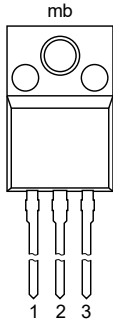



## Dynamic characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$dV_D/dt$	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		500	-	-	V/ $\mu\text{s}$

5. Pinning information

Table 2. Pinning information

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

6. Ordering information

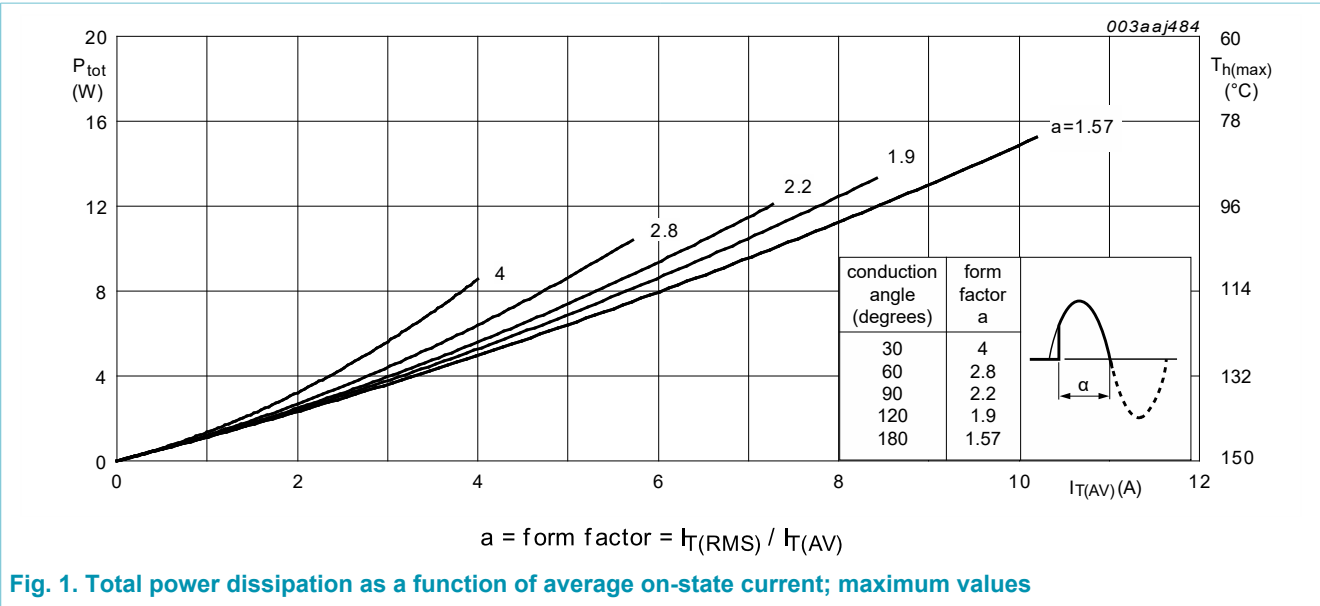
Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
TYN16X-600CTN	TO220F	TYN16X-600CTNQ	Tube	50	SOT186A	14-Nov-2013

7. 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; $T_h \leq 81\text{ }^{\circ}\text{C}$ ; Fig. 1	-	10.2	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_h \leq 81\text{ }^{\circ}\text{C}$ ; Fig. 2; Fig. 3	-	16	A
$I_{TSM}$	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; $t_p = 10\text{ ms}$ ; Fig. 4; Fig. 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	$t_p = 10\text{ ms}$ ; SIN	-	162	$\text{A}^2\text{s}$
$di_T/dt$	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	$^{\circ}\text{C}$



