

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

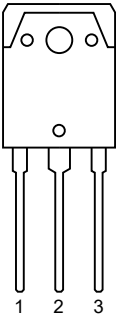
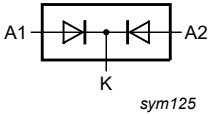
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V _R	reverse voltage	DC		-	-	600	V
I _{F(AV)}	average forward current	δ = 0.5 ; T _{mb} ≤ 126 °C; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3		-	-	15	A
I _{FRM}	repetitive peak forward current	δ = 0.5 ; t _p = 25 μs; T _{mb} ≤ 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; Fig. 4		-	-	140	A
		t _p = 8.3 ms; T _{j(init)} = 25 °C; sine-wave pulse; per diode; Fig. 4		-	-	155	A
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
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

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	 TO3P (SOT1259)	 sym125
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	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} ≤ 116 °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-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	-	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

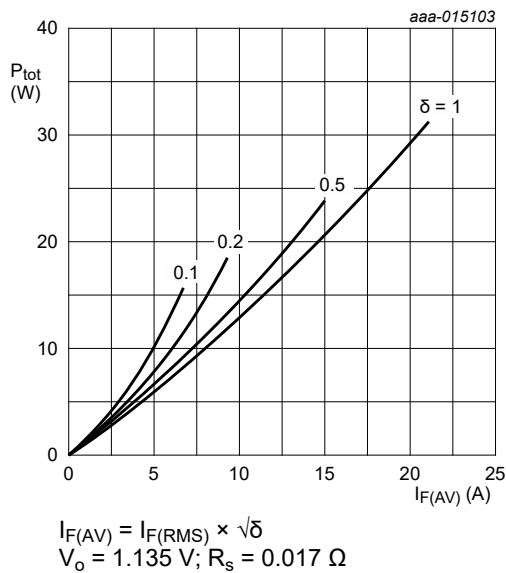


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

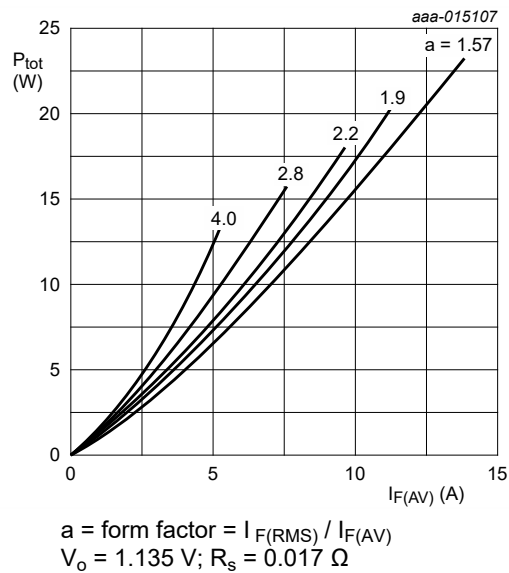


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

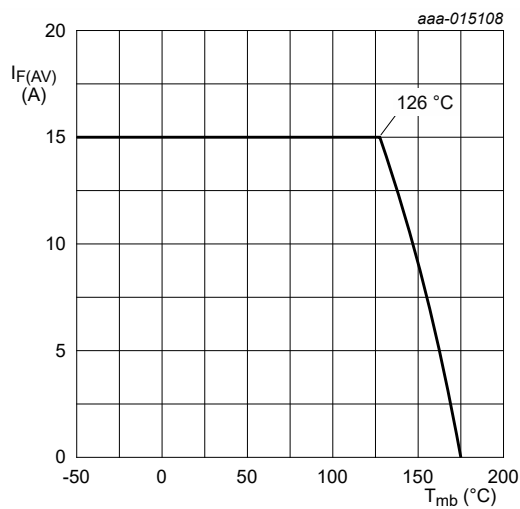


Fig. 3. Forward current as a function of mounting base temperature; maximum values

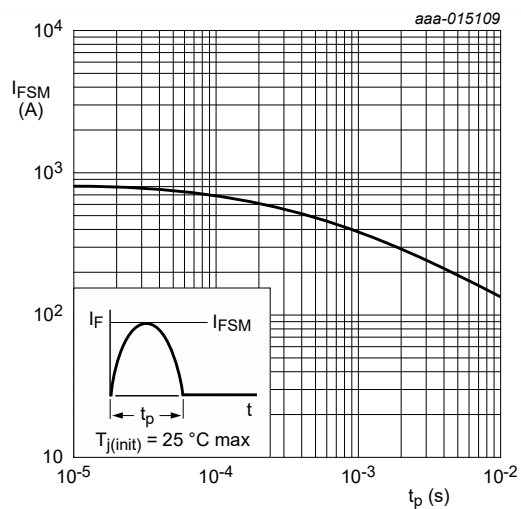


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	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	-	45	-	K/W

