

## 1. General description

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

## 2. Features and benefits

- Fast switching and soft reverse recovery characteristics
- Low forward voltage drop
- Low leakage current
- Low reverse recovery current
- Reduces switching losses in associated MOSFET or IGBT
- High operating temperature capability ( $T_{j(max)} = 175^{\circ}\text{C}$ )

## 3. Applications

- UPS
- EV Charger
- Welding Machine
- Air Conditioner

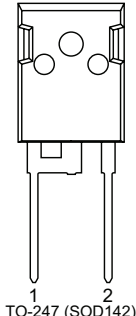
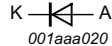
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
<b>Absolute maximum rating</b>						
$V_{RRM}$	repetitive peak reverse voltage		600			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 129^{\circ}\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	60			A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25 \mu\text{s}$ ; $T_{mb} \leq 129^{\circ}\text{C}$ ; square-wave pulse	120			A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10 \text{ ms}$ ; $T_{j(\text{init})} = 25^{\circ}\text{C}$ ; sine-wave pulse; <a href="#">Fig. 4</a>	600			A
		$t_p = 8.3 \text{ ms}$ ; $T_{j(\text{init})} = 25^{\circ}\text{C}$ ; sine-wave pulse;	660			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 60 \text{ A}$ ; $T_j = 25^{\circ}\text{C}$ ; <a href="#">Fig. 6</a>	-	1.55	2	V
		$I_F = 60 \text{ A}$ ; $T_j = 150^{\circ}\text{C}$ ; <a href="#">Fig. 6</a>	-	1.2	1.6	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1 \text{ A}$ ; $V_R = 30 \text{ V}$ ; $di_F/dt = 50 \text{ A}/\mu\text{s}$ ; $T_j = 25^{\circ}\text{C}$ ; <a href="#">Fig. 7</a>	-	-	55	ns

## 5. Pinning information

Table 2. Pinning information

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

## 6. Ordering information

Table 3. Ordering information

Type number	Package name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BYV60W-600P	TO247	BYV60W-600PQ	Tube	30	SOD142	27-Nov-2012

## 7. Marking

Table 4. Marking codes

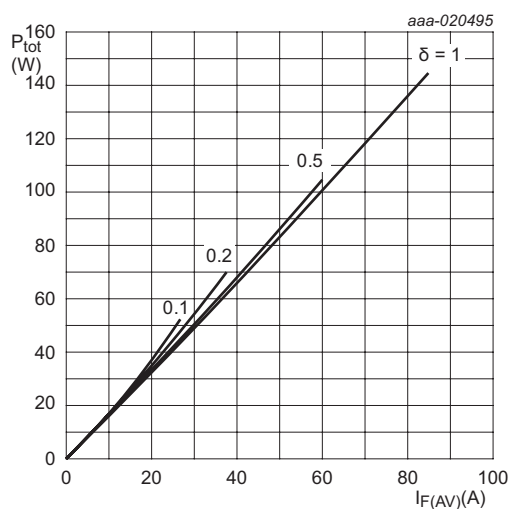
Type number	Marking codes
BYV60W-600P	BYV60W-600P

## 8. Limiting values

**Table 5. Limiting values**

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

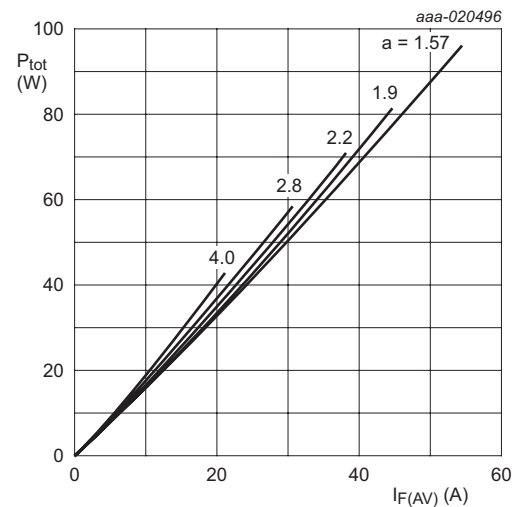
Symbol	Parameter	Conditions	Values	Unit
$V_{RRM}$	repetitive peak reverse voltage		600	V
$V_{RWM}$	crest working reverse voltage		600	V
$V_R$	reverse voltage	DC	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 129\text{ }^\circ\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	60	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	120	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; <a href="#">Fig. 4</a>	600	A
		$t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse;	660	A
$I^2t$	limiting Joule-integral	SIN; $t_p = 10\text{ ms}$	1800	$\text{A}^2\text{s}$
$T_{stg}$	storage temperature		-55 to 175	$^\circ\text{C}$
$T_j$	junction temperature		175	$^\circ\text{C}$



