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BYV415K-600PQ

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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

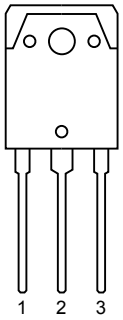
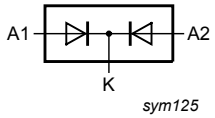
4. Quick reference data

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	δ = 0.5; T_{mb} ≤ 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/µs; T_j = 25 °C; Fig. 7		-	25	50	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1	 TO3P (SOT1259)	
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

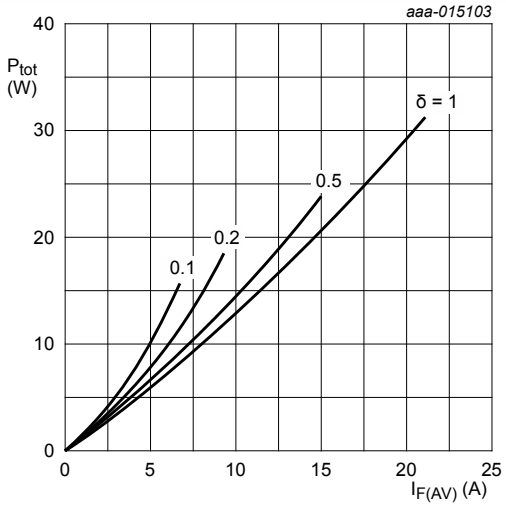
Type number	Marking code
BYV415K-600P	BYV415K-600P

8. Limiting values

Table 5. Limiting values

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

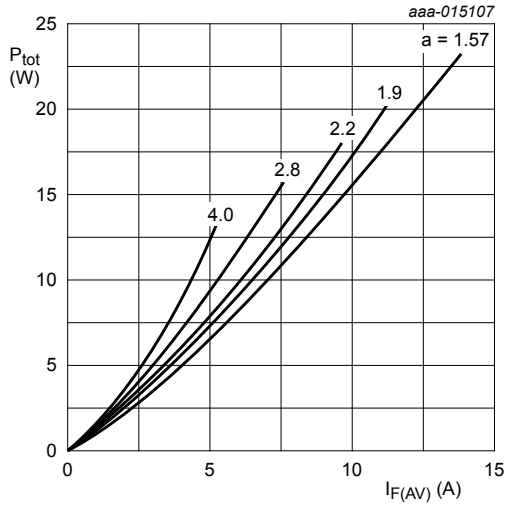
Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	600	V
V_{RWM}	crest working reverse voltage			-	600	V
V_R	reverse voltage	DC		-	600	V
$I_{F(AV)}$	average forward current	δ = 0.5; T_{mb} ≤ 126 °C; square-wave pulse; Fig. 1; Fig. 2; Fig. 3		-	15	A
$I_{O(AV)}$	average output current	δ = 0.5; T_{mb} ≤ 126 °C; square-wave pulse; both diodes conducting		-	30	A
I_{FRM}	repetitive peak forward current	δ = 0.5; t_p = 25 µs; T_{mb} ≤ 126 °C; Square-ware pulse		-	15	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; per diode; Fig. 4		-	140	A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; per diode; Fig. 4		-	155	A
T_{stg}	storage temperature			-65	175	°C
T_j	junction temperature			-	175	°C



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

V_o = 1.135 V; R_s = 0.017 Ω

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



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

V_o = 1.135 V; R_s = 0.017 Ω

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

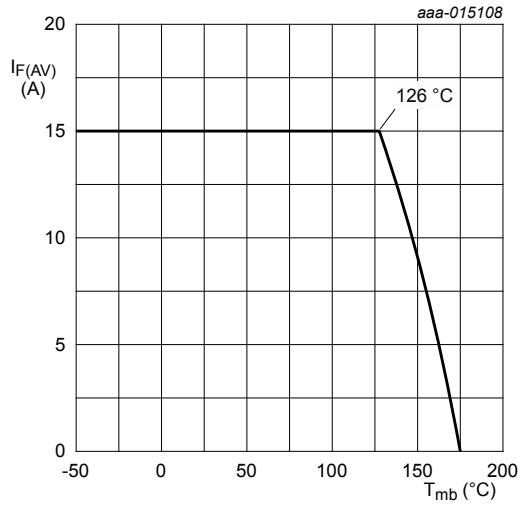


Fig. 3. Forward current as a function of mounting base temperature; maximum values

