

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 forward voltage drop
- Soft recovery characteristic

3. Applications

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

4. Quick reference data

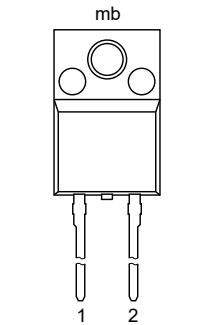
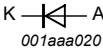
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V _R	reverse voltage	DC		-	-	600	V
I _{F(AV)}	average forward current	δ = 0.5 ; T _h ≤ 73 °C; SQW; Fig. 1 ; Fig. 2 ; Fig. 3	[1]	-	-	8	A
I _{FRM}	repetitive peak forward current	δ = 0.5 ; t _p = 25 μs; T _h ≤ 73 °C; SQW		-	-	16	A
I _{FSM}	non-repetitive peak forward current	t _p = 10 ms; T _{j(initial)} = 25 °C; SIN		-	-	60	A
		t _p = 8.3 ms; T _{j(initial)} = 25 °C; SIN		-	-	66	A
Static characteristics							
V _F	forward voltage	I _F = 20 A; T _j = 25 °C; Fig. 5		-	1.75	1.95	V
		I _F = 8 A; T _j = 150 °C; Fig. 5		-	1.07	1.5	V
		I _F = 8 A; T _j = 25 °C; Fig. 5		-	-	1.7	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; Fig. 6 ; Fig. 7		-	60	75	ns

[1] Neglecting switching and reverse current losses

5. Pinning information

Table 2. Pinning information

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

6. 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

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	$\delta = 0.5$; $T_h \leq 73^\circ\text{C}$; SQW; Fig. 1 ; Fig. 2 ; Fig. 3	-	8	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\ \mu\text{s}$; $T_h \leq 73^\circ\text{C}$; SQW	-	16	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\ \text{ms}$; $T_{j(\text{init})} = 25^\circ\text{C}$; SIN	-	60	A
		$t_p = 8.3\ \text{ms}$; $T_{j(\text{init})} = 25^\circ\text{C}$; SIN	-	66	A
T_{stg}	storage temperature		-40	150	$^\circ\text{C}$
T_j	junction temperature		-	150	$^\circ\text{C}$

[1] Neglecting switching and reverse current losses

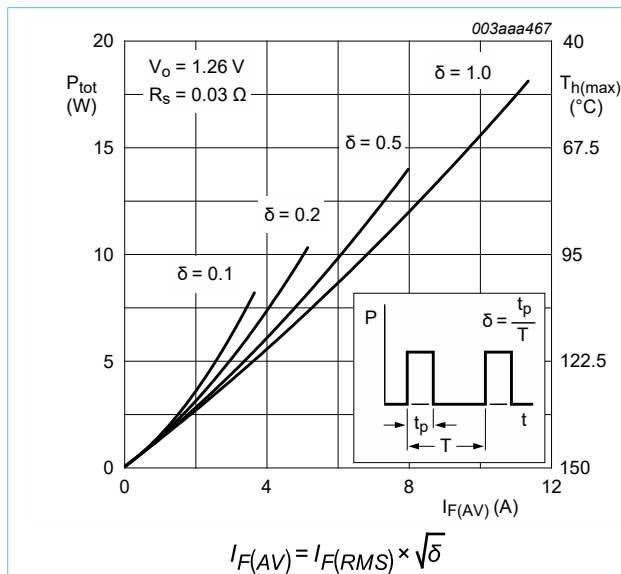


Fig. 1. Forward power dissipation and permissible heatsink temperature as a function of average forward current; square waveform; maximum values

