

1. General description

Dual ultrafast power diodes in a SOT186A (TO-220F) isolated plastic package. These diodes are rugged with a guaranteed electrostatic discharge voltage capability.

2. Features and benefits

- Fast switching
- Guaranteed ESD capability
- High thermal cycling performance
- Isolated package
- Low on-state losses
- Soft recovery minimizes power-consuming oscillations

3. Applications

- Output rectifiers in high-frequency switched-mode power supplies

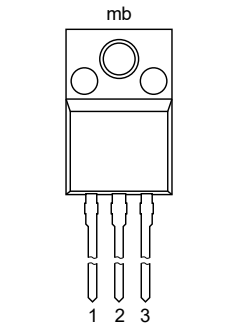
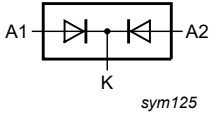
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_R	reverse voltage	DC	-	-	200	V
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25 \mu\text{s}$; $T_h \leq 92 \text{ }^\circ\text{C}$; SQW; per diode	-	-	10	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10 \text{ ms}$; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$; SIN; per diode	-	-	50	A
		$t_p = 8.3 \text{ ms}$; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$; SIN; per diode	-	-	55	A
Static characteristics						
V_F	forward voltage	$I_F = 5 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 4	-	0.95	1.1	V
		$I_F = 5 \text{ A}$; $T_j = 150 \text{ }^\circ\text{C}$; Fig. 4	-	0.8	0.895	V
		$I_F = 10 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 4	-	1.1	1.25	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1 \text{ A}$; $V_R = 30 \text{ V}$; $dI_F/dt = 100 \text{ A}/\mu\text{s}$; $T_j = 25 \text{ }^\circ\text{C}$; ramp recovery; Fig. 5	-	15	25	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1	 <p>TO-220F (SOT186A)</p>	
2	K	cathode		
3	A2	anode 2		
mb	n.c.	mounting base; isolated		

6. Ordering information

Table 3. Ordering information

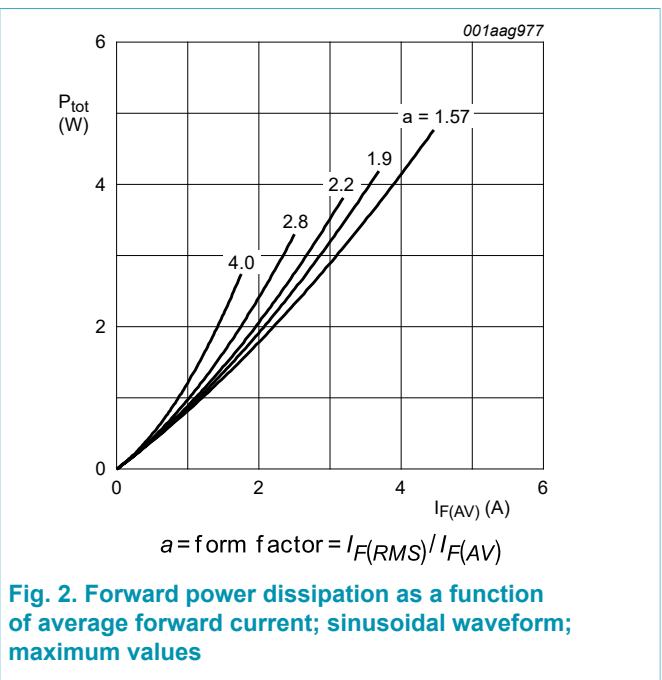
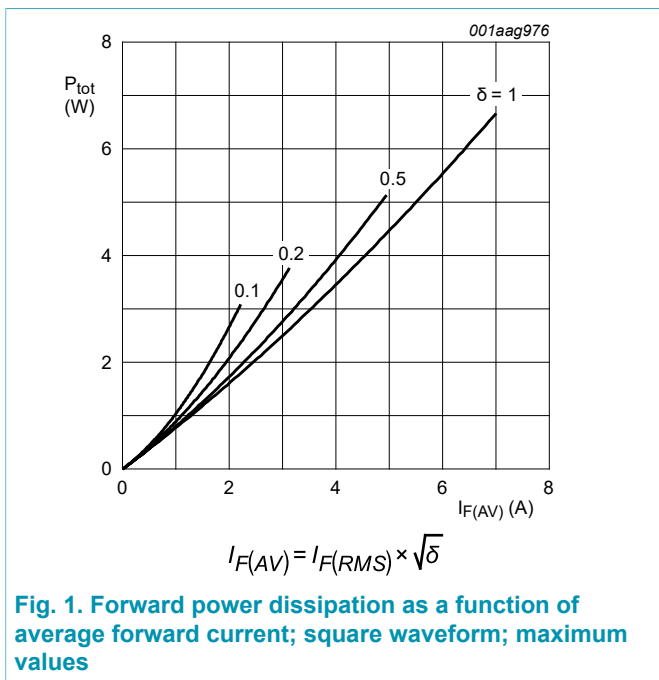
Type number	Package		
	Name	Description	Version
BYQ28X-200E	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220 "full pack"	SOT186A

