PSC1065H-Q

650 V, 10 A SiC Schottky diode in DPAK R2P for automotive applications

6 June 2024 **Product data sheet**

1. General description

Nexperia introduces leading edge Silicon Carbide (SiC) Schottky diode for ultra high performance, low loss, high efficiency power conversion applications. The SiC Schottky diode encapsulated in a Real-2-Pin R2P (TO-252-2) Surface-Mounted Device (SMD) power plastic package offers temperature independent capacitive turn-off, zero recovery switching behavior combined with an outstanding figure-of-merit (Q_C x V_F). The Merged PiN Schottky (MPS) diode improves the robustness expressed in a high I_{FSM}.

2. Features and benefits

- Reduced system costs
- Temperature independent fast and smooth switching performance
- Outstanding figure-of-merit (Q_c x V_F)
- High I_{FSM} capability
- High power density
- System miniaturization
- Reduced EMI
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- Traction inverter
- DC-DC converter
- Onboard charger

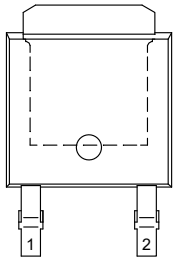
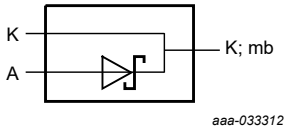
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DC}	DC blocking voltage			650	-	-	V
I_F	forward current	$T_c \leq 122$ °C; $\delta = 1$		-	-	10	A
Q_C	total capacitive charge	V_R = 400 V; dI_F/dt = 200 A/µs; I_F = 10 A; T_j = 25 °C		-	22	-	nC

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		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PSC1065H-Q	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
PSC1065H-Q	PSC1065HQ

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	650	V
dv/dt	diode dv/dt ruggedness	0 V ≤ V_R ≤ 480 V		-	100	V/ns
I_F	forward current	T_c ≤ 122 °C; δ = 1		-	10	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 µs; square wave; T_c = 25 °C		-	440	A
		t_p = 10 ms; half sine-wave; T_c = 25 °C		-	52	A
		t_p = 10 ms; half sine-wave; T_c = 150 °C		-	42	A
$\int i^2 dt$	i^2t value	t_p = 10 ms; T_c = 25 °C		-	14	A^2s
		t_p = 10 ms; T_c = 150 °C		-	9	A^2s
P_{tot}	total power dissipation	T_c ≤ 25 °C		-	58	W
T_j	junction temperature			-	175	°C
T_{amb}	ambient temperature			-55	175	°C
T_{stg}	storage temperature			-65	175	°C

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-c)}$	thermal resistance from junction to case			-	2	2.6	K/W

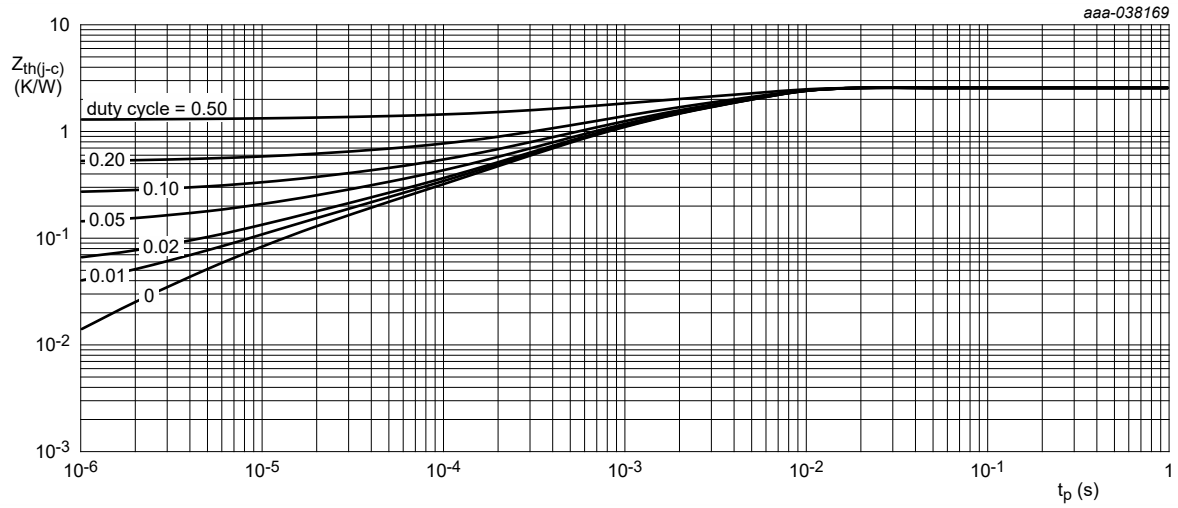


Fig. 1. Transient thermal impedance as a function of pulse duration; maximum values