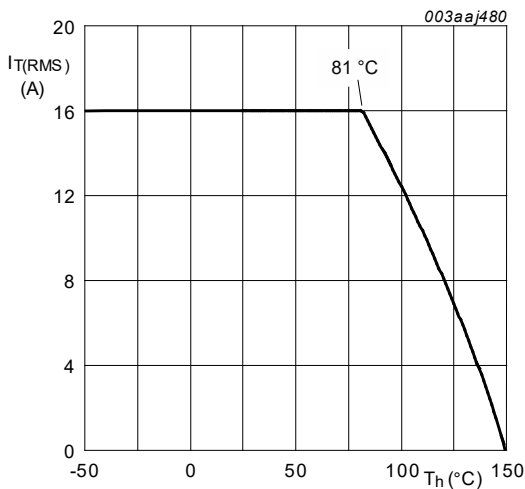
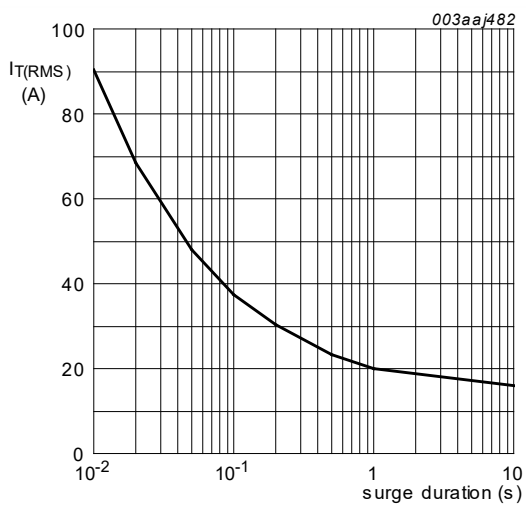
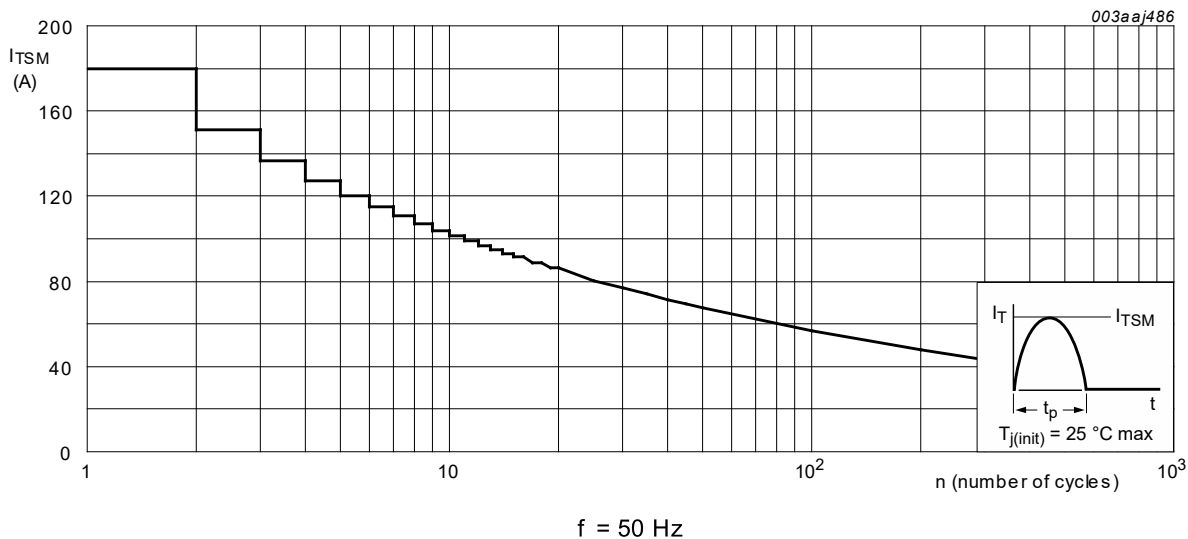


Fig. 2. RMS on-state current as a function of heatsink temperature; maximum values



