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October 2013

FQPF19N10

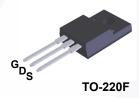
N-Channel QFET® MOSFET 100 V, 13.6 A, 100 m Ω

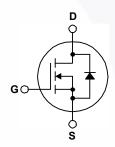
Description

This N-Channel enhancement mode power MOSFET is produced using Fairchild Semiconductor's proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, audio amplifier, DC motor control, and variable switching power applications.

Features

- 13.6 A, 100 V, $R_{DS(on)}$ =100 m $\Omega(Max.)$ @ V_{GS} =10 V, I_D =6.8 A
- Low Gate Charge (Typ. 19 nC)
- Low Crss (Typ. 32 pF)
- 100% Avalanche Tested
- 175°C Maximum Junction Temperature Rating





Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter		FQPF19N10	Unit
V _{DSS}	Drain-Source Voltage		100	V
I _D	Drain Current - Continuous (T _C = 25°C)		13.6	А
	- Continuous (T _C = 100°C)		9.6	А
I _{DM}	Drain Current - Pulsed	(Note 1)	54.4	A
V _{GSS}	Gate-Source Voltage		± 25	V
E _{AS}	Single Pulsed Avalanche Energy	(Note 2)	220	mJ
I _{AR}	Avalanche Current	(Note 1)	13.6	А
E _{AR}	Repetitive Avalanche Energy	(Note 1)	3.8	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	6.0	V/ns
P_{D}	Power Dissipation (T _C = 25°C)		38	W
	- Derate above 25°C		0.25	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +175	°C
T _L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		300	°C

Thermal Characteristics

Symbol	Parameter	FQPF19N10	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	3.95	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	62.5	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FQPF19N10	FQPF19N10	TO-220F	-	-	50

Flectrical	Charac	taristics
FIECTICAL	Charac	tensucs

Symbol	Parameter	Test Conditions	Min	Тур	Max	Unit
Off Cha	aracteristics					
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_{D} = 250 \mu\text{A}$				V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C		0.1		V/°(
I _{DSS}	SS - 0	V _{DS} = 100 V, V _{GS} = 0 V			1	μΑ
	Zero Gate Voltage Drain Current	V _{DS} = 80 V, T _C = 150°C			10	μΑ
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 25 V, V _{DS} = 0 V			100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -25 V, V _{DS} = 0 V			-100	nA
On Cha	aracteristics					
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = 250 \mu\text{A}$	2.0		4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 6.8 A	\	0.078	0.1	Ω
9 _{FS}	Forward Transconductance	V _{DS} = 40 V, I _D = 6.8 A		10		S
Dynam C _{iss}	ic Characteristics Input Capacitance	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V},$ f = 1.0 MHz		600	780	pF
C _{oss}	Output Capacitance			165	215	pF
C _{rss}	Reverse Transfer Capacitance			32	40	pF
Switchi	ing Characteristics					
t _{d(on)}	Turn-On Delay Time	V _{DD} = 50 V, I _D = 19 A,		7.5	25	ns
t _r	Turn-On Rise Time	$V_{DD} = 50 \text{ V}, I_D = 19 \text{ A},$ $R_G = 25 \Omega$		150	310	ns
t _{d(off)}	Turn-Off Delay Time	- ''.G = 20 11		20	50	ns
t _f	Turn-Off Fall Time	(Note 4)		65	140	ns
Q_g	Total Gate Charge	V _{DS} = 80 V, I _D = 19 A,		19	25	nC
Q _{gs}	Gate-Source Charge	V _{GS} = 10 V		3.9		nC
Q_{gd}	Gate-Drain Charge	(Note 4)		9.0		nC
Drain-S	Source Diode Characteristics a	nd Maximum Ratings				
I _S	Maximum Continuous Drain-Source Diode Forward Current				13.6	Α
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current				54.4	Α
V _{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_{S} = 13.6 \text{ A}$			1.5	V
			1			t

