

## 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

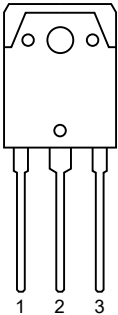
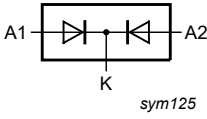
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_R$	reverse voltage	DC	-	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $T_{mb} \leq 126$ °C; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	-	15	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_{mb} \leq 126$ °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; <a href="#">Fig. 4</a>	-	-	140	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; per diode; <a href="#">Fig. 4</a>	-	-	155	A
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 15$ A; $T_j = 25$ °C; <a href="#">Fig. 6</a>	-	1.4	2.1	V
		$I_F = 15$ A; $T_j = 150$ °C; <a href="#">Fig. 6</a>	-	1.1	1.4	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 100$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 7</a>	-	25	50	ns
		$I_F = 15$ A; $V_R = 400$ V; $di_F/dt = 200$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 7</a>	-	45	-	ns
		$I_F = 15$ A; $V_R = 400$ V; $di_F/dt = 200$ A/ $\mu$ s; $T_j = 125$ °C; <a href="#">Fig. 7</a>	-	65	-	ns

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
		$I_F = 15\text{ A}; V_R = 400\text{ V}; di_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}$	-	34	-	ns

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1	 <p>TO3P (SOT1259)</p>	
2	K	cathode		
3	A2	anode 2		
mb	mb	mounting base; connected to cathode		

## 6. Ordering information

Table 3. Ordering information

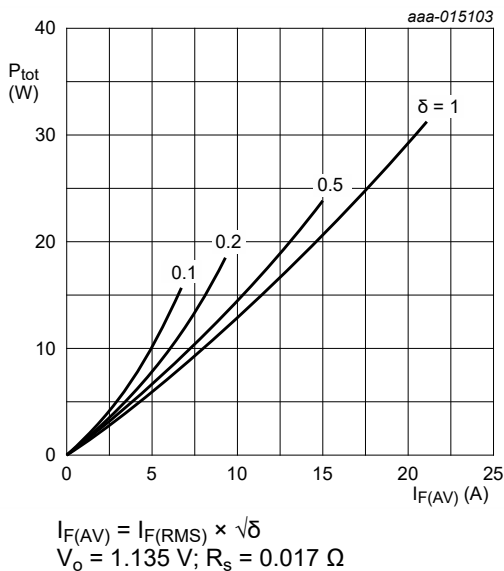
Type number	Package		
	Name	Description	Version
BYV415K-600P	TO3P	Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO3P	SOT1259

## 7. Limiting values

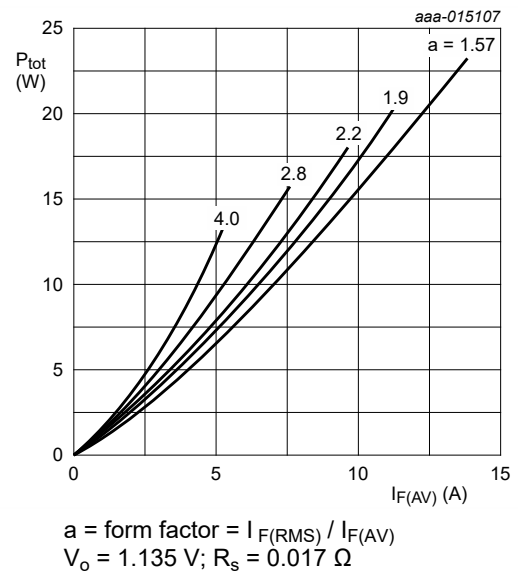
**Table 4. Limiting values**

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
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $T_{mb} \leq 126\text{ }^\circ\text{C}$ ; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	-	15	A
$I_{O(AV)}$	average output current	$\delta = 0.5$ ; $T_{mb} \leq 116\text{ }^\circ\text{C}$ ; 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	-	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; <a href="#">Fig. 4</a>	-	140	A
		$t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse; per diode; <a href="#">Fig. 4</a>	-	155	A
$T_{stg}$	storage temperature		-65	175	$^\circ\text{C}$
$T_j$	junction temperature		-	175	$^\circ\text{C}$



