FCPF220N80

N-Channel SuperFET® II MOSFET

800 V, 23 A, 220 mΩ

Features

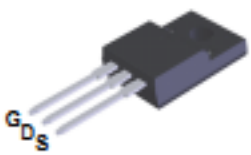
- Typ. $R_{DS(on)}$ = 188 mΩ
- Ultra Low Gate Charge (Typ. Q_g = 78 nC)
- Low E_{oss} (Typ. 7.5 uJ @ 400 V)
- Low Effective Output Capacitance (Typ. $C_{oss(eff.)}$ = 304 pF)
- 100% Avalanche Tested
- RoHS Compliant
- ESD Improved Capability

Applications

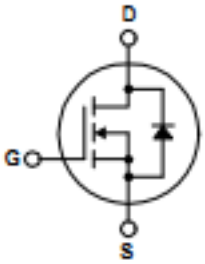
- AC-DC Power Supply
- LED Lighting

Description

SuperFET® II MOSFET is Fairchild Semiconductor's brand-new high voltage super-junction (SJ) MOSFET family that is utilizing charge balance technology for outstanding low on-resistance and lower gate charge performance. This technology is tailored to minimize conduction loss, provide superior switching performance, dv/dt rate and higher avalanche energy. Consequently, SuperFET II MOSFET is very suitable for the switching power applications such as PFC, server/telecom power, FPD TV power, ATX power and industrial power applications.



TO-220F



Absolute Maximum Ratings T_C = 25°C unless otherwise noted.

Symbol	Parameter		FCPF220N80	Unit
V_{DSS}	Drain to Source Voltage		800	V
V_{GSS}	Gate to Source Voltage	• DC	±20	V
		• AC (f >1 Hz)	±30	
I_D	Drain Current	• Continuous (T_C = 25°C)	23*	A
		• Continuous (T_C = 100°C)	14.6*	
I_{DM}	Drain Current	• Pulsed (Note 1)	57*	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	645	mJ
I_{AR}	Avalanche Current	(Note 1)	4.6	A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	27.8	mJ
dv/dt	MOSFET dv/dt		100	V/ns
	Peak Diode Recovery dv/dt	(Note 3)	20	
P_D	Power Dissipation	(T_C = 25°C)	44	W
		• Derate Above 25°C	0.35	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	°C
T_L	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds		300	°C

*Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	FCPF220N80	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	2.8	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FCPF220N80	FCPF220N80	TO-220F	Tube	N/A	N/A	50 units

Electrical Characteristics T_C = 25°C unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	V_{GS} = 0 V, I_D = 1 mA, T_J = 25°C	800	•	•	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 1 mA, Referenced to 25°C	•	0.8	•	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 800 V, V_{GS} = 0 V	•	•	25	µA
		V_{DS} = 640 V, T_C = 125°C	•	•	250	
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±20 V, V_{DS} = 0 V	•	•	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 2.3 mA	2.5	•	4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 11.5 A	•	188	220	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 20 V, I_D = 11.5 A	•	25	•	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 100 V, V_{GS} = 0 V, f = 1 MHz	•	3430	4580	pF
C_{oss}	Output Capacitance		•	100	135	pF
C_{rss}	Reverse Transfer Capacitance		•	0.3	•	pF
C_{oss}	Output Capacitance	V_{DS} = 480 V, V_{GS} = 0 V, f = 1 MHz	•	49	•	pF
$C_{oss(eff.)}$	Effective Output Capacitance	V_{DS} = 0 V to 480 V, V_{GS} = 0 V	•	304	•	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{DS} = 640 V, I_D = 23 A, V_{GS} = 10 V (Note 4)	•	78	105	nC
Q_{gs}	Gate to Source Gate Charge		•	16	•	nC
Q_{gd}	Gate to Drain "Miller" Charge		•	28	•	nC
ESR	Equivalent Series Resistance	f = 1 MHz	•	0.78	•	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 400 V, I_D = 23 A, V_{GS} = 10 V, R_g = 4.7 Ω (Note 4)	•	27	64	ns
t_r	Turn-On Rise Time		•	19	48	ns
$t_{d(off)}$	Turn-Off Delay Time		•	75	160	ns
t_f	Turn-Off Fall Time		•	2.6	15	ns
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		•	•	23	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		•	•	57	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0 V, I_{SD} = 23 A	•	•	1.2	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_{SD} = 23 A, dI_F/dt = 100 A/µs	•	580	•	ns
Q_{rr}	Reverse Recovery Charge		•	14	•	µC

Notes:

1. Repetitive rating: pulse-width limited by maximum junction temperature.
2. I_{AS} = 4.6 A, V_{DD} = 50 V, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 23 A, di/dt ≤ 200 A/µs, V_{DD} ≤ BV_{DSS}, starting T_J = 25°C.
4. Essentially independent of operating temperature typical characteristics.