

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 Figure 1 ; see Figure 2 ; see Figure 3 | - | - | 8 | A |
| I_{FSM} | non-repetitive peak forward current | $T_{j(init)} = 25$ °C; $t_p = 10$ ms; sine-wave pulse | - | - | 60 | A |
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 8$ A; $T_j = 150$ °C; see Figure 5 | - | 1.07 | 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; 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

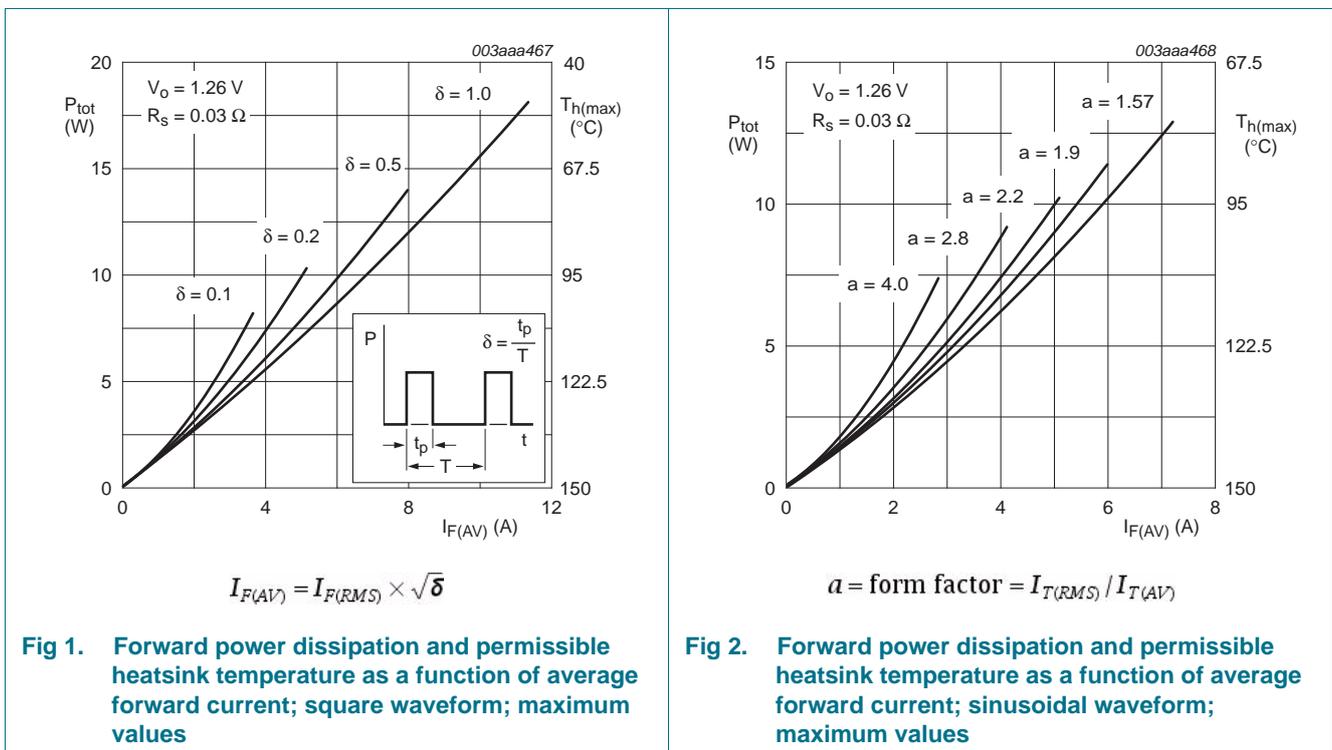
| Type number | Package | | |
|-------------|---------|---|---------|
| | Name | Description | Version |
| BYR29X-800 | TO-220F | plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack" | SOD113 |

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; $\delta = 0.5$; $T_h \leq 73\text{ }^\circ\text{C}$; see Figure 1 ; see Figure 2 ; see Figure 3 | - | 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