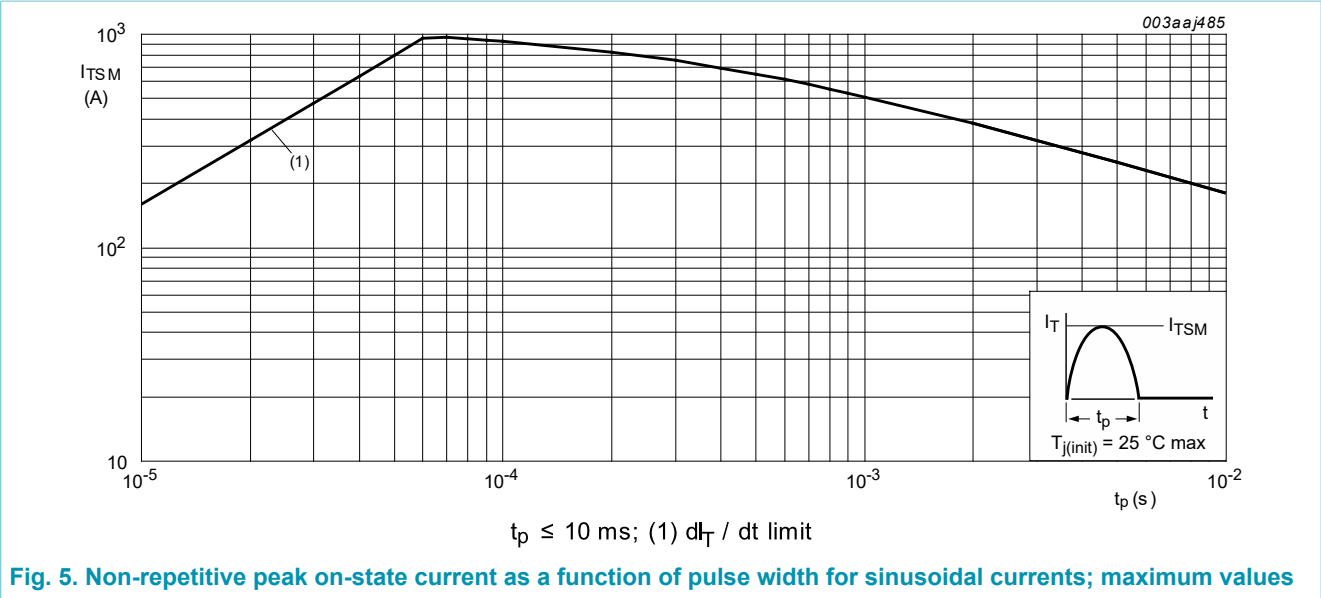
$f = 50 \text{ Hz}; T_h = 81 \text{ °C}$

Fig. 3. RMS on-state current as a function of surge duration; maximum values



$f = 50 \text{ Hz}$

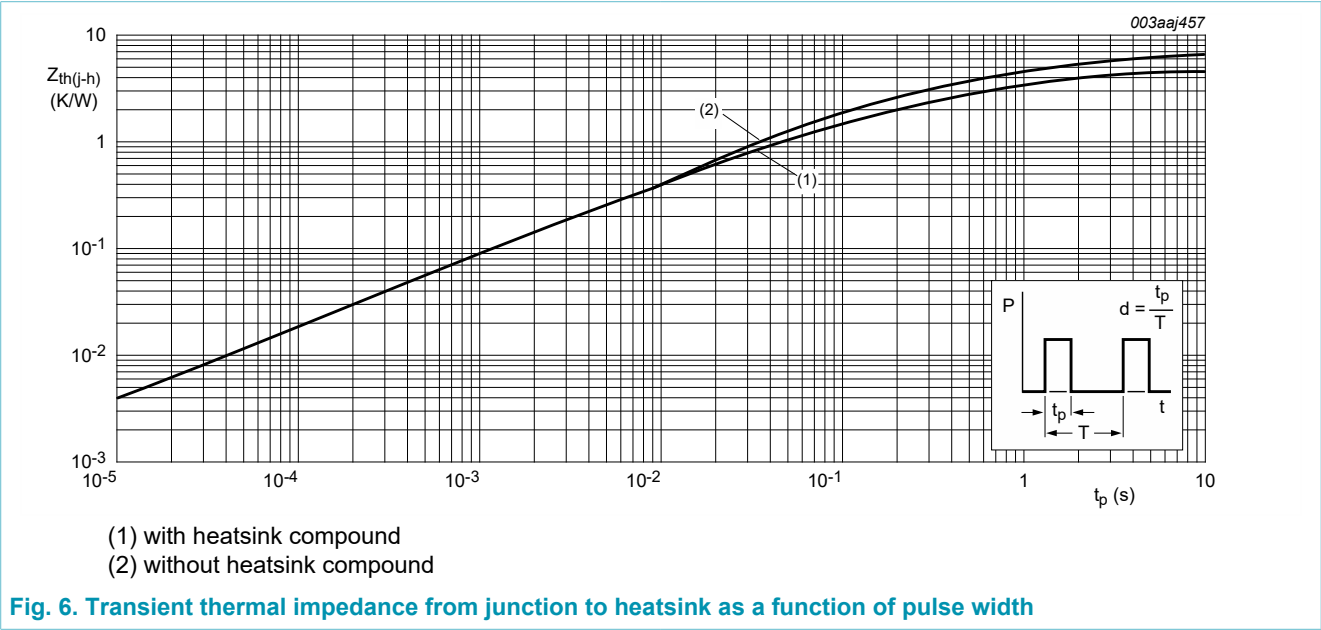
Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R <sub>th(j-h)</sub>	thermal resistance from junction to heatsink	with heatsink compound; Fig. 6	-	-	4.5	K/W
		without heatsink compound; Fig. 6	-	-	6.5	K/W
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient free air	in free air	-	55	-	K/W



