BYR29X-800

Ultrafast power diode

19 October 2017 Product data sheet

1. General description

Ultrafast power diode in a SOD113 (2-lead TO-220F) plastic package.

2. Features and benefits

- Fast switching
- Isolated plastic package
- Low forward voltage drop
- Soft recovery characteristic

3. Applications

- Discontinuous Current Mode (DCM) Power Factor Correction (PFC)
- High frequency switched-mode power supplies

4. Quick reference data

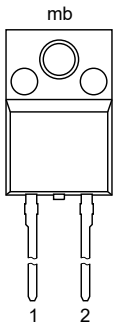
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_R	reverse voltage	DC		-	-	800	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_h \leq 73$ °C; SQW; Fig. 1; Fig. 2; Fig. 3	[1]	-	-	8	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ µs; $T_h \leq 73$ °C; SQW		-	-	16	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; SIN		-	-	60	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; SIN		-	-	66	A
Static characteristics							
V_F	forward voltage	$I_F = 8$ A; $T_j = 150$ °C; Fig. 5		-	1.07	1.5	V
		$I_F = 20$ A; $T_j = 25$ °C; Fig. 5		-	1.75	1.95	V
		$I_F = 8$ A; $T_j = 25$ °C		-	-	1.7	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. 6; Fig. 7		-	60	75	ns

[1] Neglecting switching and reverse current losses

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 TO-220F (SOD113)	
2	A	anode		
mb	n.c.	mounting base; isolated		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BYR29X-800	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack"	SOD113

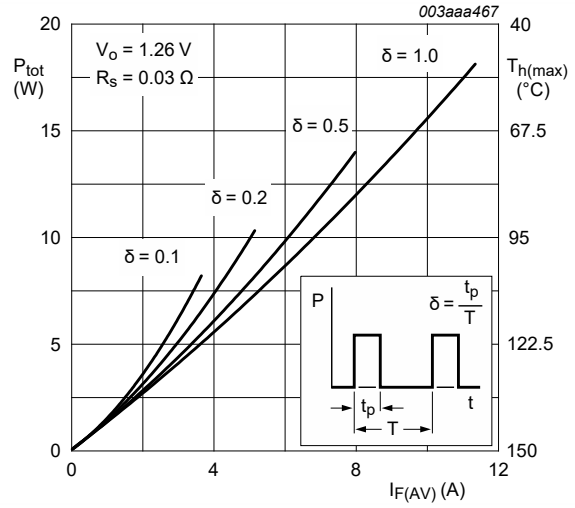
7. Limiting values

Table 4. Limiting values

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

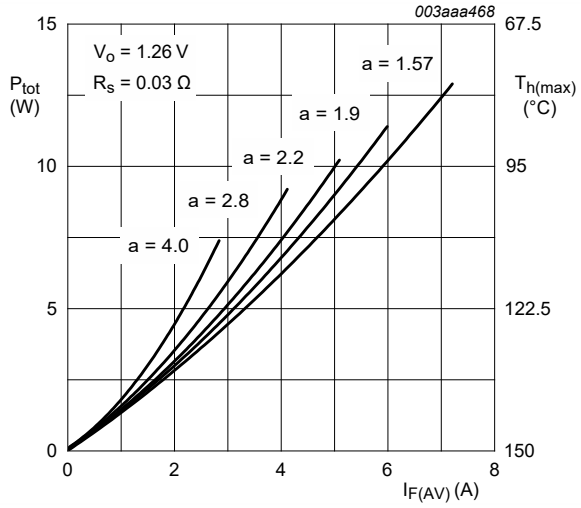
Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	800	V
V_{RWM}	crest working reverse voltage			-	800	V
V_R	reverse voltage	DC		-	800	V
$I_{F(AV)}$	average forward current	δ = 0.5 ; $T_h \leq$ 73 °C; SQW; Fig. 1; Fig. 2; Fig. 3	[1]	-	8	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_h \leq$ 73 °C; SQW		-	16	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; SIN		-	60	A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; SIN		-	66	A
T_{stg}	storage temperature			-40	150	°C
T_j	junction temperature			-	150	°C