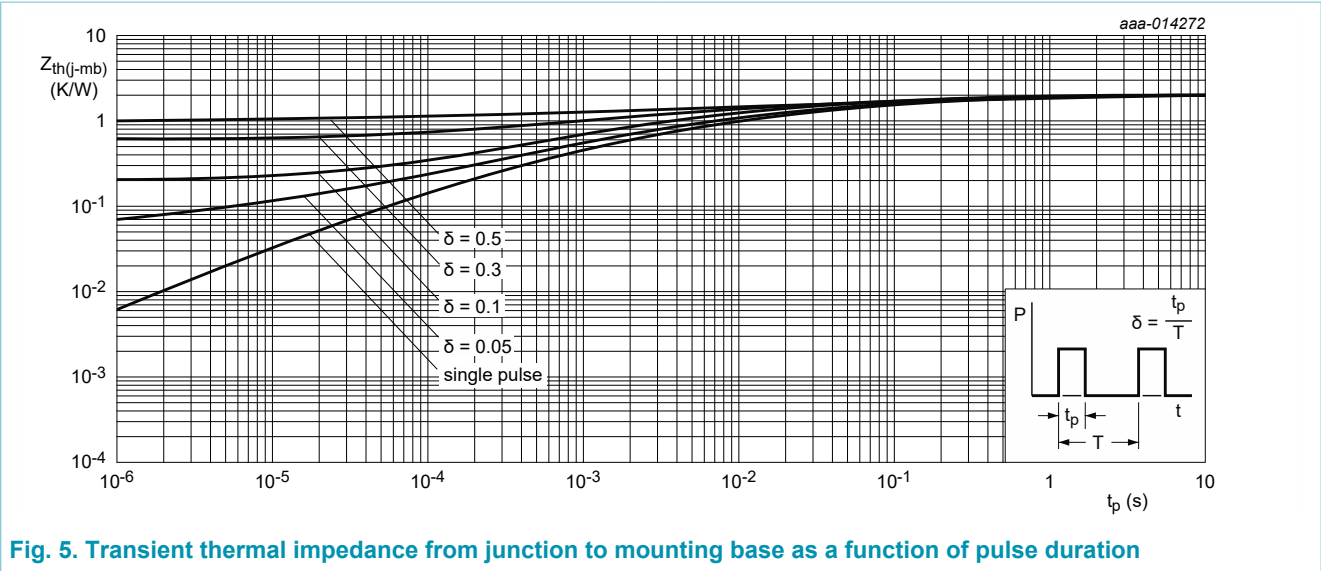


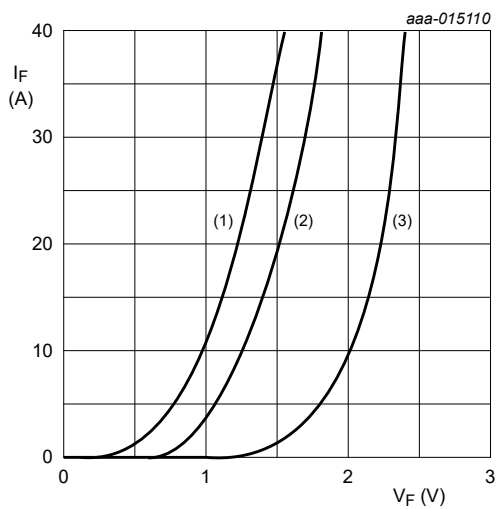
Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

9. Characteristics

Table 6. Characteristics

characteristics are per diode unless otherwise stated

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
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							
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		-	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	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



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

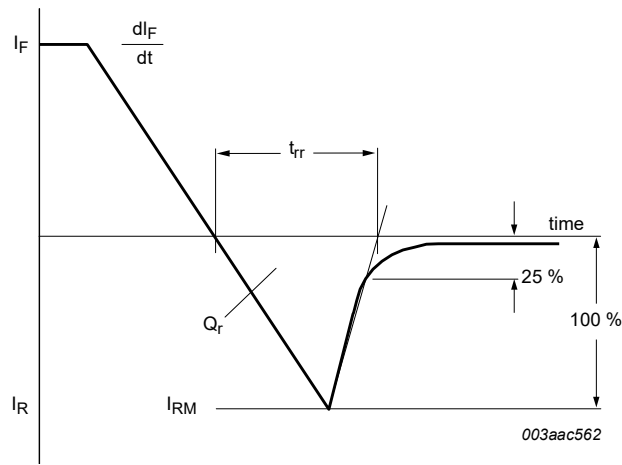


Fig. 7.

