BYV10EX-600P

Ultrafast power diode

4 July 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 leakage current
- Low forward voltage drop
- Low thermal resistance
- Soft recovery characteristic
- Enhanced avalanche energy capability

3. Applications

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

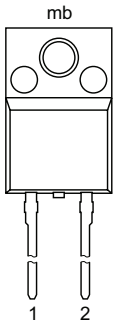
4. Quick reference data

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; $T_h \leq 71$ °C; Fig. 1; Fig. 2; Fig. 3	10				A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_h \leq 71$ °C; square-wave pulse	20				A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 4	75				A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse;	83				A
Symbol	**Parameter**	**Conditions**		**Min**	**Typ**	**Max**	**Unit**
Static characteristics							
V_F	forward voltage	I_F = 10 A; T_j = 25 °C; Fig. 6		-	1.55	2	V
		I_F = 10 A; T_j = 150 °C; Fig. 6		-	-	1.6	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		-	35	50	ns
		I_F = 10 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	50	-	ns
		I_F = 10 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	78	-	ns
		I_F = 10 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; Fig. 7		-	42	-	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		
2	A	anode		
mb	n.c.	mounting base; isolated		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BYV10EX-600P	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack"	SOD113

7. Marking

Table 4. Marking codes

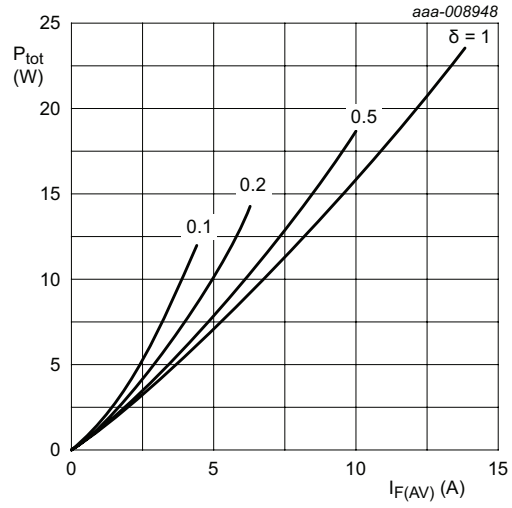
Type number	Marking codes
BYV10EX-600P	BYV10EX-600P

8. Limiting values

Table 5. Limiting values

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

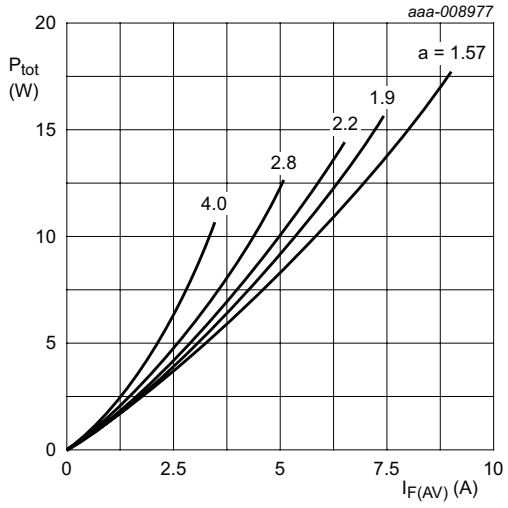
Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		600	V
V_{RWM}	crest working reverse voltage		600	V
V_R	reverse voltage	DC	600	V
$I_{F(AV)}$	average forward current	δ = 0.5 ; square-wave pulse; $T_h \leq 71$ °C; Fig. 1; Fig. 2; Fig. 3	10	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_h \leq 71$ °C; square-wave pulse	20	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 4	75	A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse;	83	A
T_{stg}	storage temperature		-65 to 175	°C
T_j	junction temperature		175	°C



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

V_o = 1.268 V; R_s = 0.031 Ω

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



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

Vo = 1.268 V; Rs = 0.031 Ω

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

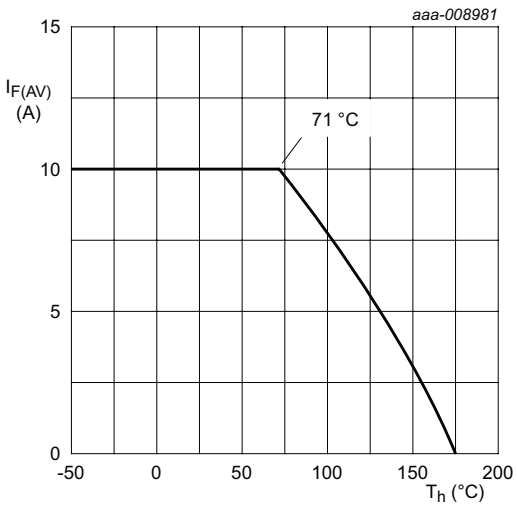


Fig. 3. Forward current as a function of heatsink temperature; maximum values

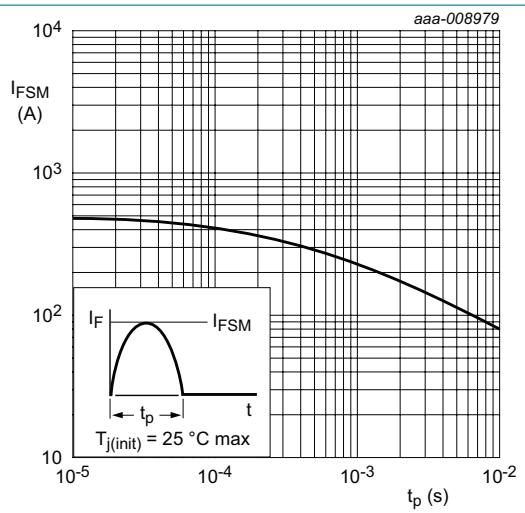


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	With heatsink compound; Fig. 5		-	-	5.5	K/W
		Without heatsink compound		-	-	7.2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	55	-	K/W

