



PSC2065J-Q

650 V, 20 A SiC Schottky diode in D2PAK R2P for automotive applications

9 December 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 D2PAK R2P (TO-263-2) 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
- Temperature independent fast and smooth switching performance
- Outstanding figure of merit ($Q_C \times V_F$)
- High I_{FSM} capability
- High power density
- Reduced system cost
- 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

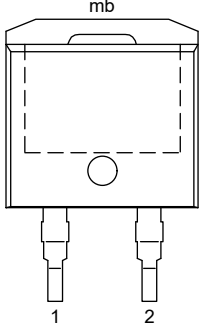
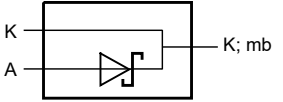
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_F	forward current	$T_C \leq 111\text{ °C}$; $\delta = 1$	-	-	20	A
Static characteristics						
V_{DC}	DC blocking voltage		650	-	-	V
Dynamic characteristics						
Q_C	total capacitive charge	$V_R = 400\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $I_F = 20\text{ A}$; $T_j = 25\text{ °C}$	-	41	-	nC

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p style="text-align: center;">D2PAK R2P (SOT8018)</p>	 <p style="text-align: right; font-size: small;">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
PSC2065J-Q	D2PAK R2P	Plastic, single-ended surface-mounted package (D2PAK R2P); Real-2-Pin configuration; 5.08 mm pitch; 8.8 mm x 10.35 mm x 4.46 mm body	SOT8018

7. Marking

Table 4. Marking codes

Type number	Marking code
PSC2065J-Q	PSC2065JQ

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	$T_c \leq 111\text{ °C}$; $\delta = 1$	-	20	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ }\mu\text{s}$; square wave; $T_c = 25\text{ °C}$	-	780	A
		$t_p = 10\text{ ms}$; half sine-wave; $T_c = 25\text{ °C}$	-	95	A
		$t_p = 10\text{ ms}$; half sine-wave; $T_c = 150\text{ °C}$	-	80	A
$\int i^2 dt$	$i^2 t$ value	$t_p = 10\text{ ms}$; $T_c = 25\text{ °C}$	-	45	A ² s
		$t_p = 10\text{ ms}$; $T_c = 150\text{ °C}$	-	32	A ² s
P_{tot}	total power dissipation	$T_c \leq 25\text{ °C}$	-	98	W
T_j	junction temperature		-55	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		-	1.2	1.5	K/W

