

1. General description

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

2. Features and benefits

- Fast switching
- Low forward voltage drop
- Soft recovery characteristic

3. Applications

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

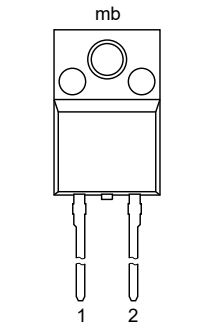
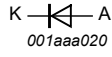
4. Quick reference data

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	$\delta = 0.5$; $T_h \leq 88$ °C; SQW; Fig. 1 ; Fig. 2 ; Fig. 3	-	-	8	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ μ s; $T_h \leq 88$ °C; SQW	-	-	16	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; SIN; Fig. 4	-	-	80	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; SIN; Fig. 4	-	-	88	A
Static characteristics						
V_F	forward voltage	$I_F = 8$ A; $T_j = 25$ °C; Fig. 6	-	1.4	1.7	V
		$I_F = 8$ A; $T_j = 150$ °C; Fig. 6	-	1.2	1.5	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 100$ A/ μ s; $T_j = 25$ °C; Fig. 7	-	40	55	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p style="text-align: center;">mb</p> <p style="text-align: center;">1 2</p> <p style="text-align: center;">TO-220F (SOD113)</p>	 <p style="text-align: center;">K — — A 001aaa020</p>
2	A	anode		
mb	n.c.	mounting base; isolated		

6. Ordering information

Table 3. Ordering information

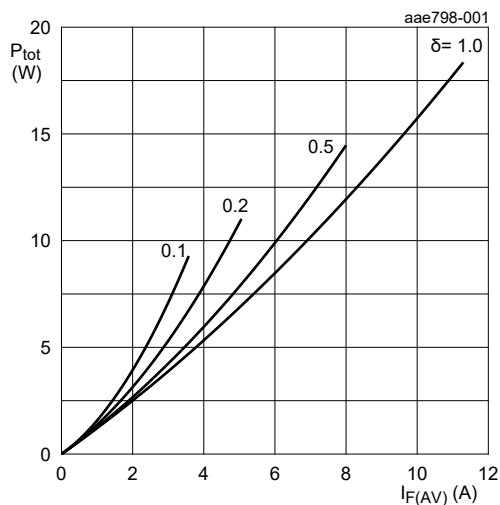
Type number	Package		
	Name	Description	Version
BYR29X-800P	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack"	SOD113

7. Limiting values

Table 4. Limiting values

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

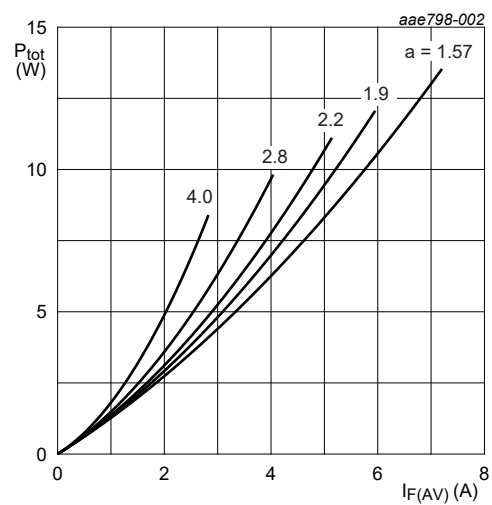
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	800	V
V_{RWM}	crest working reverse voltage		-	800	V
V_R	reverse voltage	DC	-	800	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_h \leq 88\text{ }^\circ\text{C}$; SQW; Fig. 1; Fig. 2; Fig. 3	-	8	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_h \leq 88\text{ }^\circ\text{C}$; SQW	-	16	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; SIN; Fig. 4	-	80	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; SIN; Fig. 4	-	88	A
T_{stg}	storage temperature		-40	175	$^\circ\text{C}$
T_j	junction temperature		-	175	$^\circ\text{C}$



