



BYV410-600

Dual enhanced ultrafast power diode

Rev. 2 — 5 August 2011

Product data sheet

1. Product profile

1.1 General description

Dual enhanced ultrafast power diode in a SOT78 (TO-220AB) plastic package.

1.2 Features and benefits

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

1.3 Applications

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

1.4 Quick reference data

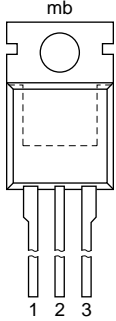
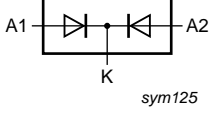
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	600	V
$I_{O(AV)}$	average output current	square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 92$ °C; both diodes conducting; see Figure 1 ; see Figure 2	-	-	20	A
Static characteristics						
V_F	forward voltage	$I_F = 10$ A; $T_j = 150$ °C	-	1.3	1.9	V
		$I_F = 10$ A; $T_j = 25$ °C; see Figure 4	-	1.4	2.1	V
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



2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1		
2	K	cathode		
3	A2	anode 2		
mb	K	mounting base; cathode		

SOT78 (TO-220AB)

3. Ordering information

Table 3. Ordering information

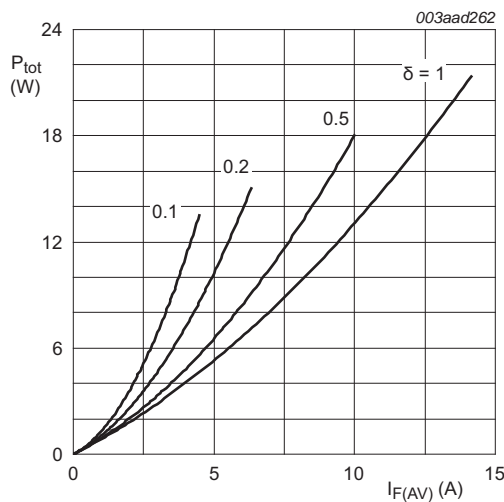
Type number	Package		
	Name	Description	Version
BYV410-600	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

4. Limiting values

Table 4. Limiting values

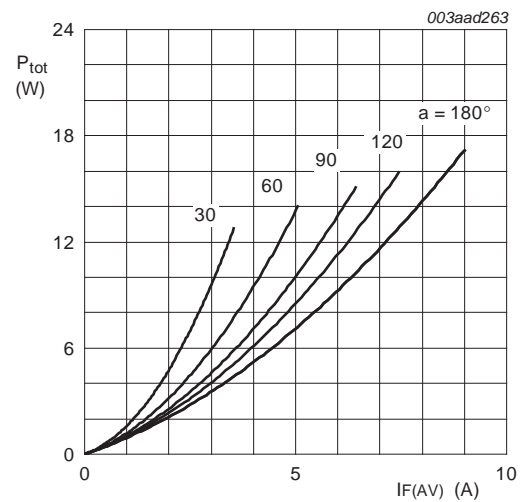
In accordance with the Absolute Maximum Rating System (IEC 60134).

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; $\delta = 0.5$; $T_{mb} \leq 92\text{ }^\circ\text{C}$; both diodes conducting; see Figure 1 ; see Figure 2	-	20	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 108\text{ }^\circ\text{C}$; 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



