

# BYR29X-800

## Ultrafast power diode

Rev. 01 — 12 July 2010

Product data sheet

## 1. Product profile

### 1.1 General description

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

### 1.2 Features and benefits

- Fast switching
- Isolated plastic package
- Low forward voltage drop
- Soft recovery characteristic

### 1.3 Applications

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

### 1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	-	800	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; $T_h \leq 73$ °C; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a> ; see <a href="#">Figure 3</a>	-	-	8	A
$I_{FSM}$	non-repetitive peak forward current	$T_{j(init)} = 25$ °C; $t_p = 10$ ms; sine-wave pulse	-	-	60	A
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 8$ A; $T_j = 150$ °C; see <a href="#">Figure 5</a>	-	1.07	1.5	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 100$ A/ $\mu$ s; $T_j = 25$ °C; see <a href="#">Figure 8</a> ; see <a href="#">Figure 7</a>	-	60	75	ns

[1] Neglecting switching and reverse current losses



## 2. 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		

**SOD113 (TO-220F)**

## 3. Ordering information

**Table 3. Ordering information**

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

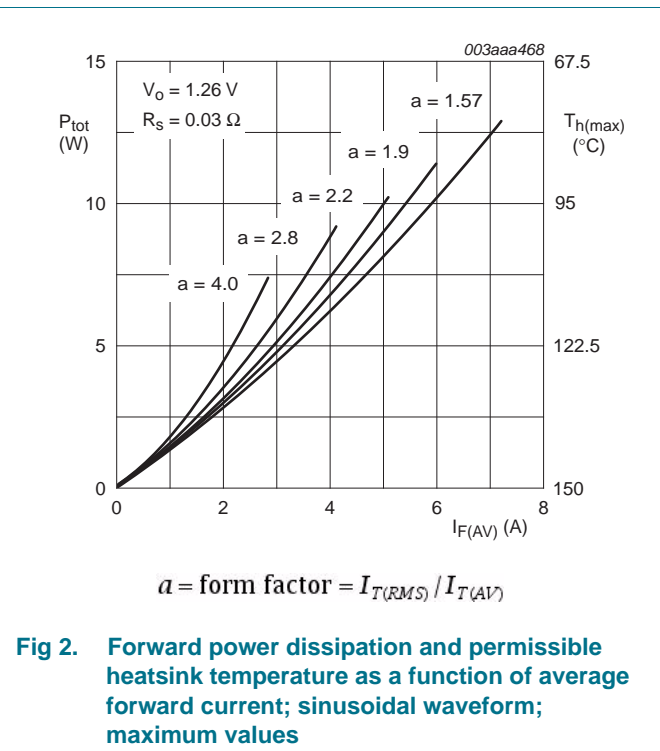
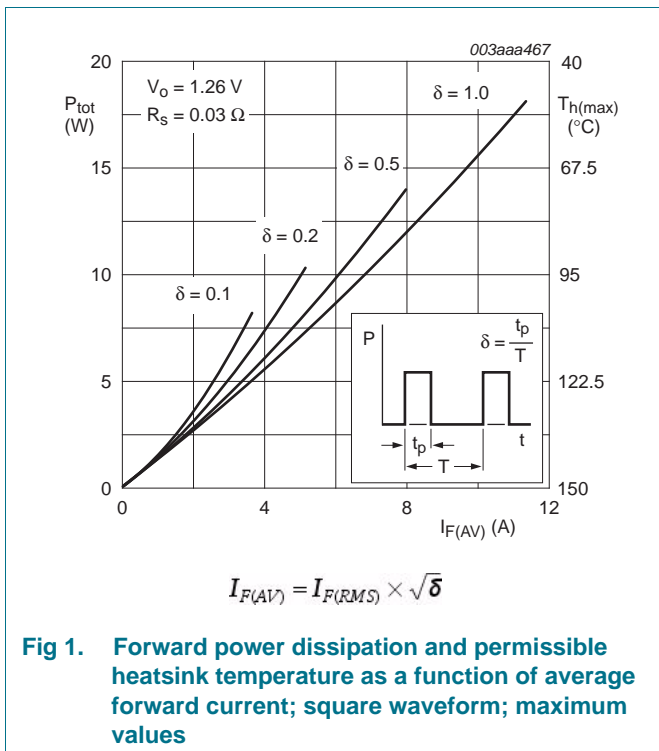
### 4. Limiting values

