PNU40006EH

400 V, 6 A ultrafast recovery rectifier

11 June 2026 Product data sheet

1. General description

High power density, ultrafast 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_{rr} of 40 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	δ = 0.5; f = 20 kHz; square wave; $T_c \leq$ 149 °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]	-	1.12	1.29	V
		I_F = 6 A; pulsed; T_j = 125 °C	[1]	-	1	1.17	V
		I_F = 6 A; pulsed; T_j = 175 °C	[1]	-	0.92	-	V
I_R	reverse current	V_R = 400 V; pulsed; T_j = 25 °C	[1]	-	-	1	µA
		V_R = 400 V; pulsed; T_j = 125 °C	[1]	-	0.5	25	µA
		V_R = 400 V; pulsed; T_j = 175 °C	[1]	-	15	-	µA

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

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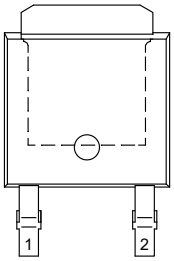
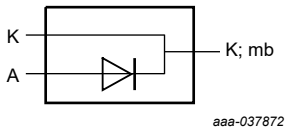
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 DPAK R2P (SOT8017)	
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
PNU40006EH	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	SOT8017

7. Marking

Table 4. Marking codes

Type number	Marking code
PNU40006EH	U40006

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8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 601134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage	T_j = 25 °C		-	400	V
V_R	reverse voltage			-	400	V
V_{RMS}	RMS voltage			-	283	V
I_F	forward current	δ = 1; $T_c \leq$ 142 °C		-	8.4	A
$I_{F(AV)}$	average forward current	δ = 0.5; f = 20 kHz; square wave; $T_c \leq$ 149 °C		-	6	A
I_{FSM}	non-repetitive peak forward current	t_p = 8.3 ms; single half sine wave (applied at rated load condition); $T_{j(init)}$ = 25 °C		-	88	A
		t_p = 10 ms; square wave; $T_{j(init)}$ = 25 °C		-	75	A
P_{tot}	total power dissipation	$T_c \leq$ 25 °C	[1]	-	1.6	W
			[2]	-	3.2	W
T_j	junction temperature			-	175	°C
T_{amb}	ambient temperature			-55	175	°C
T_{stg}	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 coppe and mounting pad for cathode 6 cm^2.

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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^2.
[3] Soldering point of cathode tab.

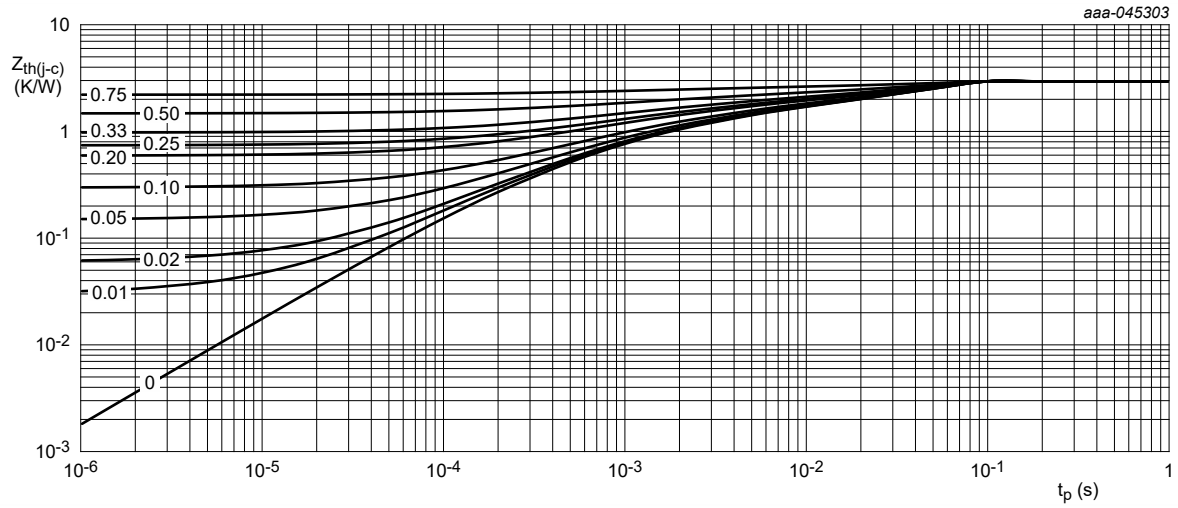

Fig. 1. Transient thermal impedance from junction to case as a function of pulse duration; typical values

