FCPF290N80

N-Channel SuperFET® II MOSFET

800 V, 17 A, 290 mΩ

Features

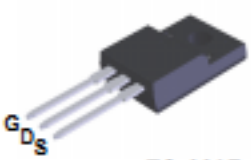
- Typ. $R_{DS(on)}$ = 0.245 Ω
- Ultra Low Gate Charge (Typ. Q_g = 58 nC)
- Low E_{oss} (Typ. 5.6 uJ @ 400 V)
- Low Effective Output Capacitance (Typ. $C_{oss(eff.)}$ = 240 pF)
- 100% Avalanche Tested
- RoHS Compliant
- ESD Improved Capability

Description

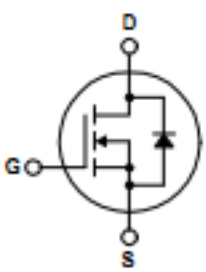
SuperFET® II MOSFET is Fairchild Semiconductor's brand-new high voltage super-junction (SJ) MOSFET family that is utilizing charge balance technology for outstanding low on-resistance and lower gate charge performance. This technology is tailored to minimize conduction loss, provide superior switching 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.

Applications

- AC-DC Power Supply
- LED Lighting



TO-220F



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

Symbol	Parameter		FCPF290N80	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)	17*	A
		• Continuous (T_C = 100°C)	10.8*	
I_{DM}	Drain Current	• Pulsed (Note 1)	42*	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	882	mJ
I_{AR}	Avalanche Current	(Note 1)	3.4	A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	2.12	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)	40	W
		• Derate Above 25°C	0.32	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	FCPF290N80	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	3.15	°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
FCPF290N80	FCPF290N80	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 = 1.7 mA	2.5	-	4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 8.5 A	-	245	290	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 20 V, I_D = 8.5 A	-	20	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 100 V, V_{GS} = 0 V, f = 1 MHz	-	2410	3205	pF
C_{oss}	Output Capacitance		-	75	100	pF
C_{rss}	Reverse Transfer Capacitance		-	0.36	-	pF
C_{oss}	Output Capacitance	V_{DS} = 480 V, V_{GS} = 0 V, f = 1 MHz	-	35	-	pF
$C_{oss(eff.)}$	Effective Output Capacitance	V_{DS} = 0 V to 480 V, V_{GS} = 0 V	-	240	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{DS} = 640 V, I_D = 17 A, V_{GS} = 10 V (Note 4)	-	58	75	nC
Q_{gs}	Gate to Source Gate Charge		-	11	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	22	-	nC
ESR	Equivalent Series Resistance	f = 1 MHz	-	0.75	-	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 400 V, I_D = 17 A, V_{GS} = 10 V, R_g = 4.7 Ω (Note 4)	-	22	54	ns
t_r	Turn-On Rise Time		-	14	38	ns
$t_{d(off)}$	Turn-Off Delay Time		-	61	132	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		-	-	17	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	42	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0 V, I_{SD} = 17 A	-	-	1.2	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_{SD} = 17 A, dI_F/dt = 100 A/µs	-	511	-	ns
Q_{rr}	Reverse Recovery Charge		-	12	-	µC

Notes:

1. Repetitive rating: pulse-width limited by maximum junction temperature.
2. I_{AS} = 3.4 A, V_{DD} = 50 V, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 17 A, di/dt ≤ 200 A/µs, V_{DD} ≤ BV_{DSS}, starting T_J = 25°C.
4. Essentially independent of operating temperature typical characteristics.