

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

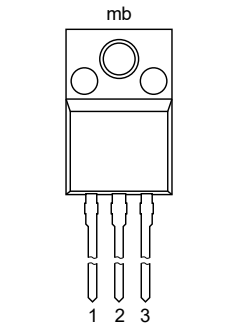
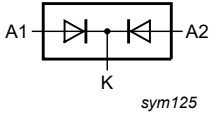
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_R	reverse voltage	DC	-	-	600	V
I_{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>	
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

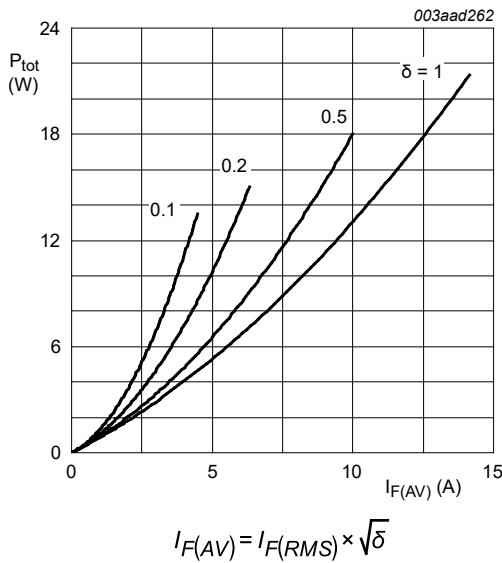


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

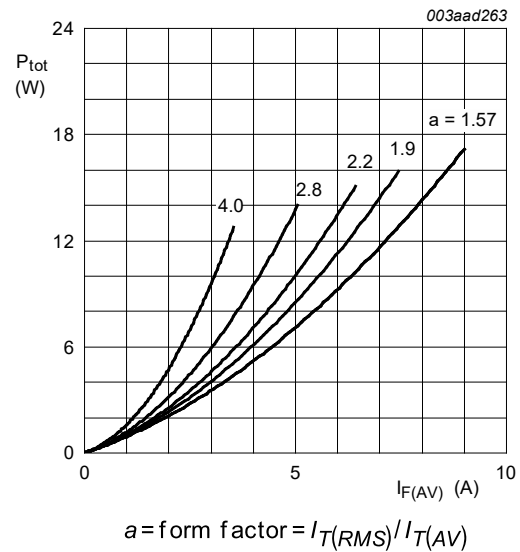


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

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	-	-	3.5	K/W
R _{th(j-a)}	thermal resistance from junction to ambient free air		-	55	-	K/W

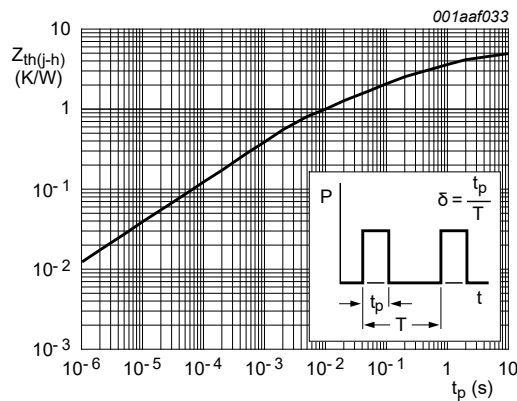


Fig. 3. Transient thermal impedance from junction to heatsink per diode as a function of pulse width