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	200	V
V_{RWM}	crest working reverse voltage		-	200	V
V_R	reverse voltage	DC	-	200	V
$I_{O(AV)}$	average output current	$\delta = 0.5$; $T_h \leq 92\text{ }^\circ\text{C}$; SQW; Fig. 1; Fig. 2	-	10	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_h \leq 92\text{ }^\circ\text{C}$; SQW; per diode	-	10	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; SIN; per diode	-	50	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; SIN; per diode	-	55	A
I_{RRM}	repetitive peak reverse current	$\delta = 0.001$; $t_p = 2\text{ }\mu\text{s}$	-	0.2	A
I_{RSM}	non-repetitive peak reverse current	$t_p = 100\text{ }\mu\text{s}$	-	0.2	A
T_{stg}	storage temperature		-40	150	$^\circ\text{C}$
T_j	junction temperature		-	150	$^\circ\text{C}$
Electrostatic discharge					
V_{ESD}	electrostatic discharge voltage	HBM; C = 250 pF; R = 1.5 k Ω ; all pins	-	8	kV



8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; Fig. 3	-	-	5.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air		-	55	-	K/W

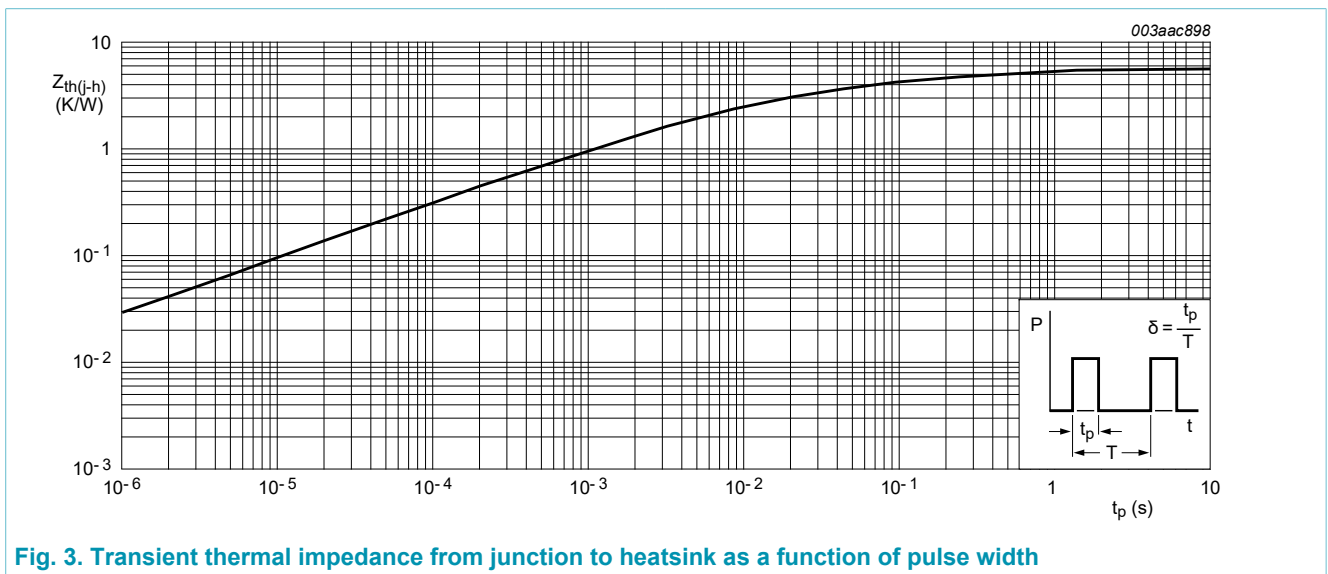


Fig. 3. Transient thermal impedance from junction to heatsink as a function of pulse width

9. Isolation characteristics

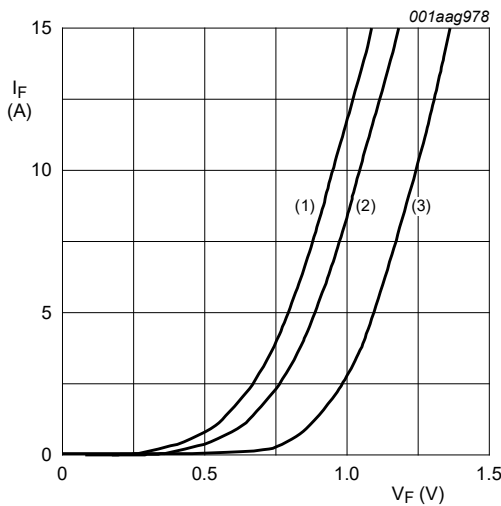
