



BYV10EX-600P

Ultrafast power diode

25 September 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
- 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	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	$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $dI_F/dt = 50\text{ A}/\mu\text{s}$; $T_j = 25^\circ\text{C}$; Fig. 7	-	35	50	ns
Avalanche energy						
E_{AS}	non-repetitive avalanche energy	$I_R = 2.6\text{ A}$; $T_{j(\text{init})} = 25^\circ\text{C}$; $L = 15\text{ mH}$	-	50	-	mJ

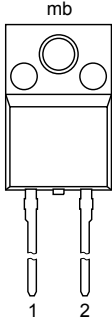
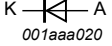


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5. Pinning information

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
BYV10EX-600P	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		-	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; T _h ≤ 71 °C; square-wave pulse; Fig. 1; Fig. 2; Fig. 3	-	10	A
I _{FRM}	repetitive peak forward current	δ = 0.5; t _p = 25 μs; T _h ≤ 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; Fig. 4	-	83	A
T _{stg}	storage temperature		-65	175	°C
T _j	junction temperature		-	175	°C

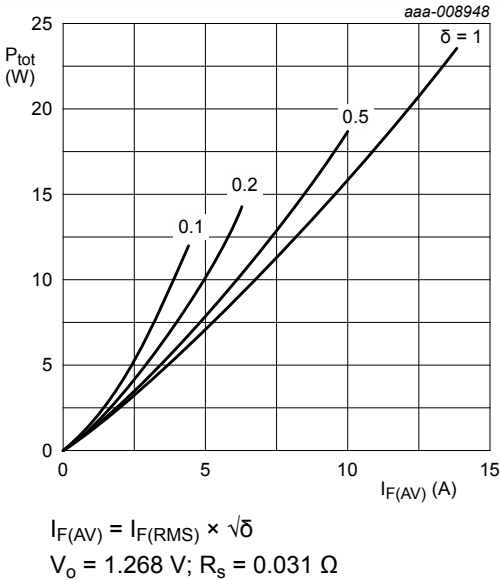


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

