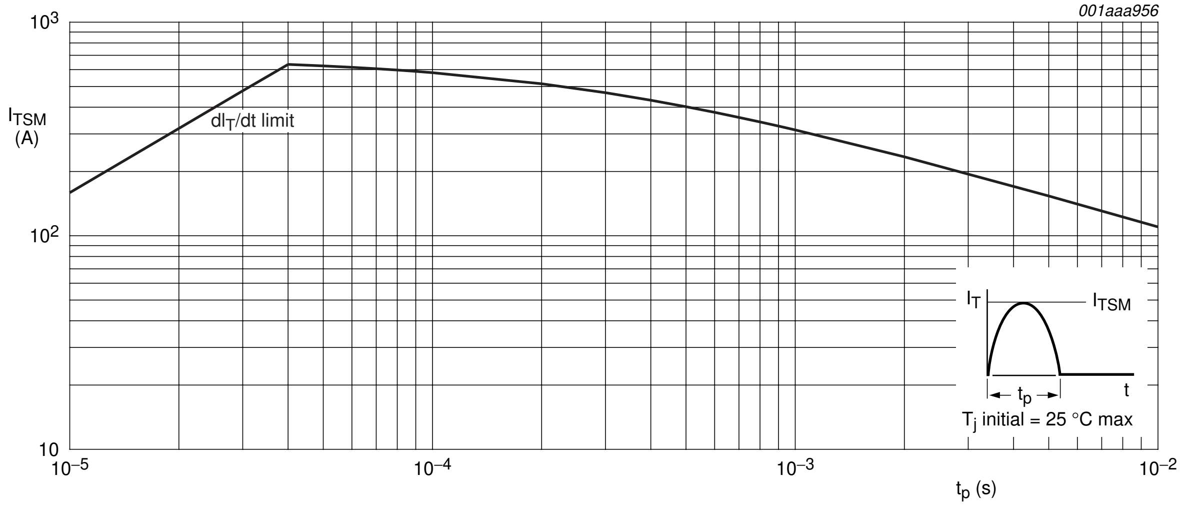
Form factor $a = I_{T(RMS)}/I_{T(AV)}$

Fig 1. Total power dissipation as a function of average on-state current; maximum values



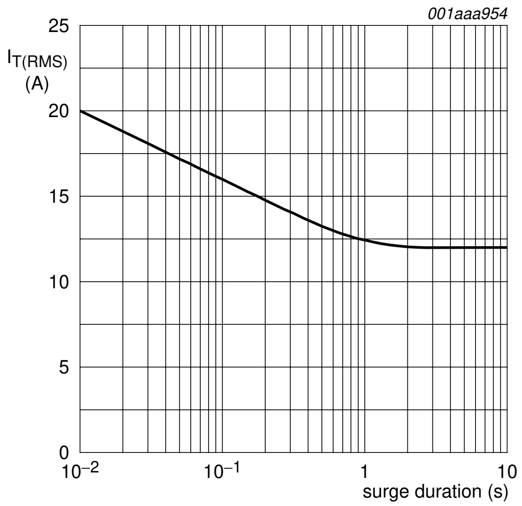
f = 50 Hz

Fig 2. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



$t_p \leq 10$ ms

Fig 3. Non-repetitive peak on-state current as a function of pulse width for sinusoidal currents; maximum values



f = 50 Hz; $T_{mb} \leq 103$ °C

Fig 4. RMS on-state current as a function of surge duration; maximum values

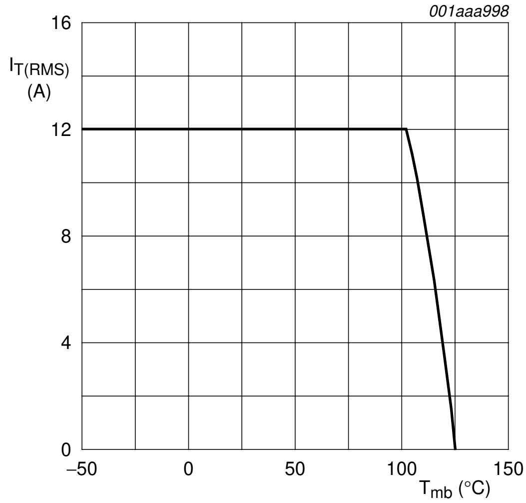


Fig 5. RMS on-state current as a function of mounting base temperature; maximum values