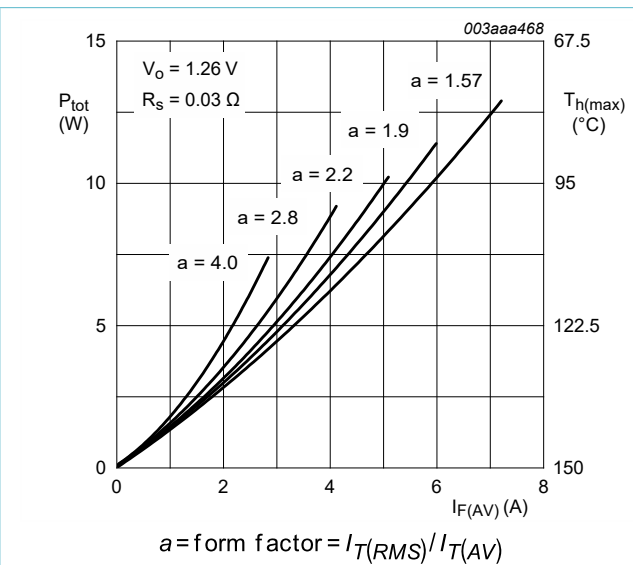


Fig. 2. Forward power dissipation and permissible heatsink temperature as a function of average forward current; sinusoidal waveform; maximum values

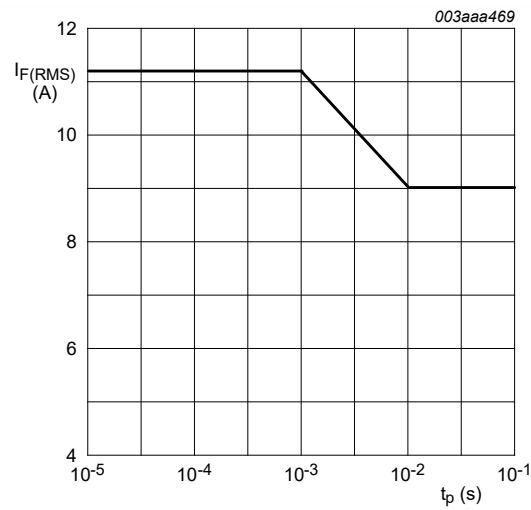
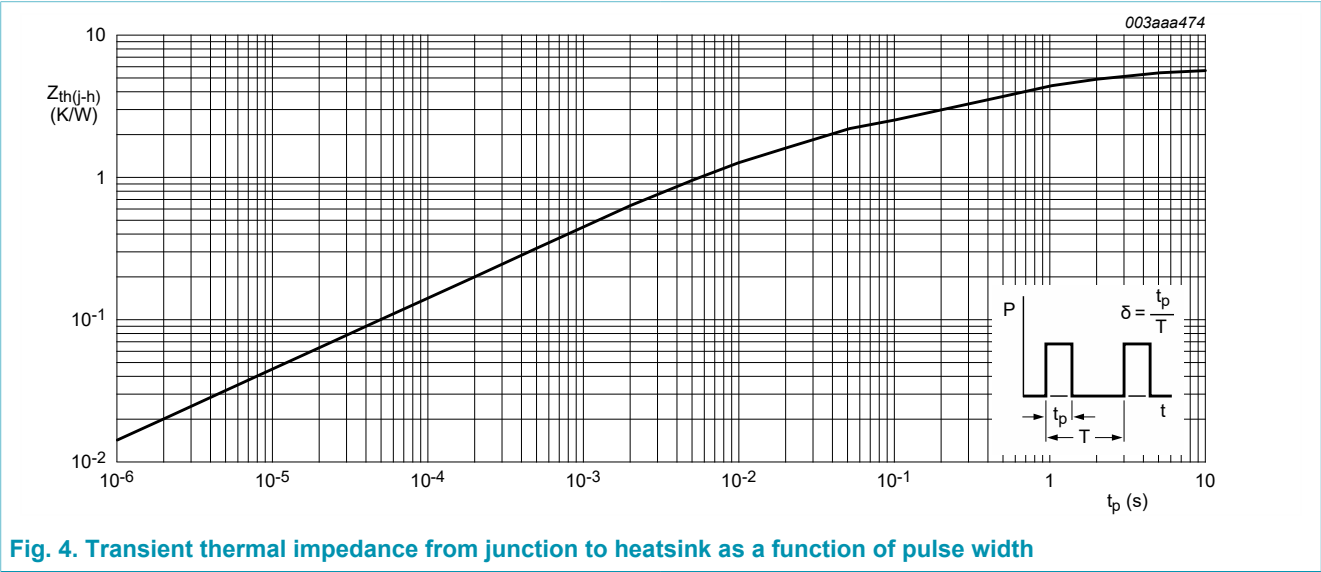


