

## 1. General description

Nexperia introduces leading edge Silicon Carbide (SiC) Schottky diode for ultra-high performance, low loss, high efficiency power conversion applications. The Merged PiN Schottky (MPS) diode delivered as bare die in Tape and Reel (T & R) offers temperature independent capacitive turn-off, zero recovery switching behavior combined with an outstanding figure-of-merit ( $Q_C \times V_F$ ) and 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

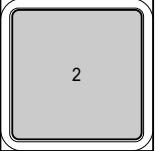
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{DC}$	DC blocking voltage		[1]	650	-	-	V
$I_F$	forward current	$\delta = 1; T_c \leq 126 \text{ } ^\circ\text{C}$	[2]	-	-	10	A
$Q_C$	total capacitive charge	$V_R = 400 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; I_F = 10 \text{ A}; T_j = 25 \text{ } ^\circ\text{C}$	[2]	-	22	-	nC

[1] Parameters 100% tested.

[2] Validation performed on TO-220-2 with mold compound.

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode (back side)	 Transparent top view	 aaa-0038726
2	A	anode (top side)		

## 6. Ordering information

Table 3. Ordering information

Type number	Package			Version
	Name	Description	Version	
PSC1065B1	PSC1065B1	Bare die product; 1.45 mm × 1.45 mm × 0.11 mm die size	PSC1065B1	

## 7. Limiting values

Table 4. 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	$0 \leq V_R \leq 480$ V		-	100	V/ns
$I_F$	forward current	$\delta = 1$ ; $T_c \leq 126$ °C	[1]	-	10	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10$ µs; square wave; $T_c = 25$ °C	[1]	-	440	A
		$t_p = 10$ ms; half sine-wave; $T_c = 25$ °C	[1]	-	52	A
		$t_p = 10$ ms; half sine-wave; $T_c = 150$ °C	[1]	-	42	A
$\int i^2 dt$	$i^2 t$ value	$t_p = 10$ ms; $T_c = 25$ °C	[1]	-	14	$A^2 s$
		$t_p = 10$ ms; $T_c = 150$ °C	[1]	-	9	$A^2 s$
$P_{tot}$	total power dissipation	$T_c = 25$ °C	[1]	-	65	W
$T_j$	junction temperature		[1]	-	175	°C
$T_{amb}$	ambient temperature		[1]	-55	175	°C
$T_{stg}$	storage temperature		[1]	-65	175	°C

