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

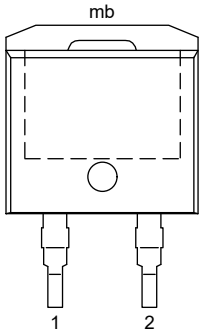
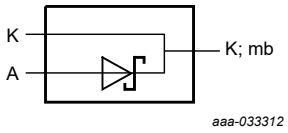
4. Quick reference data

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

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

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

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

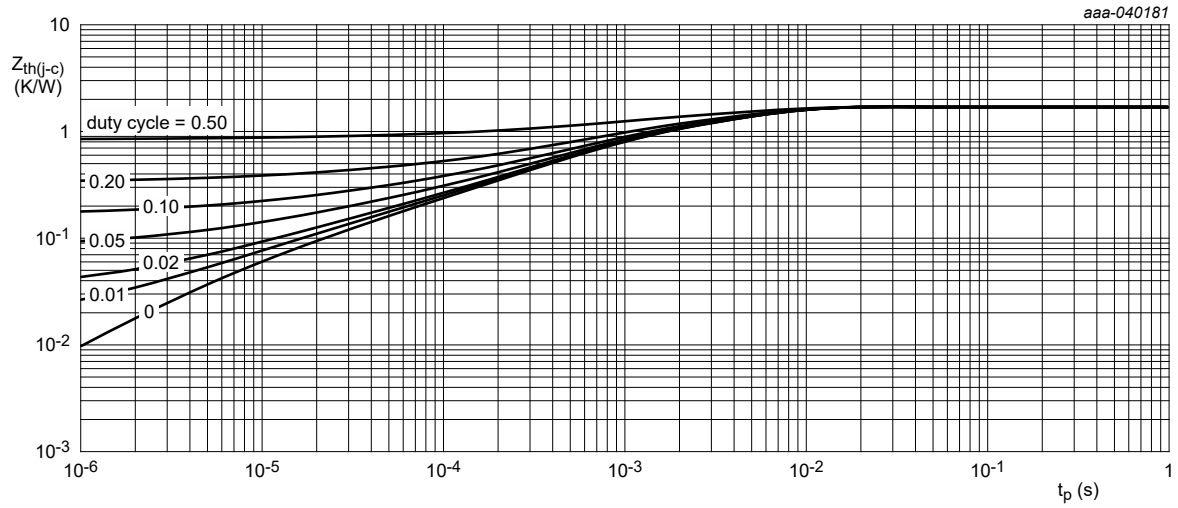


Fig. 1. Transient thermal impedance as a function of pulse duration; maximum values