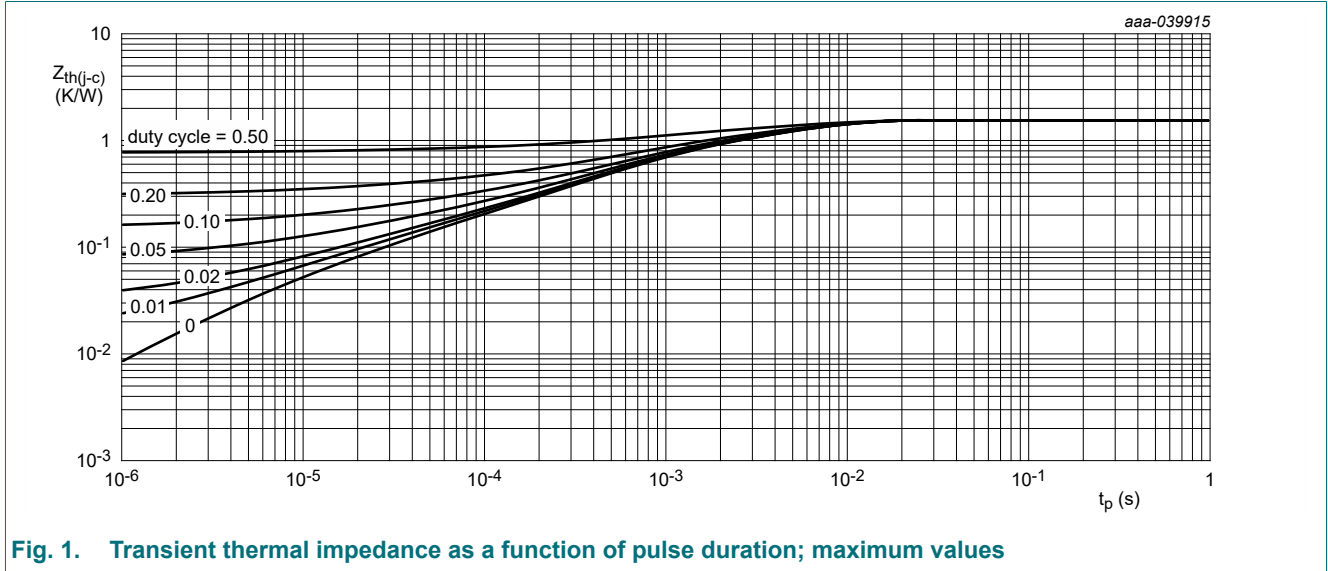


Fig. 1. Transient thermal impedance as a function of pulse duration; maximum values

