

1. General description

Dual enhanced ultrafast power diode in a SOT186A (TO-220AB) plastic package.

2. Features and benefits

- High thermal cycling performance
- Isolated package
- Low thermal resistance
- Soft recovery characteristic minimizes power consuming oscillations
- Very low on-state losses

3. Applications

- Dual mode (DCM and CCM) PFC
- Power Factor Correction (PFC) for Interleaved Topology

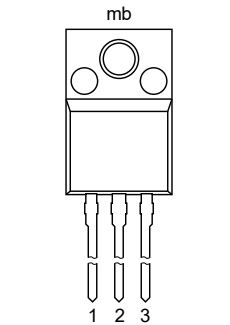
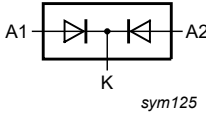
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_R	reverse voltage	DC	-	-	600	V
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25 \mu\text{s}$; $T_h \leq 60 \text{ }^\circ\text{C}$; SQW; per diode	-	-	20	A
I_{FSM}	non-repetitive peak forward current	$t_p = 8.3 \text{ ms}$; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$; SIN; per diode	-	-	132	A
		$t_p = 10 \text{ ms}$; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$; SIN; per diode	-	-	120	A
Static characteristics						
V_F	forward voltage	$I_F = 10 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 4	-	1.4	2.1	V
		$I_F = 10 \text{ A}$; $T_j = 150 \text{ }^\circ\text{C}$	-	1.3	1.9	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1 \text{ A}$; $V_R = 30 \text{ V}$; $dI_F/dt = 100 \text{ A}/\mu\text{s}$; $T_j = 25 \text{ }^\circ\text{C}$; Fig. 5	-	20	35	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1	 <p>TO-220F (SOT186A)</p>	 <p>sym125</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
BYV410X-600	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		-	600	V
V_{RWM}	crest working reverse voltage		-	600	V
V_R	reverse voltage	DC	-	600	V
$I_{O(AV)}$	average output current	$\delta = 0.5$; $T_h \leq 42$ °C; SQW; both diodes conducting; Fig. 1 ; Fig. 2	-	20	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ μ s; $T_h \leq 60$ °C; SQW; per diode	-	20	A
I_{FSM}	non-repetitive peak forward current	$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; SIN; per diode	-	132	A
		$t_p = 10$ ms; $T_{j(init)} = 25$ °C; SIN; per diode	-	120	A
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	150	°C

