

1. General description

Planar passivated Silicon Controlled Rectifier (SCR) in a SOT186A (TO-220F) plastic package intended for use in applications requiring high bidirectional blocking voltage capability, high current inrush capability and high thermal cycling performance.

2. Features and benefits

- AC power control
- High bidirectional blocking voltage capability
- High thermal cycling performance
- Planar passivated for voltage ruggedness and reliability
- Package meets UL1557 isolation test requirement rated at 2500V RMS
- Package meets UL94V0 flammability requirement
- Package is RoHS compliant
- Very high immunity to false turn-on by dv/dt and IEC 61000-4-4 fast transient

3. Applications

- Capacitive Discharge Ignition (CDI)
- Crowbar protection
- Inrush protection
- Motor control
- Voltage regulation

4. Quick reference data

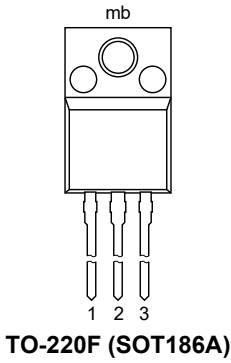

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	800	V
$I_{T(AV)}$	average on-state current	half sine wave	-	-	16	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_h \leq 30\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	25	A
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	-	-	300	A
		half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$	-	-	330	A
T_j	junction temperature		-	-	125	°C
Static characteristics						

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_j = 25\text{ °C}$; Fig. 7	-	-	35	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}$; $T_j = 125\text{ °C}$; exponential waveform; gate open circuit	200	-	-	V/ μ s

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p>mb</p> <p>1 2 3</p> <p>TO-220F (SOT186A)</p>	 <p>A K</p> <p>G</p> <p>sym037</p>
2	A	anode		
3	G	gate		
mb	n.c.	mounting base; isolated		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BT145X-800R	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220 "full pack"	SOT186A

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		-	800	V
V_{RRM}	repetitive peak reverse voltage		-	800	V
$I_{T(AV)}$	average on-state current	half sine wave	-	16	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_h \leq 30\text{ °C}$; Fig. 1; Fig. 2; Fig. 3	-	25	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 10\text{ ms}$; Fig. 4; Fig. 5	-	300	A
		half sine wave; $T_{j(\text{init})} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$	-	330	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; SIN	-	450	A ² s
di_T/dt	rate of rise of on-state current	$I_G = 70\text{ mA}$	-	200	A/ μ 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	-	0.5	W
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	125	°C