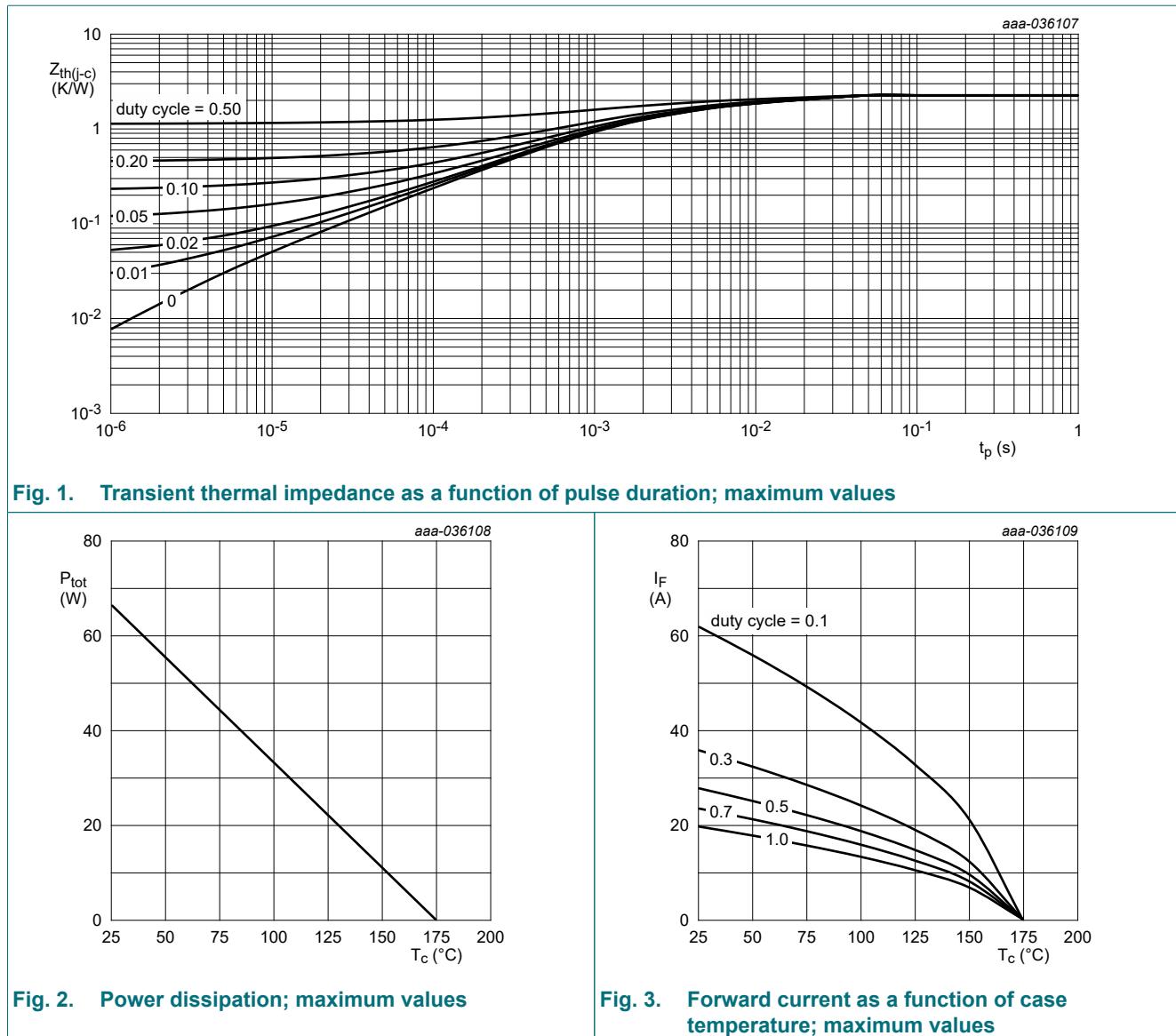
[1] Validation performed on TO-220-2 with mold compound.

## 8. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-c)}$	thermal resistance from junction to case		[1]	-	1.7	2.3	K/W

[1] Validation performed on TO-220-2 with mold compound.