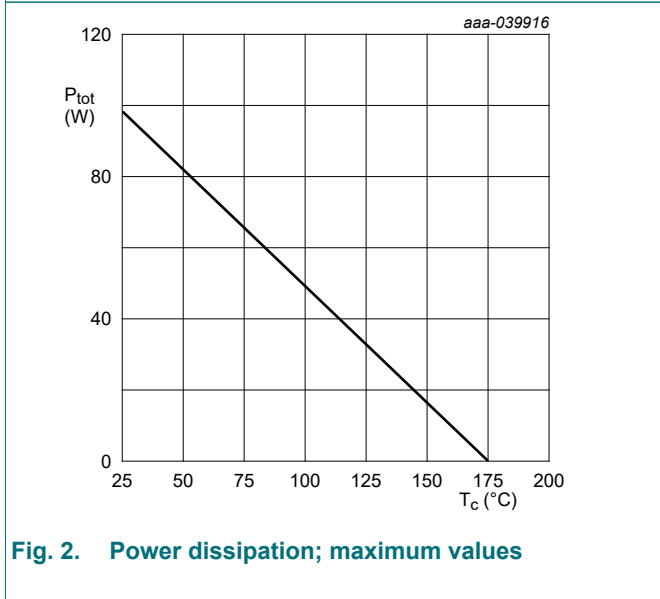


Fig. 2. Power dissipation; maximum values

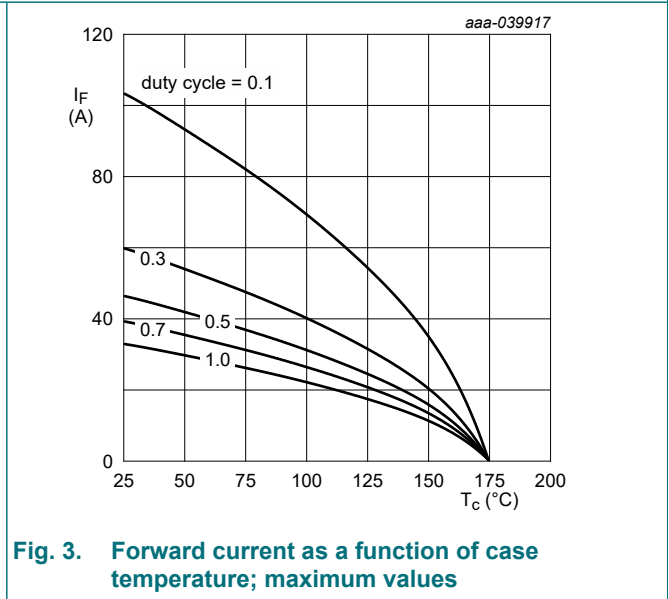
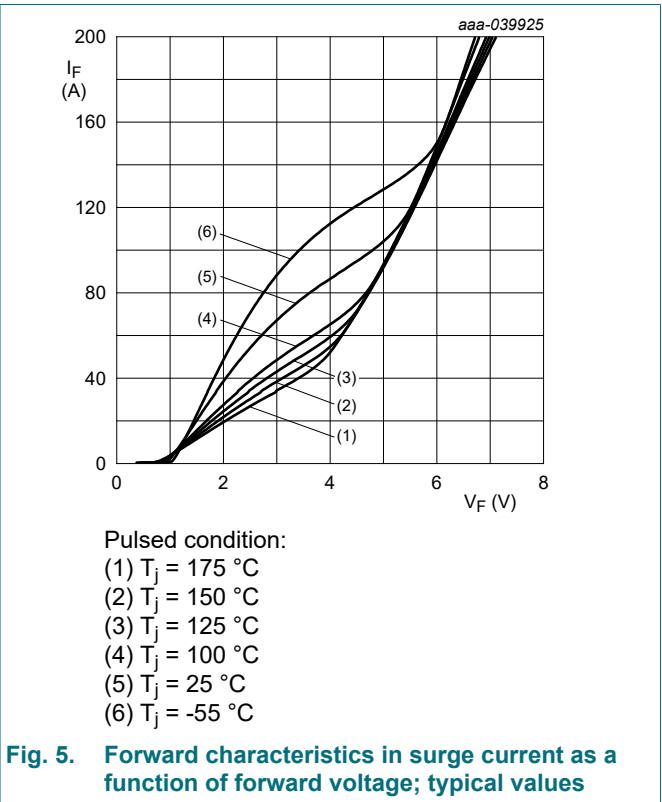
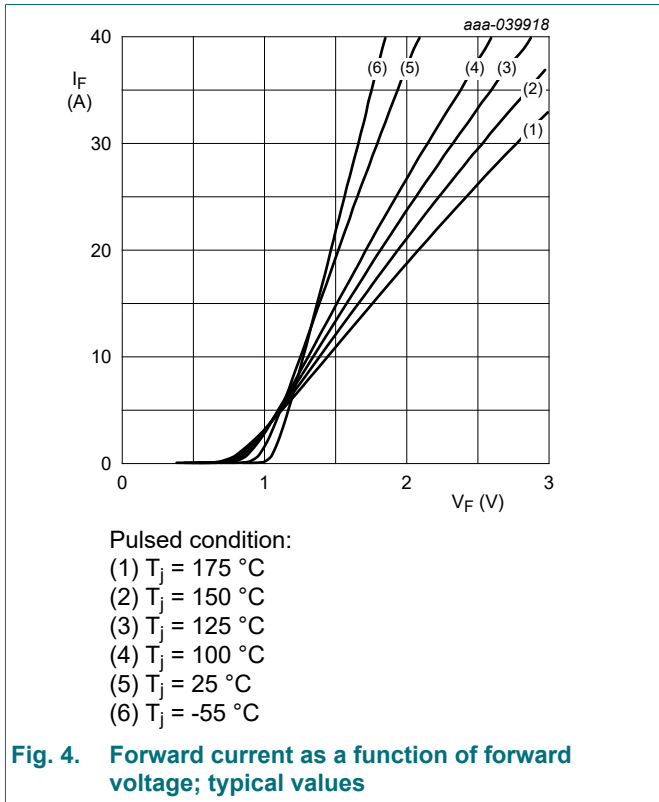


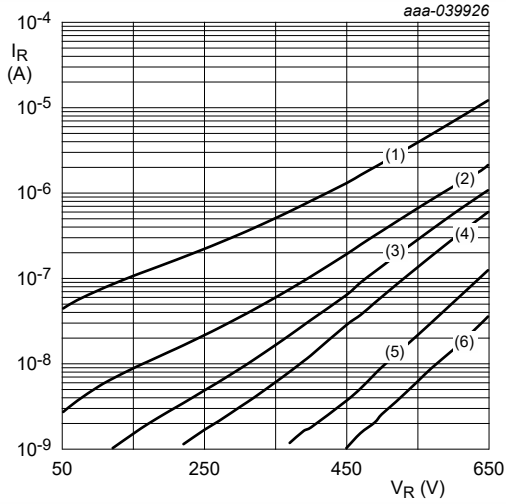
Fig. 3. Forward current as a function of case temperature; maximum values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_{DC}	DC blocking voltage		650	-	-	V
V_F	forward voltage	$I_F = 20\text{ A}; T_j = 25\text{ °C}$	-	1.5	1.8	V
		$I_F = 20\text{ A}; T_j = 150\text{ °C}$	-	2	2.6	V
I_R	reverse current	$V_R = 650\text{ V}; T_j = 25\text{ °C}$	-	1	180	μA
		$V_R = 650\text{ V}; T_j = 150\text{ °C}$	-	10	1250	μA
Dynamic characteristics						
C_d	diode capacitance	$V_R = 1\text{ V}; f = 1\text{ MHz}; T_j = 25\text{ °C}$	-	680	-	pF
		$V_R = 400\text{ V}; f = 1\text{ MHz}; T_j = 25\text{ °C}$	-	73	-	pF
Q_C	total capacitive charge	$V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; I_F = 20\text{ A}; T_j = 25\text{ °C}$	-	41	-	nC

