

TYN16X-600RT

SCR

19 July 2012

Product data sheet

1. Product profile

1.1 General description

Planar passivated Silicon Controlled Rectifier (SCR) in a SOT186A (TO-220F) "full pack" plastic package intended for use in applications requiring very high inrush current capability, high thermal cycling performance and high junction temperature capability ($T_{j(max)} = 150\text{ °C}$).

1.2 Features and benefits

- High junction operating temperature capability
- High thermal cycling performance
- High voltage capability
- Isolated package
- Planar passivated for voltage ruggedness and reliability
- Very high current surge capability

1.3 Applications

- Ignition circuits
- Motor control
- Protection circuits e.g. SMPS inrush current
- Voltage regulation

1.4 Quick reference data

Table 1. Quick reference data

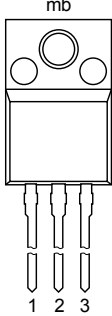
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DRM}	repetitive peak off-state voltage		-	-	600	V
V_{RRM}	repetitive peak reverse voltage		-	-	600	V
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 10\text{ ms}$; Fig. 4 ; Fig. 5	-	-	210	A
		half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$	-	-	231	A
T_j	junction temperature		-	-	150	°C
$I_{T(AV)}$	average on-state current	half sine wave; $T_h \leq 86\text{ °C}$; Fig. 3	-	-	10.2	A



Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_h \leq 86^\circ\text{C}$; Fig. 1 ; Fig. 2	-	-	16	A
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25^\circ\text{C}$; Fig. 7	-	4.5	25	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 402\text{ V}$; $T_j = 150^\circ\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit	300	-	-	V/ μs

2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 TO-220F (SOT186A)	
2	A	anode		
3	G	gate		
mb	n.c.	mounting base; isolated		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
TYN16X-600RT	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220 "full pack"	SOT186A

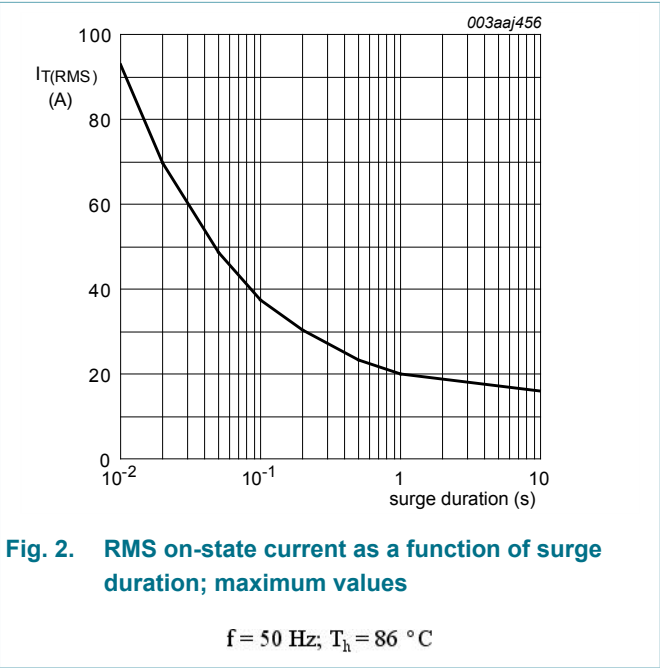
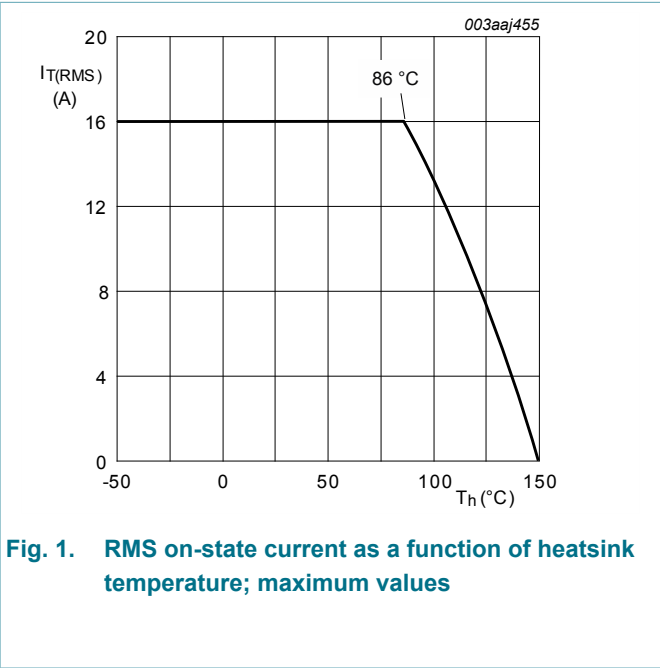
4. Limiting values

