



BYC8DX-600

Hyperfast power diode

Rev. 01 — 27 December 2010

Product data sheet

1. Product profile

1.1 General description

Hyperfast power diode in a SOD1113 (2-lead TO-220F) plastic package.

1.2 Features and benefits

- Isolated plastic package
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses in associated MOSFET

1.3 Applications

- Continuous Current Mode (CCM) Power Factor Correction (PFC)
- Half-bridge/full-bridge switched-mode power supplies
- Half-bridge lighting ballasts

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; $\delta = 0.5$; $T_h = 47\text{ }^\circ\text{C}$; see Figure 1 ; see Figure 2 | - | - | 8 | A |
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 8\text{ A}$; $T_j = 150\text{ }^\circ\text{C}$; see Figure 4 | - | 1.5 | 1.85 | V |
| | | $I_F = 8\text{ A}$; $T_j = 25\text{ }^\circ\text{C}$ | - | 2 | 2.9 | V |
| Dynamic characteristics | | | | | | |
| t_{rr} | reverse recovery time | $I_F = 8\text{ A}$; $V_R = 400\text{ V}$; $di_F/dt = 500\text{ A}/\mu\text{s}$; $T_j = 25\text{ }^\circ\text{C}$; see Figure 5 | - | 20 | - | ns |



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

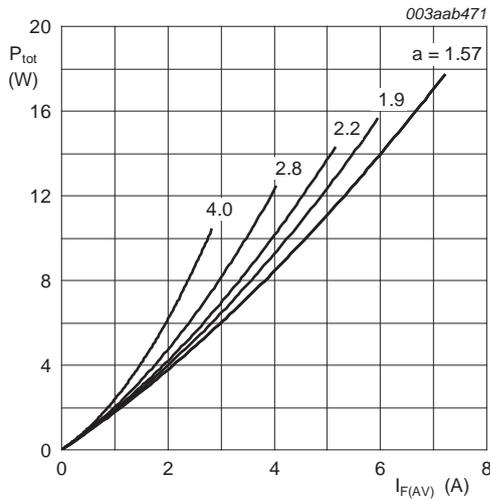
| Type number | Package | | |
|-------------|---------|---|---------|
| | Name | Description | Version |
| BYC8DX-600 | TO-220F | plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack" | SOD113 |

4. Limiting values

Table 4. Limiting values

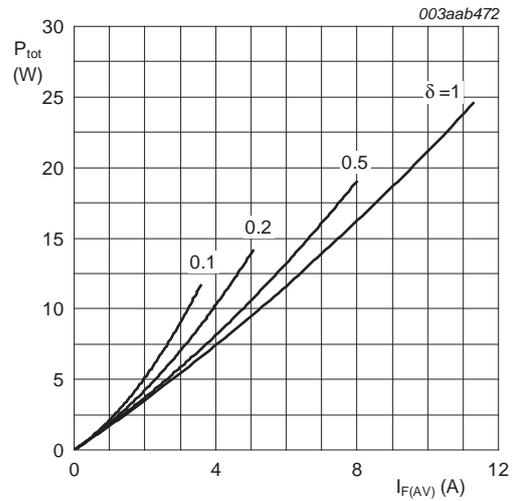
In accordance with the Absolute Maximum Rating System (IEC 60134).

| 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 | DC | - | 600 | V |
| $I_{F(AV)}$ | average forward current | square-wave pulse; $\delta = 0.5$; $T_h = 47\text{ }^\circ\text{C}$; see Figure 1 ; see Figure 2 | - | 8 | A |
| I_{FRM} | repetitive peak forward current | square-wave pulse; $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_h = 47\text{ }^\circ\text{C}$ | - | 16 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 10\text{ ms}$; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ | - | 55 | A |
| | | $t_p = 8.3\text{ ms}$; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ | - | 60 | A |
| T_{stg} | storage temperature | | -40 | 150 | $^\circ\text{C}$ |
| T_j | junction temperature | | - | 150 | $^\circ\text{C}$ |



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

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



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

Fig 2. Forward power dissipation as a function of average forward current; square waveform; 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 | without heatsink compound | - | - | 7.2 | K/W |
| | | with heatsink compound ; see Figure 3 | - | - | 5.5 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | | - | 60 | - | K/W |