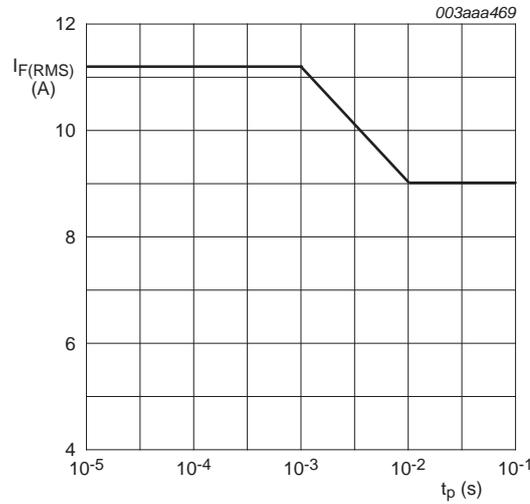


Fig 3. Forward RMS current as a function of pulse width; maximum values

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 |

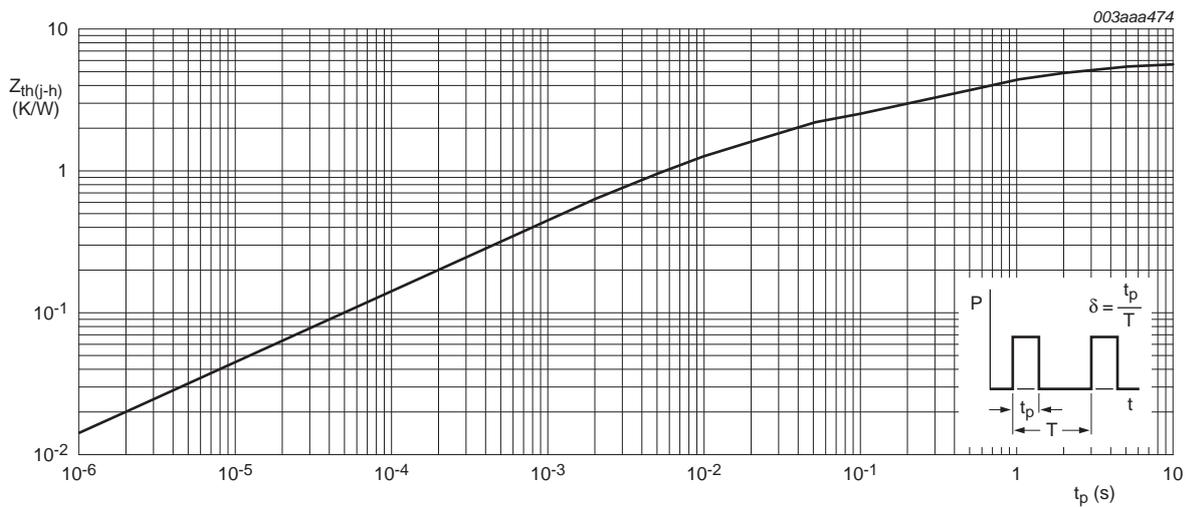


Fig 4. Transient thermal impedance from junction to heatsink as a function of pulse width

6. Isolation characteristics

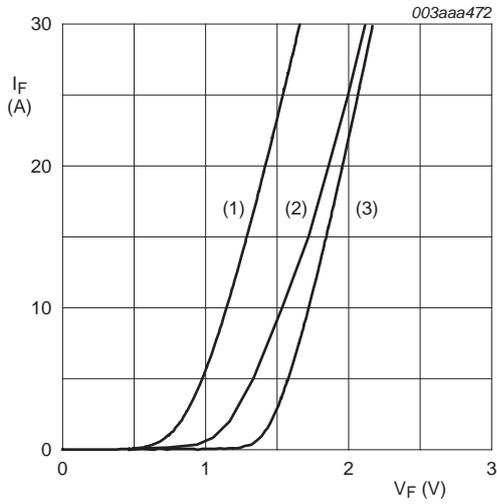
Table 6. Isolation characteristics

| 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_{isol} | isolation capacitance | f = 1 MHz ; from cathode to external heatsink | - | 10 | - | pF |

7. Characteristics

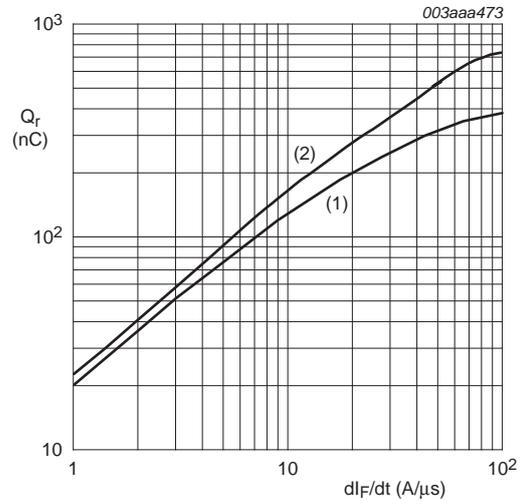
Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-------------------------------|---|-----|------|------|---------------|
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 8 \text{ A}$; $T_j = 150 \text{ }^\circ\text{C}$; see Figure 5 | - | 1.07 | 1.5 | V |
| | | $I_F = 20 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$; see Figure 5 | - | 1.75 | 1.95 | V |
| | | $I_F = 8 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$; see Figure 5 | - | - | 1.7 | V |
| I_R | reverse current | $V_R = 800 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$ | - | 1 | 10 | μA |
| | | $V_R = 800 \text{ V}$; $T_j = 100 \text{ }^\circ\text{C}$ | - | 0.1 | 0.2 | mA |
| Dynamic characteristics | | | | | | |
| 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 Figure 6 ; see Figure 7 | - | 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 Figure 8 ; see Figure 7 | - | 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 Figure 9 ; see Figure 7 | - | - | 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 Figure 10 | - | 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

