

## 1. General description

Planar passivated Silicon Controlled Rectifier (SCR) in IITO220 internally insulated 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 ( $T_{j(max)} = 150\text{ °C}$ )
- High bidirectional blocking voltage capability
- Very high current surge capability
- High thermal cycling performance
- Planar passivated for voltage ruggedness and reliability
- Internally insulated package
- Isolated mounting base with 2500 V (RMS) isolation

## 3. Applications

- High voltage capability
- Protection circuit in Power Supplies for Consumer / Industrial / Medical Equipment
- Capacitive Discharge Ignition (CDI)
- Crowbar protection
- Inrush protection
- Motor control
- Voltage regulation

## 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; $T_{mb} \leq 85\text{ °C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		50			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>		500			A
		half sine wave; $T_{j(init)} = 25\text{ °C}$ ; $t_p = 8.3\text{ ms}$		550			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>		-	-	15	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	$I_T = 100\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 10</a>		-	-	1.65	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		500	-	-	V/ $\mu$ 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	n.c.	mounting base; isolated		

## 6. Ordering information

**Table 3. Ordering information**

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
TYN50Y-800T	IITO220	TYN50Y-800TQ	Tube	50	SOT78D	07-July-2010

## 7. Marking

**Table 4. Marking codes**

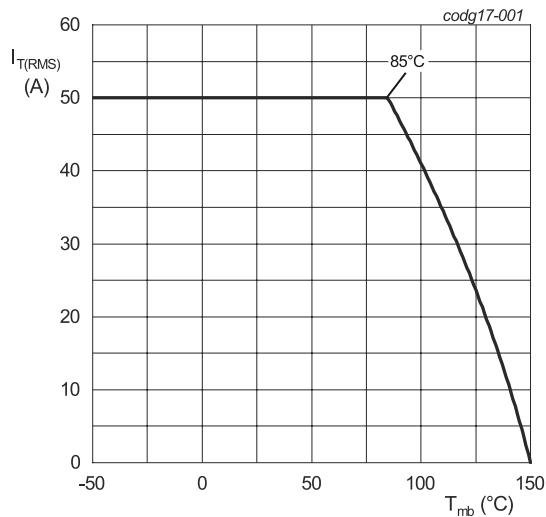
Type number	Marking codes
TYN50Y-800T	TYN50Y 800T

## 8. Limiting values

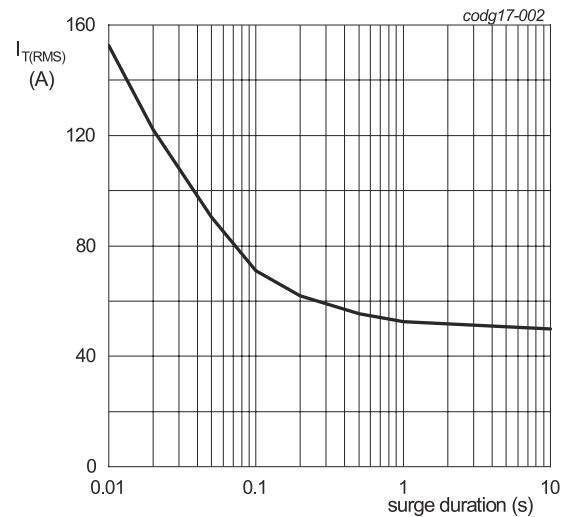
**Table 5. Limiting values**

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
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq 85\text{ }^{\circ}\text{C}$ ;		32	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 85\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		50	A
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 10\text{ ms}$ ; <a href="#">Fig. 4</a> ; <a href="#">Fig. 5</a>		500	A
		half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 8.3\text{ ms}$		550	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; sine-wave pulse		1250	$\text{A}^2\text{s}$
$di_T/dt$	rate of rise of on-state current	$I_G = 30\text{ mA}$		150	$\text{A}/\mu\text{s}$
$I_{GM}$	peak gate current			5	A
$V_{GM}$	peak gate voltage			5	V
$P_{GM}$	peak gate power			20	W
$P_{G(AV)}$	average gate power	over any 20 ms period		1	W
$T_{stg}$	storage temperature			-40 to 150	$^{\circ}\text{C}$
$T_j$	junction temperature			-40 to 150	$^{\circ}\text{C}$

