



# PSC1065K

650 V, 10 A SiC Schottky diode in TO-220-2 R2P

19 April 2023

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 is encapsulated in a Real-2-Pin (R2P) TO-220-2 (SOT8021) through-hole power plastic package. The product 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 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

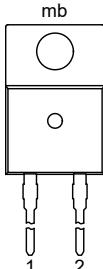
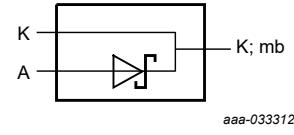
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DC}$	DC blocking voltage		650	-	-	V
$I_F$	forward current	$\delta = 1$ ; $T_c \leq 126$ °C	-	-	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	 TO-220-2 (SOT8021)	 aaa-033312
2	A	anode		
mb	K	mounting base; connected to cathode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PSC1065K	TO-220-2	Plastic, single-ended package (heatsink mounted, 1 mounting hole) (TO-220-2); 2 leads; 5.08 mm pitch; 15.3 mm x 10 mm x 4.4 mm body	SOT8021

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PSC1065K	PSC1065K

## 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	$0 \leq V_R \leq 480 \text{ V}$		-	100	V/ns
$I_F$	forward current	$\delta = 1$ ; $T_c \leq 126 \text{ }^\circ\text{C}$		-	10	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10 \mu\text{s}$ ; square wave; $T_c = 25 \text{ }^\circ\text{C}$		-	440	A
		$t_p = 10 \text{ ms}$ ; half sine-wave; $T_c = 25 \text{ }^\circ\text{C}$		-	52	A
		$t_p = 10 \text{ ms}$ ; half sine-wave; $T_c = 150 \text{ }^\circ\text{C}$		-	42	A
$\int i^2 dt$	$i^2 t$ value	$t_p = 10 \text{ ms}$ ; $T_c = 25 \text{ }^\circ\text{C}$		-	14	$\text{A}^2\text{s}$
		$t_p = 10 \text{ ms}$ ; $T_c = 150 \text{ }^\circ\text{C}$		-	9	$\text{A}^2\text{s}$
$P_{tot}$	total power dissipation	$T_c = 25 \text{ }^\circ\text{C}$		-	65	W
$T_j$	junction temperature			-	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			-	1.7	2.3	K/W

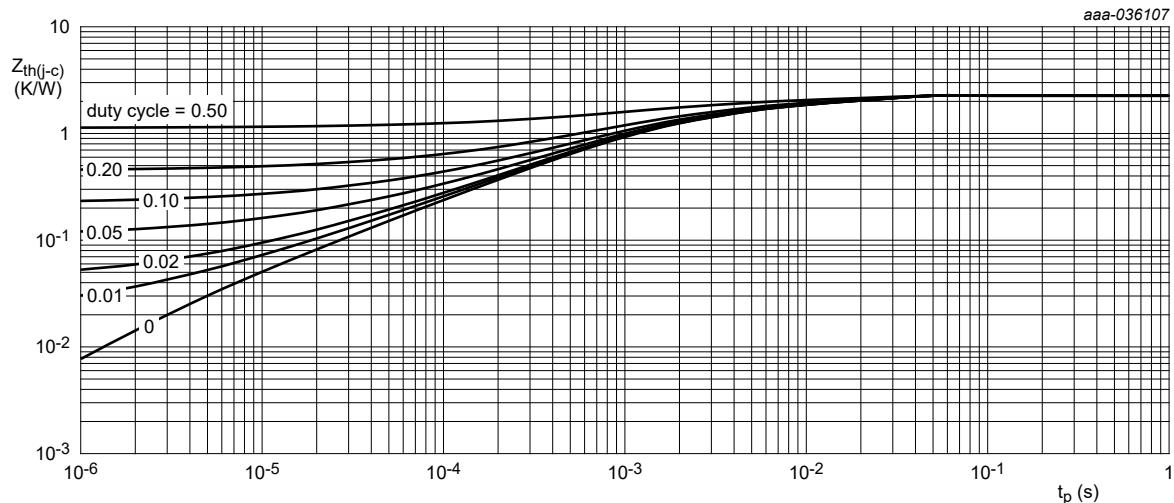


Fig. 1. Transient thermal impedance as a function of pulse duration; maximum values