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		-	600	V
V_{RRM}	repetitive peak reverse voltage		-	600	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_h \leq 86^\circ\text{C}$; Fig. 3	-	10.2	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_h \leq 86^\circ\text{C}$; Fig. 1 ; Fig. 2	-	16	A

Symbol	Parameter	Conditions	Min	Max	Unit
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$; $t_p = 10\text{ ms}$; Fig. 4; Fig. 5	-	210	A
		half sine wave; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$; $t_p = 8.3\text{ ms}$	-	231	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN	-	220.5	A^2s
dl_T/dt	rate of rise of on-state current	$I_T = 40\text{ A}$; $I_G = 200\text{ mA}$; $dl_G/dt = 200\text{ mA}/\mu\text{s}$	-	50	$\text{A}/\mu\text{s}$
I_{GM}	peak gate current		-	5	A
V_{RGM}	peak reverse 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	150	$^{\circ}\text{C}$
T_j	junction temperature		-	150	$^{\circ}\text{C}$



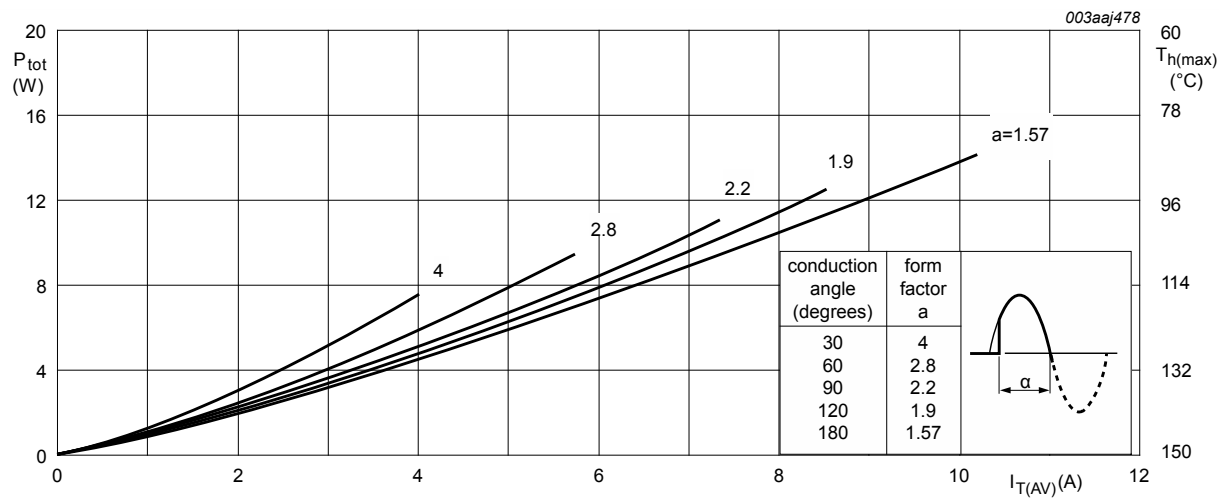


Fig. 3. Total power dissipation as a function of average on-state current; maximum values