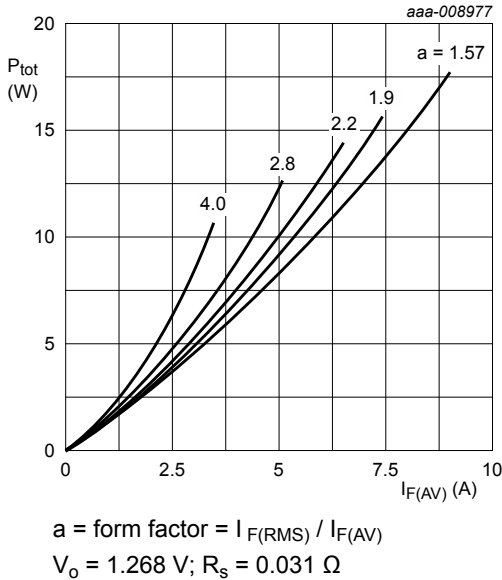


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

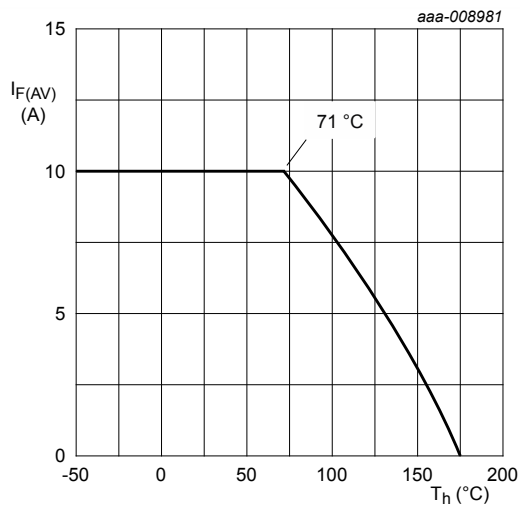


Fig. 3. Forward current as a function of heatsink temperature; maximum values

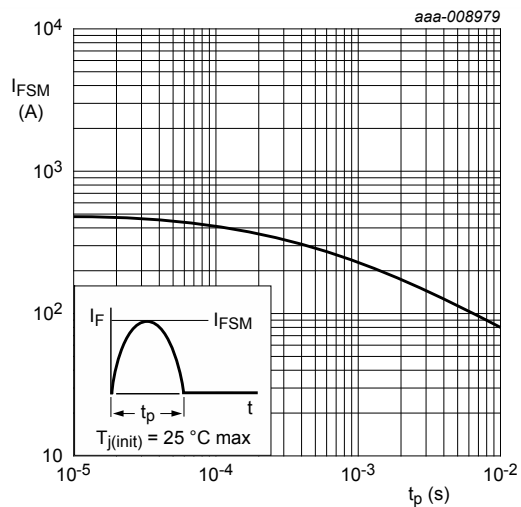


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

8. Thermal characteristics

Table 5. 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

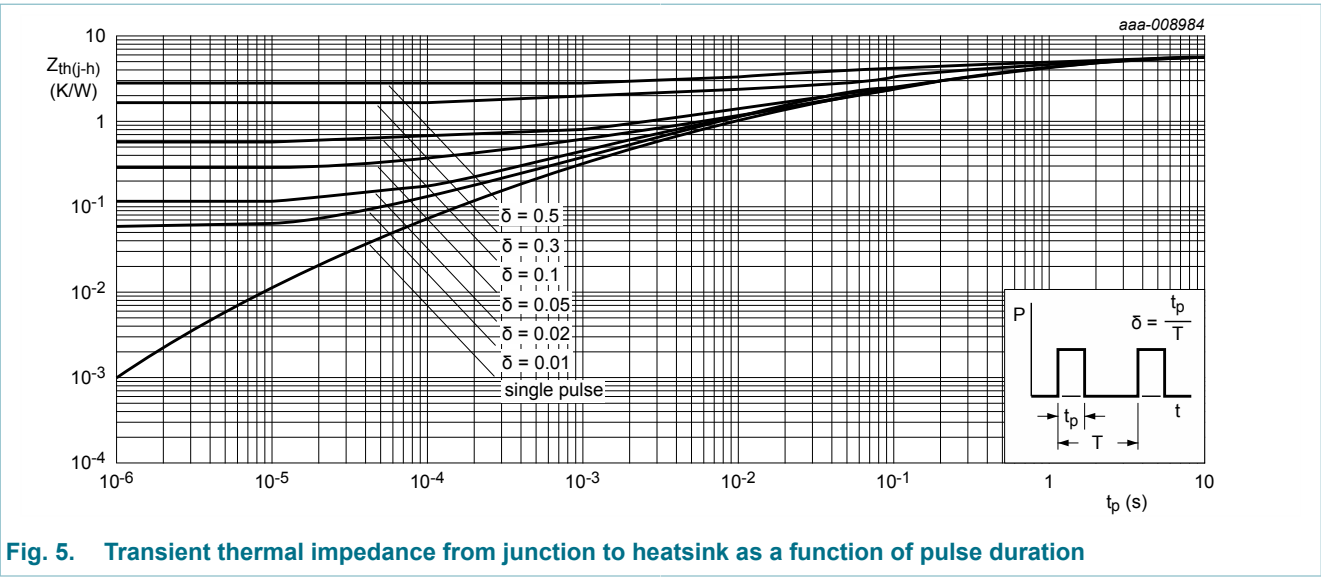


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration

9. Isolation characteristics

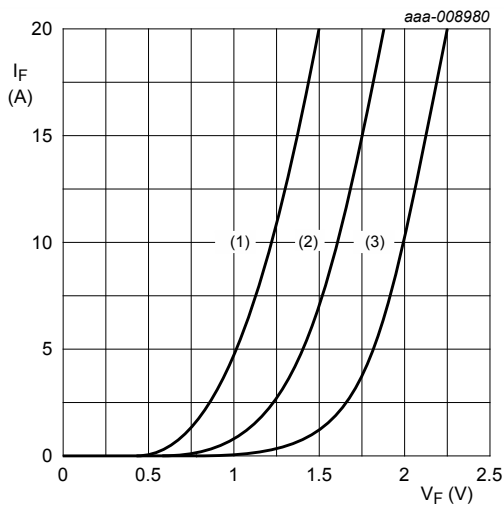
Table 6. Isolation characteristics

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	f = 1 MHz; 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 = 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 = 500 V; T _j = 150 °C		-	-	250	μA
Dynamic characteristics							
Q _r	recovered 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
Avalanche energy							
E _{AS}	non-repetitive avalanche energy	I _R = 2.6 A; T _{j(init)} = 25 °C; L = 15 mH		-	50	-	mJ



$V_o = 1.268\text{ V}; R_s = 0.031\ \Omega$

- (1) $T_j = 150\text{ }^\circ\text{C}$; typical values
- (2) $T_j = 150\text{ }^\circ\text{C}$; maximum values
- (3) $T_j = 25\text{ }^\circ\text{C}$; maximum values

