

## 1. General description

Silicon Carbide Schottky diode in a ITO220-2L plastic package, designed for high frequency switched-mode power supplies.



## 2. Features and benefits

- Highly stable switching performance
- Extremely fast reverse recovery time
- Superior in efficiency to Silicon Diode alternatives
- Reduced losses in associated MOSFET
- Reduced EMI
- Reduced cooling requirements
- RoHS compliant

## 3. Applications

- Power factor correction
- Telecom / Server SMPS
- UPS
- PV inverter
- PC Silverbox
- LED / OLED TV
- Motor Drives

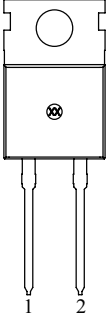
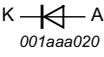
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
<b>Absolute maximum rating</b>							
$V_{RRM}$	repetitive peak reverse voltage			650			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 84$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		10			A
$T_j$	junction temperature			-55 to 175			°C
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
<b>Static characteristics</b>							
$V_F$	forward voltage	$I_F = 10$ A; $T_j = 25$ °C; <a href="#">Fig. 5</a>		-	1.45	1.70	V
		$I_F = 10$ A; $T_j = 150$ °C; <a href="#">Fig. 5</a>		-	1.80	2.20	V
<b>Dynamic characteristics</b>							
$Q_r$	recovered charge	$I_F = 10$ A; $di_F/dt = 500$ A/ $\mu$ s; $V_R = 400$ V; $T_j = 25$ °C; <a href="#">Fig. 7</a>		-	14.5	-	nC

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		
2	A	anode		
mb	n.c.	mounting base; isolated		

## 6. Ordering information

Table 3. Ordering information

Type number	Package name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
WNSC5D10650Y	IITO220-2L	WNSC5D10650Y6Q	Tube	50	IITO220P-2L	13-Mar-2023

## 7. Marking

Table 4. Marking codes

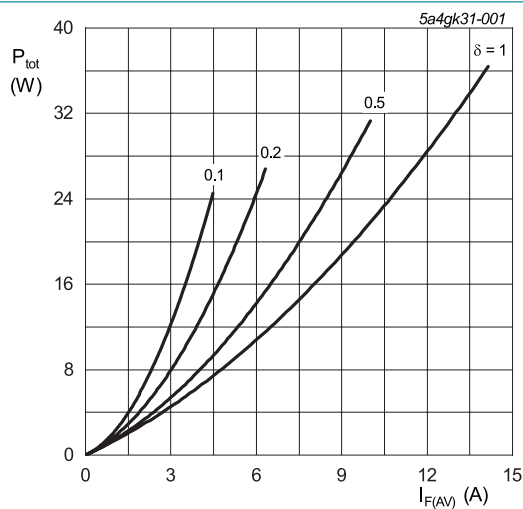
Type number	Marking codes
WNSC5D10650Y	WNSC5D 10650Y

### 8. Limiting values

**Table 5. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

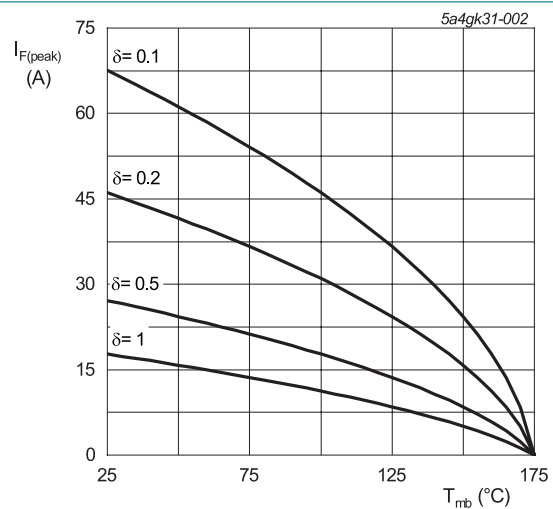
Symbol	Parameter	Conditions	Notes	Values	Unit
$V_{RRM}$	repetitive peak reverse voltage			650	V
$V_{RWM}$	crest working reverse voltage			650	V
$V_R$	reverse voltage	DC		650	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 84\text{ }^\circ\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		10	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 84\text{ }^\circ\text{C}$ ; square-wave pulse		20	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse		55	A
		$t_p = 10\text{ }\mu\text{s}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; square-wave pulse		560	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse		15.125	$\text{A}^2\text{s}$
$T_{stg}$	storage temperature			-55 to 175	$^\circ\text{C}$
$T_j$	junction temperature			-55 to 175	$^\circ\text{C}$