5. Thermal characteristics

Table 4. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	see Figure 6	-	-	1.8	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	mounted on an FR4 printed-circuit board; see Figure 14	-	75	-	K/W

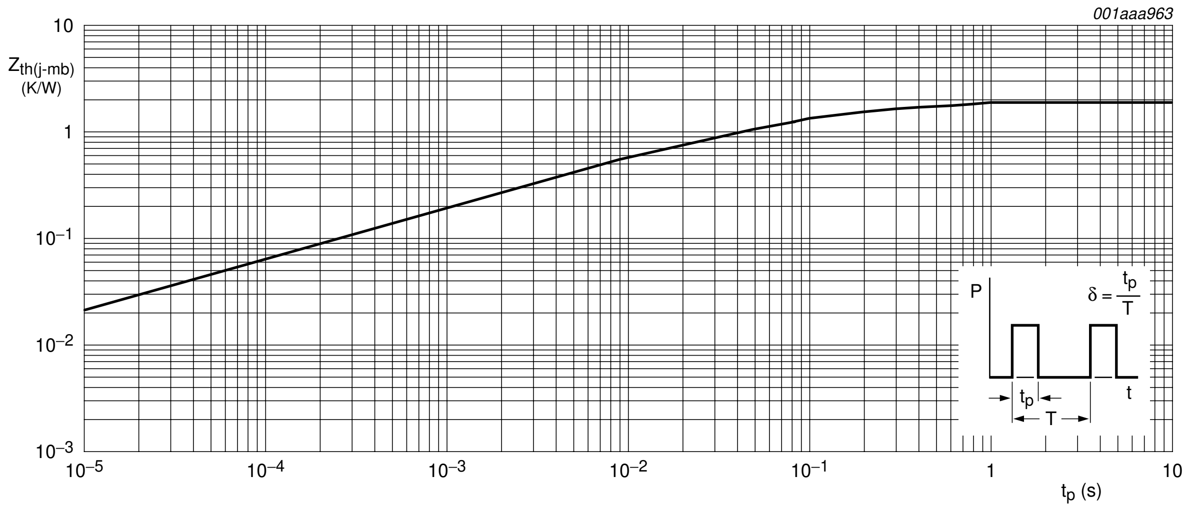


Fig 6. Transient thermal impedance from junction to mounting base as a function of pulse width

6. Characteristics

Table 5. Characteristics

T_j = 25 °C unless otherwise stated.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	V_D = 12 V; I_T = 100 mA; see Figure 8				
		BT151S-500L	-	2	5	mA
		BT151S-500R	-	2	15	mA
		BT151S-650L	-	2	5	mA
		BT151S-650R	-	2	15	mA
		BT151S-800R	-	2	15	mA
I_L	latching current	V_D = 12 V; I_{GT} = 100 mA; see Figure 10	-	10	40	mA
I_H	holding current	V_D = 12 V; I_{GT} = 100 mA; see Figure 11	-	7	20	mA
V_T	on-state voltage	I_T = 23 A; see Figure 9	-	1.4	1.75	V
V_{GT}	gate trigger voltage	I_T = 100 mA; V_D = 12 V; see Figure 7	-	0.6	1.5	V
		I_T = 100 mA; $V_D = V_{DRM(max)}$; T_j = 125 °C	0.25	0.4	-	V
I_D	off-state current	$V_D = V_{DRM(max)}$; T_j = 125 °C	-	0.1	0.5	mA
I_R	reverse current	$V_R = V_{RRM(max)}$; T_j = 125 °C	-	0.1	0.5	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 0.67 \times V_{DRM(max)}$; T_j = 125 °C; exponential waveform; see Figure 12				
		R_{GK} = 100 Ω	200	1000	-	V/µs
		gate open circuit	50	130	-	V/µs
t_{gt}	gate-controlled turn-on time	I_{TM} = 40 A; $V_D = V_{DRM(max)}$; I_G = 100 mA; dI_G/dt = 5 A/µs	-	2	-	µs
t_q	commutated turn-off time	$V_{DM} = 0.67 \times V_{DRM(max)}$; T_j = 125 °C; I_{TM} = 20 A; V_R = 25 V; $(dI_T/dt)_M$ = 30 A/µs; dV_D/dt = 50 V/µs; R_{GK} = 100 Ω	-	70	-	µs