9. Isolation characteristics

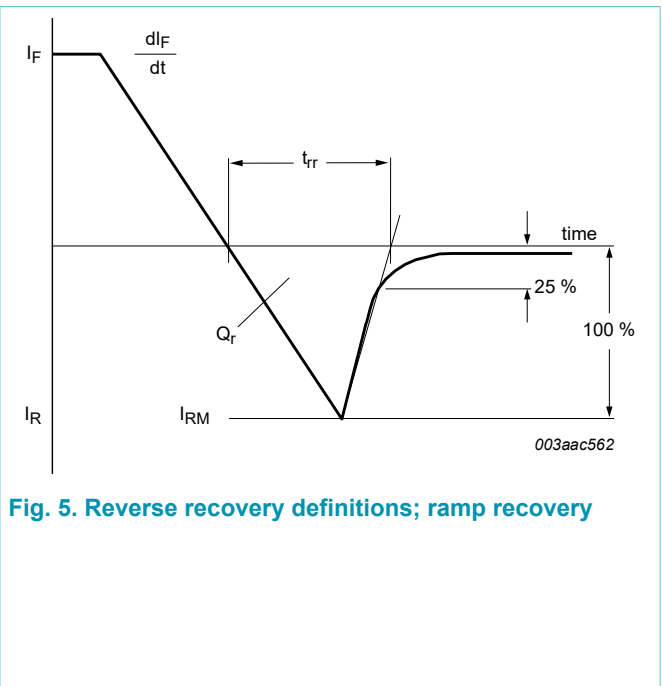
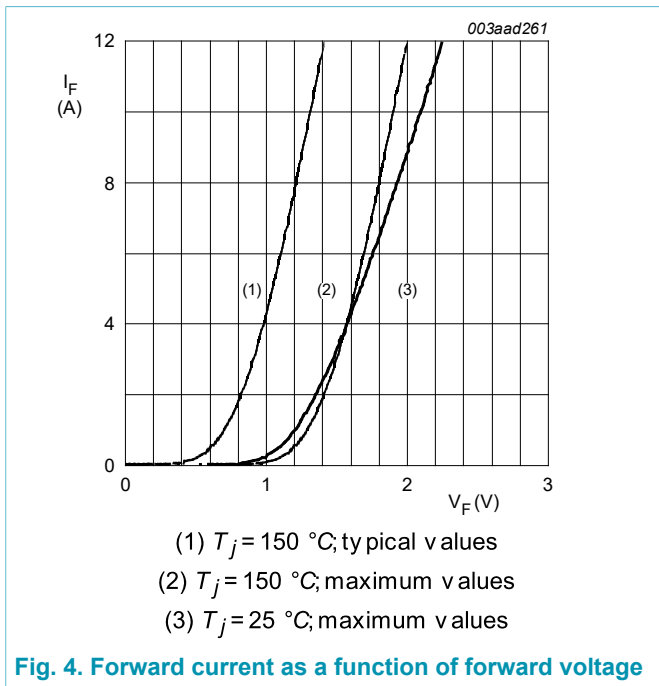
Table 6. Isolation characteristics