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

$$V_o = 1.173\text{ V}; R_s = 0.040\text{ }\Omega$$

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



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

$$V_o = 1.173\text{ V}; R_s = 0.040\text{ }\Omega$$

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

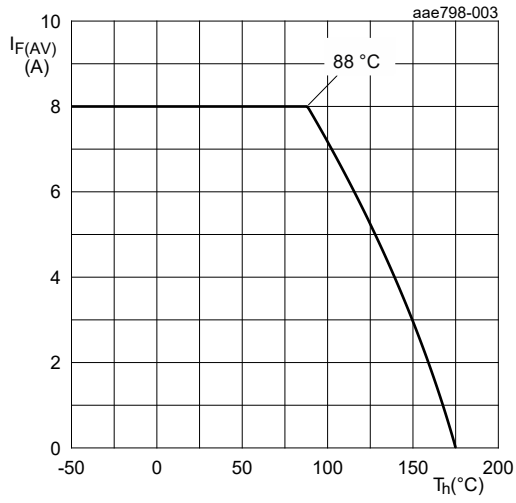


Fig. 3. Forward current as a function of heatsink temperature; maximum values

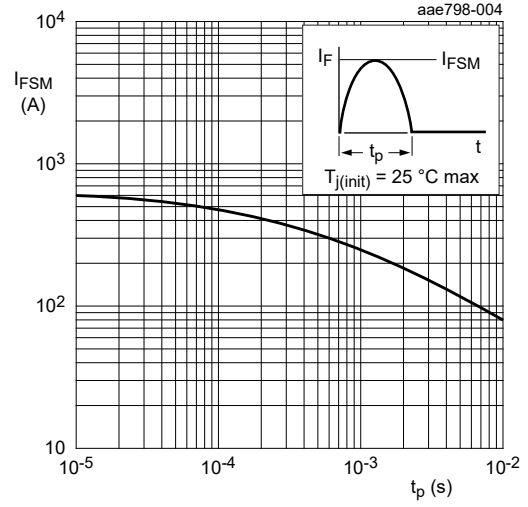


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; Fig. 5	-	-	6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	60	-	K/W

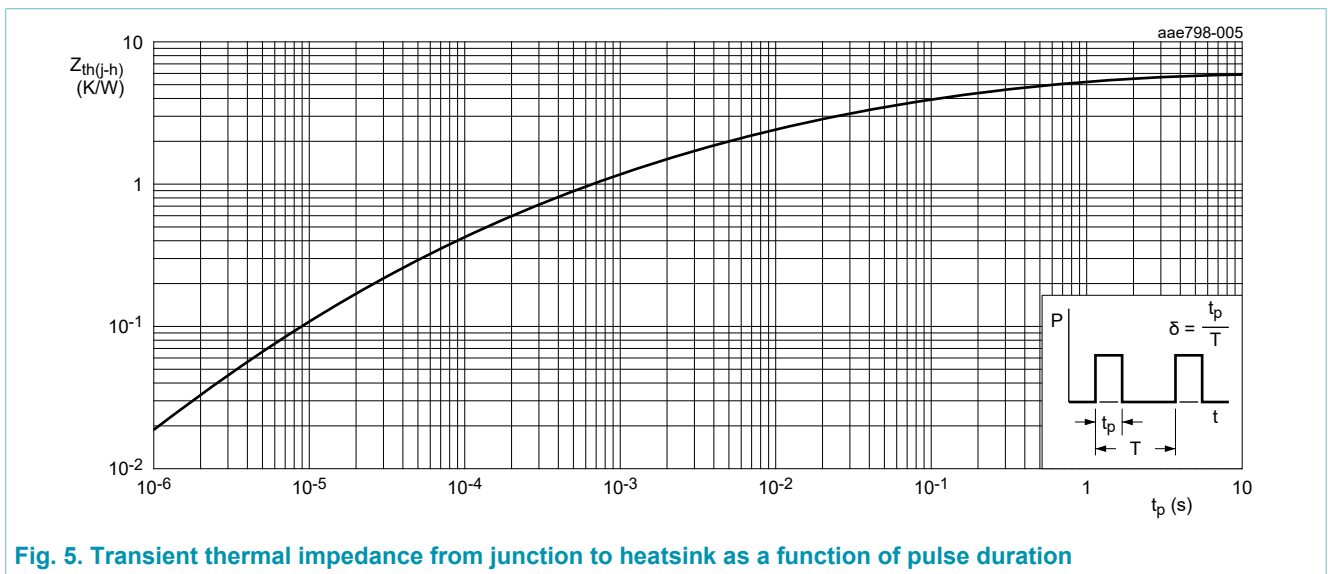


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration

9. Isolation characteristics

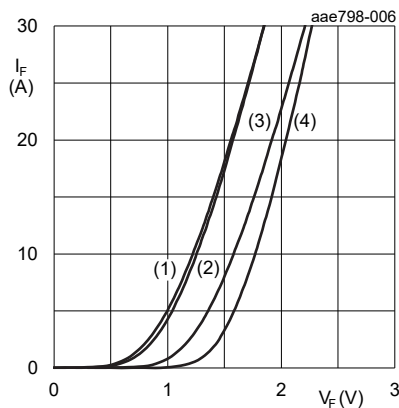
Table 6. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	$50 \text{ Hz} \leq f \leq 60 \text{ Hz}$; $RH \leq 65 \%$; 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
from cathode to external heatsink

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 8 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 6}$	-	1.4	1.7	V
		$I_F = 8 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{ Fig. 6}$	-	1.2	1.5	V
I_R	reverse current	$V_R = 800 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-	10	μA
		$V_R = 800 \text{ V}; T_j = 150 \text{ }^\circ\text{C}$	-	-	0.2	mA
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$	-	40	55	ns
I_{RM}	peak reverse recovery current	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}$	-	-	5	A
Q_r	recovered charge	$I_F = 2 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 20 \text{ A/s}; T_j = 25 \text{ }^\circ\text{C}$	-	60	110	nC