$$a = \text{form factor} = I_{T(RMS)} / I_{T(AV)}$$

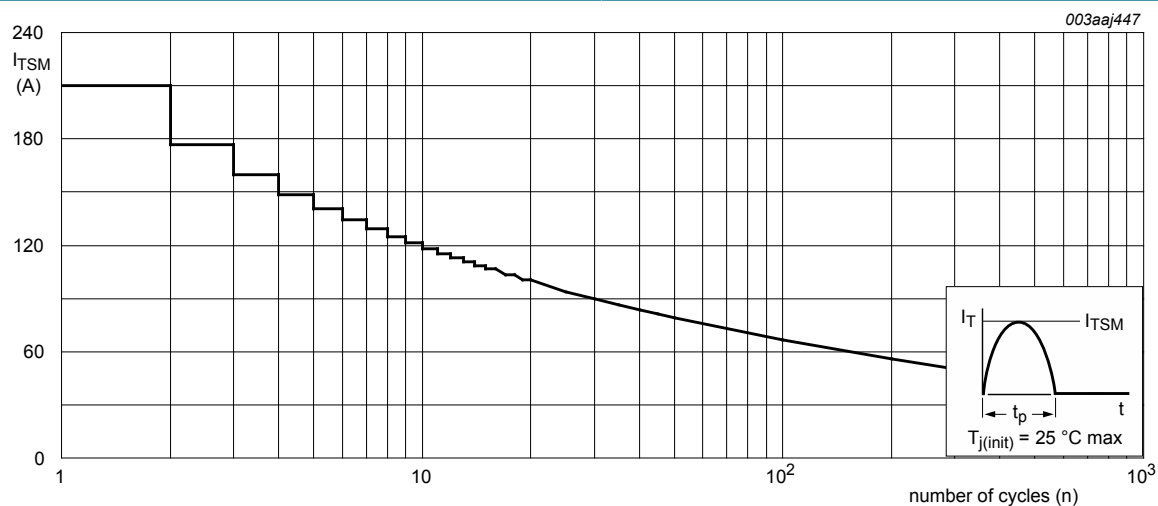
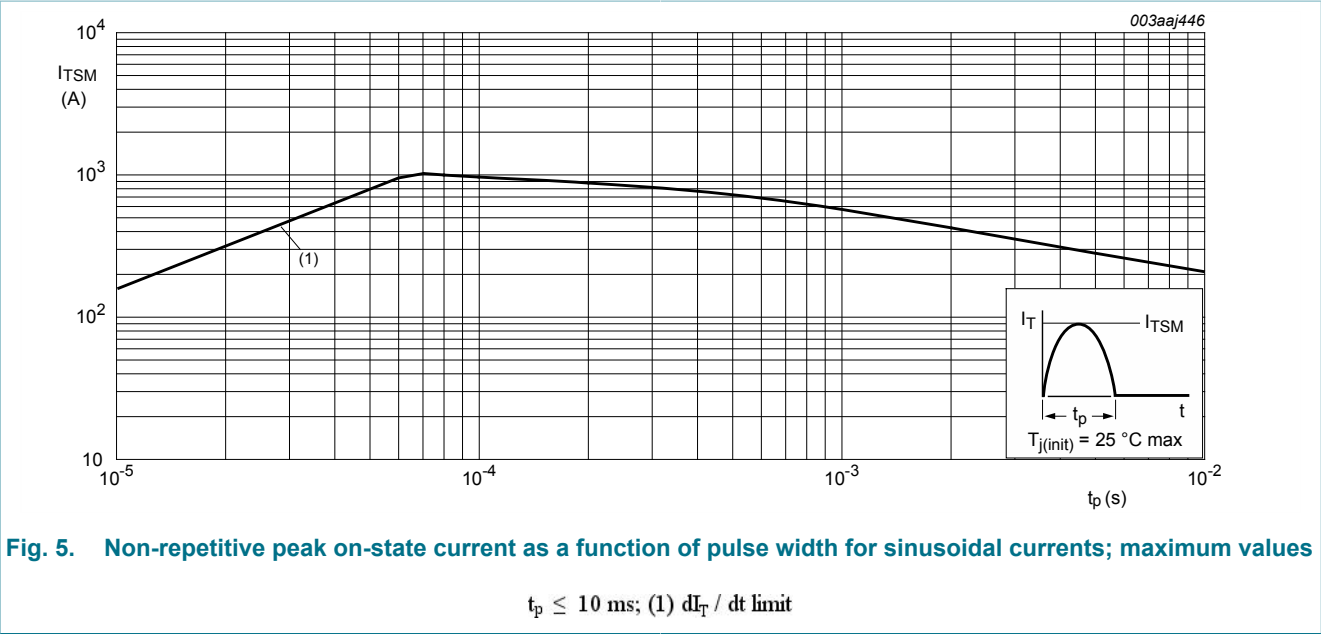


Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values

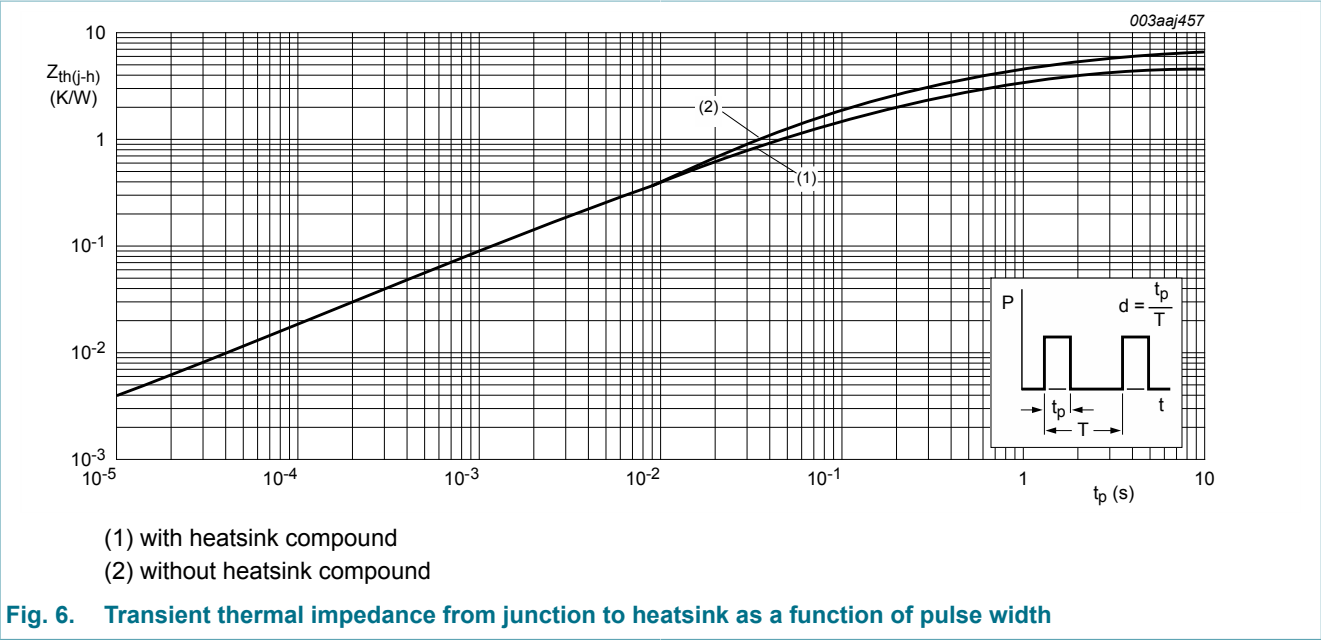
$$f = 50 \text{ Hz}$$



5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	full or half cycle; with heatsink compound; Fig. 6		-	-	4.5	K/W
		full or half cycle; without heatsink compound; Fig. 6		-	-	6.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	55	-	K/W



