

FQPF22P10

P-Channel QFET® MOSFET -100 V, -13.2 A, 125 m Ω

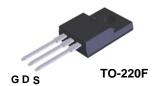
Description

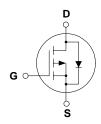
This P-Channel enhancement mode power MOSFET is produced using Fairchild Semiconductor[®]'s proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy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



Features

- -13.2 A, -100 V, $R_{DS(on)}$ =125 m $\Omega(Max.)$ @ V_{GS} =-10 V, I_D =-6.6 A
- Low Gate Charge (Typ. 40 nC)
- Low Crss (Typ. 160 pF)
- 100% Avalanche Tested
- 175°C Maximum Junction Temperature Rating





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

Symbol	Parameter		FQPF22P10	Unit	
V _{DSS}	Drain-Source Voltage		-100	V	
I _D	Drain Current - Continuous (T _C = 25	°C)	-13.2	А	
	- Continuous (T _C = 100°C)		-9.3	А	
I _{DM}	Drain Current - Pulsed	(Note 1)	-52.8	А	
V _{GSS}	Gate-Source Voltage		± 30	V	
E _{AS}	Single Pulsed Avalanche Energy	(Note 2)	710	mJ	
I _{AR}	Avalanche Current	(Note 1)	-13.2	А	
E _{AR}	Repetitive Avalanche Energy	(Note 1)	4.5	mJ	
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	-6.0	V/ns	
P_D	Power Dissipation (T _C = 25°C)		45	W	
	- Derate above 25°C		0.3	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	Тур	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case		3.3	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient		62.5	°C/W

Symbol	Parameter	Test Conditions	1	Min	Тур	Max	Unit
Off Cha	aracteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_{D} = -250 \mu\text{A}$		-100			V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = -250 μA, Referenced to 25°C			-0.1		V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -100 V, V _{GS} = 0 V				-1	μΑ
		$V_{DS} = -80 \text{ V}, T_{C} = 125^{\circ}\text{C}$		-		-10	μΑ
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = -30 V, V _{DS} = 0 V				-100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = 30 \text{ V}, V_{DS} = 0 \text{ V}$		-		100	nA
On Cha	racteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250 μA		-2.0		-4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = -10 V, I _D = -6.6 A			0.096	0.125	Ω
9 _{FS}	Forward Transconductance	$V_{DS} = -40 \text{ V}, I_{D} = -6.6 \text{ A}$	(Note 4)		11		S
C _{oss}	Output Capacitance Reverse Transfer Capacitance	$V_{DS} = -25 \text{ V}, V_{GS} = 0 \text{ V},$ f = 1.0 MHz			460 160	600 200	pF pF
C _{rss}	· · ·	f = 1.0 MHz					рF
Switchi	ing Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = -50 V, I _D = -22 A,			17	45	ns
t _r	Turn-On Rise Time	$R_{G} = 25 \Omega$	-	170	350	ns	
t _{d(off)}	Turn-Off Delay Time	11G - 20 32			60	130	ns
t _f	Turn-Off Fall Time		(Note 4, 5)		110	230	ns
Qg	Total Gate Charge	$V_{DS} = -80 \text{ V}, I_{D} = -22 \text{ A},$ $V_{GS} = -10 \text{ V}$			40	50	nC
Q _{gs}	Gate-Source Charge			7.0		nC	
Q _{gd}	Gate-Drain Charge	(Note 4, 5)		-	21		nC
Drain-S	Source Diode Characteristics a	nd Maximum Rating	S				
I _S	Maximum Continuous Drain-Source Diode Forward Current				-13.2	Α	
I _{SM}	Maximum Pulsed Drain-Source Diode F	Forward Current		-		-52.8	Α
V _{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_{S} = -13.2 \text{ A}$		-		-4.0	V
	D	V _{GS} = 0 V, I _S = -22 A,			110		ns
t _{rr}	Reverse Recovery Time	VGS = 0 V, IS = -22 A,			110		113

