



TYN16X-600CT

SCR

Rev. 1 — 20 March 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 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
- Planar passivated for voltage ruggedness and reliability

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; $T_{j(init)} = 25\text{ °C}$; $t_p = 10\text{ ms}$; see Figure 4 ; see Figure 5	-	-	180	A
		half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$	-	-	198	A
T_j	junction temperature		-	-	150	°C
$I_{T(AV)}$	average on-state current	half sine wave; $T_h \leq 81\text{ °C}$; see Figure 3	-	-	10.2	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_h \leq 81\text{ °C}$; see Figure 1 ; see Figure 2	-	-	16	A
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; see Figure 7	-	-	15	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 402\text{ V}$; $T_j = 150\text{ °C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit	500	-	-	V/ μ s



2. 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		

SOT186A (TO-220F)

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
TYN16X-600CT	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; $T_h \leq 81\text{ }^\circ\text{C}$; see Figure 3	-	10.2	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_h \leq 81\text{ }^\circ\text{C}$; see Figure 1 ; see Figure 2	-	16	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; $t_p = 10\text{ ms}$; see Figure 4 ; see Figure 5	-	180	A
		half sine wave; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; $t_p = 8.3\text{ ms}$	-	198	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; sine-wave pulse	-	162	A^2s
di_T/dt	rate of rise of on-state current	$I_T = 40\text{ A}$; $I_G = 200\text{ mA}$; $dI_G/dt = 200\text{ mA}/\mu\text{s}$	-	50	$\text{A}/\mu\text{s}$
I_{GM}	peak gate current		-	4	A
V_{RGM}	peak reverse gate voltage		-	5	V
P_{GM}	peak gate power		-	10	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	$^\circ\text{C}$

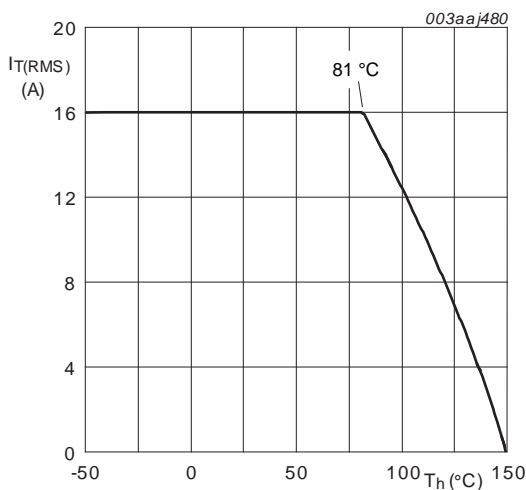
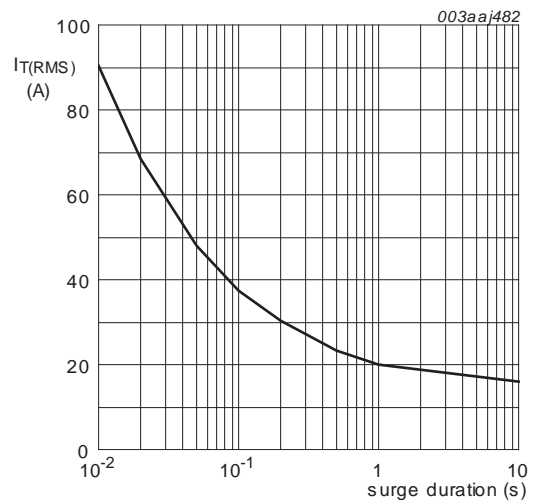


Fig 1. RMS on-state current as a function of heatsink temperature; maximum values