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10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)R}$	reverse breakdown voltage	I_R = 100 µA; pulsed; T_j = 25 °C	[1]	400	-	-	V
V_F	forward voltage	I_F = 6 A; pulsed; T_j = 25 °C	[1]	-	1.12	1.29	V
		I_F = 6 A; pulsed; T_j = 125 °C	[1]	-	1	1.17	V
		I_F = 6 A; pulsed; T_j = 175 °C	[1]	-	0.92	-	V
I_R	reverse current	V_R = 400 V; pulsed; T_j = 25 °C	[1]	-	-	1	µA
		V_R = 400 V; pulsed; T_j = 125 °C	[1]	-	0.5	25	µA
		V_R = 400 V; pulsed; T_j = 175 °C	[1]	-	15	-	µA
C_d	diode capacitance	V_R = 400 V; f = 1 MHz; T_j = 25 °C		-	5	-	pF
t_{rr}	reverse recovery time ; step recovery	I_F = 0.5 A; I_R = 1 A; $I_{R(meas)}$ = 0.25 A; T_j = 25 °C		-	40	65	ns
	reverse recovery time ; ramp recovery	I_F = 1 A; dI_F/dt = -50 A/µs; V_R = 30 V; T_j = 25 °C		-	90	-	ns
		I_F = 6 A; dI_F/dt = -200 A/µs; V_R = 400 V; T_j = 25 °C		-	101	-	ns
		I_F = 6 A; dI_F/dt = -1000 A/µs; V_R = 400 V; T_j = 25 °C		-	48	-	ns
		I_F = 6 A; dI_F/dt = -200 A/µs; V_R = 400 V; T_j = 125 °C		-	151	-	ns
		I_F = 6 A; dI_F/dt = -1000 A/µs; V_R = 400 V; T_j = 125 °C		-	61	-	ns
I_{RM}	peak reverse recovery current	I_F = 6 A; dI_F/dt = -200 A/µs; V_R = 400 V; T_j = 25 °C		-	6	-	A
		I_F = 6 A; dI_F/dt = -1000 A/µs; V_R = 400 V; T_j = 25 °C		-	17	-	A
		I_F = 6 A; dI_F/dt = -200 A/µs; V_R = 400 V; T_j = 125 °C		-	9	-	A
		I_F = 6 A; dI_F/dt = -1000 A/µs; V_R = 400 V; T_j = 125 °C		-	24	-	A
Q_{rr}	reverse recovery charge	I_F = 6 A; dI_F/dt = -200 A/µs; V_R = 400 V; T_j = 25 °C		-	344	-	nC
		I_F = 6 A; dI_F/dt = -1000 A/µs; V_R = 400 V; T_j = 25 °C		-	607	-	nC
		I_F = 6 A; dI_F/dt = -200 A/µs; V_R = 400 V; T_j = 125 °C		-	740	-	nC
		I_F = 6 A; dI_F/dt = -1000 A/µs; V_R = 400 V; T_j = 125 °C		-	1404	-	nC