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

$$V_o = 1.6\text{ V}; R_s = 0.0013\text{ }\Omega$$

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



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

$$V_o = 1.6\text{ V}; R_s = 0.0013\text{ }\Omega$$

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

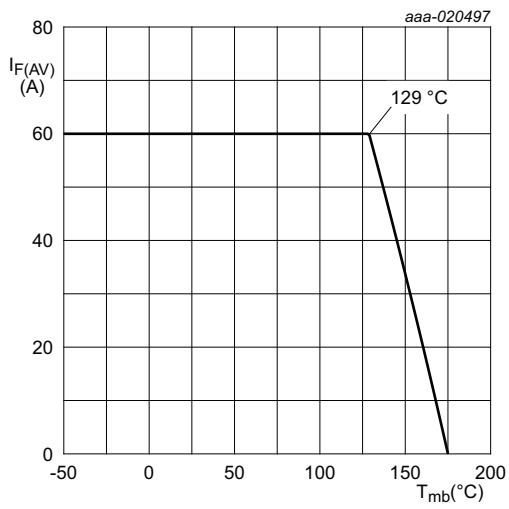


Fig. 3. Forward current as a function of mounting base temperature; maximum values

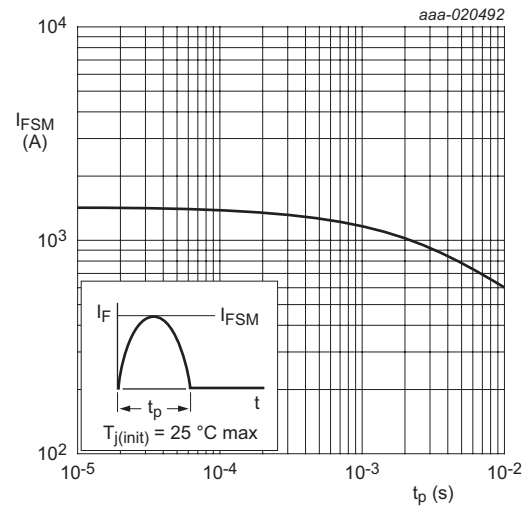
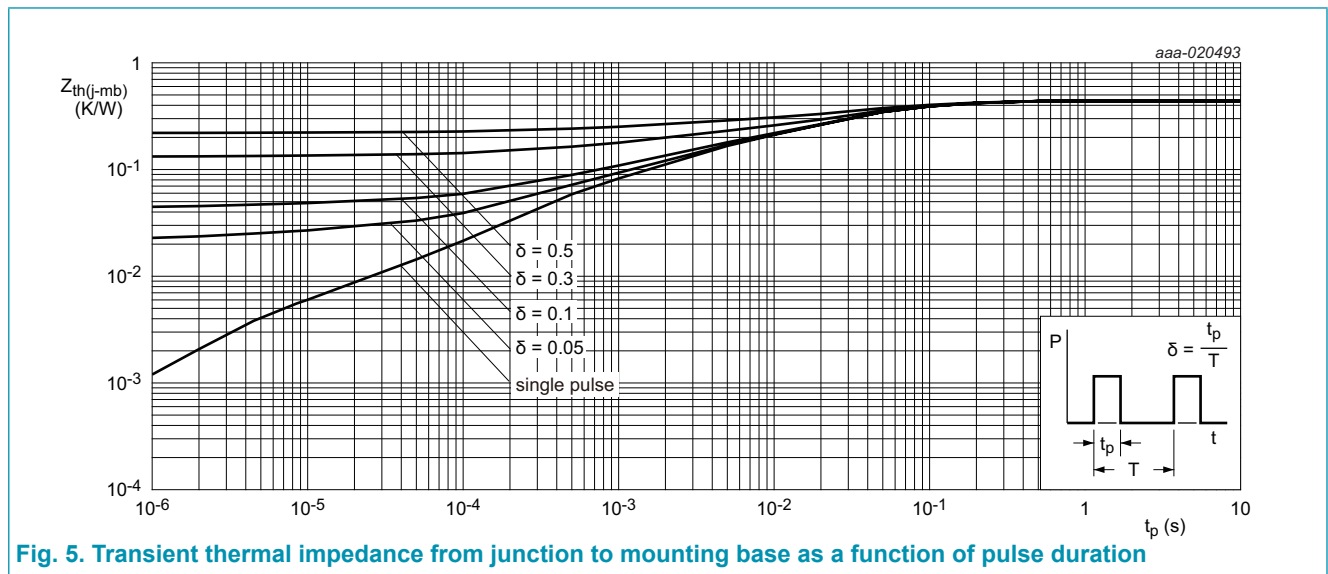