$f = 50\text{ Hz}$; $T_h = 81\text{ }^\circ\text{C}$

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

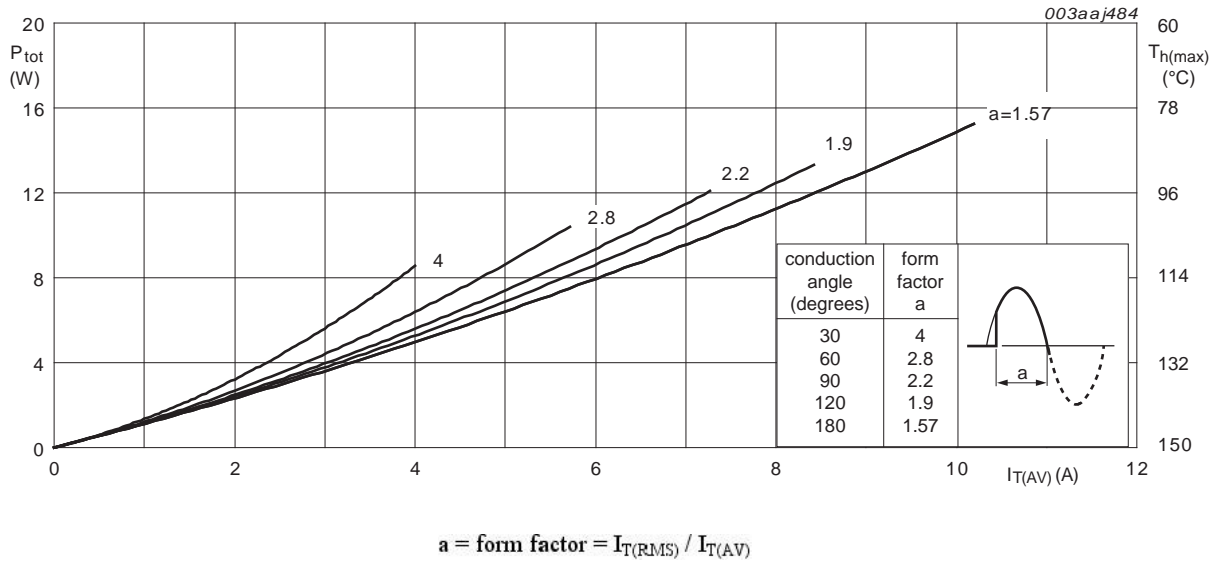


Fig 3. Total power dissipation as a function of average on-state current; maximum values