**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	$T_h \leq 136\text{ }^\circ\text{C}$ ; DC	-	800	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; <a href="#">[1]</a> $T_h \leq 73\text{ }^\circ\text{C}$ ; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a> ; see <a href="#">Figure 3</a>	-	8	A
$I_{FRM}$	repetitive peak forward current	square-wave pulse; $\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_h \leq 73\text{ }^\circ\text{C}$	-	16	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ $t_p = 8.3\text{ ms}$ ; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$	-	60 66	A
$T_{\text{stg}}$	storage temperature		-40	150	$^\circ\text{C}$
$T_j$	junction temperature		-	150	$^\circ\text{C}$

[1] Neglecting switching and reverse current losses



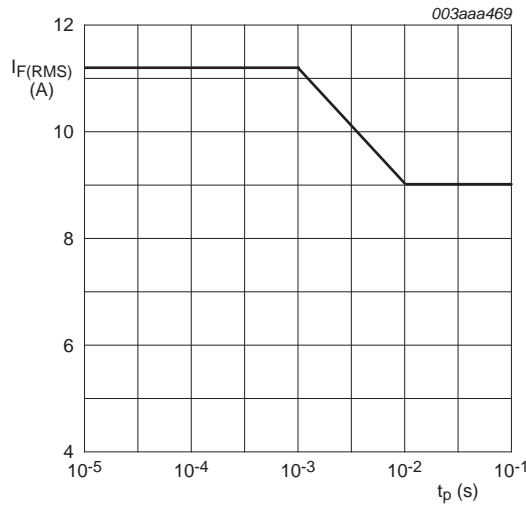


Fig 3. Forward RMS current as a function of pulse width; maximum values

## 5. 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 ; see <a href="#">Figure 4</a>	-	-	5.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	55	-	K/W

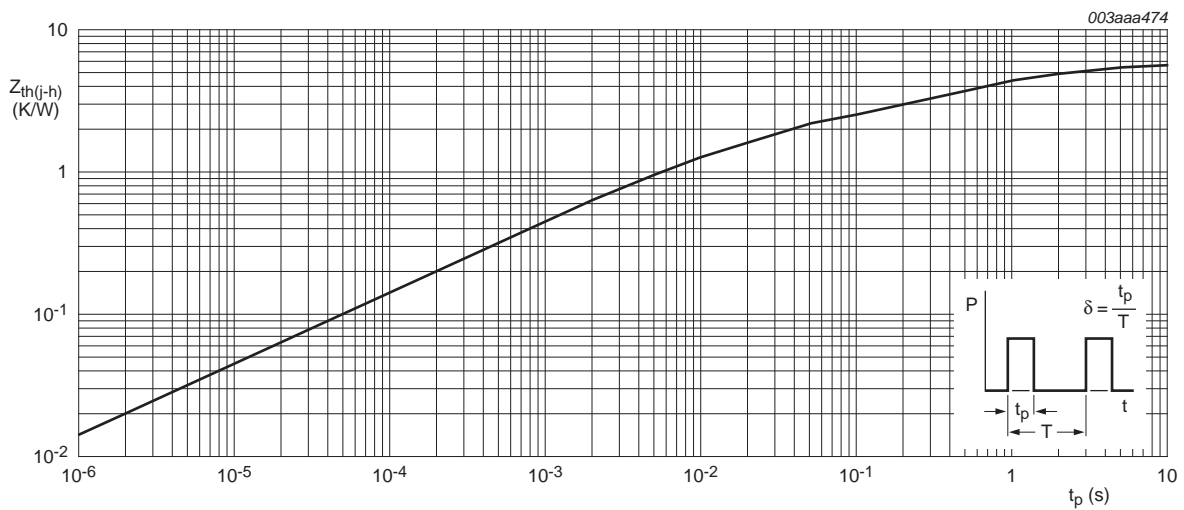


Fig 4. Transient thermal impedance from junction to heatsink as a function of pulse width

