



# PNE40006EH

400 V, 6 A hyperfast recovery rectifier

11 June 2026

Product data sheet

## 1. General description

High power density, hyperfast switching time recovery rectifier with high-efficiency planar technology, encapsulated in DPAK Real-2-Pin (SOT8017).

## 2. Features and benefits

- Reverse voltage  $V_R \leq 400$  V
- Forward current  $I_F \leq 6$  A
- Typical switching time  $t_{tr}$  of 14 ns
- Pt doped life time control
- Low inductance and soft recovery
- Planar die design

## 3. Applications

- AC/DC converter
- DC/DC converter
- SMPS / UPS
- PFC
- Freewheeling applications

## 4. Quick reference data

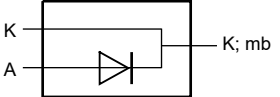
Table 1. Quick reference data

| Symbol      | Parameter                       | Conditions                                                    |     | Min | Typ  | Max  | Unit    |
|-------------|---------------------------------|---------------------------------------------------------------|-----|-----|------|------|---------|
| $I_{F(AV)}$ | average forward current         | $\delta = 0.5$ ; $f = 20$ kHz; square wave; $T_c \leq 139$ °C |     | -   | -    | 6    | A       |
| $V_{RRM}$   | repetitive peak reverse voltage | $T_j = 25$ °C                                                 |     | -   | -    | 400  | V       |
| $V_R$       | reverse voltage                 |                                                               |     | -   | -    | 400  | V       |
| $V_F$       | forward voltage                 | $I_F = 6$ A; pulsed; $T_j = 25$ °C                            | [1] | -   | 1.7  | 2.35 | V       |
|             |                                 | $I_F = 6$ A; pulsed; $T_j = 125$ °C                           | [1] | -   | 1.38 | 2    | V       |
|             |                                 | $I_F = 6$ A; pulsed; $T_j = 175$ °C                           | [1] | -   | 1.2  | -    | V       |
| $I_R$       | reverse current                 | $V_R = 400$ V; pulsed; $T_j = 25$ °C                          | [1] | -   | -    | 1    | $\mu$ A |
|             |                                 | $V_R = 400$ V; pulsed; $T_j = 125$ °C                         | [1] | -   | 1.5  | 25   | $\mu$ A |
|             |                                 | $V_R = 400$ V; pulsed; $T_j = 175$ °C                         | [1] | -   | 32   | -    | $\mu$ A |

[1] Very short pulse, in order to maintain a stable junction temperature.

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description                                                       | Simplified outline                                                                                      | Graphic symbol                                                                                    |
|-----|--------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| 1   | K      | cathode                                                           | <br>DPAK R2P (SOT8017) | <br>aaa-037872 |
| 2   | A      | anode                                                             |                                                                                                         |                                                                                                   |
| mb  | K      | mounting base; connected to cathode, also referred to as the case |                                                                                                         |                                                                                                   |

6. Ordering information

Table 3. Ordering information

| Type number                | Package  |                                                                                                                                     |                         |
|----------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
|                            | Name     | Description                                                                                                                         | Version                 |
| <a href="#">PNE40006EH</a> | DPAK R2P | Plastic, single-ended surface-mounted package (DPAK R2P); Real-2-Pin configuration; 4.58 mm pitch; 6.16 mm x 6.54 mm x 2.29 mm body | <a href="#">SOT8017</a> |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PNE40006EH  | E40006       |

8. Limiting values

Table 5. Limiting values  
In accordance with the Absolute Maximum Rating System (IEC 601134).

