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# PSC1665J

## 650 V, 16 A SiC Schottky diode in D2PAK R2P

17 July 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 ($Q_C$ x $V_F$). 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 ($Q_c$ x $V_F$)
- High $I_{FSM}$ capability
- High power density
- Reduced system costs
- 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 | $T_c \leq 120$ °C; $\delta = 1$ | | - | - | 16 | A |
| **Static characteristics** | | | | | | | |
| $V_{DC}$ | DC blocking voltage | | | 650 | - | - | V |
| **Dynamic characteristics** | | | | | | | |
| $Q_C$ | total capacitive charge | $V_R$ = 400 V; $dI_F/dt$ = 200 A/µs; $I_F$ = 16 A; $T_j$ = 25 °C | | - | 34 | - | nC |

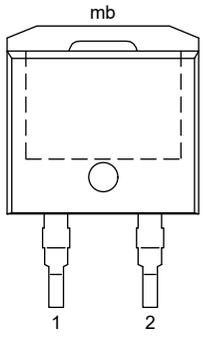
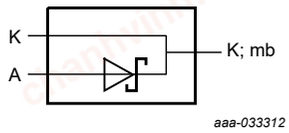
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## 5. Pinning information

**Table 2. Pinning information**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | K | cathode |  D2PAK R2P (SOT8018) |  |
| 2 | A | anode | | |
| mb | K | mounting base; connected to cathode | | |

## 6. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| PSC1665J | 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 |
|---|---|
| PSC1665J | PSC1665J |


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# 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 °C | | - | 650 | V |
| dv/dt | diode dv/dt ruggedness | 0 V ≤ $V_R$ ≤ 480 V | | - | 100 | V/ns |
| $I_F$ | forward current | $T_c$ ≤ 120 °C; δ = 1 | | - | 16 | A |
| $I_{FSM}$ | non-repetitive peak forward current | $t_p$ = 10 µs; square wave; $T_c$ = 25 °C | | - | 650 | A |
| | | $t_p$ = 10 ms; half sine-wave; $T_c$ = 25 °C | | - | 80 | A |
| | | $t_p$ = 10 ms; half sine-wave; $T_c$ = 150 °C | | - | 65 | A |
| $\int i^2dt$ | $i^2t$ value | $t_p$ = 10 ms; $T_c$ = 25 °C | | - | 32 | $A^2s$ |
| | | $t_p$ = 10 ms; $T_c$ = 150 °C | | - | 21 | $A^2s$ |
| $P_{tot}$ | total power dissipation | $T_c$ ≤ 25 °C | | - | 90 | W |
| $T_j$ | junction temperature | | | -55 | 175 | °C |
| $T_{amb}$ | ambient temperature | | | -55 | 175 | °C |
| $T_{stg}$ | storage temperature | | | -65 | 175 | °C |


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# 9. Thermal characteristics

**Table 6. Thermal characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $R_{th(j-c)}$ | thermal resistance from junction to case | | | - | 1.3 | 1.7 | K/W |