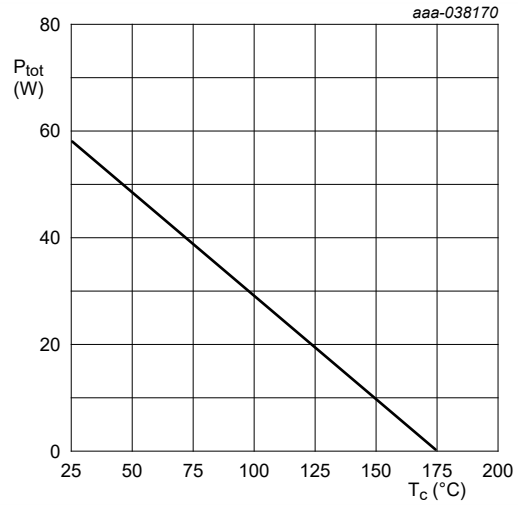


Fig. 2. Power dissipation; maximum values

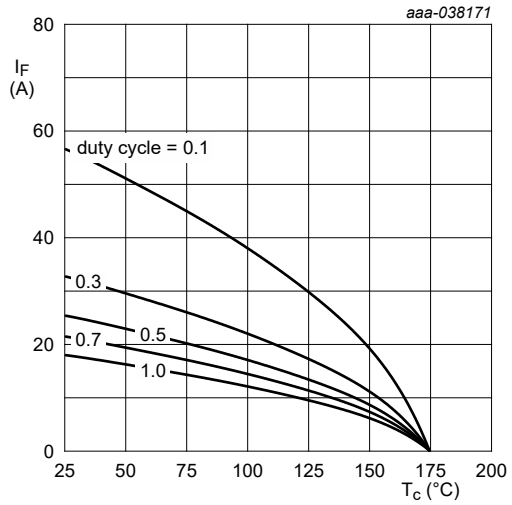
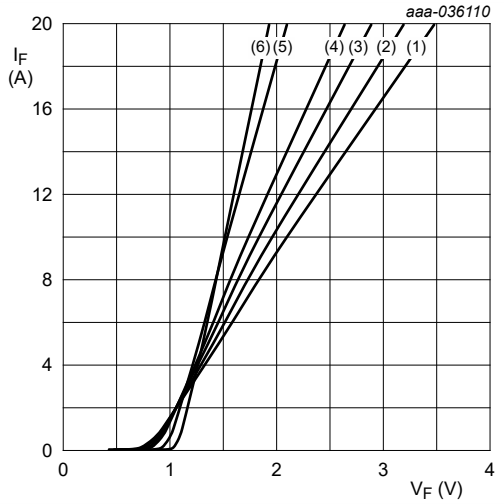


Fig. 3. Forward current as a function of case temperature; maximum values

10. Characteristics

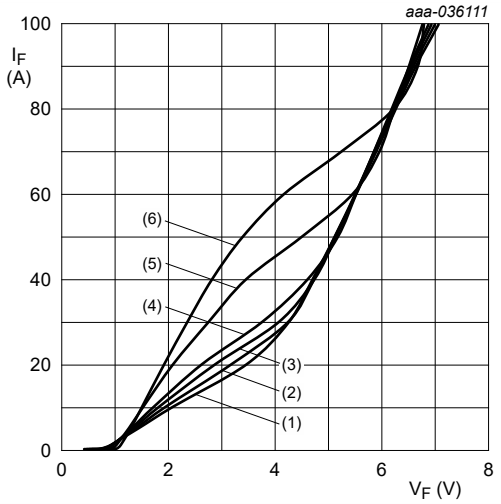
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{DC}	DC blocking voltage			650	-	-	V
V_F	forward voltage	I_F = 10 A; T_j = 25 °C		-	1.5	1.8	V
		I_F = 10 A; T_j = 150 °C		-	1.95	2.6	V
I_R	reverse current	V_R = 650 V; T_j = 25 °C		-	1	60	µA
		V_R = 650 V; T_j = 150 °C		-	10	120	µA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz; T_j = 25 °C		-	340	-	pF
		V_R = 400 V; f = 1 MHz; T_j = 25 °C		-	36	-	pF
Q_C	total capacitive charge	V_R = 400 V; dI_F/dt = 200 A/µs; I_F = 10 A; T_j = 25 °C		-	22	-	nC



