BYR16W-1200

Ultrafast power diode

26 September 2018 Product data sheet

1. General description

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

2. Features and benefits

- Fast switching
- Low forward voltage drop
- Low thermal resistance
- Soft recovery characteristic
- Reduces switching losses in associated MOSFET or IGBT
- Planar passivated for voltage ruggedness and reliability

3. Applications

- Switched-Mode Power Supplies
- Power factor correction diode
- Uninterrupted Power Supply
- Motor drive and SMPS freewheeling diode

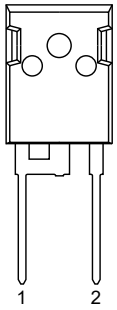
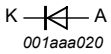
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_R	reverse voltage	DC		-	-	1200	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 98$ °C; square-wave pulse; Fig. 1; Fig. 2; Fig. 3		-	-	16	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; Fig. 4		-	-	150	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse		-	-	165	A
Static characteristics							
V_F	forward voltage	$I_F = 16$ A; $T_j = 25$ °C; Fig. 6		-	2.3	3	V
		$I_F = 32$ A; $T_j = 25$ °C; Fig. 6		-	2.8	3.9	V
		$I_F = 16$ A; $T_j = 125$ °C; Fig. 6		-	1.8	2.7	V
Dynamic characteristics							
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 200$ A/µs; $T_j = 25$ °C; Fig. 7		-	40	-	ns

5. Pinning information

Table 2. Pinning information

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

6. Ordering information

Table 3. Ordering information

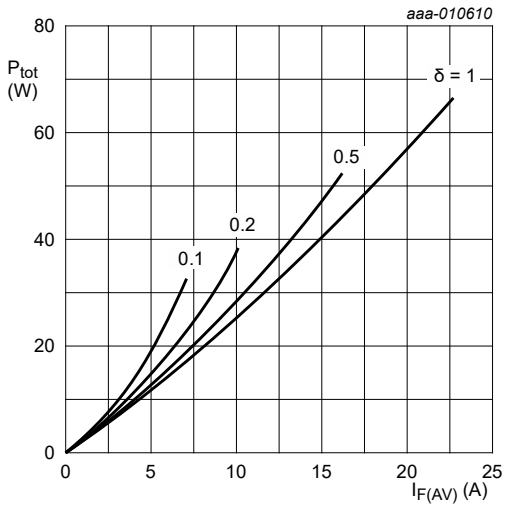
Type number	Package		
	Name	Description	Version
BYR16W-1200	TO-247	Plastic Single-ended through-hole package; Heatsink mounted; 1 mounting hole; 2-lead TO-247	SOD142

7. Limiting values

Table 4. Limiting values

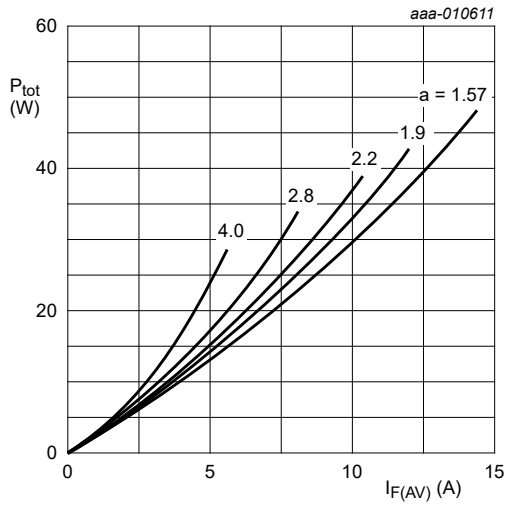
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	1200	V
V_{RWM}	crest working reverse voltage			-	1200	V
V_R	reverse voltage	DC		-	1200	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 98$ °C; square-wave pulse; Fig. 1; Fig. 2; Fig. 3		-	16	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ µs; $T_{mb} \leq 98$ °C; square-wave pulse		-	32	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; Fig. 4		-	150	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse		-	165	A
T_{stg}	storage temperature			-55	150	°C
T_j	junction temperature			-	150	°C



$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$
$V_o = 0.79$ V; $R_s = 0.008$ Ω

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



a = form factor = $I_{F(RMS)} / I_{F(AV)}$
$V_o = 2.210$ V; $R_s = 0.032$ Ω

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

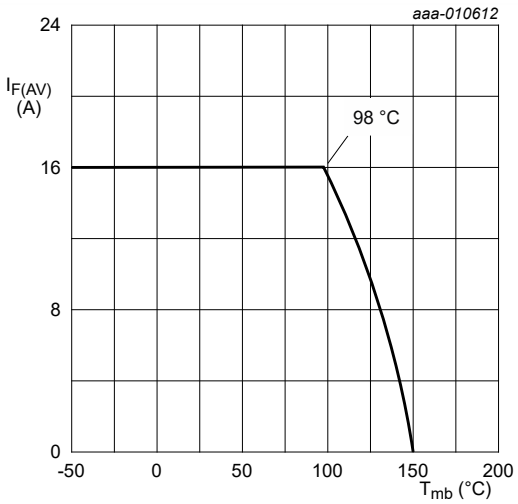


Fig. 3. Forward current as a function of mounting base temperature; maximum values