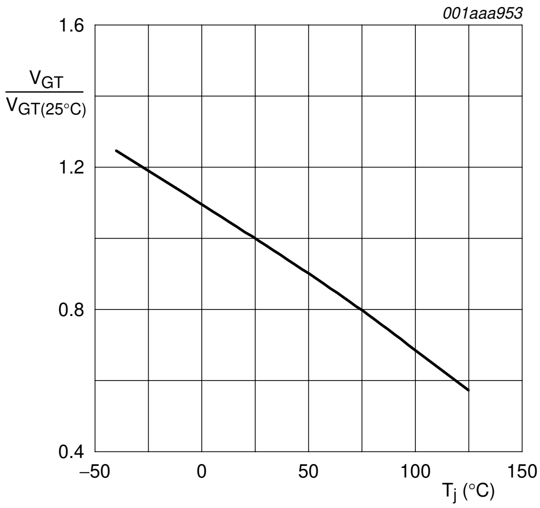


Fig 7. Normalized gate trigger voltage as a function of junction temperature

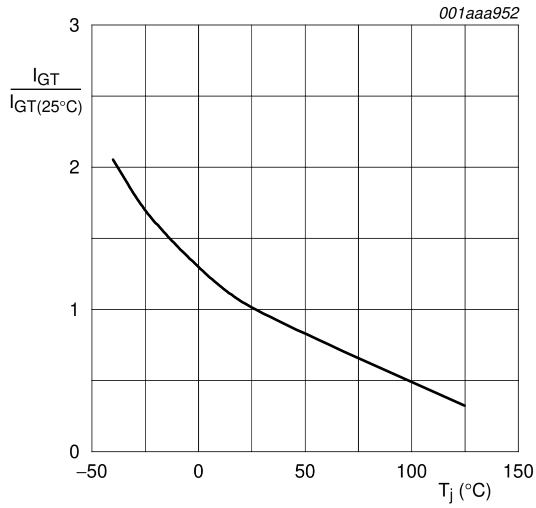
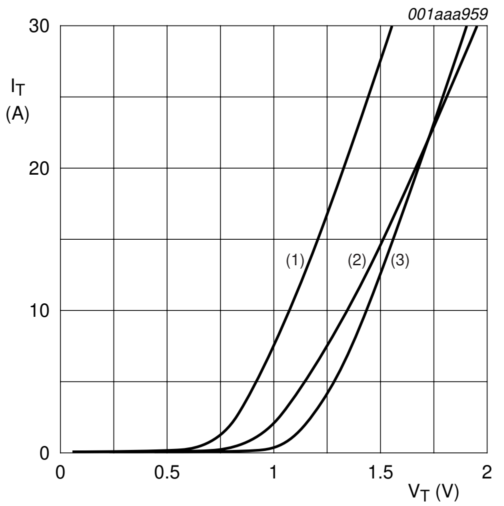


