

BYR29X-600

Ultrafast power diode

Rev. 02 — 15 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

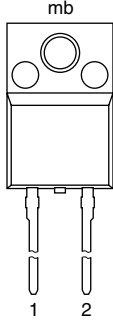

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	600	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; [1] $T_h \leq 73\text{ °C}$; see Figure 1 ; see Figure 2 ; see Figure 3	-	-	8	A
I_{FSM}	non-repetitive peak forward current	$T_{j(init)} = 25\text{ °C}$; $t_p = 10\text{ ms}$; sine-wave pulse	-	-	60	A
Static characteristics						
V_F	forward voltage	$I_F = 8\text{ A}$; $T_j = 150\text{ °C}$; see Figure 5	-	1.07	1.5	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $dI_F/dt = 100\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; see Figure 8 ; see Figure 7	-	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		Version
	Name	Description	
BYR29X-600	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack"	SOD113

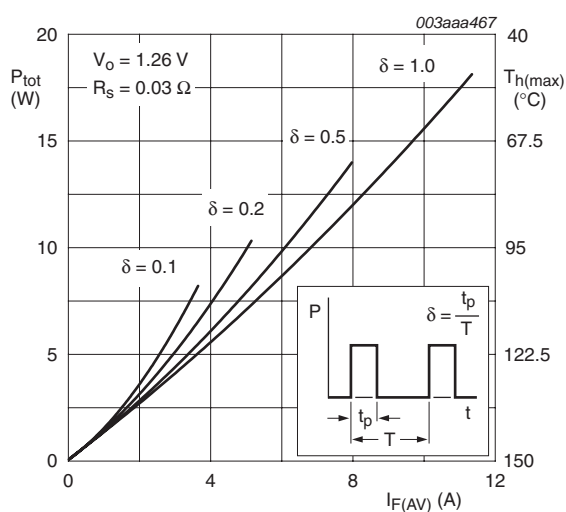
4. Limiting values

Table 4. Limiting values

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

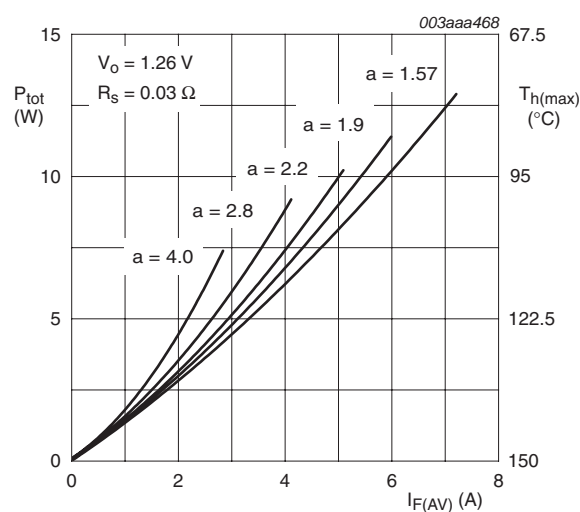
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	600	V
V_{RWM}	crest working reverse voltage		-	600	V
V_R	reverse voltage	$T_h \leq 136\text{ }^{\circ}\text{C}$; DC	-	600	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $T_h \leq 73\text{ }^{\circ}\text{C}$; see Figure 1 ; see Figure 2 ; see Figure 3	[1]	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; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$	-	60	A
		$t_p = 8.3\text{ ms}$; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$	-	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



