

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

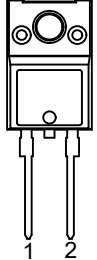
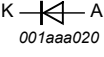
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	650	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_h \leq 104$ °C; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3 ; Fig. 4	-	-	4	A
T_j	junction temperature		-	-	175	°C
Static characteristics						
V_F	forward voltage	$I_F = 4$ A; $T_j = 25$ °C; Fig. 6	-	1.5	1.7	V
		$I_F = 4$ A; $T_j = 150$ °C; Fig. 6	-	1.8	2.1	V
Dynamic characteristics						

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Q_r	recovered charge	$I_F = 4\text{ A}$; $di_F/dt = 500\text{ A}/\mu\text{s}$; $V_R = 400\text{ V}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7	-	7	-	nC

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p style="text-align: center;">TO220F-2L</p>	
2	A	anode		
mb	n.c.	mounting base; isolated		

6. Ordering information

Table 3. Ordering information

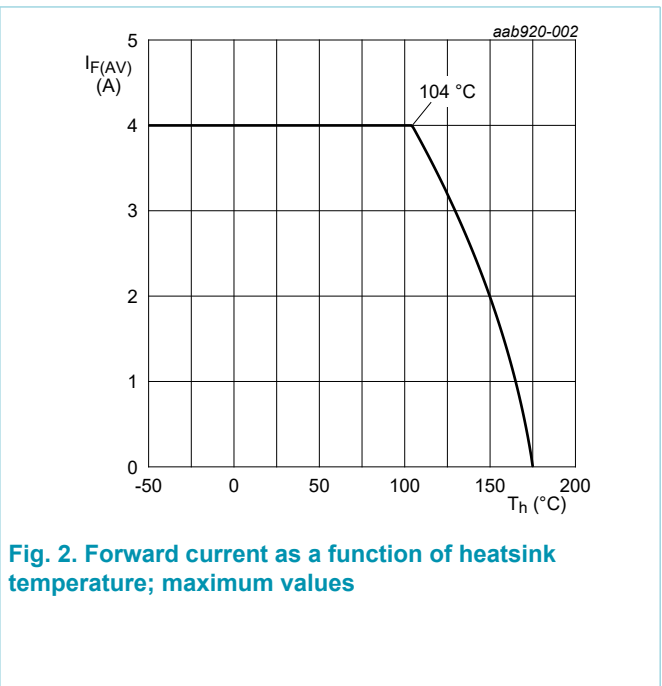
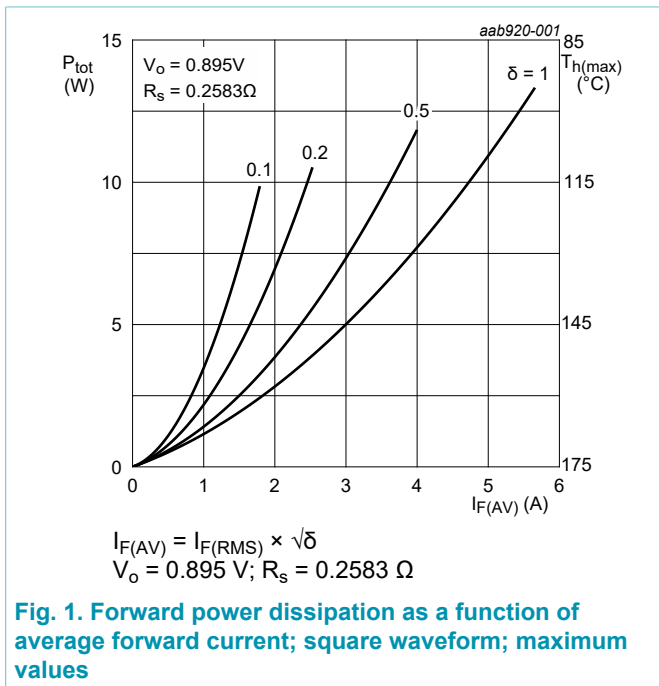
Type number	Package		
	Name	Description	Version
NXPSC04650X	-	Plastic single-ended through-hole package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220F	TO220F-2L