Table 6. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	50 Hz < f < 60 Hz; sinusoidal waveform; relative humidity < 65 %; clean and dust free; from all terminals to external heatsink	-	-	2500	V
C_{isol}	isolation capacitance	f = 1 MHz; from cathode to external heatsink	-	10	-	pF
		from cathode to external heatsink; f = 1 MHz	-	10	-	pF

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 5\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 4	-	0.95	1.1	V
		$I_F = 5\text{ A}; T_j = 150\text{ }^\circ\text{C};$ Fig. 4	-	0.8	0.895	V
		$I_F = 10\text{ A}; T_j = 25\text{ }^\circ\text{C};$ Fig. 4	-	1.1	1.25	V
I_R	reverse current	$V_R = 200\text{ V}; T_j = 25\text{ }^\circ\text{C}$	-	2	10	μA
		$V_R = 200\text{ V}; T_j = 100\text{ }^\circ\text{C}$	-	0.1	0.2	mA
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C};$ ramp recovery; Fig. 5	-	15	25	ns
		$I_F = 0.5\text{ A}; I_R = 1\text{ A}; T_j = 25\text{ }^\circ\text{C};$ step recovery; measured at $I_R = 0.25\text{ A};$ Fig. 6	-	10	20	ns
I_{RM}	peak reverse recovery current	$I_F = 2\text{ A}; V_R = 30\text{ V}; dI_F/dt = 20\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C};$ Fig. 5	-	0.4	0.7	A
Q_r	recovered charge	$I_F = 2\text{ A}; V_R = 30\text{ V}; dI_F/dt = 20\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C};$ Fig. 5	-	4	9	μC
V_{FR}	forward recovery voltage	$I_F = 1\text{ A}; dI_F/dt = 10\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C};$ Fig. 7	-	1	-	V