6. Isolation characteristics

Table 6. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	from all terminals to external heatsink; sinusoidal waveform; clean and dust free ; 50 Hz ≤ f ≤ 60 Hz; RH ≤ 65 %; T _h = 25 °C	-	-	2500	V
C_{isol}	isolation capacitance	from anode to external heatsink ; f = 1 MHz; T _h = 25 °C	-	10	-	pF

7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	V _D = 12 V; I _T = 0.1 A; T _j = 25 °C; Fig. 7	-	4.5	25	mA
I_L	latching current	V _D = 12 V; I _G = 0.1 A; T _j = 25 °C; Fig. 8	-	21	60	mA
I_H	holding current	V _D = 12 V; T _j = 25 °C; Fig. 9	-	16	40	mA
V_T	on-state voltage	I _T = 32 A; T _j = 25 °C; Fig. 10	-	1.2	1.5	V
V_{GT}	gate trigger voltage	V _D = 12 V; I _T = 0.1 A; T _j = 25 °C; Fig. 11	-	0.7	1.3	V
		V _D = 400 V; I _T = 0.1 A; T _j = 150 °C; Fig. 11	0.2	0.4	-	V

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_D	off-state current	$V_D = 600\text{ V}$; $T_j = 150\text{ }^{\circ}\text{C}$		-	0.2	1	mA
I_R	reverse current	$T_j = 150\text{ }^{\circ}\text{C}$; $V_R = 600\text{ V}$		-	0.2	1	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 402\text{ V}$; $T_j = 150\text{ }^{\circ}\text{C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit		300	-	-	V/ μ s