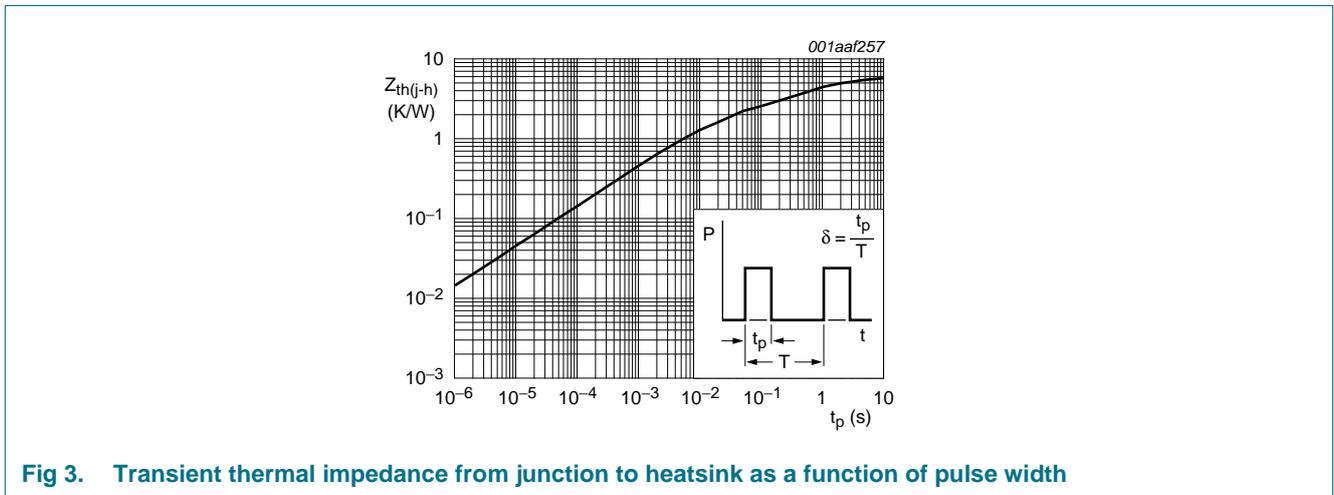


Fig 3. Transient thermal impedance from junction to heatsink as a function of pulse width

6. Isolation characteristics

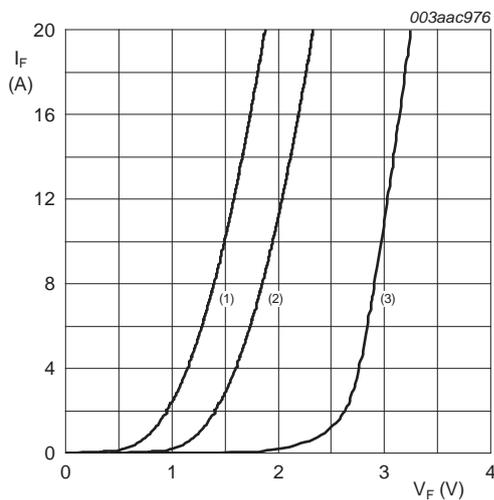
Table 6. Isolation characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------|-----------------------|--|-----|-----|------|------|
| $V_{isol(RMS)}$ | 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 | $f = 1 \text{ MHz}$; 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 | $I_F = 8\text{ A}; T_j = 150\text{ °C};$ see Figure 4 | - | 1.5 | 1.85 | V |
| | | $I_F = 8\text{ A}; T_j = 25\text{ °C}$ | - | 2 | 2.9 | V |
| I_R | reverse current | $V_R = 500\text{ V}; T_j = 100\text{ °C}$ | - | 1.1 | 3 | mA |
| | | $V_R = 600\text{ V}$ | - | 9 | 40 | μA |
| Dynamic characteristics | | | | | | |
| Q_r | recovered charge | $I_F = 1\text{ A}; V_R = 100\text{ V}; dI_F/dt = 100\text{ A}/\mu\text{s}$ | - | 13 | - | nC |
| t_{rr} | reverse recovery time | $I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 100\text{ °C}$ | - | 32 | 40 | ns |
| | | $I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 25\text{ °C}$ | - | 30 | 52 | ns |
| | | $I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ see Figure 5 | - | 20 | - | ns |
| I_{RM} | peak reverse recovery current | $I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 100\text{ °C}$ | - | 9.5 | 12 | A |
| | | $I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 125\text{ °C}$ | - | 1.5 | 5.5 | A |
| V_{FR} | forward recovery voltage | $I_F = 10\text{ A}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ see Figure 6 | - | 8 | 10 | V |