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

## 9. Thermal characteristics

Table 6. Thermal characteristics

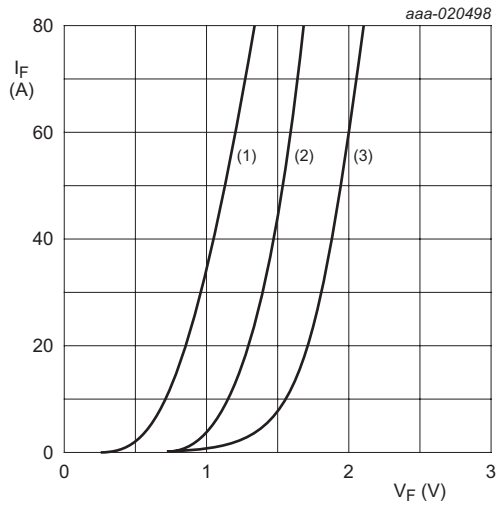
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	<a href="#">Fig. 5</a>	-	-	0.44	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	45	-	K/W



## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward current	$I_F = 60 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 6}$	-	1.55	2	V
		$I_F = 60 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{Fig. 6}$	-	1.2	1.6	V
$I_R$	reverse current	$V_R = 600 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-	10	$\mu\text{A}$
		$V_R = 600 \text{ V}; T_j = 125 \text{ }^\circ\text{C}$	-	-	500	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$Q_r$	reverse charge	$I_F = 60 \text{ A}; V_R = 400 \text{ V}; di_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	143	-	nC
		$I_F = 60 \text{ A}; V_R = 400 \text{ V}; di_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	876	-	nC
$t_{rr}$	reverse recovery time	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; di_F/dt = 50 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	-	55	ns
		$I_F = 60 \text{ A}; V_R = 400 \text{ V}; di_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	53	-	ns
		$I_F = 60 \text{ A}; V_R = 400 \text{ V}; di_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	120	-	ns
$I_{RM}$	peak reverse recovery current	$I_F = 60 \text{ A}; V_R = 400 \text{ V}; di_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	5.4	-	A
		$I_F = 60 \text{ A}; V_R = 400 \text{ V}; di_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{Fig. 7}$	-	14.5	-	A
$E_{as}$	non-repetitive avalanche energy	$I_R = 2.2 \text{ A}; T_{j(\text{init})} = 25 \text{ }^\circ\text{C}; L = 40 \text{ mH}$	-	97	-	mJ



$V_o = 1.6 \text{ V}; R_s = 0.0013 \Omega$   
 (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