$V_o = 1.173 \text{ V}; R_s = 0.040 \text{ } \Omega$
 (1) $T_j = 175 \text{ }^\circ\text{C};$ typical values
 (2) $T_j = 150 \text{ }^\circ\text{C};$ typical values
 (3) $T_j = 175 \text{ }^\circ\text{C};$ maximum values
 (4) $T_j = 25 \text{ }^\circ\text{C};$ maximum values

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

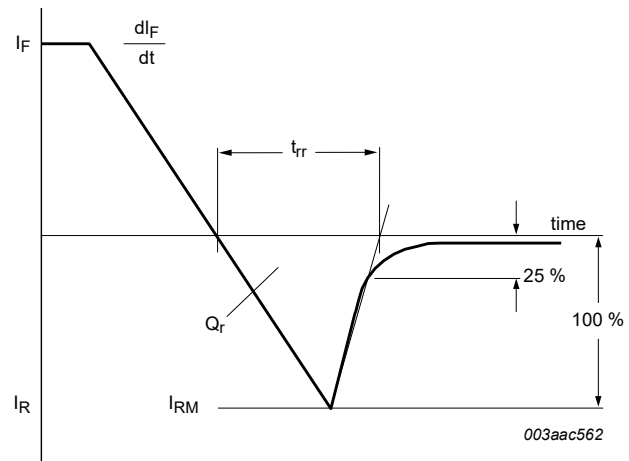
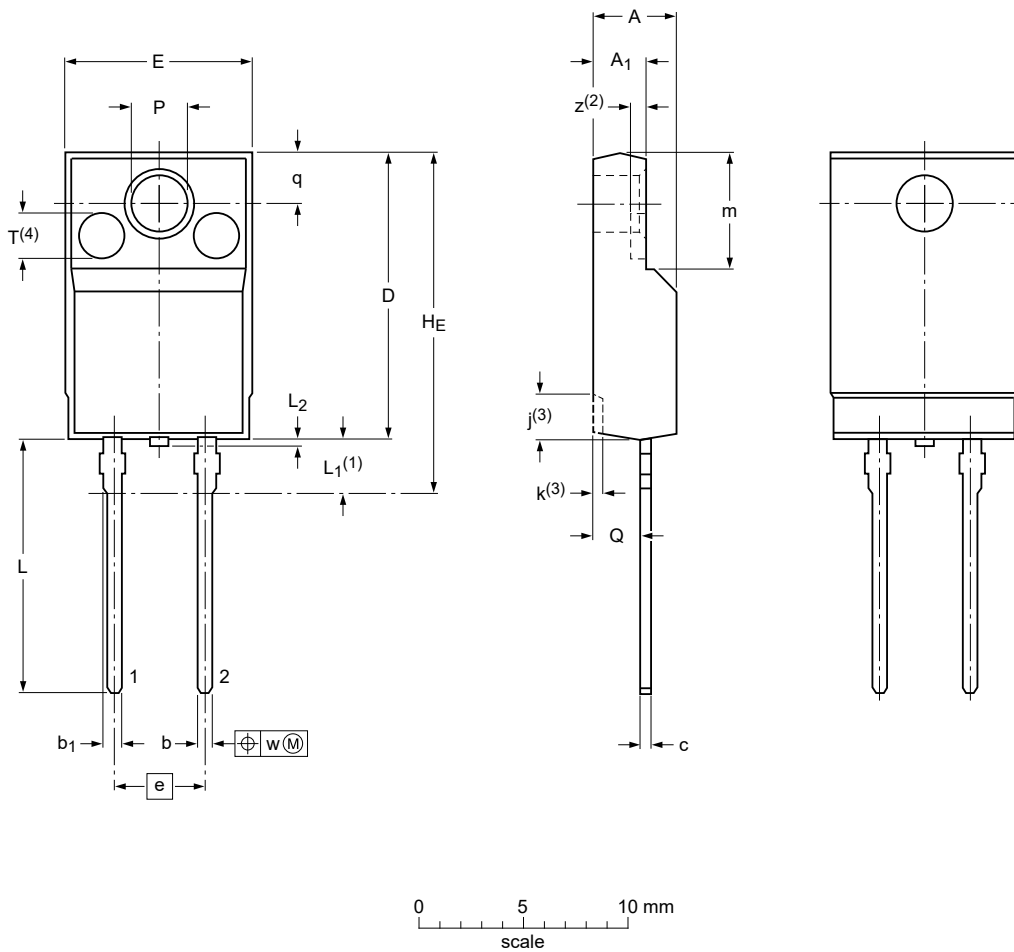


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

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	HE _{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	0.5	6.5	3.2	2.6		2.6	2.55	0.4	0.8
	nom							5.08	19.0													
	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 TO-220F (SOD113)

12. 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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
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