BYV410-600

Dual enhanced ultrafast power diode

2 February 2018 Product data sheet

1. General description

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

2. Features and benefits

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

3. Applications

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

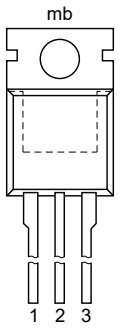
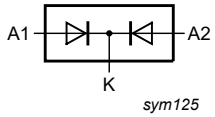
4. Quick reference data

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	$\delta = 0.5$; $t_p = 25$ µs; $T_{mb} \leq 108$ °C; 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
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; Fig. 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/µs; $T_j = 25$ °C; Fig. 5		-	20	35	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1	 TO-220AB (SOT78)	
2	K	cathode		
3	A2	anode 2		
mb	K	mounting base; cathode		

6. Ordering information

Table 3. Ordering information

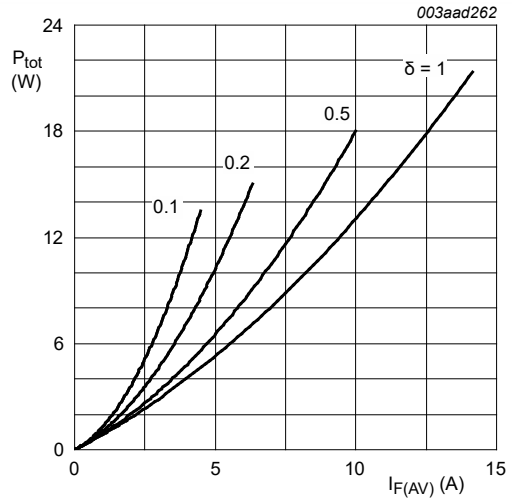
Type number	Package		
	Name	Description	Version
BYV410-600	TO-220AB	plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB	SOT78

7. Limiting values

Table 4. Limiting values

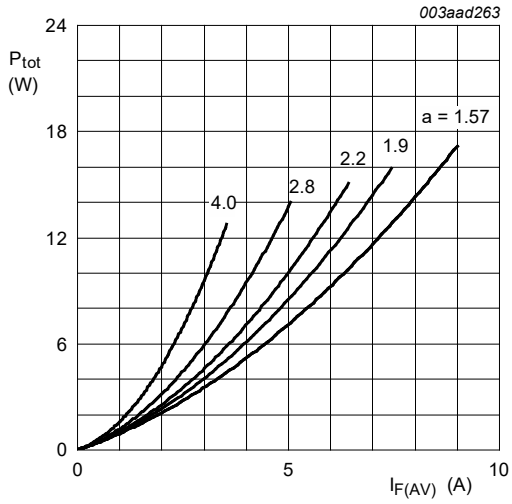
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	δ = 0.5 ; T_{mb} ≤ 92 °C; SQW; both diodes conducting; Fig. 1; Fig. 2		-	20	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; T_{mb} ≤ 108 °C; 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



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

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

8. 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; Fig. 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 free air			-	60	-	K/W

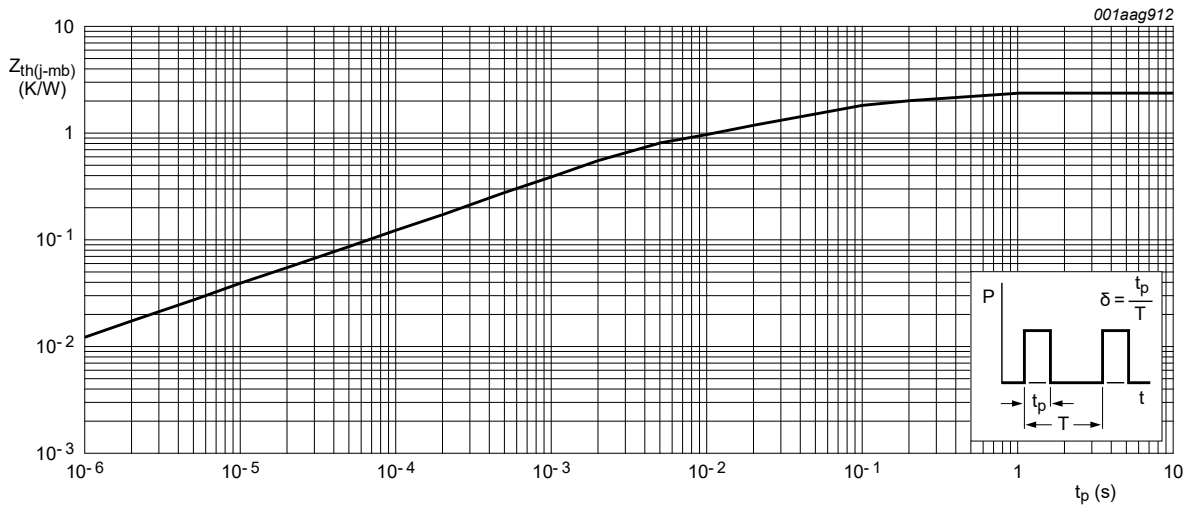
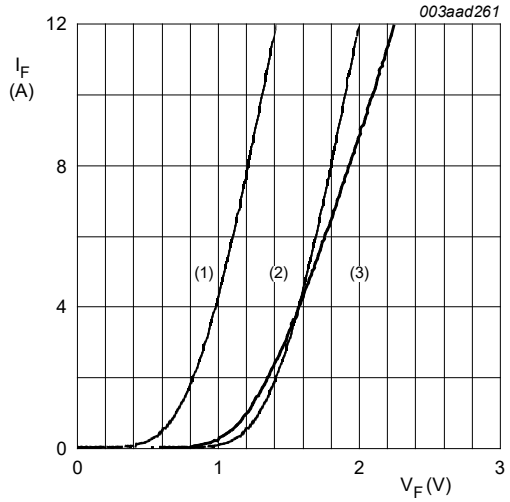


