

1. General description

Dual ultrafast power diode in a TO247 plastic package.

2. Features and benefits

- Very low on-state loss
- Fast switching
- Low leakage current
- Low thermal resistance

3. Applications

- Active PFC in air conditioner
- Interleaved PFC topology in switched-mode power supplies

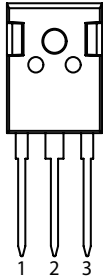
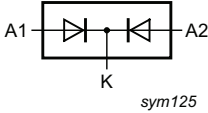
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Absolute maximum rating							
V _R	reverse voltage	DC		-	-	600	V
I _{F(AV)}	average forward current	δ = 0.5; T _{mb} ≤ 127 °C; square-wave pulse; per diode; Fig. 1 ; Fig. 2 ; Fig. 3		-	-	15	A
I _{FRM}	repetitive peak forward current	δ = 0.5 ; t _p = 25 μs; T _{mb} ≤ 127 °C; square-wave pulse		-	-	30	A
I _{FSM}	non-repetitive peak forward current	t _p = 10 ms; T _{j(init)} = 25 °C; sine-wave pulse; per diode; Fig. 4		-	-	150	A
		t _p = 8.3 ms; T _{j(init)} = 25 °C; sine-wave pulse; per diode		-	-	165	A
Static characteristics							
V _F	forward voltage	I _F = 15 A; T _j = 25 °C; per diode; Fig. 6		-	1.4	2.1	V
		I _F = 15 A; T _j = 150 °C; per diode; Fig. 6		-	1.1	1.8	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		-	25	50	ns
		I _F = 15 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	45	-	ns
		I _F = 15 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7		-	65	-	ns
		I _F = 15 A; V _R = 400 V; dI _F /dt = 500 A/μs; T _i = 25 °C; Fig. 7		-	34	-	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1		 <i>sym125</i>
2	K	cathode		
3	A2	anode 2		
mb	K	mounting base; connected to cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BYV415W-600P	TO247	BYV415W-600PQ	Tube	30	SOT429 (L)	25-Mar-2013
					TO247P (P)	31-Mar-2023

7. Marking

Table 4. Marking codes

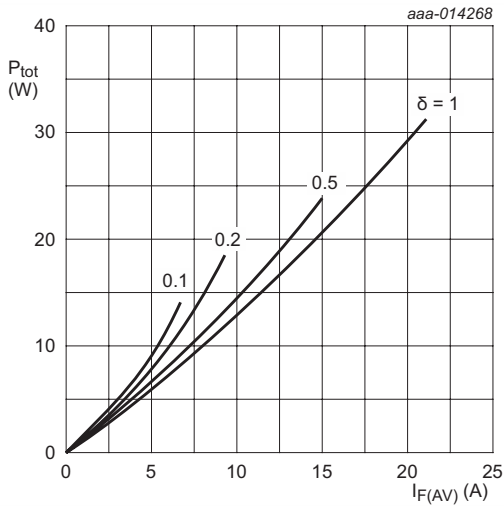
Type number	Marking codes	
	Assembly factory: L	Assembly factory: P
BYV415W-600P	BYV415W 600P PjLxxxx xx	BYV415W 600P PjPxxxx xx

8. Limiting values

Table 5. Limiting values

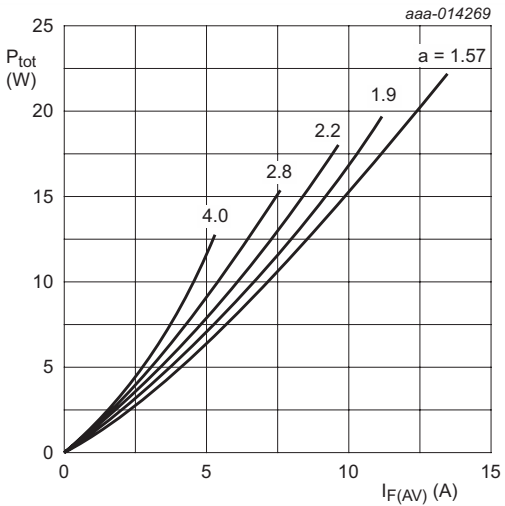
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	600	V
V_{RWM}	crest working reverse voltage			-	600	V
V_R	reverse voltage	DC		-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 127\text{ }^{\circ}\text{C}$; square-wave pulse; per diode; Fig. 1; Fig. 2; Fig. 3		-	15	A
$I_{O(AV)}$	average output current	$\delta = 0.5$; $T_{mb} \leq 117\text{ }^{\circ}\text{C}$; square-wave pulse; both diodes conducting		-	30	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 127\text{ }^{\circ}\text{C}$; square-wave pulse		-	30	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; sine-wave pulse; per diode; Fig. 4		-	150	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; sine-wave pulse; per diode		-	165	A
T_{stg}	storage temperature			-65	175	$^{\circ}\text{C}$
T_j	junction temperature			-	175	$^{\circ}\text{C}$