[1] Neglecting switching and reverse current losses



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

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



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

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

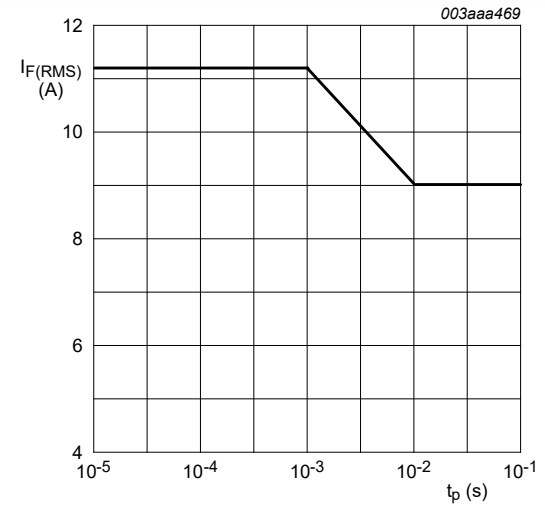


Fig. 3. Forward RMS current as a function of pulse width; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; Fig. 4		-	-	5.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	55	-	K/W

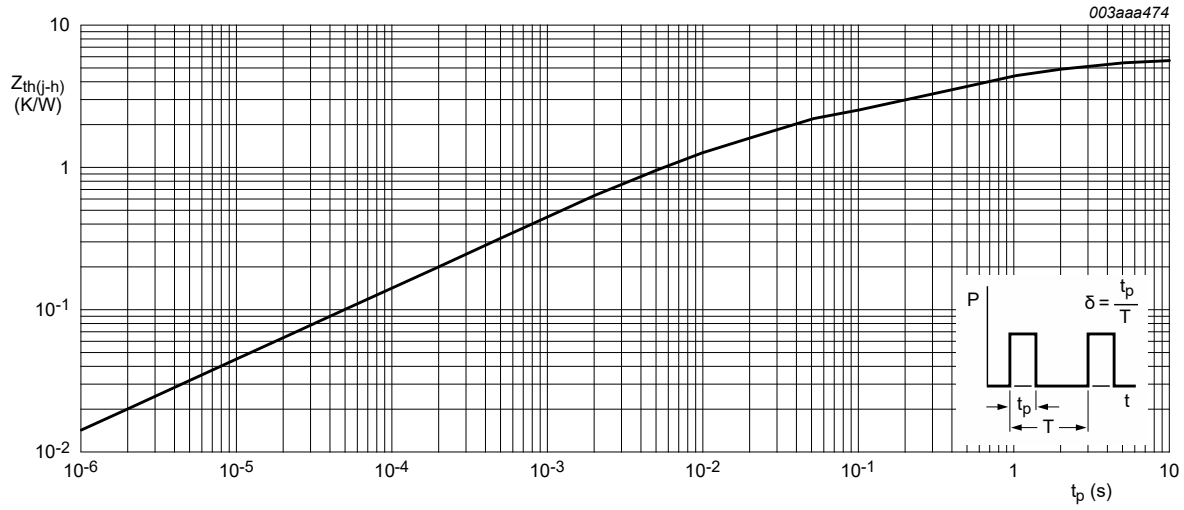


Fig. 4. Transient thermal impedance from junction to heatsink as a function of pulse width