(1) $T_j = 150\text{ }^\circ\text{C};$ typical v values
 (2) $T_j = 150\text{ }^\circ\text{C};$ maximum v values
 (3) $T_j = 25\text{ }^\circ\text{C};$ maximum v values

Fig. 4. Forward current as a function of forward voltage

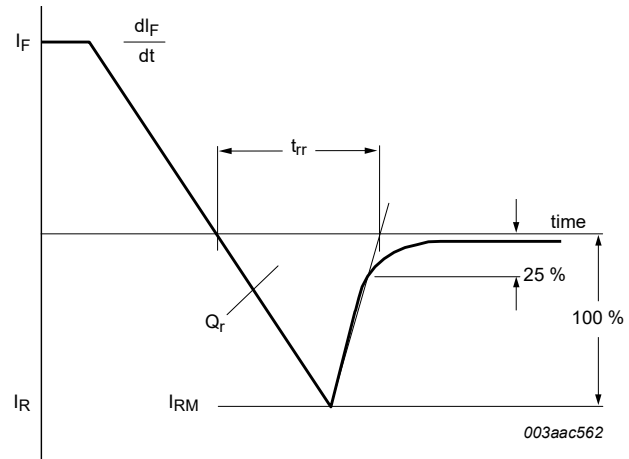
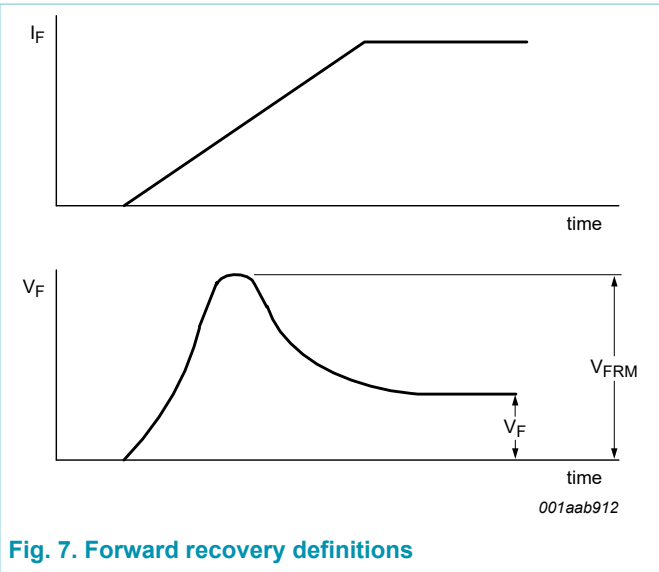
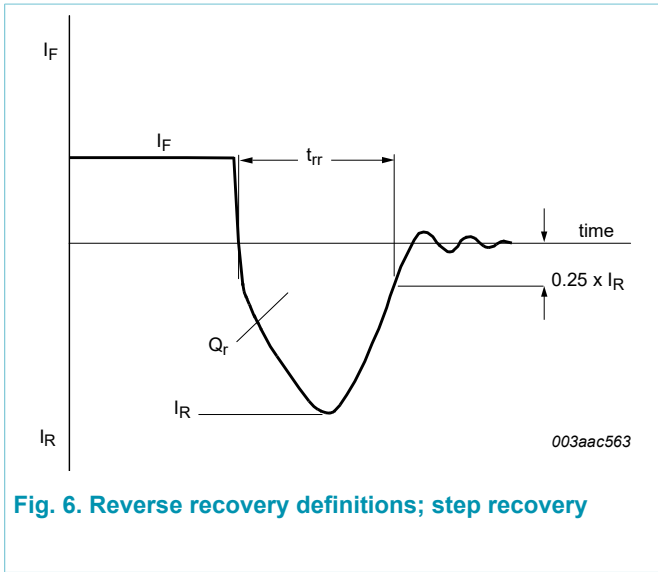


