

## 1. General description

Silicon Carbide Schottky diode in a TO220F-2L plastic package, designed for high frequency switched-mode power supplies.



## 2. Features and benefits

- New 6th Generation Technology
- Low Forward Voltage Drop
- Low Reverse Leakage Current
- High Forward Surge Capability  $I_{FSM}$
- Reduced Losses in Associated MOSFET
- Reduced EMI
- Reduced Cooling Requirements
- RoHS Compliant
- Insulated package rated at 2500V RMS

## 3. Applications

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

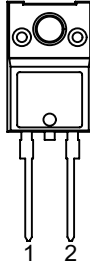
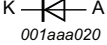
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
<b>Absolute maximum rating</b>							
$V_{RRM}$	repetitive peak reverse voltage			650			V
$I_F$	continuous forward current	$T_h \leq 140\text{ °C}$ , DC; <a href="#">Fig. 2</a>		4			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	$I_F = 4\text{ A}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 5</a>		-	1.26	1.40	V
		$I_F = 4\text{ A}$ ; $T_j = 150\text{ °C}$ ; <a href="#">Fig. 5</a>		-	1.35	1.55	V
<b>Dynamic characteristics</b>							
$Q_r$	recovered charge	$I_F = 4\text{ A}$ ; $di_F/dt = 500\text{ A}/\mu\text{s}$ ; $V_R = 400\text{ V}$ ; $T_j = 25\text{ °C}$ ; <a href="#">Fig. 7</a>		-	9	-	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
WNSC6D04650X	TO220F-2L	WNSC6D04650X6Q	Tube	50	TO220FN-2L	20-July-2016

## 7. Marking

Table 4. Marking codes

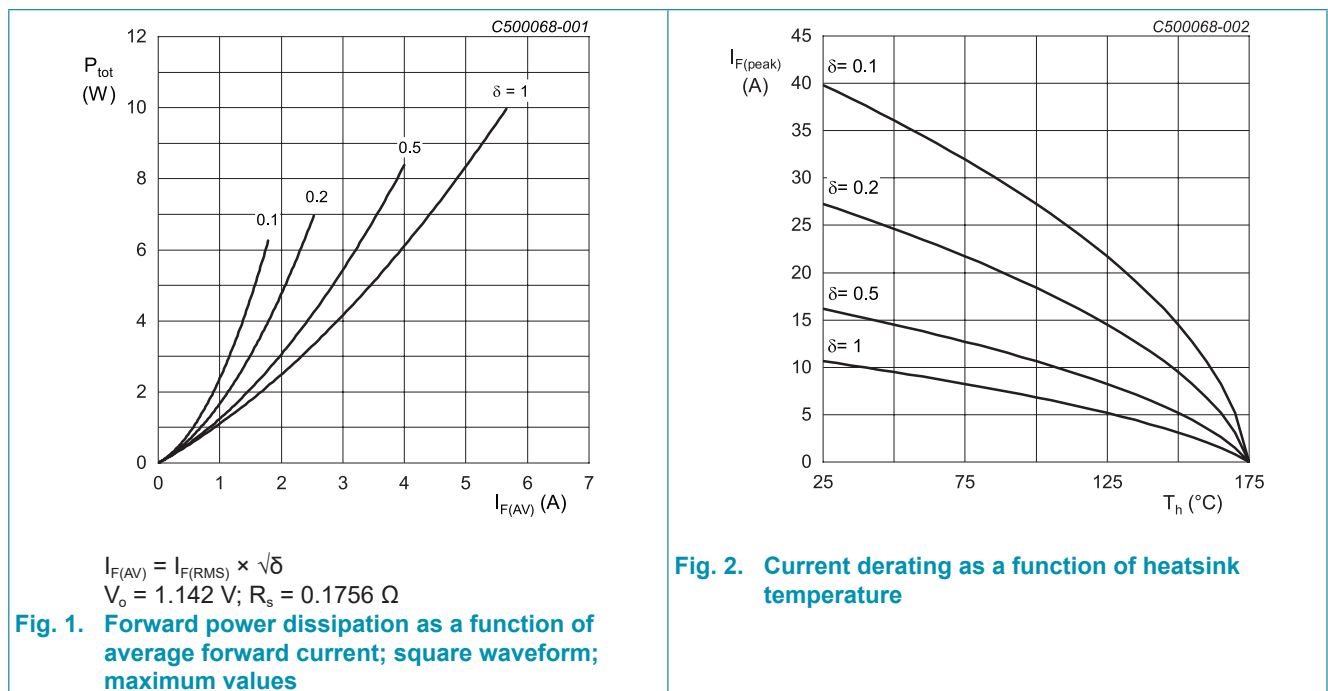
Type number	Marking codes
WNSC6D04650X	WNSC6D 04650X

