



BYV415K-600P

Dual ultrafast power diode

24 December 2014

Product data sheet

1. General description

Dual ultrafast power diode in a SOT1259 (3-lead TO-3P) 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
V_{RRM}	repetitive peak reverse voltage		-	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 126$ °C; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	15	A
Static characteristics						
V_F	forward voltage	$I_F = 15$ A; $T_j = 150$ °C; Fig. 6	-	1.1	1.4	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; Fig. 7	-	25	50	ns

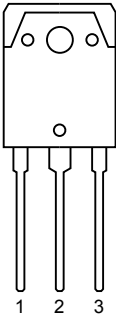
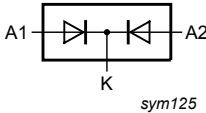


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5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1	 <p style="text-align: center;">TO3P (SOT1259)</p>	
2	K	cathode		
3	A2	anode 2		
mb	mb	mounting base; connected to cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BYV415K-600P	TO3P	Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO3P	SOT1259

7. Marking

Table 4. Marking codes

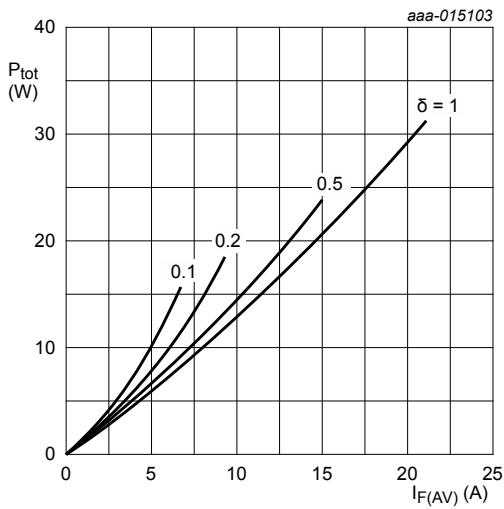
Type number	Marking code
BYV415K-600P	BYV415K-600P

8. Limiting values

Table 5. Limiting values

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

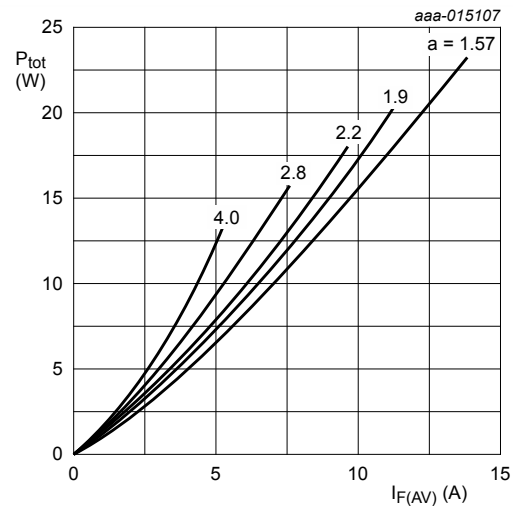
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	600	V
V_{RWM}	crest working reverse voltage		-	600	V
V_R	reverse voltage	DC	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 126\text{ }^\circ\text{C}$; square-wave pulse; Fig. 1; Fig. 2; Fig. 3	-	15	A
$I_{O(AV)}$	average output current	$\delta = 0.5$; $T_{mb} \leq 126\text{ }^\circ\text{C}$; square-wave pulse; both diodes conducting	-	30	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 126\text{ }^\circ\text{C}$; Square-wave pulse	-	15	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	-	140	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; sine-wave pulse; per diode; Fig. 4	-	155	A
T_{stg}	storage temperature		-65	175	$^\circ\text{C}$
T_j	junction temperature		-	175	$^\circ\text{C}$