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
V_{RWM}	crest working reverse voltage		-	650	V
V_R	reverse voltage	DC	-	650	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_h \leq 104\text{ }^\circ\text{C}$; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3 ; Fig. 4	-	4	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_h \leq 104\text{ }^\circ\text{C}$; 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	-	24	A
		$t_p = 10\text{ }\mu\text{s}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; square-wave pulse	-	235	A
T_{stg}	storage temperature		-55	175	$^\circ\text{C}$
T_j	junction temperature		-	175	$^\circ\text{C}$



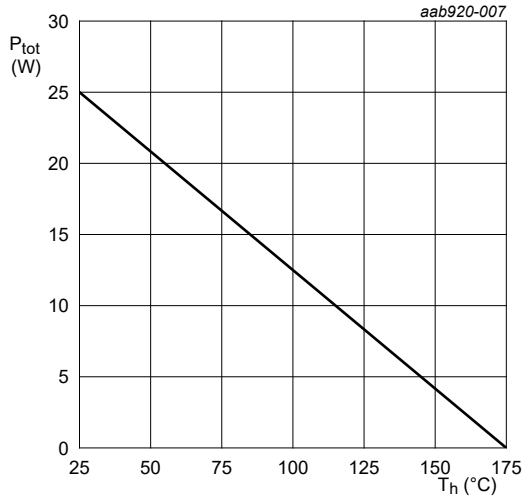


Fig. 3. Total power dissipation as a function of heatsink temperature

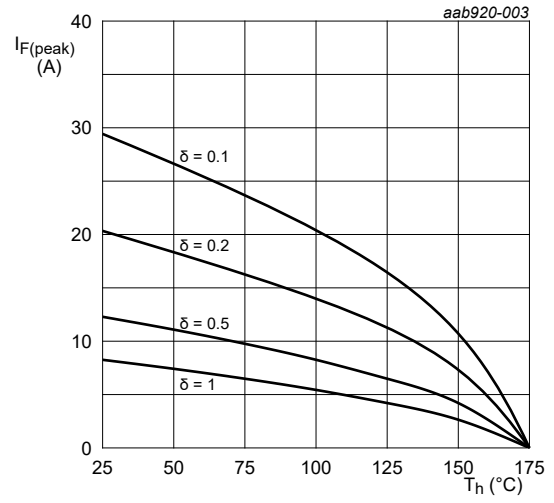


Fig. 4. Current derating as a function of heatsink temperature

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; Fig. 5	-	-	6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	55	-	K/W