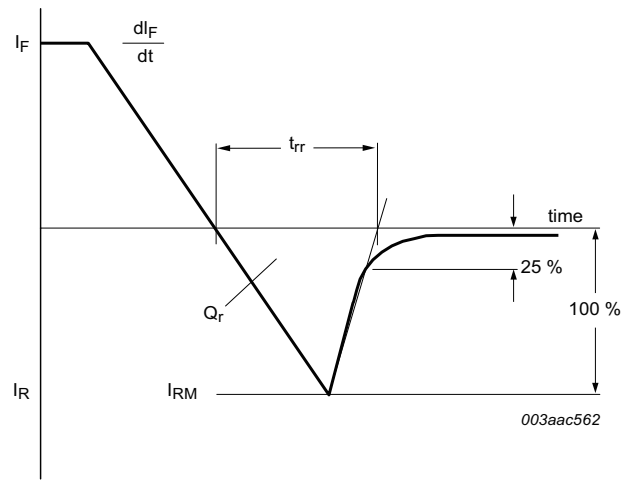
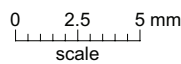
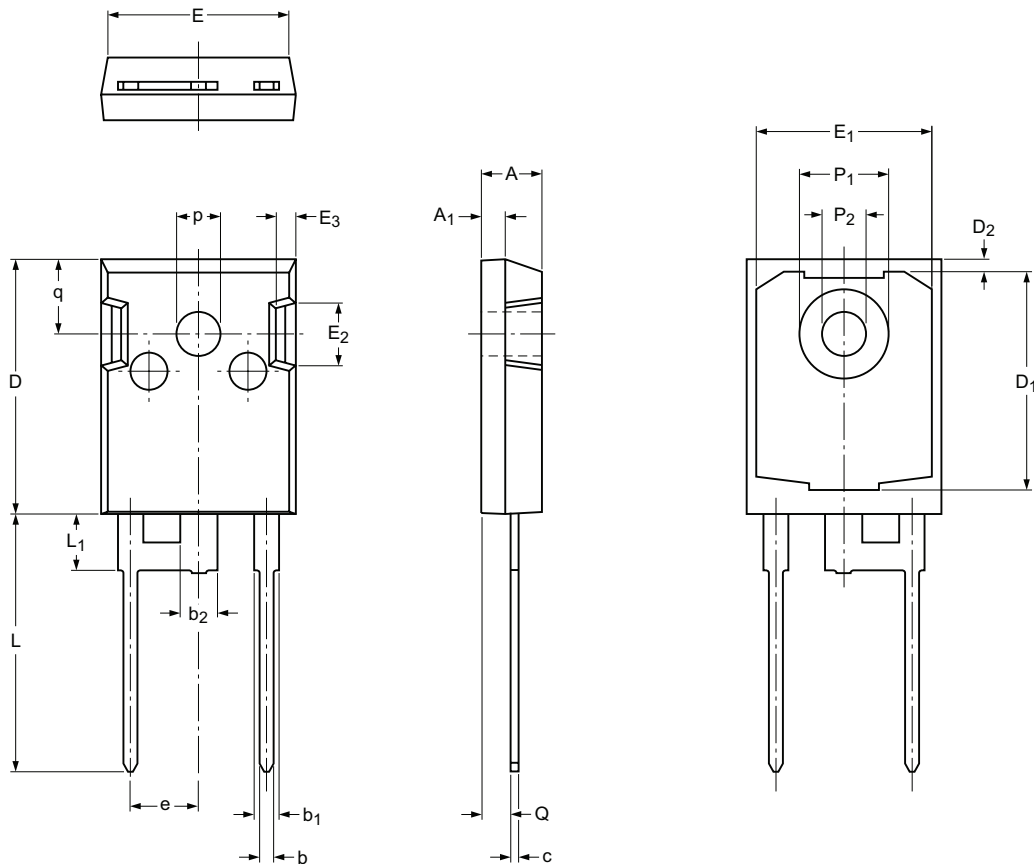


Fig. 7. Reverse recovery definitions; ramp recovery

### 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 <sub>1</sub>	b	b <sub>1</sub>	b <sub>2</sub>	c	D	D <sub>1</sub>	D <sub>2</sub>	e	E	E <sub>1</sub>	E <sub>2</sub>	E <sub>3</sub>	L	L <sub>1</sub>	p	p <sub>1</sub>	p <sub>2</sub>	q	Q	
mm	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	

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



## 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.
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## 13. Contents

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1. General description.....	1
2. Features and benefits .....	1
3. Applications .....	1
4. Quick reference data .....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values .....	3
9. Thermal characteristics .....	5
10. Characteristics.....	6
11. Package outline .....	8
12. Legal information .....	9
13. Contents .....	11

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