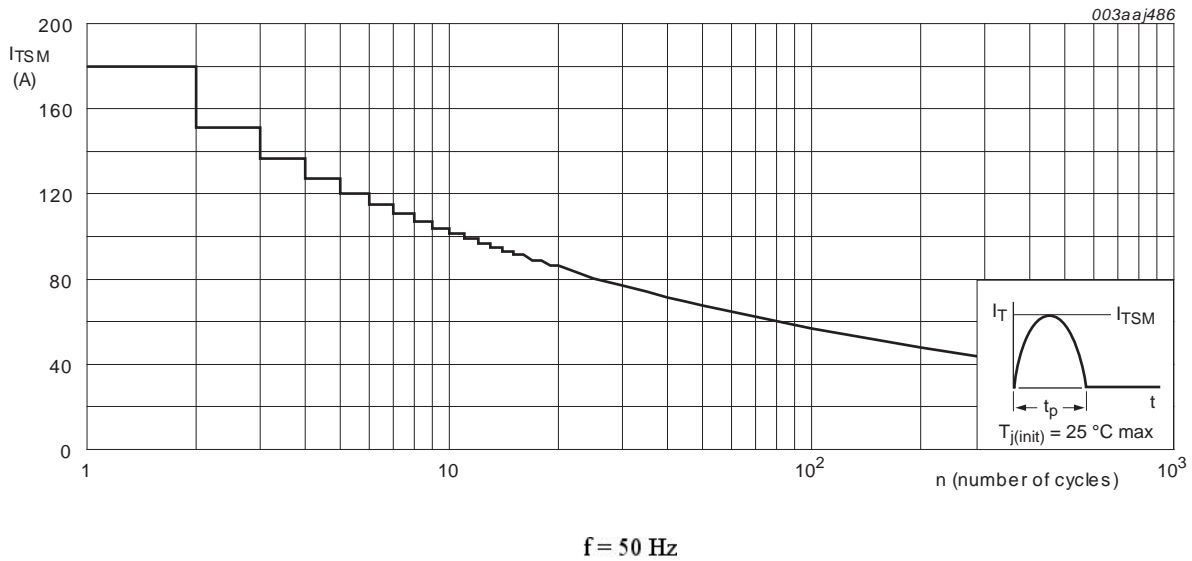
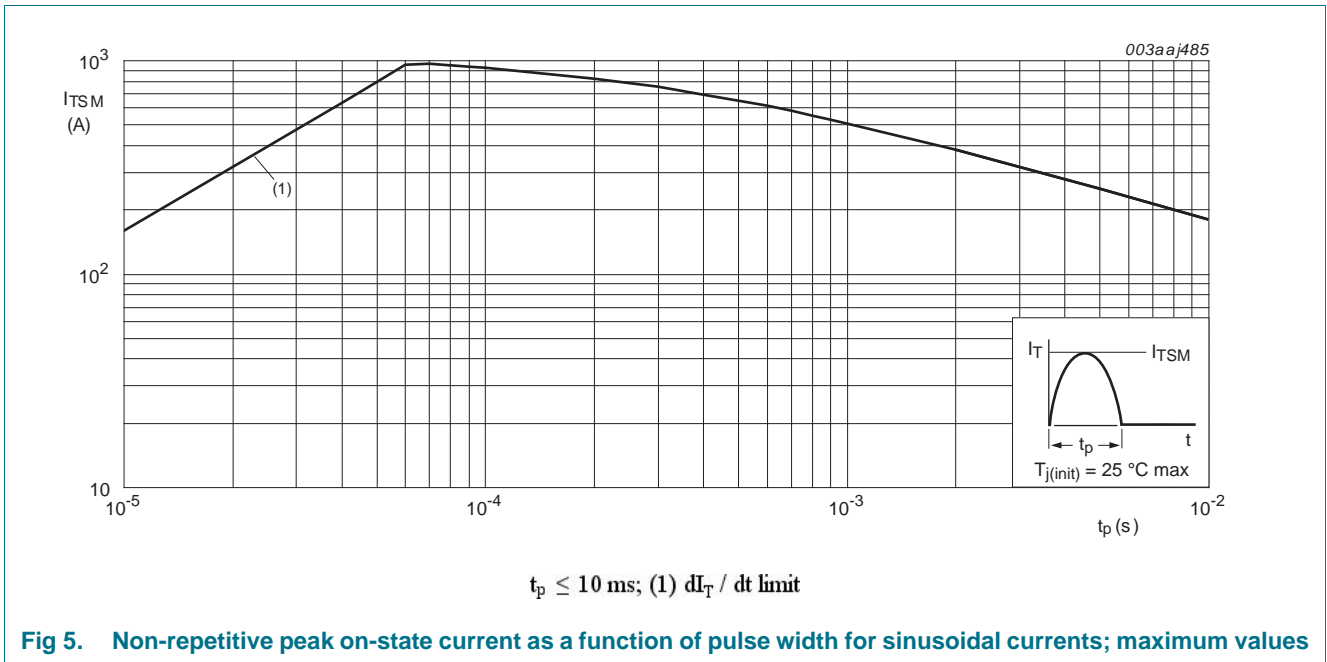


Fig 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



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; see Figure 6	-	-	4.5	K/W
		full or half cycle; without heatsink compound; see Figure 6	-	-	6.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	55	-	K/W