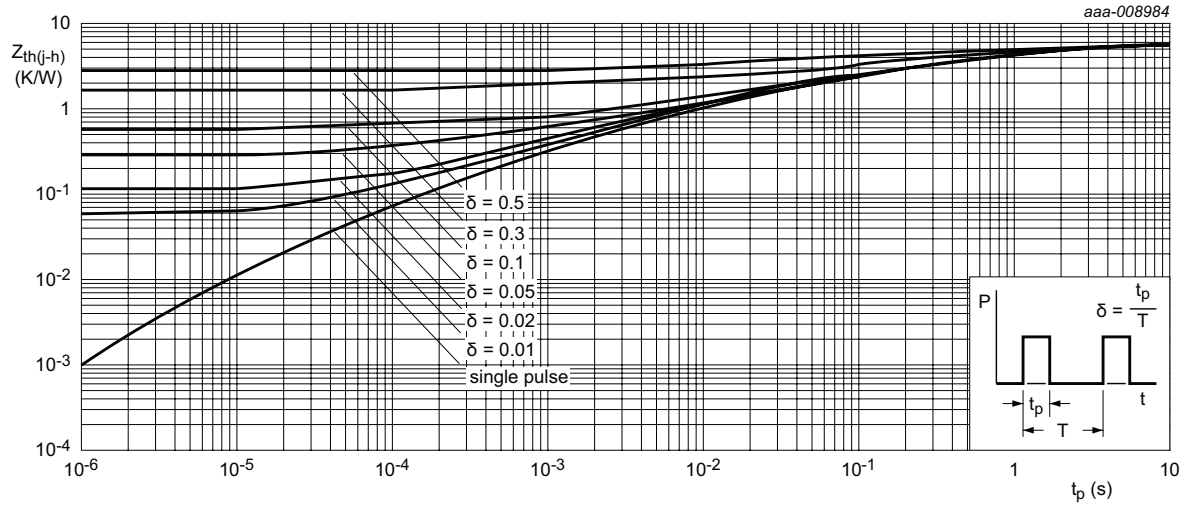


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration

10. Isolation characteristics

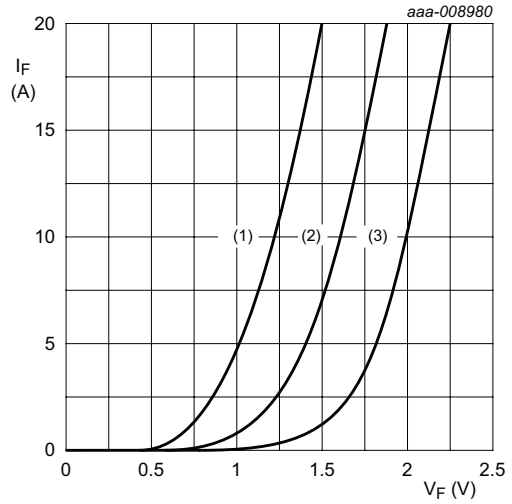
Table 6. Isolation characteristics

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

11. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V_F	forward current	I_F = 10 A; T_j = 25 °C; Fig. 6		-	1.55	2	V
		I_F = 10 A; T_j = 150 °C; Fig. 6		-	-	1.6	V
I_R	reverse current	V_R = 600 V; T_j = 25 °C		-	-	10	μA
		V_R = 600 V; T_j = 150 °C		-	-	250	μA
Dynamic characteristics							
Q_r	reverse charge	I_F = 10 A; V_R = 200 V; dI_F/dt = 200 A/μs; T_j = 25 °C; Fig. 7		-	123	-	nC
		I_F = 10 A; V_R = 200 V; dI_F/dt = 200 A/μs; T_j = 125 °C; Fig. 7		-	305	-	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		-	35	50	ns
		I_F = 10 A; V_R = 200 V; dI_F/dt = 200 A/μs; T_j = 25 °C; Fig. 7		-	50	-	ns
		I_F = 10 A; V_R = 200 V; dI_F/dt = 200 A/μs; T_j = 125 °C; Fig. 7		-	78	-	ns
		I_F = 10 A; V_R = 400 V; dI_F/dt = 500 A/μs; T_j = 25 °C; Fig. 7		-	42	-	ns
I_{RM}	peak reverse recovery current	I_F = 10 A; V_R = 200 V; dI_F/dt = 200 A/μs; T_j = 25 °C; Fig. 7		-	4.9	-	A
		I_F = 10 A; V_R = 200 V; dI_F/dt = 200 A/μs; T_j = 125 °C; Fig. 7		-	7.8	-	A
E_{as}	non-repetitive avalanche energy	I_R = 1.2 A; $T_{j(init)}$ = 25 °C; L = 15 mH		10.8	-	-	mJ