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



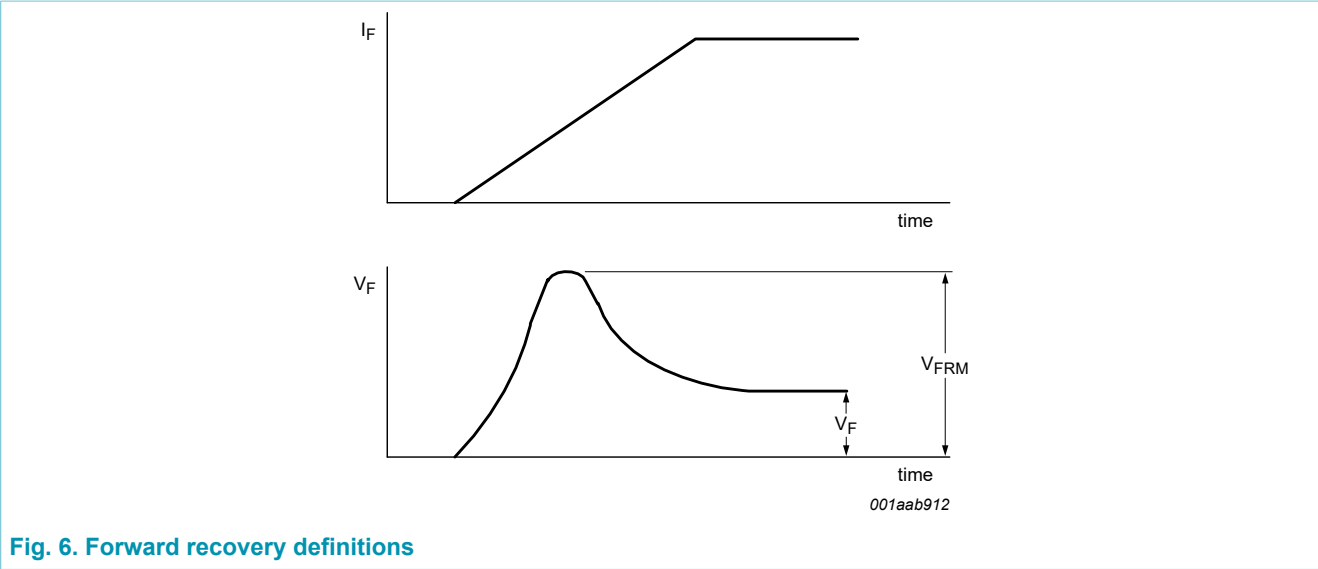


Fig. 6. Forward recovery definitions

11. Package outline

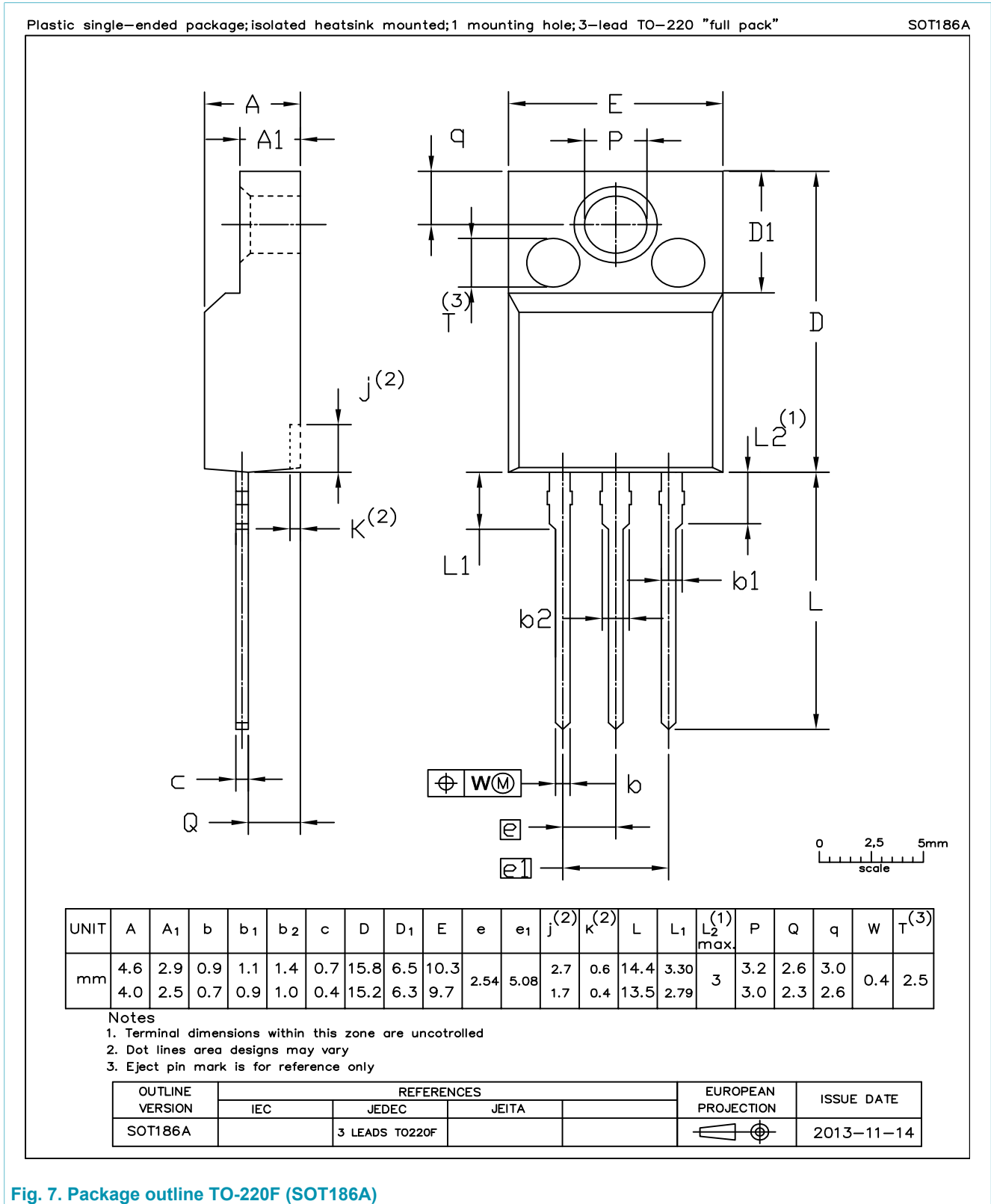


Fig. 7. Package outline TO-220F (SOT186A)

12. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYV410X-600 v.2	20181107	Product data sheet	-	BYV410X-600 v.1
Modifications:	Change from NXP version to WeEn version and update Rth.			
BYV410X-600 v.1	20180920	Product data sheet	-	-

13. 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".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.ween-semi.com>.

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