9. Isolation characteristics

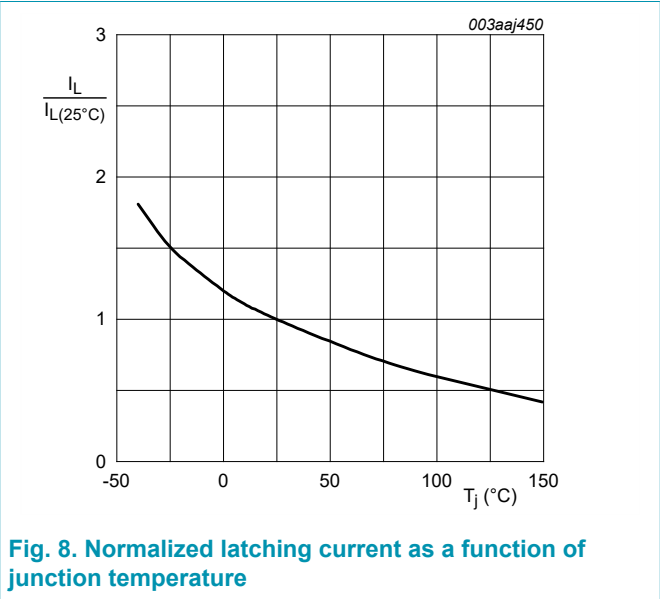
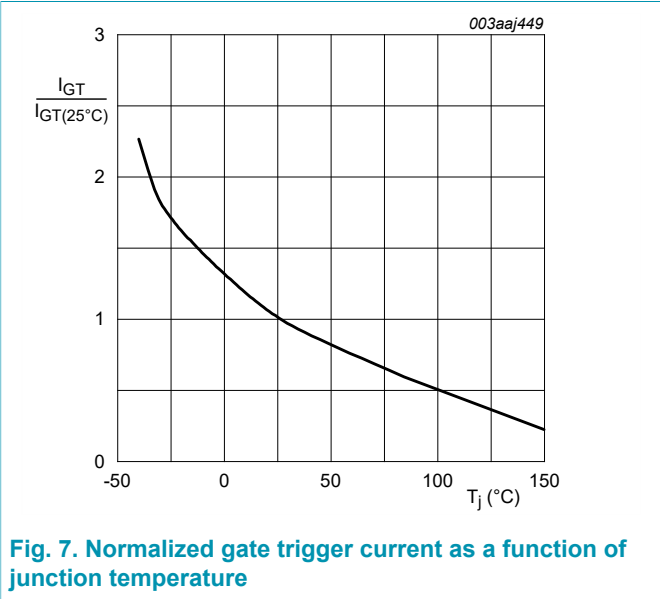
Table 6. Isolation characteristics