| Symbol             | Parameter                           | Conditions                                                                                                     |     | Min | Max | Unit |
|--------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------|-----|-----|-----|------|
| V <sub>RRM</sub>   | repetitive peak reverse voltage     | T <sub>j</sub> = 25 °C                                                                                         |     | -   | 400 | V    |
| V <sub>R</sub>     | reverse voltage                     |                                                                                                                |     | -   | 400 | V    |
| V <sub>RMS</sub>   | RMS voltage                         |                                                                                                                |     | -   | 283 | V    |
| I <sub>F</sub>     | forward current                     | δ = 1; T <sub>c</sub> ≤ 130 °C                                                                                 |     | -   | 8.4 | A    |
| I <sub>F(AV)</sub> | average forward current             | δ = 0.5; f = 20 kHz; square wave; T <sub>c</sub> ≤ 139 °C                                                      |     | -   | 6   | A    |
| I <sub>FSM</sub>   | non-repetitive peak forward current | t <sub>p</sub> = 8.3 ms; single half sine wave (applied at rated load condition); T <sub>j(init)</sub> = 25 °C |     | -   | 68  | A    |
|                    |                                     | t <sub>p</sub> = 10 ms; square wave; T <sub>j(init)</sub> = 25 °C                                              |     | -   | 55  | A    |
| P <sub>tot</sub>   | total power dissipation             | T <sub>c</sub> ≤ 25 °C                                                                                         | [1] | -   | 1.6 | W    |
|                    |                                     |                                                                                                                | [2] | -   | 3.2 | W    |
| T <sub>j</sub>     | junction temperature                |                                                                                                                |     | -   | 175 | °C   |
| T <sub>amb</sub>   | ambient temperature                 |                                                                                                                |     | -55 | 175 | °C   |
| T <sub>stg</sub>   | storage temperature                 |                                                                                                                |     | -65 | 175 | °C   |

[1] Device mounted on an FR4 PCB, single-sided copper and standard footprint.  
[2] Device mounted on an FR4 PCB, single-sided copper and mounting pad for cathode 6 cm<sup>2</sup>.

9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol        | Parameter                                   | Conditions  |     | Min | Typ | Max | Unit |
|---------------|---------------------------------------------|-------------|-----|-----|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | -   | -   | 90  | K/W  |
|               |                                             |             | [2] | -   | -   | 46  | K/W  |
| $R_{th(j-c)}$ | thermal resistance from junction to case    |             | [3] | -   | -   | 3.5 | K/W  |

- [1] Device mounted on an FR4 PCB, single-sided copper and standard footprint.  
[2] Device mounted on an FR4 PCB, single-sided copper and mounting pad for cathode 6 cm<sup>2</sup>.  
[3] Soldering point of cathode tab.

