

BYV410X-600

Enhanced ultrafast dual rectifier diode

Rev. 01 — 29 June 2009

Product data sheet

1. Product profile

1.1 General description

Enhanced ultrafast dual rectifier diode in a SOT186A (TO-220AB) plastic package.

1.2 Features and benefits

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

1.3 Applications

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

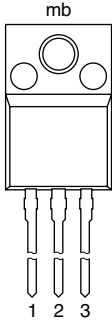
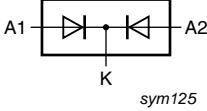
1.4 Quick reference data

Table 1. Quick reference

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{O(AV)}$	average output current	square-wave pulse; $\delta = 0.5$; $T_h \leq 42$ °C; both diodes conducting; see Figure 1 ; see Figure 2	-	-	20	A
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 100$ A/ μ s; $T_j = 25$ °C; see Figure 5	-	20	35	ns
Q_r	recovered charge	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 100$ A/ μ s	-	15	28	nC
Static characteristics						
V_F	forward voltage	$I_F = 10$ A; $T_j = 25$ °C; see Figure 4	-	1.4	2.1	V
		$I_F = 10$ A; $T_j = 150$ °C	-	1.3	1.9	V

2. Pinning information

Table 2. Pinning information

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

3. Ordering information

Table 3. Ordering information

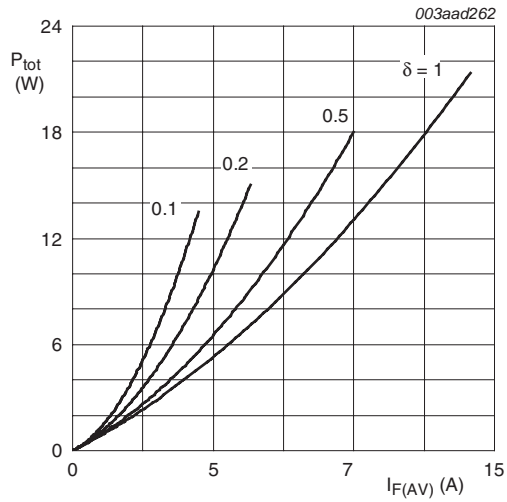
Type number	Package		Version
	Name	Description	
BYV410X-600	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220 "full pack"	SOT186A

4. Limiting values

Table 4. Limiting values

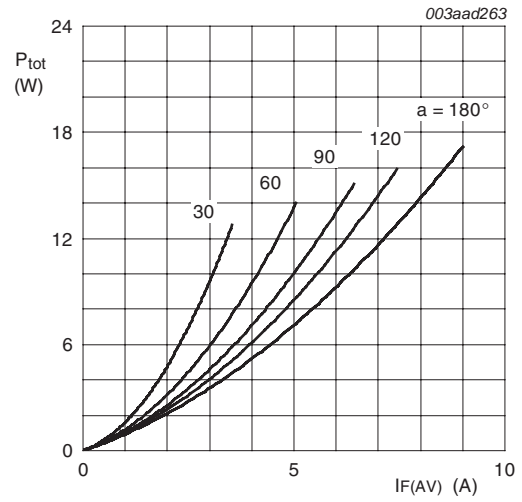
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	square-wave pulse; $\delta = 0.5$; $T_h \leq 42\text{ }^\circ\text{C}$; both diodes conducting; see Figure 1 ; see Figure 2	-	20	A
I_{FRM}	repetitive peak forward current	square-wave pulse; $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_h \leq 60\text{ }^\circ\text{C}$; per diode	-	20	A
I_{FSM}	non-repetitive peak forward current	$t_p = 8.3\text{ ms}$; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; per diode	-	132	A
		$t_p = 10\text{ ms}$; sine-wave pulse; $T_{j(\text{init})} 25\text{ }^\circ\text{C}$; per diode	-	120	A
T_{stg}	storage temperature		-40	150	$^\circ\text{C}$
T_j	junction temperature		-	150	$^\circ\text{C}$



$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$

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



$$a = \text{form factor} = I_{T(RMS)} / I_{T(AV)}$$

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

5. 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; see Figure 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

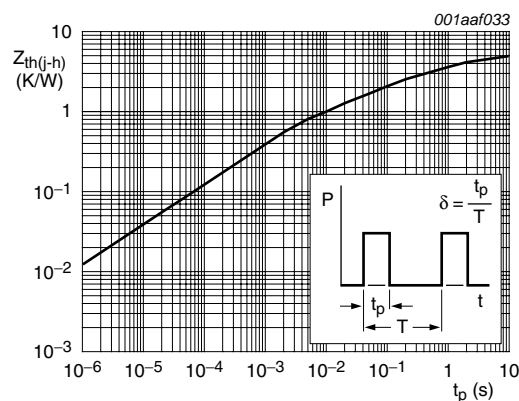


Fig 3. Transient thermal impedance from junction to heatsink per diode as a function of pulse width