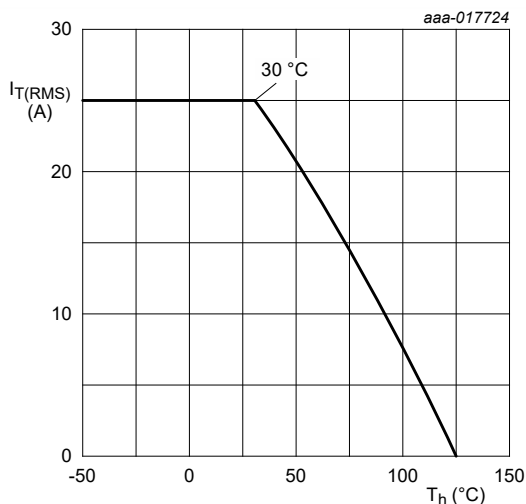
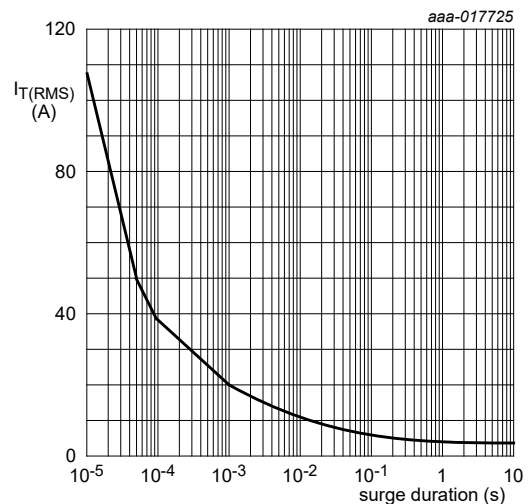
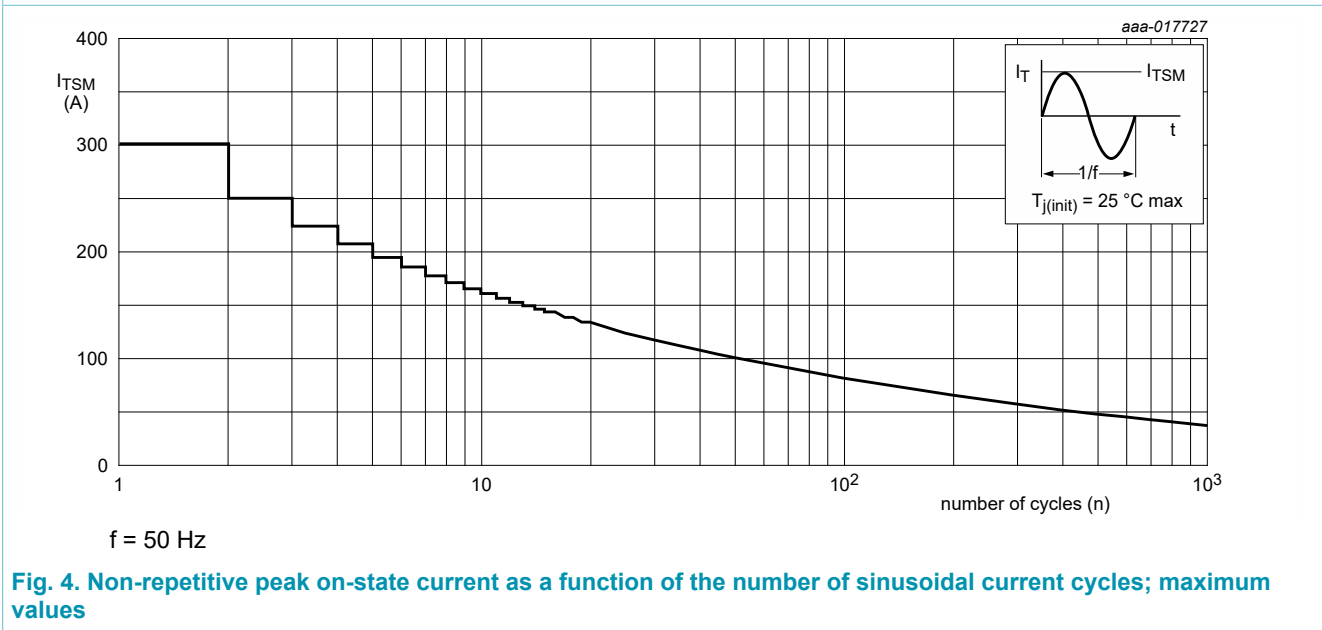
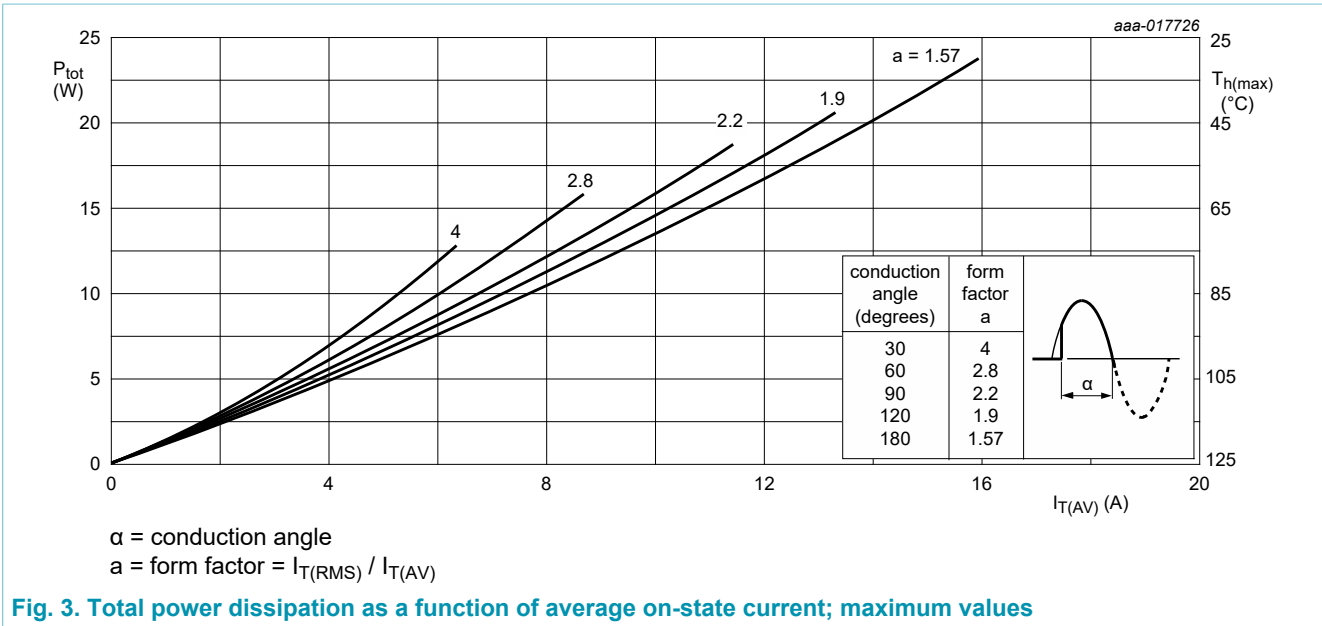