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

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
$I_{GT}$	gate trigger current	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 7</a>		3.5	5	6	mA
$I_L$	latching current	$V_D = 12\text{ V}$ ; $I_G = 0.1\text{ A}$ ; $T_j = 25\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 8</a>		-	-	60	mA
$I_H$	holding current	$V_D = 12\text{ V}$ ; $T_j = 25\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 9</a>		-	-	40	mA
$V_T$	on-state voltage	$I_T = 32\text{ A}$ ; $T_j = 25\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 10</a>		-	1.2	1.6	V
$V_{GT}$	gate trigger voltage	$V_D = 12\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 25\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 11</a>		-	0.7	1.3	V
		$V_D = 400\text{ V}$ ; $I_T = 0.1\text{ A}$ ; $T_j = 150\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 11</a>		0.2	0.4	-	V
$I_D$	off-state current	$V_D = 600\text{ V}$ ; $T_j = 150\text{ }^{\circ}\text{C}$		-	0.2	1	mA
$I_R$	reverse current	$V_R = 600\text{ V}$ ; $T_j = 150\text{ }^{\circ}\text{C}$		-	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		500	-	-	V/ $\mu\text{s}$
$t_{gt}$	gate-controlled turn-on time	$I_{TM} = 40\text{ A}$ ; $V_D = 600\text{ V}$ ; $I_G = 100\text{ mA}$ ; $dI_G/dt = 5\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ }^{\circ}\text{C}$		-	2	-	$\mu\text{s}$
$t_q$	commutated turn-off time	$V_{DM} = 402\text{ V}$ ; $T_j = 125\text{ }^{\circ}\text{C}$ ; $I_{TM} = 20\text{ A}$ ; $V_R = 25\text{ V}$ ; $(dI_T/dt)_M = 30\text{ A}/\mu\text{s}$ ; $dV_D/dt = 50\text{ V}/\mu\text{s}$ ; $R_{GK(ext)} = 100\text{ }\Omega$ ; ( $V_{DM} = 67\%$ of $V_{DRM}$ )		-	70	-	$\mu\text{s}$



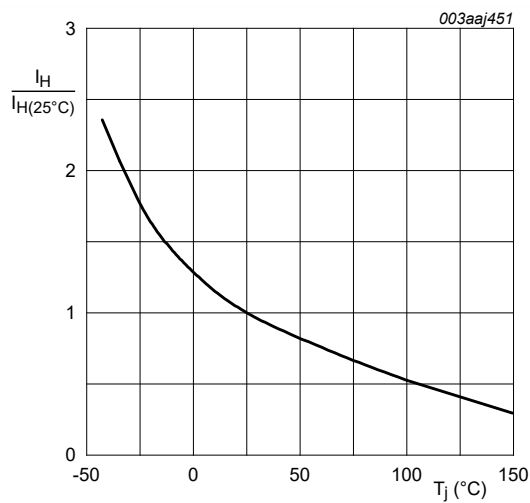
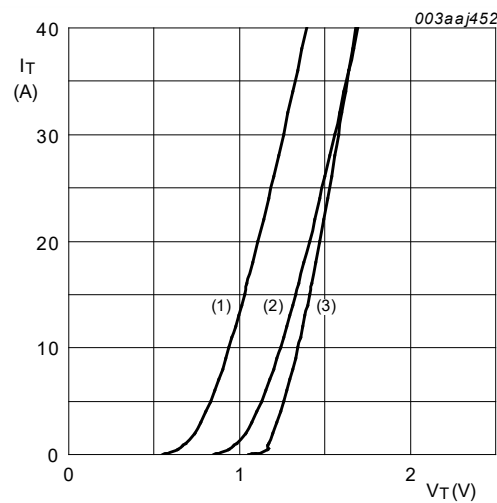


