BYR29X-600

Ultrafast power diode

Rev. 02 — 15 July 2010 | Product data sheet

1. Product profile

1.1 General description

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

1.2 Features and benefits

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

1.3 Applications

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

1.4 Quick reference data

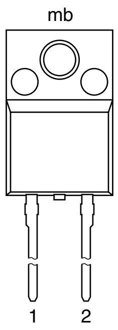
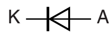
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	-	600	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $T_h \leq 73$ °C; see Figure 1; see Figure 2; see Figure 3	[1]	-	-	8	A
I_{FSM}	non-repetitive peak forward current	$T_{j(init)} = 25$ °C; $t_p = 10$ ms; sine-wave pulse		-	-	60	A
Static characteristics							
V_F	forward voltage	$I_F = 8$ A; $T_j = 150$ °C; see Figure 5		-	1.07	1.5	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; see Figure 8; see Figure 7		-	60	75	ns

[1] Neglecting switching and reverse current losses

2. Pinning information

Table 2. Pinning information

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

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BYR29X-600	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack"	SOD113

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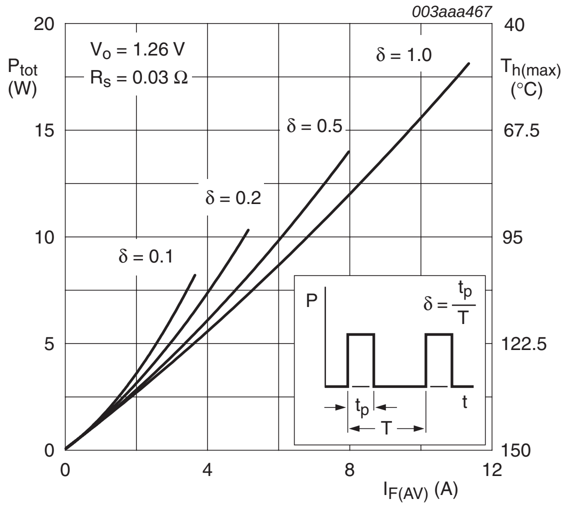
4. Limiting values

Table 4. Limiting values

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

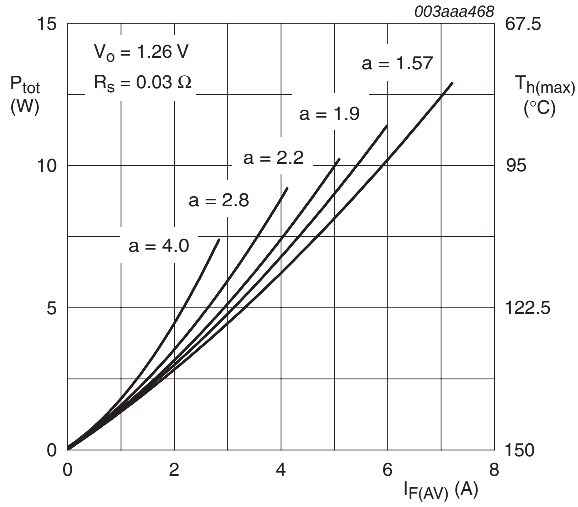
Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	600	V
V_{RWM}	crest working reverse voltage			-	600	V
V_R	reverse voltage	T_h ≤ 136 °C; DC		-	600	V
$I_{F(AV)}$	average forward current	square-wave pulse; δ = 0.5 ; T_h ≤ 73 °C; see Figure 1; see Figure 2; see Figure 3	[1]	-	8	A
I_{FRM}	repetitive peak forward current	square-wave pulse; δ = 0.5 ; t_p = 25 µs; T_h ≤ 73 °C		-	16	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; sine-wave pulse; $T_{j(init)}$ = 25 °C		-	60	A
		t_p = 8.3 ms; sine-wave pulse; $T_{j(init)}$ = 25 °C		-	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

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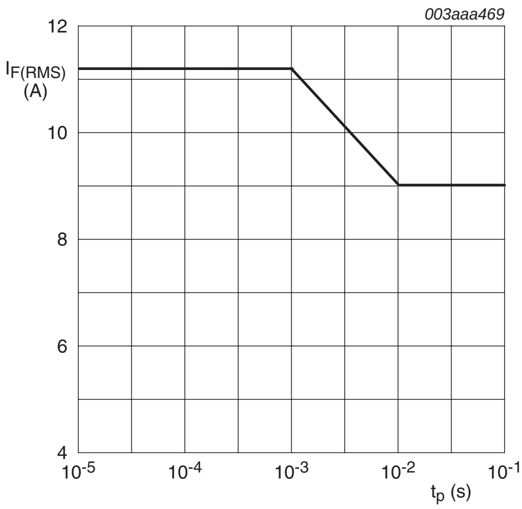