9. Isolation characteristics

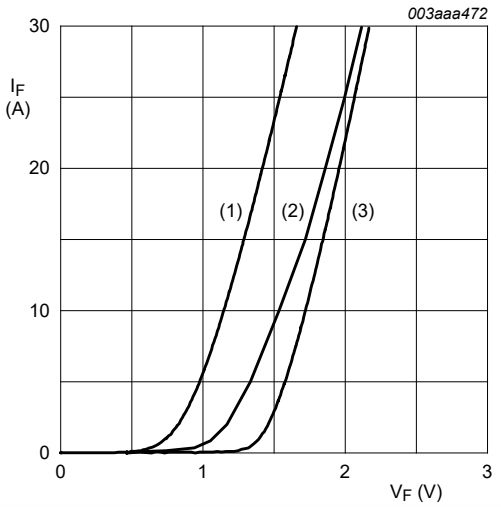
Table 6. Isolation characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	50 Hz ≤ f ≤ 60 Hz; RH ≤ 65 %; from all pins to external heatsink; sinusoidal waveform; clean and dust free		-	-	2500	V
C_{isol}	isolation capacitance	from cathode to external heatsink		-	10	-	pF

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	I_F = 8 A; T_j = 150 °C; Fig. 5		-	1.07	1.5	V
		I_F = 20 A; T_j = 25 °C; Fig. 5		-	1.75	1.95	V
		I_F = 8 A; T_j = 25 °C		-	-	1.7	V
I_R	reverse current	V_R = 800 V; T_j = 25 °C		-	1	10	µA
		V_R = 800 V; T_j = 100 °C		-	0.1	0.2	mA
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. 6; Fig. 7		-	60	75	ns
I_{RM}	peak reverse recovery current	I_F = 10 A; V_R = 30 V; dI_F/dt = 50 A/µs; T_j = 100 °C; Fig. 6; Fig. 8		-	-	6	A
Q_r	recovered charge	I_F = 2 A; V_R = 30 V; dI_F/dt = 20 A/s; T_j = 25 °C; Fig. 9; Fig. 6		-	150	200	nC
V_{FR}	forward recovery voltage	I_F = 10 A; dI_F/dt = 10 A/µs; T_j = 25 °C; Fig. 10		-	5	-	V



(1) T_j = 150 °C; typical values
(2) T_j = 150 °C; maximum values
(3) T_j = 25 °C; maximum values

Fig. 5. Forward current as a function of forward voltage

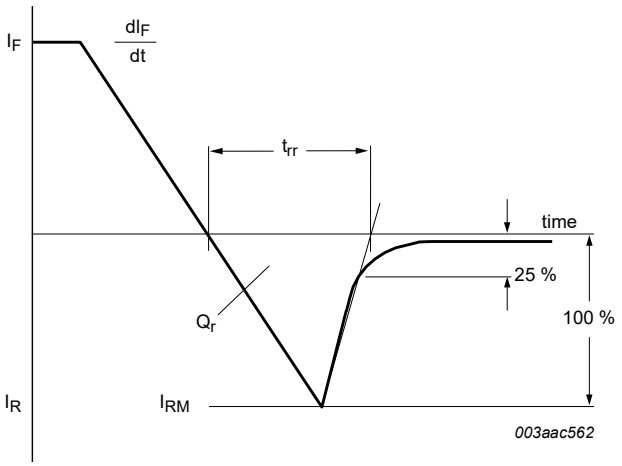
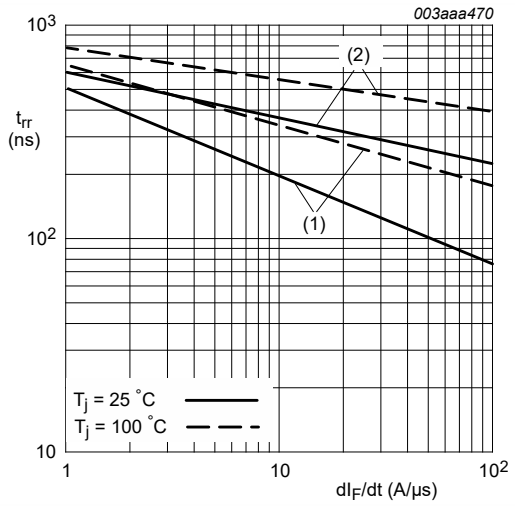
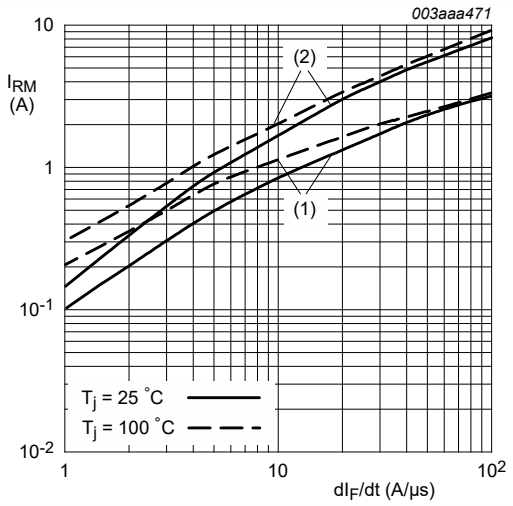


