

1. General description

Ultrafast power diode in a SOD142 (2-lead TO247) plastic package.

2. Features and benefits

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

3. Applications

- Active PFC in air conditioner
- S.M.P.S Power Factor Correction (PFC)
- Half-bridge / full-bridge switched-mode power supplies

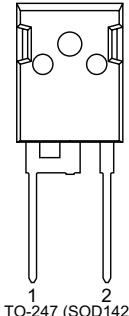
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values				Unit
Absolute maximum rating							
V _{RRM}	repetitive peak reverse voltage		600				V
I _{F(AV)}	average forward current	δ = 0.5 ; square-wave pulse; T _{mb} ≤ 129 °C; Fig. 1 ; Fig. 2 ; Fig. 3	30				A
I _{FRM}	repetitive peak forward current	δ = 0.5 ; t _p = 25 μs; T _{mb} ≤ 129 °C; square-wave pulse	60				A
I _{FSM}	non-repetitive peak forward current	t _p = 10 ms; T _{j(init)} = 25 °C; sine-wave pulse; Fig. 4	290				A
		t _p = 8.3 ms; T _{j(init)} = 25 °C; sine-wave pulse;	330				A
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V _F	forward voltage	I _F = 30 A; T _j = 25 °C; Fig. 6		-	1.18	1.55	V
		I _F = 30 A; T _j = 150 °C; Fig. 6		-	0.98	-	V
Dynamic characteristics							
t _{rr}	reverse recovery time	I _F = 1 A; V _R = 30 V; dI _F /dt = 50 A/μs; T _j = 25 °C; Fig. 7		-	42	75	ns
		I _F = 30 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	65	-	ns
		I _F = 30 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _i = 125 °C; Fig. 7		-	101	-	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 TO-247 (SOD142)	 001aaa020
2	A	anode		
mb	mb	mounting base; connected to cathod		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BYV30W-600P	TO-247	Plastic Single-ended through-hole package; Heatsink mounted; 1 mounting hole; 2-lead TO-247	SOD142

7. Marking

Table 4. Marking codes

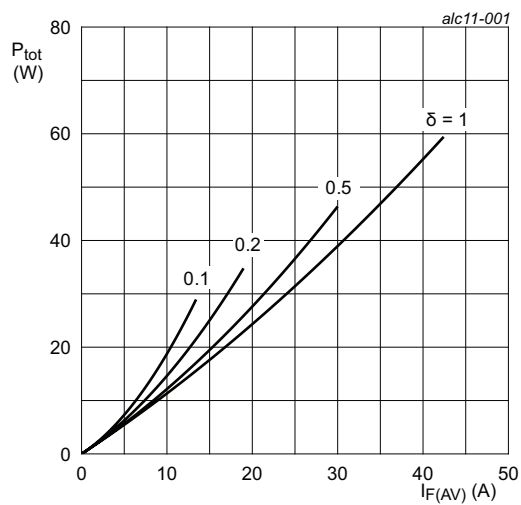
Type number	Marking codes
BYV30W-600P	BYV30W-600P

8. Limiting values

Table 5. Limiting values

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

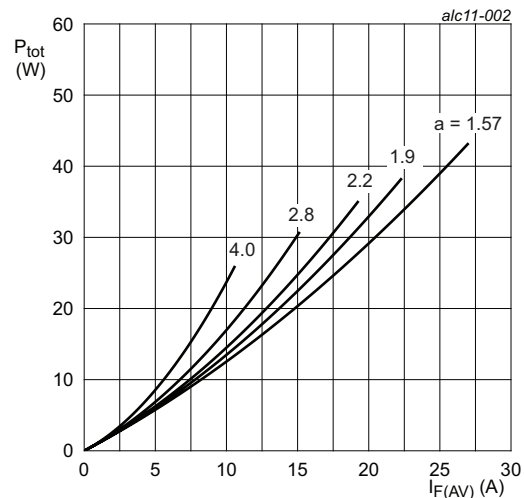
Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		600	V
V_{RWM}	crest working reverse voltage		600	V
V_R	reverse voltage	DC	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; square-wave pulse; $T_{mb} \leq 129\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	30	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 129\text{ }^{\circ}\text{C}$; square-wave pulse	60	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; Fig. 4	290	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; sine-wave pulse;	330	A
T_{stg}	storage temperature		-55 to 175	$^{\circ}\text{C}$
T_j	junction temperature		175	$^{\circ}\text{C}$