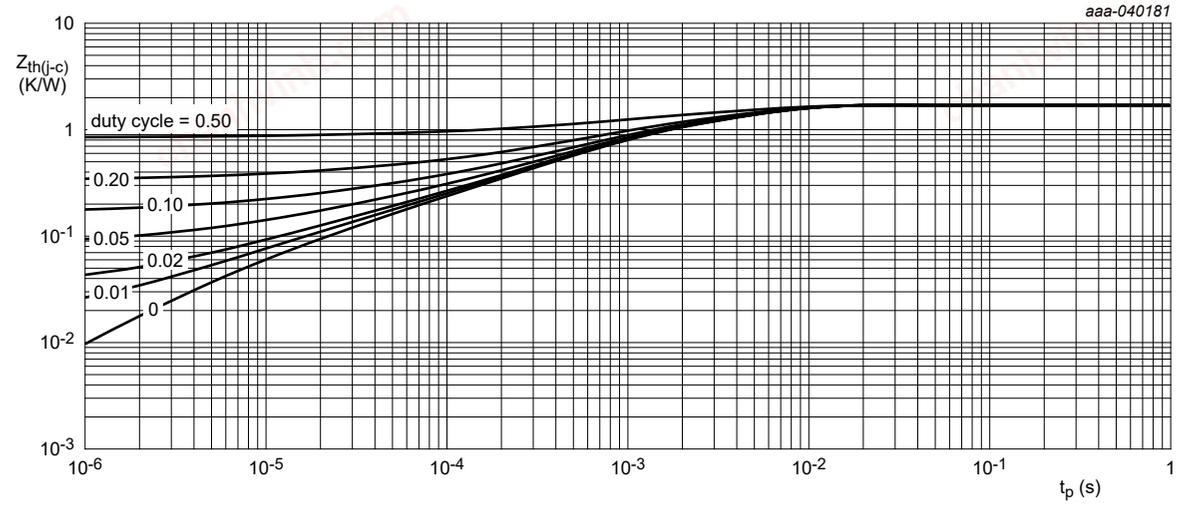



**Fig. 1. Transient thermal impedance as a function of pulse duration; maximum values**

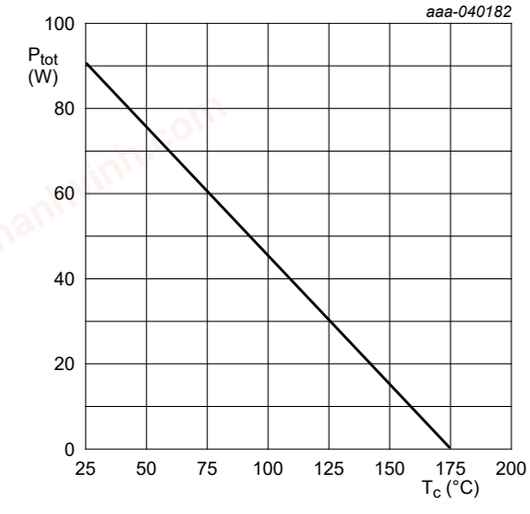



**Fig. 2. Power dissipation; maximum values**

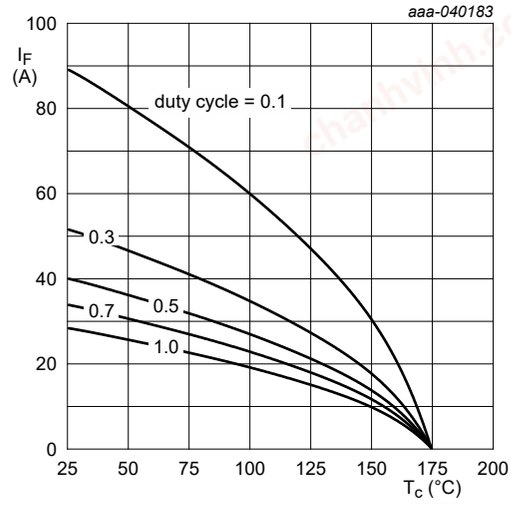



**Fig. 3. Forward current as a function of case temperature; maximum values**


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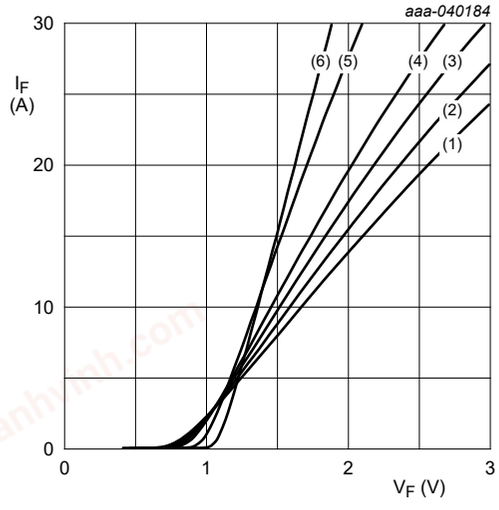
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## 10. Characteristics

