

## 1. General description

Planar passivated Silicon Controlled Rectifier (SCR) in a TO220 plastic package intended for use in applications requiring very high inrush current capability, high thermal cycling performance and high junction temperature capability ( $T_{j(max)} = 150\text{ °C}$ )

## 2. Features and benefits

- High junction operating temperature capability ( $T_{j(max)} = 150\text{ °C}$ )
- Very high current surge capability
- Planar passivated for voltage ruggedness and reliability
- High turn-on current rise  $dI_T/dt = 200\text{ A/}\mu\text{s}$
- High noise immunity  $dV_D/dt = 1000\text{ V/}\mu\text{s}$  up to  $150\text{ °C}$
- High thermal cycling performance
- High voltage capability

## 3. Applications

- Ignition circuits
- Protection circuits e.g. SMPS inrush current
- Motor control circuits and starters
- Voltage regulation
- Solid state relays
- High junction operating temperature capability ( $T_{j(max)} = 150\text{ °C}$ )

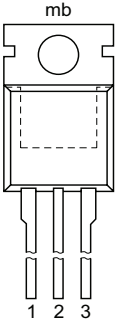

## 4. Quick reference data

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	half sine wave; $T_{mb} \leq 129\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		40			A
$I_{TSM}$	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>		450			A
		half sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 8.3\text{ ms}$		495			A
$T_j$	junction temperature			-40 to 150			°C
Symbol	Parameter	Conditions	Notes	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. 7</a>		5	-	35	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 9</a>		-	-	60	mA
$V_T$	on-state voltage	$I_T = 80\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 10</a>		-	-	1.60	V
<b>Dynamic characteristics</b>							
$dV_D/dt$	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$ ; $T_j = 150\text{ °C}$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ ); exponential waveform; gate open circuit		1000	-	-	V/ $\mu\text{s}$

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		
2	A	anode		
3	G	gate		
mb	A	mounting base; connected to anode		

6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
TYN40-800TN	TO220	TYN40-800TNQ	Tube	50	SOT78	13-Jun-2008

7. Marking

Table 4. Marking codes

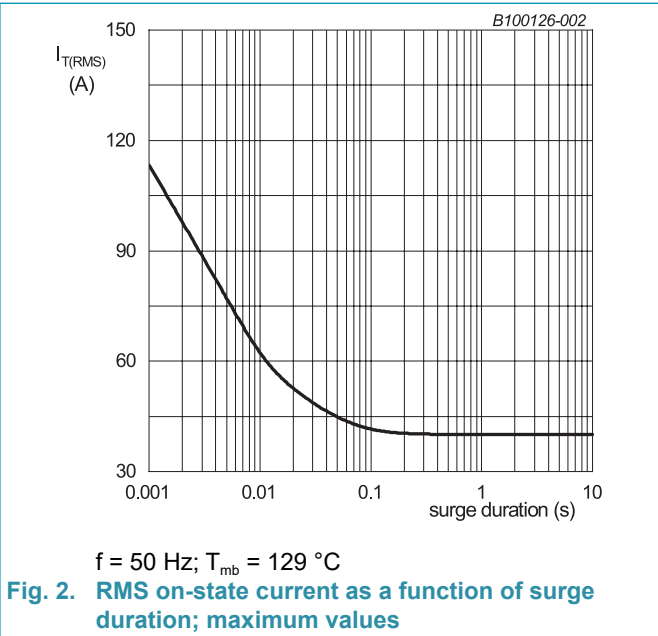
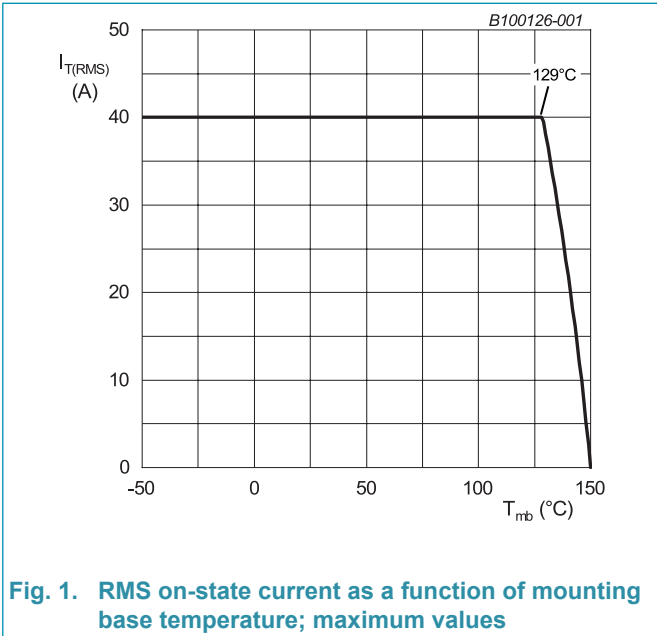
Type number	Marking codes
TYN40-800TN	TYN40 800TN