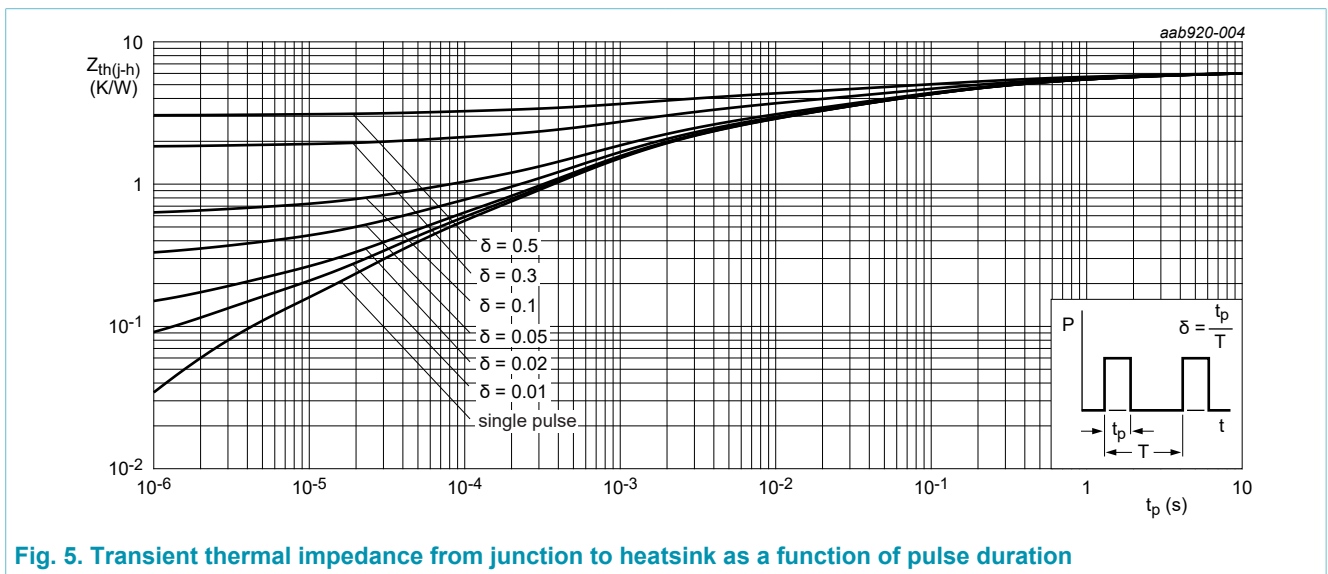


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse duration

9. Isolation characteristics

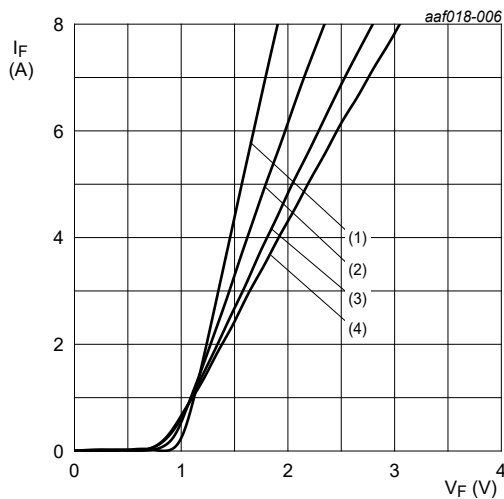
Table 6. Isolation characteristics

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

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 4\text{ A}; T_j = 25\text{ °C};$ Fig. 6	-	1.5	1.7	V
		$I_F = 4\text{ A}; T_j = 150\text{ °C};$ Fig. 6	-	1.8	2.1	V
I_R	reverse current	$V_R = 650\text{ V}; T_j = 25\text{ °C}$	-	-	170	μA
		$V_R = 650\text{ V}; T_j = 150\text{ °C}$	-	-	550	μA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 4\text{ A}; dI_F/dt = 500\text{ A}/\mu\text{s}; V_R = 400\text{ V}; T_j = 25\text{ °C};$ Fig. 7	-	7	-	nC
C_d	diode capacitance	$f = 1\text{ MHz}; V_R = 1\text{ V}; T_j = 25\text{ °C}$	-	130	-	pF
		$f = 1\text{ MHz}; V_R = 300\text{ V}; T_j = 25\text{ °C}$	-	16	-	pF
		$f = 1\text{ MHz}; V_R = 600\text{ V}; T_j = 25\text{ °C}$	-	13	-	pF



- (1) $T_j = 25\text{ °C};$ typical values
- (2) $T_j = 100\text{ °C};$ typical values
- (3) $T_j = 150\text{ °C};$ typical values
- (4) $T_j = 175\text{ °C};$ typical values