- **Notes:**1. Repetitive Rating : Pulse width limited by maximum junction temperature 2. L = 6.1mH, I_{AS} = -13.2A, V_{DD} = -25V, R_G = 25 Ω , Starting T_J = 25°C 3. I_{SD} \leq -22A, di/dt \leq 300A/µs, V_{DD} \leq BV_{DSS}, Starting T_J = 25°C 4. Pulse Test : Pulse width \leq 300µs, Duty cycle \leq 2% 5. Essentially independent of operating temperature

Typical Characteristics

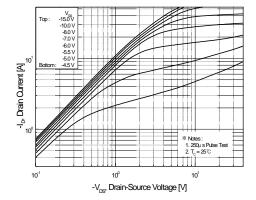


Figure 1. On-Region Characteristics

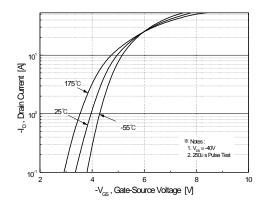


Figure 2. Transfer Characteristics

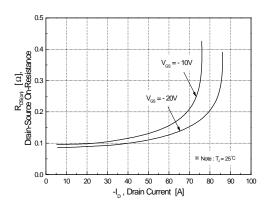


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

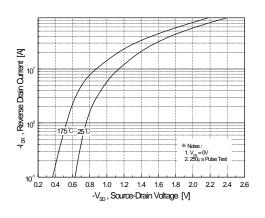


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

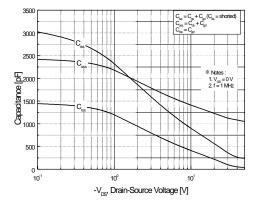


Figure 5. Capacitance Characteristics

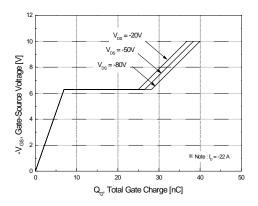


Figure 6. Gate Charge Characteristics

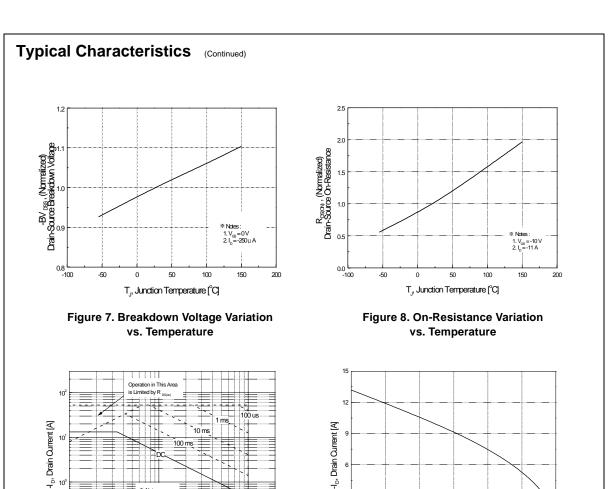


Figure 9. Maximum Safe Operating Area

-V_{DS}, Drain-Source Voltage [V]

Figure 10. Maximum Drain Current vs. Case Temperature

 $T_{_{\mathbb{C}^{\prime}}}$ Case Temperature [${}^{\circ}\mathbb{C}$]

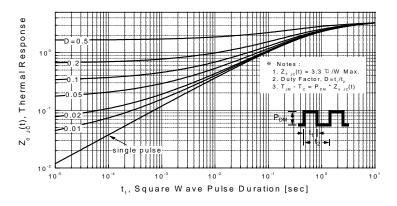
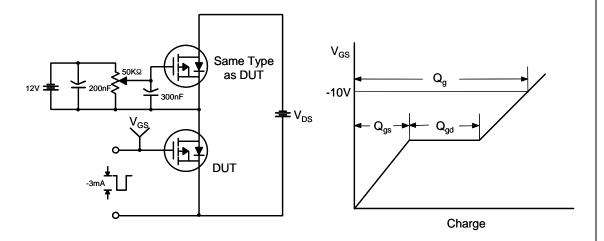