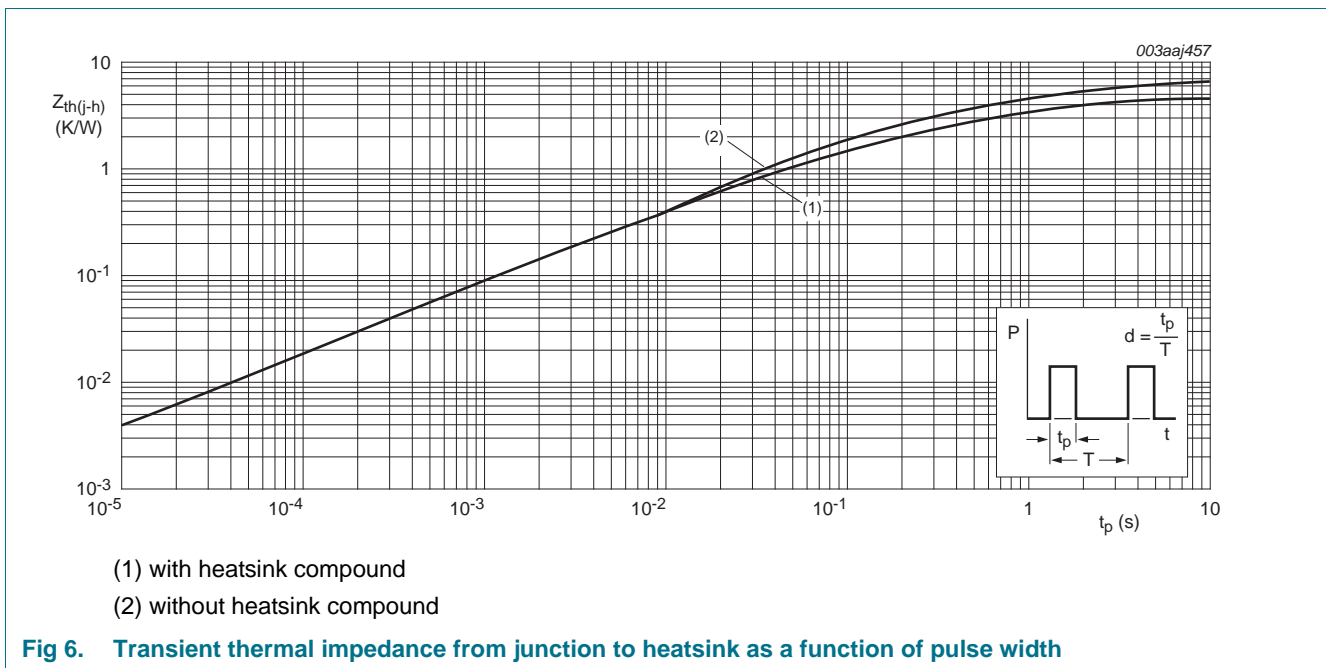


Fig 6. Transient thermal impedance from junction to heatsink as a function of pulse width

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 ; $50\text{ Hz} \leq f \leq 60\text{ Hz}$; $RH \leq 65\%$; $T_h = 25\text{ }^\circ\text{C}$	-	-	2500	V
C_{isol}	isolation capacitance	from anode to external heatsink ; $f = 1\text{ MHz}$; $T_h = 25\text{ }^\circ\text{C}$	-	10	-	pF

7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; see Figure 7	-	-	15	mA
I_L	latching current	$V_D = 12\text{ V}$; $I_G = 0.1\text{ A}$; $T_j = 25\text{ °C}$; see Figure 8	-	-	60	mA
I_H	holding current	$V_D = 12\text{ V}$; $T_j = 25\text{ °C}$; see Figure 9	-	-	40	mA
V_T	on-state voltage	$I_T = 32\text{ A}$; $T_j = 25\text{ °C}$; see Figure 10	-	1.2	1.6	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; see Figure 11	-	0.7	1.3	V
		$V_D = 400\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 150\text{ °C}$; see Figure 11	0.2	0.4	-	V
I_D	off-state current	$V_D = 600\text{ V}$; $T_j = 150\text{ °C}$	-	0.2	1	mA
I_R	reverse current	$T_j = 150\text{ °C}$; $V_R = 600\text{ V}$	-	0.2	1	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 402\text{ V}$; $T_j = 150\text{ °C}$; ($V_{DM} = 67\%$ of V_{DRM}); exponential waveform; gate open circuit	500	-	-	V/ μ s