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

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



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

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

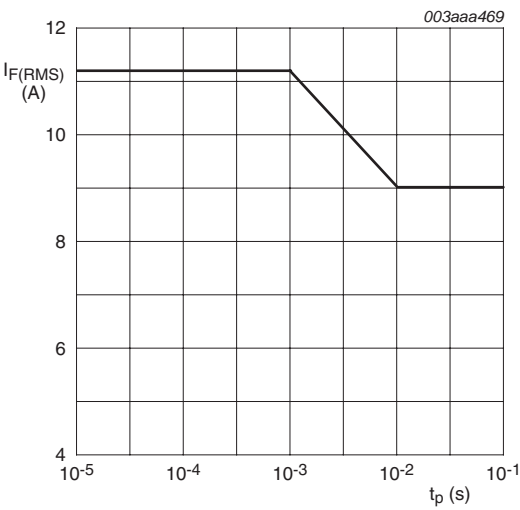
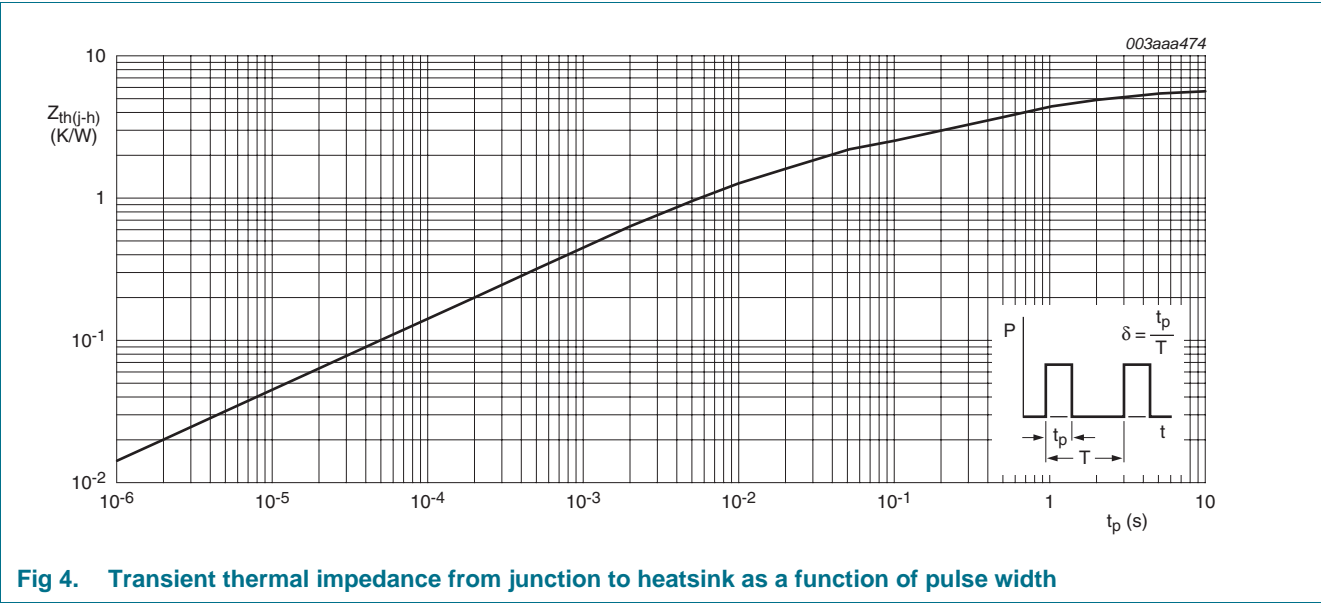