Fig. 3. Forward RMS current as a function of pulse width; maximum values

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



9. Isolation characteristics

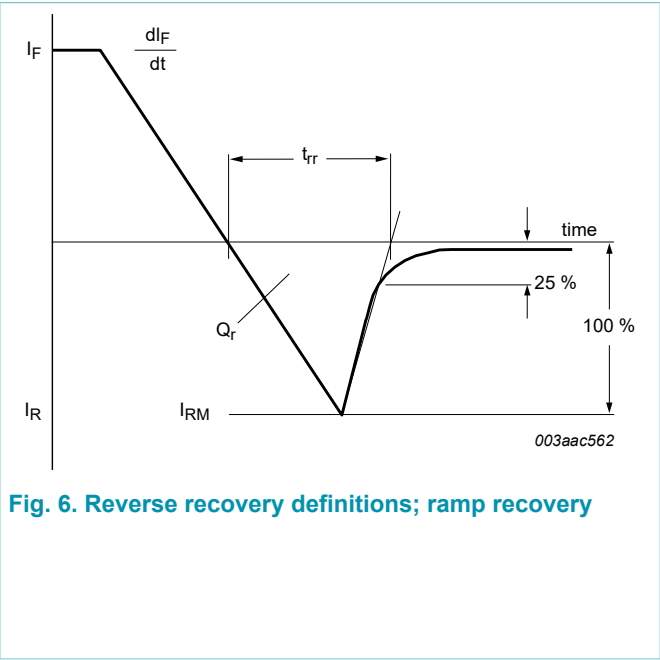
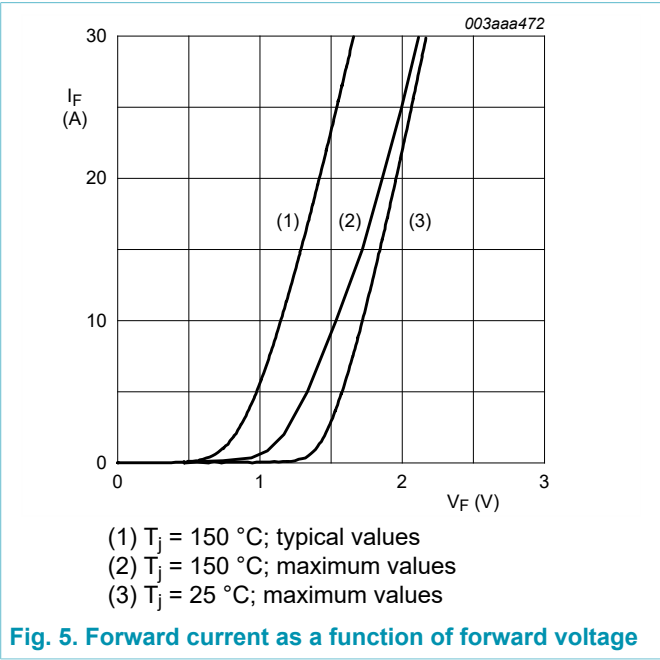
Table 6. Isolation characteristics

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	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 = 20 A; T _j = 25 °C; Fig. 5		-	1.75	1.95	V
		I _F = 8 A; T _j = 150 °C; Fig. 5		-	1.07	1.5	V
		I _F = 8 A; T _j = 25 °C; Fig. 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							
t _{rr}	reverse recovery time	I _F = 1 A; V _R = 30 V; dI _F /dt = 100 A/μs; T _j = 25 °C; Fig. 6 ; Fig. 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; Fig. 6 ; Fig. 8		-	-	6	A
Q _r	recovered charge	I _F = 2 A; V _R = 30 V; dI _F /dt = 20 A/μs; T _j = 25 °C; Fig. 9 ; Fig. 6		-	150	200	nC
V _{FR}	forward recovery voltage	I _F = 10 A; dI _F /dt = 10 A/μs; T _j = 25 °C; Fig. 10		-	5	-	V