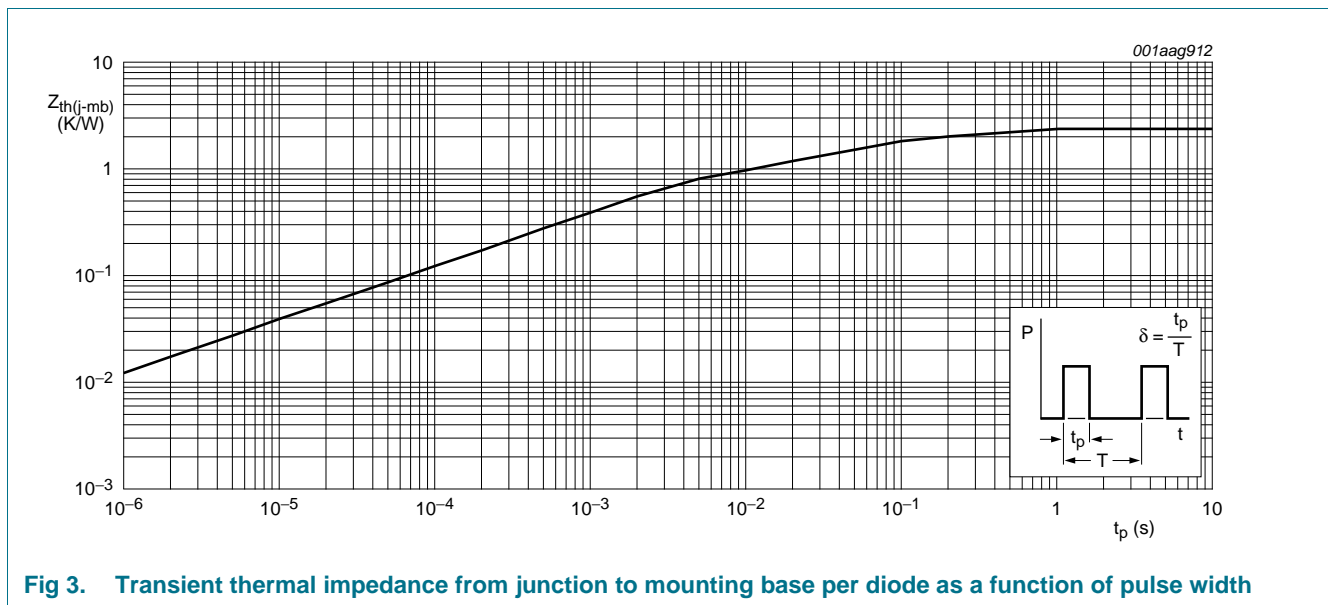
$$a = \text{form factor} = I_{T(RMS)} / I_{T(AV)}$$

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

5. Thermal characteristics

Table 5. Thermal characteristics

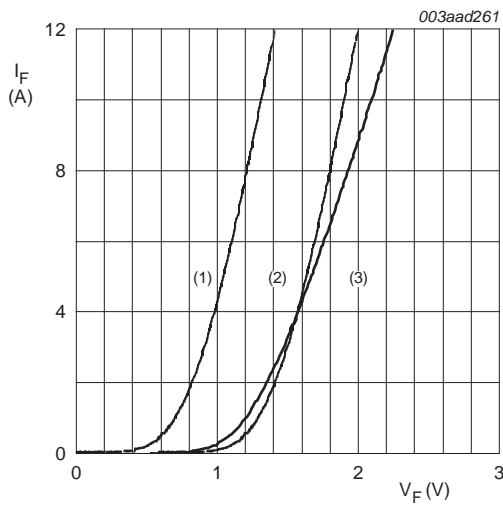
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	with heatsink compound; per diode; see Figure 3	-	-	2.4	K/W
		with heatsink compound; both diodes conducting	-	-	1.6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient		-	60	-	K/W



6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 10 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$	-	1.3	1.9	V
		$I_F = 10 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$; see Figure 4	-	1.4	2.1	V
I_R	reverse current	$V_R = 600 \text{ V}$	-	13	50	μA
		$V_R = 600 \text{ V}; T_j = 100 \text{ }^\circ\text{C}$	-	1	1.5	mA
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	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}$; 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) $T_j = 150 \text{ }^\circ\text{C}$; typical values
- (2) $T_j = 150 \text{ }^\circ\text{C}$; maximum values
- (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