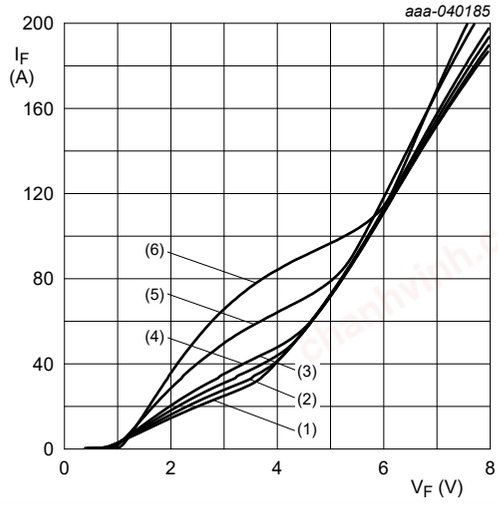
**Table 7. Characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **Static characteristics** | | | | | | | |
| $V_{DC}$ | DC blocking voltage | | | 650 | - | - | V |
| $V_F$ | forward voltage | $I_F$ = 16 A; $T_j$ = 25 °C | | - | 1.5 | 1.8 | V |
| | | $I_F$ = 16 A; $T_j$ = 150 °C | | - | 2 | 2.6 | V |
| $I_R$ | reverse current | $V_R$ = 650 V; $T_j$ = 25 °C | | - | 1 | 180 | µA |
| | | $V_R$ = 650 V; $T_j$ = 150 °C | | - | 10 | 1250 | µA |
| **Dynamic characteristics** | | | | | | | |
| $C_d$ | diode capacitance | $V_R$ = 1 V; f = 1 MHz; $T_j$ = 25 °C | | - | 475 | - | pF |
| | | $V_R$ = 400 V; f = 1 MHz; $T_j$ = 25 °C | | - | 61 | - | pF |
| $Q_C$ | total capacitive charge | $V_R$ = 400 V; $dI_F/dt$ = 200 A/µs; $I_F$ = 16 A; $T_j$ = 25 °C | | - | 34 | - | 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

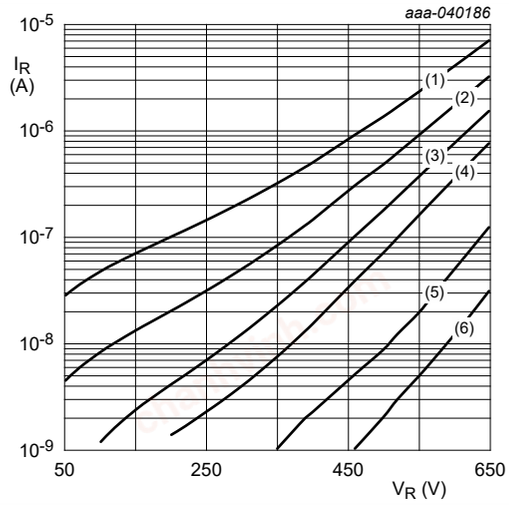
**Fig. 5. Forward characteristics in surge current as a function of forward voltage; typical values**


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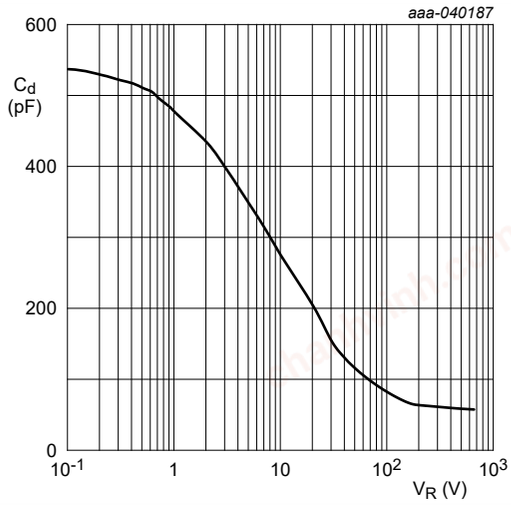
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Pulsed condition:
(1) $T_j$ = 175 °C
(2) $T_j$ = 150 °C
(3) $T_j$ = 125 °C
(4) $T_j$ = 100 °C
(5) $T_j$ = 25 °C
(6) $T_j$ = -55 °C