10. Package outline

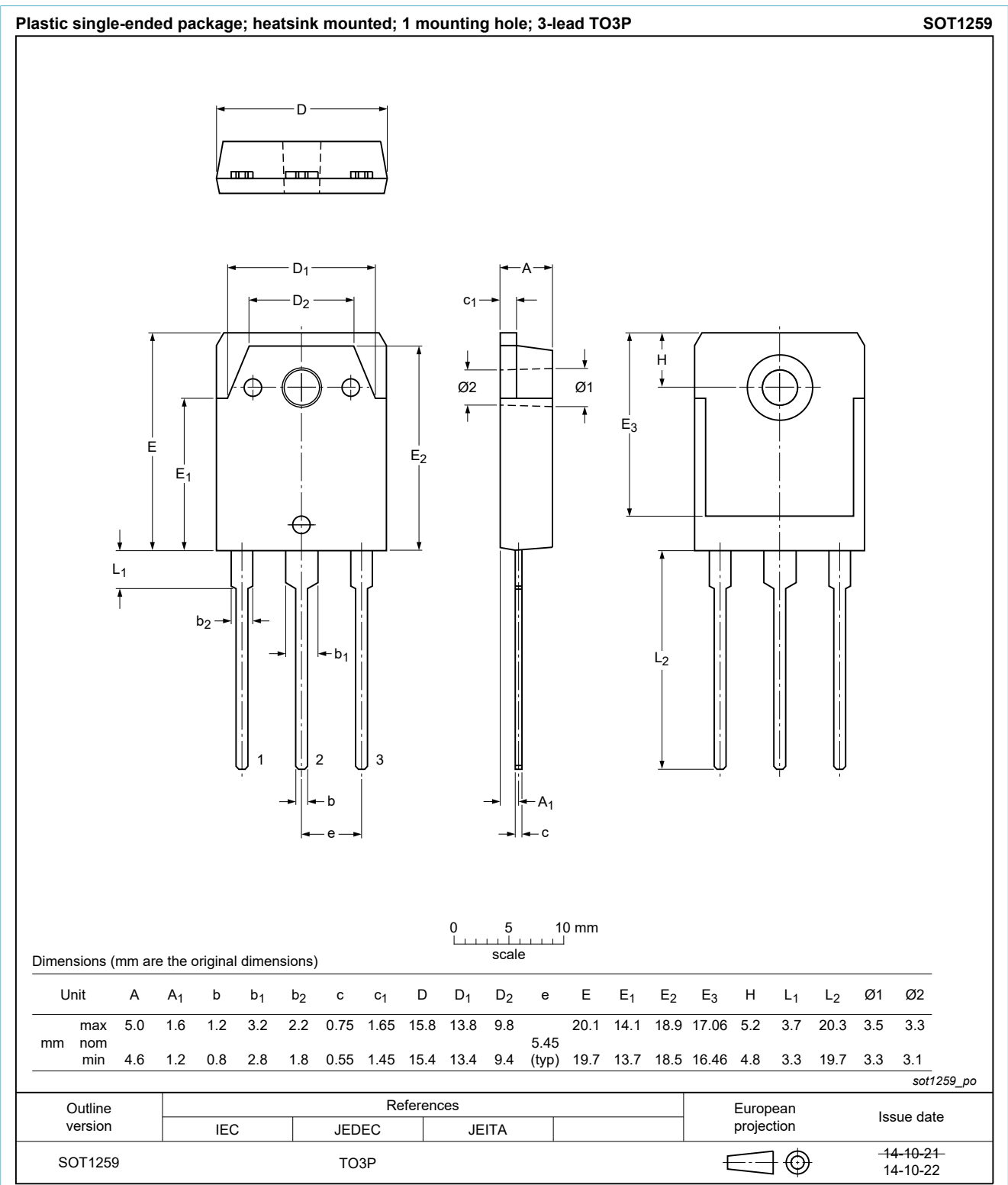


Fig. 8. Package outline TO3P (SOT1259)

11. Package outline

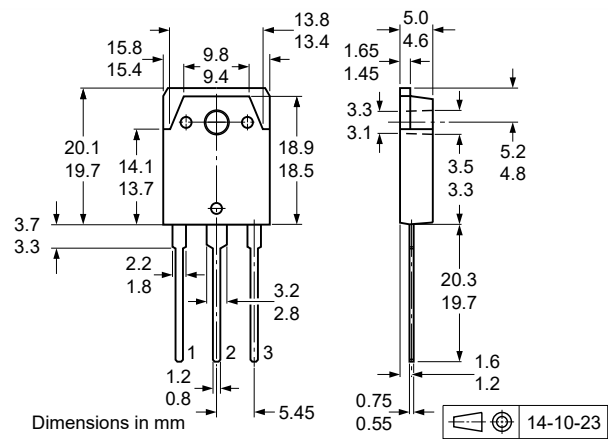


Fig. 9. Package outline TO3P (SOT1259)

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.
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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