Fig 3. Forward RMS current as a function of pulse width; maximum values

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



6. Isolation characteristics

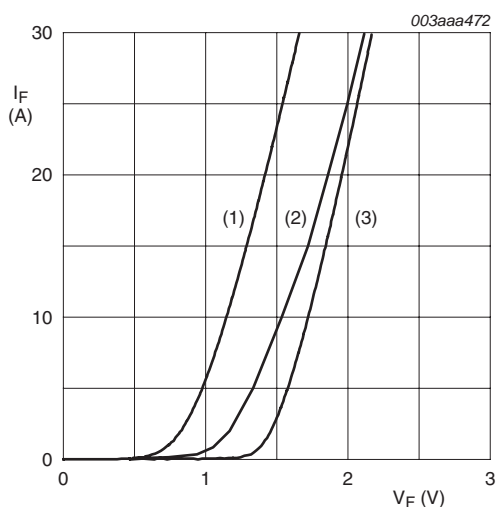
Table 6. Isolation characteristics

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

7. Characteristics

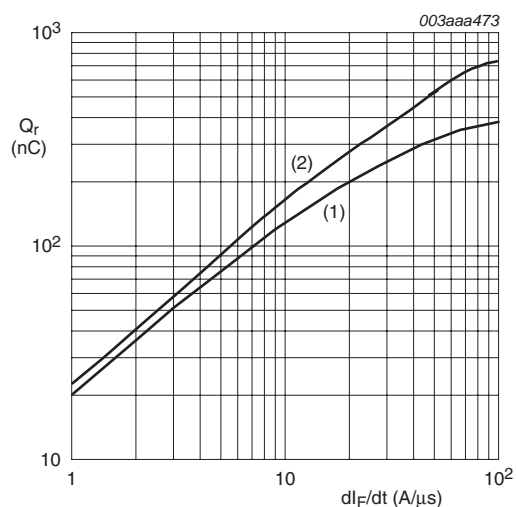
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V _F	forward voltage	I _F = 20 A; T _j = 25 °C; see Figure 5	-	1.75	1.95	V
		I _F = 8 A; T _j = 150 °C; see Figure 5	-	1.07	1.5	V
		I _F = 8 A; T _j = 25 °C; see Figure 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						
Q _r	recovered charge	I _F = 2 A; V _R = 30 V; dI _F /dt = 20 A/µs; T _j = 25 °C; see Figure 6 ; see Figure 7	-	150	200	nC
t _{rr}	reverse recovery time	I _F = 1 A; V _R = 30 V; dI _F /dt = 100 A/µs; T _j = 25 °C; see Figure 8 ; see Figure 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; see Figure 9 ; see Figure 7	-	-	6	A
V _{FR}	forward recovery voltage	I _F = 10 A; dI _F /dt = 10 A/µs; T _j = 25 °C; see Figure 10	-	5	-	V



- (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 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