# 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
$V_{RRM}$	repetitive peak reverse voltage			800	V
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 129\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		40	A
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 10\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>		450	A
		half sine wave; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 8.3\text{ ms}$		495	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; sine-wave pulse		1012.5	$\text{A}^2\text{s}$
$di_T/dt$	rate of rise of on-state current	$I_G = 70\text{ mA}$		200	$\text{A}/\mu\text{s}$
$I_{GM}$	peak gate current	$t_p = 20\text{ }\mu\text{s}$		5	A
$V_{GM}$	peak gate voltage	$t_p = 20\text{ }\mu\text{s}$		5	V
$P_{GM}$	peak gate power	$T_{j(init)} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 20\text{ }\mu\text{s}$		20	W
$P_{G(AV)}$	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	$^{\circ}\text{C}$



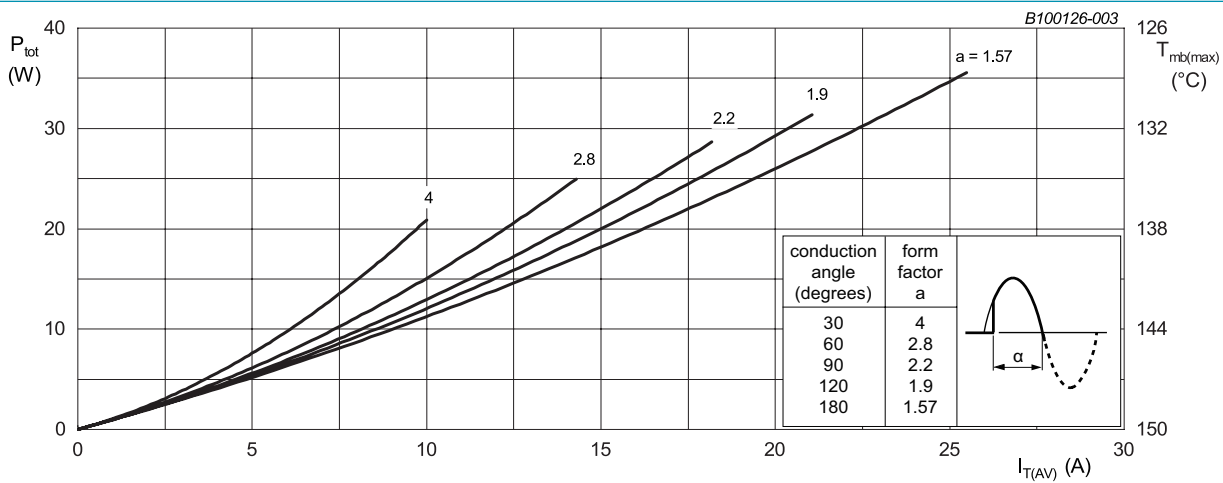


Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values

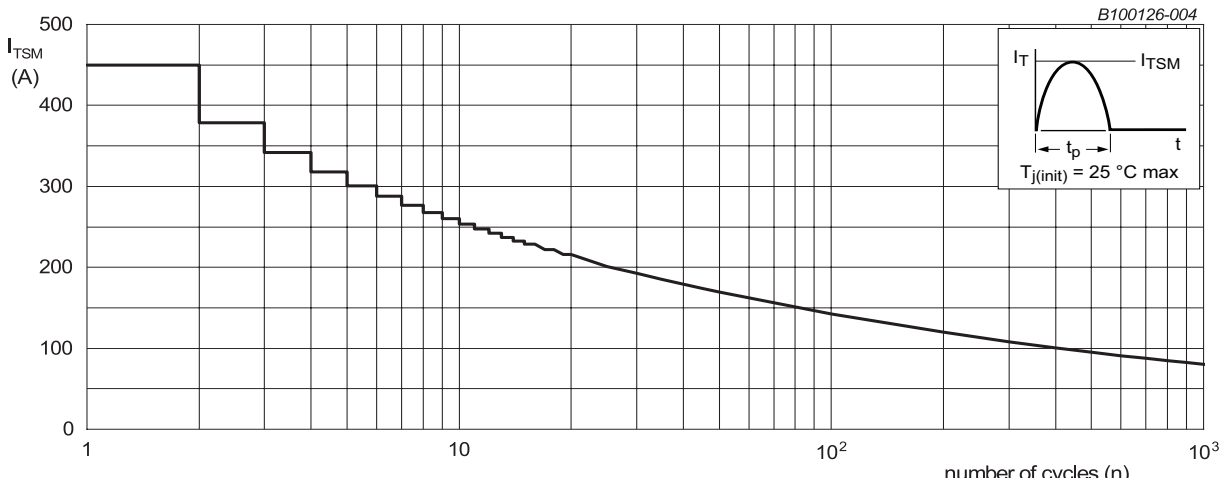


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

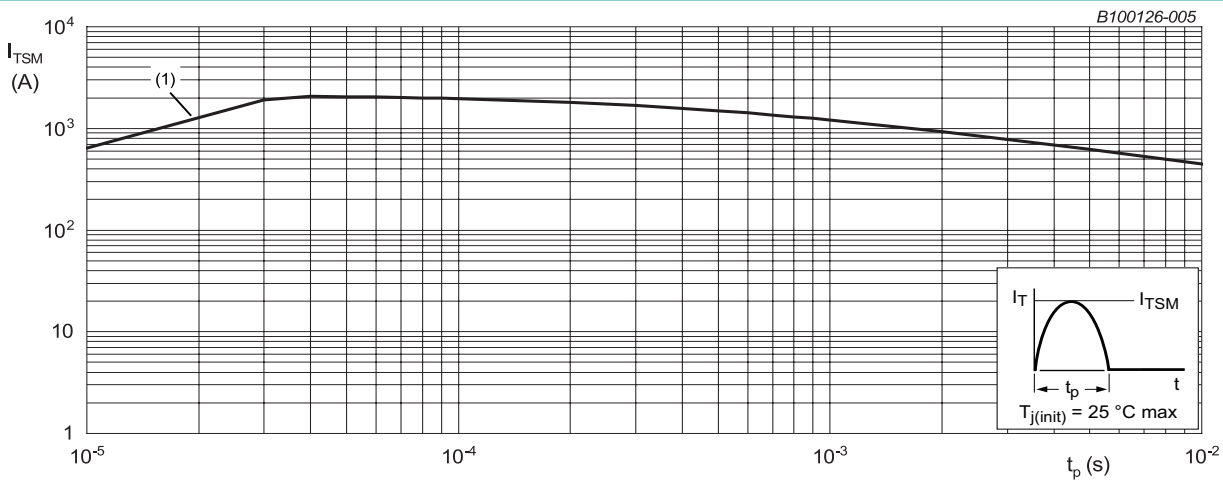
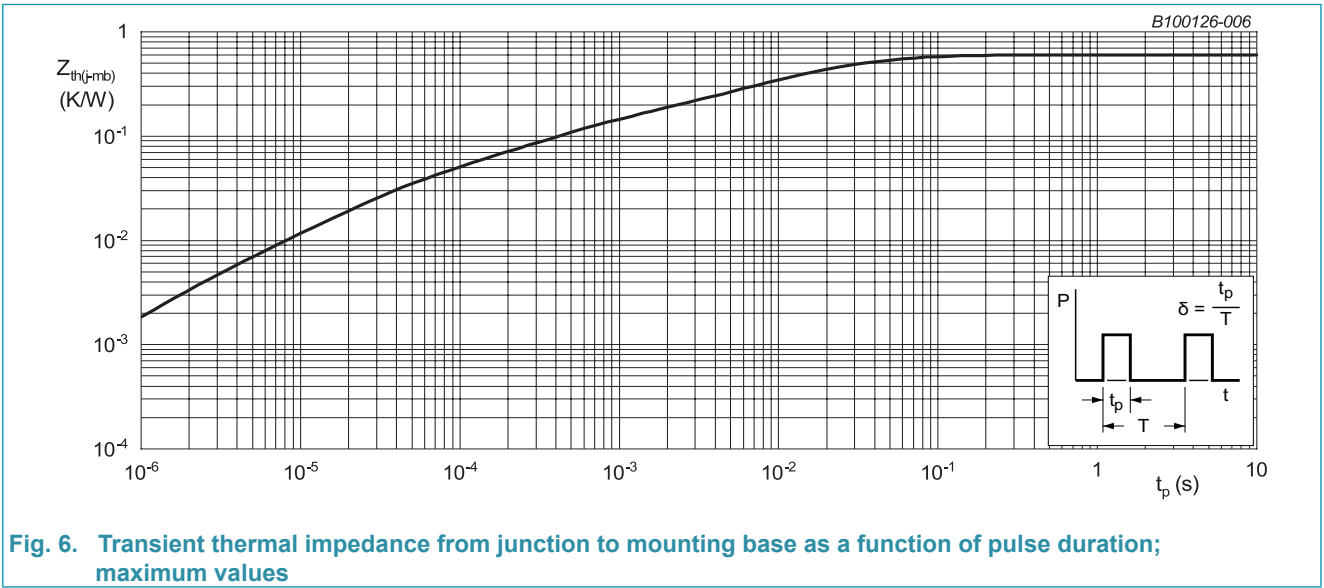


