FCP16N60 / FCPF16N60

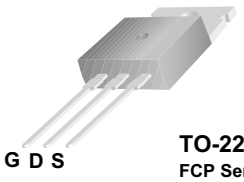
600V N-Channel MOSFET

Features

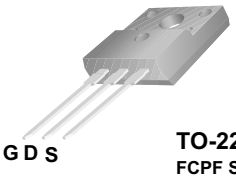
- 650V @T_J = 150°C
- Typ. Rds(on)=0.22Ω
- Ultra low gate charge (typ. Qg=45nC)
- Low effective output capacitance (typ. Coss.eff=110pF)
- 100% avalanche tested

Description

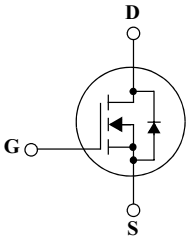
SuperFET^{TM} is, Farichild's proprietary, new generation of high voltage MOSFET family that is utilizing an advanced charge balance mechanism for outstanding low on-resistance and lower gate charge performance.
This advanced technology has been tailored to minimize conduction loss, provide superior switching performance, and withstand extreme dv/dt rate and higher avalanche energy. Consequently, SuperFET is very suitable for various AC/DC power conversion in switching mode operation for system miniaturization and higher efficiency.



TO-220
FCP Series



TO-220F
FCPF Series



Absolute Maximum Ratings

Symbol	Parameter	FCP16N60	FCPF16N60	Unit
V_{DSS}	Drain-Source Voltage	600		V
I_D	Drain Current - Continuous (T_C = 25°C) - Continuous (T_C = 100°C)	16 10.1	16* 10.1*	A A
I_{DM}	Drain Current - Pulsed (Note 1)	48	48*	A
V_{GSS}	Gate-Source voltage	± 30		V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	tbd		mJ
I_{AR}	Avalanche Current (Note 1)	16		A
E_{AR}	Repetitive Avalanche Energy (Note 1)	20.8		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5		V/ns
P_D	Power Dissipation (T_C = 25°C) - Derate above 25°C	167 1.33	37.9 0.3	W W/°C
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150		°C
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds	300		°C

*Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	FCP16N60	FCPF16N60	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.75	3.3	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	62.5	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FCP16N60	FCP16N60	TO-220	-	-	50
FCPF16N60	FCPF16N60	TO-220F	-	-	50

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA, T_J = 25°C	600	--	--	V
		V_{GS} = 0V, I_D = 250μA, T_J = 150°C	--	650	--	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25°C	--	0.6	--	V/°C
BV_{DS}	Drain-Source Avalanche Breakdown Voltage	V_{GS} = 0V, I_D = 16A	--	700	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 600V, V_{GS} = 0V V_{DS} = 480V, T_C = 125°C	-- --	-- --	1 10	μA μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30V, V_{DS} = 0V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30V, V_{DS} = 0V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	3.0	--	5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10V, I_D = 8A	--	0.22	0.26	Ω
g_{FS}	Forward Transconductance	V_{DS} = 40V, I_D = 8A (Note 4)	--	11.5	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	--	1610	2100	pF
C_{oss}	Output Capacitance		--	870	1135	pF
C_{rss}	Reverse Transfer Capacitance		--	65	--	pF
C_{oss}	Output Capacitance	V_{DS} = 480V, V_{GS} = 0V, f = 1.0MHz	--	45	58	pF
C_{oss} eff.	Effective Output Capacitance	V_{DS} = 0V to 400V, V_{GS} = 0V	--	110	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 300V, I_D = 16A R_G = 25Ω (Note 4, 5)	--	42	90	ns
t_r	Turn-On Rise Time		--	95	200	ns
$t_{d(off)}$	Turn-Off Delay Time		--	150	320	ns
t_f	Turn-Off Fall Time		--	45	95	ns
Q_g	Total Gate Charge	V_{DS} = 480V, I_D = 16A V_{GS} = 10V (Note 4, 5)	--	50	66	nC
Q_{gs}	Gate-Source Charge		--	9.2	12	nC
Q_{gd}	Gate-Drain Charge		--	25	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	16	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	48	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0V, I_S =16A	--	--	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_S = 16A dI_F/dt =100A/μs (Note 4)	--	450	--	ns
Q_{rr}	Reverse Recovery Charge		--	8.2	--	μC

NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. I_{AS} = 8A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 16A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

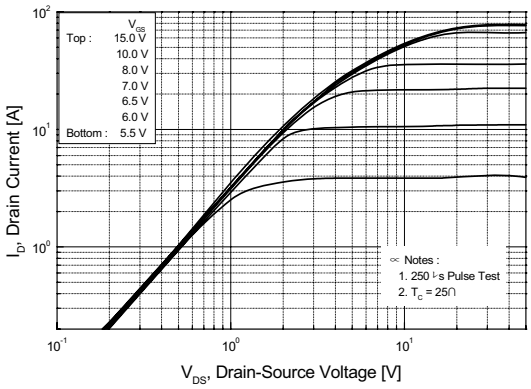


Figure 2. Transfer Characteristics

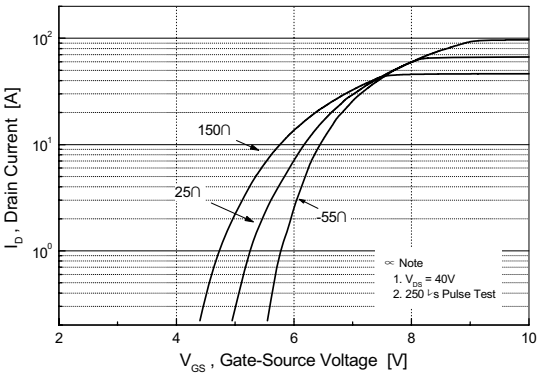


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

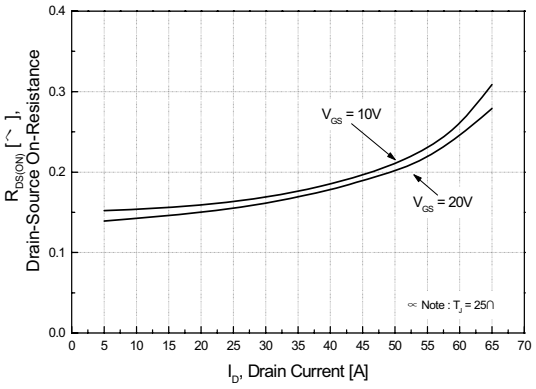


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperatue

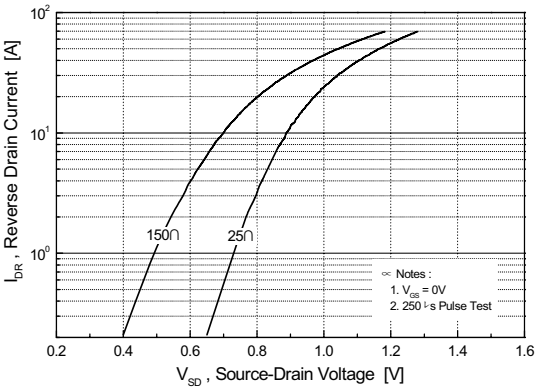


Figure 5. Capacitance Characteristics

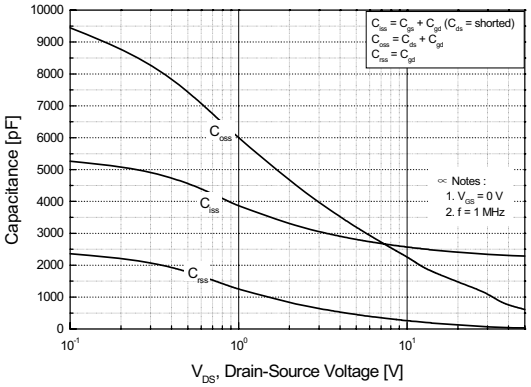


Figure 6. Gate Charge Characteristics