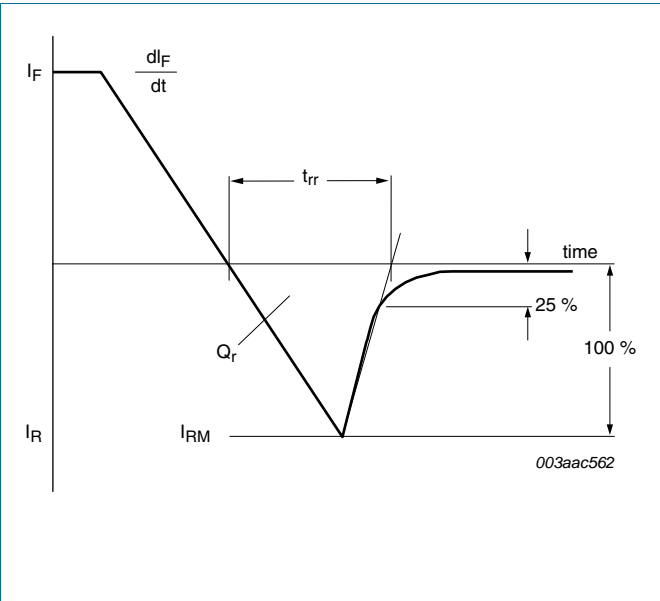


Fig 7. Reverse recovery definitions; ramp recovery

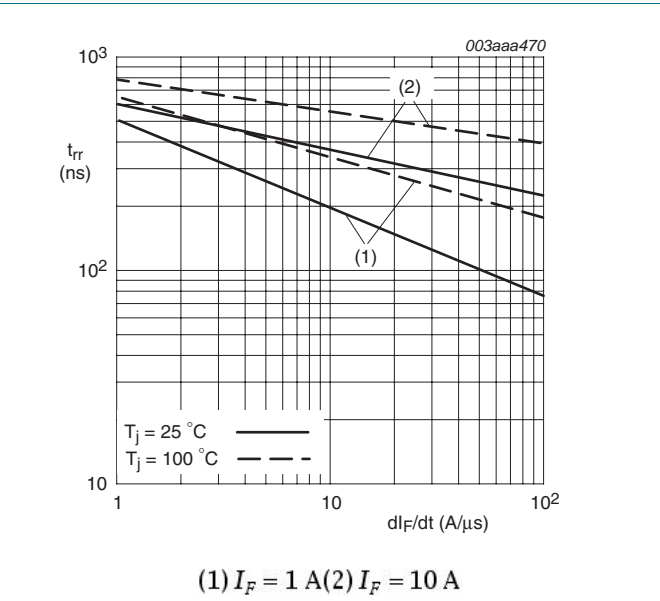


Fig 8. Reverse recovery time as a function of rate of change of forward current at indicated temperatures; maximum values

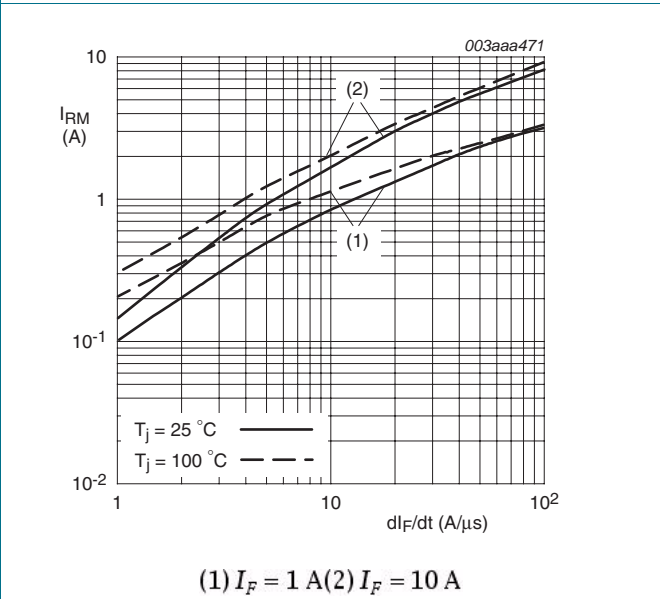


Fig 9. Peak reverse recovery current as a function of rate of change of forward current at indicated temperatures