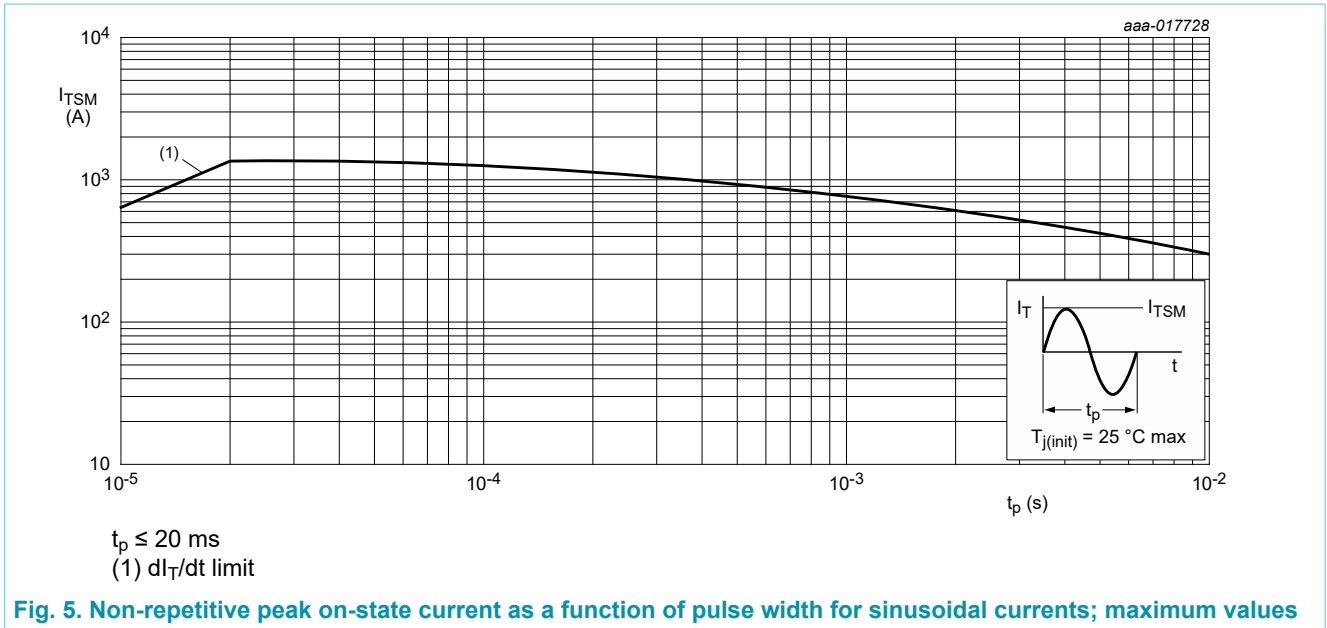
Fig. 1. RMS on-state current as a function of heatsink temperature; maximum values



$f = 50\text{ Hz}$; $T_h = 30\text{ °C}$

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





8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	full cycle or half cycle; with heatsink compound; Fig. 6	-	-	4	K/W
		full cycle or half cycle; without heatsink compound	-	-	5.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	55	-	K/W