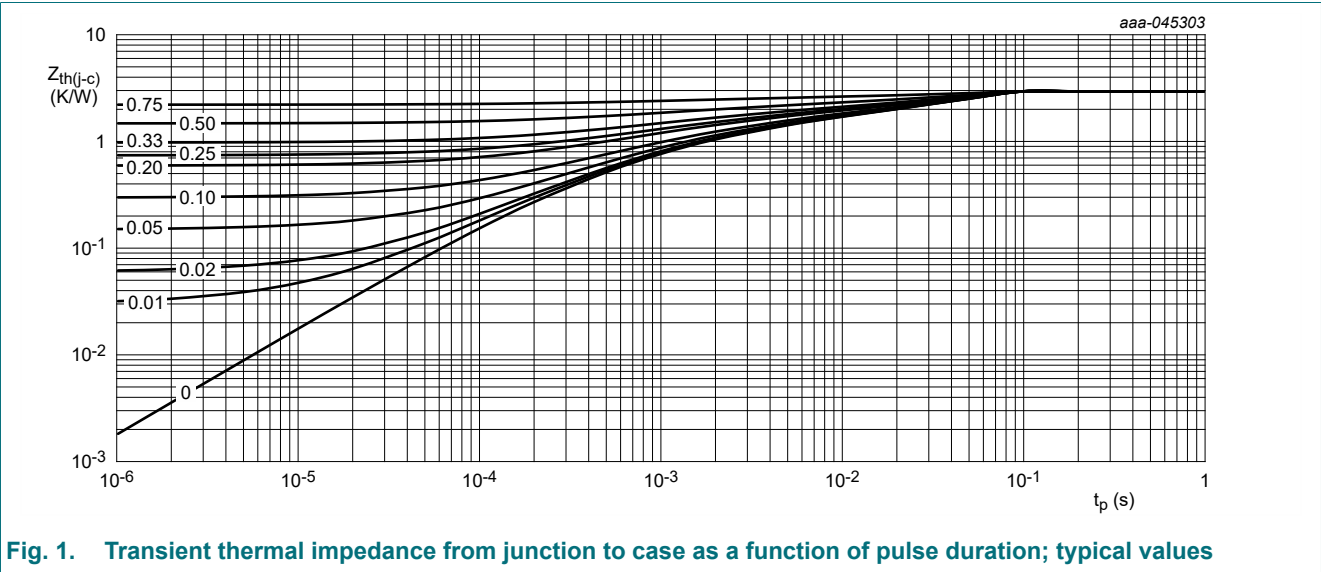


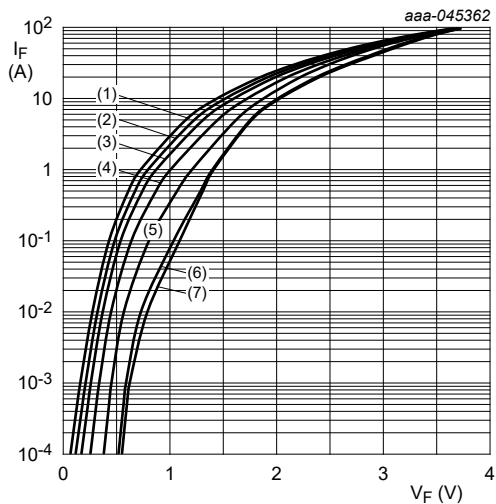
Fig. 1. Transient thermal impedance from junction to case as a function of pulse duration; typical values

## 10. Characteristics

Table 7. Characteristics

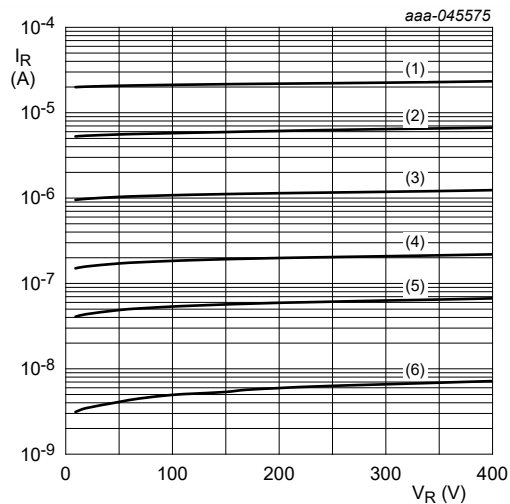
| Symbol      | Parameter                                | Conditions                                                                       |     | Min | Typ  | Max  | Unit    |
|-------------|------------------------------------------|----------------------------------------------------------------------------------|-----|-----|------|------|---------|
| $V_{(BR)R}$ | reverse breakdown voltage                | $I_R = 100 \mu A$ ; pulsed; $T_j = 25^\circ C$                                   | [1] | 400 | -    | -    | V       |
| $V_F$       | forward voltage                          | $I_F = 6 A$ ; pulsed; $T_j = 25^\circ C$                                         | [1] | -   | 1.7  | 2.35 | V       |
|             |                                          | $I_F = 6 A$ ; pulsed; $T_j = 125^\circ C$                                        | [1] | -   | 1.38 | 2    | V       |
|             |                                          | $I_F = 6 A$ ; pulsed; $T_j = 175^\circ C$                                        | [1] | -   | 1.2  | -    | V       |
| $I_R$       | reverse current                          | $V_R = 400 V$ ; pulsed; $T_j = 25^\circ C$                                       | [1] | -   | -    | 1    | $\mu A$ |
|             |                                          | $V_R = 400 V$ ; pulsed; $T_j = 125^\circ C$                                      | [1] | -   | 1.5  | 25   | $\mu A$ |
|             |                                          | $V_R = 400 V$ ; pulsed; $T_j = 175^\circ C$                                      | [1] | -   | 32   | -    | $\mu A$ |
| $C_d$       | diode capacitance                        | $V_R = 400 V$ ; $f = 1 MHz$ ; $T_j = 25^\circ C$                                 |     | -   | 5    | -    | pF      |
| $t_{rr}$    | reverse recovery time ;<br>step recovery | $I_F = 0.5 A$ ; $I_R = 1 A$ ; $I_{R(meas)} = 0.25 A$ ;<br>$T_j = 25^\circ C$     |     | -   | 14   | 25   | ns      |
|             | reverse recovery time ;<br>ramp recovery | $I_F = 1 A$ ; $dI_F/dt = -50 A/\mu s$ ; $V_R = 30 V$ ;<br>$T_j = 25^\circ C$     |     | -   | 23   | -    | ns      |
|             |                                          | $I_F = 6 A$ ; $dI_F/dt = -200 A/\mu s$ ; $V_R = 400 V$ ;<br>$T_j = 25^\circ C$   |     | -   | 61   | -    | ns      |
|             |                                          | $I_F = 6 A$ ; $dI_F/dt = -1000 A/\mu s$ ;<br>$V_R = 400 V$ ; $T_j = 25^\circ C$  |     | -   | 21   | -    | ns      |
|             |                                          | $I_F = 6 A$ ; $dI_F/dt = -200 A/\mu s$ ; $V_R = 400 V$ ;<br>$T_j = 125^\circ C$  |     | -   | 98   | -    | ns      |
|             |                                          | $I_F = 6 A$ ; $dI_F/dt = -1000 A/\mu s$ ;<br>$V_R = 400 V$ ; $T_j = 125^\circ C$ |     | -   | 47   | -    | ns      |
|             |                                          |                                                                                  |     |     |      |      |         |
| $I_{RM}$    | peak reverse recovery current            | $I_F = 6 A$ ; $dI_F/dt = -200 A/\mu s$ ; $V_R = 400 V$ ;<br>$T_j = 25^\circ C$   |     | -   | 3    | -    | A       |
|             |                                          | $I_F = 6 A$ ; $dI_F/dt = -1000 A/\mu s$ ;<br>$V_R = 400 V$ ; $T_j = 25^\circ C$  |     | -   | 10   | -    | A       |
|             |                                          | $I_F = 6 A$ ; $dI_F/dt = -200 A/\mu s$ ; $V_R = 400 V$ ;<br>$T_j = 125^\circ C$  |     | -   | 5    | -    | A       |
|             |                                          | $I_F = 6 A$ ; $dI_F/dt = -1000 A/\mu s$ ;<br>$V_R = 400 V$ ; $T_j = 125^\circ C$ |     | -   | 14   | -    | A       |
| $Q_{rr}$    | reverse recovery charge                  | $I_F = 6 A$ ; $dI_F/dt = -200 A/\mu s$ ; $V_R = 400 V$ ;<br>$T_j = 25^\circ C$   |     | -   | 82   | -    | nC      |
|             |                                          | $I_F = 6 A$ ; $dI_F/dt = -1000 A/\mu s$ ;<br>$V_R = 400 V$ ; $T_j = 25^\circ C$  |     | -   | 124  | -    | nC      |
|             |                                          | $I_F = 6 A$ ; $dI_F/dt = -200 A/\mu s$ ; $V_R = 400 V$ ;<br>$T_j = 125^\circ C$  |     | -   | 276  | -    | nC      |
|             |                                          | $I_F = 6 A$ ; $dI_F/dt = -1000 A/\mu s$ ;<br>$V_R = 400 V$ ; $T_j = 125^\circ C$ |     | -   | 379  | -    | nC      |