Fig. 3. Transient thermal impedance from junction to mounting base per diode as a function of pulse width

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
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; Fig. 4		-	1.4	2.1	V
I_R	reverse current	V_R = 600 V		-	13	50	µA
		V_R = 600 V; T_j = 100 °C		-	1	1.5	mA
Dynamic characteristics							
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs; T_j = 25 °C; Fig. 5		-	20	35	ns
I_{RM}	peak reverse recovery current	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs; Fig. 5		-	1.4	1.9	A
Q_r	recovered charge	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs		-	15	28	nC
V_{FR}	forward recovery voltage	I_F = 1 A; dI_F/dt = 100 A/µs; Fig. 6		-	3.2	-	V



(1) T_j = 150 °C; typical values

(2) T_j = 150 °C; maximum values

(3) T_j = 25 °C; maximum values

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

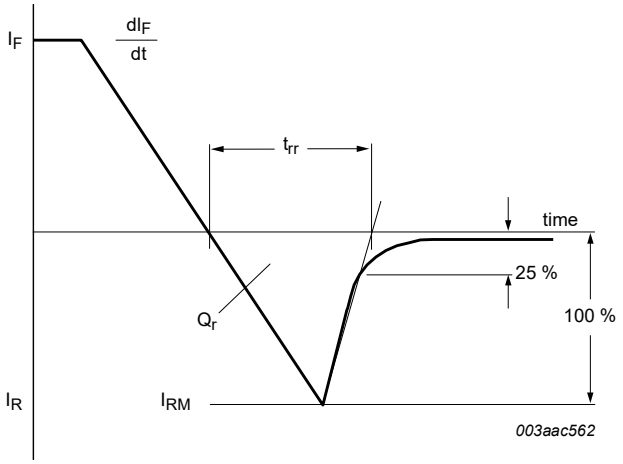


Fig. 5.

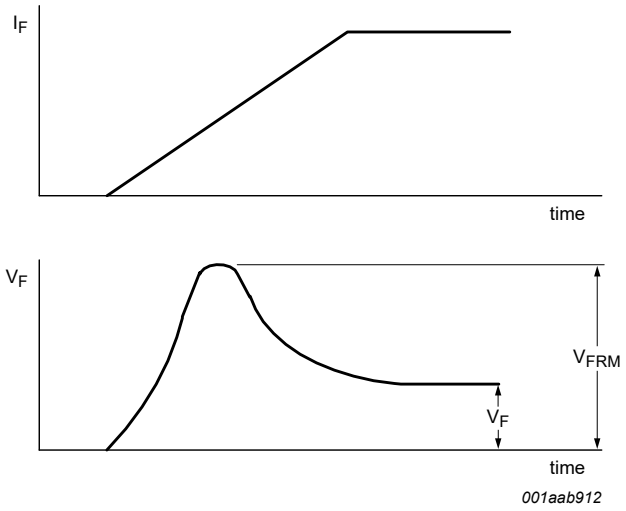
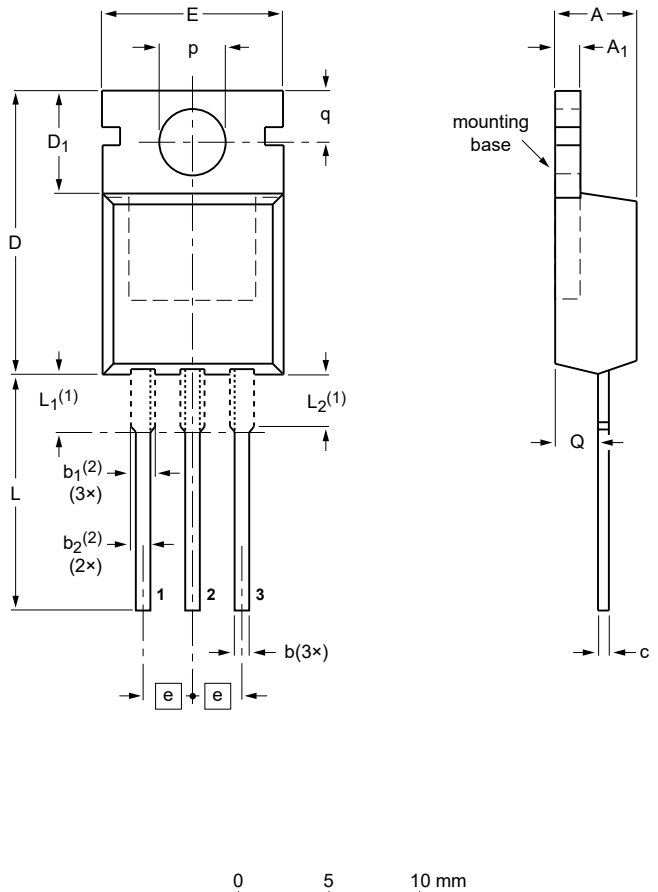


Fig. 6. Forward recovery definitions

10. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB **SOT78**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1(2)	b_2(2)	c	D	D_1	E	e	L	L_1(1)	L_2(1) max.	p	q	Q
mm	4.7 4.1	1.40 1.25	0.9 0.6	1.6 1.0	1.3 1.0	0.7 0.4	16.0 15.2	6.6 5.9	10.3 9.7	2.54	15.0 12.8	3.30 2.79	3.0	3.8 3.5	3.0 2.7	2.6 2.2

Notes

1. Lead shoulder designs may vary.
2. Dimension includes excess dambar.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT78		3-lead TO-220AB	SC-46			~~08-04-23~~ 08-06-13

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

11. 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.
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12. Contents

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