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

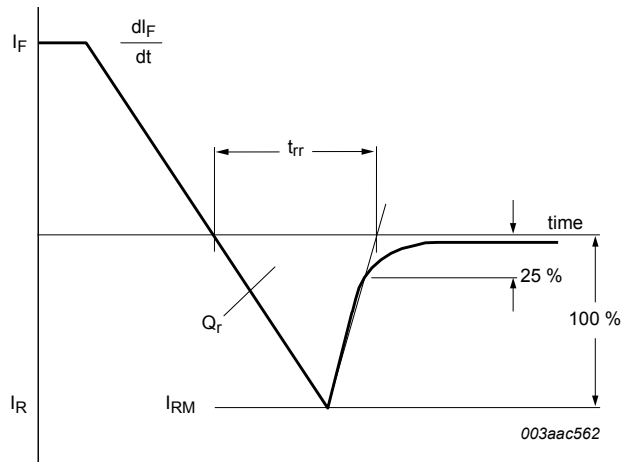


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

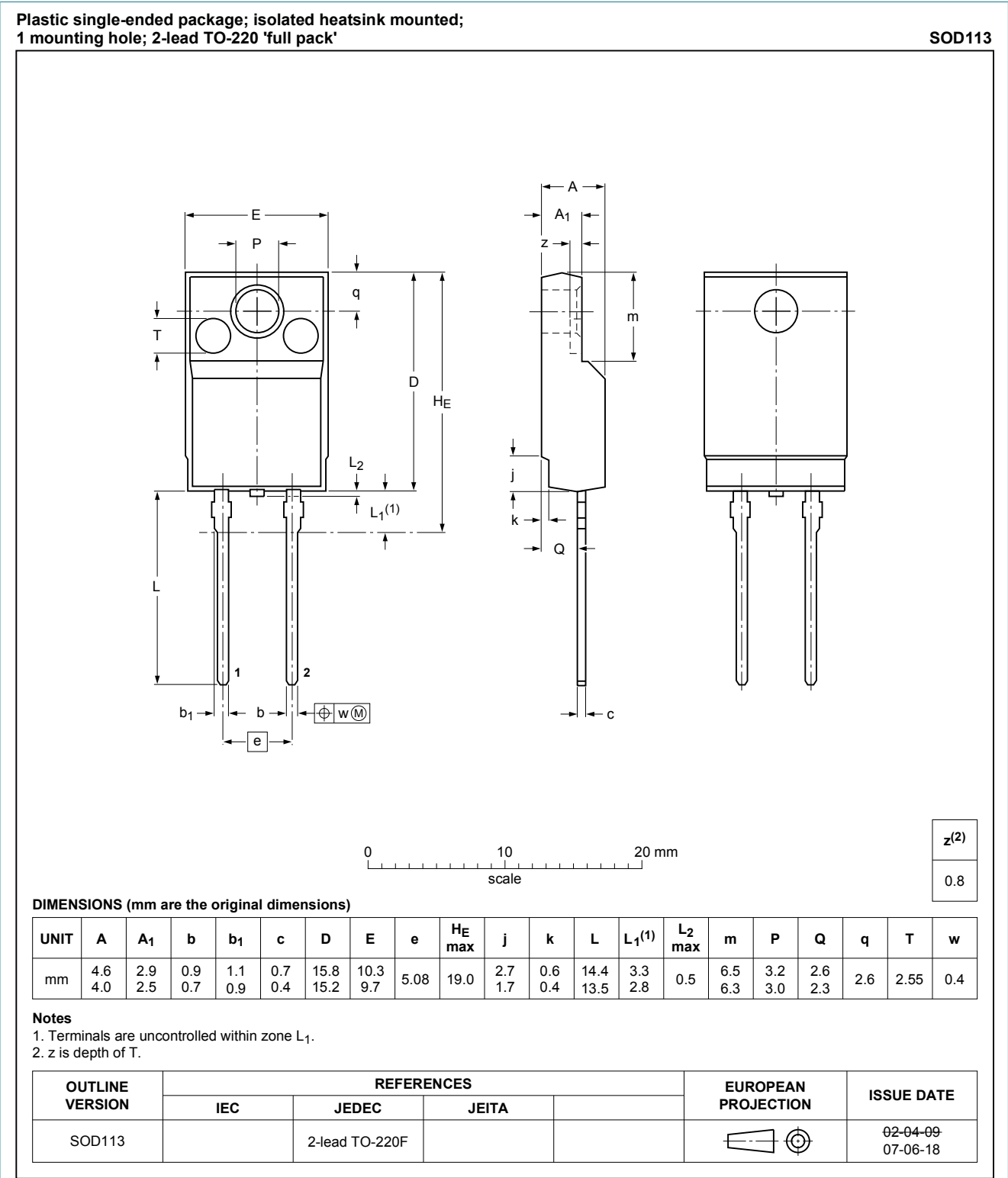


Fig. 8. Package outline TO-220F (SOD113)

12. Legal information

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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