

## 1. General description

Ultrafast, dual common cathode, epitaxial rectifier diodes in a SOT428 (DPAK) plastic package.

## 2. Features and benefits

- Fast switching
- Low thermal resistance
- Soft recovery characteristic
- Low forward voltage drop
- Reverse surge capability
- High thermal cycling performance

## 3. Applications

- Output rectifiers in high-frequency switched-mode power supplies

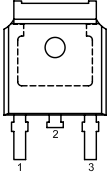
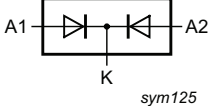
## 4. Quick reference data

Table 1. Quick reference data

| Symbol                  | Parameter                           | Conditions                                                                                                                                 | Values |     |      |       | Unit |
|-------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|--------|-----|------|-------|------|
| Absolute maximum rating |                                     |                                                                                                                                            |        |     |      |       |      |
| V <sub>RRM</sub>        | repetitive peak reverse voltage     |                                                                                                                                            | 200    |     |      |       | V    |
| I <sub>O(AV)</sub>      | average output current              | δ = 0.5; square-wave pulse; T <sub>mb</sub> ≤ 119 °C; both diodes conducting; <a href="#">Fig. 5</a> ; <a href="#">Fig. 6</a>              | 10     |     |      |       | A    |
| I <sub>FRM</sub>        | repetitive peak forward current     | δ = 0.5; t <sub>p</sub> = 25 μs; T <sub>mb</sub> ≤ 119 °C; square-wave pulse; per diode                                                    | 10     |     |      |       | A    |
| I <sub>FSM</sub>        | non-repetitive peak forward current | t <sub>p</sub> = 10 ms; sine-wave pulse; per diode                                                                                         | 50     |     |      |       | A    |
|                         |                                     | t <sub>p</sub> = 8.3 ms; sine-wave pulse; per diode                                                                                        | 55     |     |      |       | A    |
| Symbol                  | Parameter                           | Conditions                                                                                                                                 |        | Min | Typ  | Max   | Unit |
| Static characteristics  |                                     |                                                                                                                                            |        |     |      |       |      |
| V <sub>F</sub>          | forward voltage                     | I <sub>F</sub> = 5 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 2</a>                                                                       |        | -   | 0.95 | 1.1   | V    |
|                         |                                     | I <sub>F</sub> = 5 A; T <sub>J</sub> = 150 °C; <a href="#">Fig. 2</a>                                                                      |        | -   | 0.8  | 0.895 | V    |
|                         |                                     | I <sub>F</sub> = 10 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 2</a>                                                                      |        | -   | 1.1  | 1.25  | V    |
| Dynamic characteristics |                                     |                                                                                                                                            |        |     |      |       |      |
| t <sub>rr</sub>         | reverse recovery time               | ramp recovery; I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 100 A/μs; T <sub>J</sub> = 25 °C; <a href="#">Fig. 3</a> |        | -   | 15   | 25    | ns   |
|                         |                                     | step recovery; when switched from I <sub>F</sub> = 0.5 A to I <sub>R</sub> = 1 A; measured at I <sub>R</sub> = 0.25 A                      |        | -   | 10   | 20    | ns   |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description                         | Simplified outline                                                                | Graphic symbol                                                                      |
|-----|--------|-------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1   | A1     | anode 1                             |  |  |
| 2   | K      | cathode [1]                         |                                                                                   |                                                                                     |
| 3   | A2     | anode 2                             |                                                                                   |                                                                                     |
| mb  | K      | mounting base; connected to cathode |                                                                                   |                                                                                     |

[1] It is not possible to connect to pin 2 of the SOT428 package.

6. Ordering information

Table 3. Ordering information

| Type number | Package |                                                                                 |         |
|-------------|---------|---------------------------------------------------------------------------------|---------|
|             | Name    | Description                                                                     | Version |
| BYQ28ED-200 | DPAK    | plastic single-ended surface-mounted package (DPAK); 3-leads (one lead cropped) | SOT428  |

7. Marking

Table 4. Marking codes

| Type number | Marking codes |
|-------------|---------------|
| BYQ28ED-200 | BYQ28ED-200   |