6. Isolation characteristics

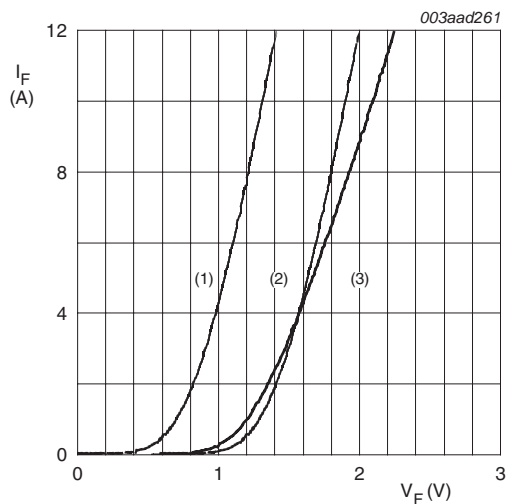
Table 6. Isolation characteristics

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

7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 10\text{ A}$; $T_j = 25\text{ °C}$; see Figure 4	-	1.4	2.1	V
		$I_F = 10\text{ A}$; $T_j = 150\text{ °C}$	-	1.3	1.9	V
I_R	reverse current	$V_R = 600\text{ V}$; $T_j = 100\text{ °C}$	-	0.7	1.5	mA
		$V_R = 600\text{ V}$; $T_j = 25\text{ °C}$	-	10	50	μA
Dynamic characteristics						
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
t_{rr}	reverse recovery time	$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $dI_F/dt = 100\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; see Figure 5	-	20	35	ns
I_{RM}	peak reverse recovery current	$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $dI_F/dt = 100\text{ A}/\mu\text{s}$; see Figure 5	-	1.4	1.9	A
V_{FR}	forward recovery voltage	$I_F = 1\text{ A}$; $dI_F/dt = 100\text{ A}/\mu\text{s}$; see Figure 6	-	3.2	-	V



- (1) $T_j = 150\text{ °C}$; typical values
- (2) $T_j = 150\text{ °C}$; maximum values
- (3) $T_j = 25\text{ °C}$; maximum values

Fig 4. Forward current as a function of forward voltage

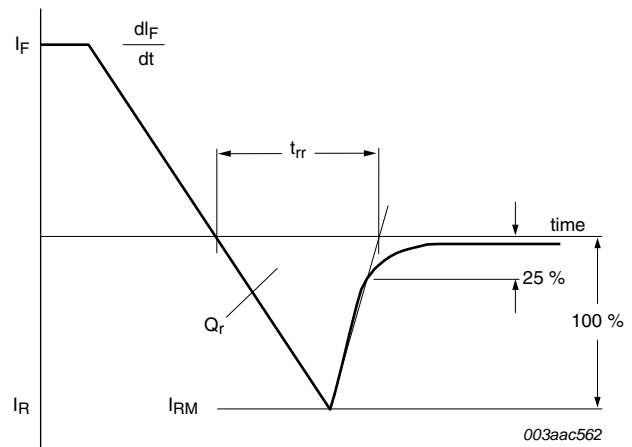


Fig 5. Reverse recovery definitions; ramp recovery

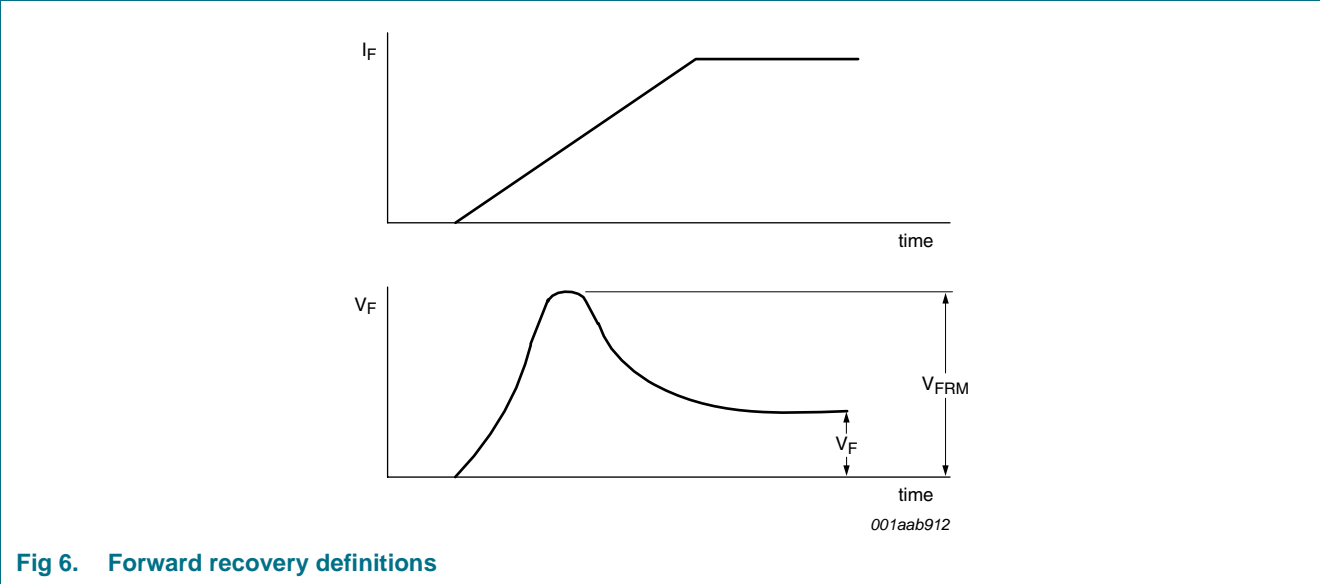


Fig 6. Forward recovery definitions

8. Package outline

Plastic single-ended package; isolated heatsink mounted;
1 mounting hole; 3-lead TO-220 'full pack'