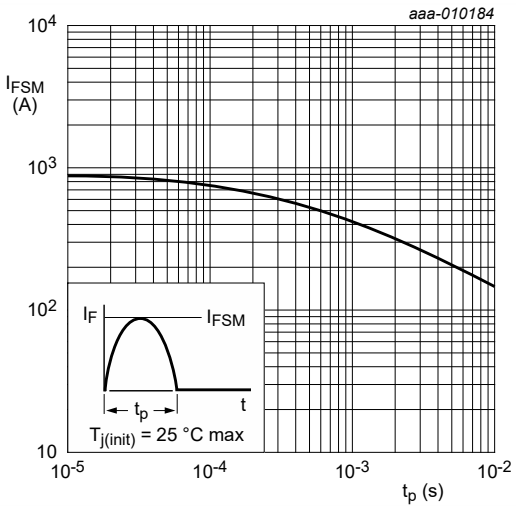


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j\text{-}mb)}$	thermal resistance from junction to mounting base	with heatsink compound; Fig. 5		-	-	1	K/W
$R_{th(j\text{-}a)}$	thermal resistance from junction to ambient free air	in free air		-	45	-	K/W

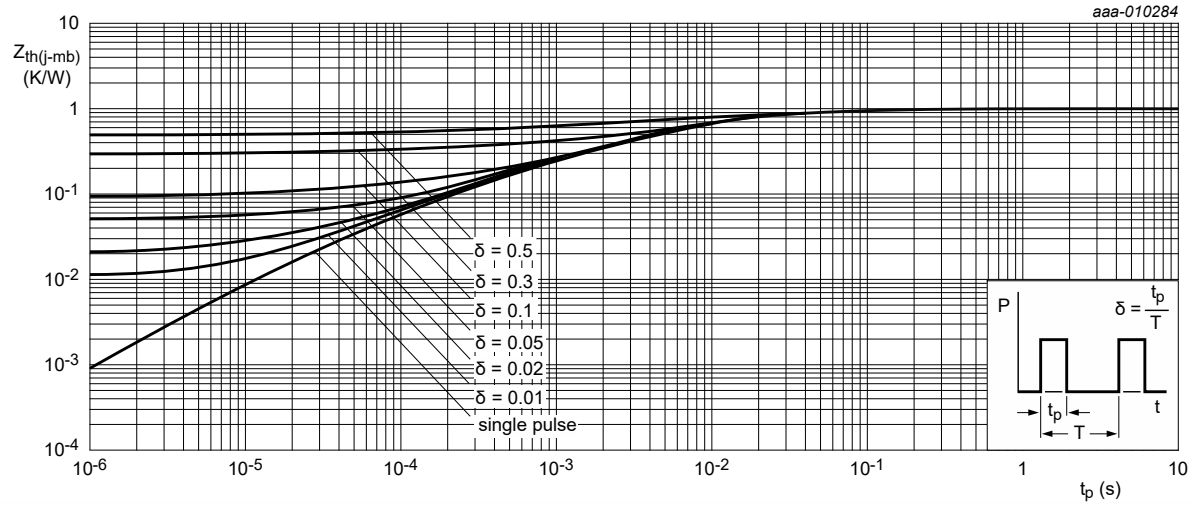
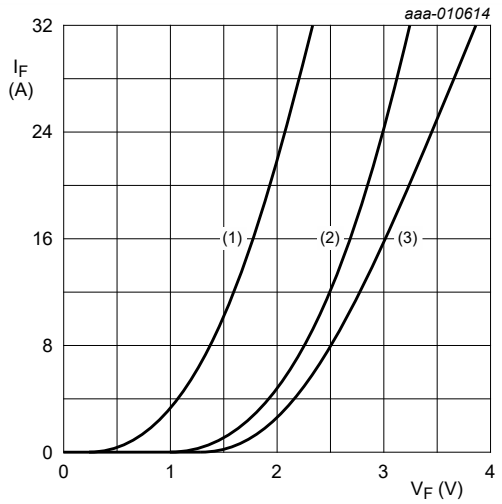


