



# PSC0665H

650 V, 6 A SiC Schottky diode in DPAK R2P

25 September 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 DPAK 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 ( $Q_C \times V_F$ ). The Merged PiN Schottky (MPS) diode improves the robustness expressed in a high  $I_{FSM}$ .

## 2. Features and benefits

- Zero forward and reverse recovery
- Reduced system cost
- Temperature independent fast and smooth switching performance
- Outstanding figure-of-merit ( $Q_C \times V_F$ )
- High  $I_{FSM}$  capability
- High power density
- System miniaturization
- Reduced EMI

## 3. Applications

- Switch Mode Power Supply (SMPS)
- AC-DC and DC-DC converter
- Battery charging infrastructure
- Server and telecom power supply
- Uninterruptible Power Supply (UPS)
- Photovoltaic inverters

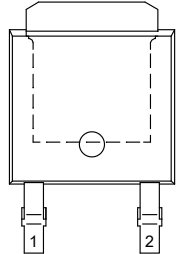
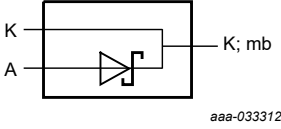
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_F$	forward current	$T_c \leq 133\text{ °C}$ ; $\delta = 1$	-	-	6	A
<b>Static characteristics</b>						
$V_{DC}$	DC blocking voltage		650	-	-	V
<b>Dynamic characteristics</b>						
$Q_C$	total capacitive charge	$V_R = 400\text{ V}$ ; $di_F/dt = 200\text{ A}/\mu\text{s}$ ; $I_F \leq 6\text{ A}$ ; $T_j = 25\text{ °C}$	-	14	-	nC

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p>DPAK R2P (SOT8017)</p>	 <p>aaa-033312</p>
2	A	anode		
mb	K	mounting base; connected to cathode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">PSC0665H</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
PSC0665H	PSC0665H

## 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	$T_j = 25\text{ °C}$	-	650	V
$dv/dt$	diode $dv/dt$ ruggedness	$0\text{ V} \leq V_R \leq 480\text{ V}$	-	100	V/ns
$I_F$	forward current	$T_c \leq 133\text{ °C}$ ; $\delta = 1$	-	6	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ }\mu\text{s}$ ; square wave; $T_c = 25\text{ °C}$	-	300	A
		$t_p = 10\text{ ms}$ ; half sine-wave; $T_c = 25\text{ °C}$	-	36	A
		$t_p = 10\text{ ms}$ ; half sine-wave; $T_c = 150\text{ °C}$	-	30	A
$\int i^2 dt$	$i^2 t$ value	$t_p = 10\text{ ms}$ ; $T_c = 25\text{ °C}$	-	6.5	$A^2s$
		$t_p = 10\text{ ms}$ ; $T_c = 150\text{ °C}$	-	4.5	$A^2s$
$P_{tot}$	total power dissipation	$T_c \leq 25\text{ °C}$	-	41	W
$T_j$	junction temperature		-55	175	$^{\circ}\text{C}$
$T_{amb}$	ambient temperature		-55	175	$^{\circ}\text{C}$
$T_{stg}$	storage temperature		-65	175	$^{\circ}\text{C}$

## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-c)}$	thermal resistance from junction to case		-	2.7	3.6	K/W