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

$$V_o = 1.051\text{ V}; R_s = 0.0083\text{ }\Omega$$

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



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

$$V_o = 1.051\text{ V}; R_s = 0.0083\text{ }\Omega$$

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

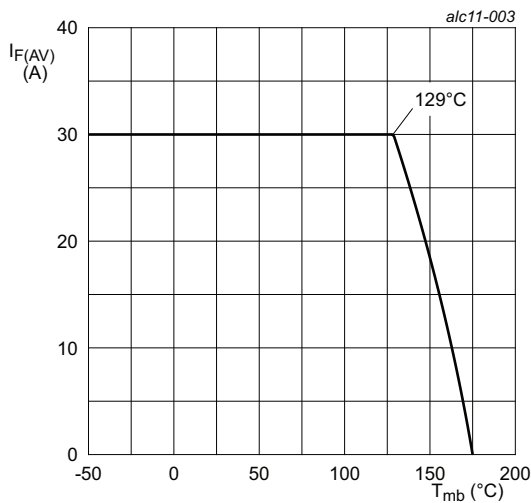


Fig. 3. Forward current as a function of mounting base temperature; maximum values

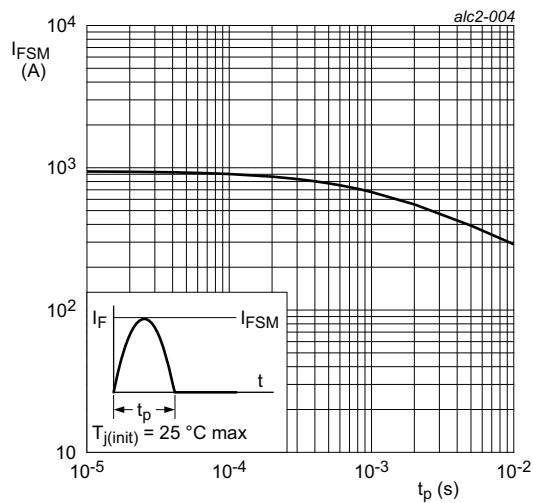


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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	Fig. 5	-	-	1	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	45	-	K/W