Fig. 5. Non-repetitive peak on-state current as a function of pulse duration; maximum values

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	<a href="#">Fig. 6</a>		-	-	0.6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	60	-	K/W



10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I <sub>GT</sub>	gate trigger current	V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 7</a>		5	-	35	mA
I <sub>L</sub>	latching current	V <sub>D</sub> = 12 V; I <sub>G</sub> = 0.1 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 8</a>		-	-	80	mA
I <sub>H</sub>	holding current	V <sub>D</sub> = 12 V; T <sub>J</sub> = 25 °C; <a href="#">Fig. 9</a>		-	-	60	mA
V <sub>T</sub>	on-state voltage	I <sub>T</sub> = 80 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 10</a>		-	-	1.60	V
V <sub>GT</sub>	gate trigger voltage	V <sub>D</sub> = 12 V; I <sub>T</sub> = 0.1 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 11</a>		-	0.7	1.0	V
		V <sub>D</sub> = 400 V; I <sub>T</sub> = 0.1 A; T <sub>J</sub> = 150 °C		0.25	0.40	-	V
I <sub>D</sub>	off-state current	V <sub>D</sub> = 800 V; T <sub>J</sub> = 25 °C		-	-	10	μA
		V <sub>D</sub> = 800 V; T <sub>J</sub> = 150 °C		-	-	2	mA
I <sub>R</sub>	reverse current	V <sub>D</sub> = 800 V; T <sub>J</sub> = 25 °C		-	-	10	μA
		V <sub>D</sub> = 800 V; T <sub>J</sub> = 150 °C		-	-	2	mA
Dynamic characteristics							
dV <sub>D</sub> /dt	rate of rise of off-state voltage	V <sub>DM</sub> = 536 V; T <sub>J</sub> = 150 °C; (V <sub>DM</sub> = 67% of V <sub>DRM</sub> ); exponential waveform; gate open circuit		1000	-	-	V/μs
t <sub>gt</sub>	gate-controlled turn-on time	I <sub>TM</sub> = 80 A; V <sub>D</sub> = 800 V; I <sub>G</sub> = 0.1 A; dI <sub>G</sub> /dt = 0.2 A/μs; T <sub>J</sub> = 25 °C		-	2	-	μs
t <sub>q</sub>	commutated turn-off time	V <sub>DM</sub> = 536 V; T <sub>J</sub> = 150 °C; I <sub>TM</sub> = 40 A; V <sub>R</sub> = 25 V; (d <sub>IT</sub> /d <sub>i</sub> )M = 30 A/μs; dV <sub>D</sub> /dt = 50 V/μs; (V <sub>DM</sub> = 67% of V <sub>DRM</sub> );		-	70	-	μs