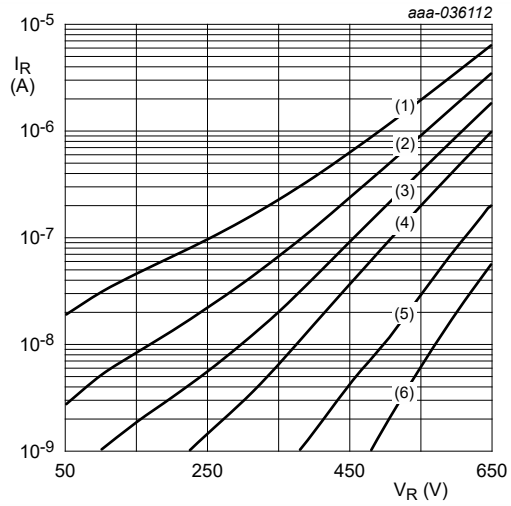
Pulsed condition:
(1) T_j = 175 °C
(2) T_j = 150 °C
(3) T_j = 125 °C
(4) T_j = 100 °C
(5) T_j = 25 °C
(6) T_j = -55 °C

Fig. 4. Forward current as a function of forward voltage; typical values



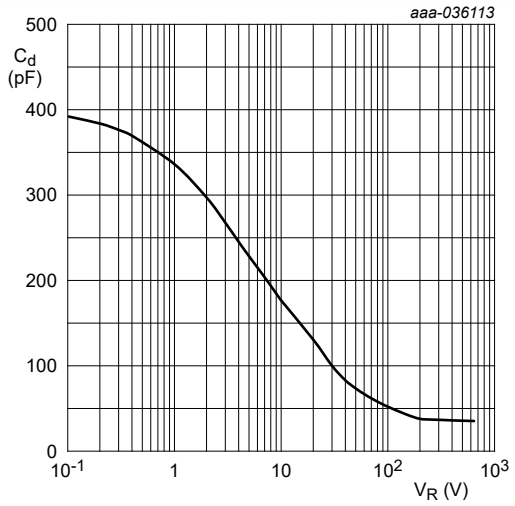
Pulsed condition:
(1) T_j = 175 °C
(2) T_j = 150 °C
(3) T_j = 125 °C
(4) T_j = 100 °C
(5) T_j = 25 °C
(6) T_j = -55 °C

Fig. 5. Forward characteristics in surge 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 = 25 °C
(6) T_j = -55 °C

Fig. 6. Reverse current as a function of reverse voltage; typical values



f = 1 MHz; T_{amb} = 25 °C

Fig. 7. Diode capacitance as a function of reverse voltage; typical values

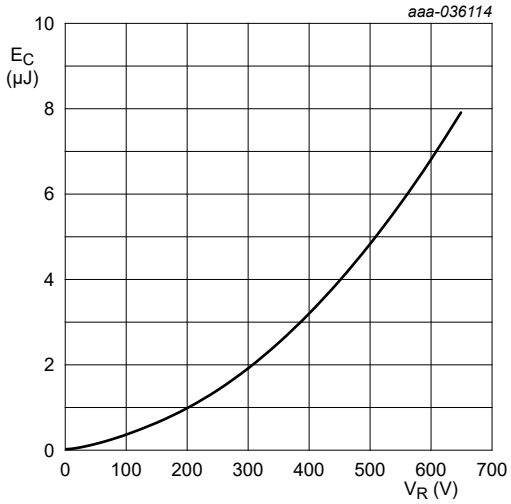


Fig. 8. Capacitance stored energy as a function of reverse voltage; typical values