Fig 4. Forward current as a function of forward voltage

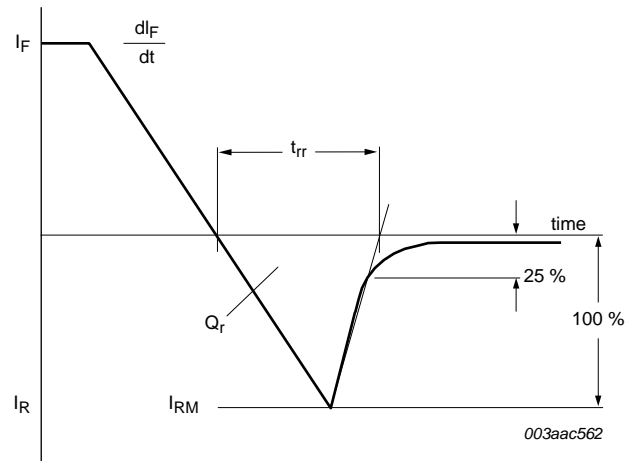


Fig 5. Reverse recovery definitions; ramp recovery

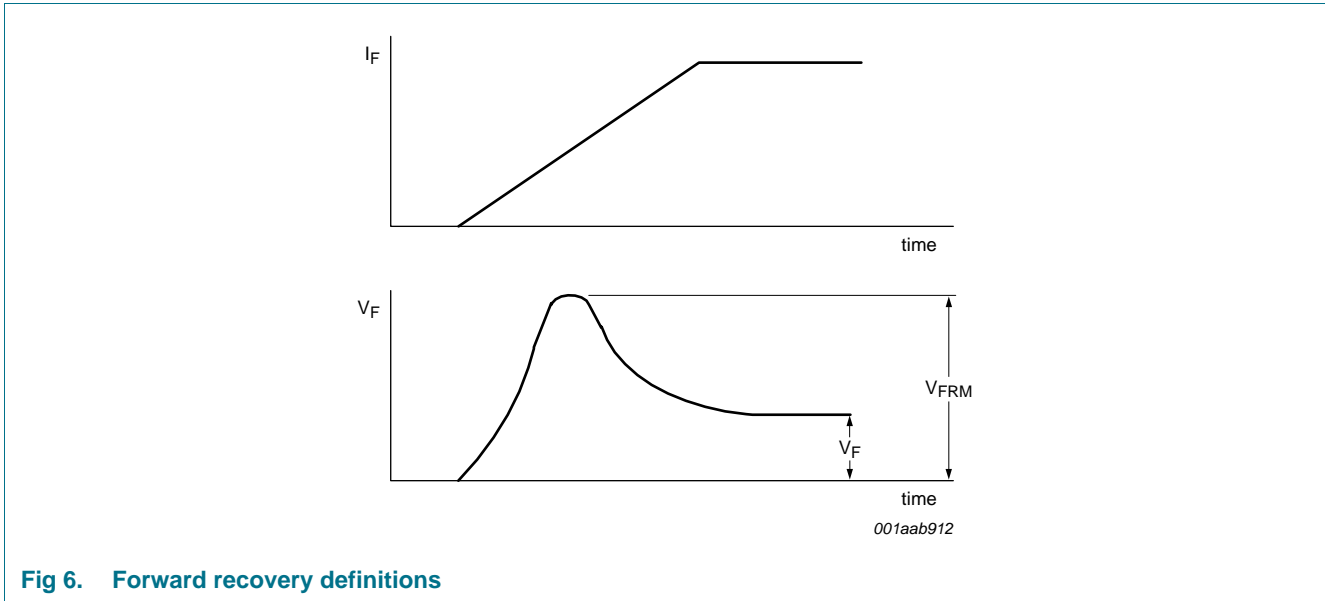


Fig 6. Forward recovery definitions

7. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB

SOT78

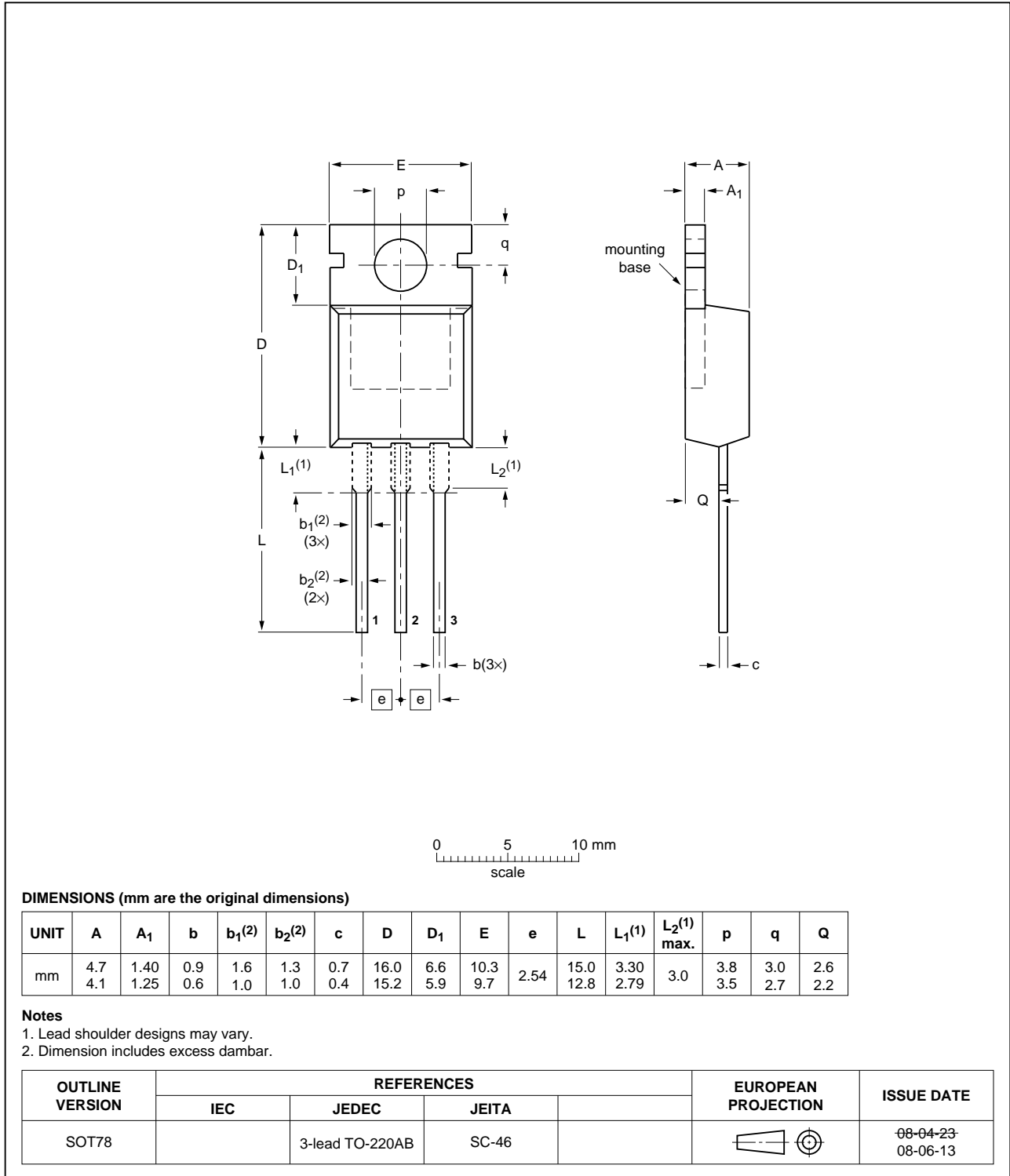


Fig 7. Package outline SOT78 (TO-220AB)

8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYV410-600 v.2	20110805	Product data sheet	-	BYV410-600_1
Modifications:	• Various changes to content.			
BYV410-600_1	20090629	Product data sheet	-	-

9. Legal information

9.1 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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