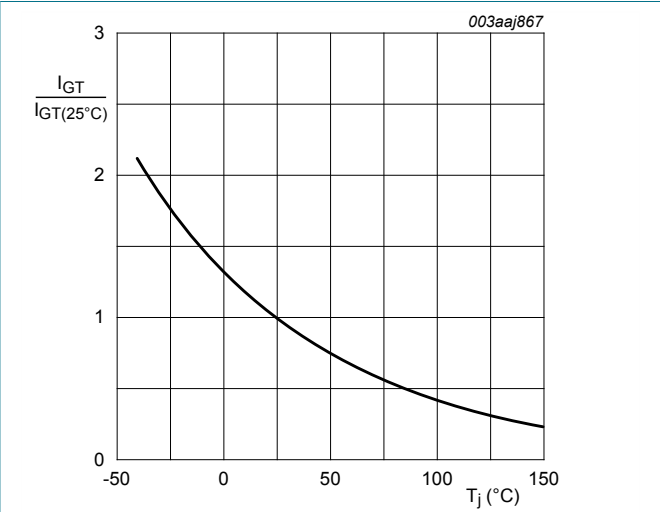


Fig. 7. Normalized gate trigger current as a function of junction temperature

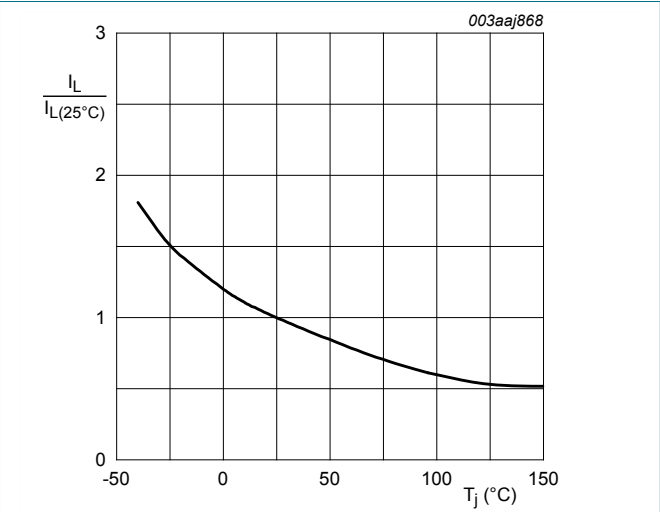


Fig. 8. Normalized latching current as a function of junction temperature

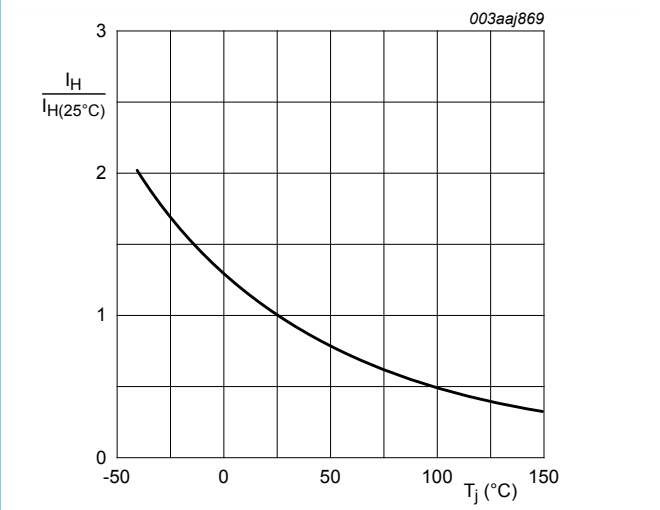


Fig. 9. Normalized holding current as a function of junction temperature

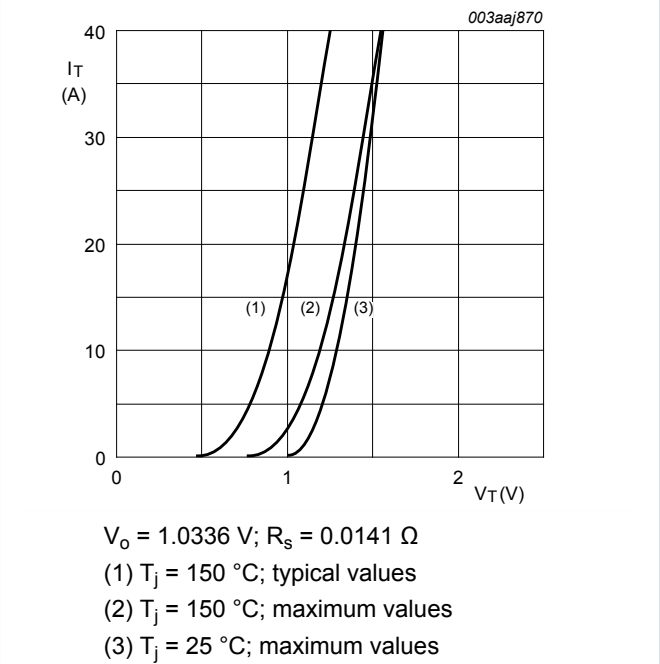