Fig 8. Normalized gate trigger current as a function of junction temperature



V_o = 1.06 V

R_s = 0.0304 Ω

(1) T_j = 125 °C; typical values

(2) T_j = 125 °C; maximum values

(3) T_j = 25 °C; maximum values

Fig 9. On-state current as a function of on-state voltage

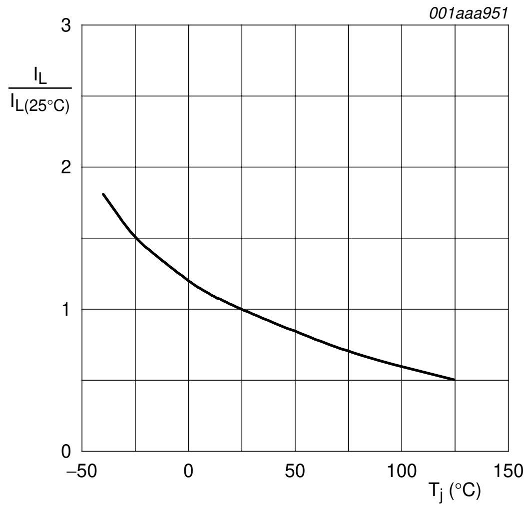


Fig 10. Normalized latching current as a function of junction temperature

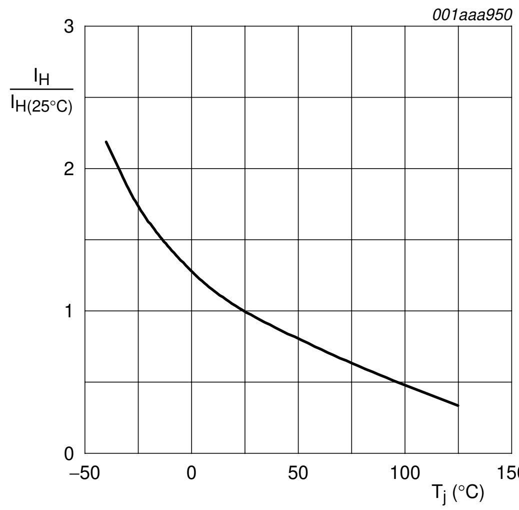
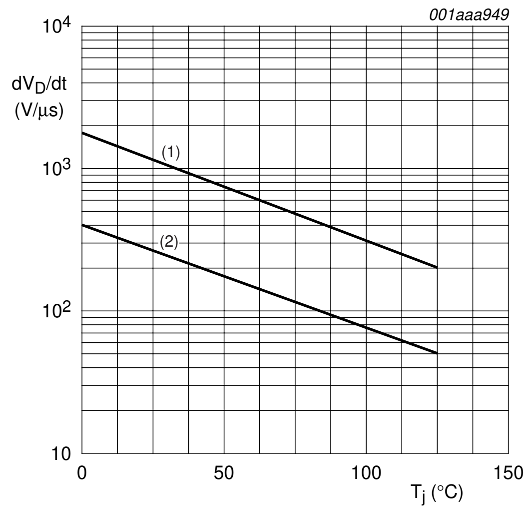