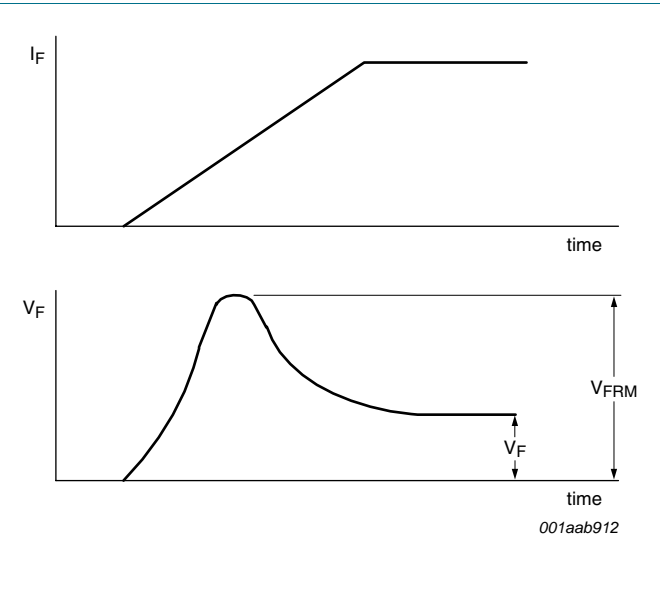


Fig 10. Forward recovery definitions

8. Package outline

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

SOD113

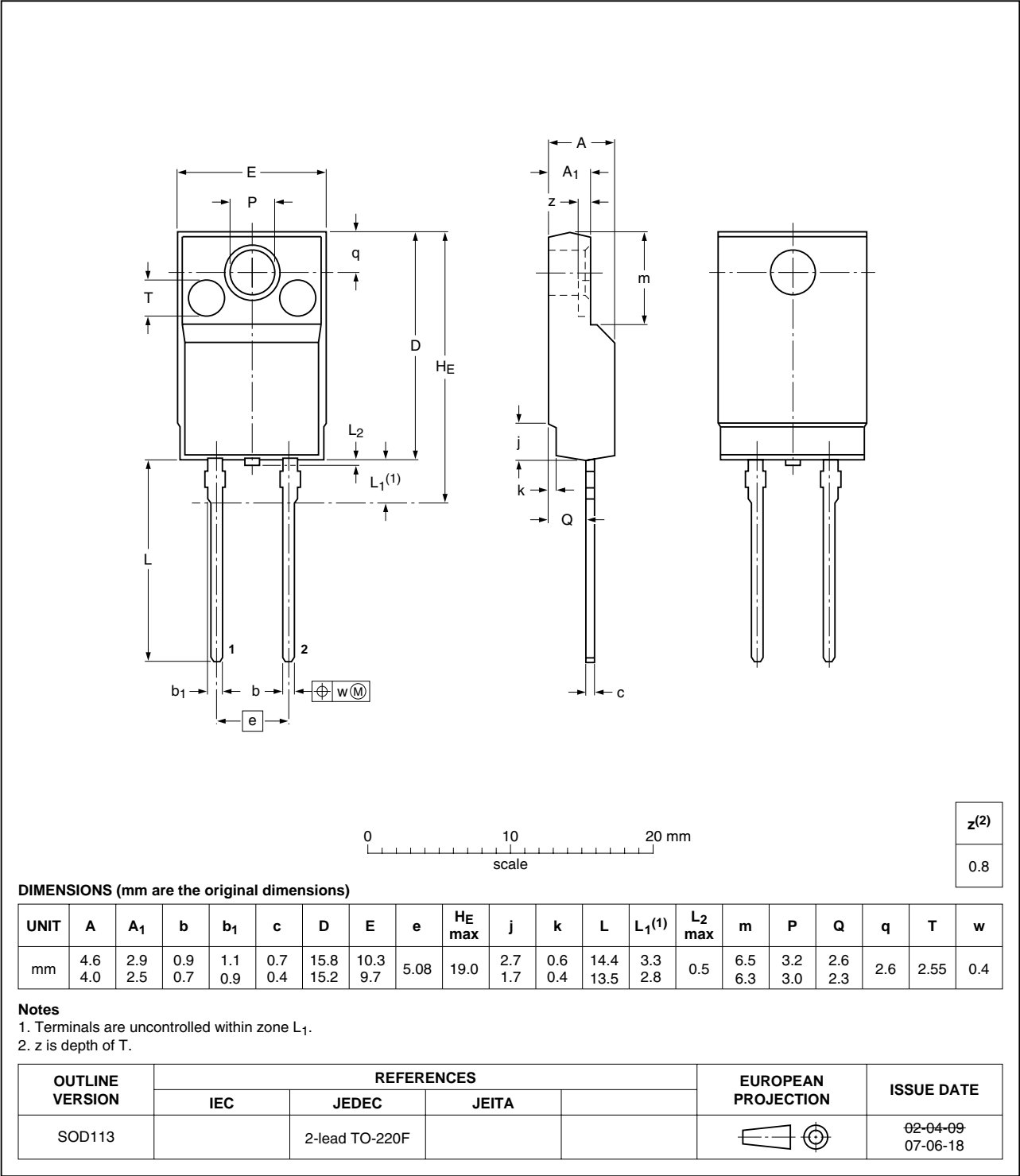


Fig 11. Package outline SOD113 (TO-220F)

9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYR29X-600 v.2	20100715	Product data sheet	-	BYR29X-600 v.1
Modifications:	<ul style="list-style-type: none">• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.• Legal texts have been adapted to the new company name where appropriate.			
BYR29X-600 v.1 (9397 750 12006)	20030926	Product data	-	-

10. 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.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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