## 6. Isolation characteristics

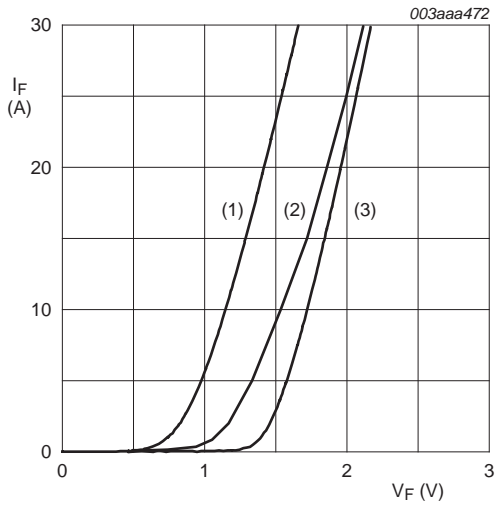
Table 6. Isolation characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{\text{isol(RMS)}}$	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
$C_{\text{isol}}$	isolation capacitance	f = 1 MHz ; from cathode to external heatsink	-	10	-	pF

## 7. Characteristics

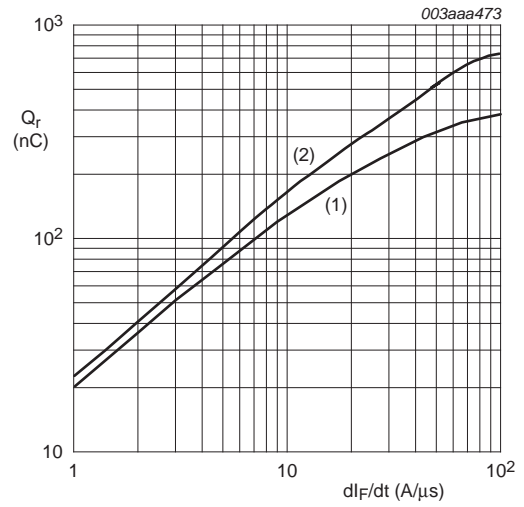
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 8 \text{ A}$ ; $T_j = 150 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 5</a>	-	1.07	1.5	V
		$I_F = 20 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 5</a>	-	1.75	1.95	V
		$I_F = 8 \text{ A}$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 5</a>	-	-	1.7	V
$I_R$	reverse current	$V_R = 800 \text{ V}$ ; $T_j = 25 \text{ }^\circ\text{C}$	-	1	10	$\mu\text{A}$
		$V_R = 800 \text{ V}$ ; $T_j = 100 \text{ }^\circ\text{C}$	-	0.1	0.2	mA
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 2 \text{ A}$ ; $V_R = 30 \text{ V}$ ; $di_F/dt = 20 \text{ A/s}$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 6</a> ; see <a href="#">Figure 7</a>	-	150	200	nC
$t_{rr}$	reverse recovery time	$I_F = 1 \text{ A}$ ; $V_R = 30 \text{ V}$ ; $di_F/dt = 100 \text{ A}/\mu\text{s}$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 8</a> ; see <a href="#">Figure 7</a>	-	60	75	ns
$I_{RM}$	peak reverse recovery current	$I_F = 10 \text{ A}$ ; $V_R = 30 \text{ V}$ ; $di_F/dt = 50 \text{ A}/\mu\text{s}$ ; $T_j = 100 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 9</a> ; see <a href="#">Figure 7</a>	-	-	6	A
$V_{FR}$	forward recovery voltage	$I_F = 10 \text{ A}$ ; $di_F/dt = 10 \text{ A}/\mu\text{s}$ ; $T_j = 25 \text{ }^\circ\text{C}$ ; see <a href="#">Figure 10</a>	-	5	-	V