Fig. 9. Normalized holding current as a function of junction temperature



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

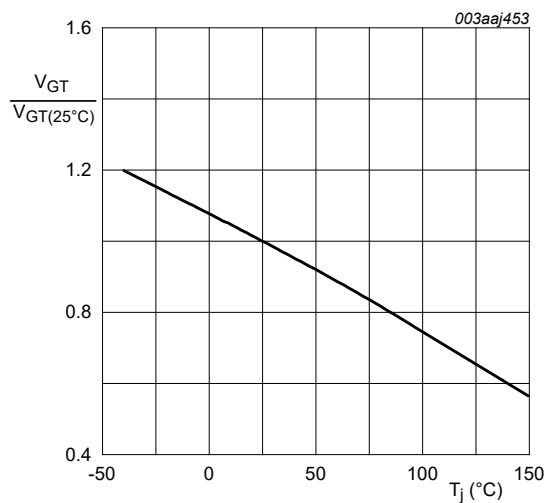


Fig. 11. Normalized gate trigger voltage as a function of junction temperature



11. Package outline

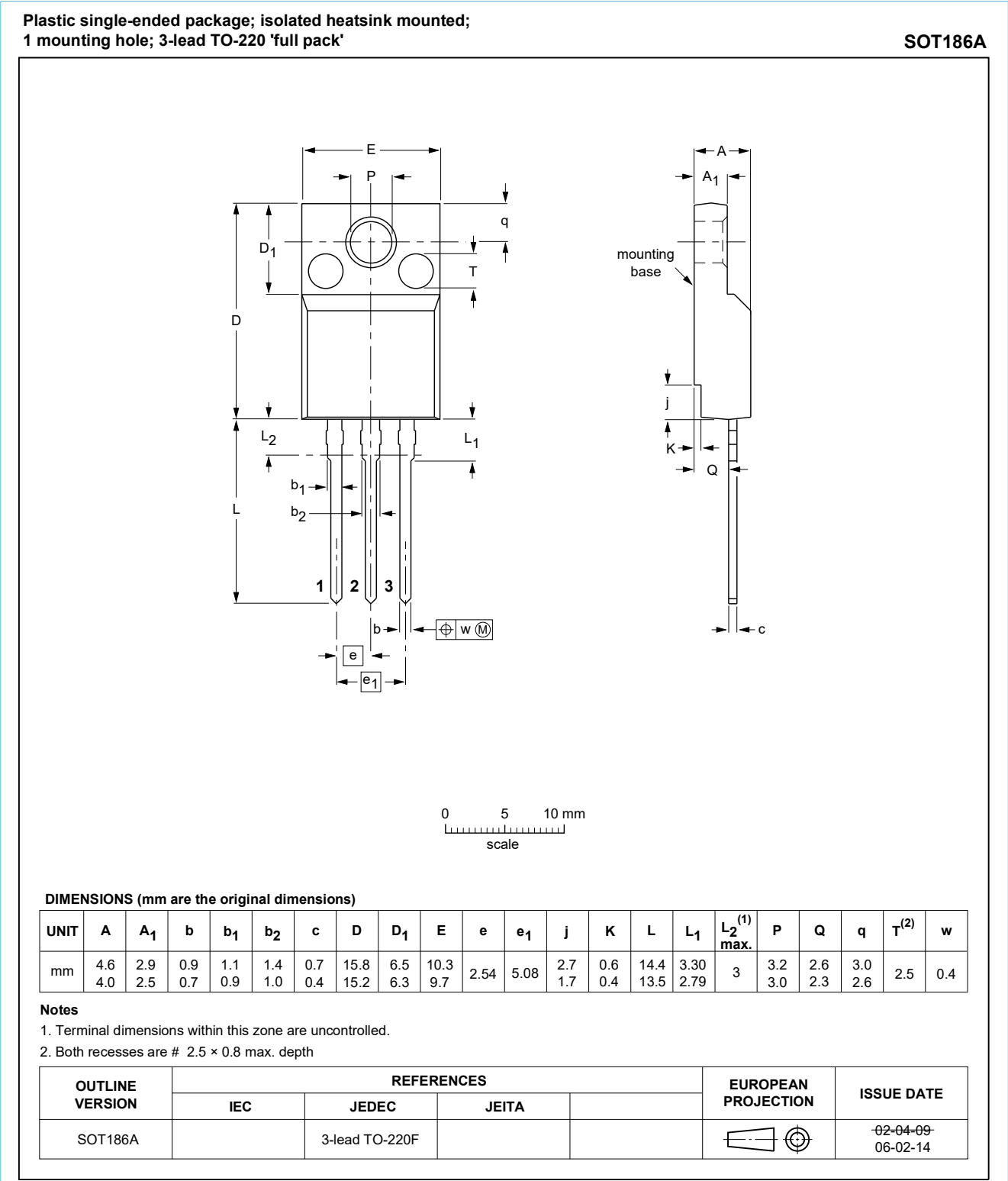


Fig. 12. Package outline TO-220F (SOT186A)

## 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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