## 8. Limiting values

**Table 5. Limiting values**

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

| Symbol                         | Parameter                           | Conditions                                                                                                                                              | Values     | Unit               |
|--------------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------------------|
| $V_{RRM}$                      | repetitive peak reverse voltage     |                                                                                                                                                         | 200        | V                  |
| $V_{RWM}$                      | crest working reverse voltage       |                                                                                                                                                         | 200        | V                  |
| $V_R$                          | reverse voltage                     | $\delta = 1.0$ ; square-wave pulse;                                                                                                                     | 200        | V                  |
| $I_{O(AV)}$                    | average output current              | $\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 119\text{ }^{\circ}\text{C}$ ; both diodes conducting; <a href="#">Fig. 5</a> ; <a href="#">Fig. 6</a> | 10         | A                  |
| $I_{FRM}$                      | repetitive peak forward current     | $\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 119\text{ }^{\circ}\text{C}$ ; square-wave pulse; per diode                               | 10         | A                  |
| $I_{FSM}$                      | non-repetitive peak forward current | $t_p = 10\text{ ms}$ ; sine-wave pulse; per diode                                                                                                       | 50         | A                  |
|                                |                                     | $t_p = 8.3\text{ ms}$ ; sine-wave pulse; per diode                                                                                                      | 55         | A                  |
| $I_{RM}$                       | peak reverse recovery current       | $\delta = 0.001$ ; $t_p = 2\text{ }\mu\text{s}$                                                                                                         | 0.2        | A                  |
| $I_{RSM}$                      | non-repetitive peak reverse current | $t_p = 100\text{ }\mu\text{s}$                                                                                                                          | 0.2        | A                  |
| $T_{stg}$                      | storage temperature                 |                                                                                                                                                         | -40 to 150 | $^{\circ}\text{C}$ |
| $T_j$                          | junction temperature                |                                                                                                                                                         | 150        | $^{\circ}\text{C}$ |
| <b>Electrostatic discharge</b> |                                     |                                                                                                                                                         |            |                    |
| $V_{ESD}$                      | electrostatic discharge voltage     | all pins; human body model; $C = 250\text{ pF}$ ; $R = 1.5\text{ k}\Omega$                                                                              | 8          | kV                 |

9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol         | Parameter                                         | Conditions                                               |  | Min | Typ | Max | Unit |
|----------------|---------------------------------------------------|----------------------------------------------------------|--|-----|-----|-----|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base | with heatsink compound; both diodes conducting           |  | -   | -   | 3   | K/W  |
|                |                                                   | with heatsink compound; per diode; <a href="#">Fig 1</a> |  | -   | -   | 4.5 | K/W  |
| $R_{th(j-a)}$  | thermal resistance from junction to ambient       | in free air                                              |  | -   | 60  | -   | K/W  |

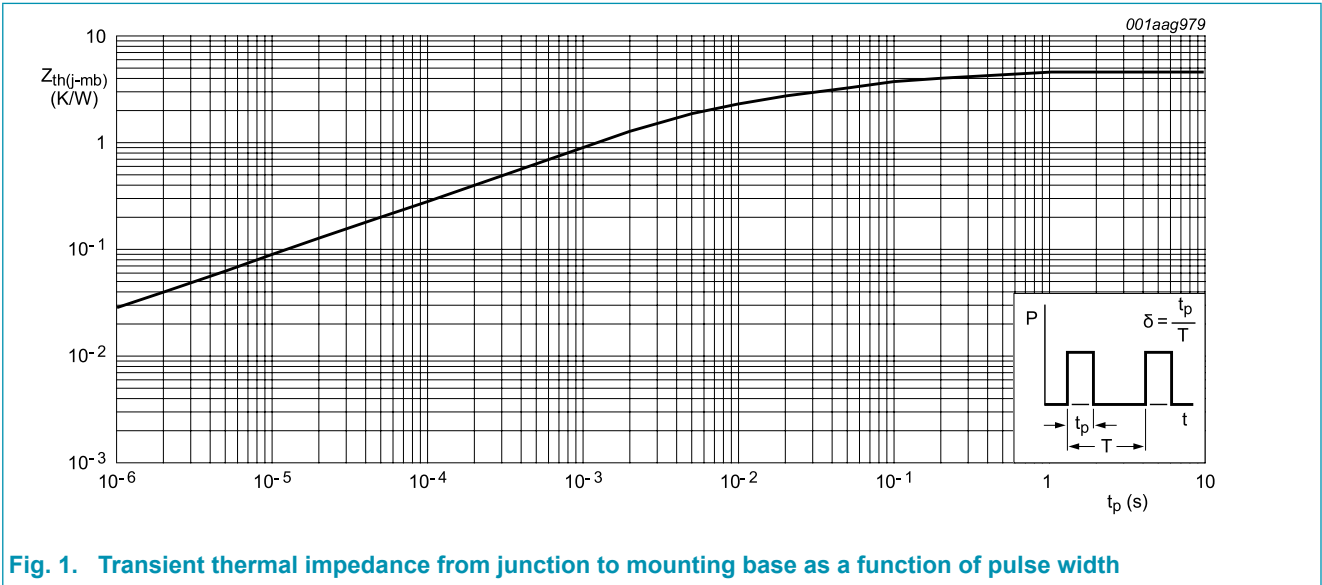
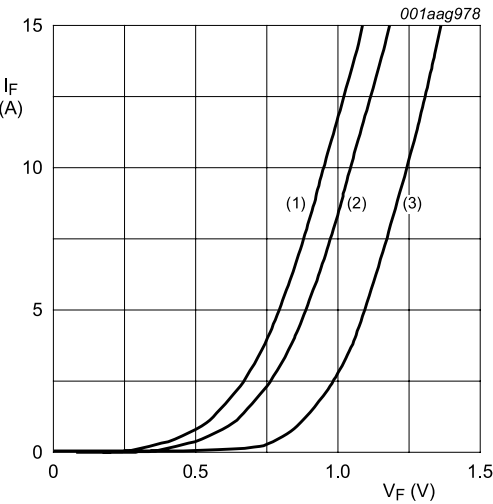


