FCP22N60N / FCPF22N60NT

N-Channel MOSFET

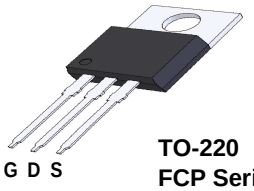
600V, 22A, 0.165Ω

Features

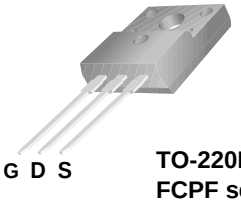
- $R_{DS(on)}$ = 0.140Ω (Typ.)@ V_{GS} = 10V, I_D = 11A
- BV_{DSS}>650V @ T_J = 150°C
- Ultra Low Gate Charge (Typ. Qg = 45nC)
- Low Effective Output Capacitance
- 100% Avalanche Tested
- RoHS Compliant

Description

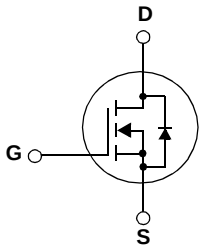
The SupreMOS MOSFET, Fairchild's next generation of high voltage super-junction MOSFETs, employs a deep trench filling process that differentiates it from preceding multi-epi based technologies. By utilizing this advanced technology and precise process control, SupreMOS provides world class Rsp, superior switching performance and ruggedness.
This SupreMOS MOSFET fits the industry's AC-DC SMPS requirements for PFC, server/telecom power, FPD TV power, ATX power, and industrial power applications.



TO-220
FCP Series



TO-220F
FCPF series



MOSFET Maximum Ratings T_C = 25°C unless otherwise noted*

Symbol	Parameter		FCP22N60N	FCPF22N60NT	Units
V_{DSS}	Drain to Source Voltage		600		V
V_{GSS}	Gate to Source Voltage		±30		V
I_D	Drain Current	Continuous (T_C = 25°C)	22	22*	A
		Continuous (T_C = 100°C)	13.8	13.8*	
I_{DM}	Drain Current	Pulsed (Note 1)	66	66*	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	672		mJ
I_{AR}	Avalanche Current		7.3		A
E_{AR}	Repetitive Avalanche Energy		2.75		mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	20		V/ns
	MOSFET dv/dt		100		
P_D	Power Dissipation	(T_C = 25°C)	205	39	W
		Derate above 25°C	1.64	0.31	W/^{o}C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150		^{o}C
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds		300		^{o}C

*Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	FCP22N60N	FCPF22N60NT	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.61	3.2	^{o}C/W
$R_{\theta JS}$	Thermal Resistance, Case to Heat Sink (Typical)	0.5	0.5	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62.5	62.5	

Package Marking and Ordering Information T_C = 25°C unless otherwise noted

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FCP22N60N	FCP22N60N	TO-220	-	-	50
FCPF22N60NT	FCPF22N60NT	TO-220F	-	-	50

Electrical Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 1mA, V_{GS} = 0V, T_J = 25°C	600	-	-	V
		I_D = 1mA, V_{GS} = 0V, T_J = 150°C	650	-	-	
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 1mA, Referenced to 25°C	-	0.68	-	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 480V, V_{GS} = 0V	-	-	10	µA
		V_{DS} = 480V, T_J = 125°C	-	-	100	
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±50V, V_{DS} = 0V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 250µA	2.0	3	4.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 11A	-	0.140	0.165	Ω
g_{FS}	Forward Transconductance	V_{DS} = 20V, I_D = 11A	-	22	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 100V, V_{GS} = 0V f = 1MHz	-	1950	-	pF
C_{oss}	Output Capacitance		-	75.9	-	pF
C_{rss}	Reverse Transfer Capacitance		-	3	-	pF
C_{oss}	Output Capacitance	V_{DS} = 380V, V_{GS} = 0V, f = 1MHz	-	43.2	-	pF
C_{oss}eff.	Effective Output Capacitance	V_{DS} = 0V to 480V, V_{GS} = 0V	-	196.4	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{DS} = 380V, I_D = 11A, V_{GS} = 10V (Note 4)	-	45	-	nC
Q_{gs}	Gate to Source Gate Charge		-	8.7	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	14.5	-	nC
ESR	Equivalent Series Resistance (G-S)	Drain Open, f=1MHz	-	1	-	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 380V, I_D = 11A R_G = 4.7Ω (Note 4)	-	16.9	-	ns
t_r	Turn-On Rise Time		-	16.7	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	49	-	ns
t_f	Turn-Off Fall Time		-	4	-	ns
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	22	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	66	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 11A	-	-	1.2	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_{SD} = 11A dI_F/dt = 100A/µs	-	350	-	ns
Q_{rr}	Reverse Recovery Charge		-	6	-	µC

