



BYV10X-600P

Ultrafast power diode

3 January 2014

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

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	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_h \leq 71^\circ\text{C}$; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	10	A
Static characteristics						
V_F	forward voltage	$I_F = 10\text{ A}$; $T_j = 150^\circ\text{C}$; Fig. 6	-	-	1.6	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $dI_F/dt = 100\text{ A}/\mu\text{s}$; $T_j = 25^\circ\text{C}$; Fig. 7	-	20	-	ns

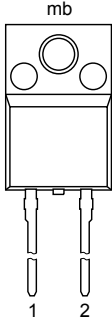
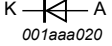


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5. Pinning information

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
BYV10X-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 code
BYV10X-600P	BYV10X-600P

8. Limiting values

Table 5. 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	DC	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_h \leq 71^\circ\text{C}$; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3	-	10	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\ \mu\text{s}$; $T_h \leq 71^\circ\text{C}$; square-wave pulse	-	20	A

Symbol	Parameter	Conditions		Min	Max	Unit
I _{FSM}	non-repetitive peak forward current	t _p = 10 ms; T _{j(init)} = 25 °C; sine-wave pulse; Fig. 4		-	80	A
		t _p = 8.3 ms; T _{j(init)} = 25 °C; sine-wave pulse; Fig. 4		-	88	A
T _{stg}	storage temperature			-65	175	°C
T _j	junction temperature			-	175	°C

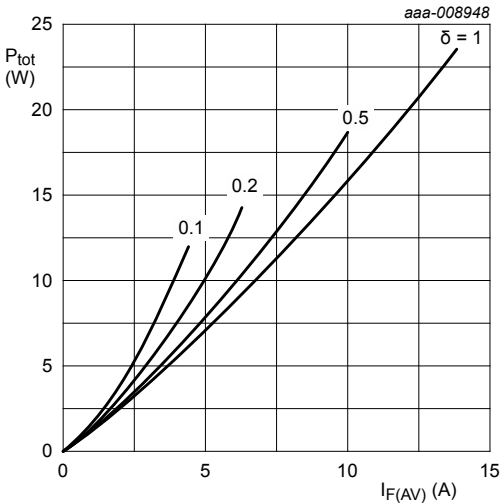


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$
$$V_O = 1.268 \text{ V}; R_S = 0.031 \text{ }\Omega$$

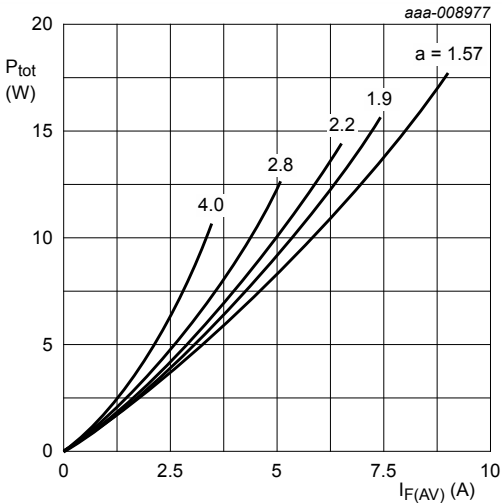


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

$$a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$$
$$V_O = 1.268 \text{ V}; R_S = 0.031 \text{ }\Omega$$