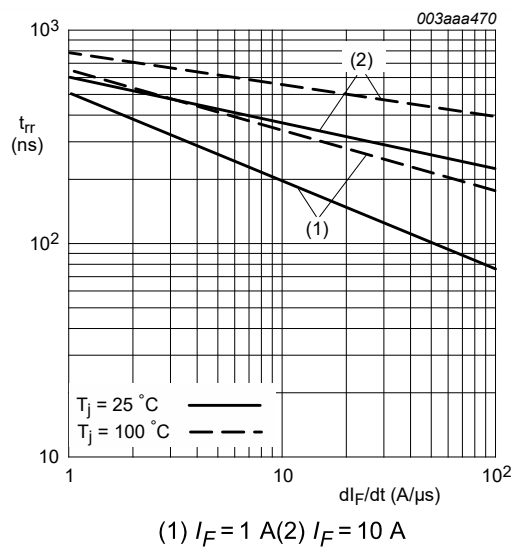


Fig. 7. Reverse recovery time as a function of rate of change of forward current at indicated temperatures; maximum values

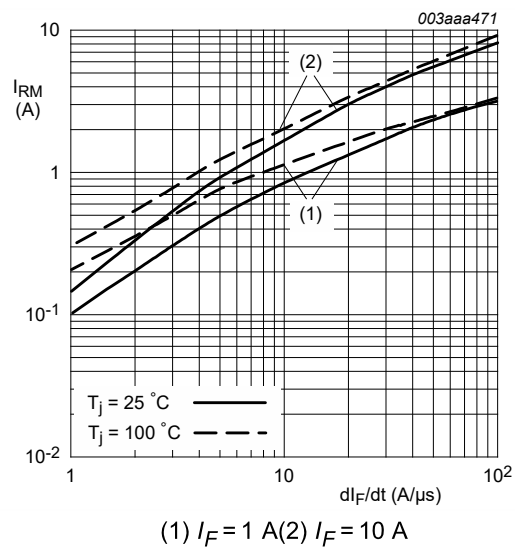


Fig. 8. Peak reverse recovery current as a function of rate of change of forward current at indicated temperatures