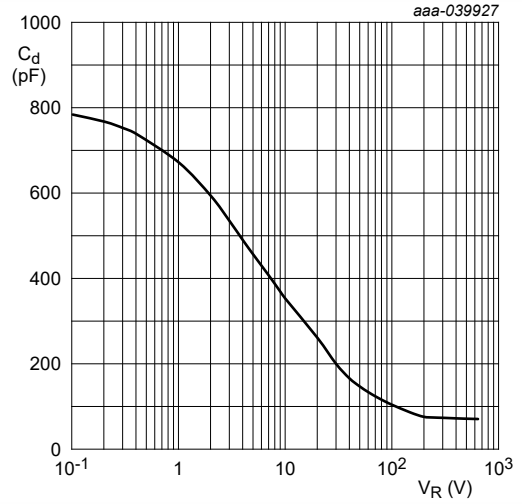




Pulsed condition:

- (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

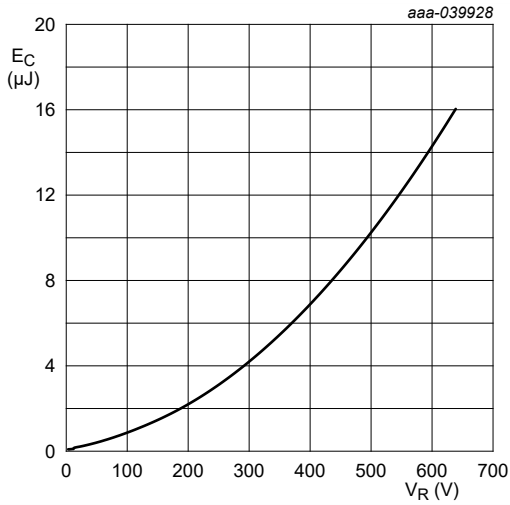


Fig. 8. Capacitance stored energy as a function of reverse voltage; typical values