[1] Very short pulse, in order to maintain a stable junction temperature.



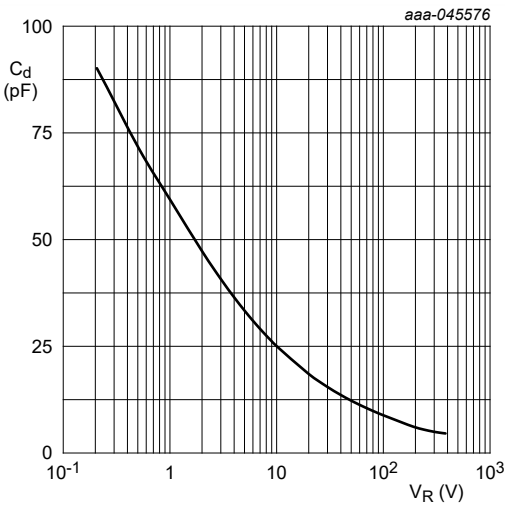
pulsed condition  
(1)  $T_j = 175^\circ\text{C}$   
(2)  $T_j = 150^\circ\text{C}$   
(3)  $T_j = 125^\circ\text{C}$   
(4)  $T_j = 85^\circ\text{C}$   
(5)  $T_j = 25^\circ\text{C}$   
(6)  $T_j = -40^\circ\text{C}$   
(7)  $T_j = -55^\circ\text{C}$