Fig. 6. Reverse recovery definitions; ramp recovery



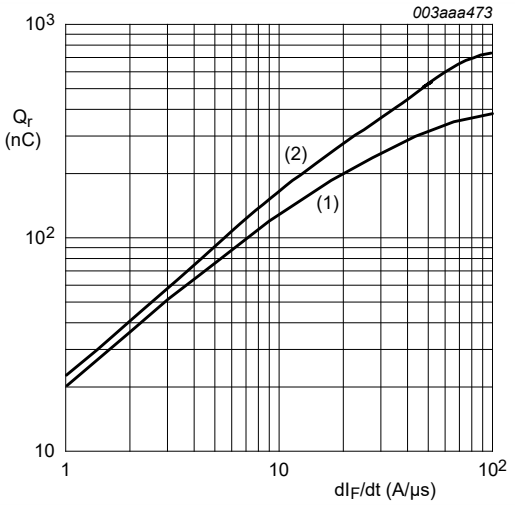
(1) I_F = 1 A(2) I_F = 10 A

Fig. 7. Reverse recovery time as a function of rate of change of forward current at indicated temperatures; maximum values



(1) I_F = 1 A(2) I_F = 10 A

Fig. 8. Peak reverse recovery current as a function of rate of change of forward current at indicated temperatures