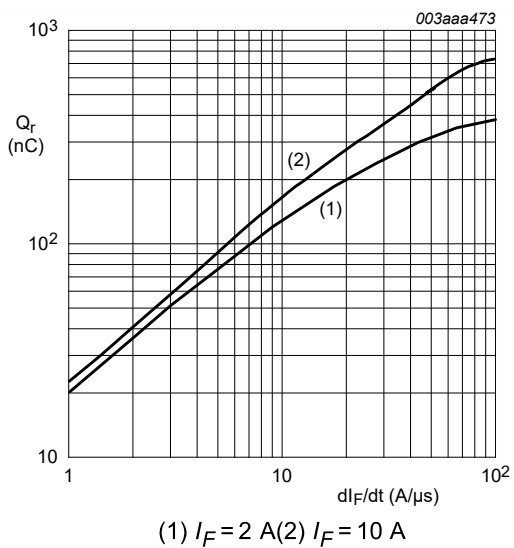


Fig. 9. Recovered charge as a function of rate of change of forward current

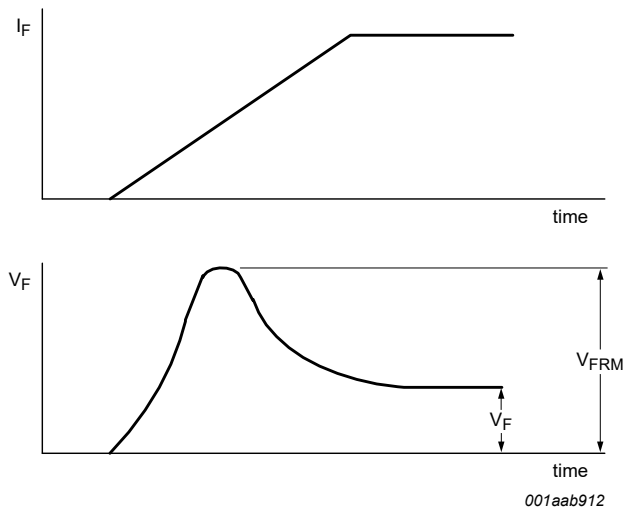
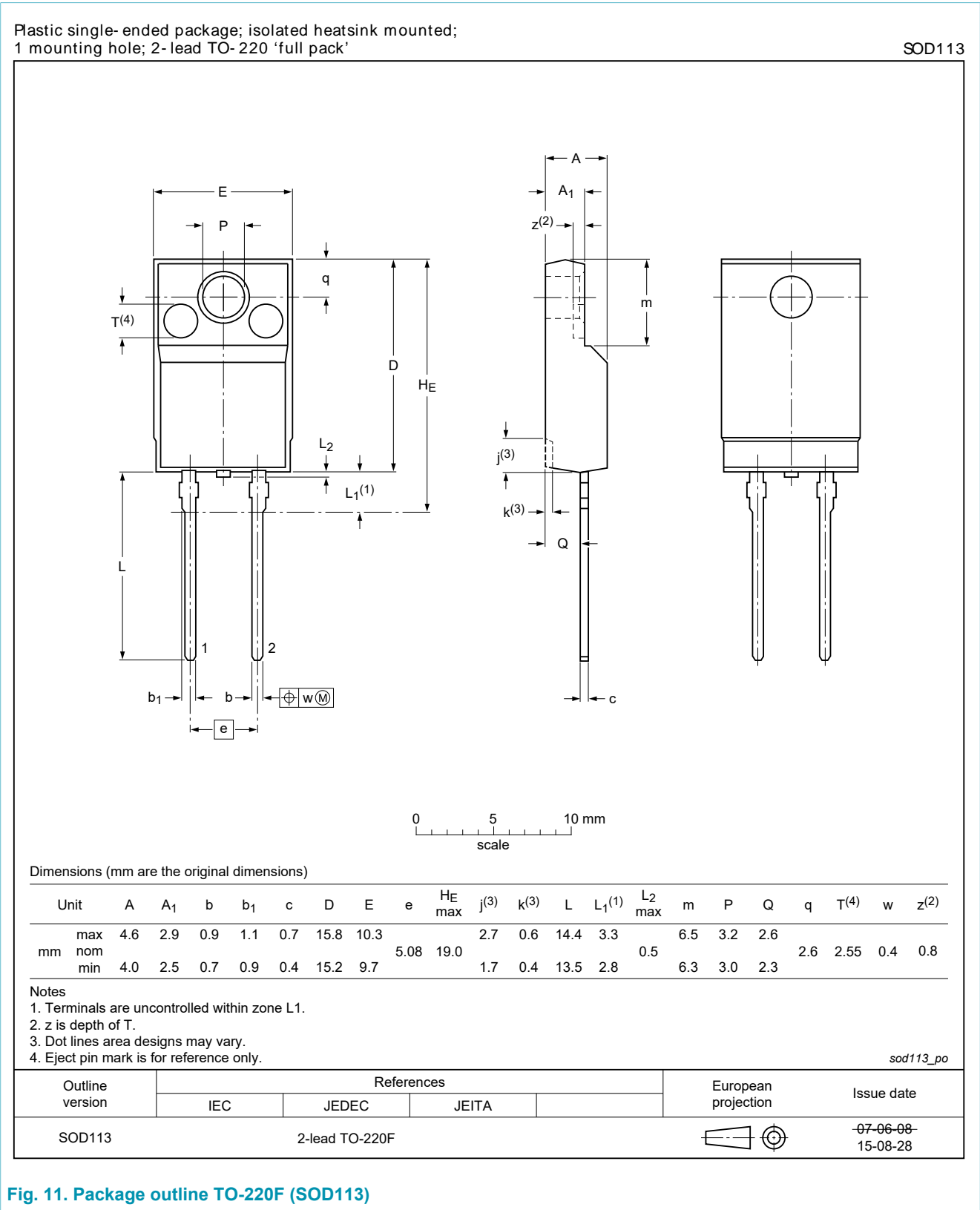


Fig. 10. Forward recovery definitions

11. Package outline



12. Legal information

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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.

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