Fig 3. Forward RMS current as a function of pulse width; maximum values

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5. 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 ; see Figure 4	-	-	5.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	55	-	K/W

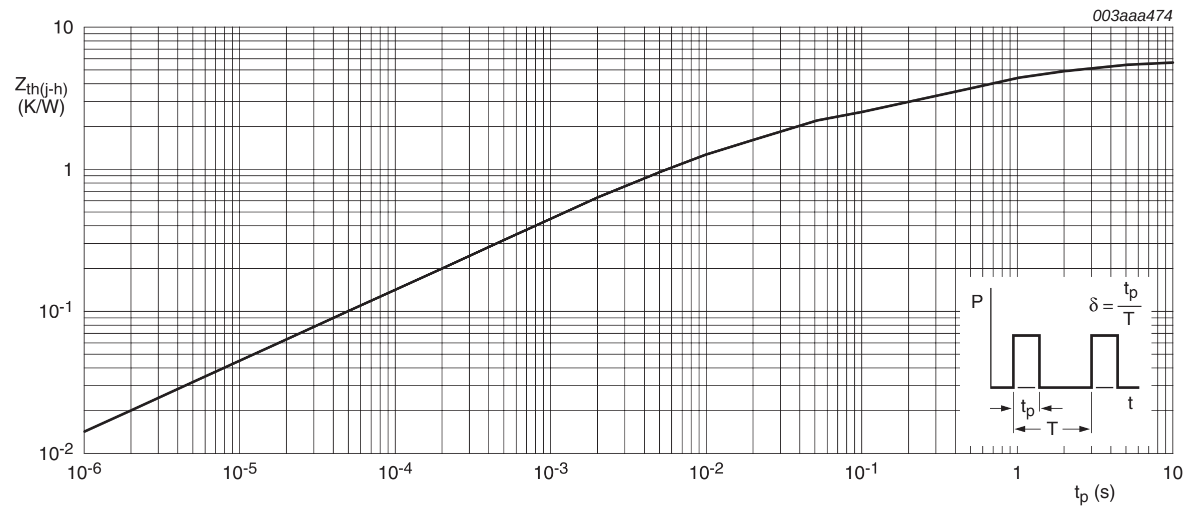

Fig 4. Transient thermal impedance from junction to heatsink as a function of pulse width

6. 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	f = 1 MHz ; from cathode to external heatsink	-	10	-	pF

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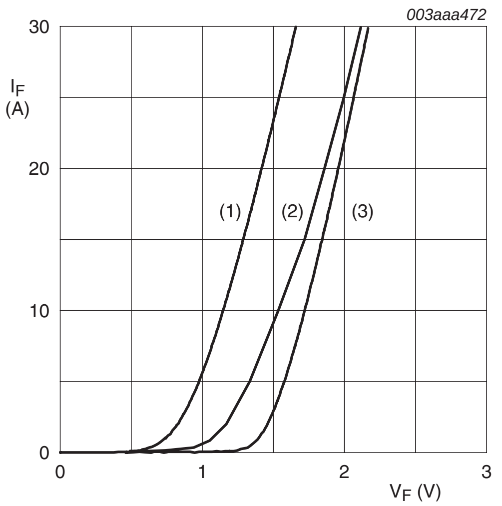
7. Characteristics