**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**

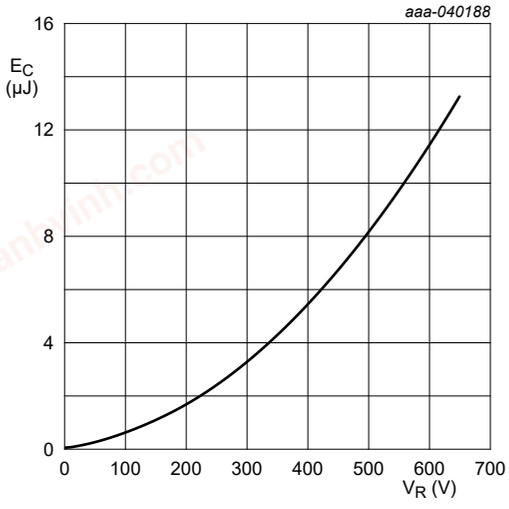



**Fig. 8. Capacitance stored energy as a function of reverse voltage; typical values**

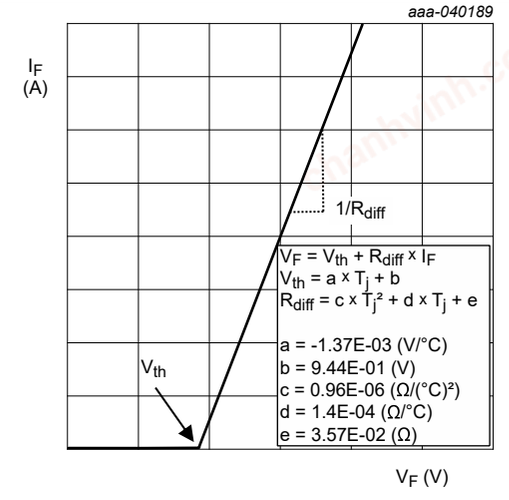



**Fig. 9. Simplified forward characteristics mode**


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## 11. Test information

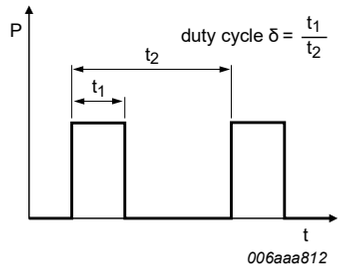



Fig. 10. Duty cycle definition

## 12. Package outline

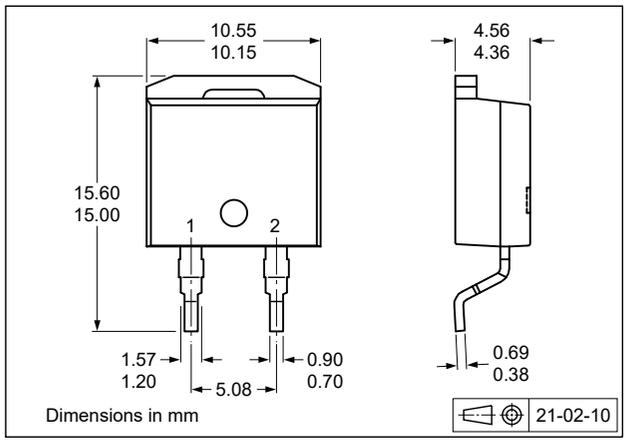



Fig. 11. Package outline D2PAK R2P (SOT8018)