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

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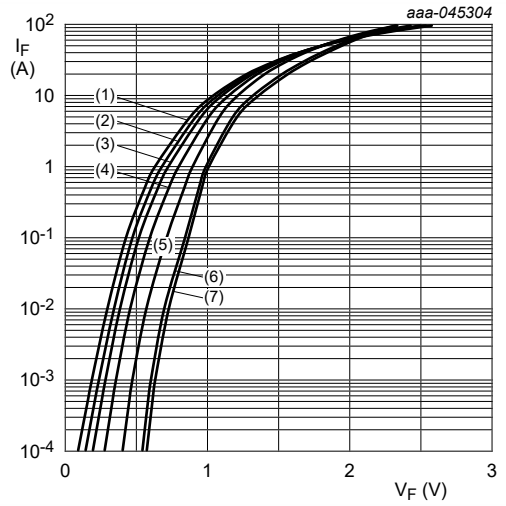
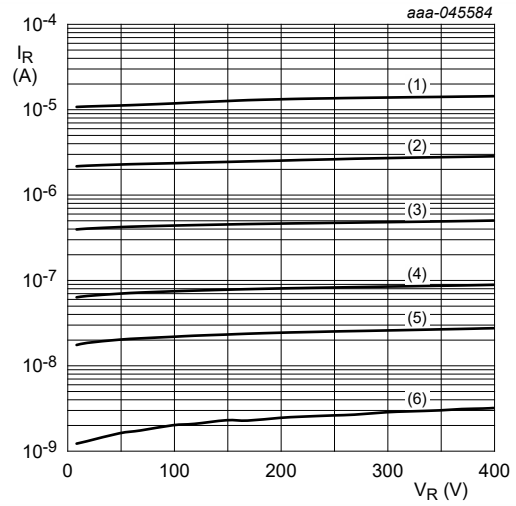


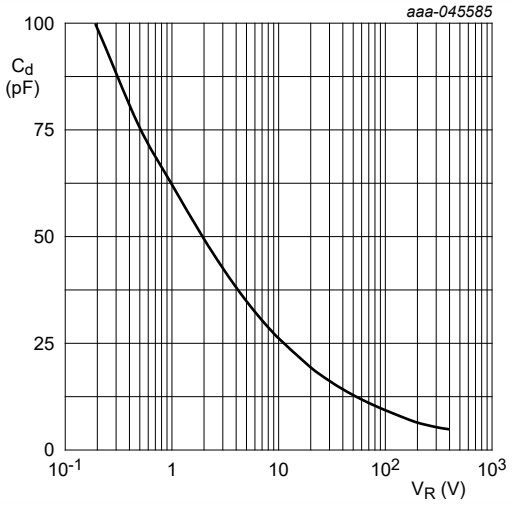
pulsed condition
(1) T_j = 175 °C
(2) T_j = 150 °C
(3) T_j = 125 °C
(4) T_j = 85 °C
(5) T_j = 25 °C
(6) T_j = -40 °C
(7) T_j = -55 °C

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



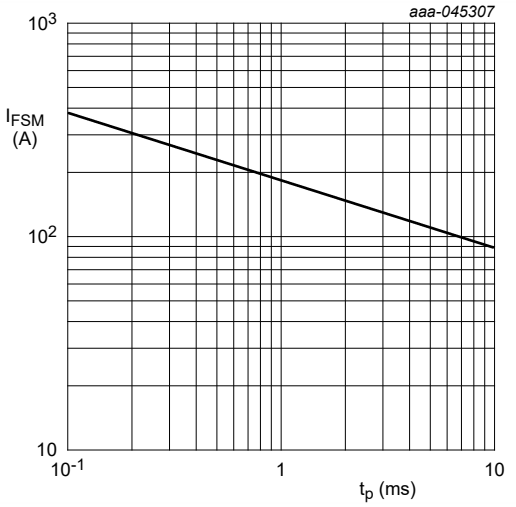
pulsed condition
(1) T_j = 175 °C
(2) T_j = 150 °C
(3) T_j = 125 °C
(4) T_j = 100 °C
(5) T_j = 85 °C
(6) T_j = 55 °C