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

$$V_o = 1.135\text{ V}; R_s = 0.017\text{ }\Omega$$

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



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

$$V_o = 1.135\text{ V}; R_s = 0.017\text{ }\Omega$$

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

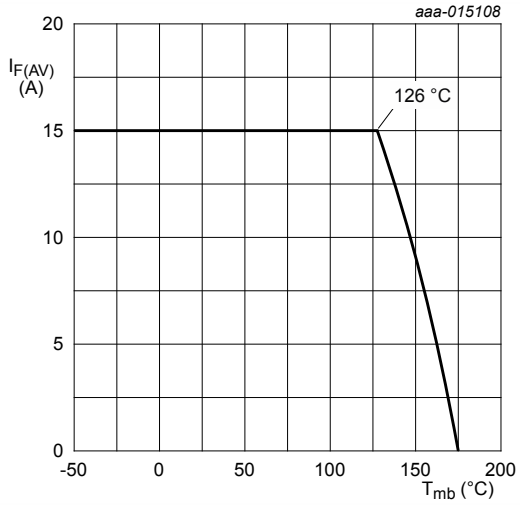


Fig. 3. Forward current as a function of mounting base temperature; maximum values

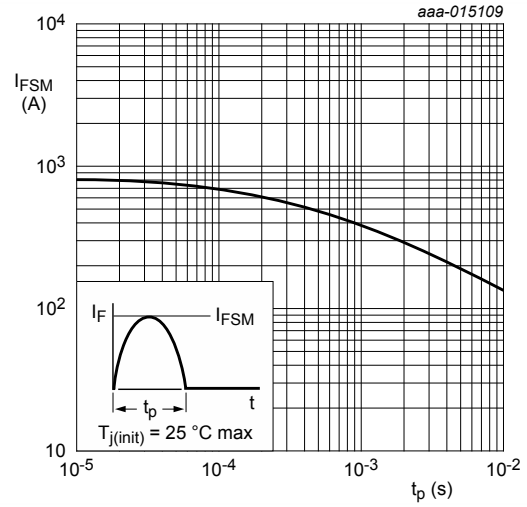


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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	-	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	in free air	-	45	-	K/W