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



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

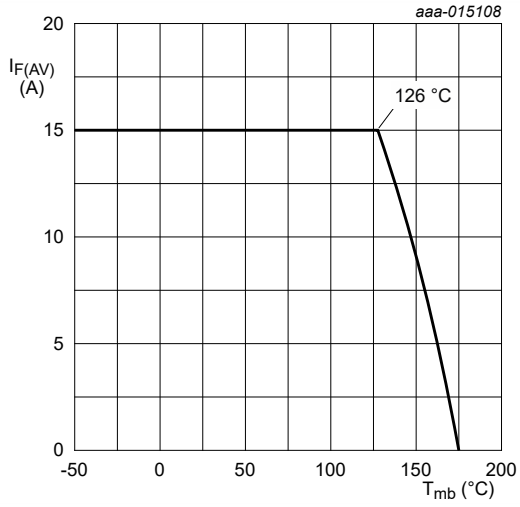


Fig. 3. Forward current as a function of mounting base temperature; maximum values

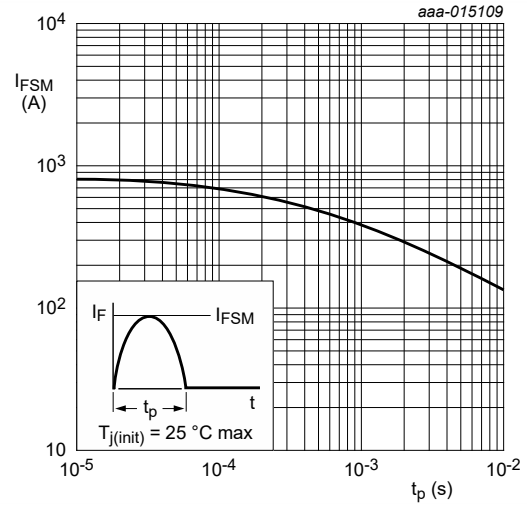


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

### 8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R <sub>th(j-mb)</sub>	thermal resistance from junction to mounting base	with heatsink compound; per diode; <a href="#">Fig. 5</a>	-	1.2	2	K/W
		with heatsink compound; both diodes conducting	-	0.65	1.2	K/W
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient free air	in free air	-	45	-	K/W