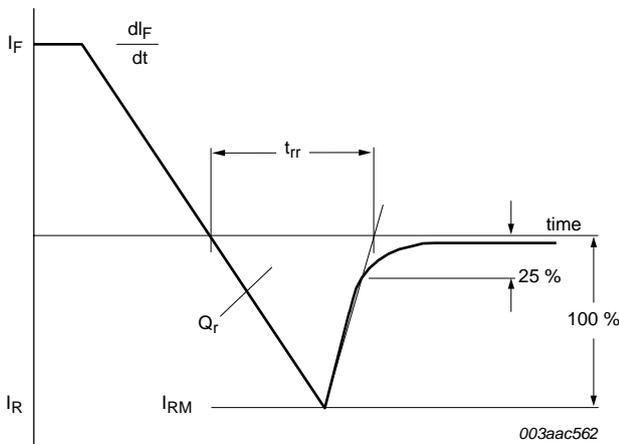
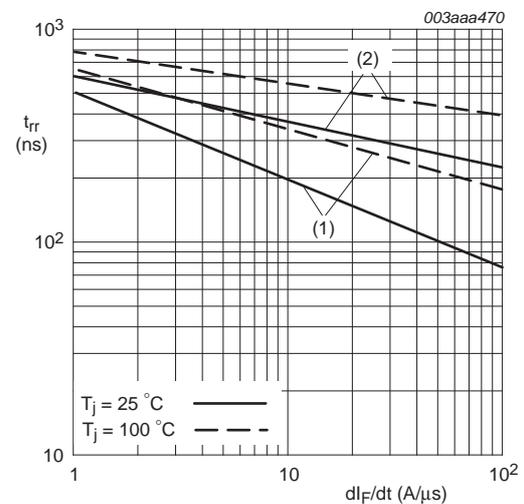
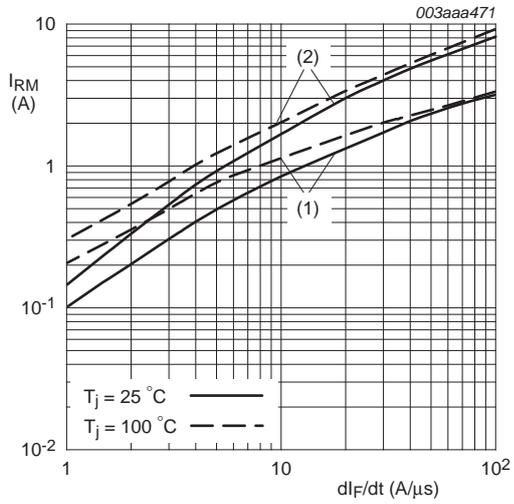