(1) I_F = 2 A(2) I_F = 10 A

Fig. 9. Recovered charge as a function of rate of change of forward current

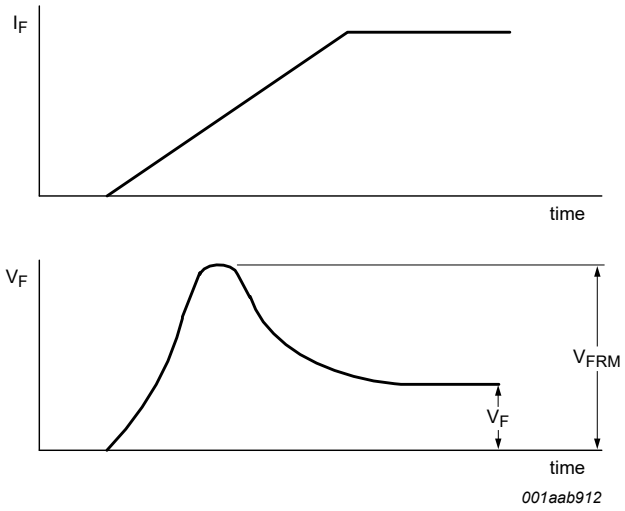
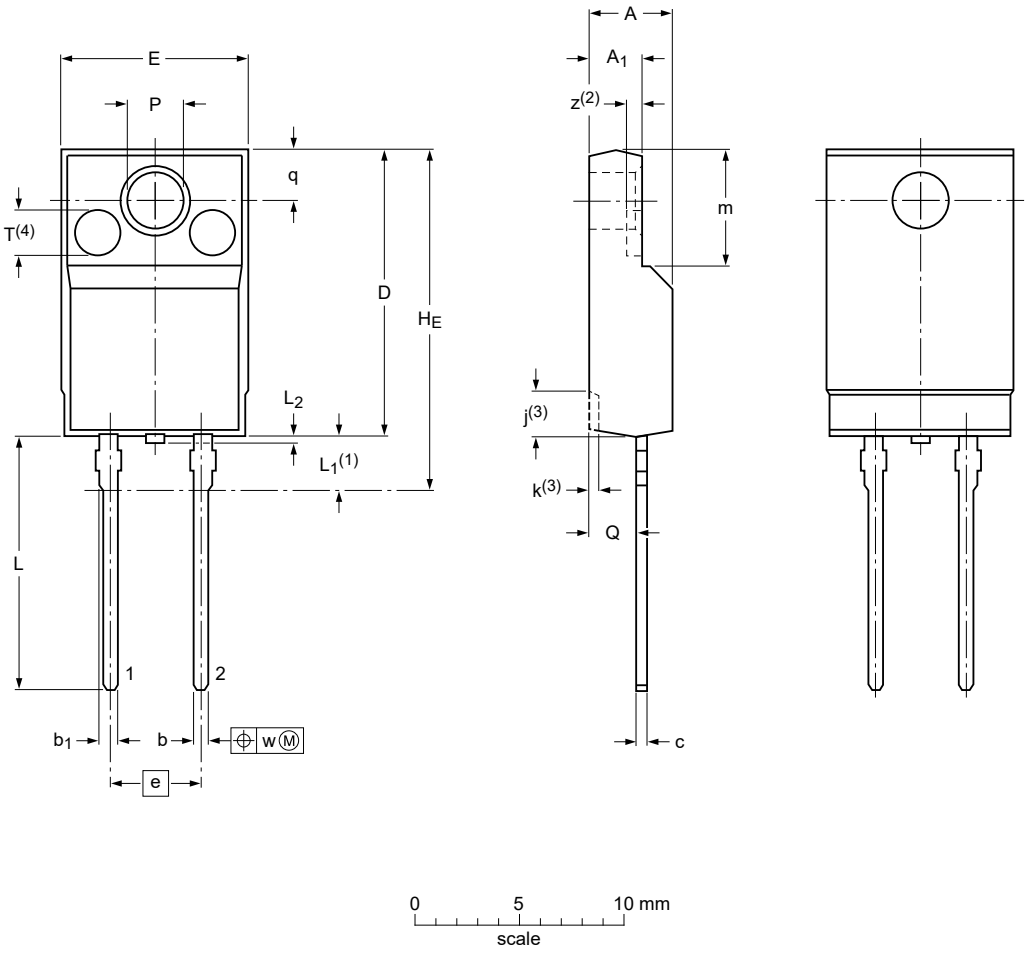


Fig. 10. Forward recovery definitions

11. Package outline

Plastic single-ended package; isolated heatsink mounted;
1 mounting hole; 2-lead TO-220 'full pack'

SOD113



Dimensions (mm are the original dimensions)

Unit		A	A_1	b	b_1	c	D	E	e	H_E max	$j^{(3)}$	$k^{(3)}$	L	$L_1{}^{(1)}$	L_2 max	m	P	Q	q	$T^{(4)}$	w	$z^{(2)}$
mm	max	4.6	2.9	0.9	1.1	0.7	15.8	10.3			2.7	0.6	14.4	3.3		6.5	3.2	2.6				
	nom								5.08	19.0					0.5				2.6	2.55	0.4	0.8
	min	4.0	2.5	0.7	0.9	0.4	15.2	9.7			1.7	0.4	13.5	2.8		6.3	3.0	2.3				

Notes
1. Terminals are uncontrolled within zone L1.
2. z is depth of T.
3. Dot lines area designs may vary.
4. Eject pin mark is for reference only.

sod113_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOD113		2-lead TO-220F				~~07-06-08~~ 15-08-28

Fig. 11. Package outline TO-220F (SOD113)

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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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