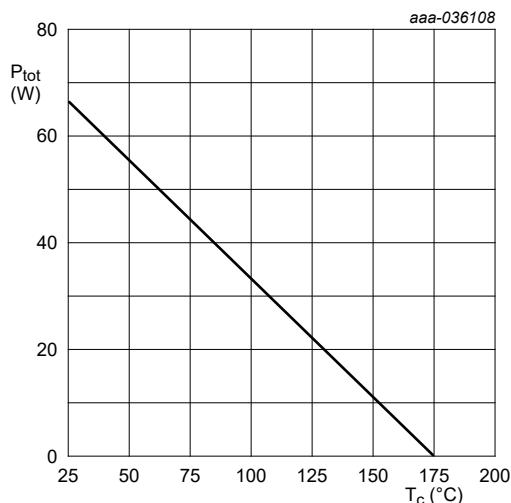


Fig. 2. Power dissipation; maximum values

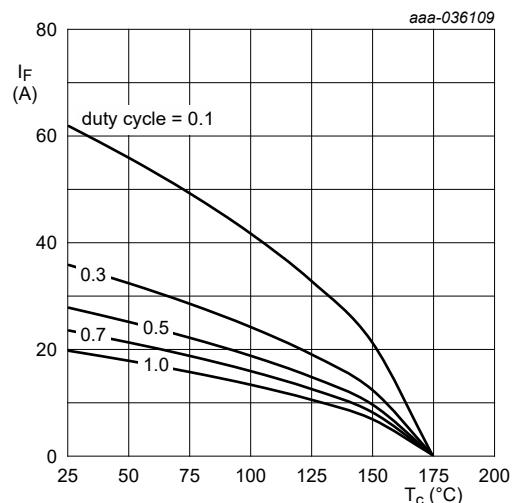
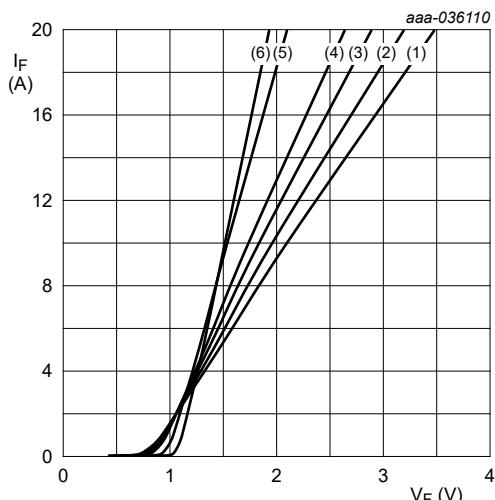


Fig. 3. Forward current as a function of case temperature; maximum values

## 10. Characteristics

Table 7. Characteristics

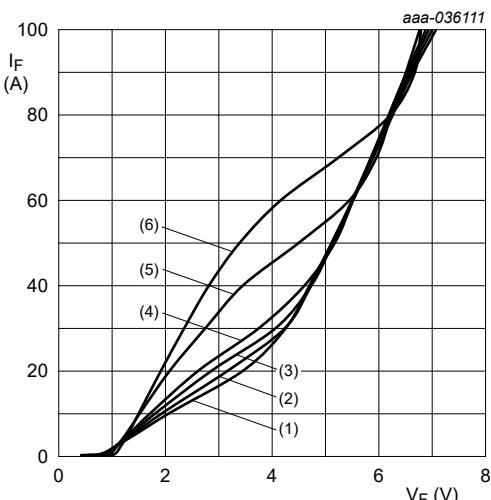
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DC}$	DC blocking voltage		650	-	-	V
$V_F$	forward voltage	$I_F = 10 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$	-	1.5	1.8	V
		$I_F = 10 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$	-	1.95	2.6	V
$I_R$	reverse current	$V_R = 650 \text{ V}; T_j = 25 \text{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



Pulsed condition:

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

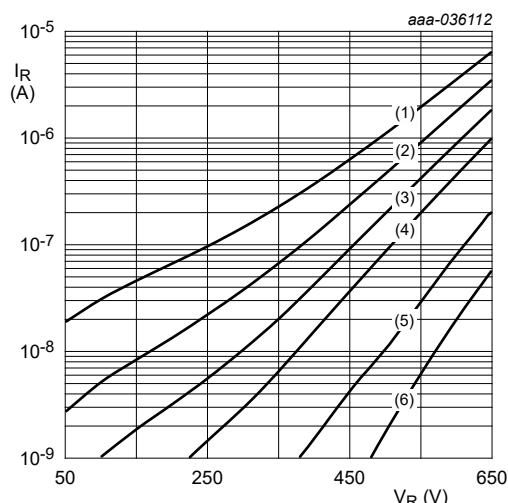
Fig. 4. Forward current as a function of forward voltage; typical values