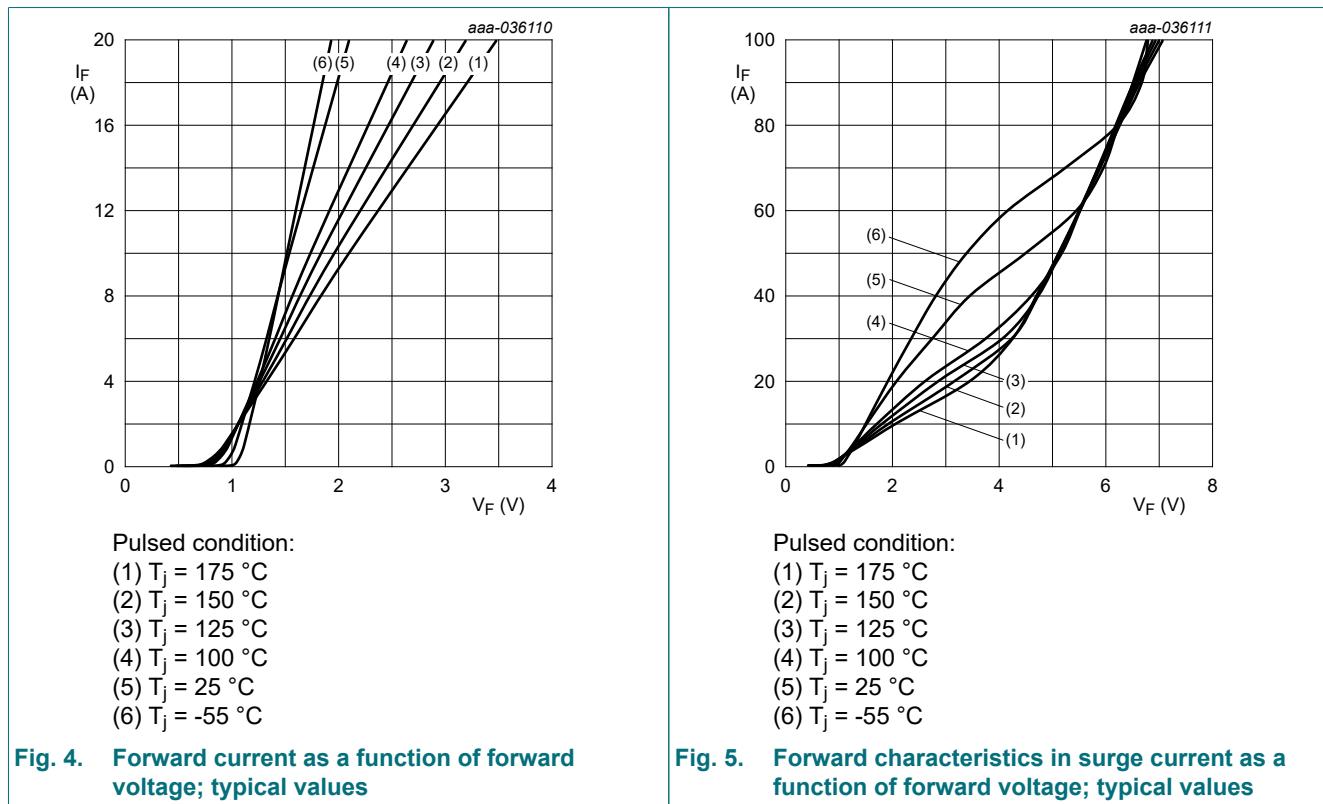
## 9. Characteristics

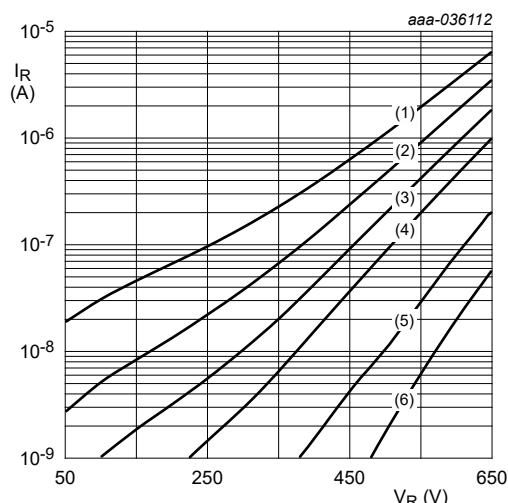
**Table 6. Characteristics**

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{DC}$	DC blocking voltage		[1]	650	-	-	V
$V_F$	forward voltage	$I_F = 10 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$	[1]	-	1.5	1.8	V
		$I_F = 10 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$	[2]	-	1.95	2.6	V
$I_R$	reverse current	$V_R = 650 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	[1]	-	1	60	$\mu\text{A}$
		$V_R = 650 \text{ V}; T_j = 150 \text{ }^\circ\text{C}$	[2]	-	10	120	$\mu\text{A}$
$C_d$	diode capacitance	$f = 1 \text{ MHz}; V_R = 1 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	[2]	-	340	-	pF
		$f = 1 \text{ MHz}; V_R = 400 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	[2]	-	36	-	pF
$Q_C$	total capacitive charge	$V_R = 400 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; I_F = 10 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$	[2]	-	22	-	nC

[1] Parameters 100% tested.