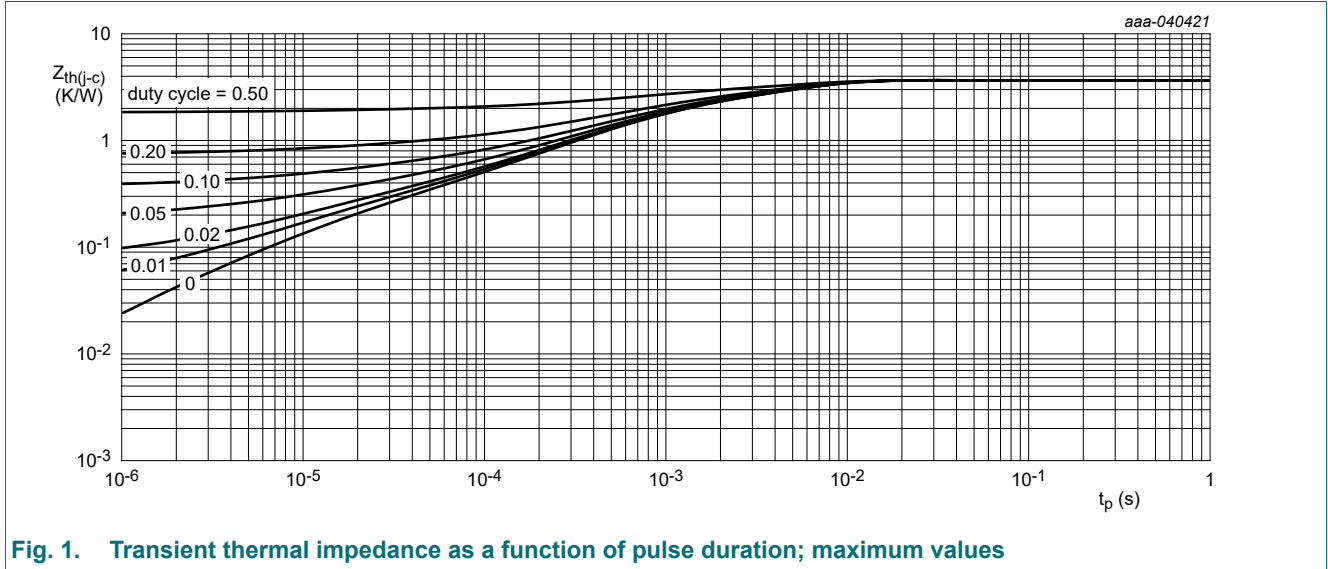


Fig. 1. Transient thermal impedance as a function of pulse duration; maximum values