Q_{rr}

 \mathbf{t}_{rr}

Reverse Recovery Time

Reverse Recovery Charge

ns

nC

78

200

 $V_{GS} = 0 \text{ V}, I_{S} = 19 \text{ A},$

 $dI_F / dt = 100 A/\mu s$

Notes:1. Repetitive Rating : Pulse width limited by maximum junction temperature 2. L = 1.8mH, $|_{AS}$ = 13.6A, V_{DD} = 25V, R_{G} = 25 Ω , Starting T_{J} = 25°C 3. $|_{SD}$ ≤ 19A, di/dt ≤ 300A/ μ s, V_{DD} ≤ BV $_{DSS}$, Starting T_{J} = 25°C 4.Essentially independent of operating temperature

Typical Characteristics

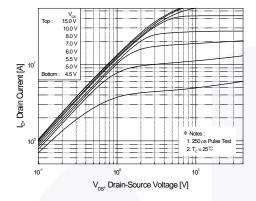


Figure 1. On-Region Characteristics

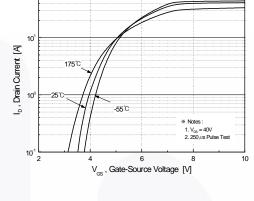


Figure 2. Transfer Characteristics

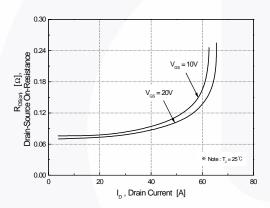


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

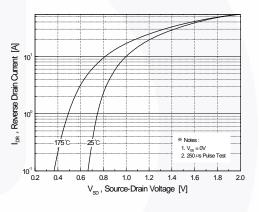


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

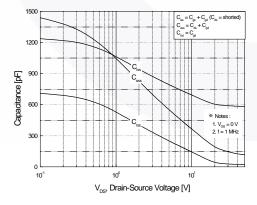


Figure 5. Capacitance Characteristics

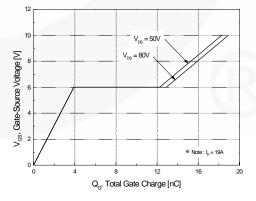


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

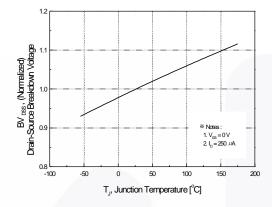
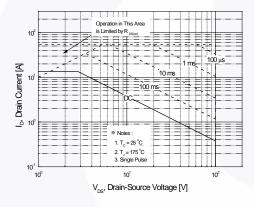