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

Fig 4. Forward current as a function of forward voltage

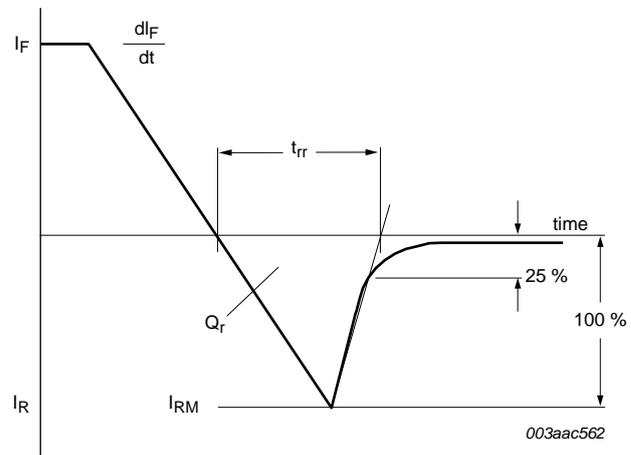


Fig 5. Reverse recovery definitions; ramp recovery

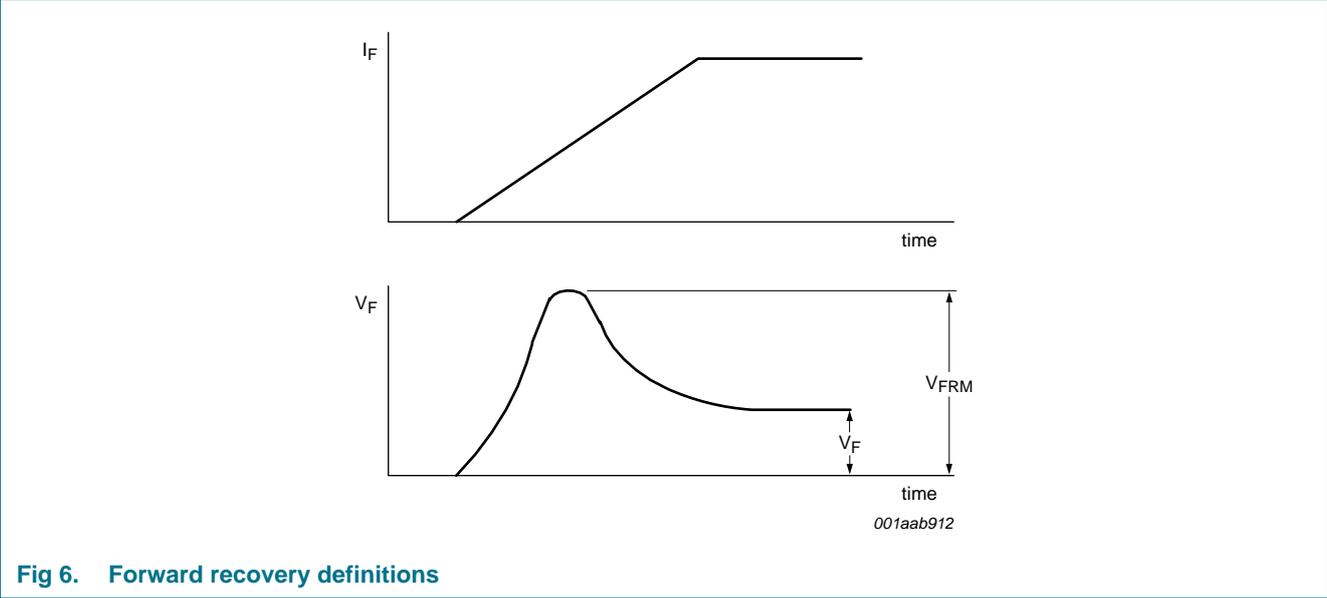


Fig 6. Forward recovery definitions

8. Package outline

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

SOD113