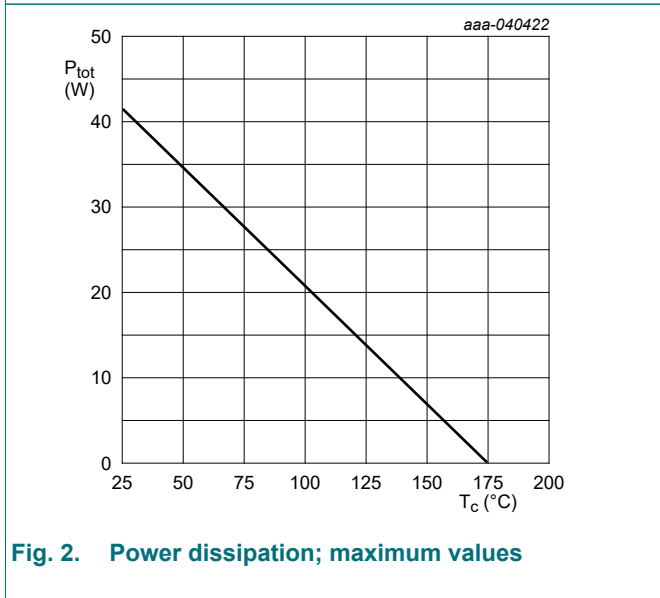


Fig. 2. Power dissipation; maximum values

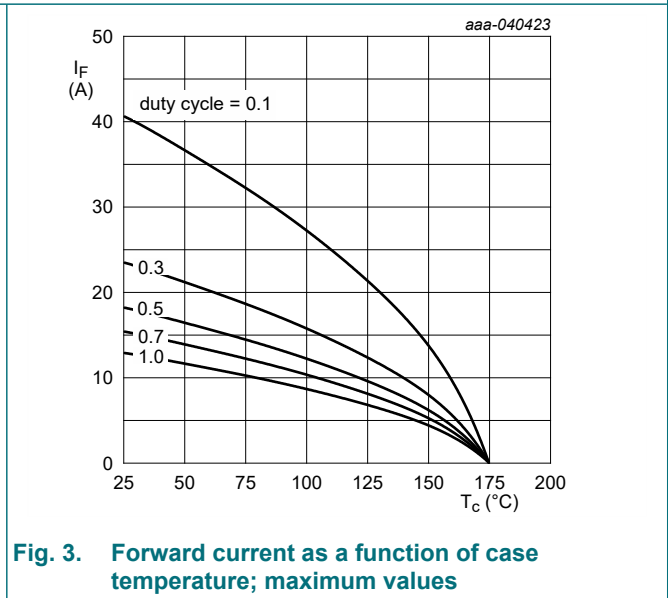
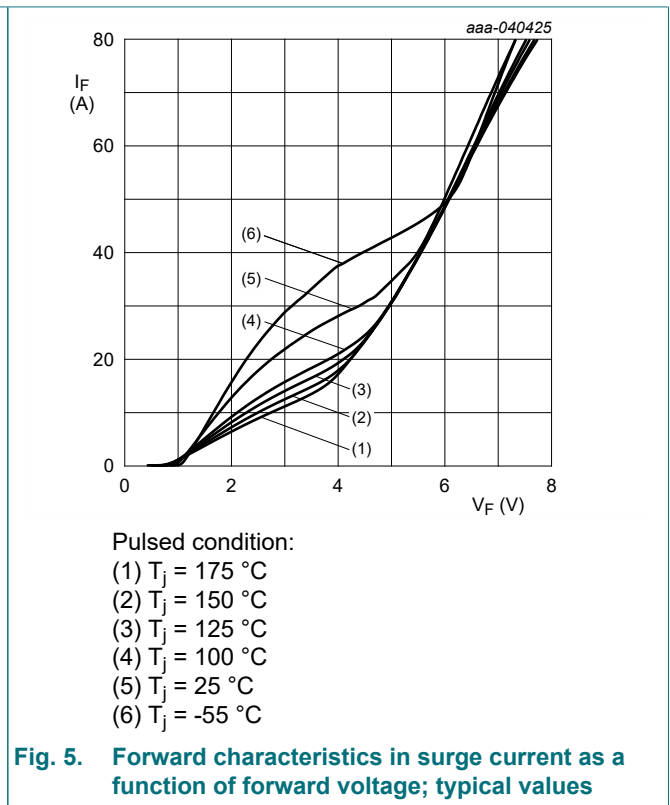
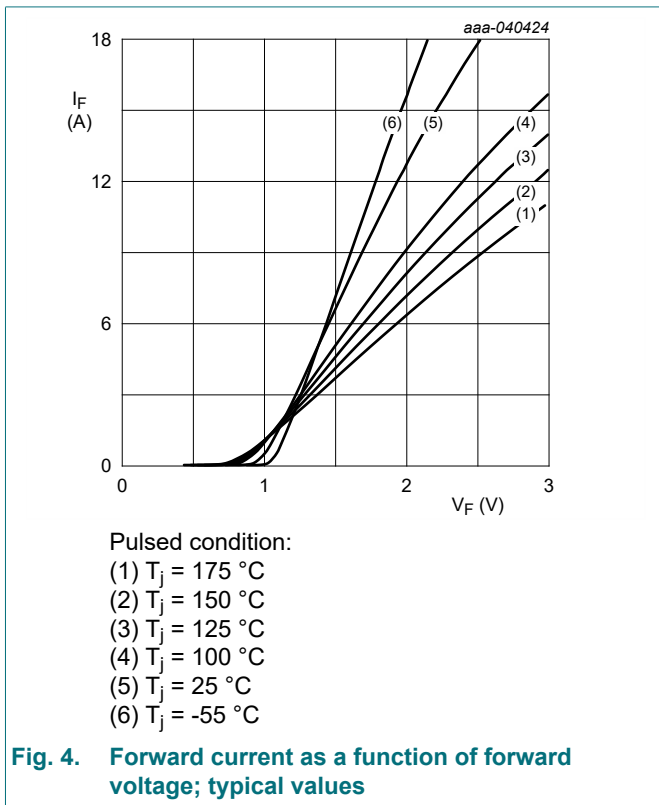


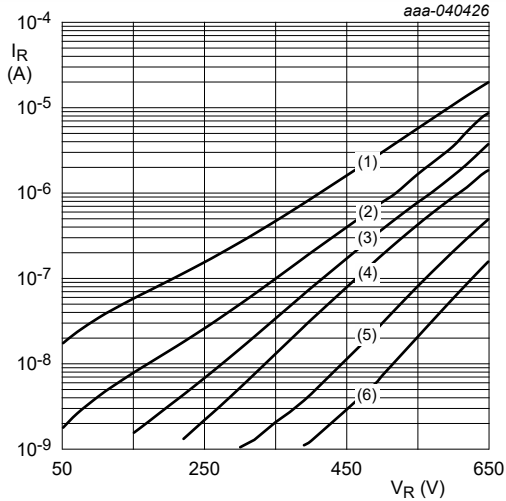
Fig. 3. Forward current as a function of case temperature; maximum values

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_{DC}$	DC blocking voltage		650	-	-	V
$V_F$	forward voltage	$I_F = 6\text{ A}; T_j = 25\text{ °C}$	-	1.5	1.8	V
		$I_F = 6\text{ A}; T_j = 150\text{ °C}$	-	1.95	2.6	V
$I_R$	reverse current	$V_R = 650\text{ V}; T_j = 25\text{ °C}$	-	1	180	$\mu\text{A}$
		$V_R = 650\text{ V}; T_j = 150\text{ °C}$	-	10	1250	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$C_d$	diode capacitance	$V_R = 1\text{ V}; f = 1\text{ MHz}; T_j = 25\text{ °C}$	-	225	-	pF
$Q_C$	total capacitive charge	$V_R = 400\text{ V}; di_F/dt = 200\text{ A}/\mu\text{s}; I_F \leq 6\text{ A}; T_j = 25\text{ °C}$	-	14	-	nC