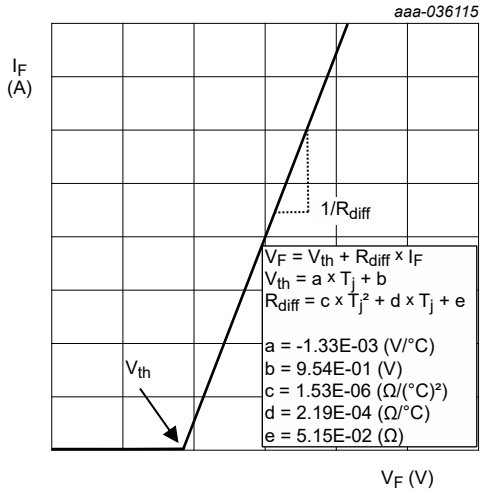


Fig. 9. Simplified forward characteristics mode

11. Test information

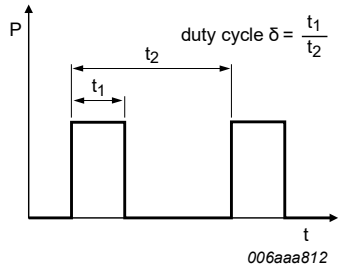


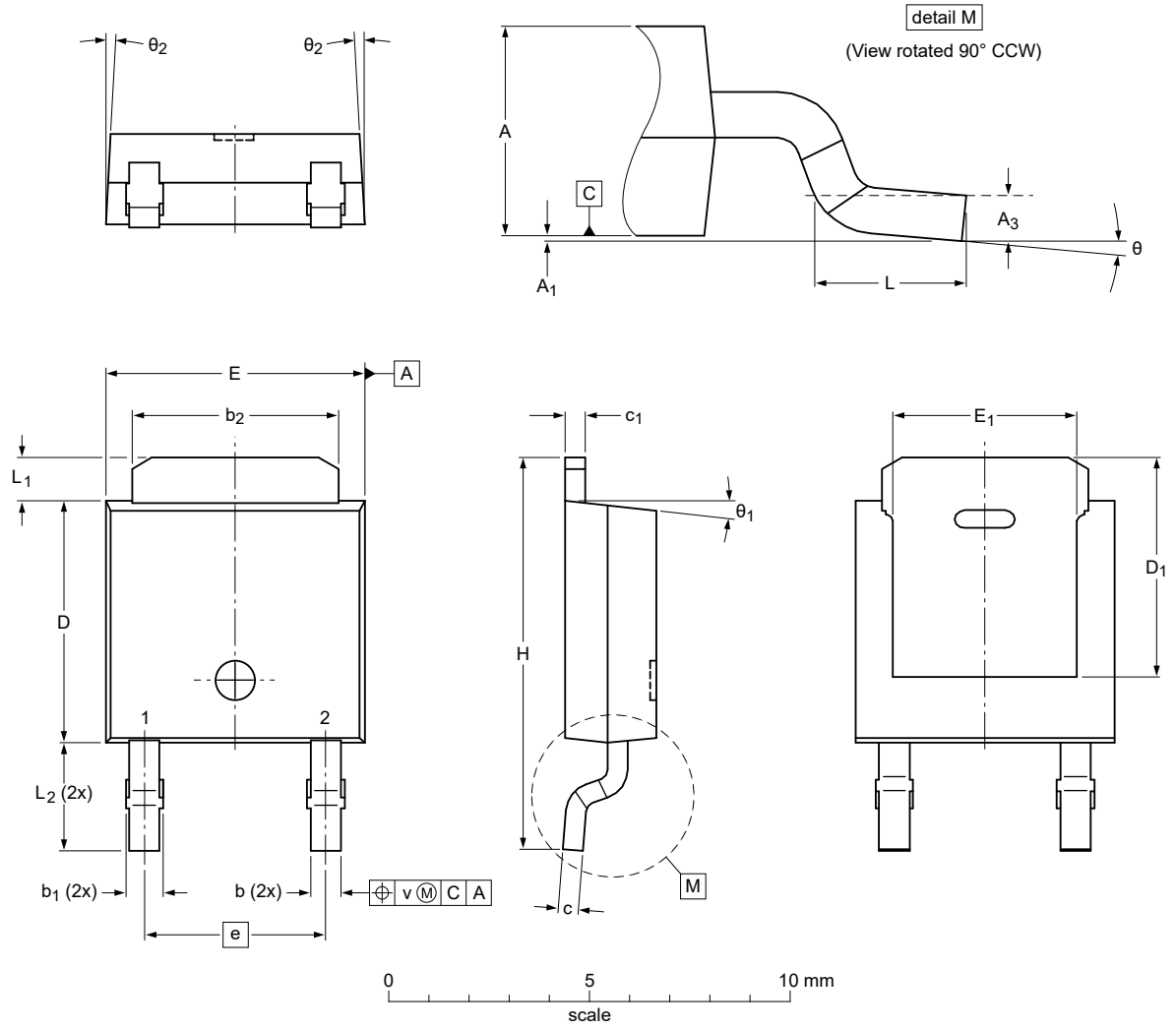
Fig. 10. Duty cycle definition

Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

12. Package outline

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**



Dimensions (mm are the original dimensions)

Unit		A	A_1	A_3	b	b_1	b_2	c	c_1	D	D_1	E	E_1	e	H	L	L_1	L_2	θ	$θ_1$	$θ_2$	v
mm	max	2.39	0.13	0.51 (TYP.)	0.89	1.13	5.46	0.61	0.60	6.22	5.70	6.73	4.80	4.58	10.34	1.78	1.27	2.74 (REF.)	10°	15°	3° (REF.)	0.25
	nom																					
	min	2.18	0.00		0.65	0.76	4.95	0.46	0.46	5.97	5.21	6.35	4.32		9.94	1.50	0.89		0°	0°		