Fig. 1. Transient thermal impedance from junction to mounting base as a function of pulse width

10. Characteristics

Table 7. Characteristics

| Symbol                  | Parameter                     | Conditions                                                                                                                                 |  | Min | Typ  | Max   | Unit |
|-------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|--|-----|------|-------|------|
| Static characteristics  |                               |                                                                                                                                            |  |     |      |       |      |
| V <sub>F</sub>          | forward voltage               | I <sub>F</sub> = 5 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 2</a>                                                                      |  | -   | 0.8  | 0.895 | V    |
|                         |                               | I <sub>F</sub> = 5 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 2</a>                                                                       |  | -   | 0.95 | 1.1   | V    |
|                         |                               | I <sub>F</sub> = 10 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 2</a>                                                                      |  | -   | 1.1  | 1.25  | V    |
| I <sub>R</sub>          | reverse current               | V <sub>R</sub> = 200 V; T <sub>j</sub> = 25 °C                                                                                             |  | -   | 2    | 10    | μA   |
|                         |                               | V <sub>R</sub> = 200 V; T <sub>j</sub> = 100 °C                                                                                            |  | -   | 0.1  | 0.2   | mA   |
| Dynamic characteristics |                               |                                                                                                                                            |  |     |      |       |      |
| Q <sub>r</sub>          | recovered charge              | I <sub>F</sub> = 2 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 20 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 3</a>                 |  | -   | 4    | 9     | nC   |
| t <sub>rr</sub>         | reverse recovery time         | ramp recovery; I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 100 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 3</a> |  | -   | 15   | 25    | ns   |
|                         |                               | step recovery; when switched from I <sub>F</sub> = 0.5 A to I <sub>R</sub> = 1 A; measured at I <sub>R</sub> = 0.25 A                      |  | -   | 10   | 20    | ns   |
| I <sub>RM</sub>         | peak reverse recovery current | I <sub>F</sub> = 5 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 50 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 3</a>                 |  | -   | 0.5  | 0.7   | A    |
| V <sub>FR</sub>         | forward recovery voltage      | I <sub>F</sub> = 1 A; dI <sub>F</sub> /dt = 10 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 4</a>                                        |  | -   | 1    | -     | V    |



- (1) T<sub>J</sub> = 150 °C; typical values
- (2) T<sub>J</sub> = 150 °C; maximum values
- (3) T<sub>J</sub> = 25 °C; maximum values