[2] Validation performed on TO-220-2 with mold compound.

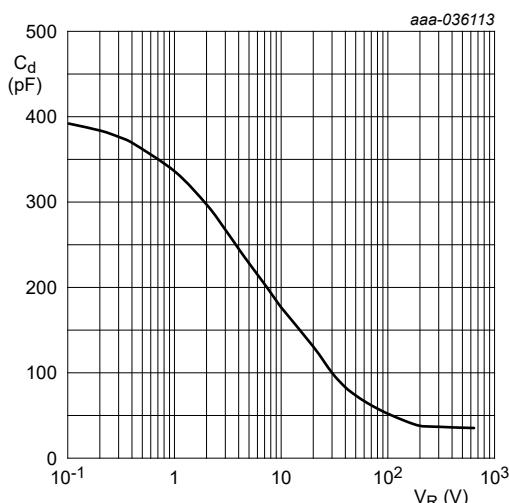




Pulsed condition:

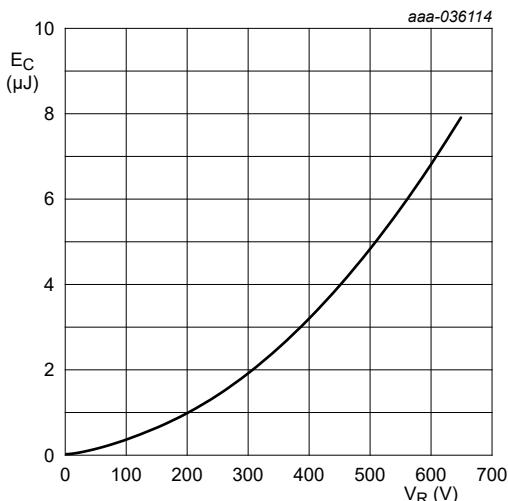
- (1)  $T_j = 175^\circ\text{C}$
- (2)  $T_j = 150^\circ\text{C}$
- (3)  $T_j = 125^\circ\text{C}$
- (4)  $T_j = 100^\circ\text{C}$
- (5)  $T_j = 25^\circ\text{C}$
- (6)  $T_j = -55^\circ\text{C}$

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

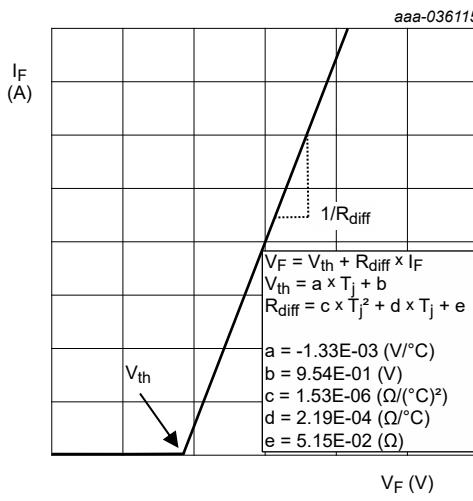


$f = 1\text{ MHz}; T_{\text{amb}} = 25^\circ\text{C}$

**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**

## 10. Test information

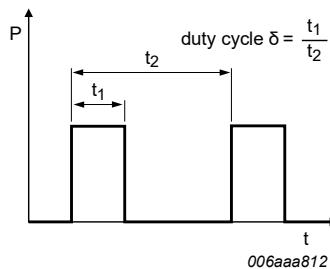


Fig. 10. Duty cycle definition

### Quality information

The reliability of the bare die product was tested in the TO-220-2 package with epoxy mold compound.