$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$
 $V_o = 1.172\text{ V}$; $R_s = 0.015\text{ }\Omega$

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



$a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$
 $V_o = 1.172\text{ V}$; $R_s = 0.015\text{ }\Omega$

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

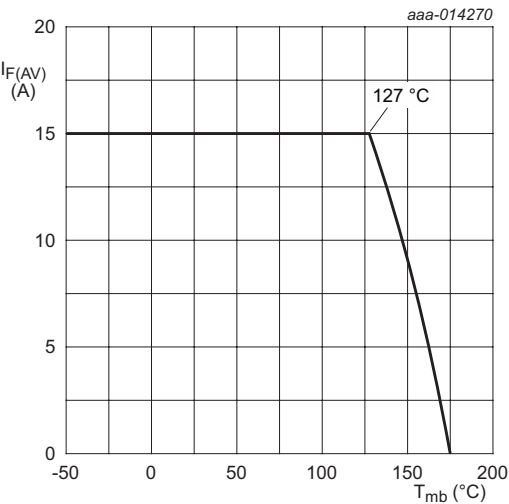


Fig. 3. Forward current as a function of mounting base temperature; maximum values; per diode

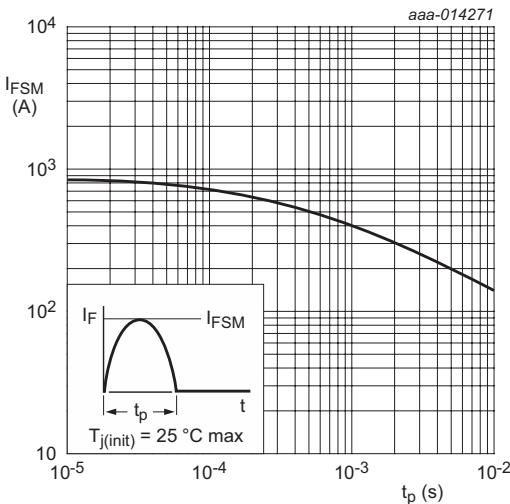


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values; per diode

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	-	1.2	2	K/W
		with heatsink compound; both diodes conducting	-	0.65	1.2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	40	-	K/W

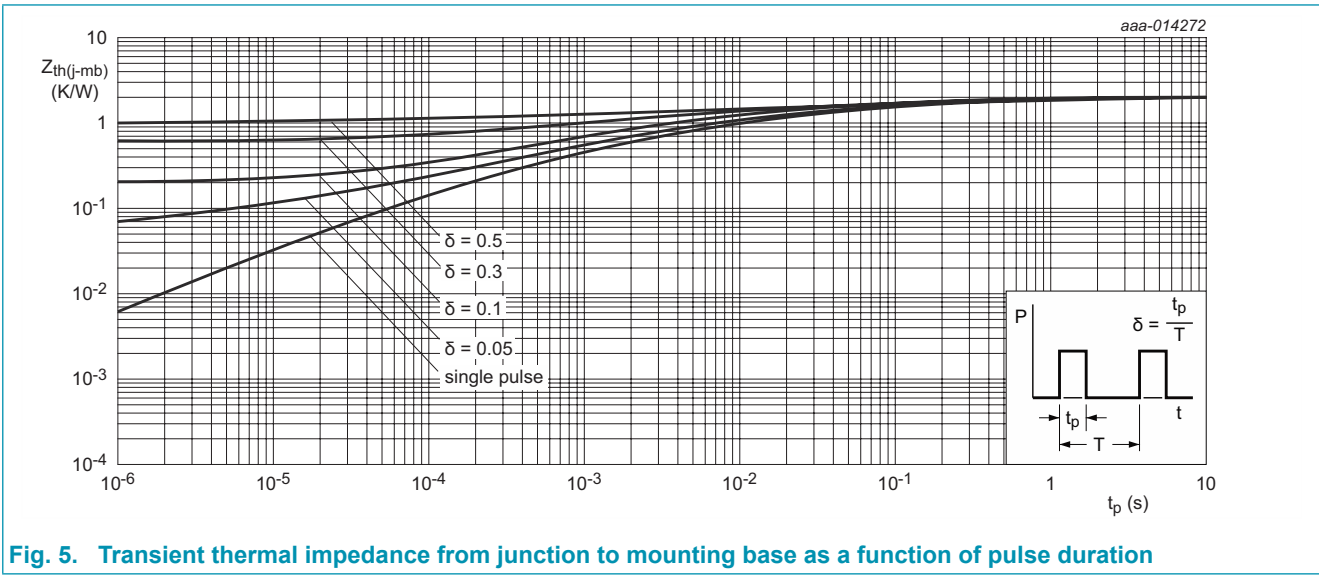
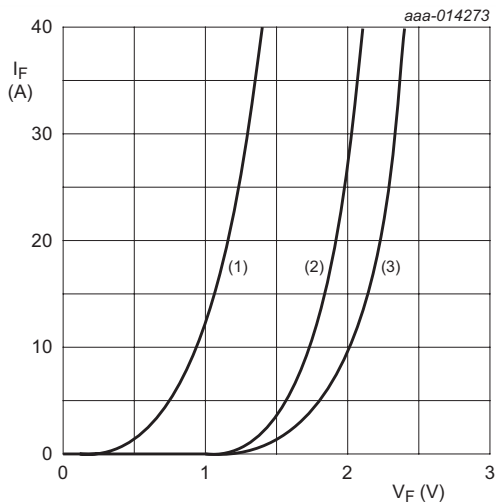