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

Fig 5. Forward current as a function of forward voltage



(1)  $I_F = 2\text{ A}$  (2)  $I_F = 10\text{ A}$

Fig 6. Recovered charge as a function of rate of change of forward current

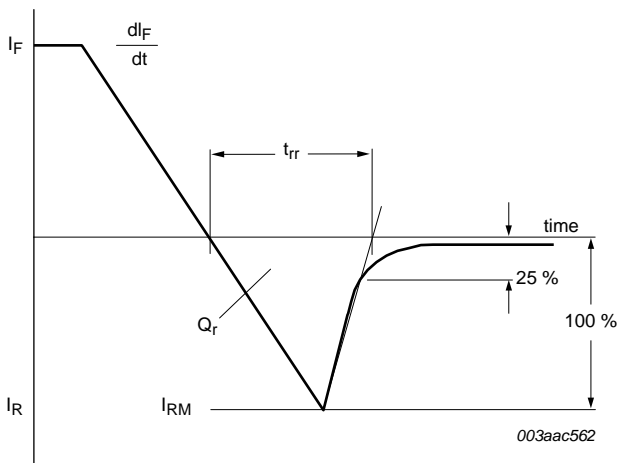
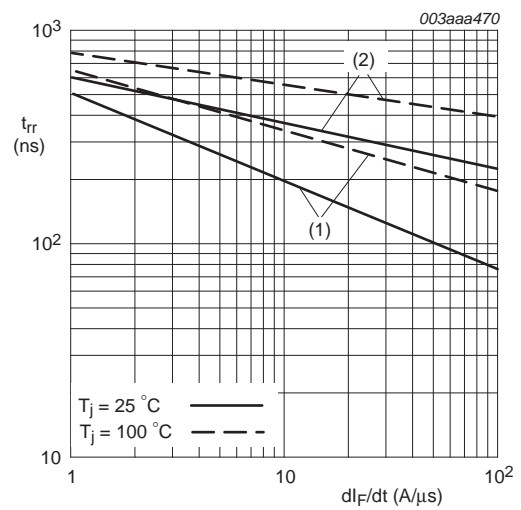
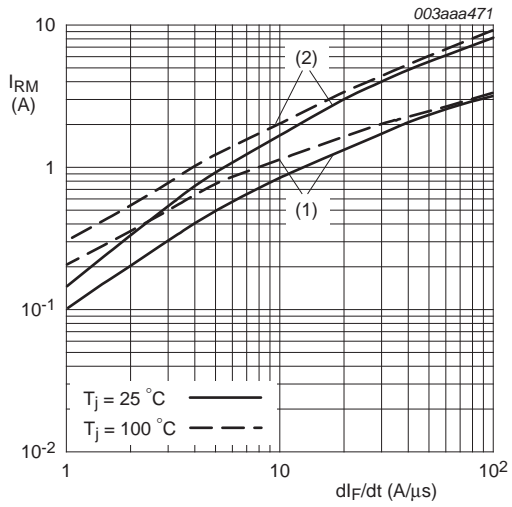


Fig 7. Reverse recovery definitions; ramp recovery



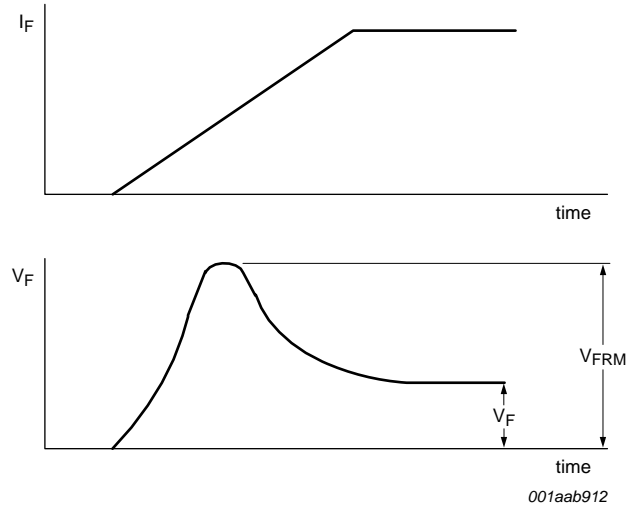
(1)  $I_F = 1\text{ A}$  (2)  $I_F = 10\text{ A}$

Fig 8. Reverse recovery time as a function of rate of change of forward current at indicated temperatures; maximum values



(1)  $I_F = 1\text{ A}$  (2)  $I_F = 10\text{ A}$

**Fig 9. Peak reverse recovery current as a function of rate of change of forward current at indicated temperatures**



**Fig 10. Forward recovery definitions**

8. Package outline

Plastic single-ended package; isolated heatsink mounted;  
1 mounting hole; 2-lead TO-220 'full pack'