Pulsed condition:

- (1)  $T_j = 175 \text{ }^\circ\text{C}$
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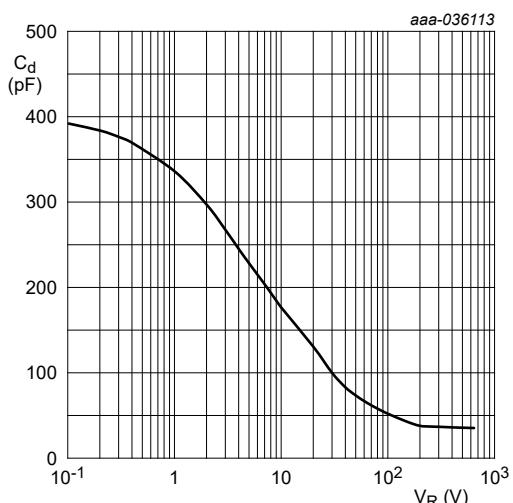
Fig. 5. Forward characteristics in surge current as a function of forward voltage; typical values



Pulsed condition:

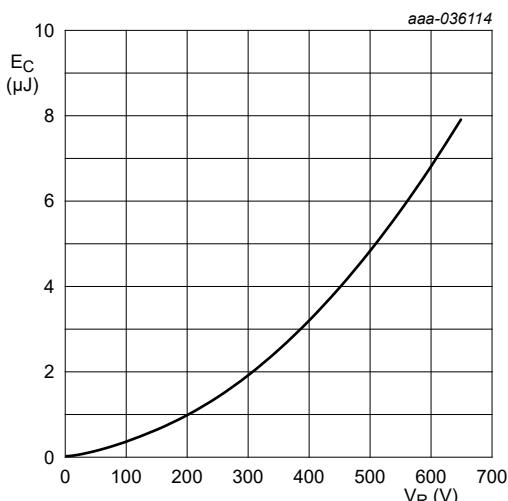
- (1)  $T_j = 175^\circ\text{C}$
- (2)  $T_j = 150^\circ\text{C}$
- (3)  $T_j = 125^\circ\text{C}$
- (4)  $T_j = 100^\circ\text{C}$
- (5)  $T_j = 25^\circ\text{C}$
- (6)  $T_j = -55^\circ\text{C}$

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

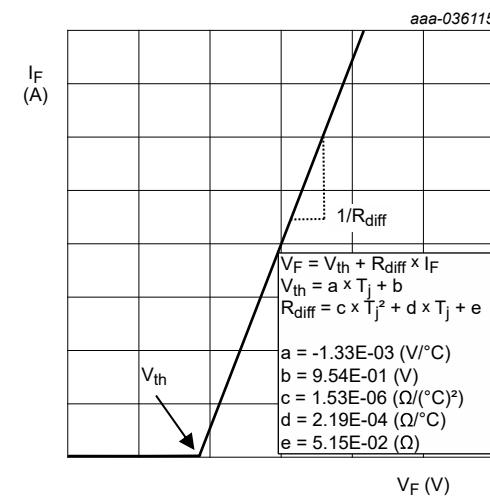


$f = 1\text{ MHz}; T_{\text{amb}} = 25^\circ\text{C}$

**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

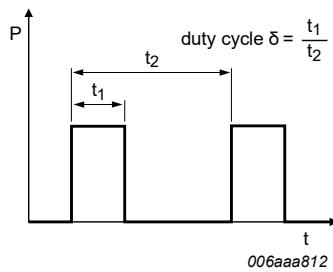


Fig. 10. Duty cycle definition

## 12. Package outline

Plastic, single-ended package (heatsink mounted, 1 mounting hole) (TO-220-2); 2 leads; 5.08 mm pitch; 15.3 mm x 10 mm x 4.4 mm body