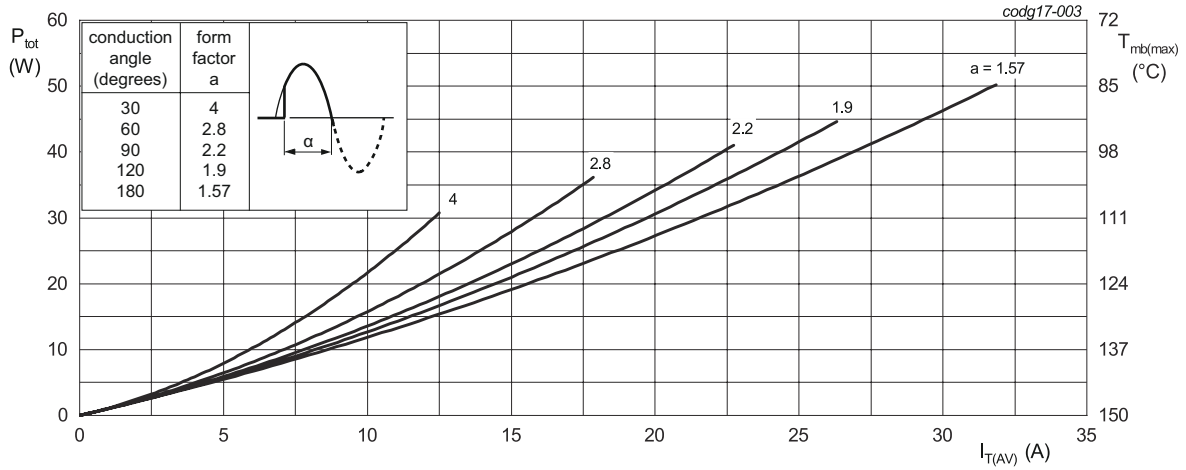


**Fig. 1. RMS on-state current as a function of mounting base temperature; maximum values**



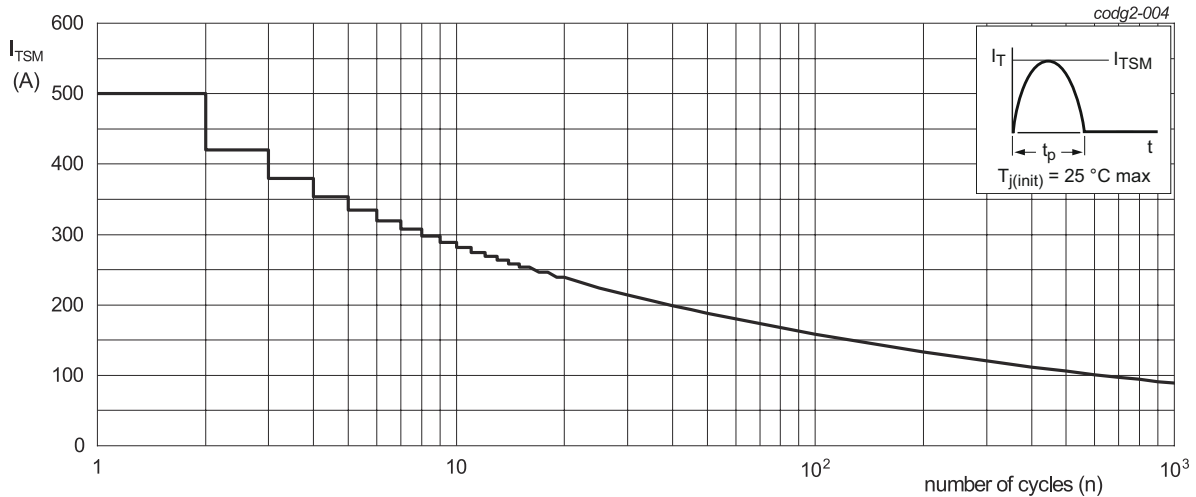
$f = 50\text{ Hz}$ ;  $T_{mb} = 85\text{ }^{\circ}\text{C}$