SOD113

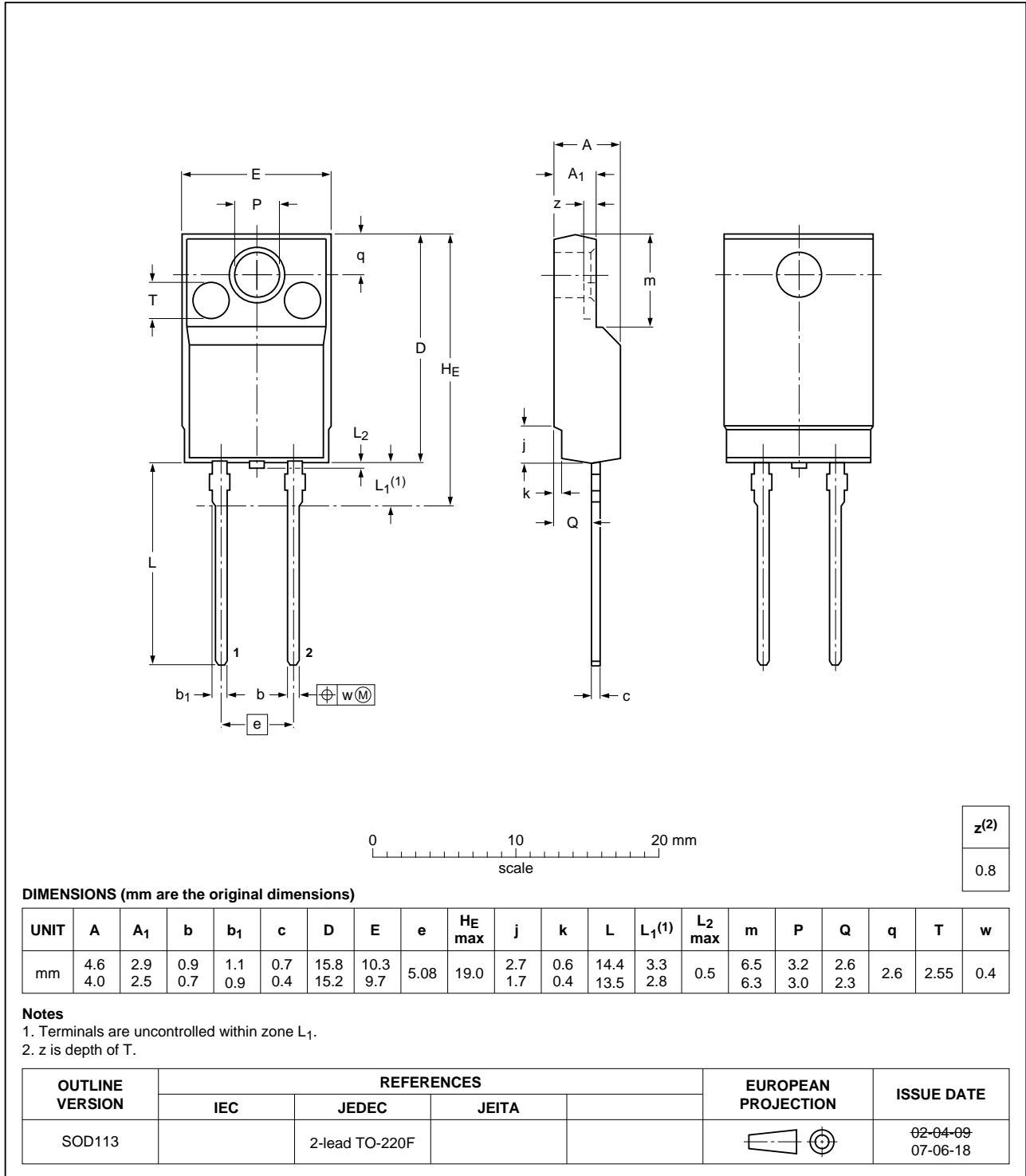


Fig 11. Package outline SOD113 (TO-220F)



## 9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYR29X-800 v.1	20100712	Product data sheet	-	-

## 10. Legal information

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Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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