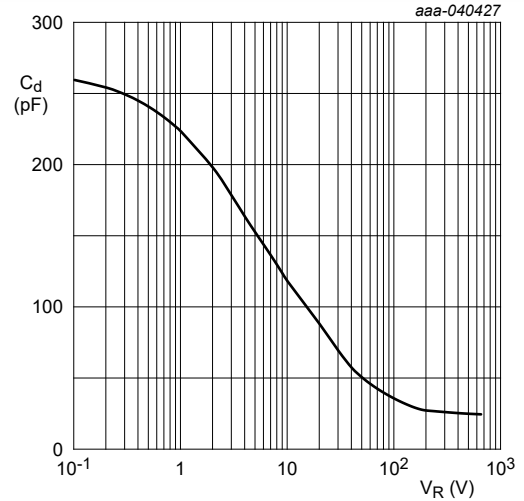




Pulsed condition:

- (1)  $T_j = 175\text{ °C}$
- (2)  $T_j = 150\text{ °C}$
- (3)  $T_j = 125\text{ °C}$
- (4)  $T_j = 100\text{ °C}$
- (5)  $T_j = 25\text{ °C}$
- (6)  $T_j = -55\text{ °C}$

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



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

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

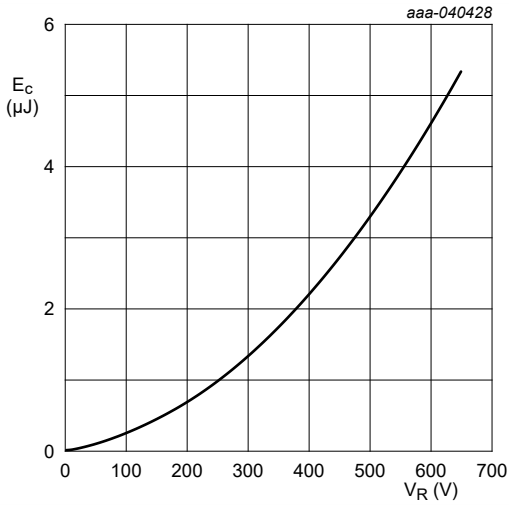


Fig. 8. Capacitance stored energy as a function of reverse voltage; typical values

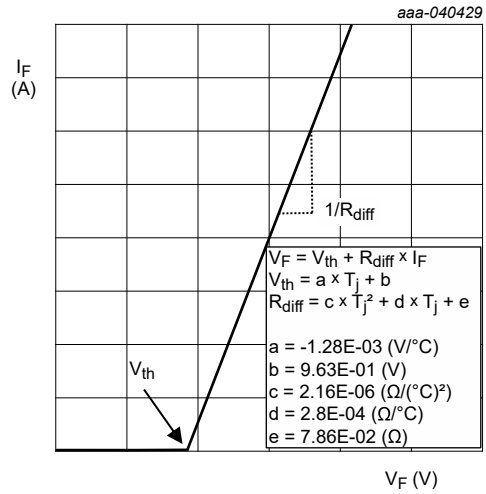


Fig. 9. Simplified forward characteristics mode

## 11. Test information

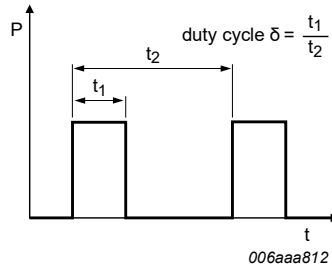


Fig. 10. Duty cycle definition

## 12. Package outline

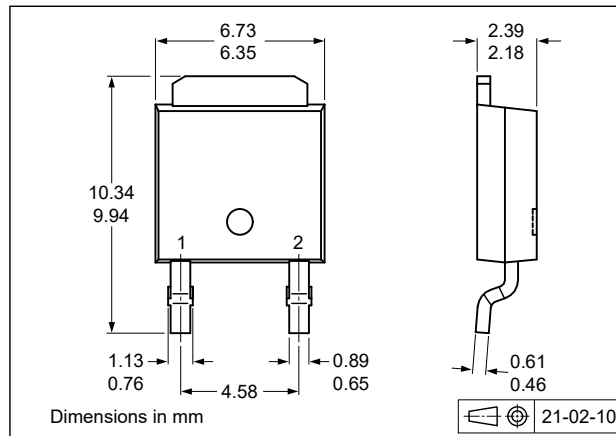


Fig. 11. Package outline DPAK R2P (SOT8017)