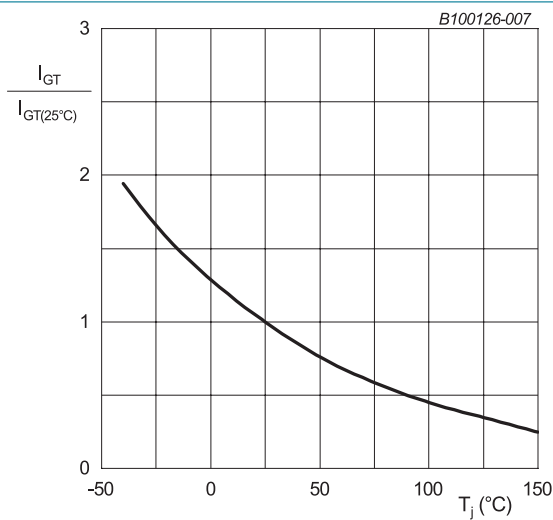


Fig. 7. Normalized gate trigger current as a function of junction temperature

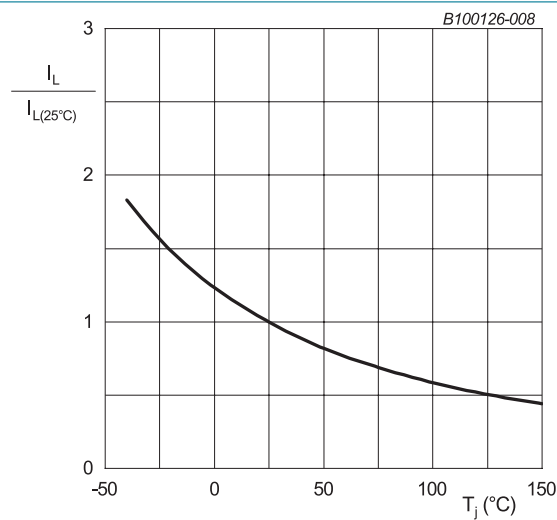


Fig. 8. Normalized latching current as a function of junction temperature

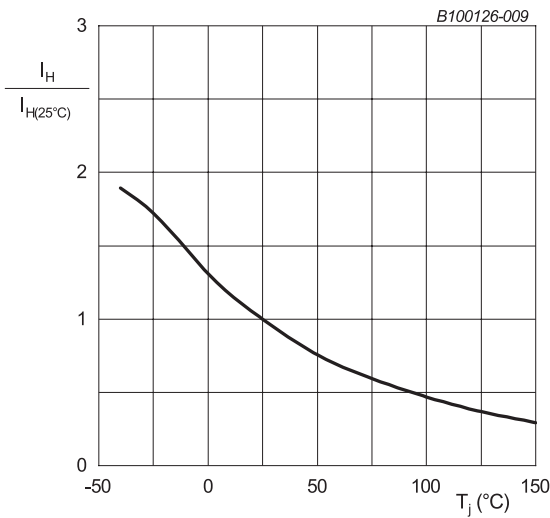
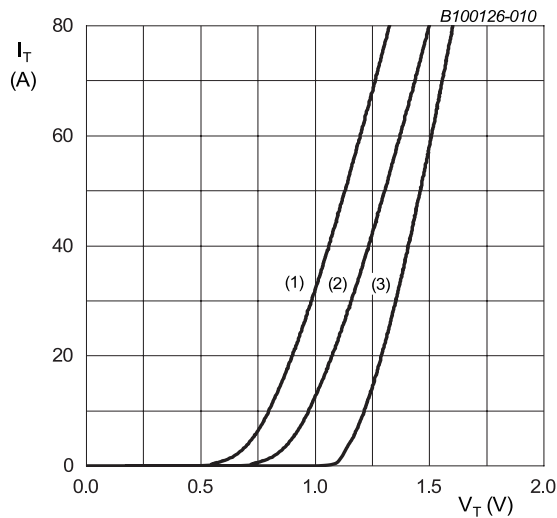


Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 0.948\text{ V}; R_s = 0.0071\ \Omega$   
(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. 10. On-state current as a function of on-state voltage

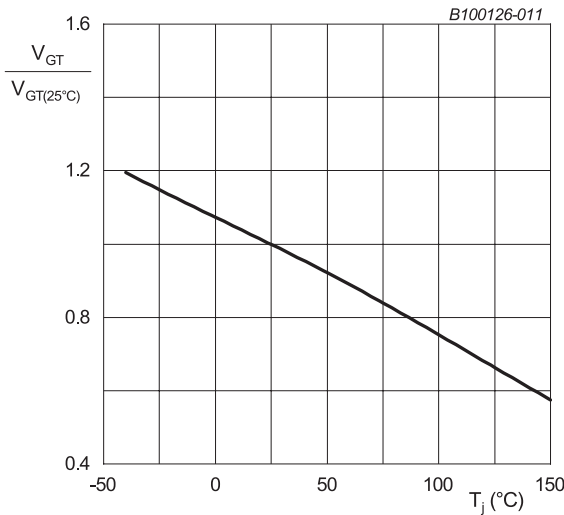
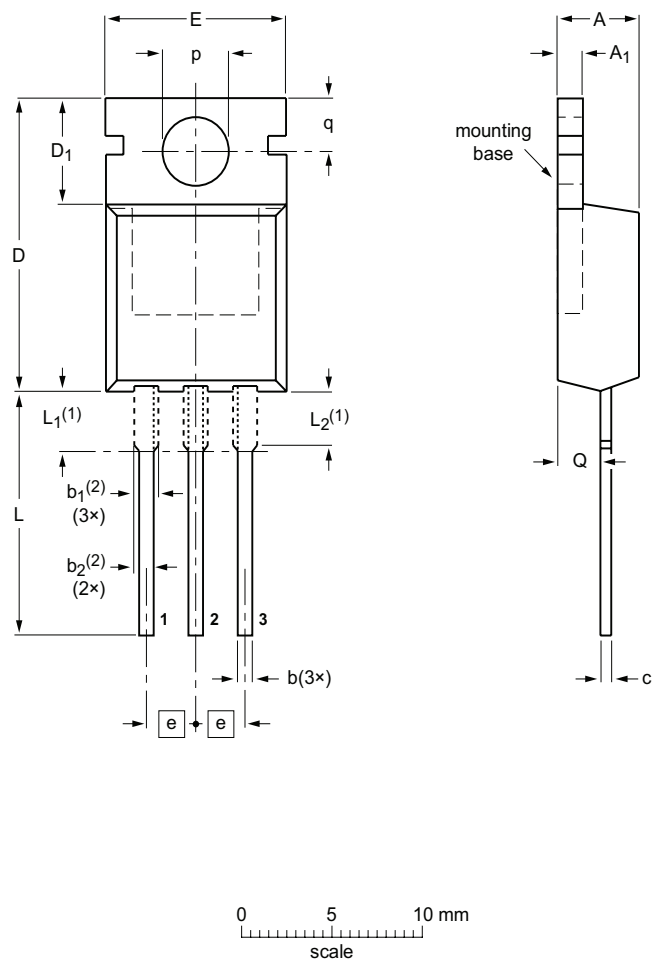


Fig. 10. Normalized gate trigger voltage as a function of junction temperature

11. Package outline

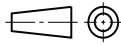
Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB SOT78



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub>	b	b <sub>1</sub> (2)	b <sub>2</sub> (2)	c	D	D <sub>1</sub>	E	e	L	L <sub>1</sub> (1)	L <sub>2</sub> (1) max.	p	q	Q
mm	4.7 4.1	1.40 1.25	0.9 0.6	1.6 1.0	1.3 1.0	0.7 0.4	16.0 15.2	6.6 5.9	10.3 9.7	2.54	15.0 12.8	3.30 2.79	3.0	3.8 3.5	3.0 2.7	2.6 2.2

- Notes
1. Lead shoulder designs may vary.
  2. Dimension includes excess dambar.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT78		3-lead TO-220AB	SC-46			08-04-23 08-06-13



# 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.

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