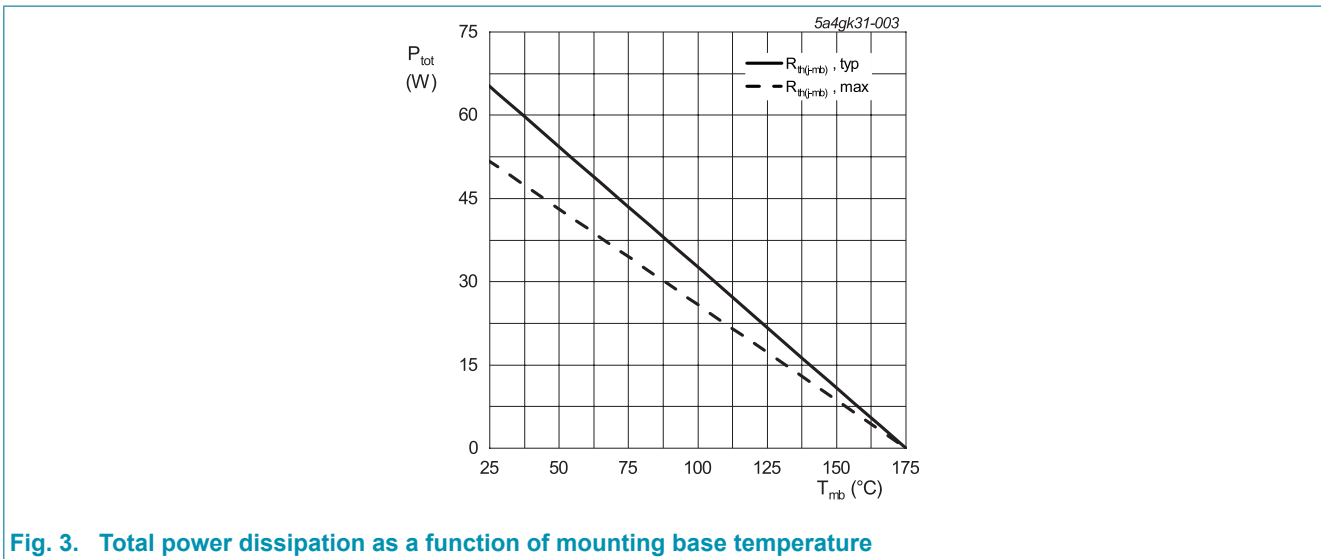
$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$

$$V_o = 1.228\text{ V}; R_s = 0.0951\text{ }\Omega$$

**Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values**



**Fig. 2. Current derating as a function of mounting base temperature**



## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	<a href="#">Fig. 4</a>		-	2.3	2.9	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