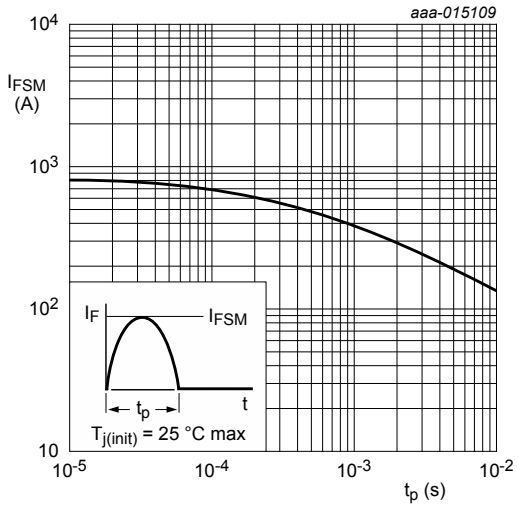


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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

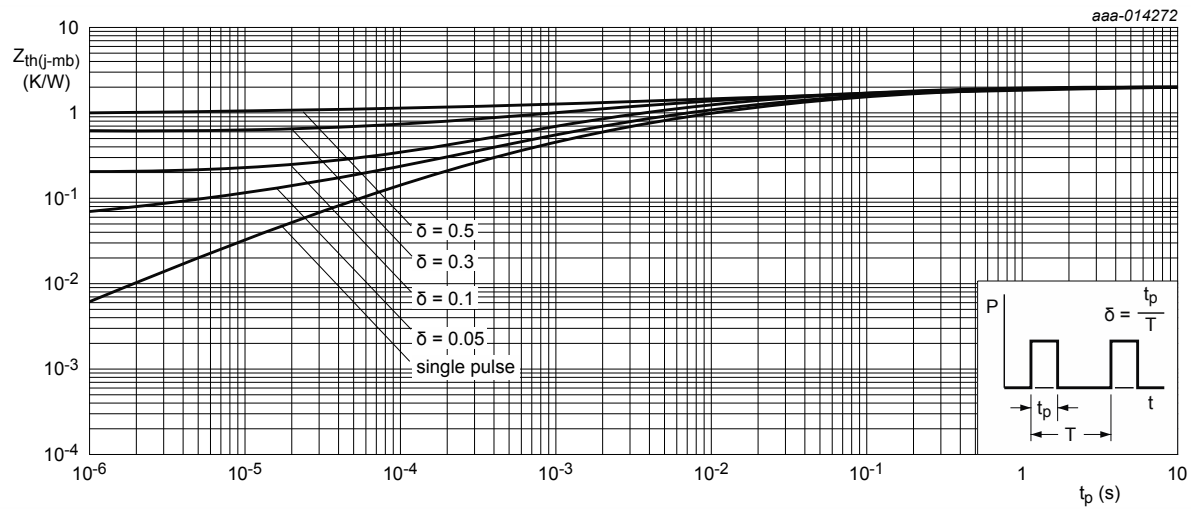


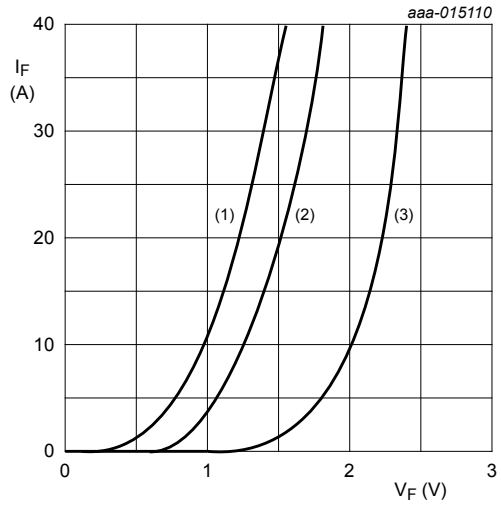
Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

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 A; T_j = 25 °C; Fig. 6		-	1.4	2.1	V
		I_F = 15 A; T_j = 150 °C; Fig. 6		-	1.1	1.4	V
I_R	reverse current	V_R = 600 V; T_j = 25 °C		-	-	10	µA
		V_R = 600 V; T_j = 150 °C		-	-	500	µA
Dynamic characteristics							
Q_r	recovered 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
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