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



f = 1 MHz; T_{amb} = 25 °C

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



square wave; T_{amb} = 25 °C

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

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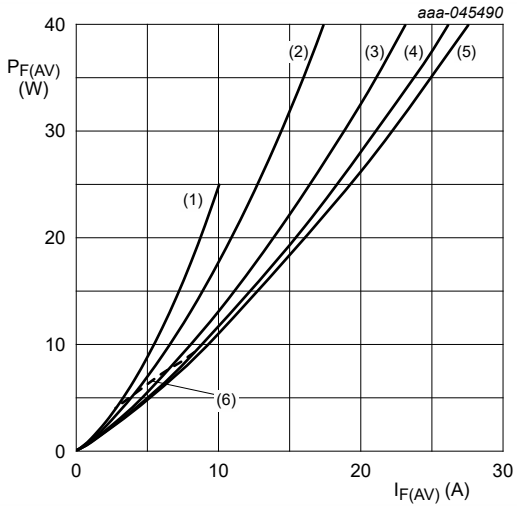
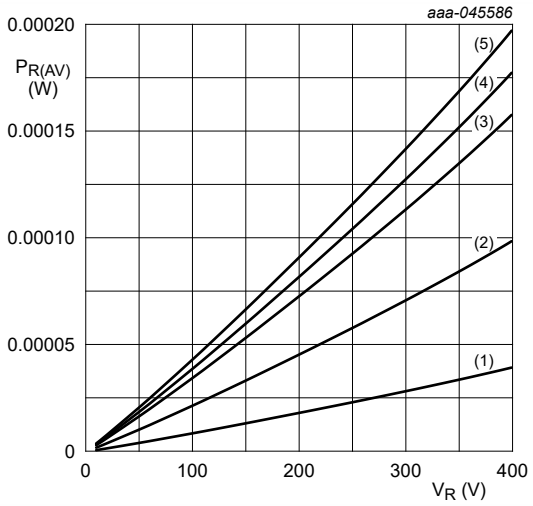


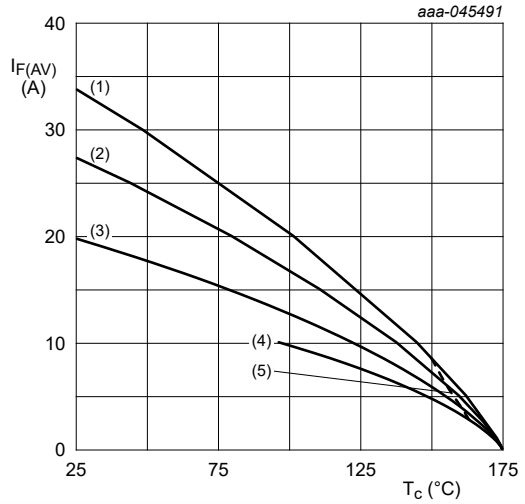
T_j = 125 °C
(1) δ = 0.1
(2) δ = 0.2
(3) δ = 0.5
(4) δ = 0.8
(5) δ = 1 (DC)
(6) RMS limit

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



T_j = 125 °C
(1) δ = 0.2
(2) δ = 0.5
(3) δ = 0.8
(4) δ = 0.9
(5) δ = 1 (DC)

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



T_j = 175 °C
(1) δ = 1; DC
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz
(5) RMS limit