Fig. 5. Reverse recovery definitions; ramp recovery



11. Package outline

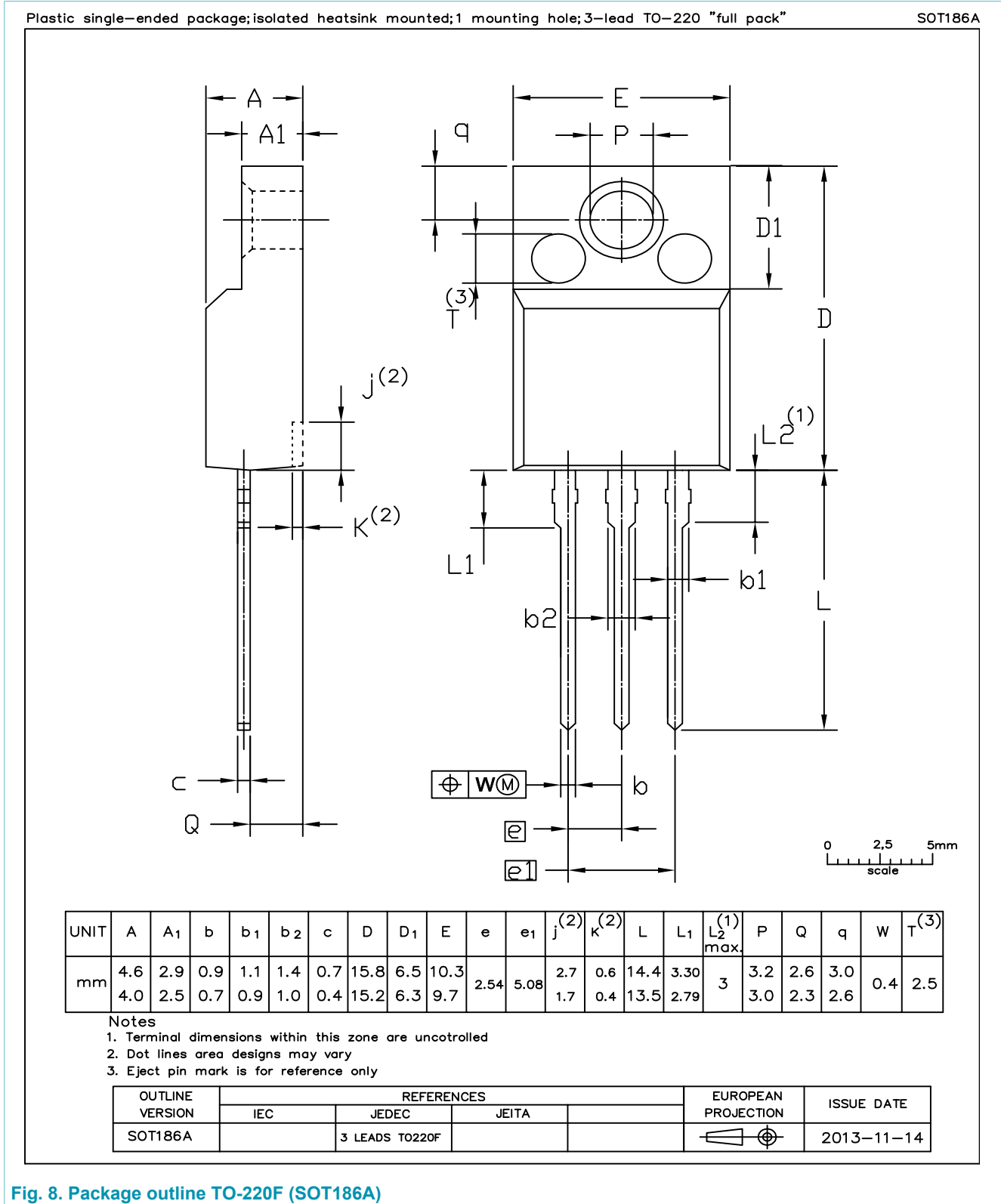


Fig. 8. Package outline TO-220F (SOT186A)

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.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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