Fig. 2. Forward current as a function of forward voltage; typical values



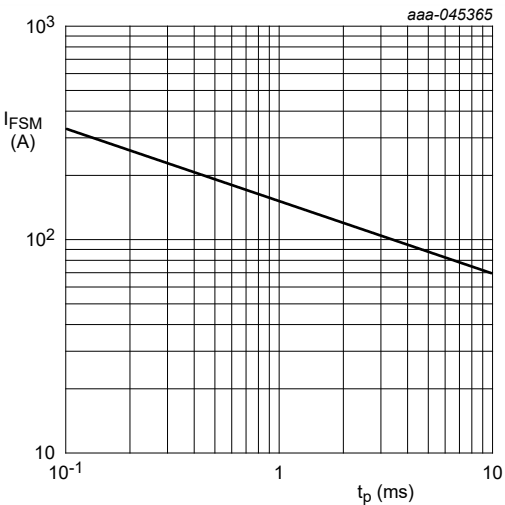
pulsed condition  
(1)  $T_j = 175^\circ\text{C}$   
(2)  $T_j = 150^\circ\text{C}$   
(3)  $T_j = 125^\circ\text{C}$   
(4)  $T_j = 100^\circ\text{C}$   
(5)  $T_j = 85^\circ\text{C}$   
(6)  $T_j = 55^\circ\text{C}$

Fig. 3. Reverse current as a function of reverse voltage; typical values



$f = 1\text{ MHz}$ ;  $T_{\text{amb}} = 25^\circ\text{C}$

Fig. 4. Diode capacitance as a function of reverse voltage; typical values



square wave;  $T_{\text{amb}} = 25^\circ\text{C}$

Fig. 5. Non-repetitive peak forward current as a function of pulse duration; typical values

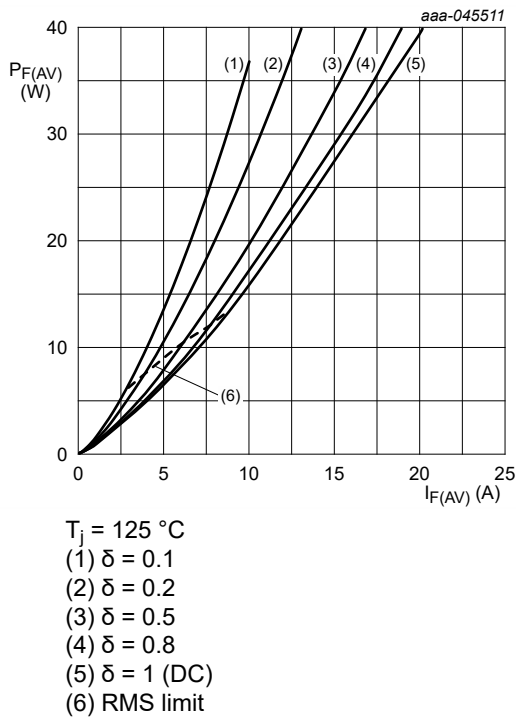


Fig. 6. Average forward power dissipation as a function of average forward current; typical values

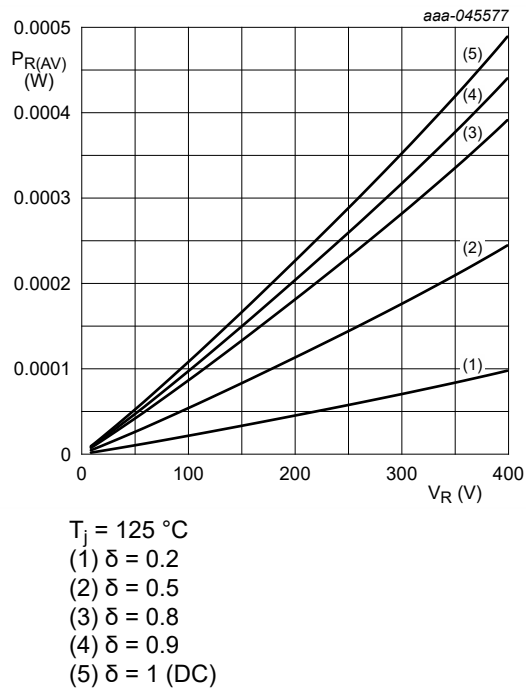


Fig. 7. Average reverse power dissipation as a function of reverse voltage; typical values