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



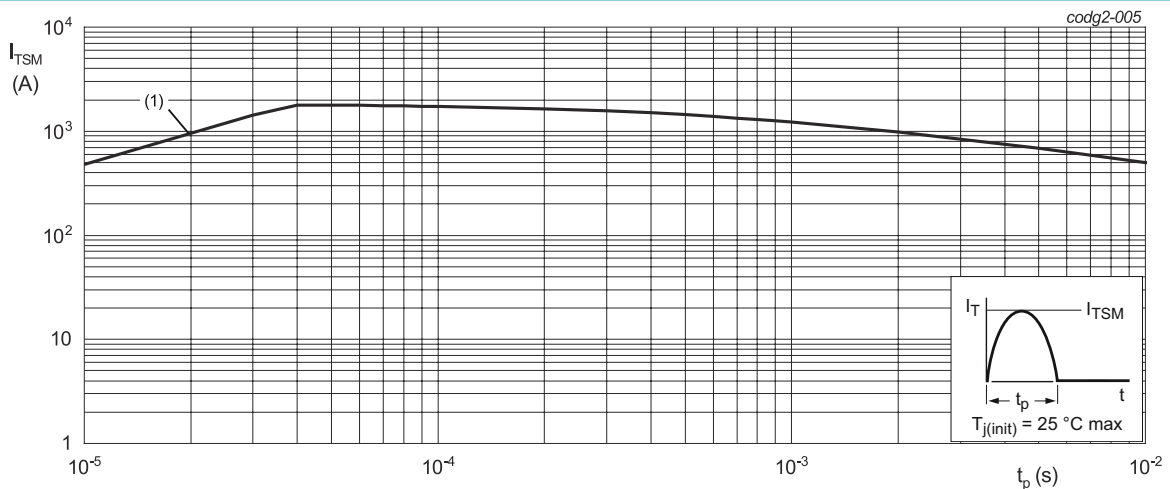
$\alpha$  = conduction angle  
 $a$  = form factor =  $I_{T(RMS)} / I_{T(AV)}$

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



$f = 50 \text{ Hz}$

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



$t_p \leq 10 \text{ ms}$   
 (1)  $di_T/dt$  limit

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>		-	-	1.3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	60	-	K/W