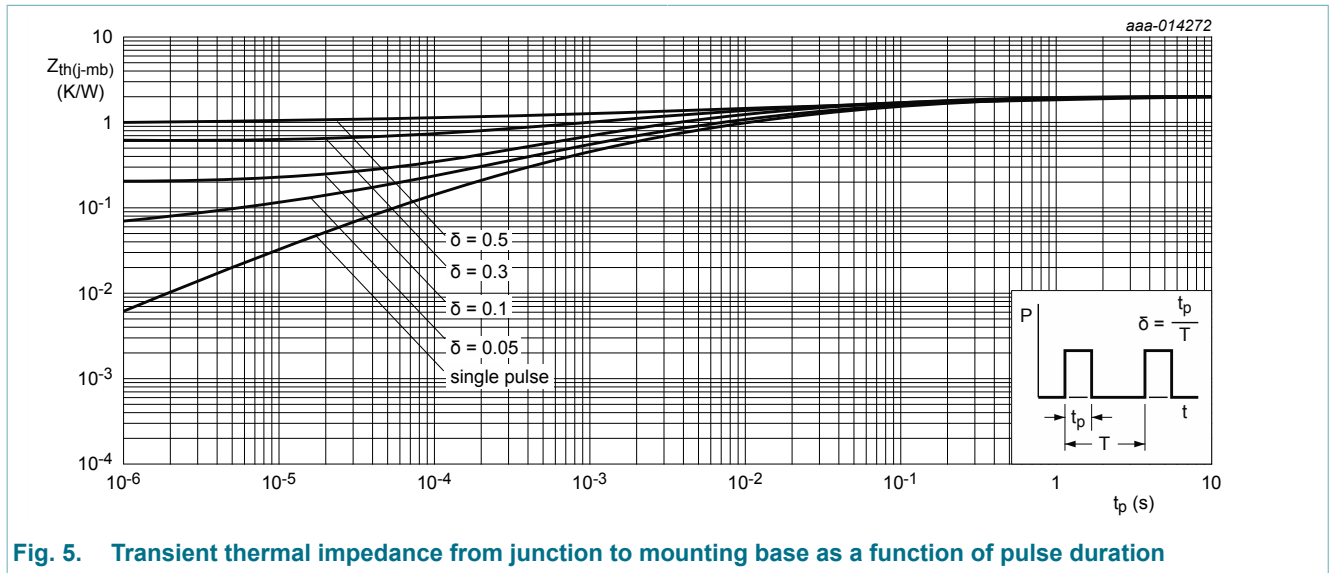


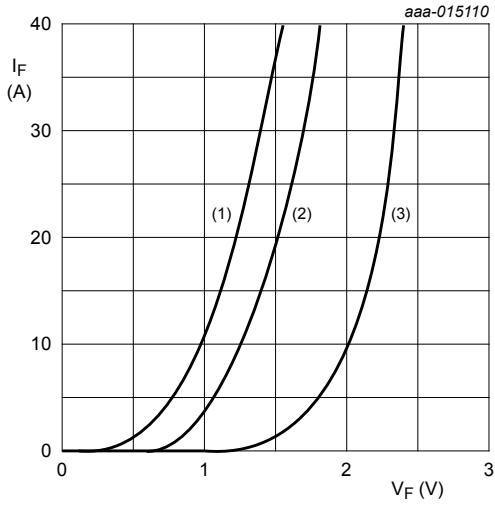
Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

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	$I_F = 15\text{ A}$; $T_j = 25\text{ °C}$; Fig. 6	-	1.4	2.1	V
		$I_F = 15\text{ A}$; $T_j = 150\text{ °C}$; Fig. 6	-	1.1	1.4	V
I_R	reverse current	$V_R = 600\text{ V}$; $T_j = 25\text{ °C}$	-	-	10	μA
		$V_R = 600\text{ V}$; $T_j = 150\text{ °C}$	-	-	500	μA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 15\text{ A}$; $V_R = 400\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 7	-	125	-	nC
		$I_F = 15\text{ A}$; $V_R = 400\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 125\text{ °C}$; Fig. 7	-	318	-	nC
t_{rr}	reverse recovery time	$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $di_F/dt = 100\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 7	-	25	50	ns
		$I_F = 15\text{ A}$; $V_R = 400\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 7	-	45	-	ns
		$I_F = 15\text{ A}$; $V_R = 400\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 125\text{ °C}$; Fig. 7	-	65	-	ns
		$I_F = 15\text{ A}$; $V_R = 400\text{ V}$; $di_F/dt = 500\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 7	-	34	-	ns
I_{RM}	peak reverse recovery current	$I_F = 15\text{ A}$; $V_R = 400\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 7	-	5.5	-	A
		$I_F = 15\text{ A}$; $V_R = 400\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 125\text{ °C}$; Fig. 7	-	9.7	-	A



$V_o = 1.135 \text{ V}; R_s = 0.017 \Omega$

- (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. 6. Forward current as a function of forward voltage