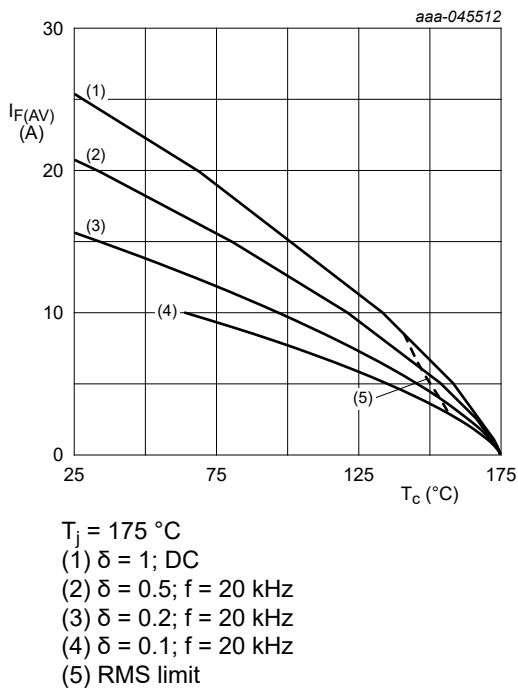


Fig. 8. Average forward current as a function of case temperature; typical values

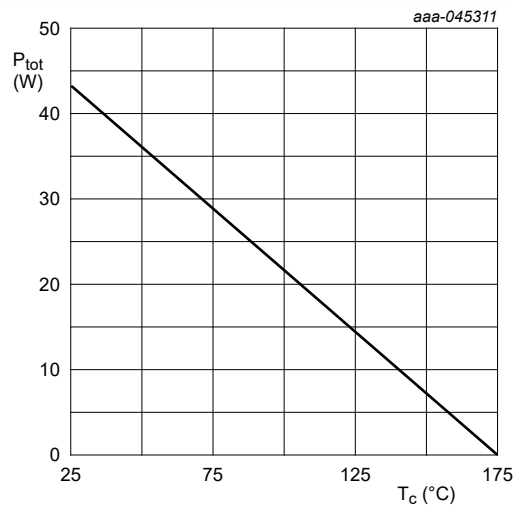
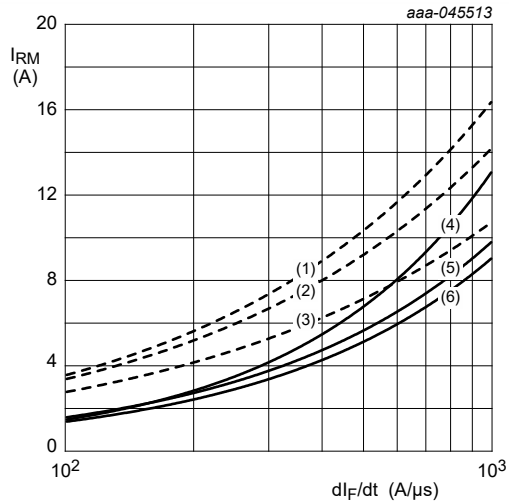


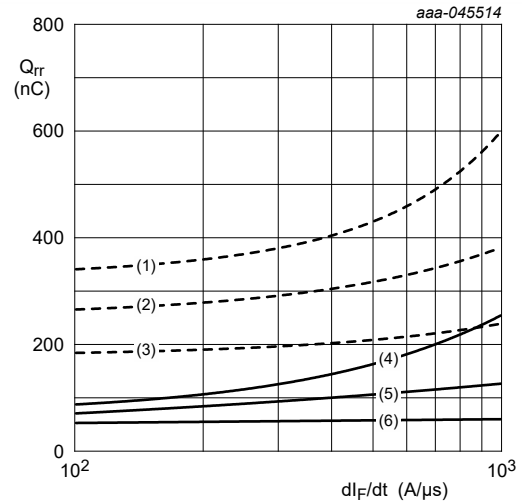
Fig. 9. Power dissipation as a function of case temperature; maximum values