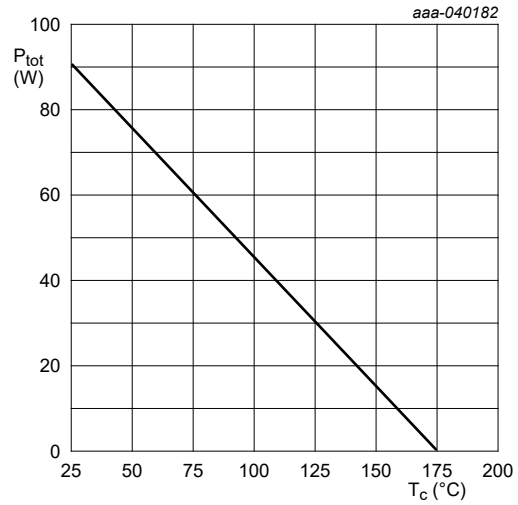


Fig. 2. Power dissipation; maximum values

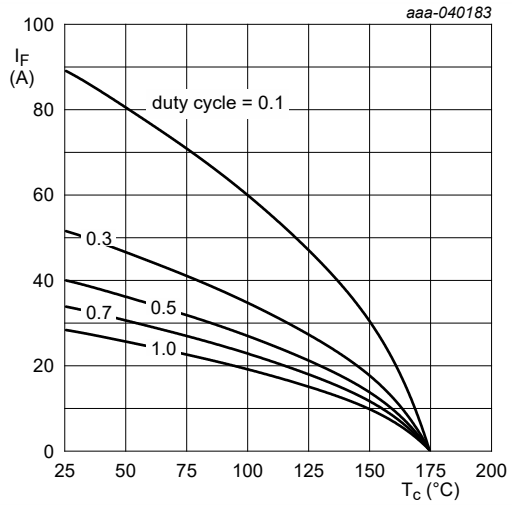
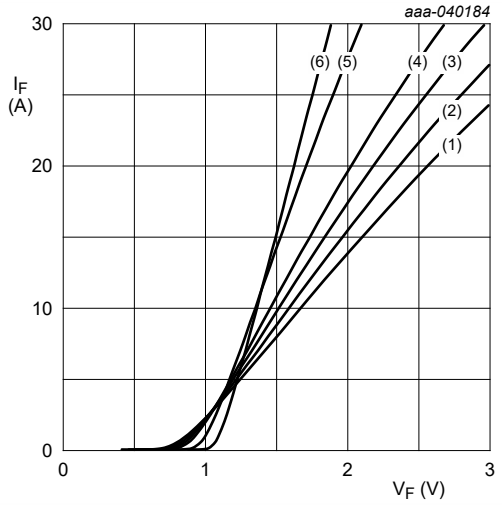


Fig. 3. Forward current as a function of case temperature; maximum values

10. Characteristics

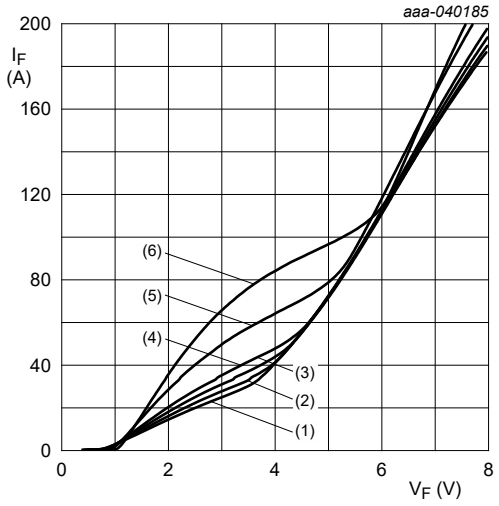
Table 7. Characteristics

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



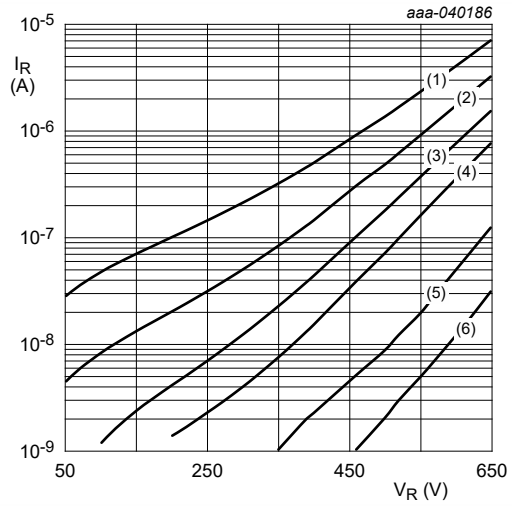
Pulsed condition:
(1) T_j = 175 °C
(2) T_j = 150 °C
(3) T_j = 125 °C
(4) T_j = 100 °C
(5) T_j = 25 °C
(6) T_j = -55 °C