V_o = 1.135 V; R_s = 0.017 Ω

(1) T_j = 150 °C; typical values

(2) T_j = 150 °C; maximum values

(3) T_j = 25 °C; maximum values

Fig. 6. Forward current as a function of forward voltage

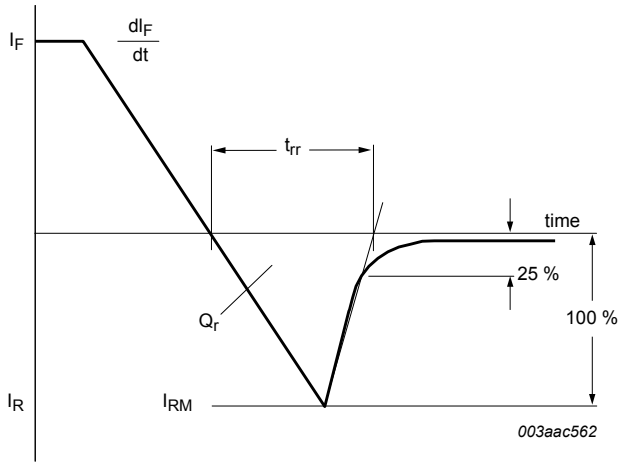
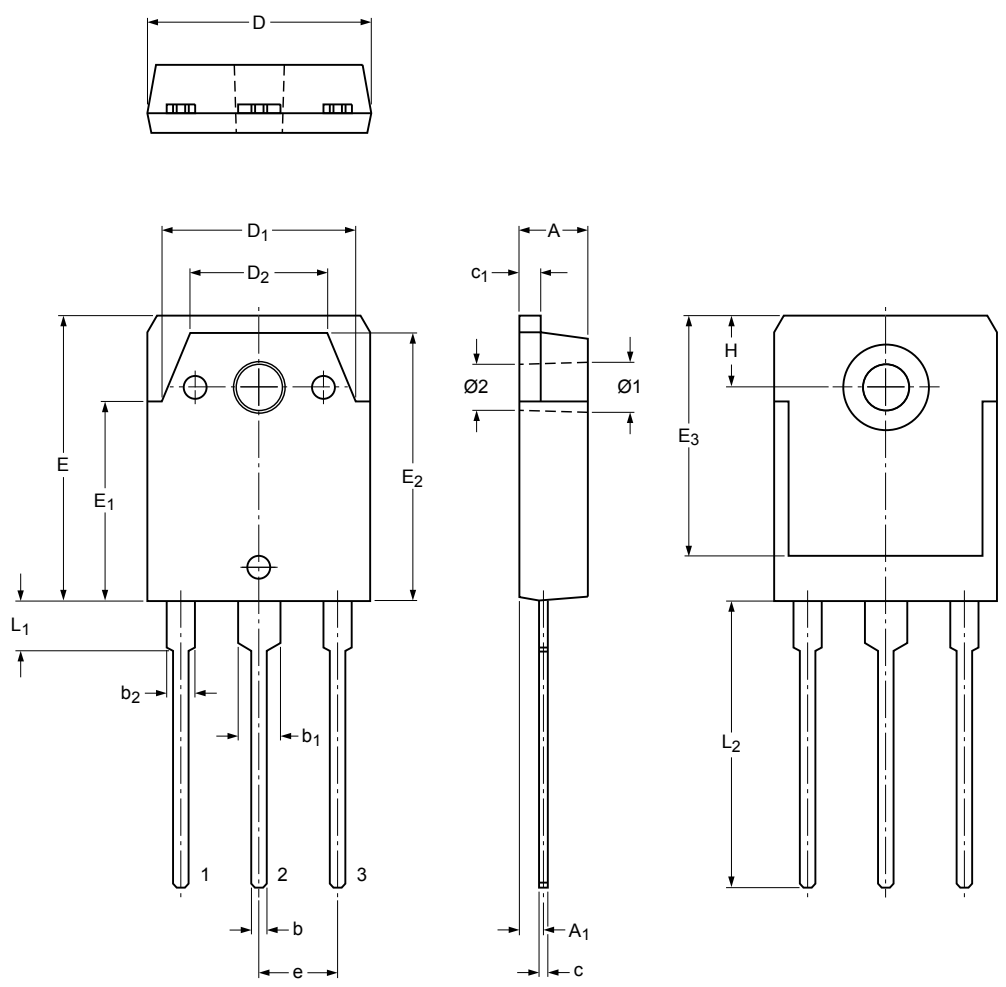


Fig. 7. Reverse recovery definitions; ramp recovery

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
mm	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

sot1259_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)

12. Legal information

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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.
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Date of release: 24 December 2014