Fig. 6. Forward current as a function of forward voltage; typical values

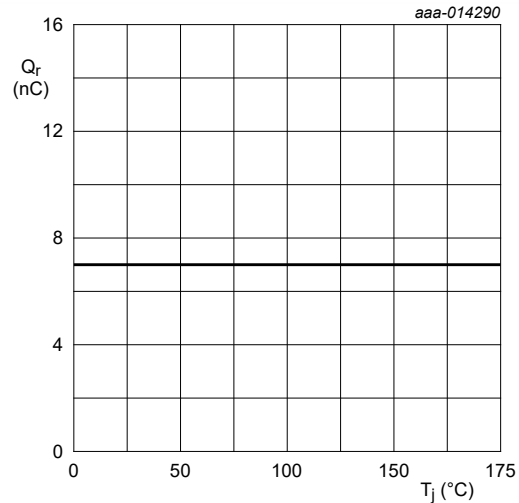
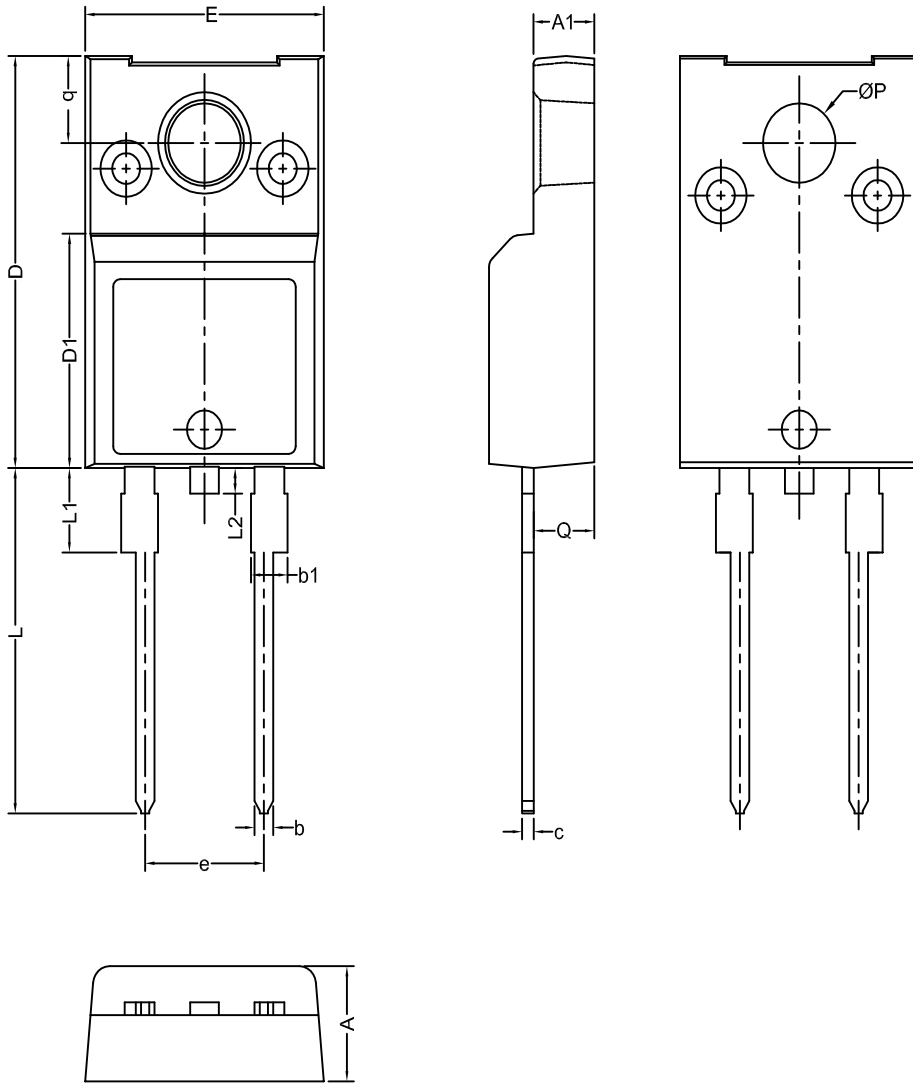


Fig. 7. Recovered charge as a function of junction temperature

11. 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		-				

Fig. 8. Package outline TO220F-2L

12. 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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