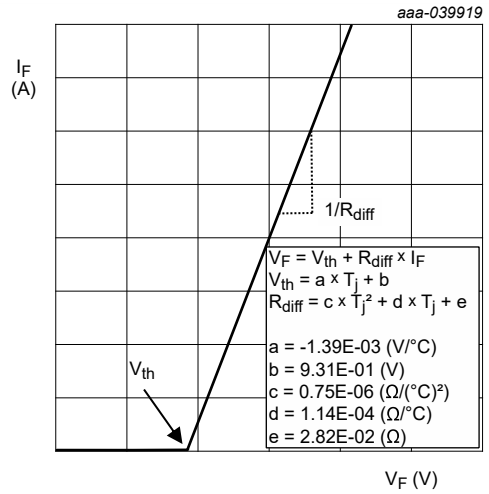


Fig. 9. Simplified forward characteristics mode

11. Test information

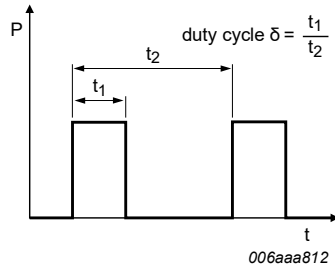


Fig. 10. Duty cycle definition

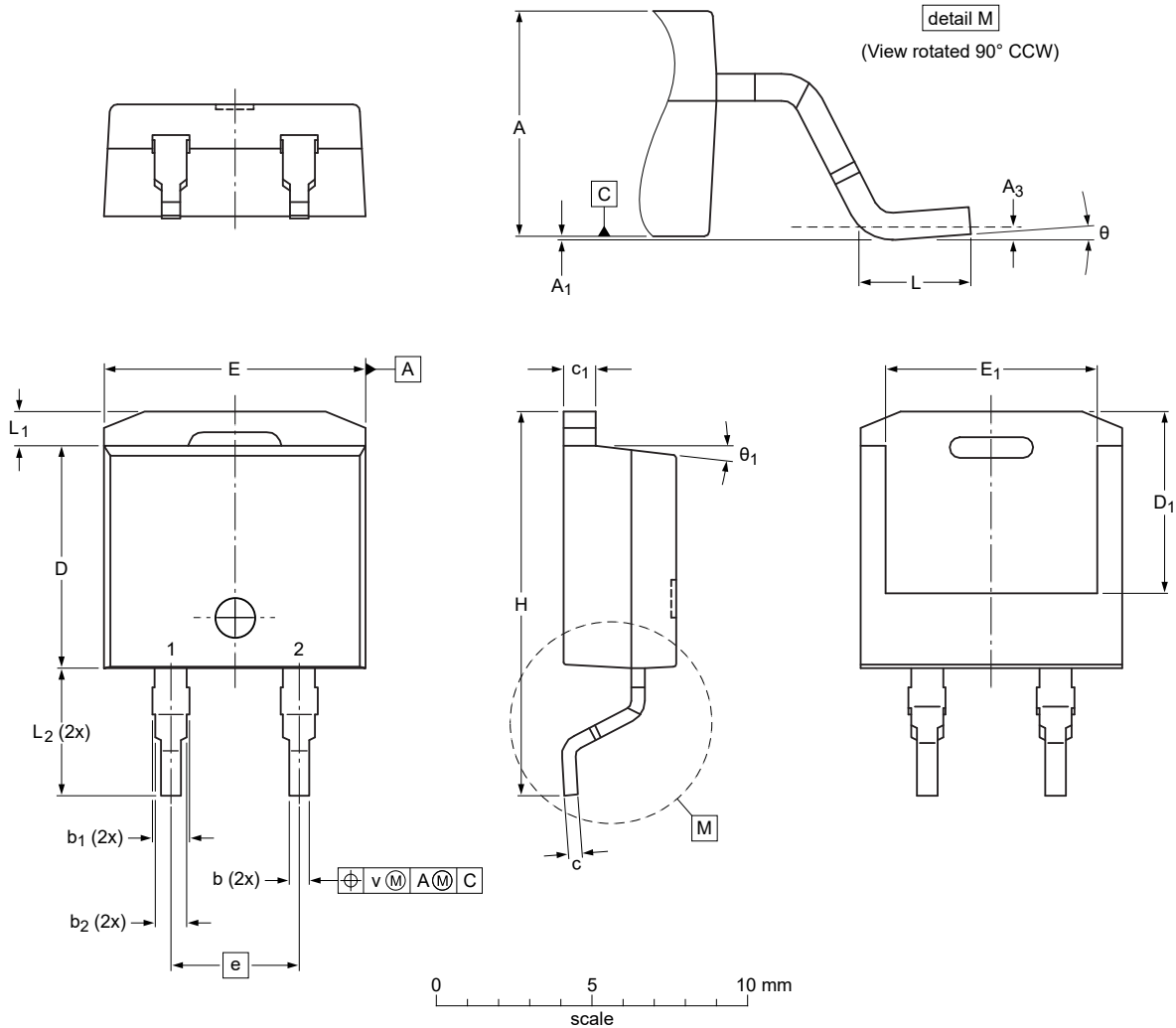
Quality information

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 (D2PAK R2P); Real-2-Pin configuration;
5.08 mm pitch; 8.8 mm x 10.35 mm x 4.46 mm body

SOT8018



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	v
max	4.56	0.25	0.25	0.90	1.57	1.46	0.69	1.34	9.00	7.50	10.55	8.70	15.60	2.50	1.65	5.28	10°	15°		
nom			(TYP.)										5.08							0.25
min	4.36	0.00		0.70	1.20	1.20	0.38	1.19	8.60	6.90	10.15	8.10	15.00	1.90	1.05	4.78	0°	0°		

Note

- Dimensions "D" and "E" do not include mold flash.
- All metal surfaces are Tin plated except trimmed area.

sot8018_po

Outline version	References			European projection	Issue date
	IEC	JEDEC	JEITA		
SOT8018		TO-263 Compatible			22-04-28 24-01-17

Fig. 11. Package outline D2PAK R2P (SOT8018)