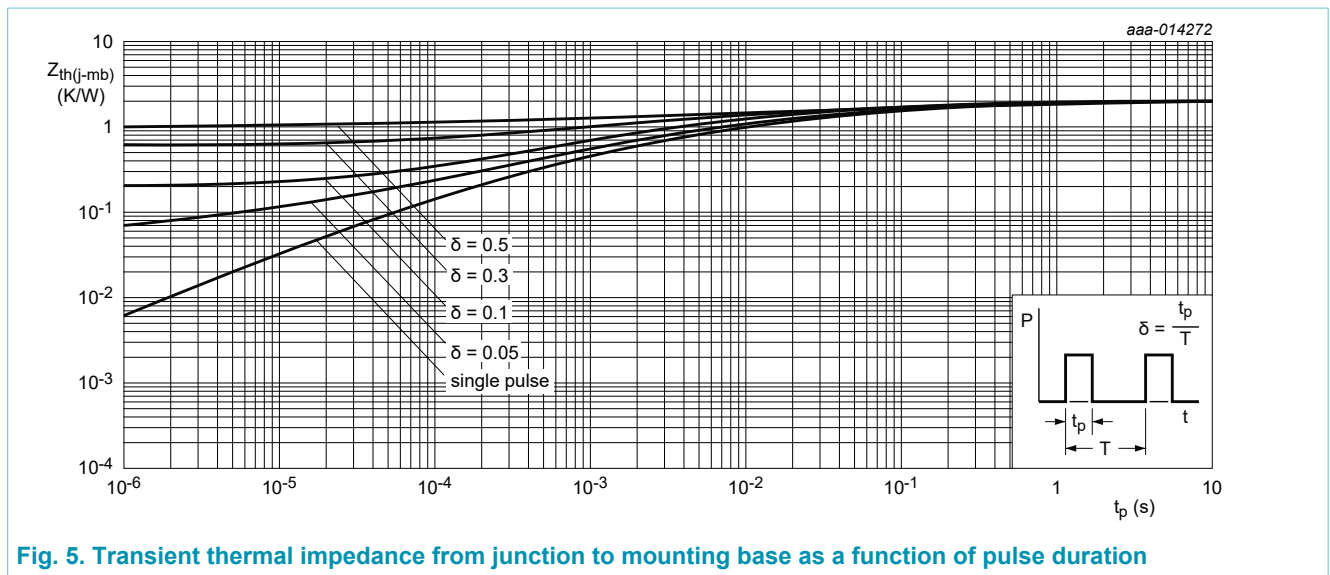


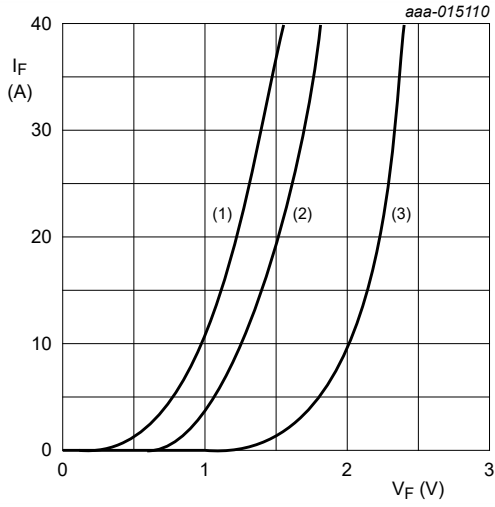
Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

## 9. Characteristics

**Table 6. Characteristics**

characteristics are per diode unless otherwise stated

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 15\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 6</a>	-	1.4	2.1	V
		$I_F = 15\text{ A}$ ; $T_j = 150\text{ °C}$ ; <a href="#">Fig. 6</a>	-	1.1	1.4	V
$I_R$	reverse current	$V_R = 600\text{ V}$ ; $T_j = 25\text{ °C}$	-	-	10	$\mu\text{A}$
		$V_R = 600\text{ V}$ ; $T_j = 150\text{ °C}$	-	-	500	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}$ ; $V_R = 30\text{ V}$ ; $di_F/dt = 100\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	-	25	50	ns
		$I_F = 15\text{ A}$ ; $V_R = 400\text{ V}$ ; $di_F/dt = 200\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	-	45	-	ns
		$I_F = 15\text{ A}$ ; $V_R = 400\text{ V}$ ; $di_F/dt = 200\text{ A}/\mu\text{s}$ ; $T_j = 125\text{ °C}$ ; <a href="#">Fig. 7</a>	-	65	-	ns
		$I_F = 15\text{ A}$ ; $V_R = 400\text{ V}$ ; $di_F/dt = 500\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$	-	34	-	ns
$I_{RM}$	peak reverse recovery current	$I_F = 15\text{ A}$ ; $V_R = 400\text{ V}$ ; $di_F/dt = 200\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	-	5.5	-	A
		$I_F = 15\text{ A}$ ; $V_R = 400\text{ V}$ ; $di_F/dt = 200\text{ A}/\mu\text{s}$ ; $T_j = 125\text{ °C}$ ; <a href="#">Fig. 7</a>	-	9.7	-	A
$Q_r$	recovered charge	$I_F = 15\text{ A}$ ; $V_R = 400\text{ V}$ ; $di_F/dt = 200\text{ A}/\mu\text{s}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>	-	125	-	nC
		$I_F = 15\text{ A}$ ; $V_R = 400\text{ V}$ ; $di_F/dt = 200\text{ A}/\mu\text{s}$ ; $T_j = 125\text{ °C}$ ; <a href="#">Fig. 7</a>	-	318	-	nC



