

## 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

- Highly stable switching performance
- High forward surge capability  $I_{FSM}$
- Extremely fast reverse recovery time
- Superior in efficiency to Silicon Diode alternatives
- 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

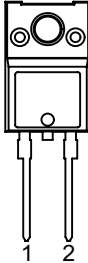
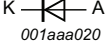
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	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; $T_n \leq 77\text{ }^\circ\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	6			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 6\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 5</a>	-	1.5	1.7	V
		$I_F = 6\text{ A}$ ; $T_j = 150\text{ }^\circ\text{C}$ ; <a href="#">Fig. 5</a>	-	1.8	2.1	V

## 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
NXPSC06650X	TO220F-2L	NXPSC06650X6Q	Tube	50	TO220FN-2L	20-July-2016

## 7. Marking

Table 4. Marking codes

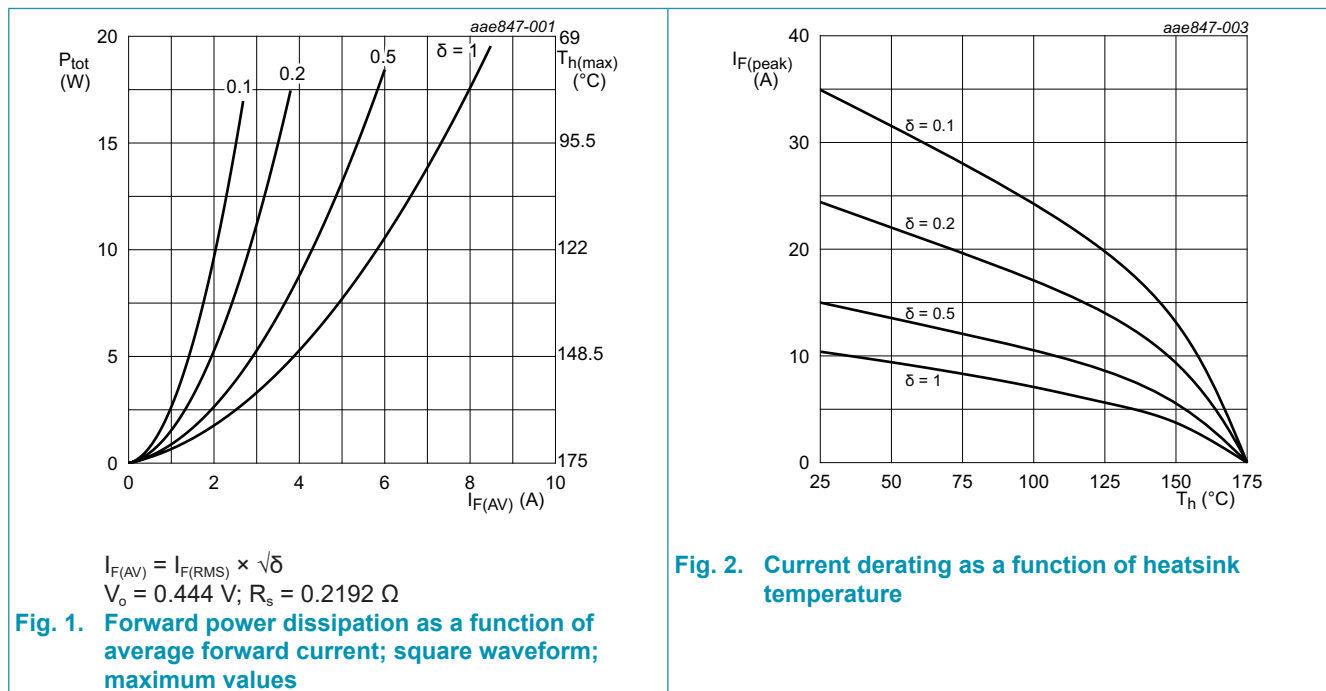
Type number	Marking codes
NXPSC06650X	NXPSC 06650X

## 8. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	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; $T_h \leq 77\text{ }^\circ\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	6	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_h \leq 77\text{ }^\circ\text{C}$ ; square-wave pulse	12	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	310	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	$\text{A}^2\text{s}$
$T_{stg}$	storage temperature		-55 to 175	$^\circ\text{C}$
$T_j$	junction temperature		175	$^\circ\text{C}$



