BYV74W-400

Dual ultrafast power diode

16 July 2013 **Product data sheet**

1. General description

Dual ultrafast power diode in a SOT429 (3-lead TO-247) plastic package.

2. Features and benefits

- Very low on-state loss
- Fast switching
- Soft recovery characteristic minimizes power consuming oscillations
- High thermal cycling performance
- Low thermal resistance

3. Applications

Output rectifiers in high-frequency switched-mode power supplies

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	-	400	V
$I_{F(AV)}$	average forward current	δ = 0.5 ; T_{mb} ≤ 104 °C; square-wave pulse; per diode; Fig. 1; Fig. 2; Fig. 3		-	-	15	A
$I_{O(AV)}$	average output current	δ = 0.5 ; T_{mb} ≤ 94 °C; square-wave pulse; both diodes conducting		-	-	30	A
Static characteristics							
V_F	forward voltage	I_F = 15 A; T_j = 150 °C; Fig. 6		-	0.95	1.12	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. 7		-	35	60	ns

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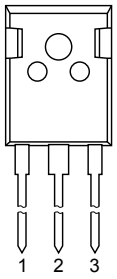
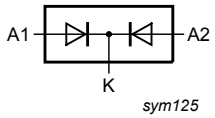
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1	 TO-247 (SOT429)	
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
BYV74W-400	TO-247	plastic single-ended through-hole package; heatsink mounted; 1 mounting hole; 3 lead TO-247	SOT429

7. Marking

Table 4. Marking codes

Type number	Marking code
BYV74W-400	BYV74W-400

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	400	V
V_{RWM}	crest working reverse voltage			-	400	V
V_R	reverse voltage	$T_{mb} \leq 136$ °C; DC		-	400	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 104$ °C; square-wave pulse; per diode; Fig. 1; Fig. 2; Fig. 3		-	15	A
$I_{O(AV)}$	average output current	$\delta = 0.5$; $T_{mb} \leq 94$ °C; square-wave pulse; both diodes conducting		-	30	A

Symbol	Parameter	Conditions		Min	Max	Unit
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; per diode; Fig. 4		-	170	A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; per diode; Fig. 4		-	185	A
T_{stg}	storage temperature			-40	150	°C
T_j	junction temperature			-	150	°C

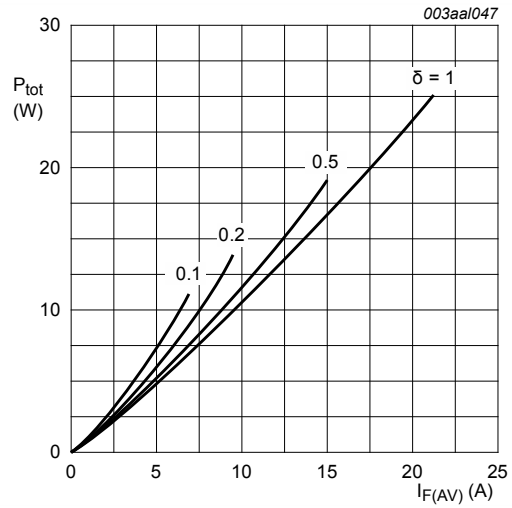


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; per diode; maximum values

$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$
$$V_O = 0.959\ V;\ R_S = 0.010\ \Omega$$

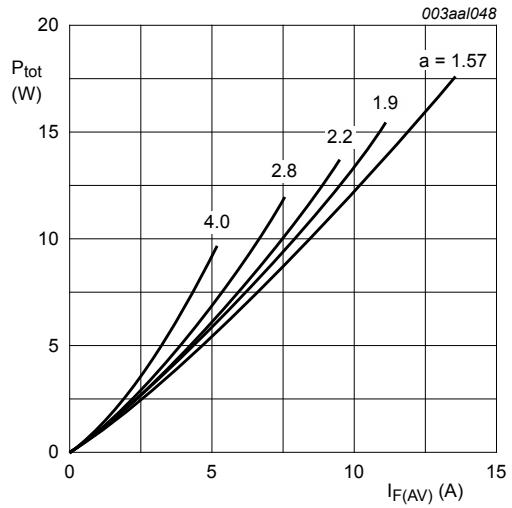


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; per diode; maximum values

$$a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$$
$$V_O = 0.959\ V;\ R_S = 0.010\ \Omega$$