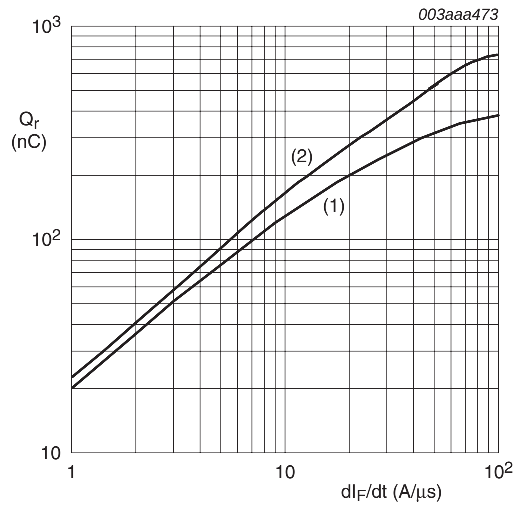
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	I_F = 20 A; T_j = 25 °C; see Figure 5	-	1.75	1.95	V
		I_F = 8 A; T_j = 150 °C; see Figure 5	-	1.07	1.5	V
		I_F = 8 A; T_j = 25 °C; see Figure 5	-	-	1.7	V
I_R	reverse current	V_R = 600 V; T_j = 100 °C	-	0.1	0.2	mA
		V_R = 600 V; T_j = 25 °C	-	1	10	µA
Dynamic characteristics						
Q_r	recovered charge	I_F = 2 A; V_R = 30 V; dI_F/dt = 20 A/µs; T_j = 25 °C; see Figure 6; see Figure 7	-	150	200	nC
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs; T_j = 25 °C; see Figure 8; see Figure 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; see Figure 9; see Figure 7	-	-	6	A
V_{FR}	forward recovery voltage	I_F = 10 A; dI_F/dt = 10 A/µs; T_j = 25 °C; see Figure 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



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

Fig 6. Recovered charge as a function of rate of change of forward current

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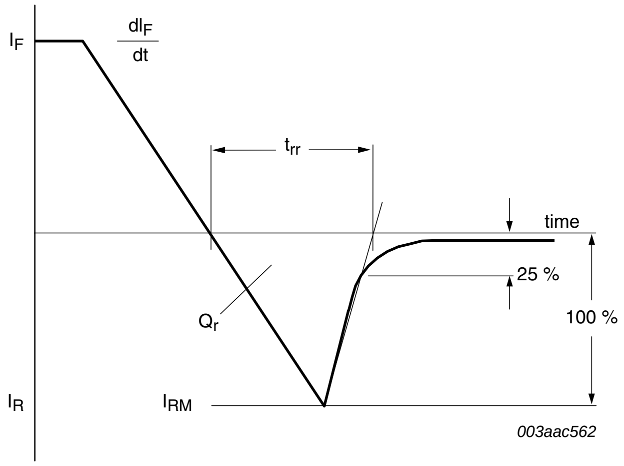
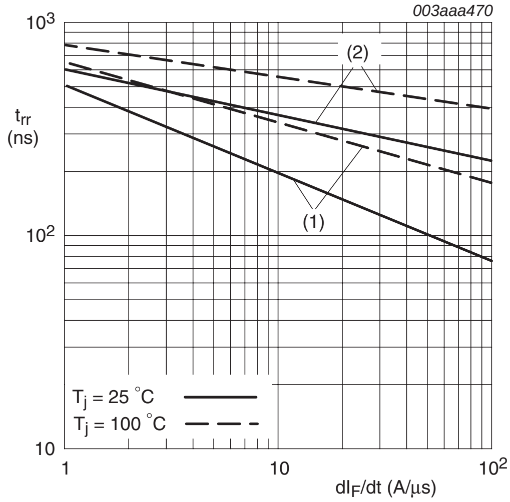
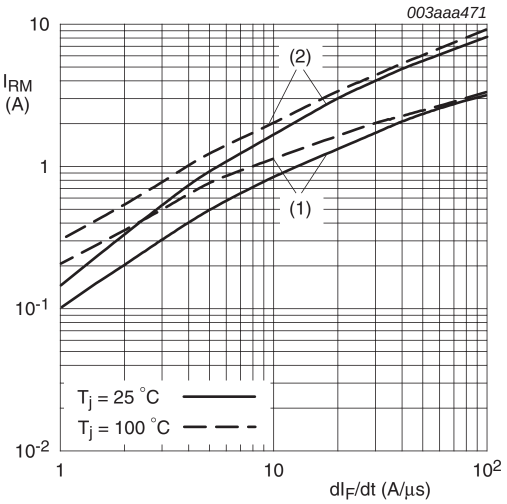


Fig 7. Reverse recovery definitions; ramp recovery



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

Fig 8. 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 9. Peak reverse recovery current as a function of rate of change of forward current at indicated temperatures