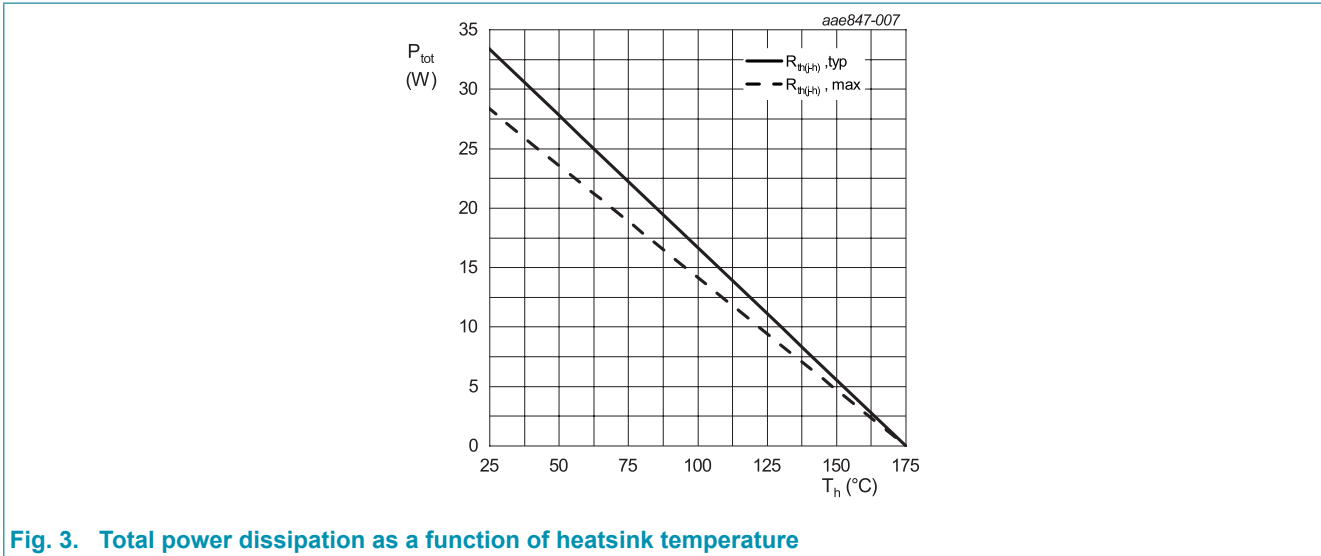
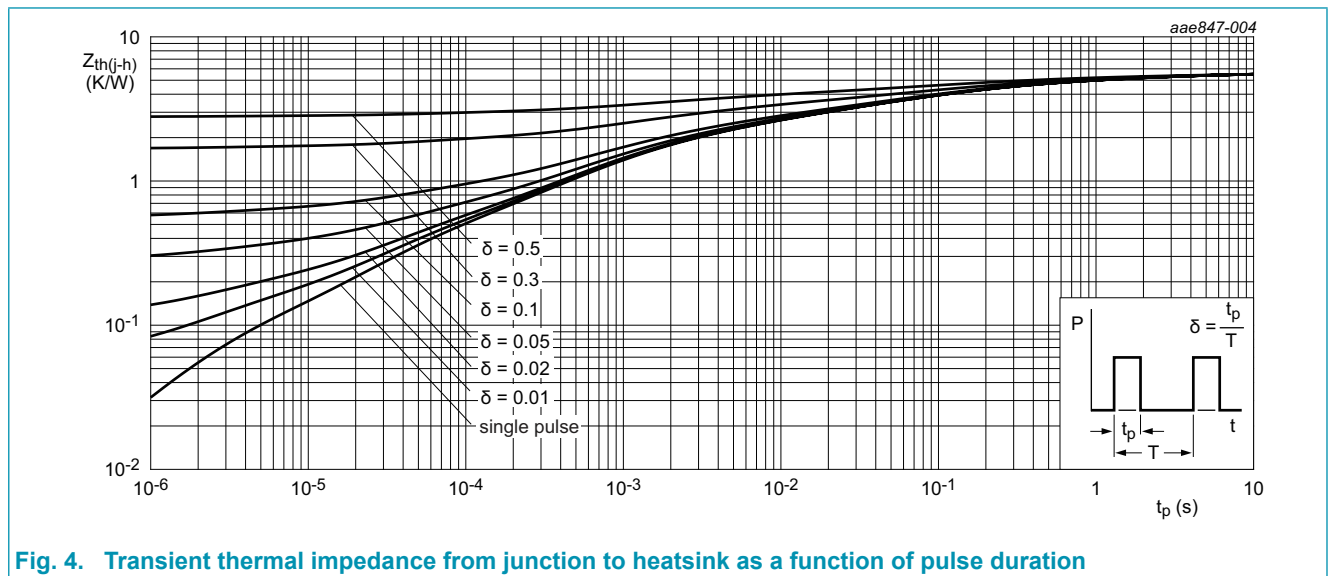