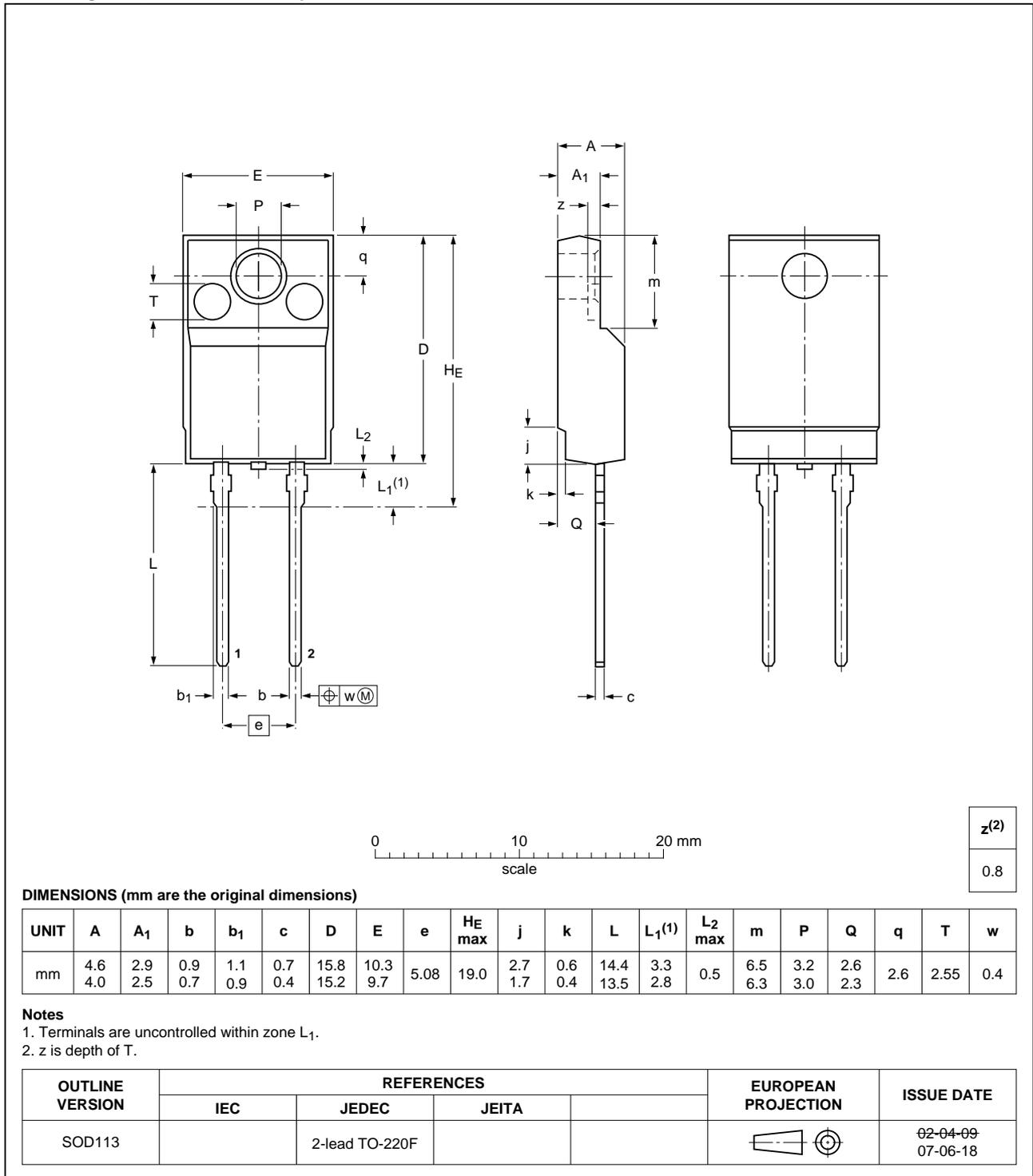


Fig 7. Package outline SOD113 (TO-220F)

9. Revision history

Table 8. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| BYC8DX-600 v.1 | 20101227 | Product data sheet | - | - |

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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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