## 11. Package outline

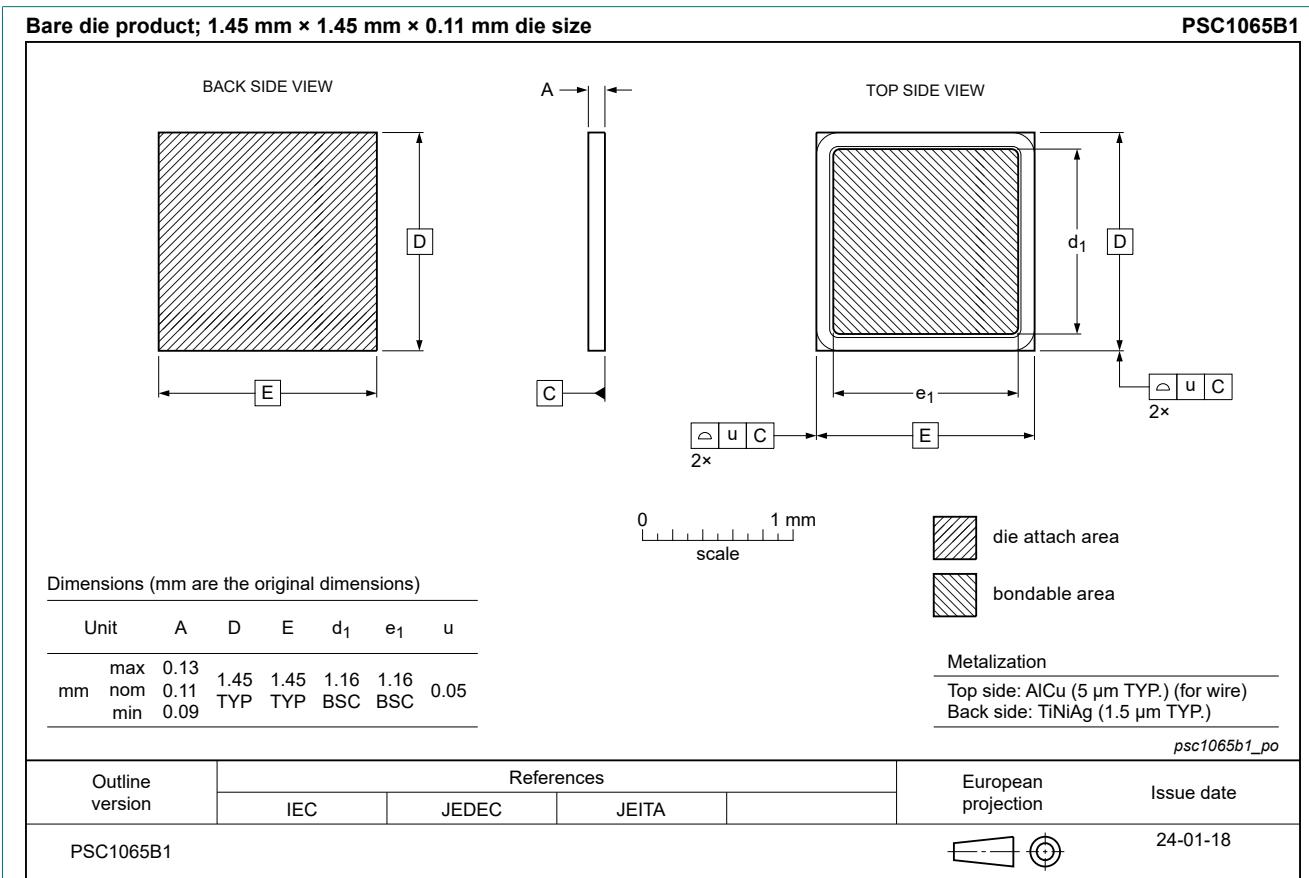


Fig. 11. Package outline PSC1065B1

## 12. Revision history

**Table 7. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PSC1065B1 v.1	20240515	Product data sheet	-	-

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

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