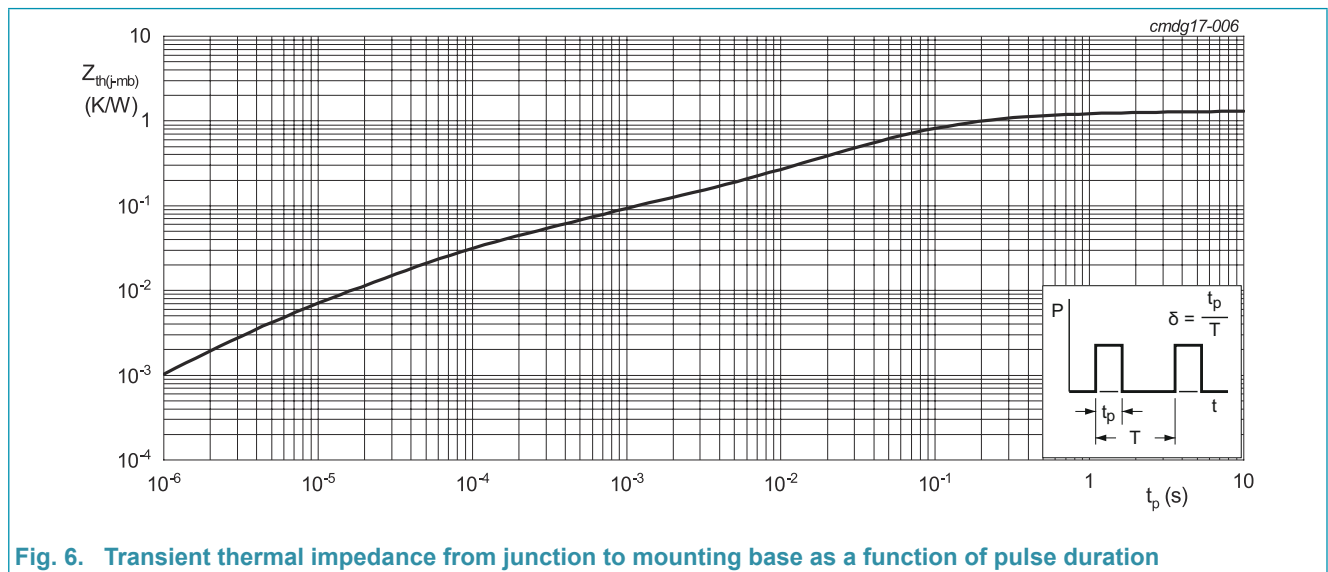


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration

## 10. Isolation characteristics

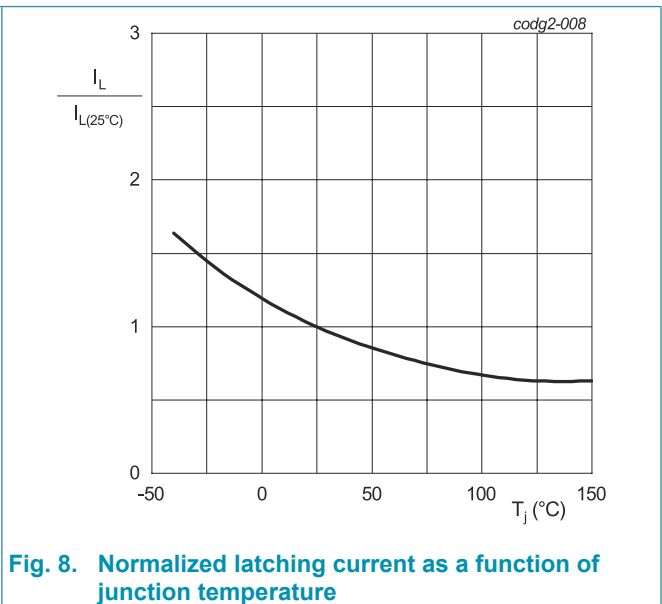
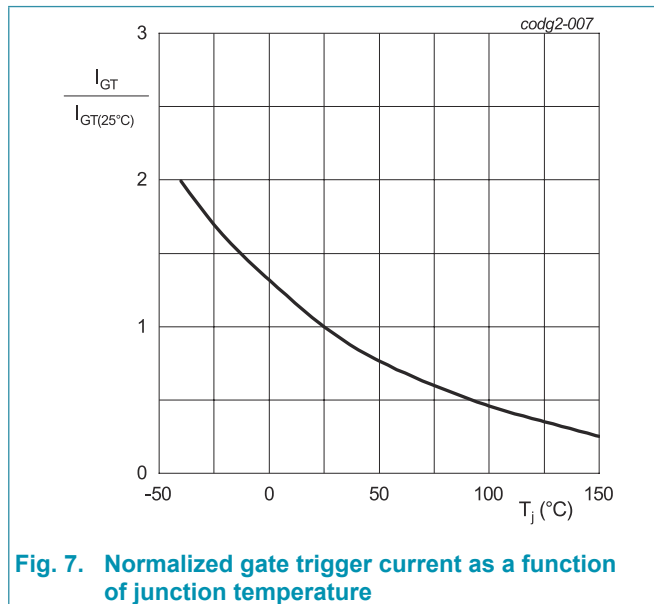
Table 7. Isolation characteristics