Fig. 3. Total power dissipation as a function of heatsink temperature

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; <a href="#">Fig. 4</a>	-	4.5	5.3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	55	-	K/W



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

## 10. Isolation characteristics

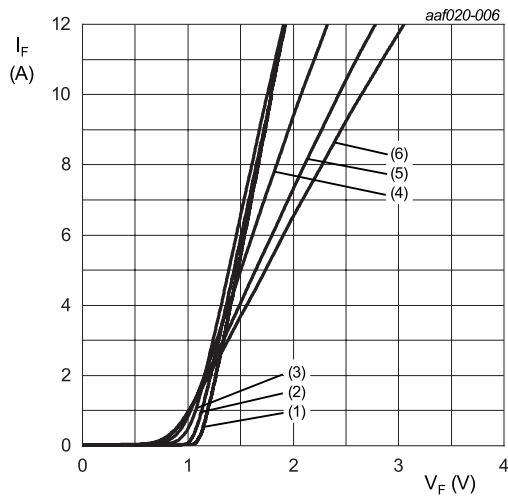
**Table 7. Isolation characteristics**

Symbol	Parameter	Conditions	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	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 6\text{ A}; T_j = 25\text{ °C}; \text{Fig. 5}$	-	1.5	1.7	V
		$I_F = 6\text{ A}; T_j = 150\text{ °C}; \text{Fig. 5}$	-	1.8	2.1	V
$I_R$	reverse current	$V_R = 650\text{ V}; T_j = 25\text{ °C}; \text{Fig. 6}$	-	-	40	$\mu\text{A}$
		$V_R = 650\text{ V}; T_j = 150\text{ °C}; \text{Fig. 6}$	-	-	160	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 6\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$	-	9	-	nC
$C_d$	diode capacitance	$f = 1\text{ MHz}; V_R = 1\text{ V}; T_j = 25\text{ °C}$	-	190	-	pF
		$f = 1\text{ MHz}; V_R = 300\text{ V}; T_j = 25\text{ °C}$	-	30	-	pF
		$f = 1\text{ MHz}; V_R = 600\text{ V}; T_j = 25\text{ °C}$	-	29	-	pF
$E_{as}$	non-repetitive avalanche energy	$I_R = 4.25\text{ A}; T_{j(\text{init})} = 25\text{ °C}; L = 5\text{ mH}$	45	-	-	mJ



$V_o = 0.444\text{ V}; R_s = 0.2192\ \Omega$   
 (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

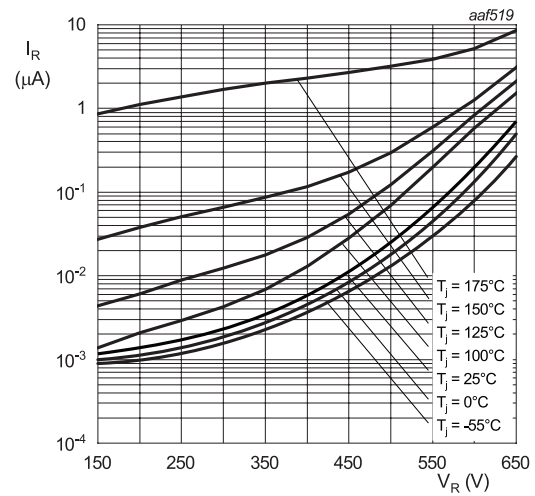
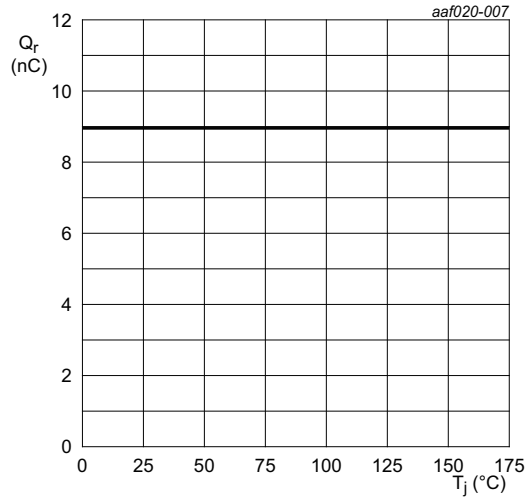