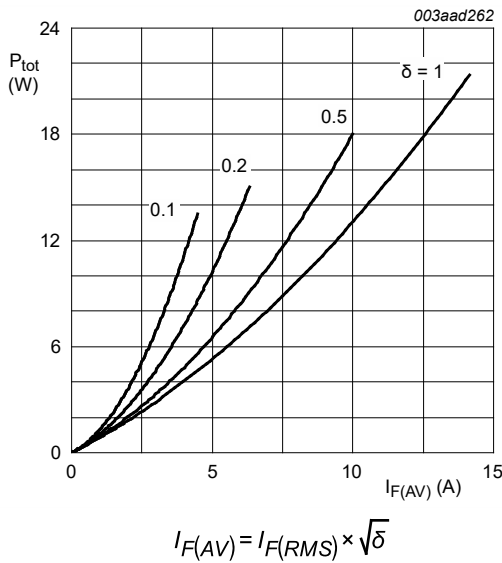


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

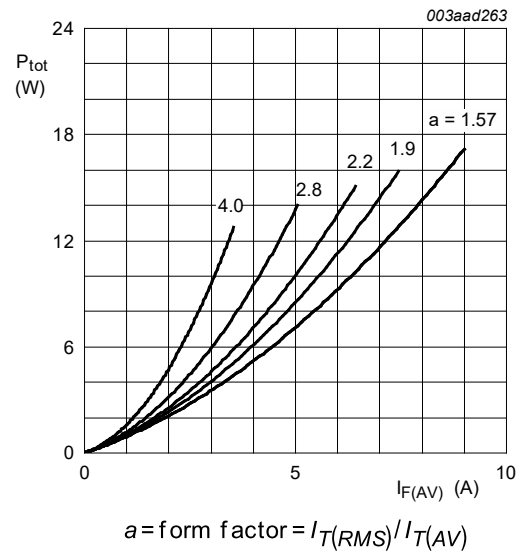


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R _{th(j-h)}	thermal resistance from junction to heatsink	with heatsink compound; per diode; Fig. 3	-	-	5	K/W
		with heatsink compound; both diodes conducting	-	-	3	K/W
R _{th(j-a)}	thermal resistance from junction to ambient free air		-	55	-	K/W

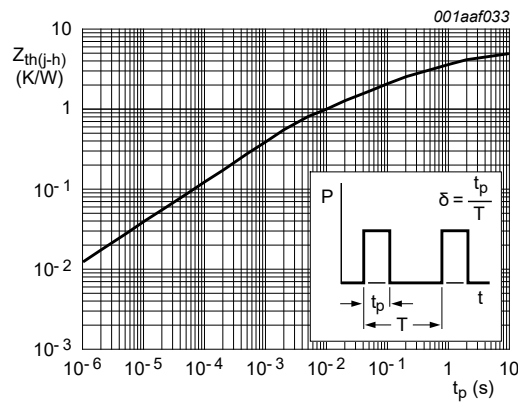


Fig. 3. Transient thermal impedance from junction to heatsink per diode as a function of pulse width

9. Isolation characteristics

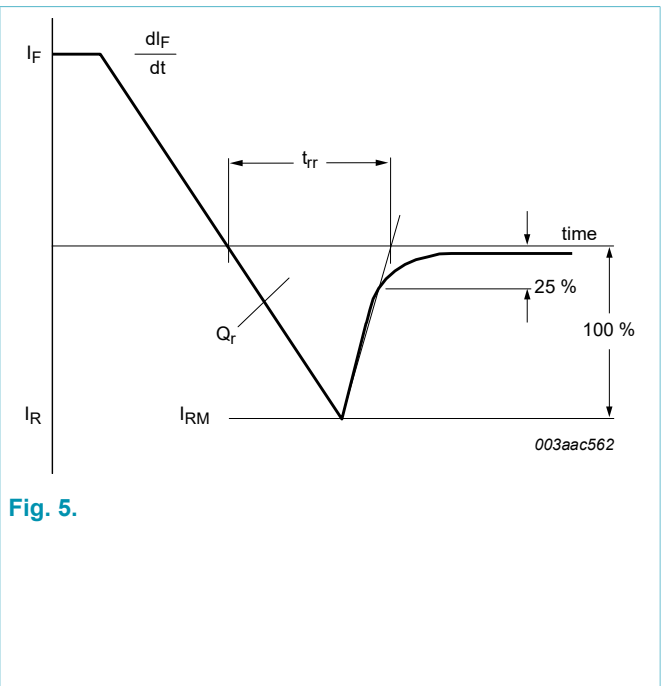
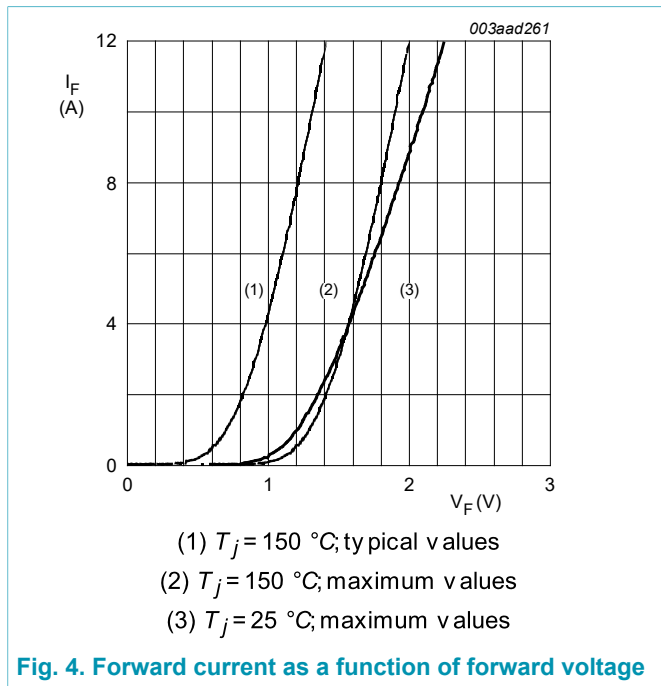
Table 6. Isolation characteristics