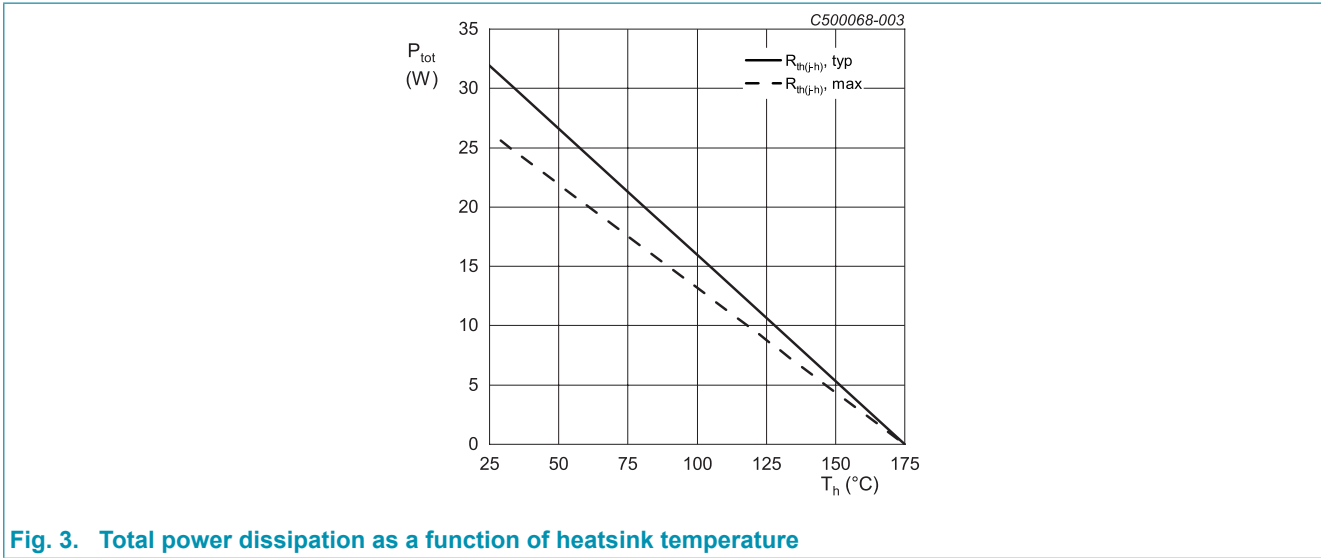
## 8. Limiting values

**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
$I_F$	continuous forward current	$T_h \leq 140\text{ }^\circ\text{C}$ , DC; <a href="#">Fig. 2</a>		4	A
		$T_h \leq 125\text{ }^\circ\text{C}$ , DC; <a href="#">Fig. 2</a>		5	A
		$T_h \leq 25\text{ }^\circ\text{C}$ , DC; <a href="#">Fig. 2</a>		10	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_h \leq 125\text{ }^\circ\text{C}$ ; square-wave pulse		8	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		36	A
		$t_p = 10\text{ }\mu\text{s}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; square-wave pulse		350	A
$I^2t$	$I^2t$ for fusing	$t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse		6.48	A <sup>2</sup> s
$T_{stg}$	storage temperature			-55 to 175	$^\circ\text{C}$
$T_j$	junction temperature			-55 to 175	$^\circ\text{C}$





## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; <a href="#">Fig. 4</a>		-	4.7	5.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