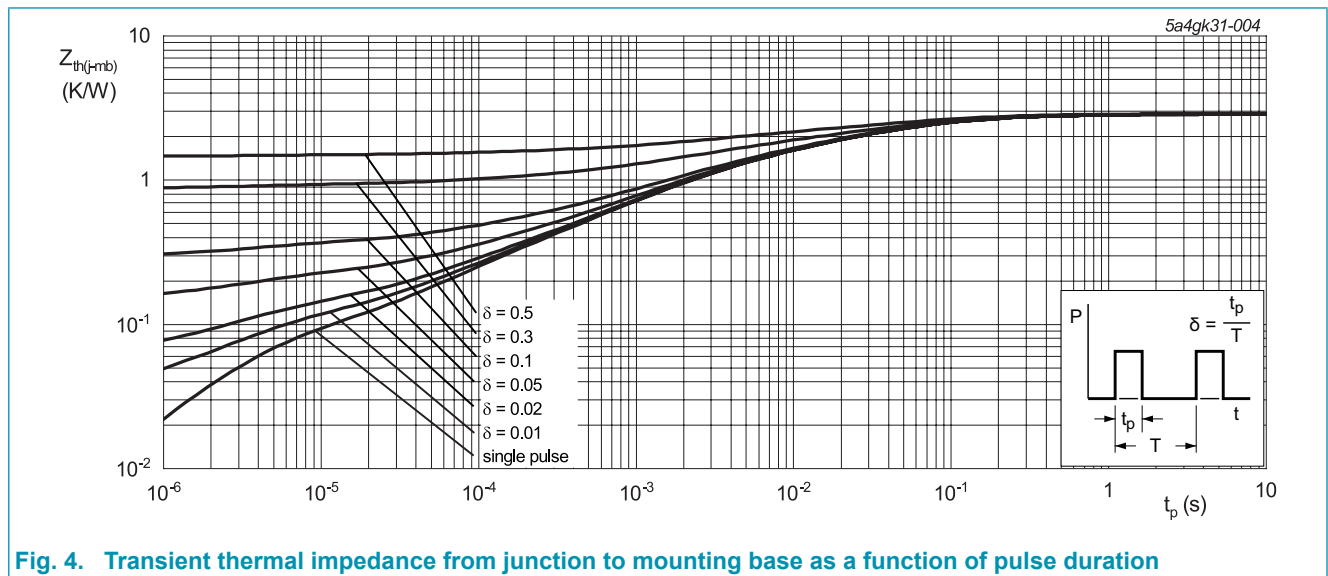


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

## 10. Isolation characteristics

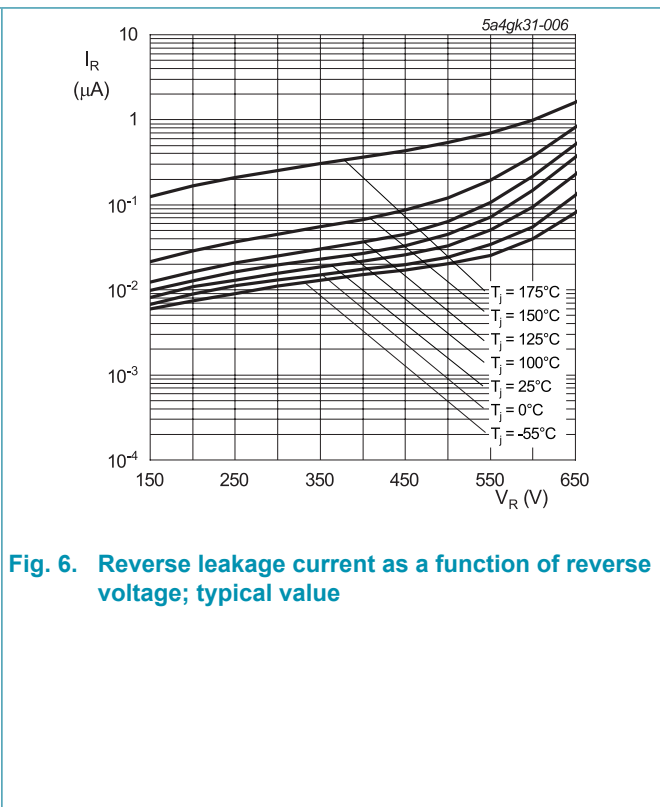
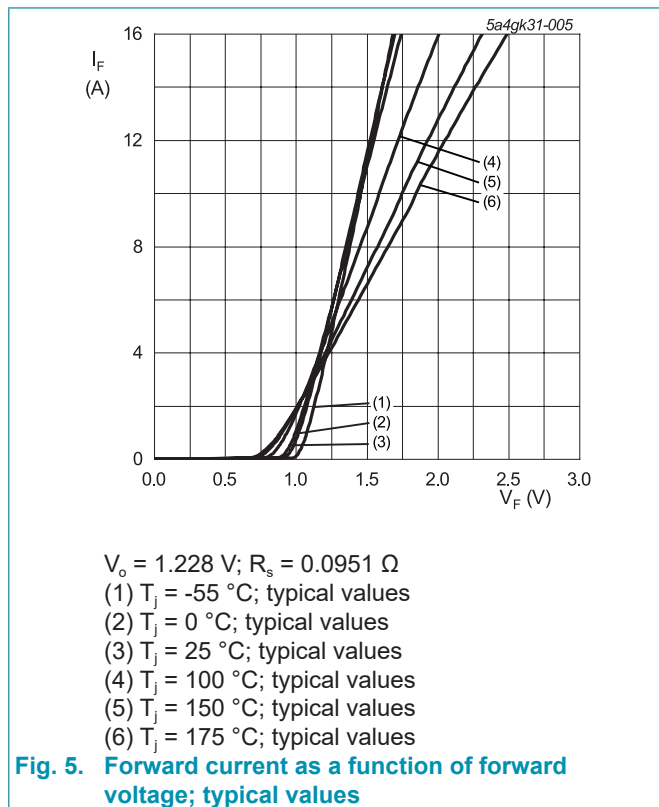
Table 7. Isolation characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	from all terminals to external heatsink; sinusoidal waveform; clean and dust free; $50\text{ Hz} \leq f \leq 60\text{ Hz}$ ; $RH \leq 65\%$ ; $T_{mb} = 25\text{ }^\circ\text{C}$		-	-	2500	V