SOT8021

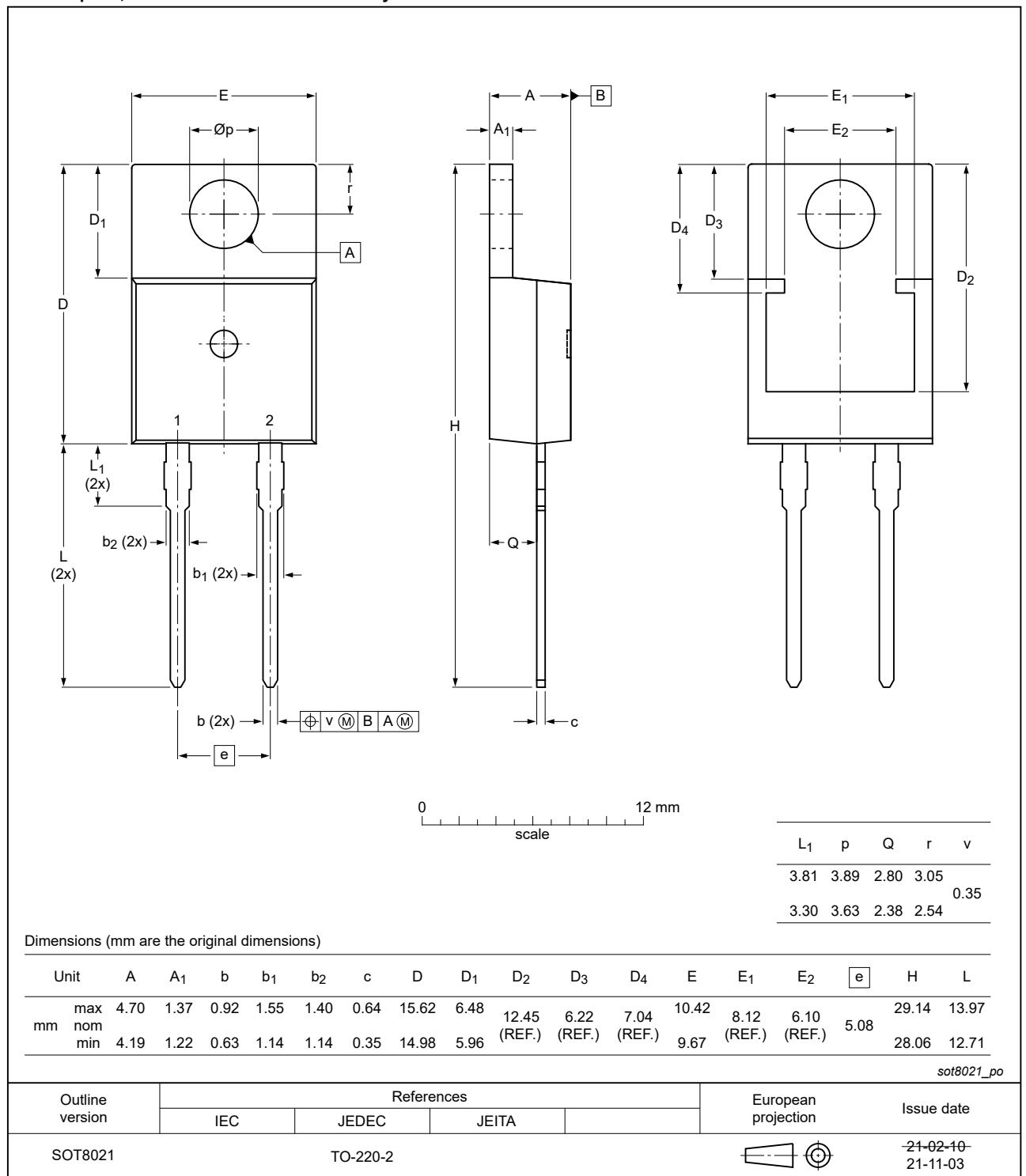


Fig. 11. Package outline TO-220-2 (SOT8021)

## 13. Revision history

**Table 8. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PSC1065K v.2	20230419	Product data sheet	-	PSC1065K v.1
Modifications:	<ul style="list-style-type: none"><li>Product status changed</li></ul>			
PSC1065K v.1	20230201	Preliminary data sheet	-	-

## 14. 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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## 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.....	2
9. Thermal characteristics.....	3
10. Characteristics.....	4
11. Test information.....	6
12. Package outline.....	7
13. Revision history.....	8
14. Legal information.....	9

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