V_o = 1.268 V; R_s = 0.031 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

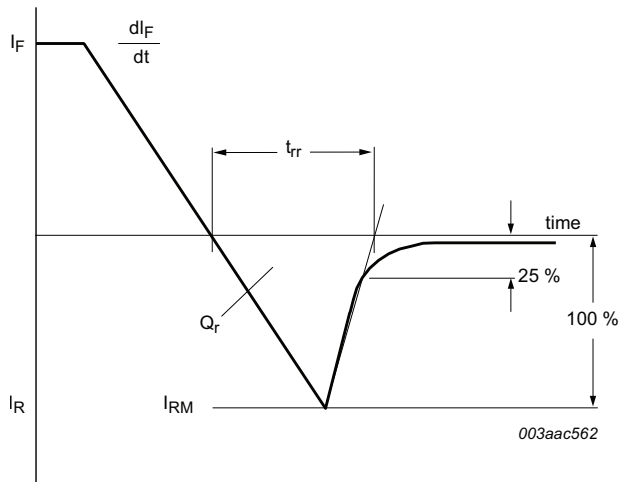
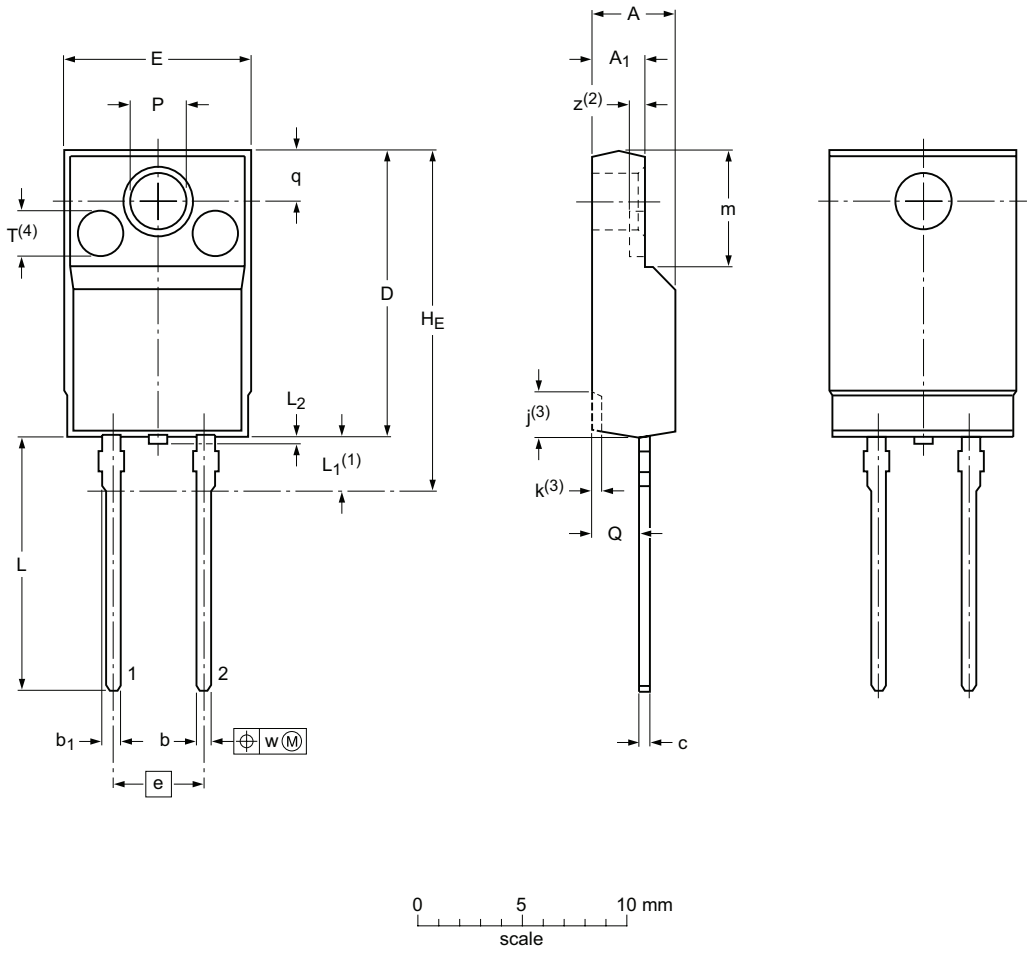


Fig. 7. Reverse recovery definitions; ramp recovery

12. 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	5.08	19.0	2.7	0.6	14.4	3.3	0.5	6.5	3.2	2.6	2.6	2.55	0.4	0.8
	nom																					
	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. 8. Package outline SOD113 (TO-220F)

13. 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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Product [short] data sheet	Production	This document contains the product specification.

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14. Contents

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