Fig. 2. Forward current as a function of forward voltage

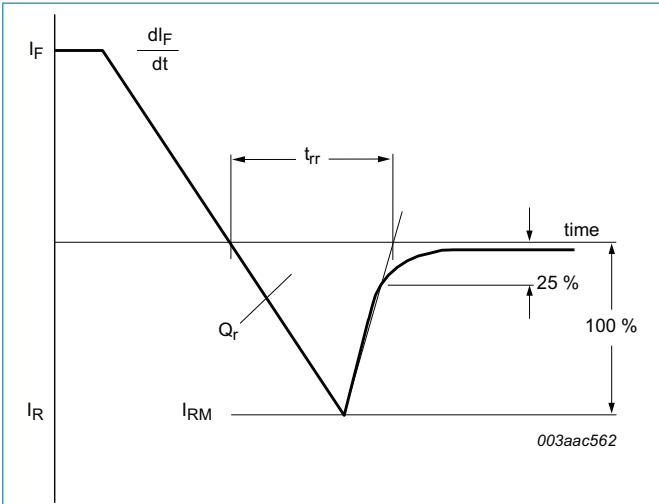


Fig. 3. Reverse recovery definitions; ramp recovery

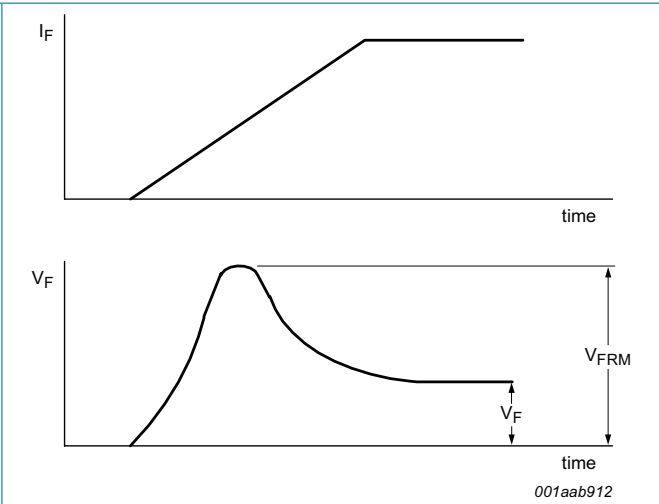


Fig. 4. Forward recovery definitions

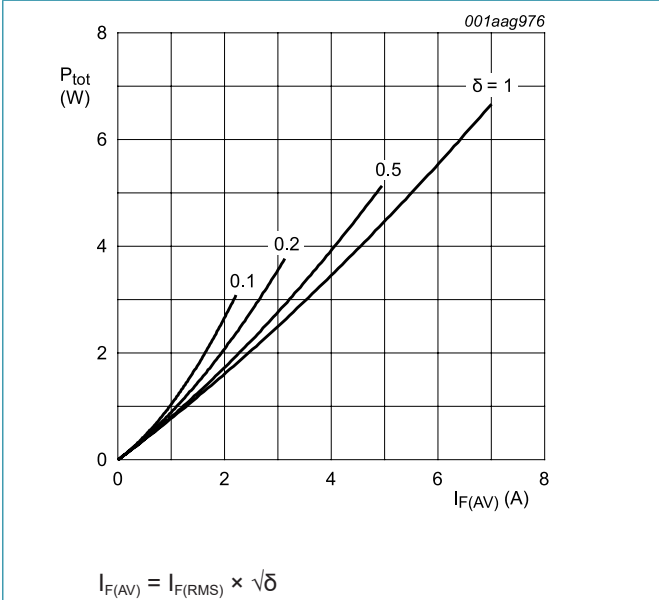


Fig. 5. Forward power dissipation as a function of average forward current; square waveform; maximum values; per diode