Note
1. Dimensions “D” and “E” do not include mold flash.
2. All metal surfaces are Tin plated except trimmed area.

sot8017_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT8017		TO-252 Compatible				~~21-11-03~~ 24-01-17

Fig. 11. Package outline DPAK R2P (SOT8017)

13. Soldering

Footprint information for reflow soldering of DPAK R2P (SOT8017) package **SOT8017**

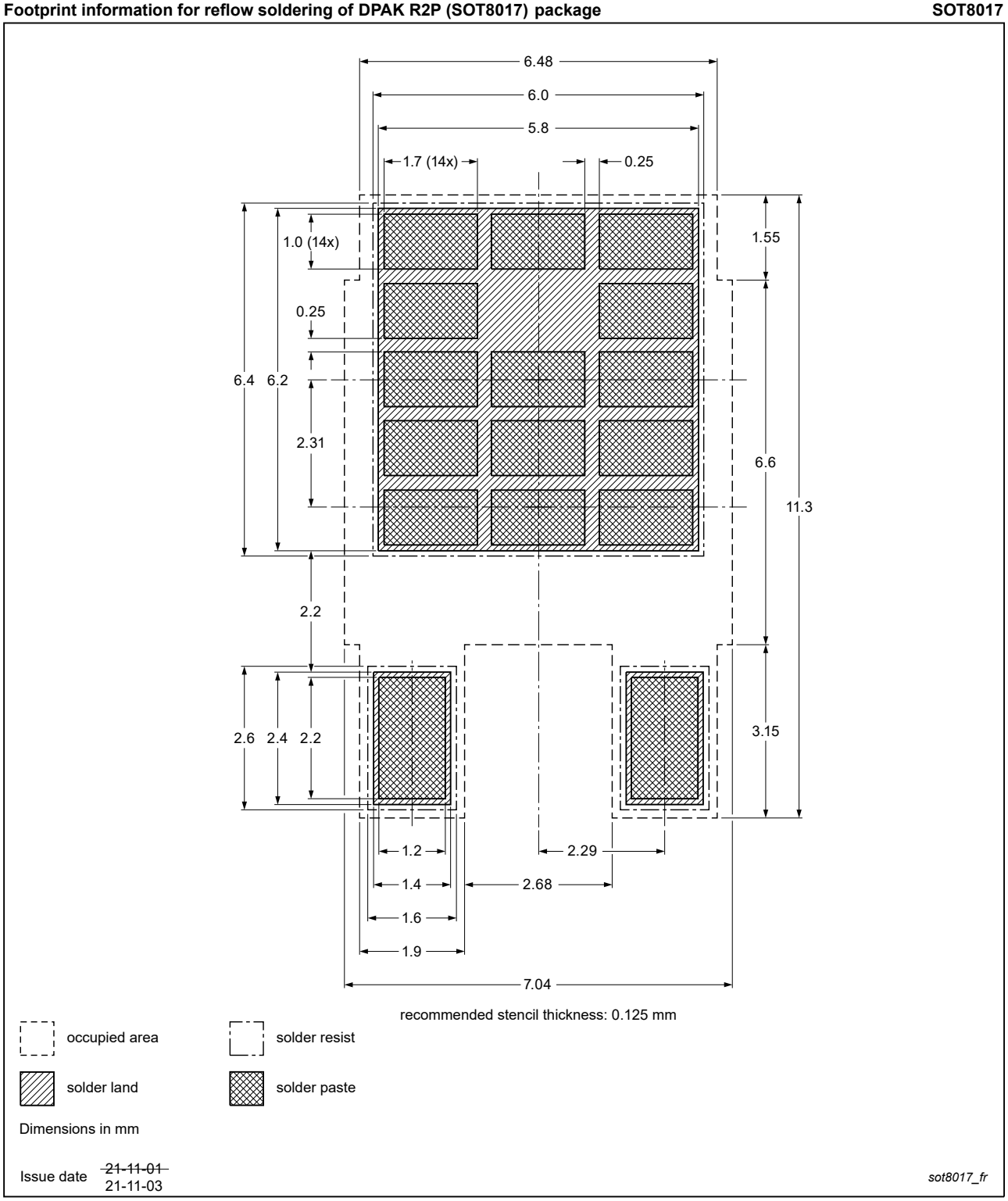


Fig. 12. Reflow soldering footprint for DPAK R2P (SOT8017)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PSC1065H-Q v.1	20240606	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.
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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Date of release: 6 June 2024