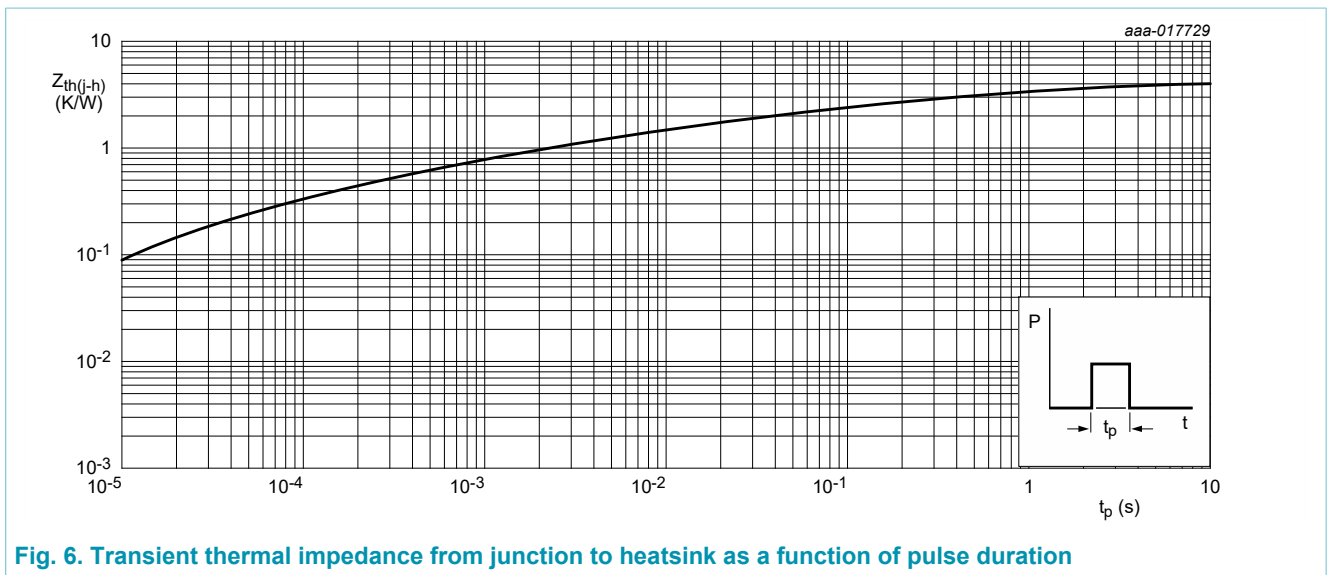
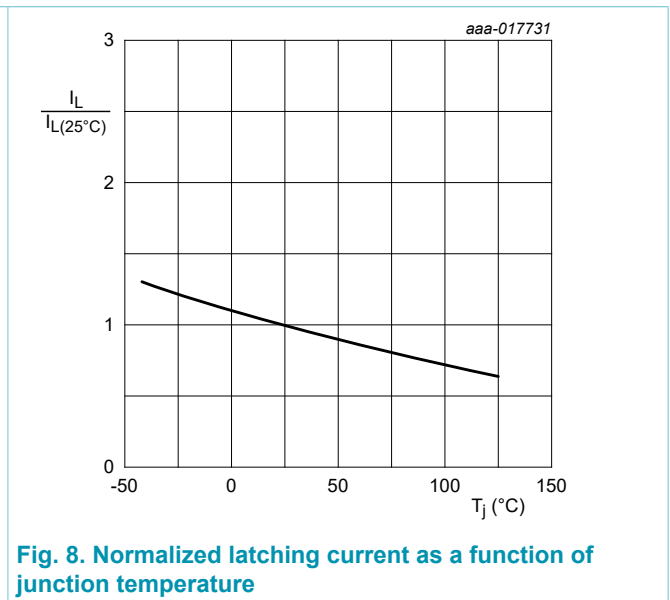
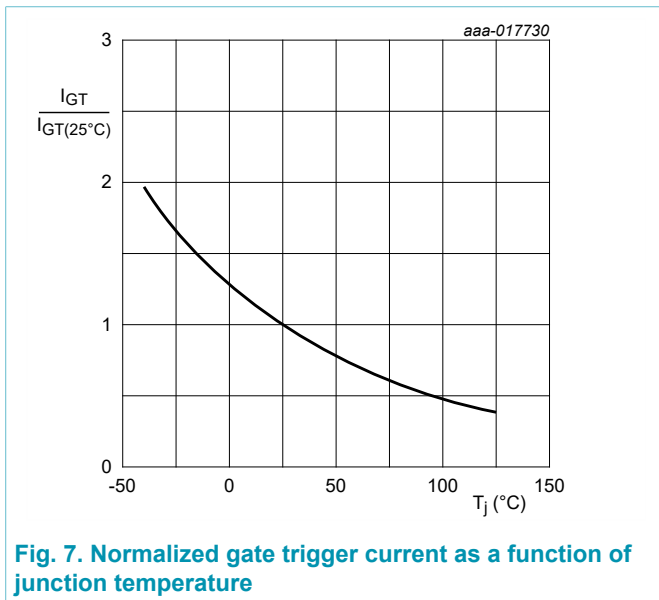