SOT186A

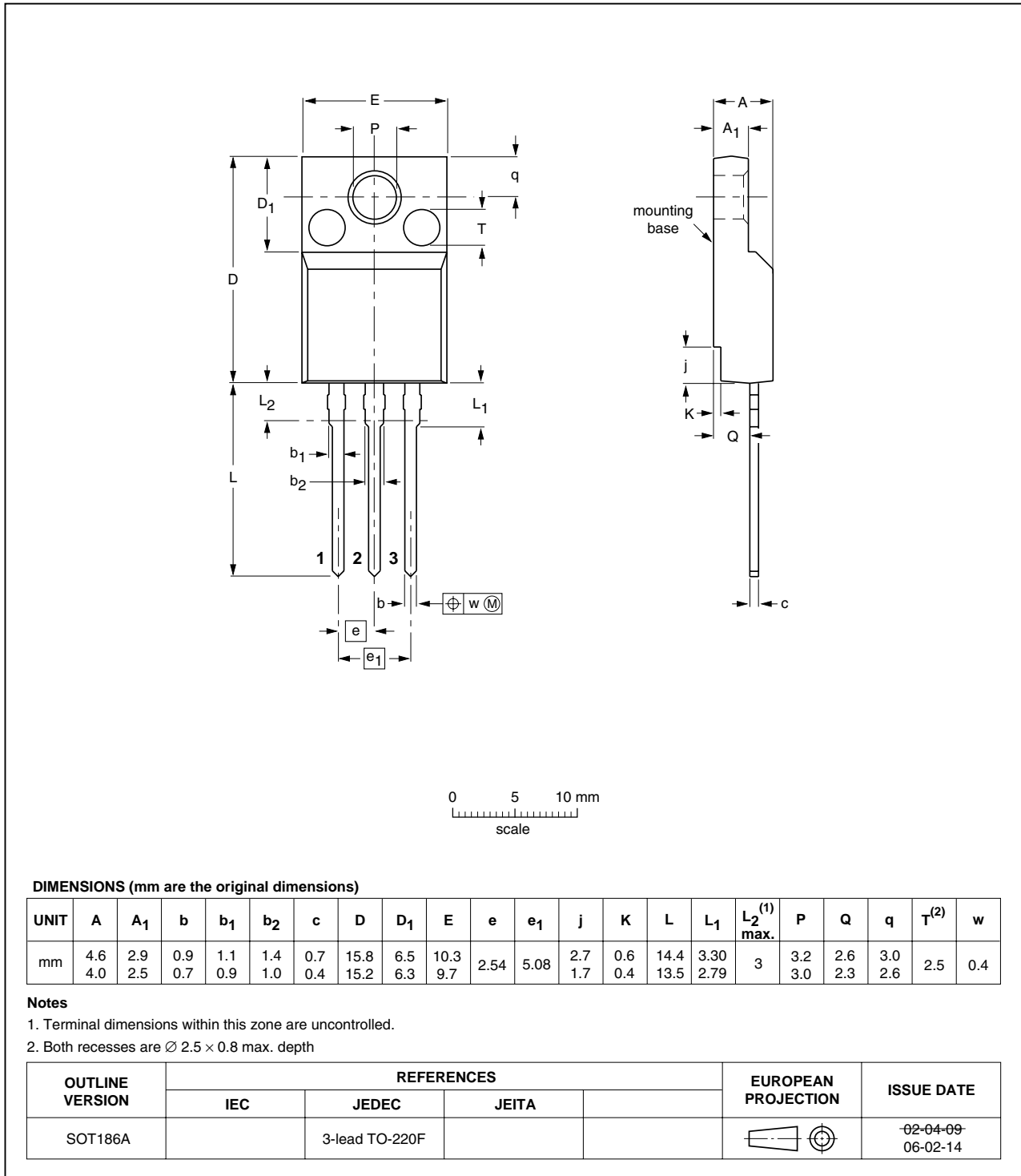


Fig 7. Package outline SOT186A (TO-220F)

9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYV410X-600_1	20090629	Product data sheet	-	-

10. 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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
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[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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12. Contents

1	Product profile	1
1.1	General description	1
1.2	Features and benefits	1
1.3	Applications	1
1.4	Quick reference data	1
2	Pinning information	2
3	Ordering information	2
4	Limiting values	2
5	Thermal characteristics	4
6	Isolation characteristics	4
7	Characteristics	5
8	Package outline	7
9	Revision history	8
10	Legal information	9
10.1	Data sheet status	9
10.2	Definitions	9
10.3	Disclaimers	9
10.4	Trademarks	9
11	Contact information	9

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