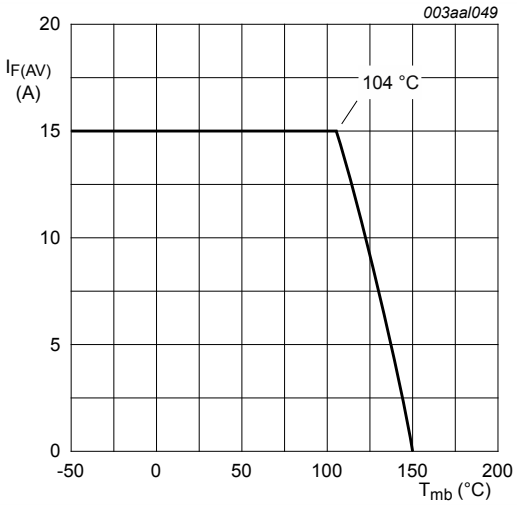


Fig. 3. Average forward current as a function of mounting base temperature; per diode; maximum values

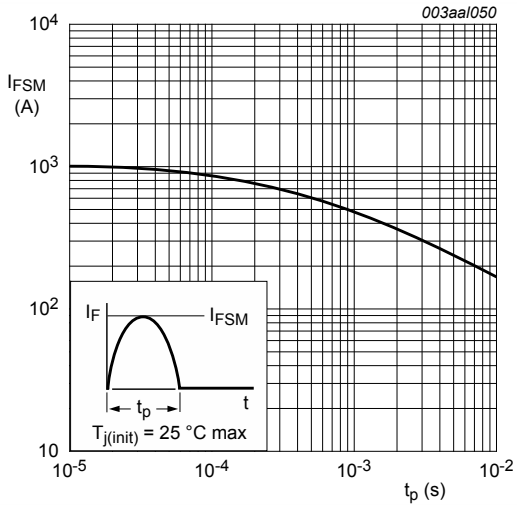


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; per diode; maximum values

9. Thermal characteristics

Table 6. 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. 5		-	-	2.4	K/W
		with heatsink compound; both diodes conducting		-	-	1.4	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	45	-	K/W

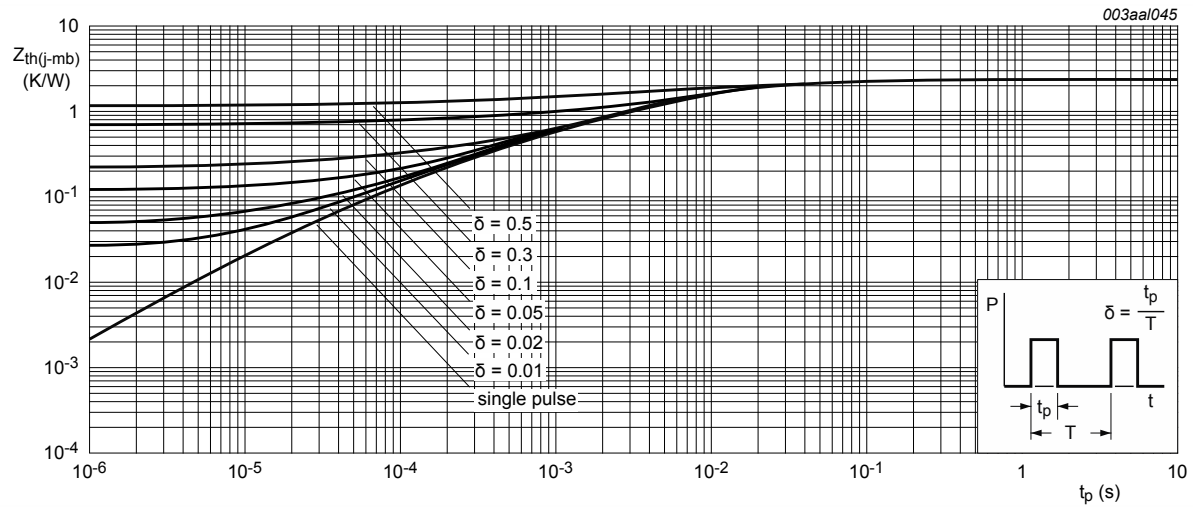


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse width; per diode; maximum values