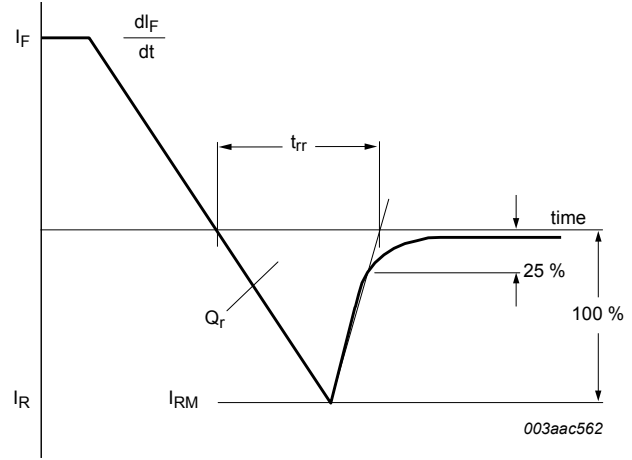
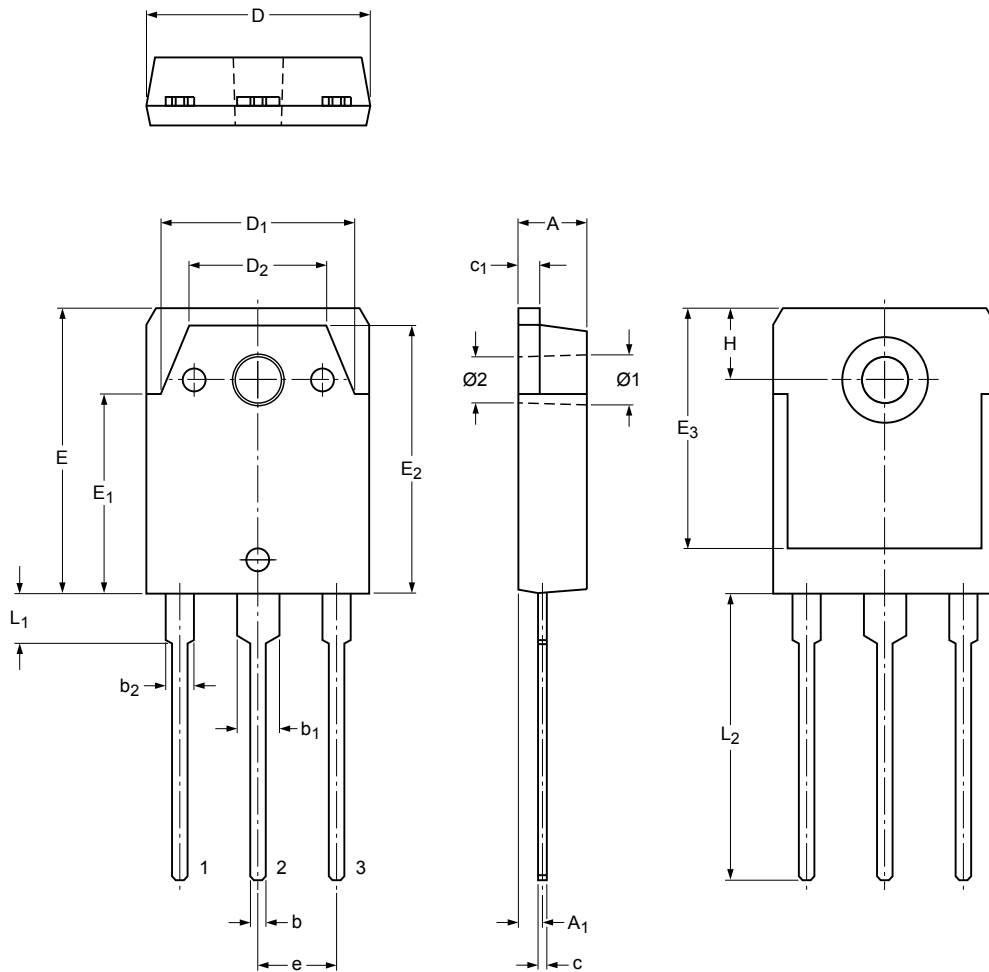


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO3P SOT1259



Dimensions (mm are the original dimensions)

Unit	A	A ₁	b	b ₁	b ₂	c	c ₁	D	D ₁	D ₂	e	E	E ₁	E ₂	E ₃	H	L ₁	L ₂	Ø1	Ø2
max	5.0	1.6	1.2	3.2	2.2	0.75	1.65	15.8	13.8	9.8		20.1	14.1	18.9	17.06	5.2	3.7	20.3	3.5	3.3
nom											5.45									
min	4.6	1.2	0.8	2.8	1.8	0.55	1.45	15.4	13.4	9.4	(typ)	19.7	13.7	18.5	16.46	4.8	3.3	19.7	3.3	3.1

sof1259_po

Outline version	References			European projection	Issue date
	IEC	JEDEC	JEITA		
SOT1259		TO3P			14-10-21 14-10-22

Fig. 8. Package outline TO3P (SOT1259)

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