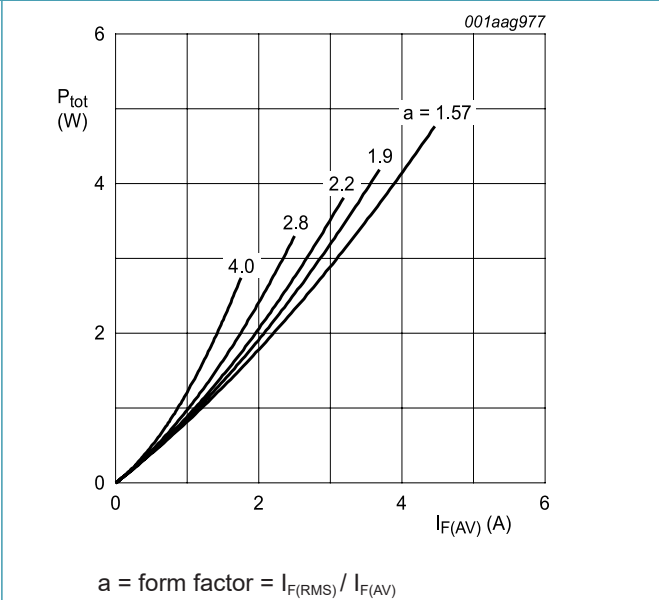
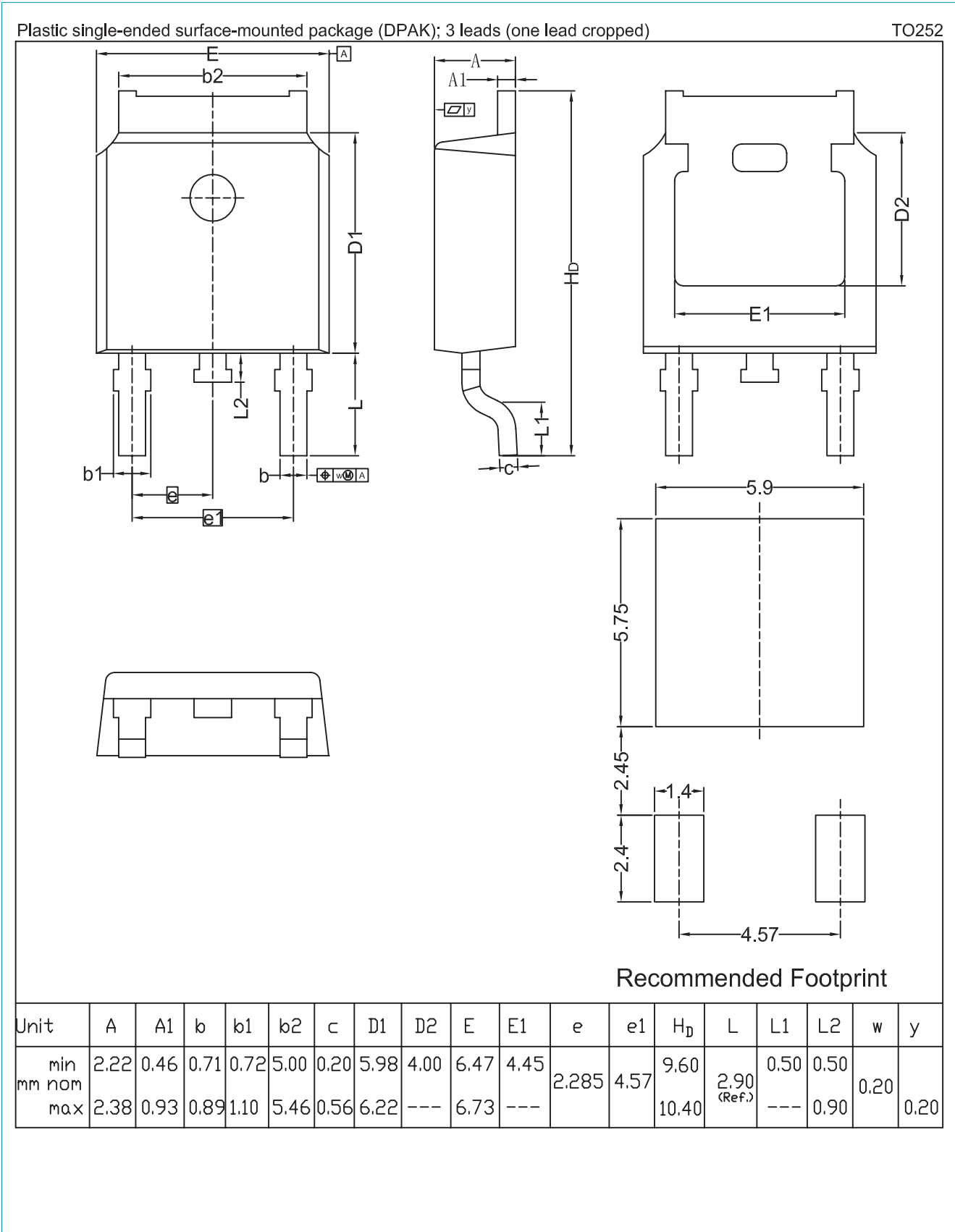


Fig. 6. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values; per diode

11. Package outline



## 12. Revision history

Table 8. Revision history

| Document ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Release date | Data sheet status     | Change notice | Supersedes                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------------|---------------|--------------------------------------|
| BYQ28ED-200 v.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 20180224     | Product data sheet    | -             | BYQ28_SER_E_ED_4                     |
| Modifications: Change from NXP version to WeEn version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |                       |               |                                      |
| BYQ28_SER_E_ED_4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 20071205     | Product data sheet    | -             | BYQ28E_SERIES_3                      |
| Modifications: <ul style="list-style-type: none"> <li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>• Legal texts have been adapted to the new company name where appropriate.</li> <li>• Limiting values table: some parameter descriptions amended to conform to latest standards; IFRM conditions amended; VESD row added.</li> <li>• Characteristics: Qrr changed to Qr 'recovered charge'; trr1 and trr2 changed to trr with 'ramp recovery' and 'step recovery' added to conditions.</li> </ul> |              |                       |               |                                      |
| BYQ28E_SERIES_3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 19981001     | Product specification | -             | BYQ28E_SERIES_2                      |
| BYQ28E_SERIES_2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 19980701     | Product specification | -             | BYQ28E_SERIES_1;<br>BYQ28EB_SERIES_1 |
| BYQ28E_SERIES_1;<br>BYQ28EB_SERIES_1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 19960801     | Product specification | -             | -                                    |



## 13. Legal information

### 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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| 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.
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