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# 13. Soldering

**Footprint information for reflow soldering of D2PAK R2P (SOT8018) package** **SOT8018**

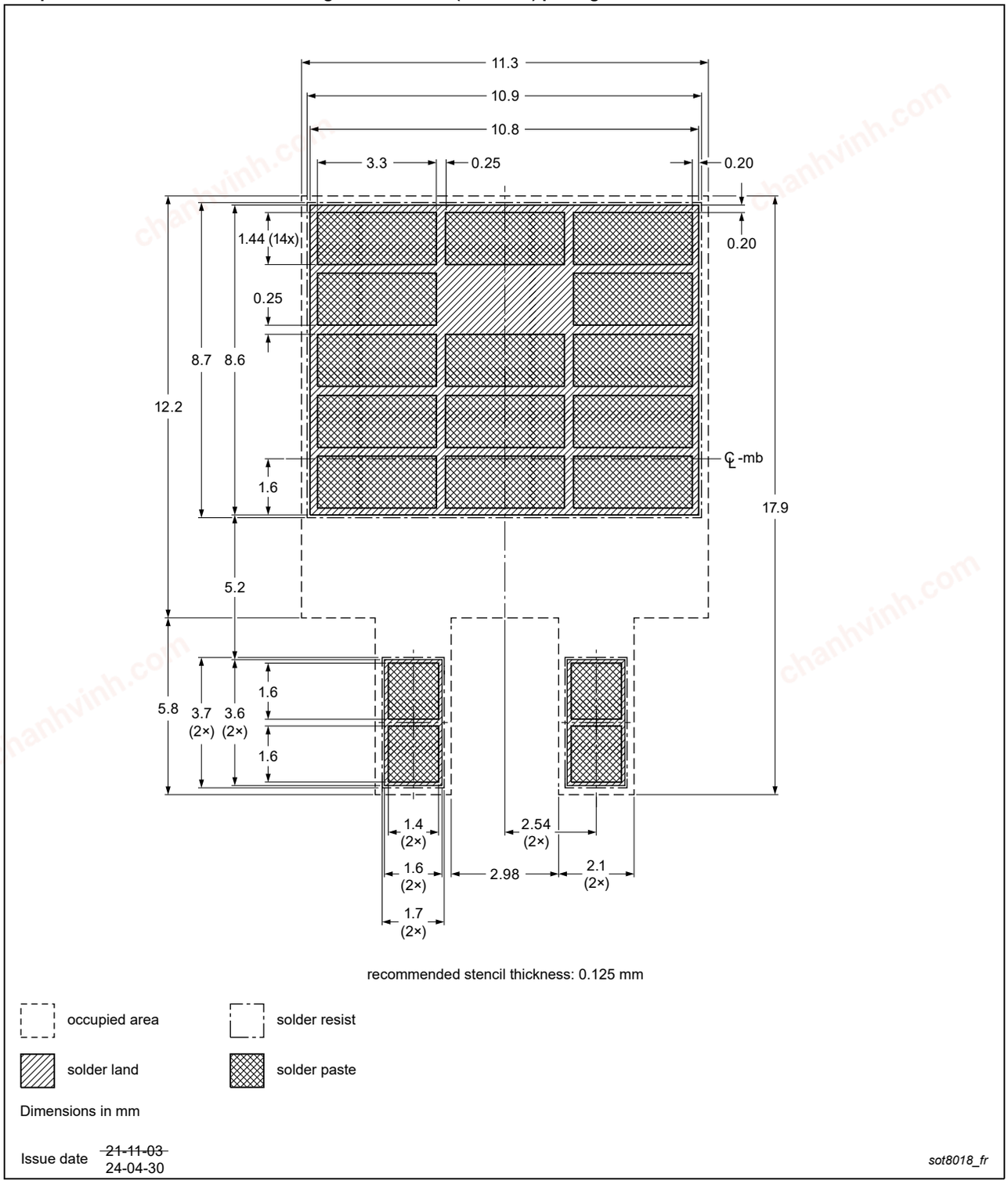



**Fig. 12. Reflow soldering footprint for D2PAK R2P (SOT8018)**


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# 14. Revision history

**Table 8. Revision history**

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| PSC1665J v.1 | 20240717 | Product data sheet | - | - |

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| Document status [1][2] | Product status [3] | Definition |
|---|---|---|
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| 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".
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