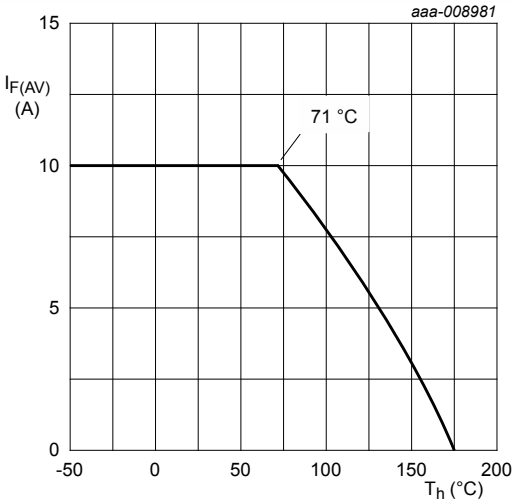


Fig. 3. Forward current as a function of heatsink temperature; maximum values

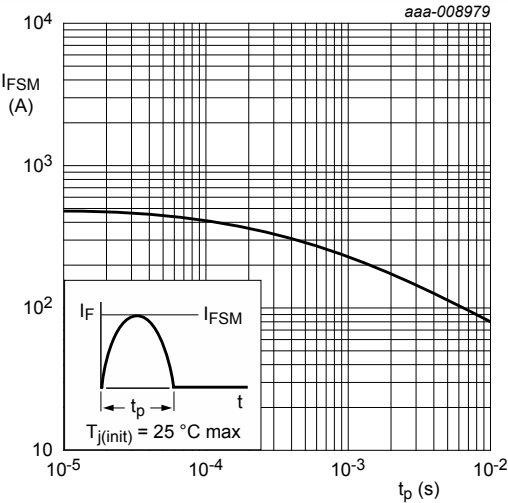


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

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

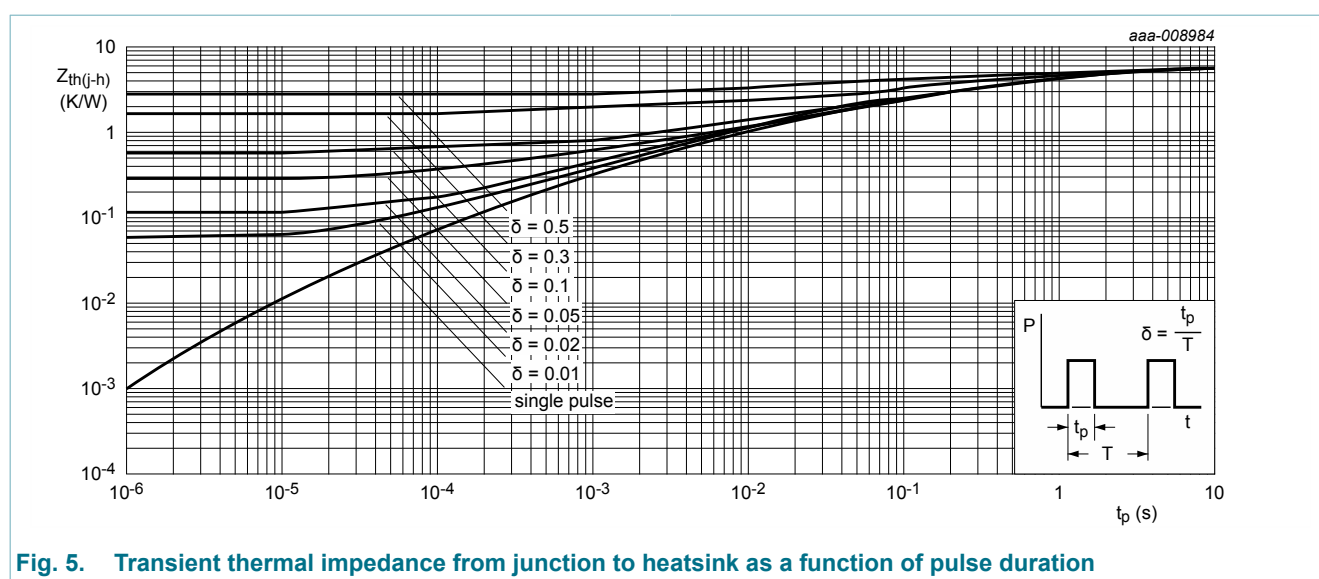


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration

10. Isolation characteristics

Table 7. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	50 Hz $\leq f \leq$ 60 Hz; RH $\leq$ 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

11. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 10$ A; $T_j = 25$ °C; Fig. 6	-	1.5	2	V

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I _R	reverse current	I _F = 10 A; T _j = 150 °C; Fig. 6		-	-	1.6	V
		V _R = 600 V; T _j = 25 °C		-	-	10	μA
		V _R = 500 V; T _j = 150 °C		-	-	250	μA
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 = 1 A; V _R = 30 V; dI _F /dt = 100 A/μs; T _j = 25 °C; Fig. 7		-	20	-	ns
		I _F = 10 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	40	-	ns

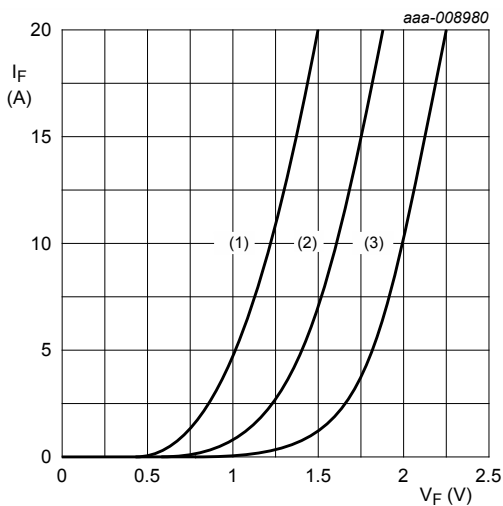


Fig. 6. Forward current as a function of forward voltage

- (1) T_j = 150 °C; typical values;
 - (2) T_j = 150 °C; maximum values;
 - (3) T_j = 25 °C; maximum values;
- V_O = 1.268 V; R_S = 0.031 Ω