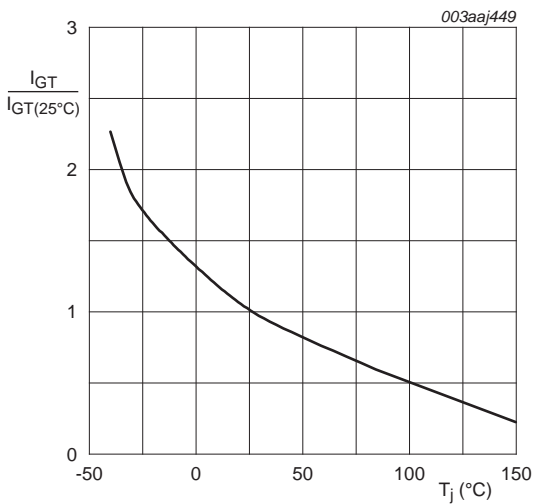


Fig 7. Normalized gate trigger current as a function of junction temperature

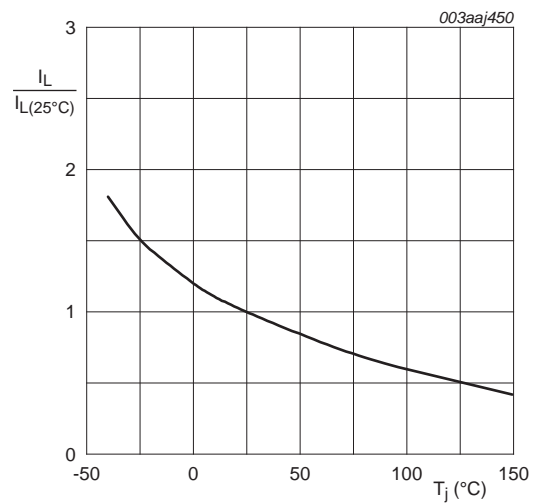


Fig 8. Normalized latching current as a function of junction temperature

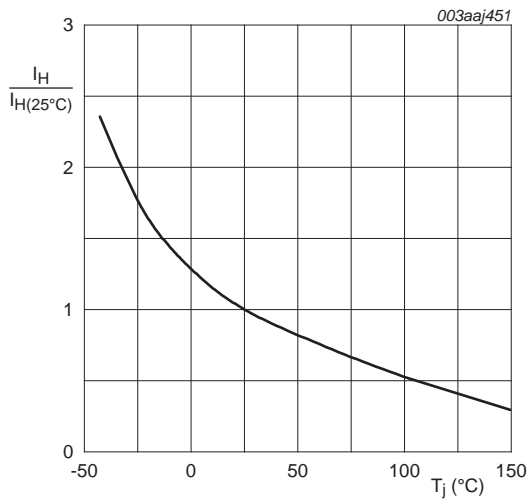
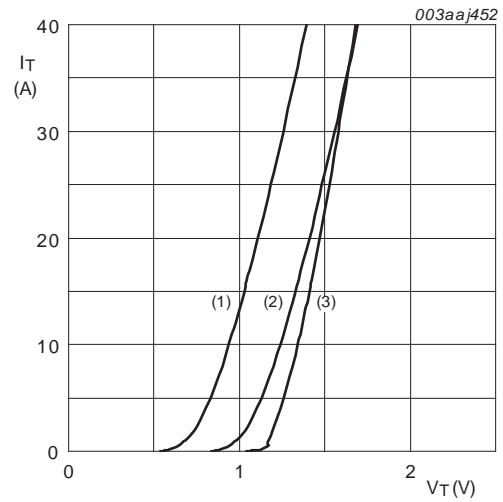