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

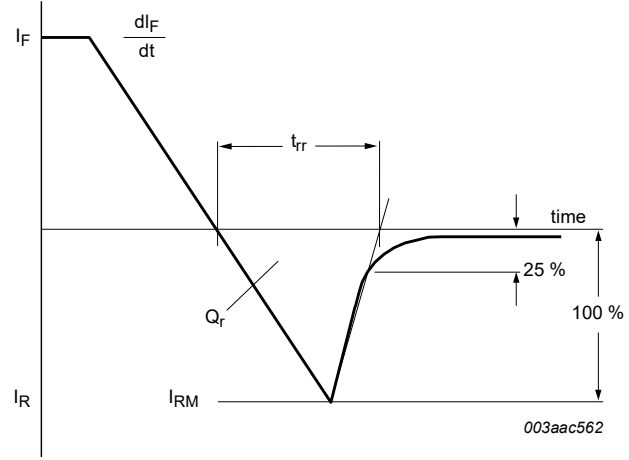
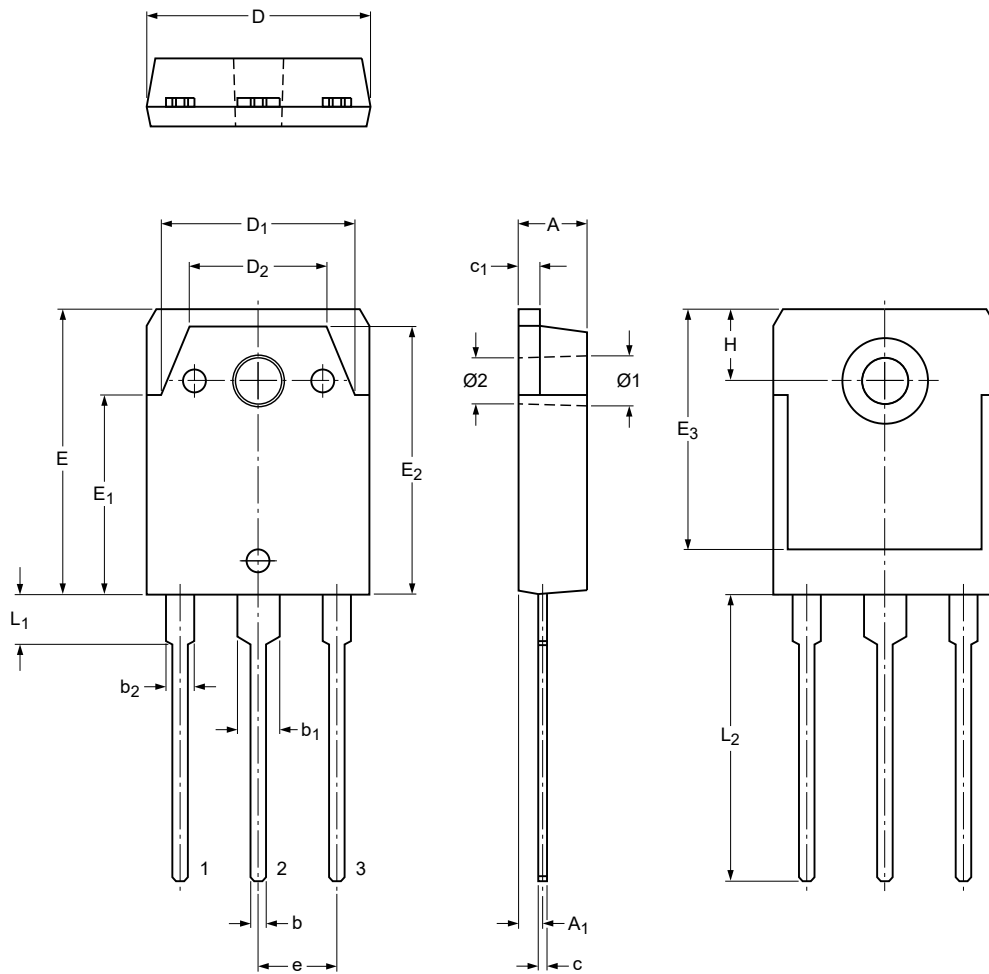


Fig. 7.

10. Package outline

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



Dimensions (mm are the original dimensions)

Unit	A	A <sub>1</sub>	b	b <sub>1</sub>	b <sub>2</sub>	c	c <sub>1</sub>	D	D <sub>1</sub>	D <sub>2</sub>	e	E	E <sub>1</sub>	E <sub>2</sub>	E <sub>3</sub>	H	L <sub>1</sub>	L <sub>2</sub>	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

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)



### 11. Package outline

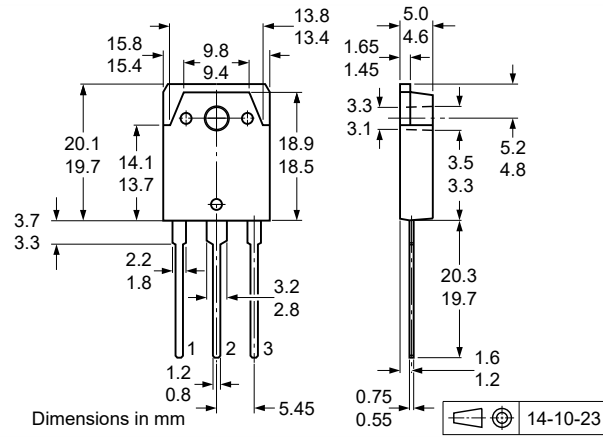


Fig. 9. Package outline TO3P (SOT1259)

## 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.
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