Figure 7. Breakdown Voltage Variation vs. Temperature

Figure 8. On-Resistance Variation vs. Temperature



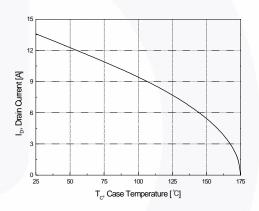


Figure 9. Maximum Safe Operating Area

Figure 10. Maximum Drain Current vs. Case Temperature

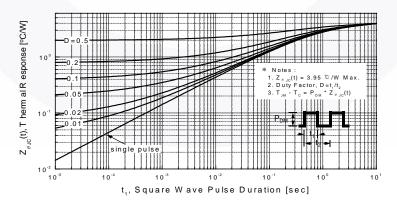


Figure 11. Transient Thermal Response Curve

Figure 12. Gate Charge Test Circuit & Waveform

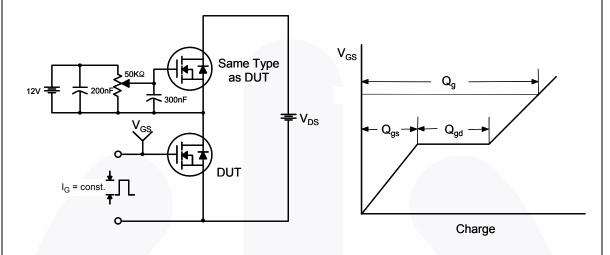


Figure 13. Resistive Switching Test Circuit & Waveforms

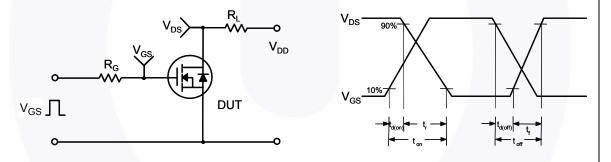
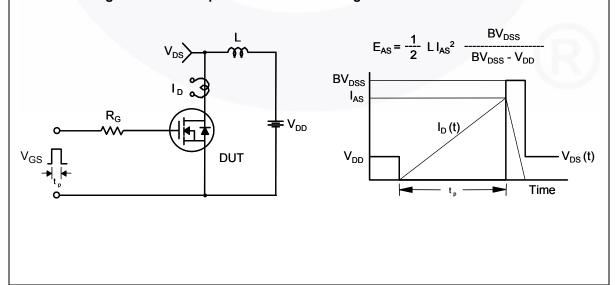
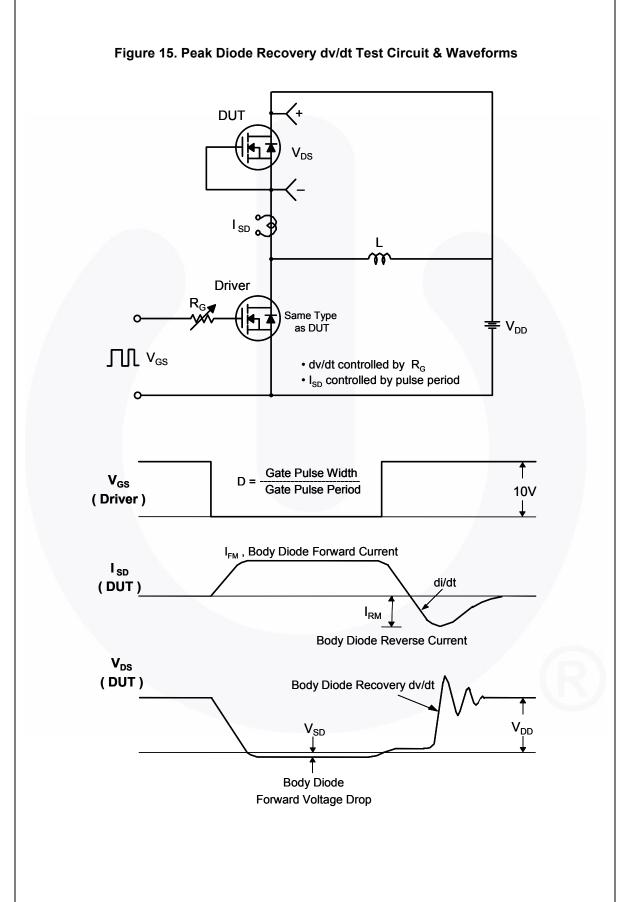


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms





Mechanical Dimensions

TO-220F 3L

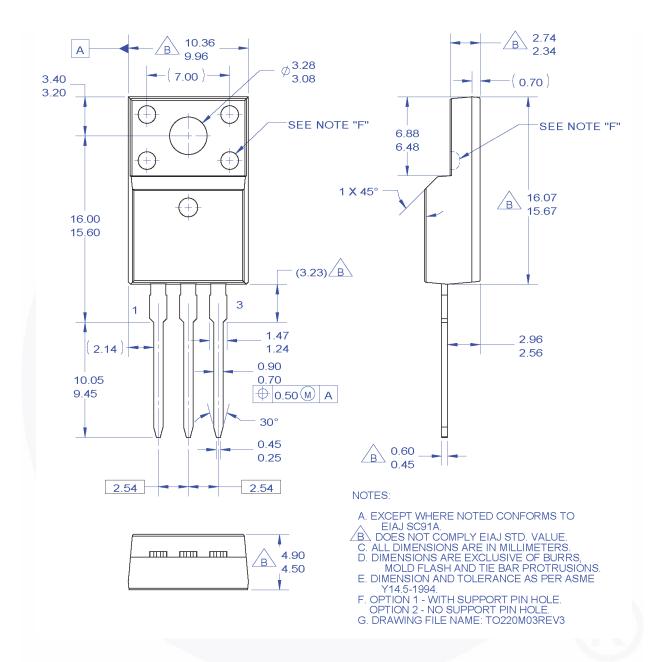


Figure 16. TO220, Molded, 3LD, Full Pack, EIAJ SC91, Straight Lead

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Dimension in Millimeters





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