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

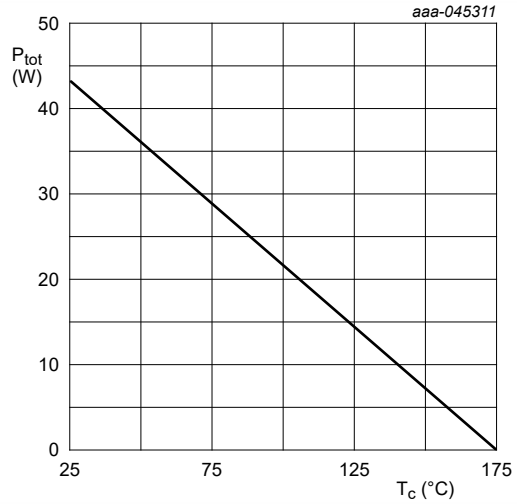


Fig. 9. Power dissipation as a function of case temperature; maximum values

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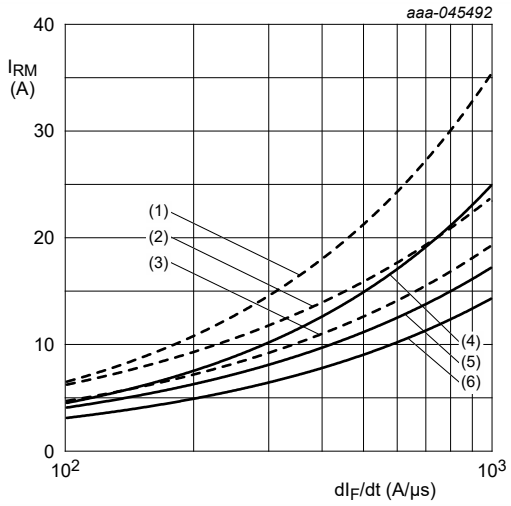
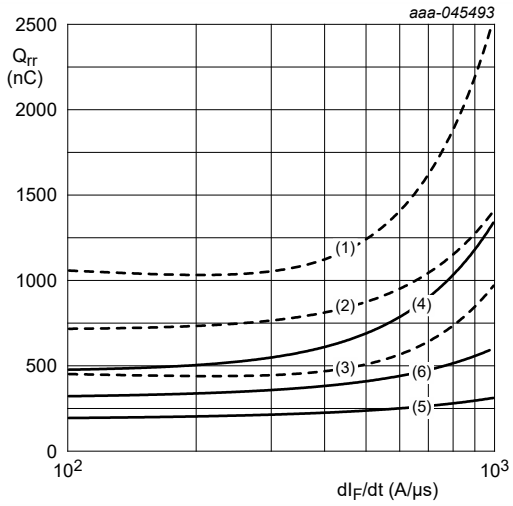


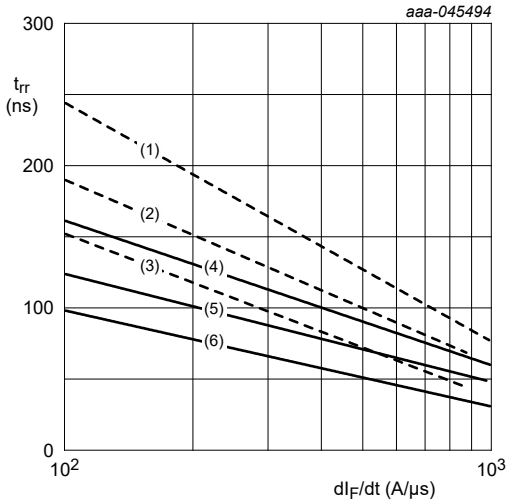
V_R = 400 V
(1) I_F = 12 A; T_j = 125 °C
(2) I_F = 6 A; T_j = 125 °C
(3) I_F = 3 A; T_j = 125 °C
(4) I_F = 12 A; T_j = 25 °C
(5) I_F = 6 A; T_j = 25 °C
(6) I_F = 3 A; T_j = 25 °C