### 11. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
<b>Static characteristics</b>							
$V_F$	forward voltage	$I_F = 10\text{ A}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 5}$		-	1.45	1.70	V
		$I_F = 10\text{ A}; T_j = 150\text{ }^\circ\text{C}; \text{Fig. 5}$		-	1.80	2.20	V
		$I_F = 10\text{ A}; T_j = 175\text{ }^\circ\text{C}; \text{Fig. 5}$		-	2.00	2.30	V
$I_R$	reverse current	$V_R = 650\text{ V}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 6}$		-	0.5	50	$\mu\text{A}$
		$V_R = 650\text{ V}; T_j = 175\text{ }^\circ\text{C}; \text{Fig. 6}$		-	25	250	$\mu\text{A}$
<b>Dynamic characteristics</b>							
$Q_r$	recovered charge	$I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$		-	14.5	-	nC
$C_d$	diode capacitance	$f = 1\text{ MHz}; V_R = 1\text{ V}; T_j = 25\text{ }^\circ\text{C}$		-	333	-	pF
		$f = 1\text{ MHz}; V_R = 300\text{ V}; T_j = 25\text{ }^\circ\text{C}$		-	38	-	pF
		$f = 1\text{ MHz}; V_R = 600\text{ V}; T_j = 25\text{ }^\circ\text{C}$		-	35	-	pF
$E_{as}$	non-repetitive avalanche energy	$I_R = 4.9\text{ A}; T_{j(\text{init})} = 25\text{ }^\circ\text{C}; L = 5\text{ mH}$		60	-	-	mJ