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V _F	forward current	I _F = 15 A; T _j = 25 °C; per diode; Fig. 6		-	1.4	2.1	V
		I _F = 15 A; T _j = 150 °C; per diode; Fig. 6		-	1.1	1.8	V
I _R	reverse current	V _R = 600 V; T _j = 25 °C; per diode		-	-	10	μA
		V _R = 600 V; T _j = 125 °C; per diode		-	-	500	μA
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		-	25	50	ns
		I _F = 15 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	45	-	ns
		I _F = 15 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7		-	65	-	ns
		I _F = 15 A; V _R = 400 V; dI _F /dt = 500 A/μs; T _j = 25 °C; Fig. 7		-	34	-	ns
I _{RM}	peak reverse recovery current	I _F = 15 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	5.5	-	A
		I _F = 15 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7		-	9.7	-	A
Q _r	reverse charge	I _F = 15 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	125	-	nC
		I _F = 15 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7		-	318	-	nC



$V_o = 1.172\text{ V}$; $R_s = 0.015\ \Omega$
(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. 6. Forward current as a function of forward voltage; per diode

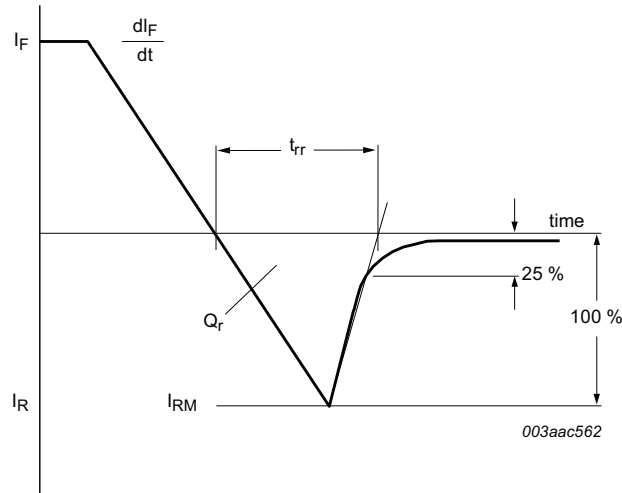


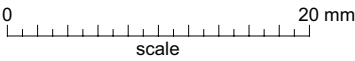
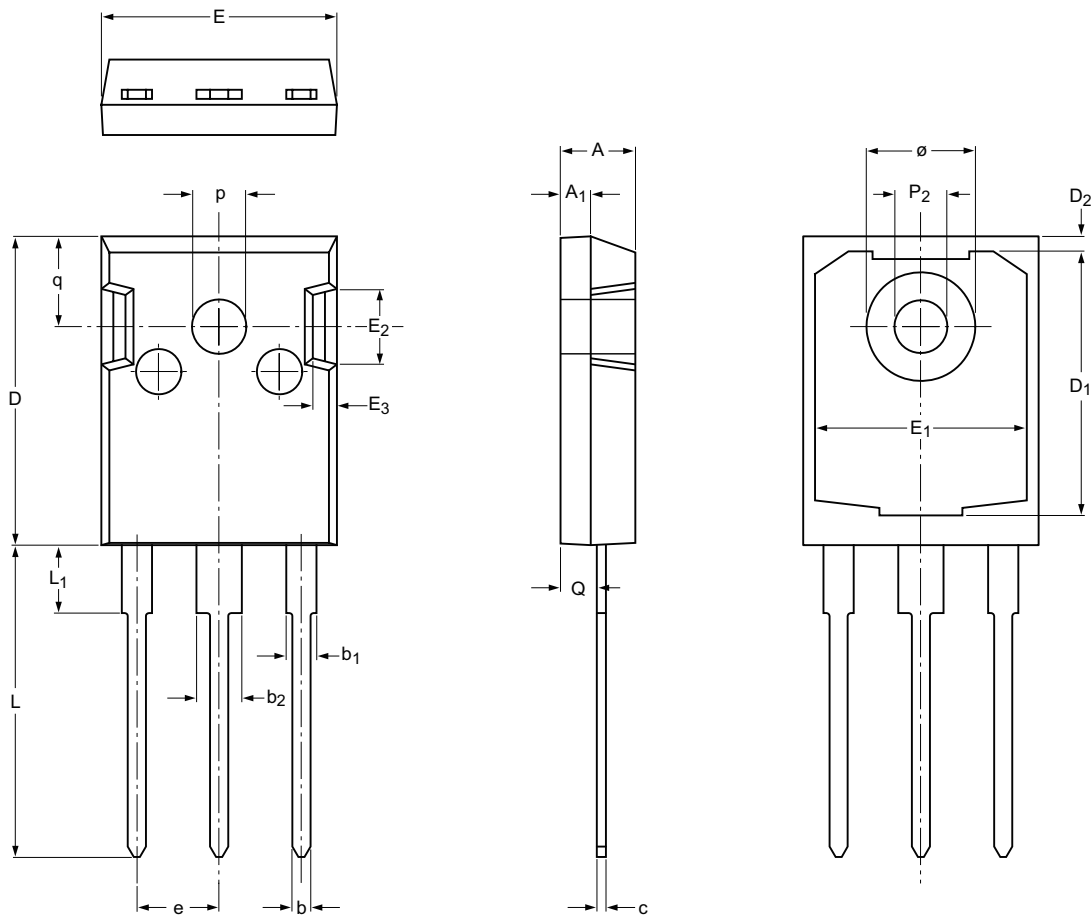
Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