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

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11. Test information

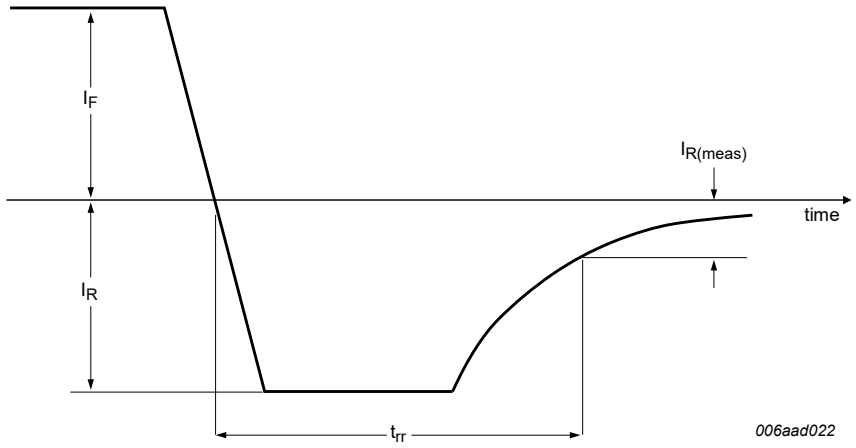

Fig. 13. Reverse recovery definition; step recovery

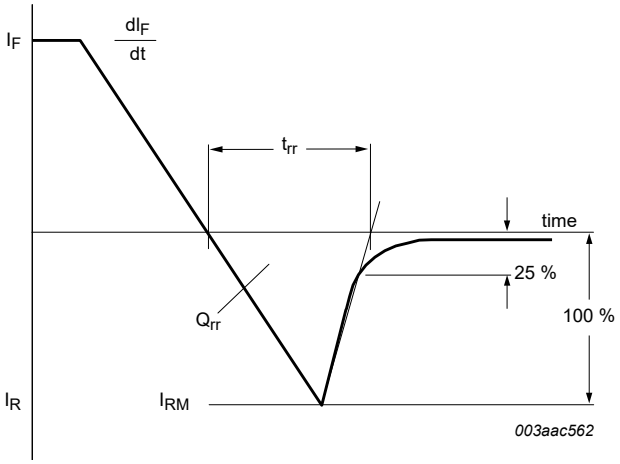

Fig. 14. Reverse recovery definition; ramp recovery

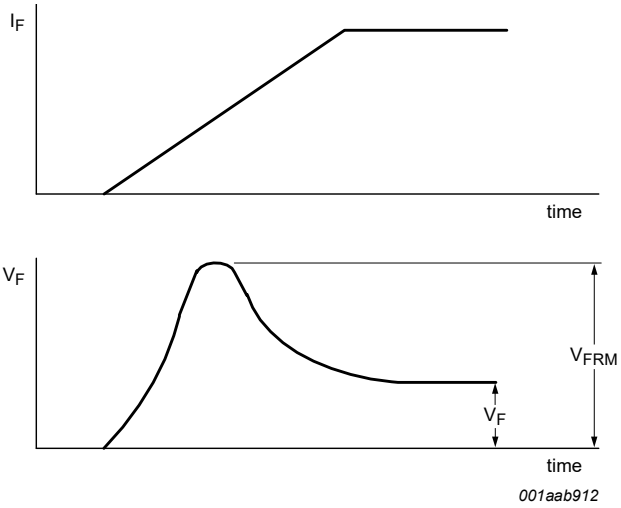

Fig. 15. Forward recovery definition

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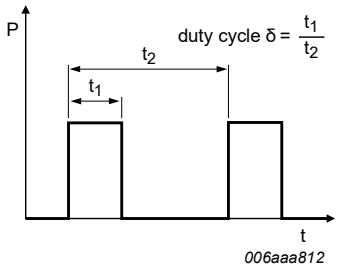

Fig. 16. Duty cycle definition

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

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

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

with I_{RMS} defined as RMS current.

12. Package outline

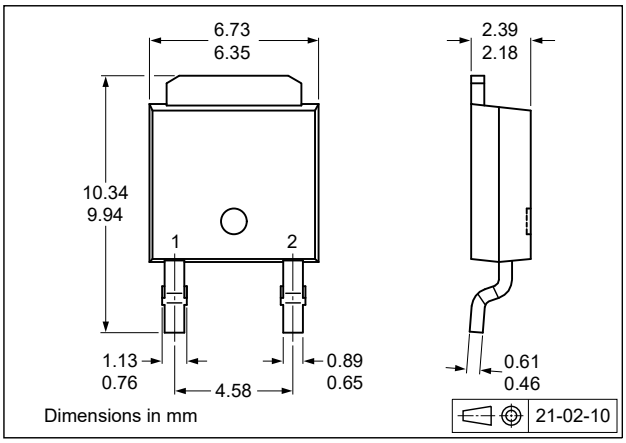

Fig. 17. Package outline DPAK R2P (SOT8017)