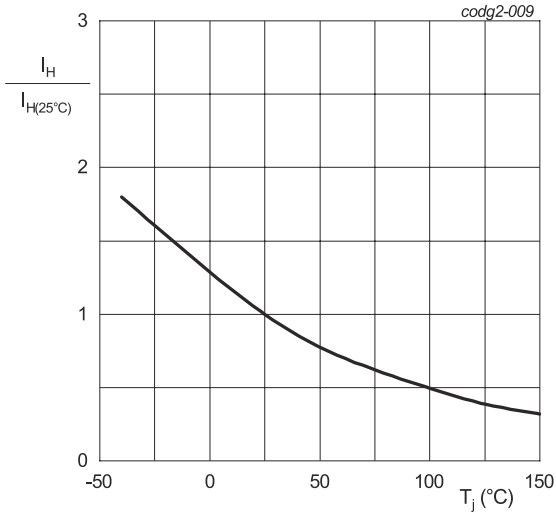
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	50 Hz $\leq$ f $\leq$ 60 Hz; RH $\leq$ 65 %; from all pins to external heatsink; sinusoidal waveform; clean and dust free		-	-	2500	V
$C_{isol}$	isolation capacitance	from cathode to external heatsink		-	10	-	pF

## 11. Characteristics

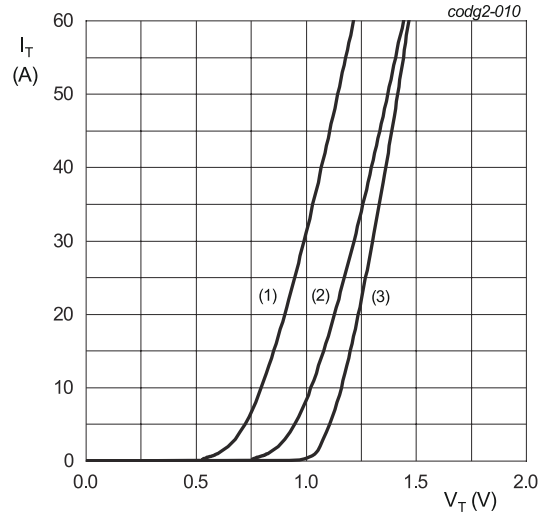
Table 8. Characteristics

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>		-	-	15	mA
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 8</a>		-	-	80	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	$I_T = 100\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 10</a>		-	-	1.65	V
$V_{GT}$	gate trigger voltage	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 11</a>		-	0.7	1.2	V
		$V_D = 800\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 150\text{ °C}$		0.25	0.5	-	V
$I_D$	off-state current	$V_D = 800\text{ V}$ ; $T_j = 25\text{ °C}$		-	-	5	$\mu\text{A}$
		$V_D = 800\text{ V}$ ; $T_j = 150\text{ °C}$		-	-	2	mA
$I_R$	reverse current	$V_D = 800\text{ V}$ ; $T_j = 25\text{ °C}$		-	-	5	$\mu\text{A}$
		$V_D = 800\text{ V}$ ; $T_j = 150\text{ °C}$		-	-	2	mA
<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		500	-	-	V/ $\mu\text{s}$
$t_{gt}$	gate-controlled turn-on time	$I_{TM} = 50\text{ A}$ ; $V_D = 800\text{ V}$ ; $I_G = 30\text{ mA}$ ; $dI_G/dt = 5\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$		-	2	-	$\mu\text{s}$
$t_q$	commutated turn-off time	$I_{TM} = 2\text{ A}$ ; $t_p = 50\text{ }\mu\text{s}$ ; $dV/dt = 5\text{ V}/\mu\text{s}$ ; $dI/dt = 30\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$		-	-	25	$\mu\text{s}$