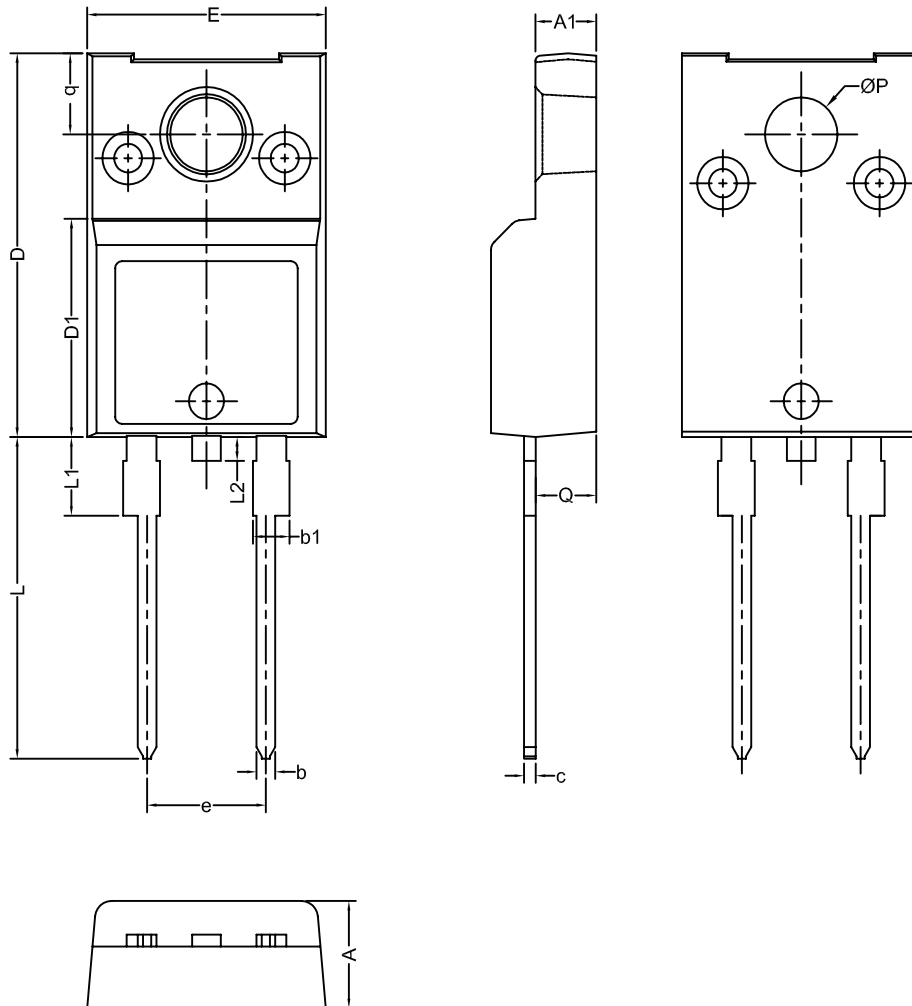
Fig. 6. Reverse leakage current as a function of reverse voltage; typical value



**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 (typ)	10.05	13.15	3.15	0.50	2.95	3.40 (typ)	2.30
max	4.65	2.80	0.89	1.60	0.59	16.25	9.30		10.35	13.85	3.45	1.00	3.25		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.
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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## 14. 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 .....	3
9. Thermal characteristics .....	5
10. Isolation characteristics .....	5
11. Characteristics.....	6
12. Package outline .....	8
13. Legal information .....	9
14. Contents .....	11

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