$V_R = 400$  V

- (1)  $I_F = 12$  A;  $T_j = 125$  °C
- (2)  $I_F = 6$  A;  $T_j = 125$  °C
- (3)  $I_F = 3$  A;  $T_j = 125$  °C
- (4)  $I_F = 12$  A;  $T_j = 25$  °C
- (5)  $I_F = 6$  A;  $T_j = 25$  °C
- (6)  $I_F = 3$  A;  $T_j = 25$  °C

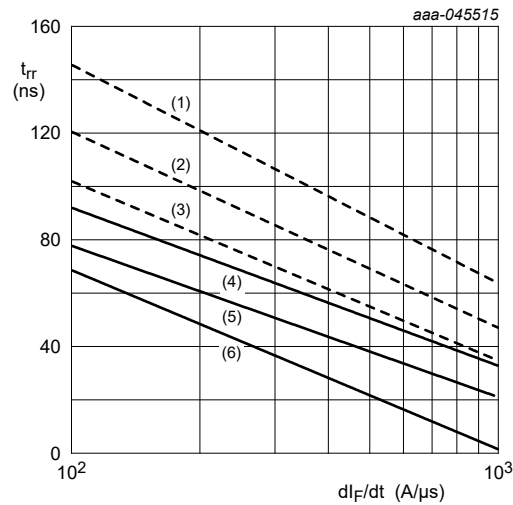
**Fig. 10. Peak reverse recovery current as a function of ramp rate; typical values**



$V_R = 400$  V

- (1)  $I_F = 12$  A;  $T_j = 125$  °C
- (2)  $I_F = 6$  A;  $T_j = 125$  °C
- (3)  $I_F = 3$  A;  $T_j = 125$  °C
- (4)  $I_F = 12$  A;  $T_j = 25$  °C
- (5)  $I_F = 6$  A;  $T_j = 25$  °C
- (6)  $I_F = 3$  A;  $T_j = 25$  °C

**Fig. 11. Reverse recovery charge as a function of ramp rate; typical values**



$V_R = 400$  V

- (1)  $I_F = 12$  A;  $T_j = 125$  °C
- (2)  $I_F = 6$  A;  $T_j = 125$  °C
- (3)  $I_F = 3$  A;  $T_j = 125$  °C
- (4)  $I_F = 12$  A;  $T_j = 25$  °C
- (5)  $I_F = 6$  A;  $T_j = 25$  °C
- (6)  $I_F = 3$  A;  $T_j = 25$  °C

**Fig. 12. Reverse recovery time as a function of ramp rate; typical values**

11. Test information



Fig. 13. Reverse recovery definition; step recovery



Fig. 14. Reverse recovery definition; ramp recovery



Fig. 15. Forward recovery definition

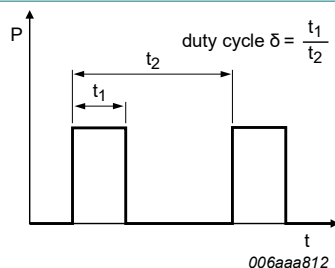


Fig. 16. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations:

$$I_{F(AV)} = I_M \times \delta \text{ with } I_M \text{ defined as peak current}$$

$$I_{RMS} = I_{F(AV)} \text{ at DC, and } I_{RMS} = I_M \times \sqrt{\delta}$$

with  $I_{RMS}$  defined as RMS current.

## 12. Package outline

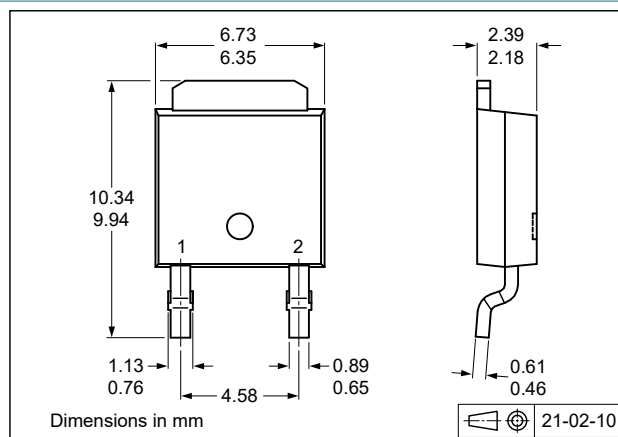


Fig. 17. Package outline DPAK R2P (SOT8017)