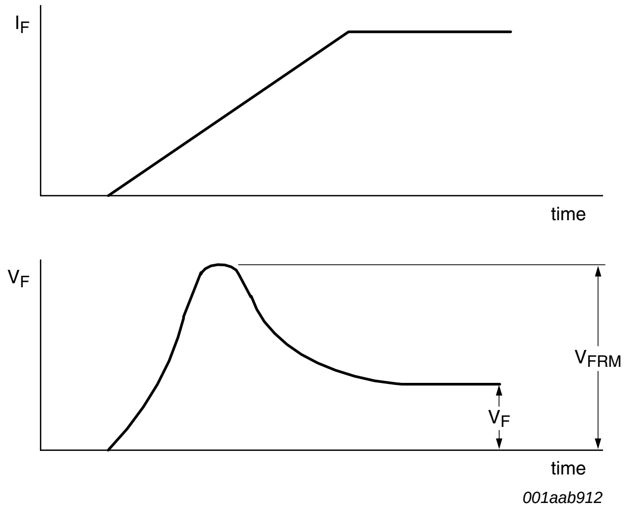


Fig 10. Forward recovery definitions

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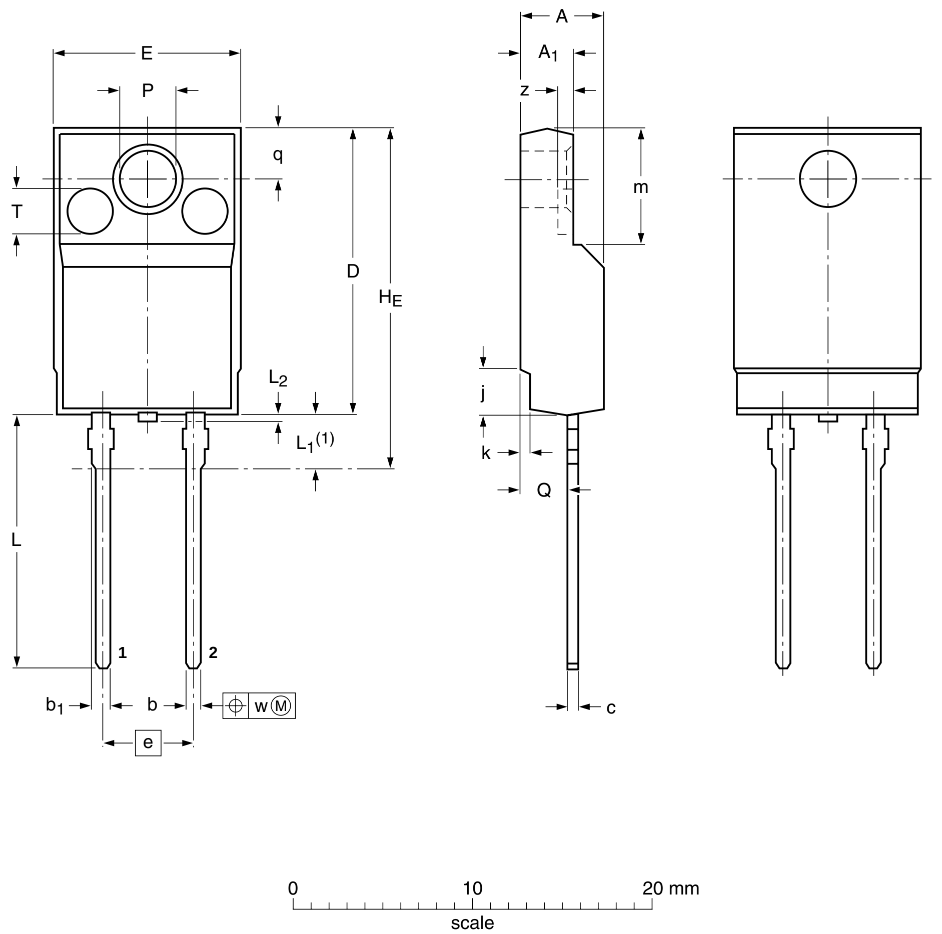
8. Package outline

Plastic single-ended package; isolated heatsink mounted;
1 mounting hole; 2-lead TO-220 'full pack' **SOD113**



$z^{(2)}$
0.8

DIMENSIONS (mm are the original dimensions)

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

Notes

1. Terminals are uncontrolled within zone L_1.
2. z is depth of T.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOD113		2-lead TO-220F				~~02-04-09~~ 07-06-18

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

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9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYR29X-600 v.2	20100715	Product data sheet	-	BYR29X-600 v.1
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate.			
BYR29X-600 v.1 (9397 750 12006)	20030926	Product data	-	-

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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.

[1] Please consult the most recently issued document before initiating or completing a design.

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

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