Fig 9. Normalized holding current as a function of junction temperature



$V_o = 1.08 \text{ V}; R_s = 0.0165 \Omega$

- (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

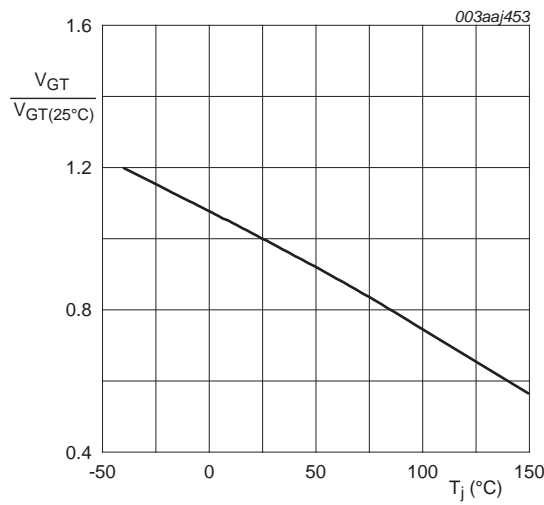


Fig 11. Normalized gate trigger voltage as a function of junction temperature

8. Package outline

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

SOT186A

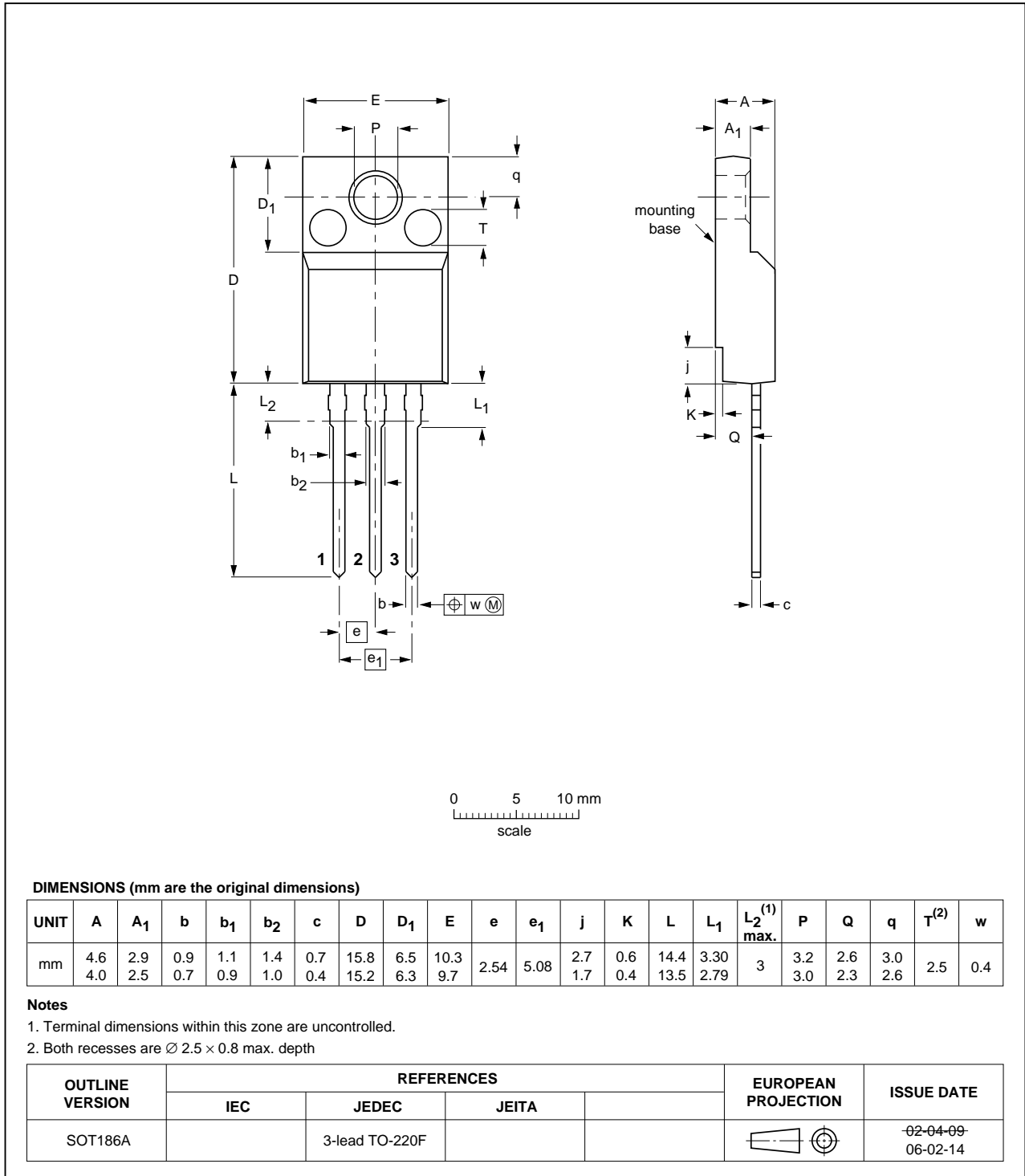


Fig 12. Package outline SOT186A (TO-220F)

9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
TYN16X-600CT v.1	20120320	Product data sheet	-	-

10. 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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