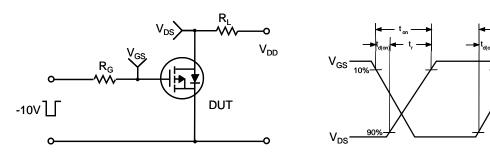
Figure 11. Transient Thermal Response Curve

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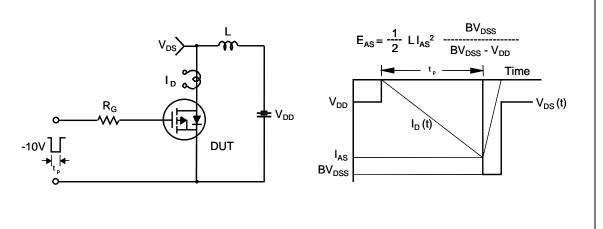
Gate Charge Test Circuit & Waveform



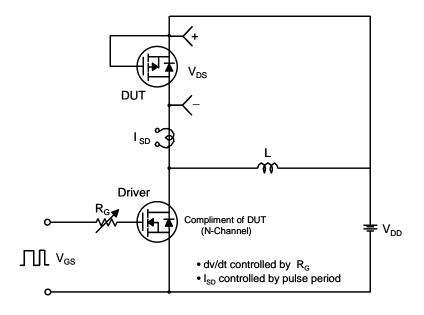
Resistive Switching Test Circuit & Waveforms

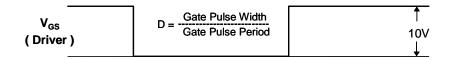


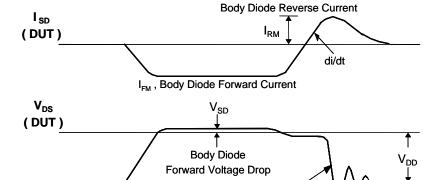
Unclamped Inductive Switching Test Circuit & Waveforms



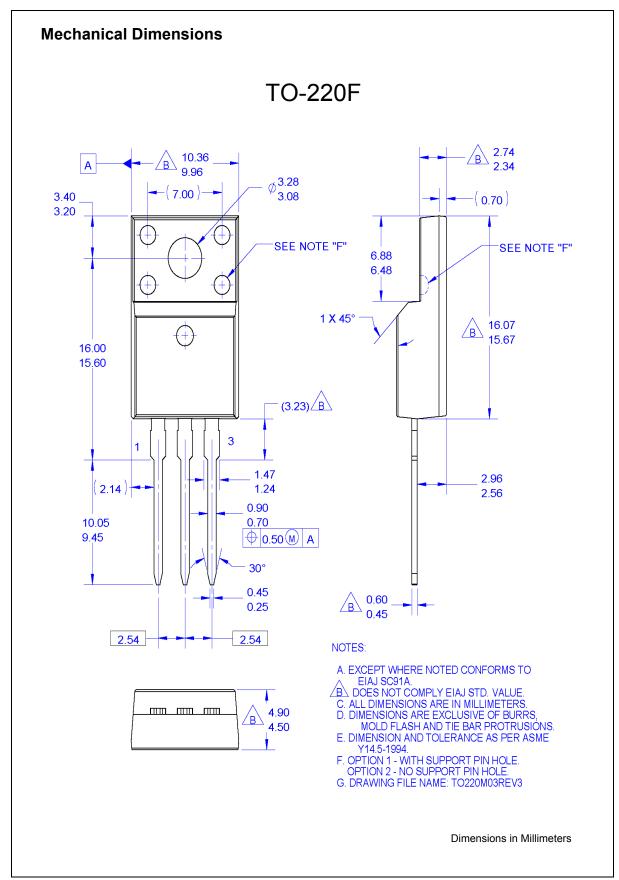
Peak Diode Recovery dv/dt Test Circuit & Waveforms







Body Diode Recovery dv/dt







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Rev. 164