Notes:
1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. I_{AS} = 7.3A, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 22A, di/dt ≤ 200A/µs, V_{DD} ≤ 380V, Starting T_J = 25°C
4. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

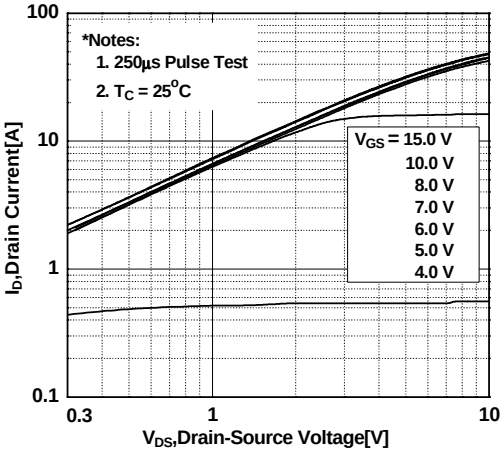


Figure 2. Transfer Characteristics

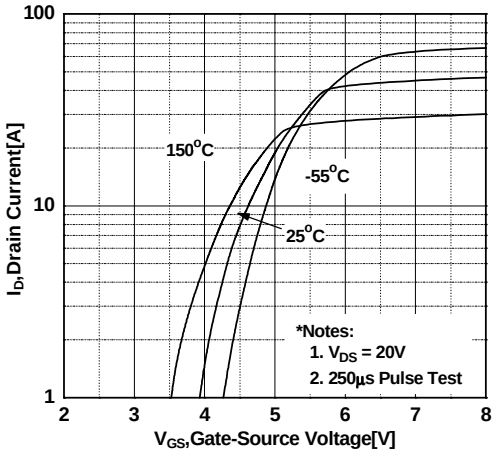


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

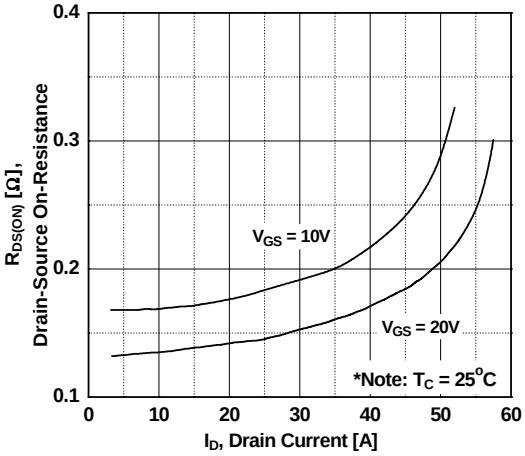


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

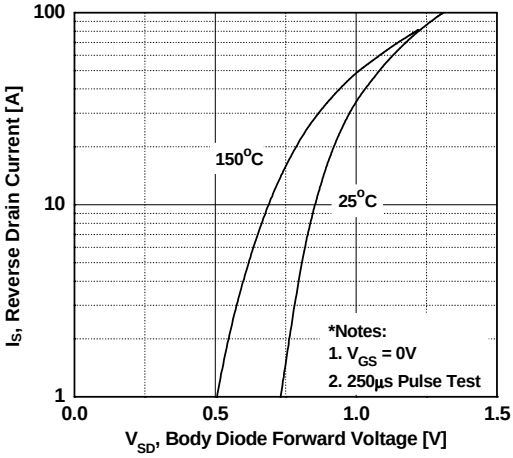


Figure 5. Capacitance Characteristics

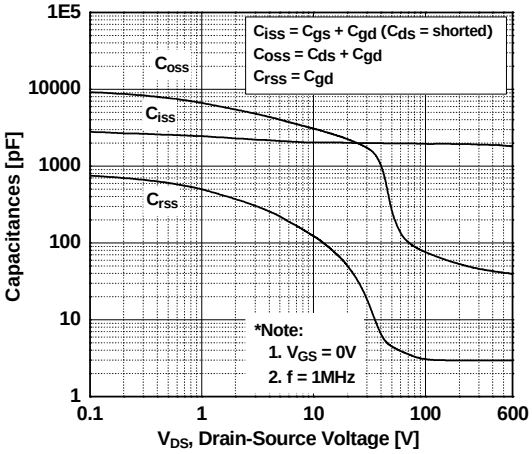


Figure 6. Gate Charge Characteristics