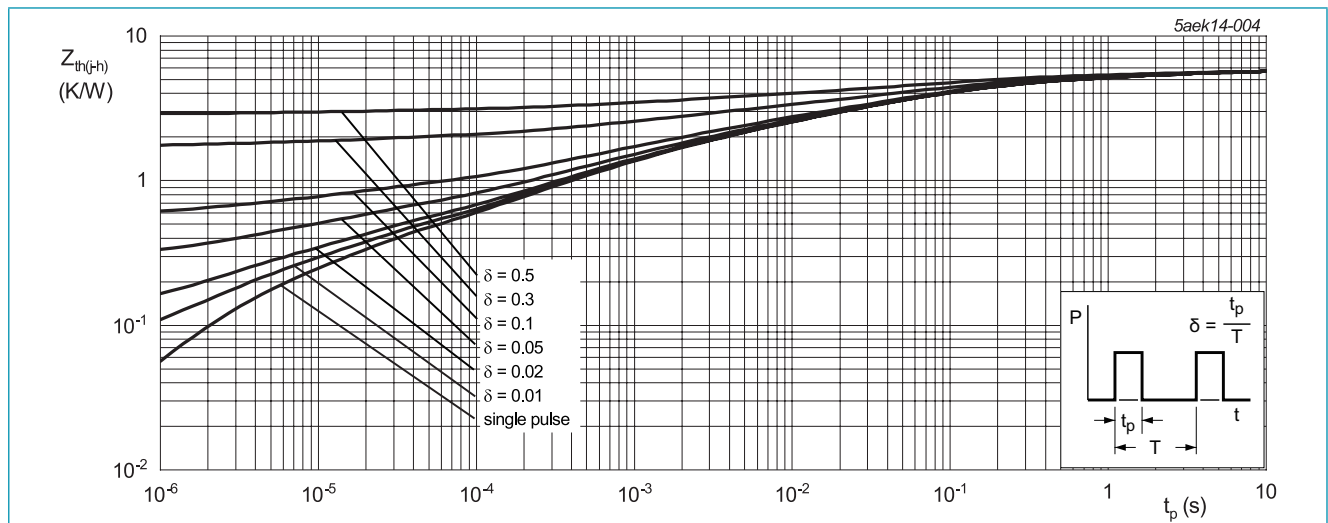


Fig. 4. Transient thermal impedance from junction to heatsink as a function of pulse duration

## 10. Isolation characteristics

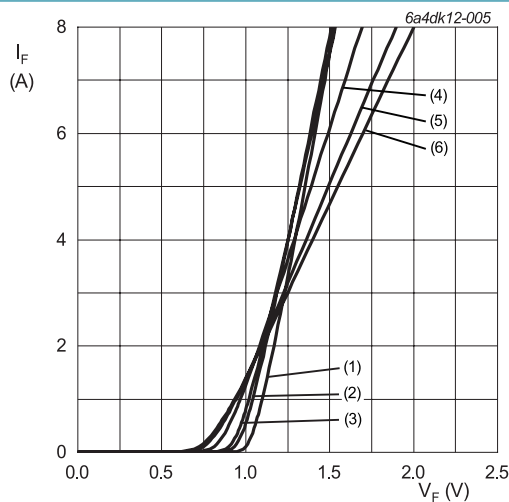
Table 7. Isolation characteristics

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; $50\text{ Hz} \leq f \leq 60\text{ Hz}$ ; $T_h = 25\text{ }^\circ\text{C}$ ; $RH \leq 65\%$		-	-	2500	V

### 11. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
<b>Static characteristics</b>							
$V_F$	forward voltage	$I_F = 4\text{ A}; T_j = 25\text{ °C}; \text{Fig. 5}$		-	1.26	1.40	V
		$I_F = 4\text{ A}; T_j = 150\text{ °C}; \text{Fig. 5}$		-	1.35	1.55	V
		$I_F = 4\text{ A}; T_j = 175\text{ °C}; \text{Fig. 5}$		-	1.40	1.60	V
$I_R$	reverse current	$V_R = 650\text{ V}; T_j = 25\text{ °C}; \text{Fig. 6}$		-	0.4	20	$\mu\text{A}$
		$V_R = 650\text{ V}; T_j = 175\text{ °C}; \text{Fig. 6}$		-	6	80	$\mu\text{A}$
<b>Dynamic characteristics</b>							
$Q_r$	recovered charge	$I_F = 4\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$		-	9	-	nC
$C_d$	diode capacitance	$f = 1\text{ MHz}; V_R = 1\text{ V}; T_j = 25\text{ °C}$		-	220	-	pF
		$f = 1\text{ MHz}; V_R = 300\text{ V}; T_j = 25\text{ °C}$		-	25	-	pF
		$f = 1\text{ MHz}; V_R = 600\text{ V}; T_j = 25\text{ °C}$		-	22	-	pF
$E_{as}$	non-repetitive avalanche energy	$I_R = 3.5\text{ A}; T_{j(\text{init})} = 25\text{ °C}; L = 5\text{ mH}$		30	-	-	mJ