### 13. Soldering

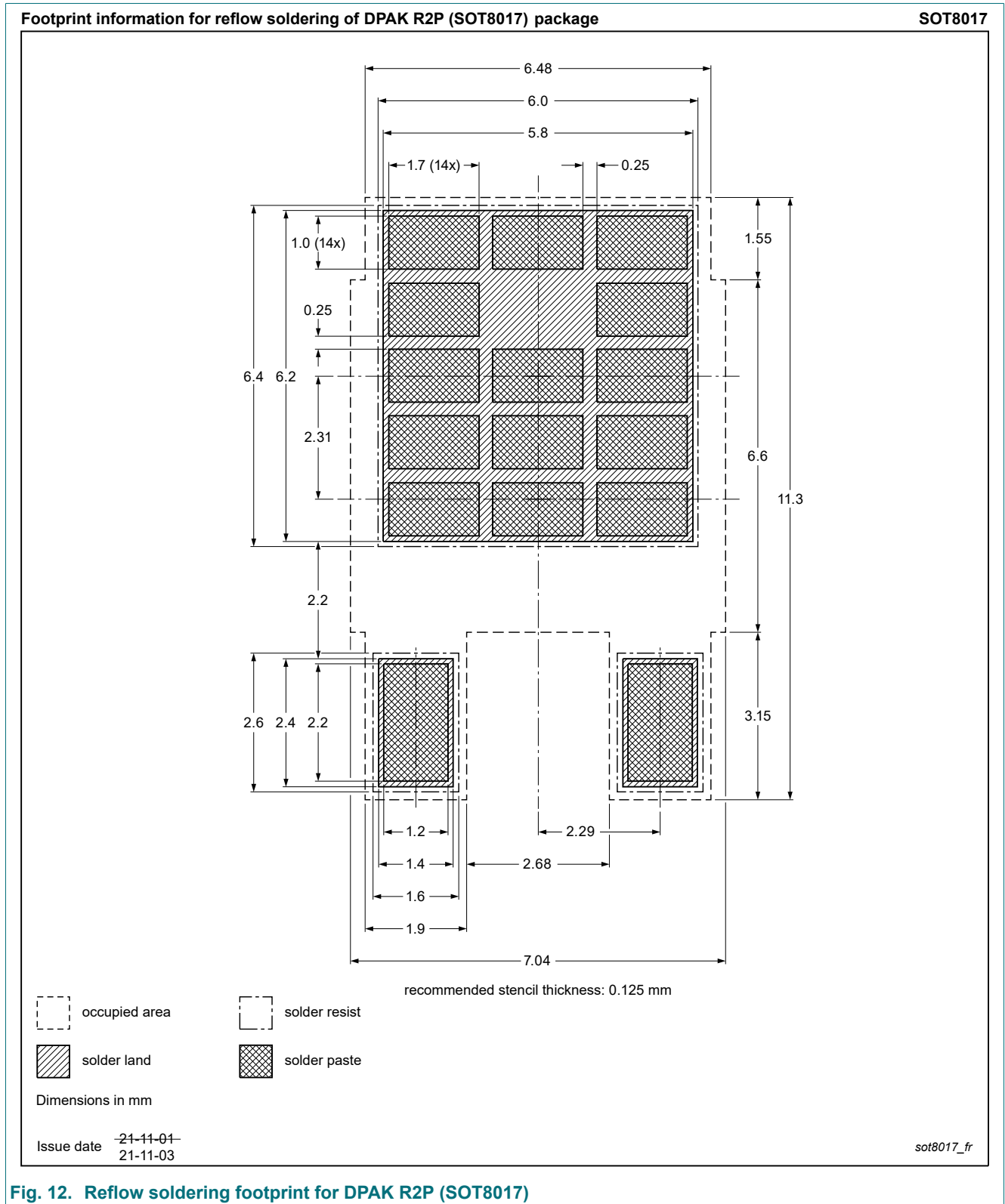


Fig. 12. Reflow soldering footprint for DPAK R2P (SOT8017)

## 14. Revision history

**Table 8. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PSC0665H v.3	20240925	Product data sheet	-	PSC0665H v.2
Modifications:	<ul style="list-style-type: none"><li>• Thermal Characteristics: Figure 3 adapted</li><li>• Product status changed</li></ul>			
PSC0665H v.2	20240819	Preliminary data sheet	-	PSC0665H v.1
PSC0665H v.1	20240716	Preliminary 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.

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