Fig 11. Normalized holding current as a function of junction temperature



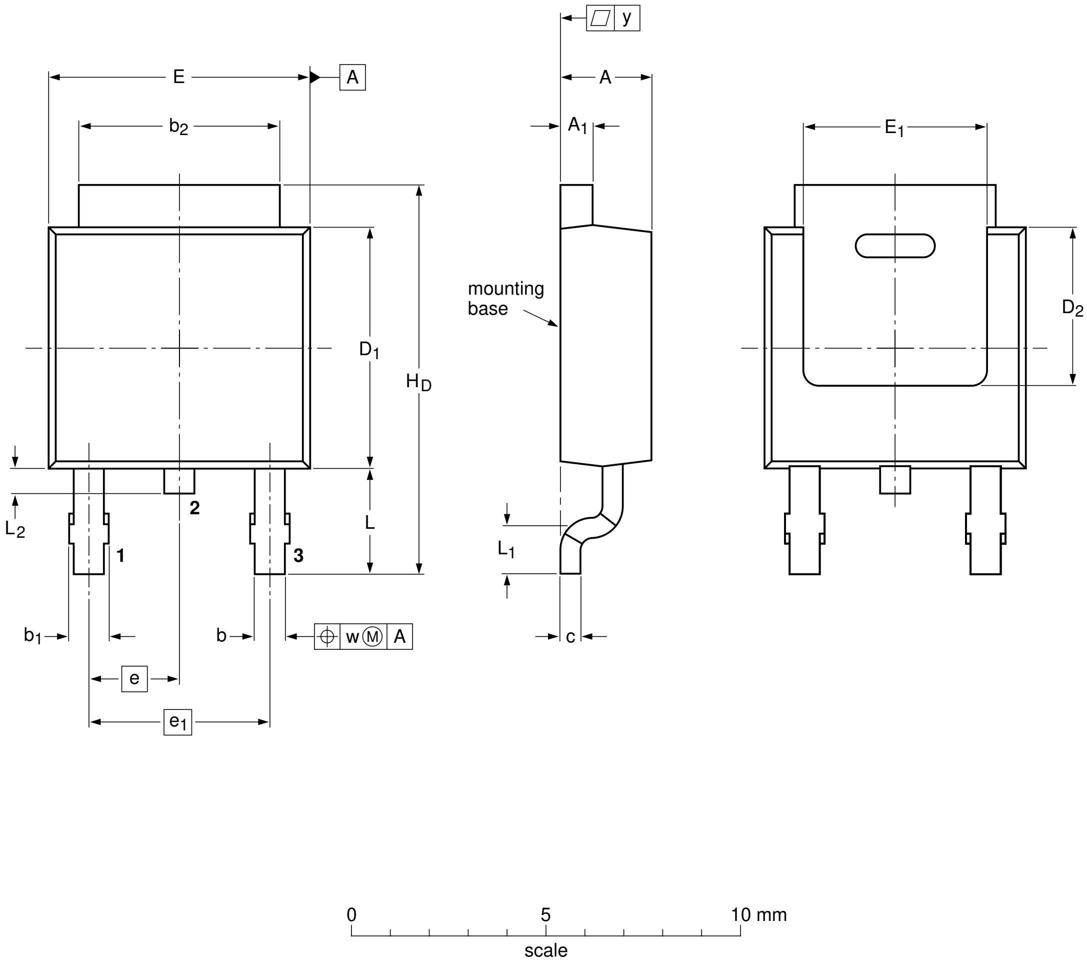
(1) R_{GK} = 100 Ω

(2) Gate open circuit

Fig 12. Critical rate of rise of off-state voltage as a function of junction temperature; minimum values

7. Package outline

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



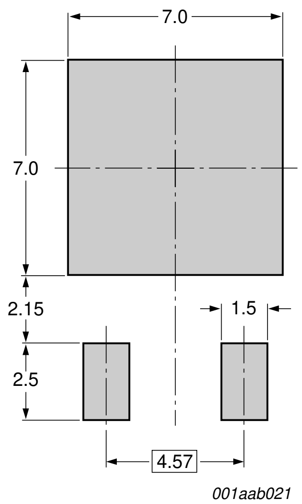
DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1	b_2	c	D_1	D_2 min	E	E_1 min	e	e_1	H_D	L	L_1 min	L_2	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 13. Package outline SOT428 (DPAK)

8. Mounting



Plastic meets requirements of UL94 V-O at 3.175 mm

Fig 14. SOT428: minimum pad size for surface-mounting

9. Revision history

Table 6. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BT151S_SER_L_R_5	20061009	Product data sheet	-	BT151S_SERIES_4
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Added type numbers BT151S-500L and BT151S-650L			
BT151S_SERIES_4 (9397 750 13161)	20040609	Product specification	-	BT151S_SERIES_3
BT151S_SERIES_3	20020101	Product specification	-	BT151S_SERIES_2
BT151S_SERIES_2	19990601	Product specification	-	BT151S_SERIES_1
BT151S_SERIES_1	19970901	Product specification	-	-

10. Legal information

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”.

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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Date of release: 9 October 2006

Document identifier: BT151S_SER_L_R_5