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



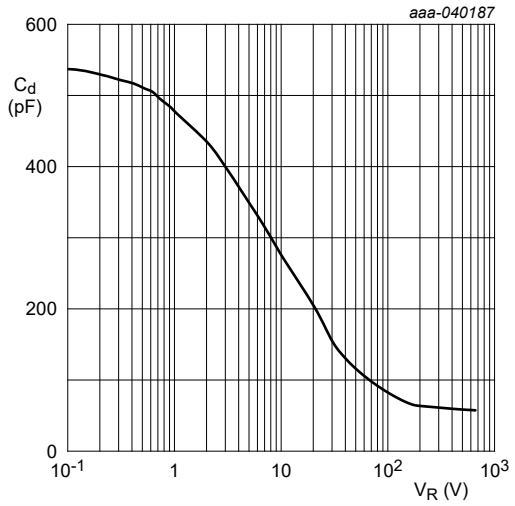
Pulsed condition:
(1) T_j = 175 °C
(2) T_j = 150 °C
(3) T_j = 125 °C
(4) T_j = 100 °C
(5) T_j = 25 °C
(6) T_j = -55 °C

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



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

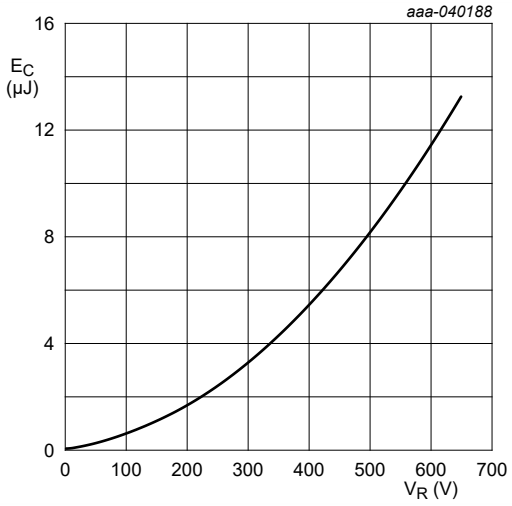


Fig. 8. Capacitance stored energy as a function of reverse voltage; typical values

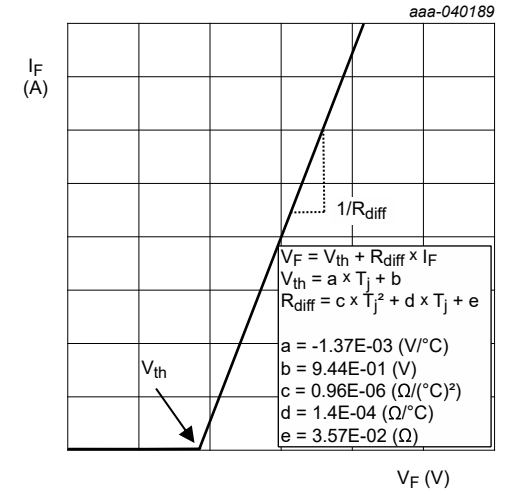


Fig. 9. Simplified forward characteristics mode

11. Test information

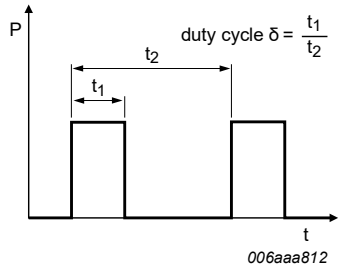


Fig. 10. Duty cycle definition

12. Package outline

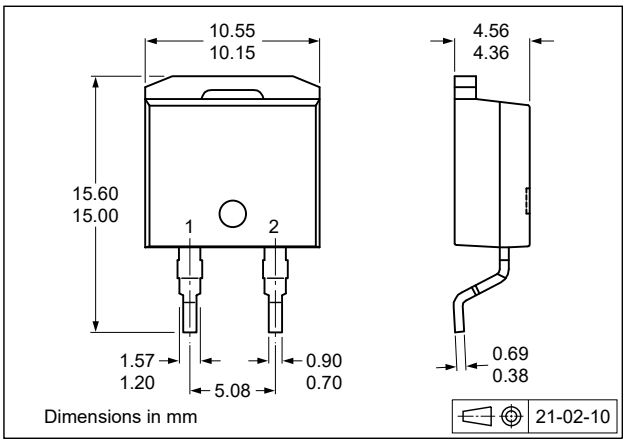


Fig. 11. Package outline D2PAK R2P (SOT8018)