13. Soldering

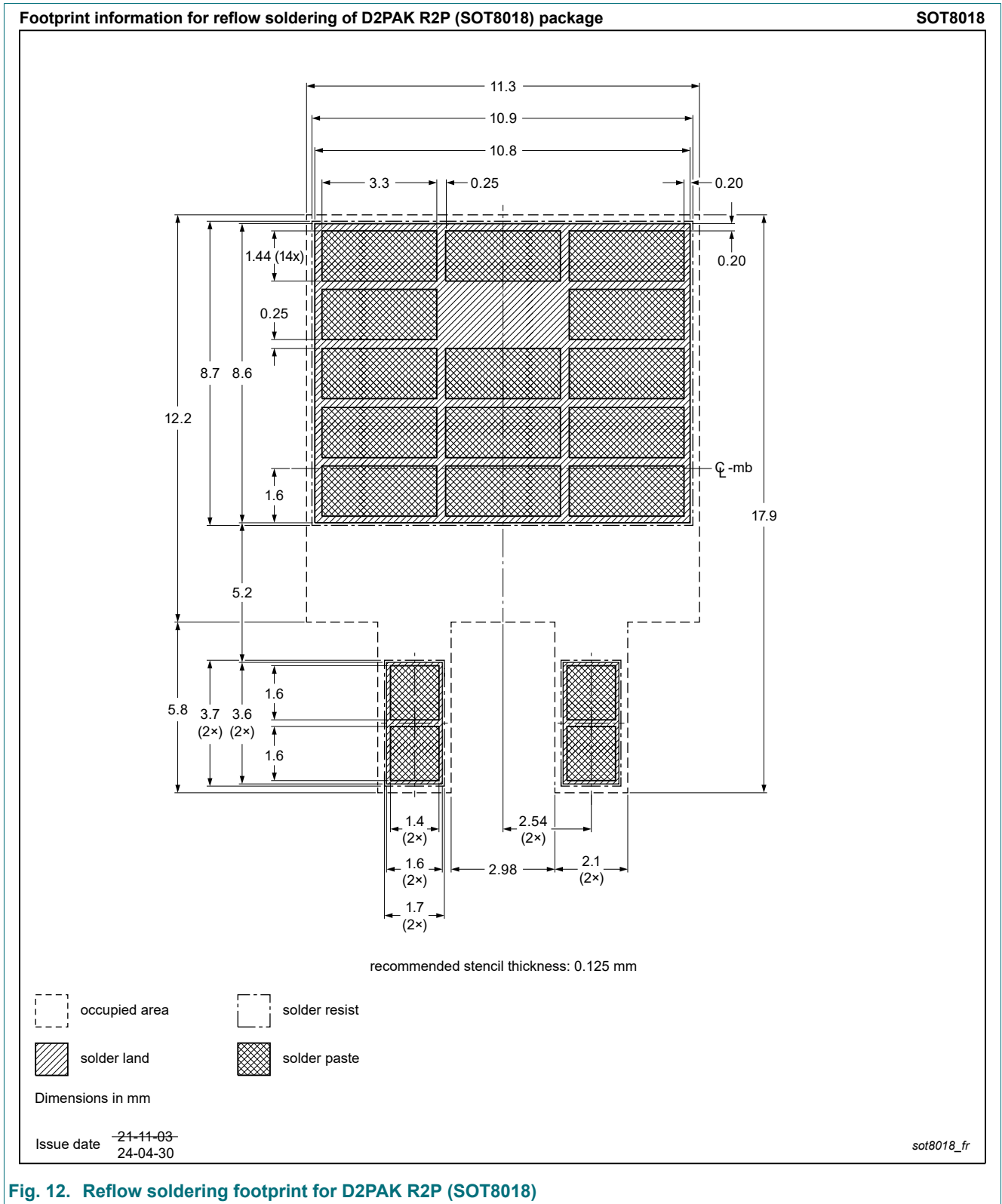


Fig. 12. Reflow soldering footprint for D2PAK R2P (SOT8018)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PSC2065J-Q v.3	20241209	Product data sheet	-	PSC2065J-Q v.2
Modifications:	• Product status changed			
PSC2065J-Q v.2	20240930	Preliminary data sheet	-	PSC2065J-Q v.1
PSC2065J-Q v.1	20240610	Objective 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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- [2] The term 'short data sheet' is explained in section "Definitions".
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Contents

1. General description.....	1
2. Features and benefits.....	1
3. Applications.....	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values.....	3
9. Thermal characteristics.....	4
10. Characteristics.....	5
11. Test information.....	7
12. Package outline.....	8
13. Soldering.....	9
14. Revision history.....	10
15. Legal information.....	11

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