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	I_F = 16 A; T_j = 25 °C; Fig. 6		-	2.3	3	V
		I_F = 32 A; T_j = 25 °C; Fig. 6		-	2.8	3.9	V
		I_F = 16 A; T_j = 125 °C; Fig. 6		-	1.8	2.7	V
I_R	reverse current	V_R = 1200 V; T_j = 25 °C		-	3	100	µA
		V_R = 1200 V; T_j = 125 °C		-	0.2	2	mA
Dynamic characteristics							
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	40	-	ns
		I_F = 16 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	90	-	ns
		I_F = 16 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	150	-	ns
		I_F = 16 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	105	-	ns
		I_F = 16 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	200	-	ns
		I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs; T_j = 25 °C; Fig. 7		-	50	-	ns
I_{RM}	peak reverse recovery current	I_F = 16 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	11.2	-	A
		I_F = 16 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	16	-	A
		I_F = 16 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	11.2	-	A
		I_F = 16 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	16.2	-	A
Q_r	recovered charge	I_F = 16 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	520	-	nC
		I_F = 16 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	1200	-	nC
		I_F = 16 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	605	-	nC
		I_F = 16 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	1600	-	nC



V_o = 2.210 V; R_s = 0.032 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

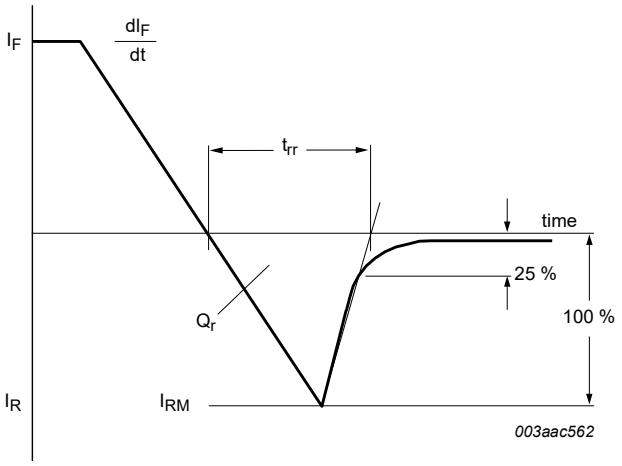
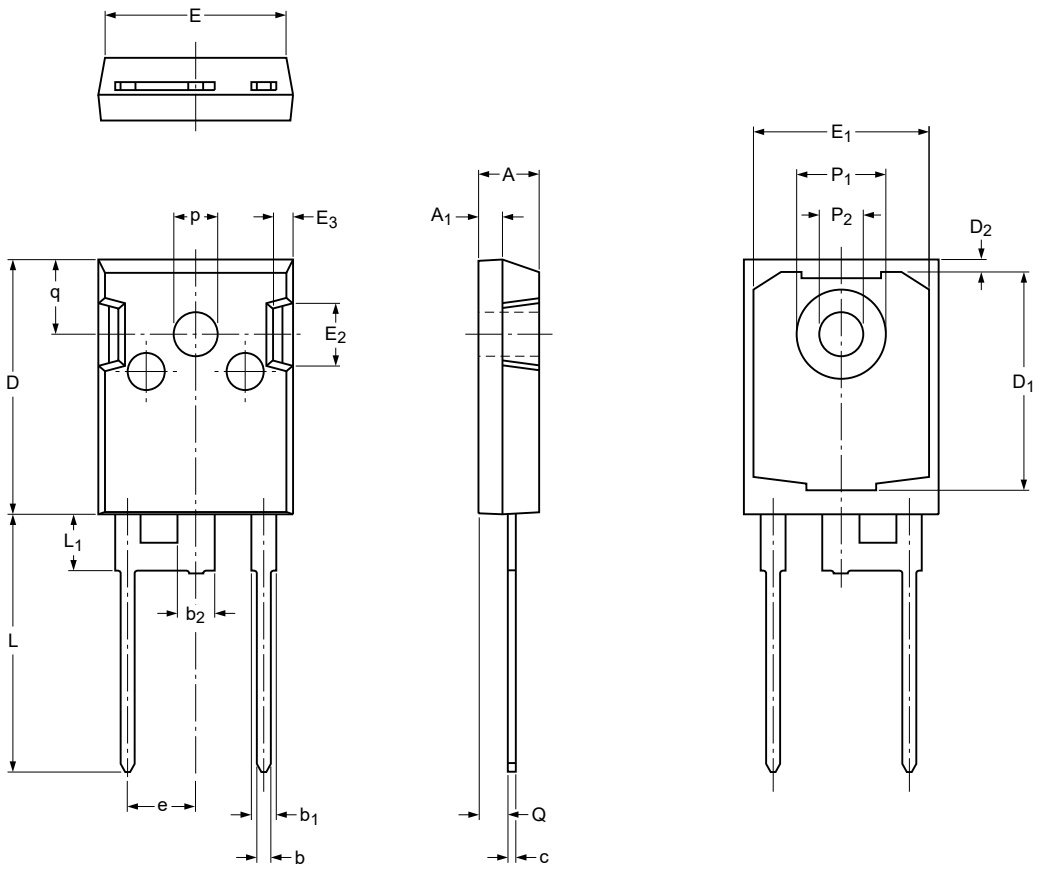


Fig. 7. Reverse recovery definitions; ramp recovery

10. 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
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

sod142_po

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

Fig. 8. Package outline TO-247 (SOD142)

11. 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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