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	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	$I_F = 10 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 4}$	-	1.4	2.1	V
		$I_F = 10 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$	-	1.3	1.9	V
I_R	reverse current	$V_R = 600 \text{ V}; T_j = 100 \text{ }^\circ\text{C}$	-	1	1.5	mA
		$V_R = 600 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	13	50	μA
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 5}$	-	20	35	ns
I_{RM}	peak reverse recovery current	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; \text{ Fig. 5}$	-	1.4	1.9	A
Q_r	recovered charge	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}$	-	15	28	nC
V_{FR}	forward recovery voltage	$I_F = 1 \text{ A}; dI_F/dt = 100 \text{ A}/\mu\text{s}; \text{ Fig. 6}$	-	3.2	-	V



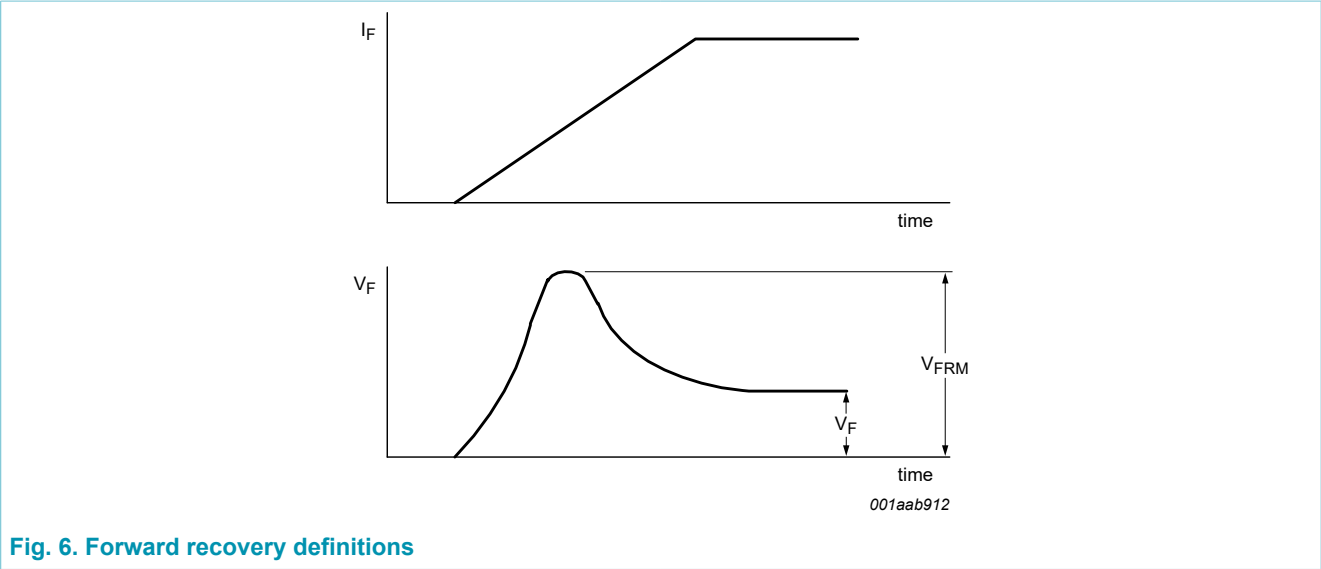


Fig. 6. Forward recovery definitions

11. Package outline

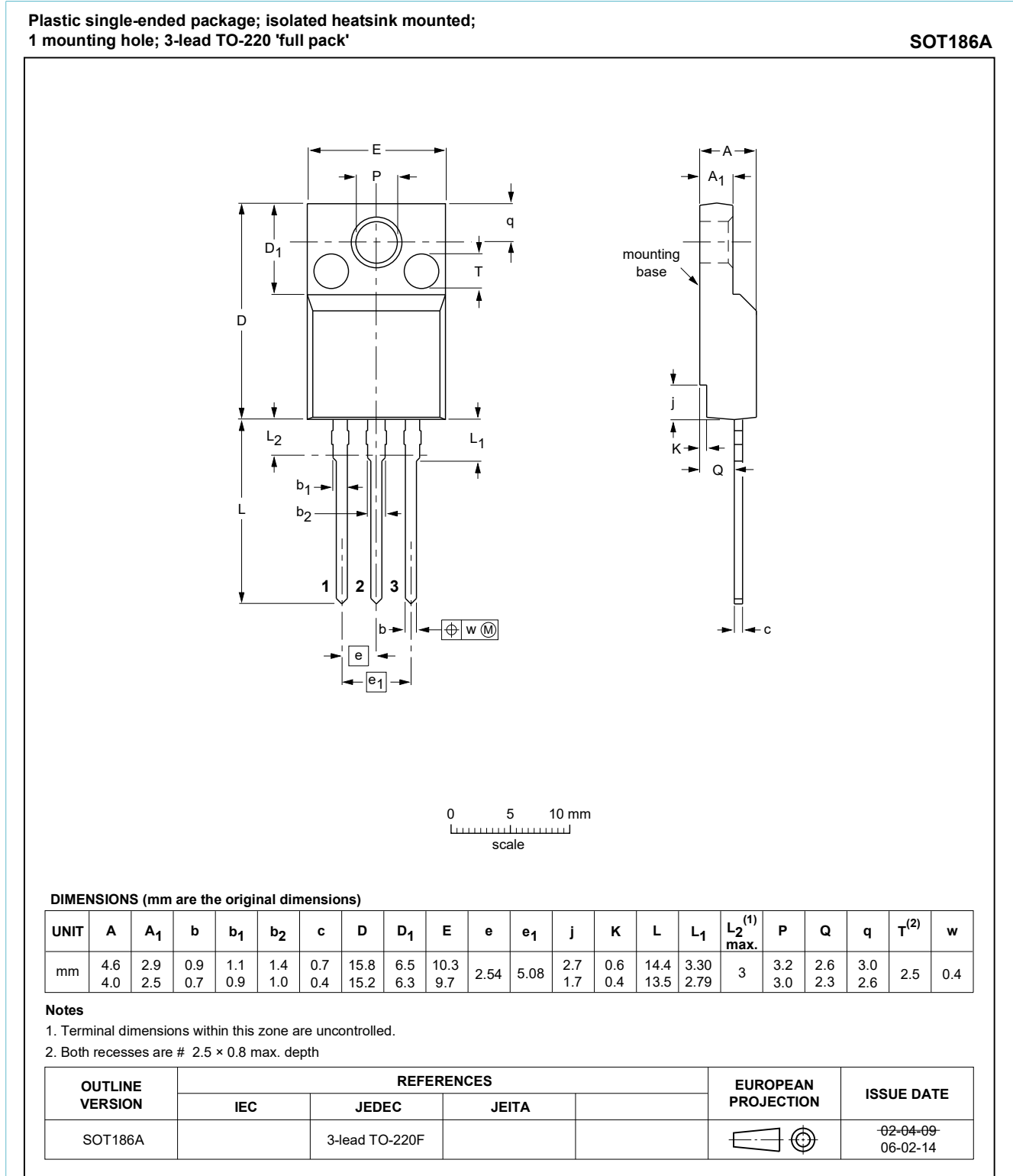


Fig. 7. Package outline TO-220F (SOT186A)

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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13. Contents

1. General description.....	1
2. Features and benefits.....	1
3. Applications.....	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Limiting values.....	3
8. Thermal characteristics.....	4
9. Isolation characteristics.....	4
10. Characteristics.....	5
11. Package outline.....	7
12. Legal information.....	8

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