13. Soldering

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

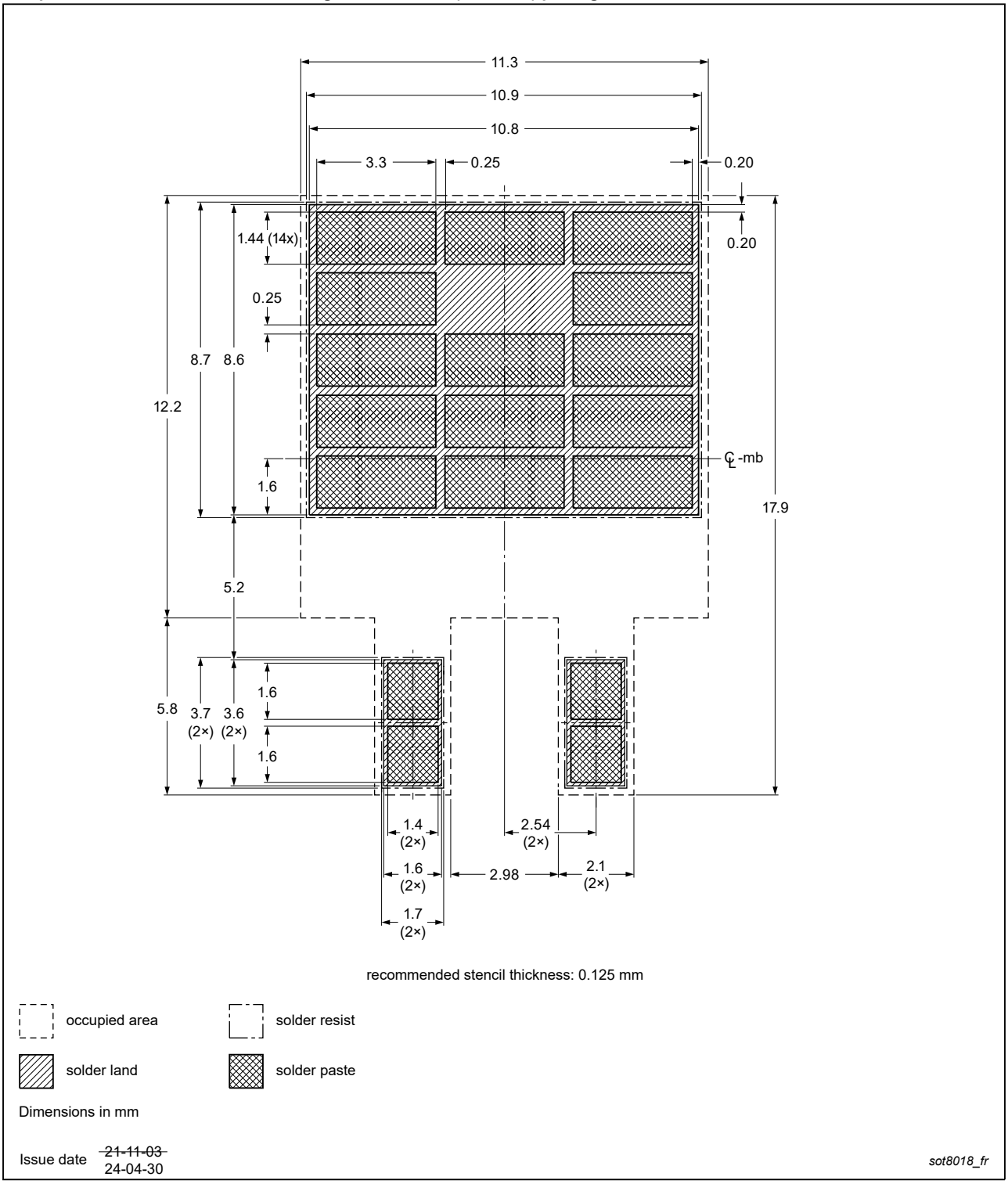


Fig. 12. Reflow soldering footprint for D2PAK R2P (SOT8018)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PSC1665J v.1	20240717	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".
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