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13. Soldering

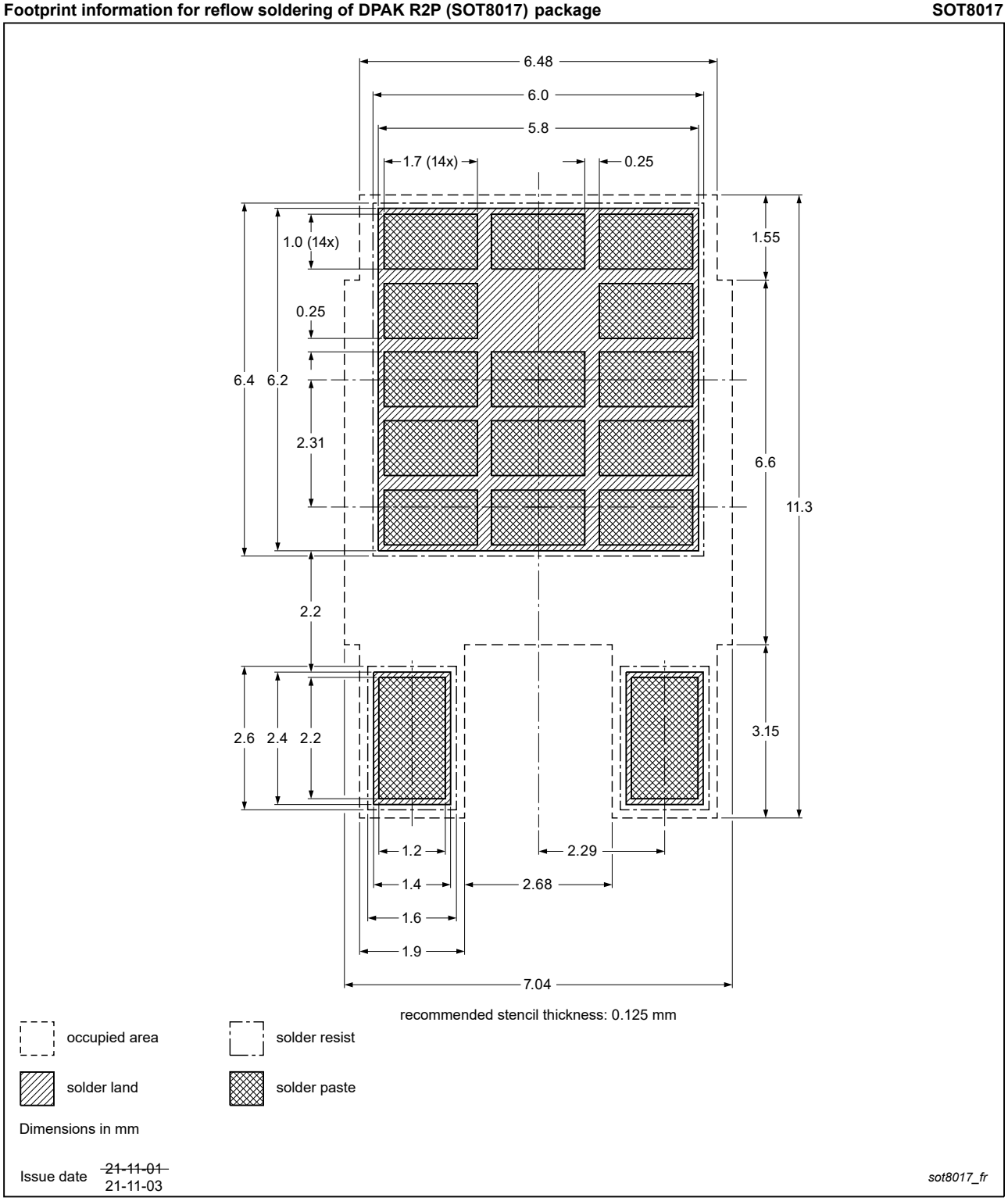

Fig. 18. Reflow soldering footprint for DPAK R2P (SOT8017)

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14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PNU40006EH v.1	20260611	Product data sheet	-	-

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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.
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".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at https://www.nexperia.com.

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