Fig. 6. Transient thermal impedance from junction to heatsink as a function of pulse duration

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 7	-	-	35	mA
I_L	latching current	$V_D = 12\text{ V}; I_G = 0.1\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 8	-	-	80	mA
I_H	holding current	$V_D = 12\text{ V}; T_j = 25\text{ }^\circ\text{C};$ Fig. 9	-	-	60	mA
V_T	on-state voltage	$I_T = 30\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 10	-	1.1	1.5	V
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 11	-	0.6	1	V
		$V_D = 800\text{ V}; I_T = 0.1\text{ A}; T_j = 125\text{ }^\circ\text{C};$ Fig. 11	0.25	0.4	-	V
I_D	off-state current	$V_D = 800\text{ V}; T_j = 125\text{ }^\circ\text{C}$	-	0.2	1	mA
I_R	reverse current	$V_R = 800\text{ V}; T_j = 125\text{ }^\circ\text{C}$	-	0.2	1	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536\text{ V}; T_j = 125\text{ }^\circ\text{C};$ exponential waveform; gate open circuit	200	-	-	V/ μs
t_{gt}	gate-controlled turn-on time	$I_{TM} = 40\text{ A}; V_D = 800\text{ V}; I_G = 0.1\text{ mA};$ $dI_G/dt = 5\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}$	-	2	-	μs
t_q	commutated turn-off time	$V_{DM} = 536\text{ V}; T_j = 125\text{ }^\circ\text{C}; I_{TM} = 50\text{ A};$ $V_R = 25\text{ V}; (dI_T/dt)_M = 30\text{ A}/\mu\text{s};$ $dV_D/dt = 50\text{ V}/\mu\text{s}$	-	70	-	μs



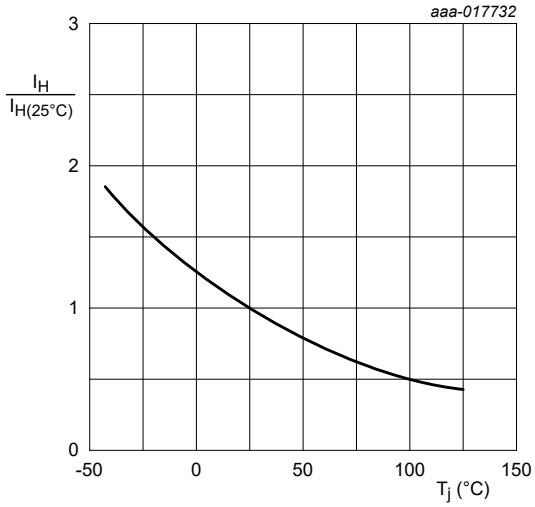
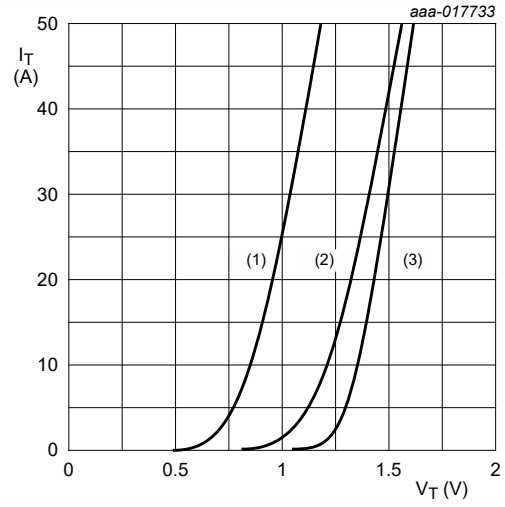


Fig. 9. Normalized holding current as a function of junction temperature



$V_o = 1.145 \text{ V}; R_s = 0.009 \Omega$

- (1) $T_j = 125 \text{ }^\circ\text{C}$; typical values
- (2) $T_j = 125 \text{ }^\circ\text{C}$; maximum values
- (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