$V_o = 1.142\text{ V}; R_s = 0.1756\ \Omega$   
 (1)  $T_j = -55\text{ °C}$ ; typical values  
 (2)  $T_j = 0\text{ °C}$ ; typical values  
 (3)  $T_j = 25\text{ °C}$ ; typical values  
 (4)  $T_j = 100\text{ °C}$ ; typical values  
 (5)  $T_j = 150\text{ °C}$ ; typical values  
 (6)  $T_j = 175\text{ °C}$ ; typical values

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

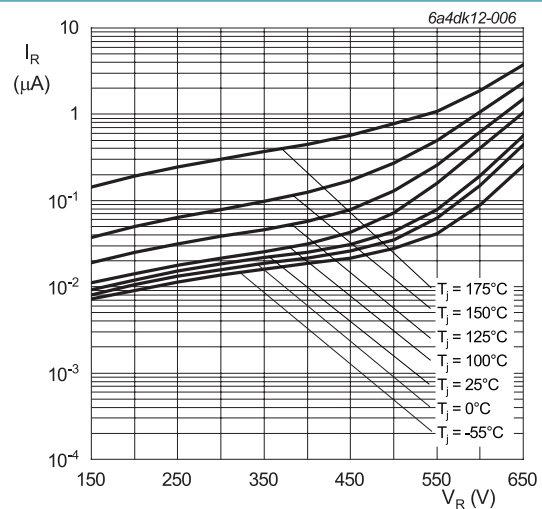


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value

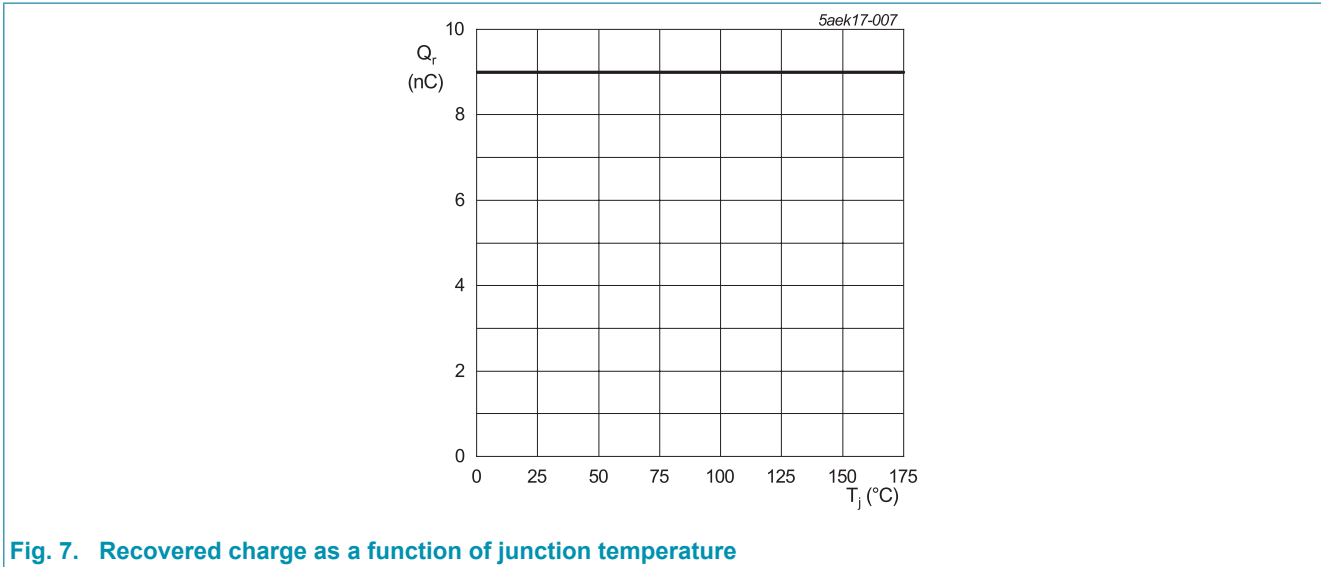
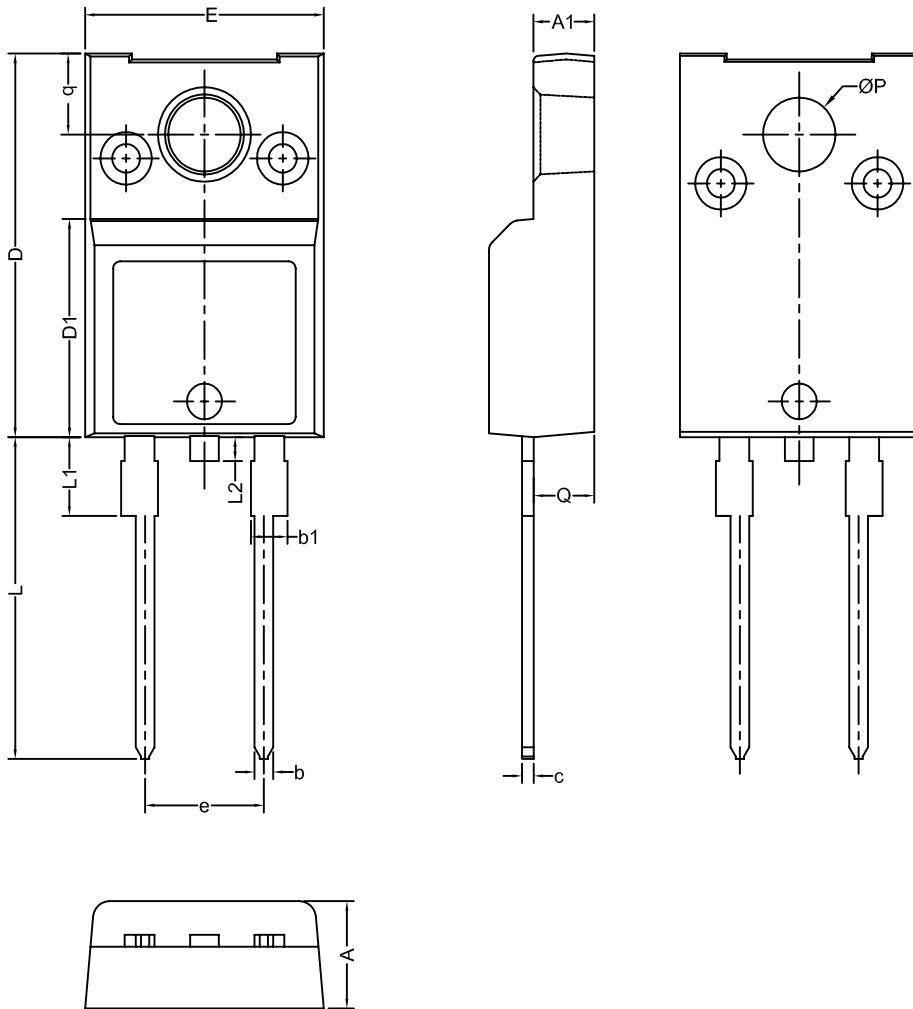


Fig. 7. Recovered charge as a function of junction temperature

### 12. Package outline

Plastic single-ended through-hole package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220F TO220F-2L



Unit	A	A1	b	b1	c	D	D1	e	E	L	L1	L2	P	q	Q
min	4.35	2.40	0.76	1.22	0.46	15.95	9.00	5.08	10.05	13.15	3.15	0.50	2.95	3.40	2.30
max	4.65	2.80	0.89	1.60	0.59	16.25	9.30	5.08 (typ.)	10.35	13.85	3.45	1.00	3.25	3.40 (typ.)	2.80

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ		
TO220F-2L		-			



## 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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