13. Soldering

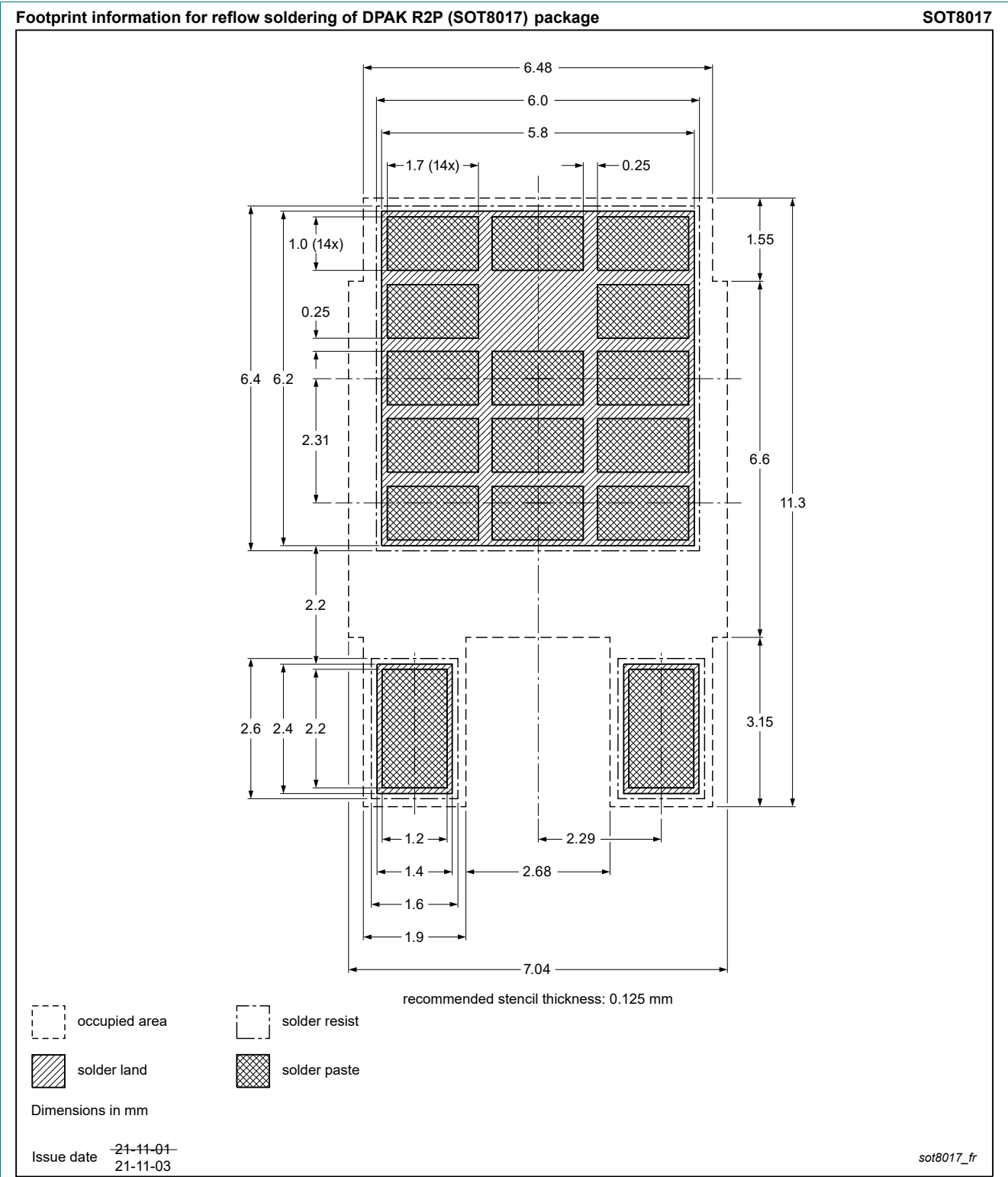


Fig. 18. Reflow soldering footprint for DPAK R2P (SOT8017)

## 14. Revision history

Table 8. Revision history

| Data sheet ID  | Release date | Data sheet status  | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| PNE40006EH v.1 | 20260611     | Product data sheet | -             | -          |

15. 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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- [2] The term 'short data sheet' is explained in section "Definitions".
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