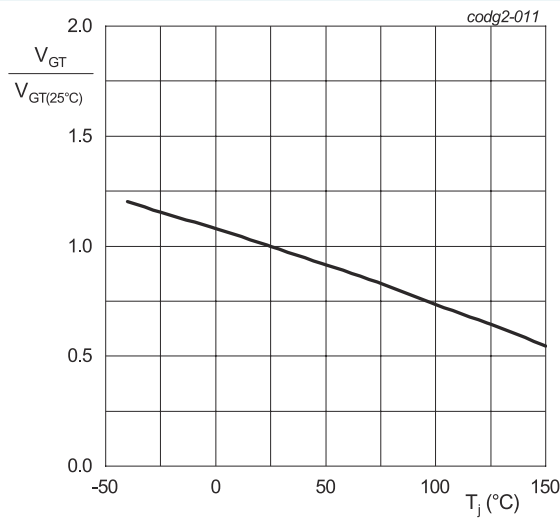


**Fig. 9. Normalized holding current as a function of junction temperature**



$V_o = 1.006 \text{ V}$ ;  $R_s = 0.0073 \Omega$   
 (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. 10. On-state current as a function of on-state voltage**

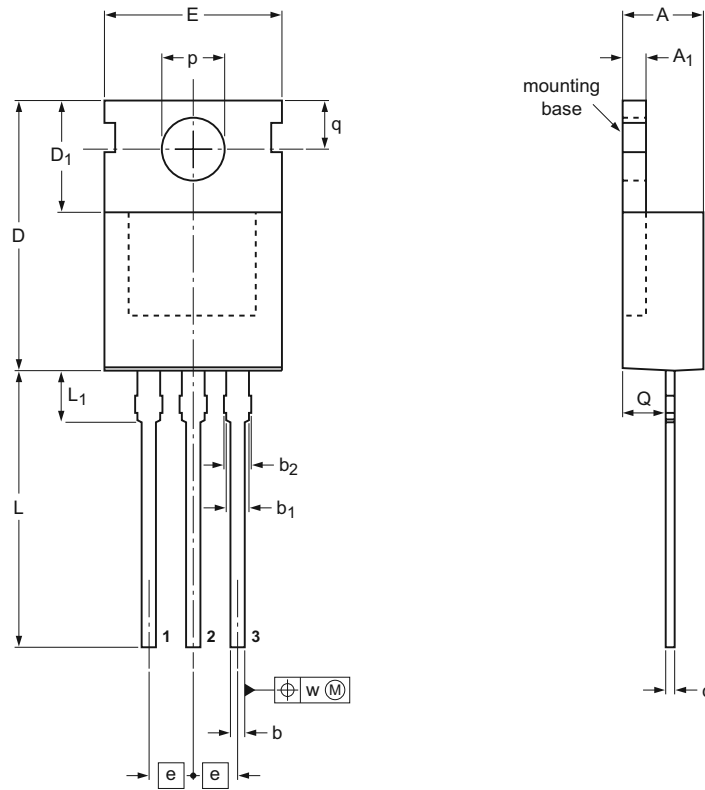


**Fig. 11. Normalized gate trigger voltage as a function of junction temperature**

## 12. Package outline

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

SOT78D



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub>	b	b <sub>1</sub>	b <sub>2</sub>	c	D	D <sub>1</sub> ref	E	e	L	L <sub>1</sub> ref	p	Q	q	w
mm	4.7 4.3	1.40 1.25	0.9 0.6	1.4 1.1	1.72 1.32	0.6 0.4	16.0 15.2	6.5	10.3 9.7	2.54	14.0 12.8	3.0	3.7 3.5	2.6 2.2	3.0 2.7	0.2

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT78D		TO-220				07-04-04 07-07-10



## 13. 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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