Assembly factory: L

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
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.

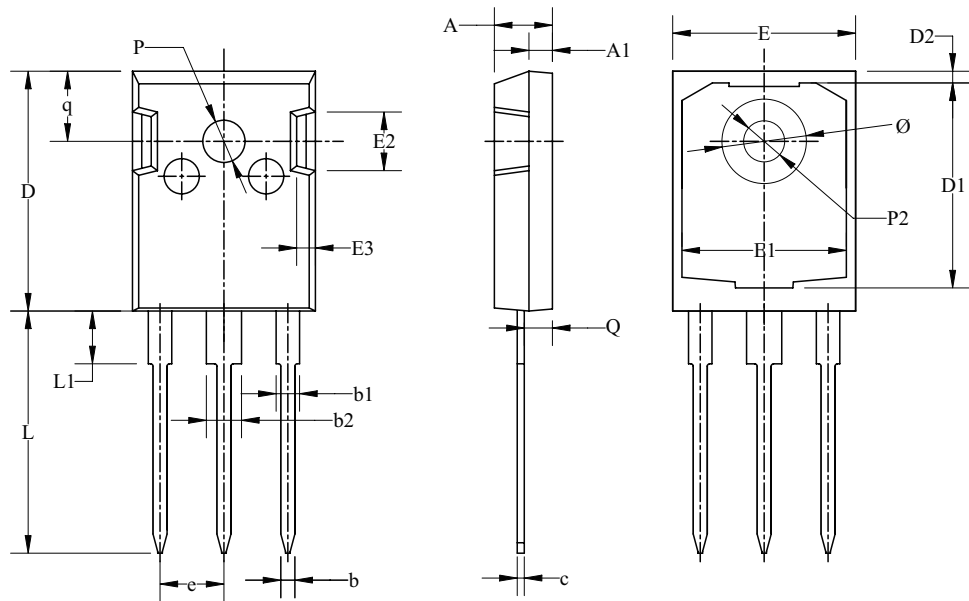
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Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT429		TO-247				04-09-14 13-03-25

Assembly factory: P

Plastic single-ended through-hole pack age; headsink mounted; 1 mounting hole; 3 leads TO-247

TO247



Dim	All Dimensions in Millimeters		
	Min	Typ	Max
A	4.70	4.95	5.20
A1	1.90	2.00	2.10
b	1.00	1.20	1.40
b1	1.80	2.00	2.20
b2	2.80	3.00	3.20
c	0.50	0.60	0.70
D	20.30	20.45	20.60
D1	17.28	17.48	17.68
D2	0.80	1.00	1.20
E	15.45	15.60	15.75
E1	13.82	14.02	14.22
E2	4.80	5.00	5.20
E3	1.40	1.60	1.80
e	5.45 BSC		
L	20.40	20.65	20.90
L1	4.25	4.50	4.75
P2	3.40	3.50	3.60
P	3.50	3.60	3.70
Q	2.20	2.40	2.60
q	5.78	5.98	6.18
Ø	7.10	7.19	7.30

12. 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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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13. Contents

1. General description.....	1
2. Features and benefits	1
3. Applications	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values	3
9. Thermal characteristics	5
10. Characteristics.....	6
11. Package outline	8
12. Legal information	10
13. Contents	12

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