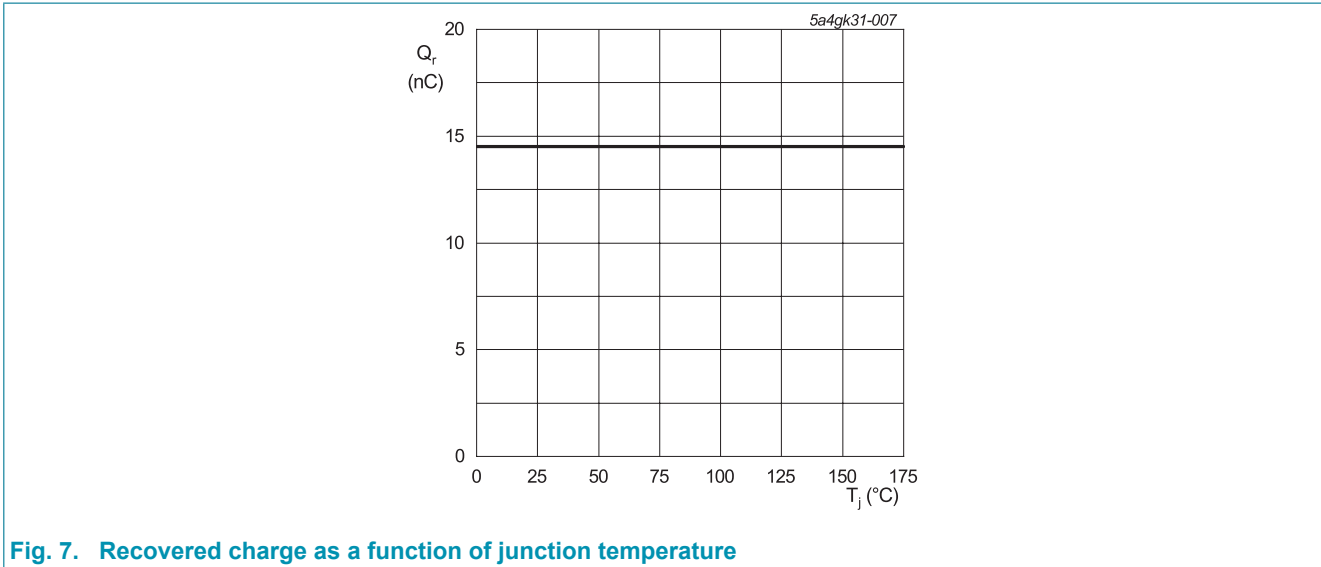
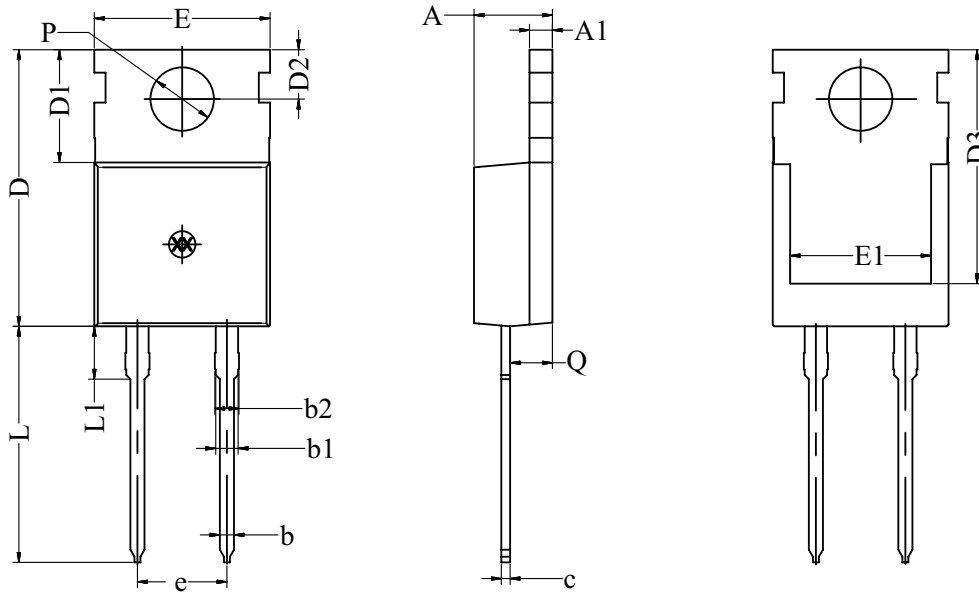


Fig. 7. Recovered charge as a function of junction temperature

## 12. Package outline

Plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2 leads TO-220 ITO220-2L



Dim	All Dimensions in Millimeters		
	Min	Typ	Max
A	4.30	4.45	4.70
A1	1.25	1.30	1.40
b	0.60	0.80	0.90
b1	1.10	1.27	1.40
b2	1.32	1.37	1.72
c	0.40	0.50	0.60
D	15.20	15.70	16.00
D1	6.20	6.40	6.60
D2	2.70	2.80	3.00
D3	12.98	13.28	13.58
E	9.70	10.00	10.30
E1	7.50	8.00	8.50
e	5.08(BSC)		
L	12.80	13.40	14.00
L1	2.80	3.00	3.20
P	3.50	3.60	3.70
Q	2.20	2.40	2.60



## 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.
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