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

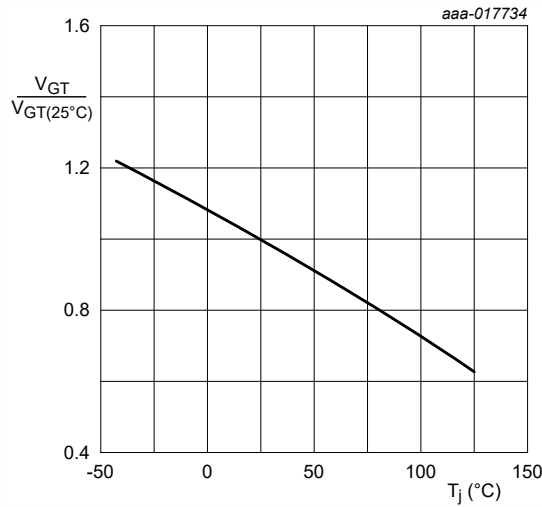


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

10. Package outline

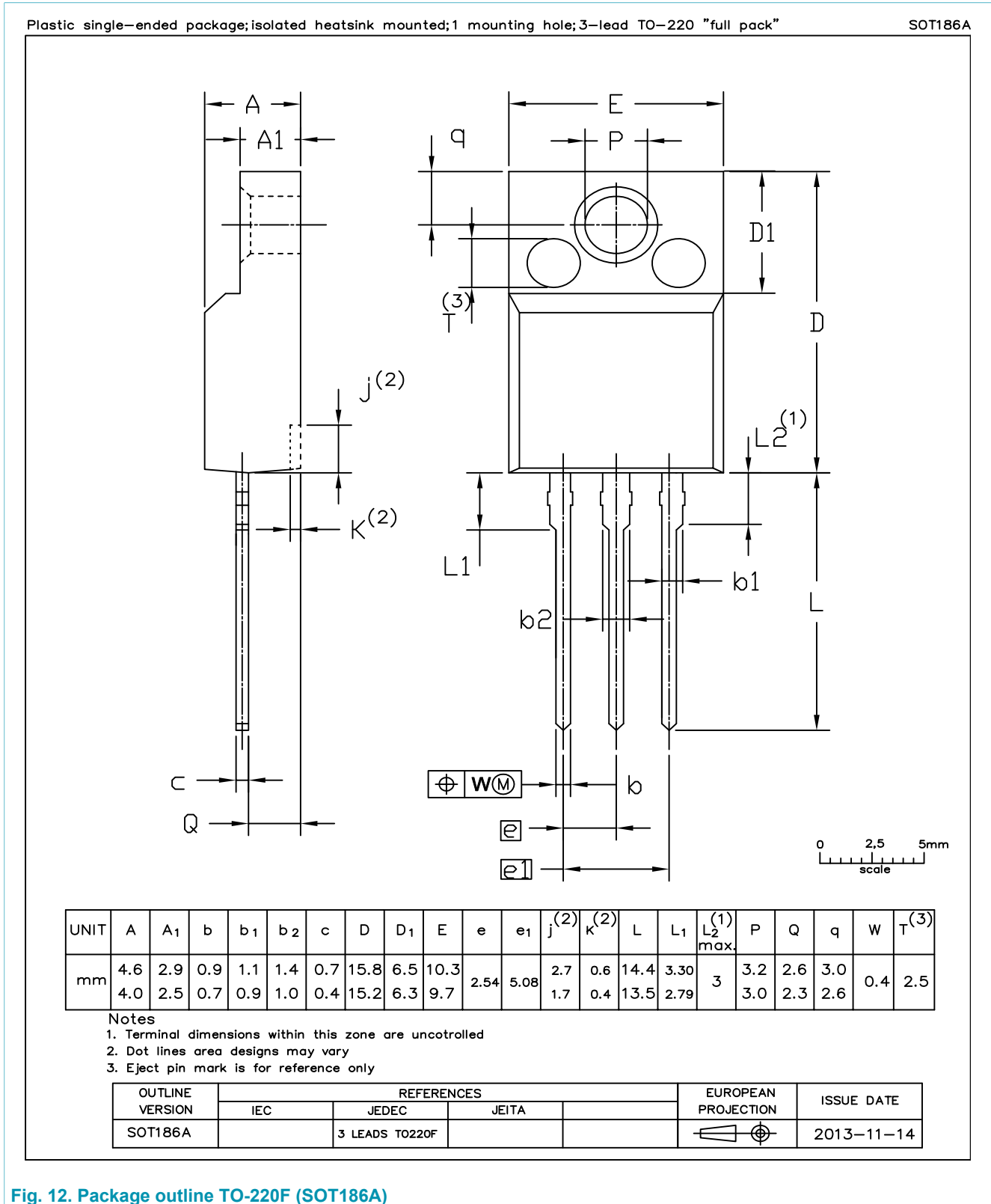


Fig. 12. Package outline TO-220F (SOT186A)

11. 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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