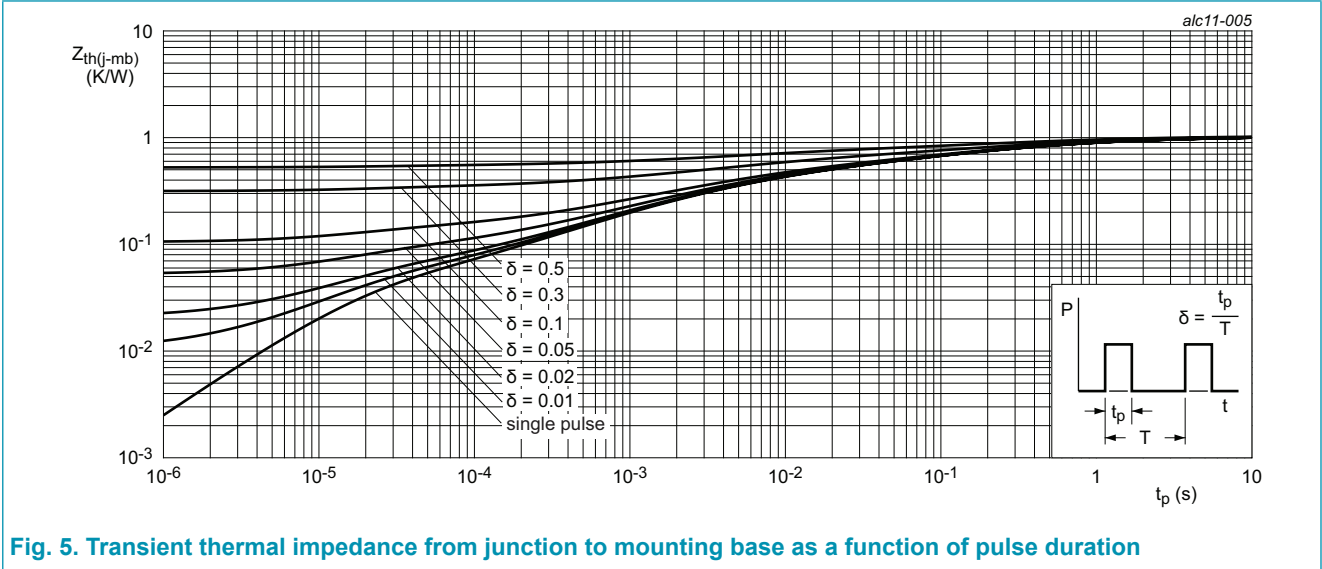
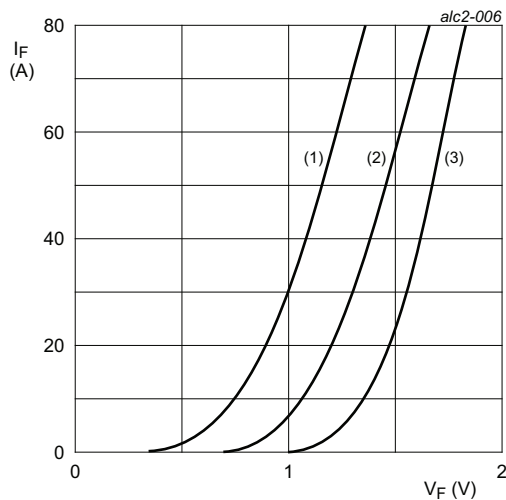


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V _F	forward current	I _F = 30 A; T _j = 25 °C; Fig. 6		-	1.18	1.55	V
		I _F = 30 A; T _j = 150 °C; Fig. 6		-	0.98	-	V
I _R	reverse current	V _R = 600 V; T _j = 25 °C		-	2	10	μA
		V _R = 600 V; T _j = 125 °C		-	-	500	μA
Dynamic characteristics							
Q _r	reverse charge	I _F = 30 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	272	-	nC
		I _F = 30 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7		-	775	-	nC
t _{rr}	reverse recovery time	I _F = 1 A; V _R = 30 V; dI _F /dt = 50 A/μs; T _j = 25 °C; Fig. 7		-	42	75	ns
		I _F = 30 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	65	-	ns
		I _F = 30 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7		-	101	-	ns
I _{RM}	peak reverse recovery current	I _F = 30 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	8.4	-	A
		I _F = 30 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7		-	15.2	-	A



$V_o = 1.051\text{ V}; R_s = 0.0083\text{ }\Omega$
 (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