Fig. 10. On-state current as a function of on-state voltage

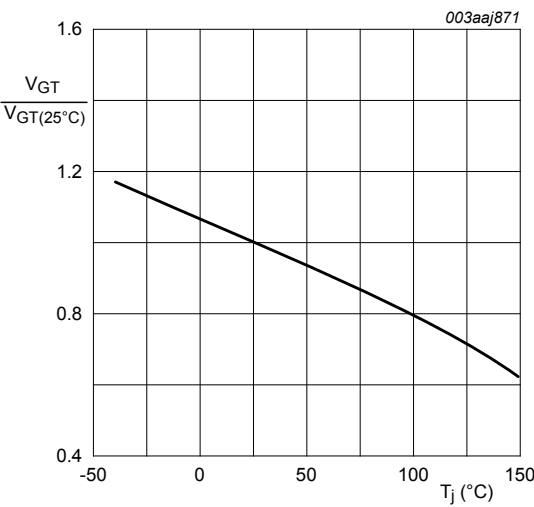


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

8. Package outline

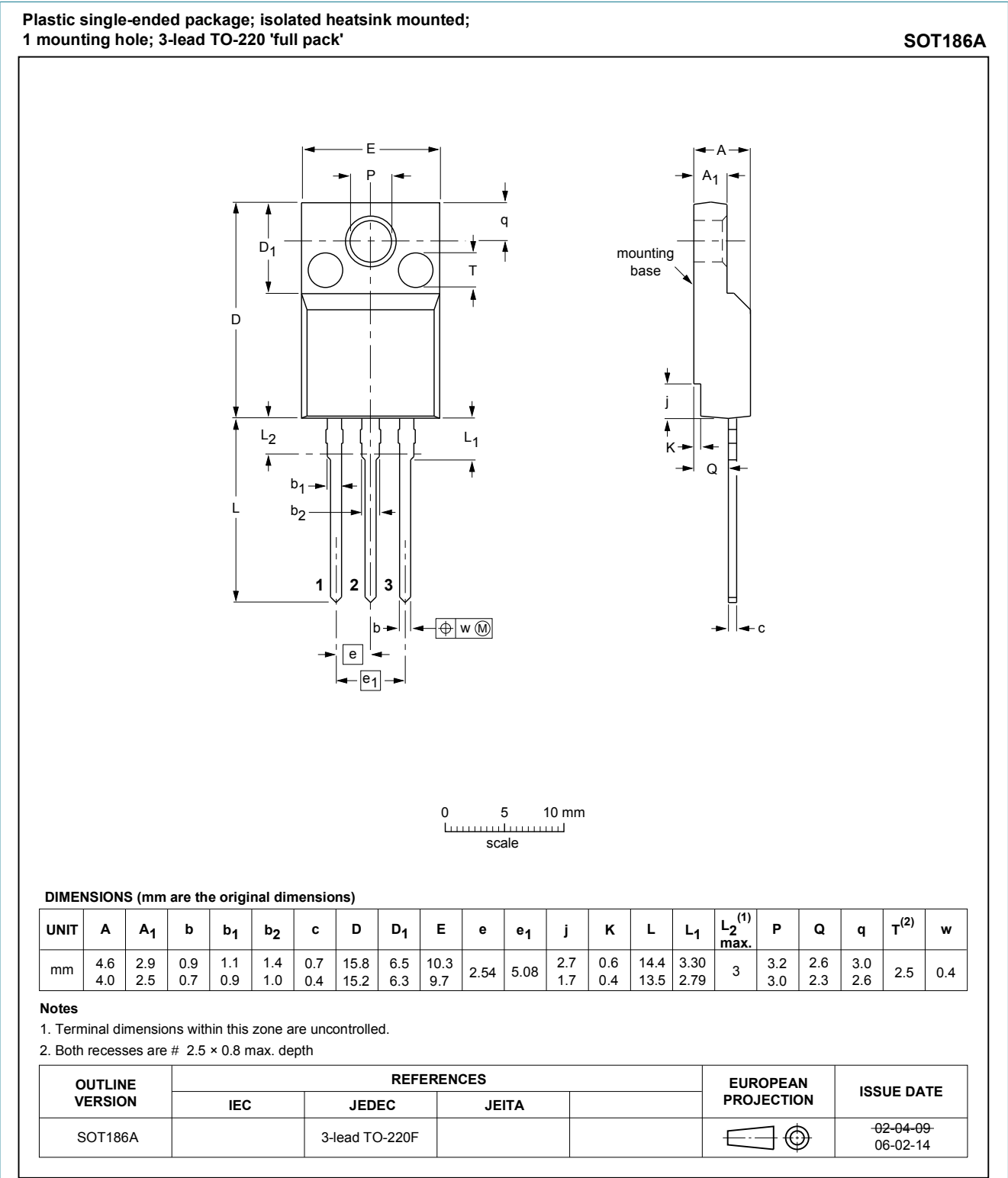


Fig. 12. TO-220F (SOT186A)

9. Legal information

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

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