10. Characteristics

Table 7. Characteristics

characteristics are per diode unless otherwise stated

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	I_F = 15 A; T_j = 25 °C; Fig. 6		-	1.08	1.25	V
		I_F = 30 A; T_j = 25 °C; Fig. 6		-	1.15	1.36	V
		I_F = 15 A; T_j = 150 °C; Fig. 6		-	0.95	1.12	V
I_R	reverse current	V_R = 400 V; T_j = 25 °C		-	10	50	µA
		V_R = 400 V; T_j = 100 °C		-	0.3	0.8	mA

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Dynamic characteristics							
Q_r	recovered charge	I_F = 2 A; V_R = 30 V; dI_F/dt = 20 A/µs; T_j = 25 °C; Fig. 7		-	40	60	nC
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs; T_j = 25 °C; Fig. 7		-	35	60	ns
I_{RM}	peak reverse recovery current	I_F = 10 A; V_R = 30 V; dI_F/dt = 50 A/µs; T_j = 100 °C; Fig. 7		-	4.2	5.2	A
V_{FRM}	forward recovery voltage	I_F = 10 A; dI_F/dt = 10 A/µs; T_j = 25 °C; Fig. 8		-	2.5	-	V

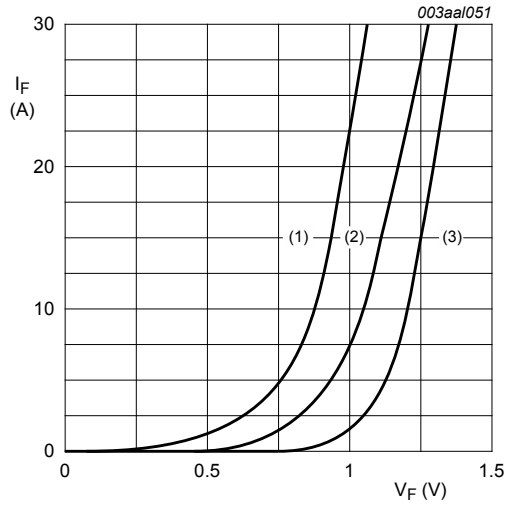


Fig. 6. Forward current as a function of forward voltage; per diode

(1) T_j = 150 °C; typical values;
(2) T_j = 150 °C; maximum values;
(3) T_j = 25 °C; maximum values;
V_O = 0.959 V; R_S = 0.010 Ω