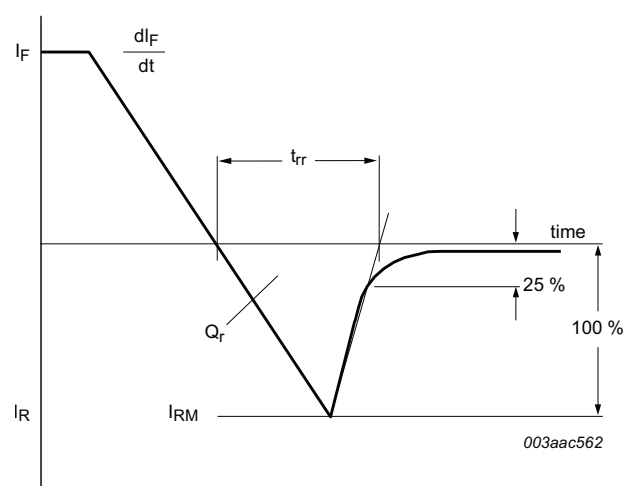
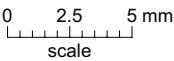
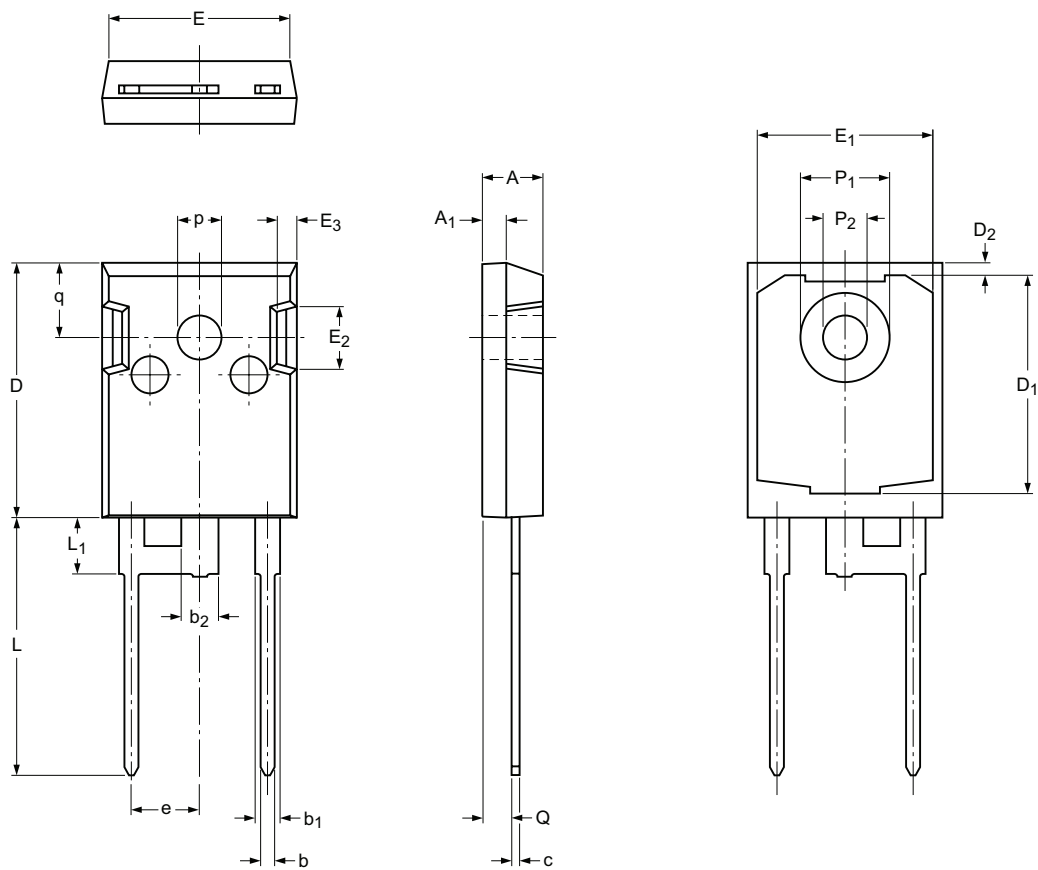


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

Plastic Single-ended through-hole package; Heatsink mounted; 1 mounting hole; 2-lead TO-247 SOD142



Dimensions (mm are the original dimensions)

Unit	A	A ₁	b	b ₁	b ₂	c	D	D ₁	D ₂	e	E	E ₁	E ₂	E ₃	L	L ₁	p	p ₁	p ₂	q	Q
max	5.2	2.1	1.4	2.2	3.2	0.7	20.6	17.68	1.2		15.75	14.22	5.2	1.8	20.9	4.75	3.7	7.3	3.6	6.18	2.6
nom										5.45											
min	4.7	1.9	1.0	1.8	2.8	0.5	20.3	17.28	0.8		15.45	13.82	4.8	1.4	20.4	4.25	3.5	7.1	3.4	5.78	2.2

sod142_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOD142		TO247				12-11-13 12-11-27

Fig. 8. Package outline SOD142

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