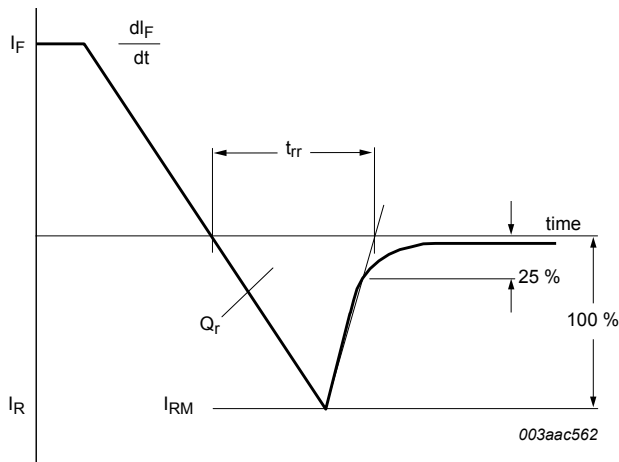


Fig. 7. Reverse recovery definitions; ramp recovery

12. Package outline

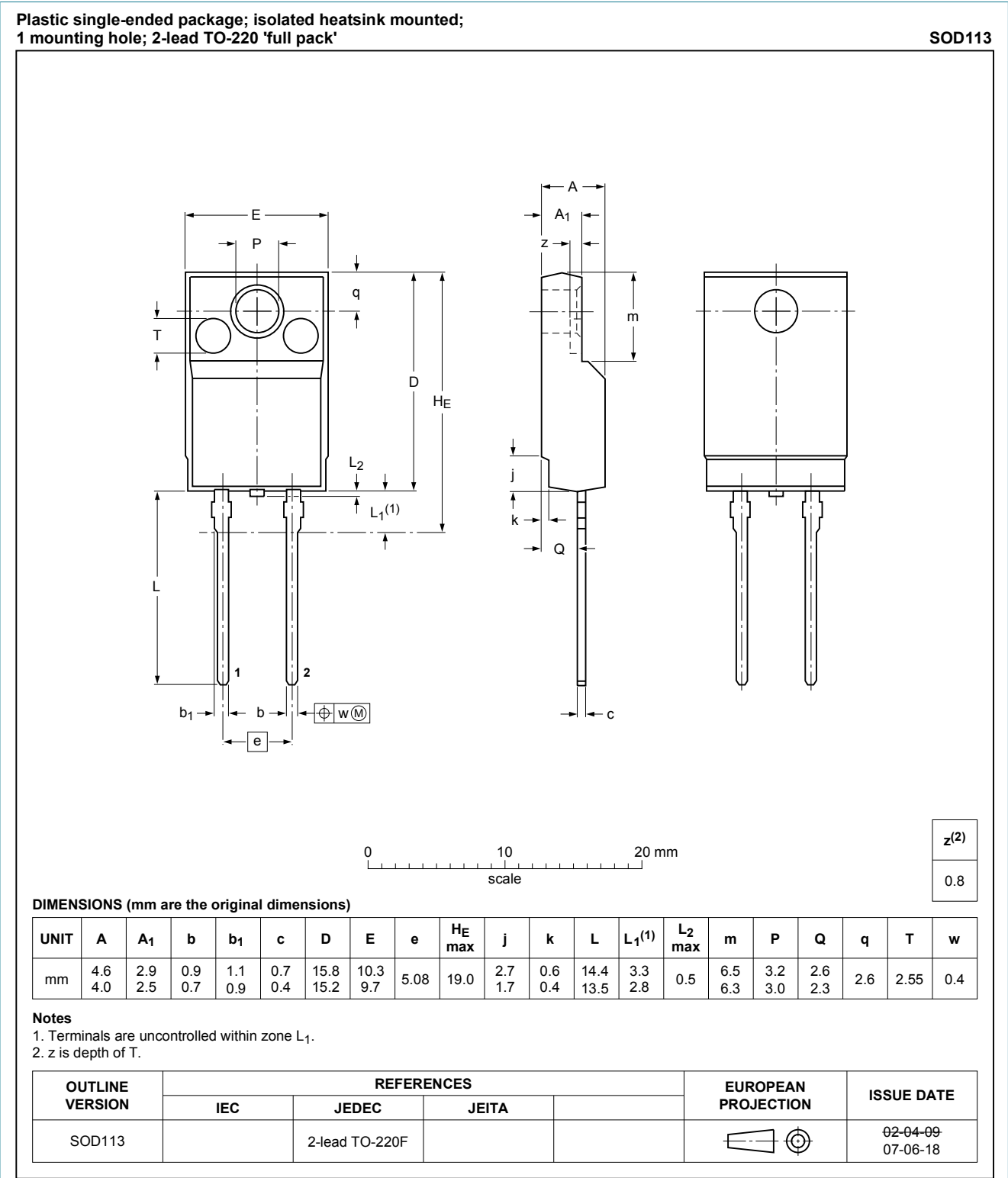


Fig. 8. Package outline TO-220F (SOD113)

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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.
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