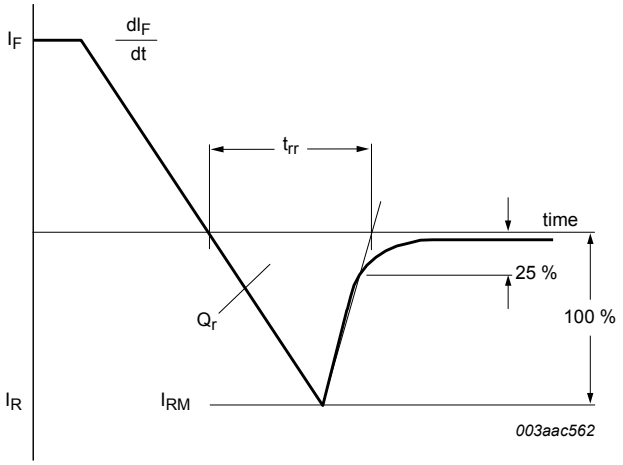


Fig. 7. Reverse recovery definitions; ramp recovery

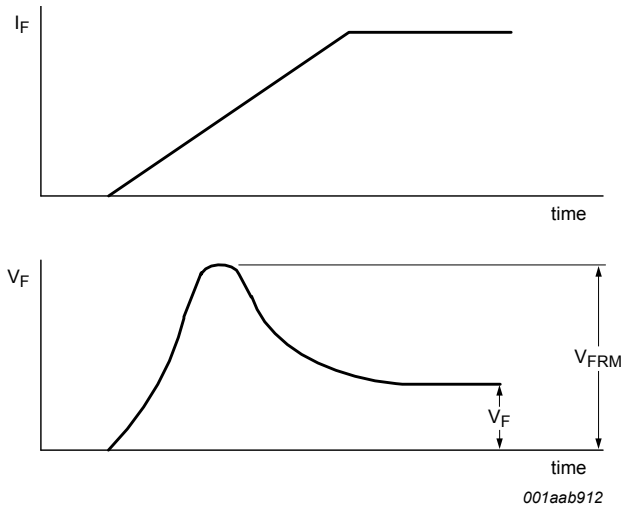
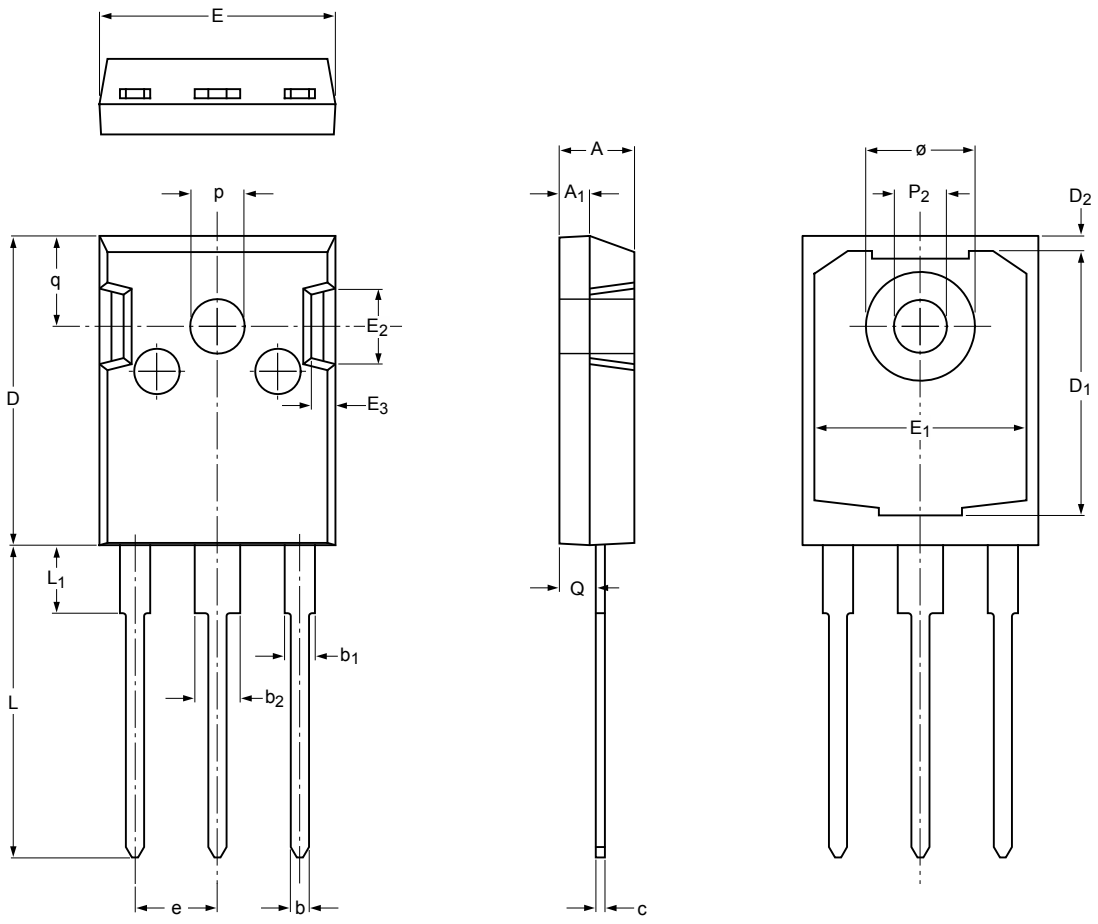


Fig. 8. Forward recovery definitions

11. Package outline

Plastic single-ended through-hole package; heatsink mounted; 1 mounting hole; 3-lead TO-247 **SOT429**



Dimensions (mm are the original dimensions)

Unit[1]		A	A_1	b	b_1	b_2	c	D	D_1	D_2	E	E_1	E_2	E_3	e[1]	L	L_1	P_2	p	Q	q	ø
mm	max	5.20	2.10	1.40	2.20	3.20	0.70	20.6	17.68	1.20	15.75	14.22	5.20	1.80		20.90	4.75	3.60	3.70	2.60	6.18	7.30
	nom														5.45							
	min	4.70	1.90	1.00	1.80	2.80	0.50	20.3	17.28	0.80	15.45	13.82	4.80	1.40		20.40	4.25	3.40	3.50	2.20	5.78	7.10

Note
1. Basic spacing between centers.

sot429_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT429		TO-247				~~04-09-14~~ 13-03-25

Fig. 9. Package outline TO-247 (SOT429)

12. Legal information

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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