Fig 7. Reverse recovery definitions; ramp recovery



(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

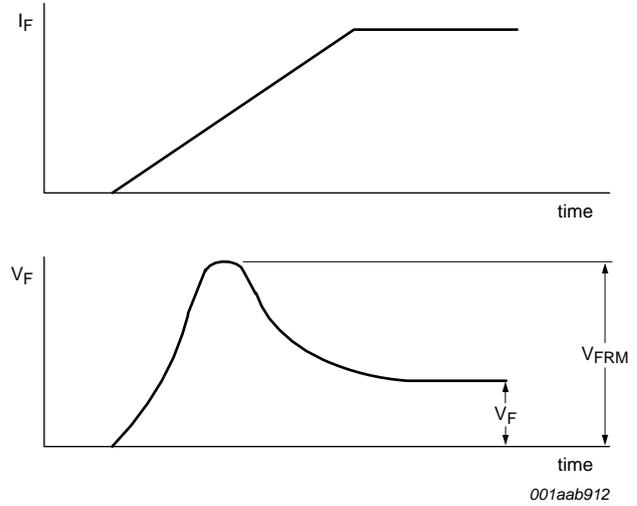


Fig 10. Forward recovery definitions

8. Package outline

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

SOD113

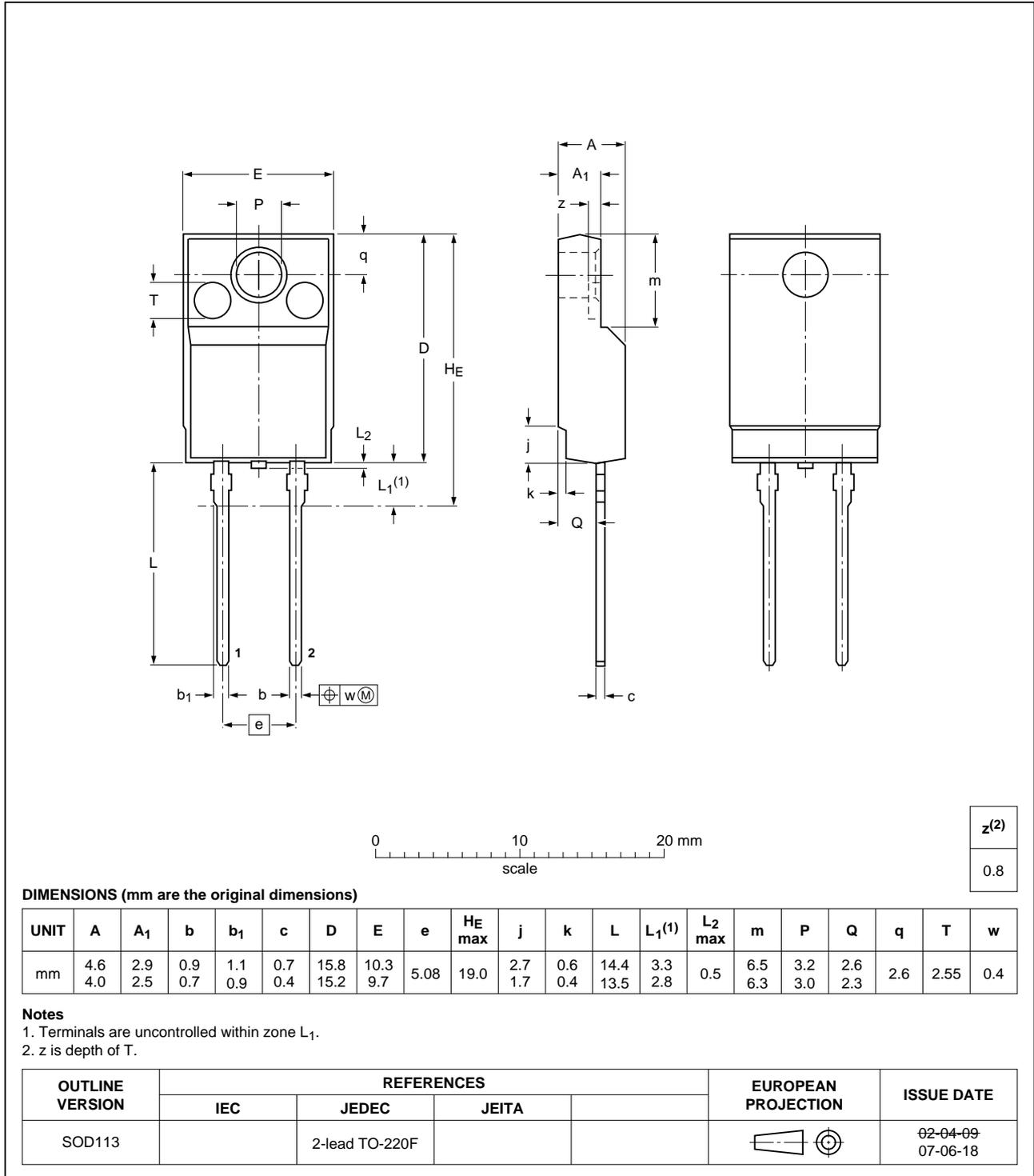


Fig 11. Package outline SOD113 (TO-220F)

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

10.1 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. |
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12. Contents

| | | |
|-----------|--|-----------|
| 1 | Product profile | 1 |
| 1.1 | General description | 1 |
| 1.2 | Features and benefits | 1 |
| 1.3 | Applications | 1 |
| 1.4 | Quick reference data | 1 |
| 2 | Pinning information | 2 |
| 3 | Ordering information | 2 |
| 4 | Limiting values | 3 |
| 5 | Thermal characteristics | 4 |
| 6 | Isolation characteristics | 5 |
| 7 | Characteristics | 5 |
| 8 | Package outline | 8 |
| 9 | Revision history | 9 |
| 10 | Legal information | 10 |
| 10.1 | Data sheet status | 10 |
| 10.2 | Definitions | 10 |
| 10.3 | Disclaimers | 10 |
| 10.4 | Trademarks | 11 |
| 11 | Contact information | 11 |

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Date of release: 12 July 2010

Document identifier: BYR29X-800