

March 2013

FQPF47P06 / FQPF47P06YDTU P-Channel QFET® MOSFET

-60 V, -30 A, 26 m Ω

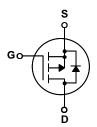
Description

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

- -30 A, -60 V, $R_{DS(on)}$ =26 m $\Omega(Max.)$ @ V_{GS} =-10 V, I_D =-15 A
- Low Gate Charge (Typ. 84 nC)
- Low Crss (Typ. 320 pF)
- 100% Avalanche Tested
- 175°C Maximum Junction Temperature Rating





Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter		FQPF47P06 / FQPF47P06YDTU	Unit
V _{DSS}	Drain-Source Voltage		-60	V
I _D	Drain Current - Continuous (T _C = 25°C)		-30	Α
	- Continuous (T _C = 10	0°C)	-21.2	Α
I _{DM}	Drain Current - Pulsed	(Note 1)	-120	Α
V_{GSS}	Gate-Source Voltage		± 25	V
E _{AS}	Single Pulsed Avalanche Energy	(Note 2)	820	mJ
I _{AR}	Avalanche Current	(Note 1)	-30	Α
E _{AR}	Repetitive Avalanche Energy	(Note 1)	6.2	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	-7.0	V/ns
P _D	Power Dissipation (T _C = 25°C)		62	W
	- Derate above 25°C		0.41	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +175	°C
TL	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		300	°C
'L			300	

Thermal Characteristics

Symbol	Parameter	Тур	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case		2.42	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient		62.5	°C/W

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Symbol	Parameter	Test Conditions	Min	Тур	Max	Unit
Off Cha	aracteristics					
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_{D} = -250 \mu\text{A}$	-60			V
ΔBV _{DSS} / ΔΤ _J	Breakdown Voltage Temperature Coefficient	I_D = -250 μA, Referenced to 25°C		-0.06		V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -60 V, V _{GS} = 0 V			-1	μΑ
		V _{DS} = -48 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	racteristics					
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 = -15 A		0.021	0.026	Ω
9 _{FS}	Forward Transconductance	$V_{DS} = -30 \text{ V}, I_D = -15 \text{ A}$ (Note 4)		19		S
C _{oss}	Output Capacitance Reverse Transfer Capacitance	$V_{DS} = -25 \text{ V}, V_{GS} = 0 \text{ V},$ f = 1.0 MHz		1300 320	1700 420	pF pF
C _{rss}	Reverse Transfer Capacitance			320	420	pF
Switchi	ng Characteristics					
t _{d(on)}	Turn-On Delay Time	V _{DD} = -30 V, I _D = -23.5 A,		50	110	ns
t _r	Turn-On Rise Time	$R_G = 25 \Omega$		450	910	ns
t _{d(off)}	Turn-Off Delay Time			100	210	ns
t _f	Turn-Off Fall Time	(Note 4, 5)		195	400	ns
Q_g	Total Gate Charge	$V_{DS} = -48 \text{ V}, I_{D} = -47 \text{ A},$		84	110	nC
Q_{gs}	Gate-Source Charge	V _{GS} = -10 V		18		nC
Q_{gd}	Gate-Drain Charge	(Note 4, 5)		44		nC
Drain-S	Source Diode Characteristics a	nd Maximum Ratings				
l _S	Maximum Continuous Drain-Source Diode Forward Current				-30	Α
I _{SM}	Maximum Pulsed Drain-Source Diode F	orward Current			-120	Α
	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = -30 A			-4.0	V
V_{SD}	Diani-Oddice Diode i diward voltage	00				
V _{SD}	Reverse Recovery Time	V _{GS} = 0 V, I _S = -47 A,		130		ns

- **Notes:**1. Repetitive Rating : Pulse width limited by maximum junction temperature 2. L = 1.06mH, I_{AS} = -30A, V_{DD} = -25V, R_G = 25 Ω, Starting T_J = 25°C 3. I_{SD} \leq -47A, 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

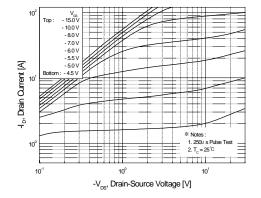


Figure 1. On-Region Characteristics

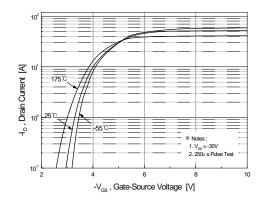


Figure 2. Transfer Characteristics

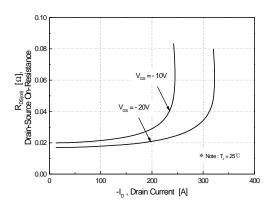


Figure 3. On-Resistance Variation vs.

Drain Current and Gate Voltage

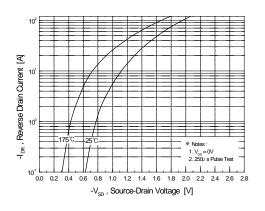


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

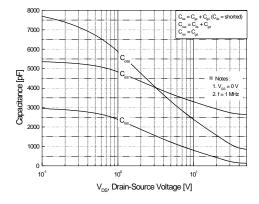


Figure 5. Capacitance Characteristics

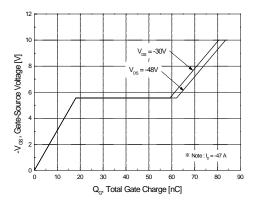
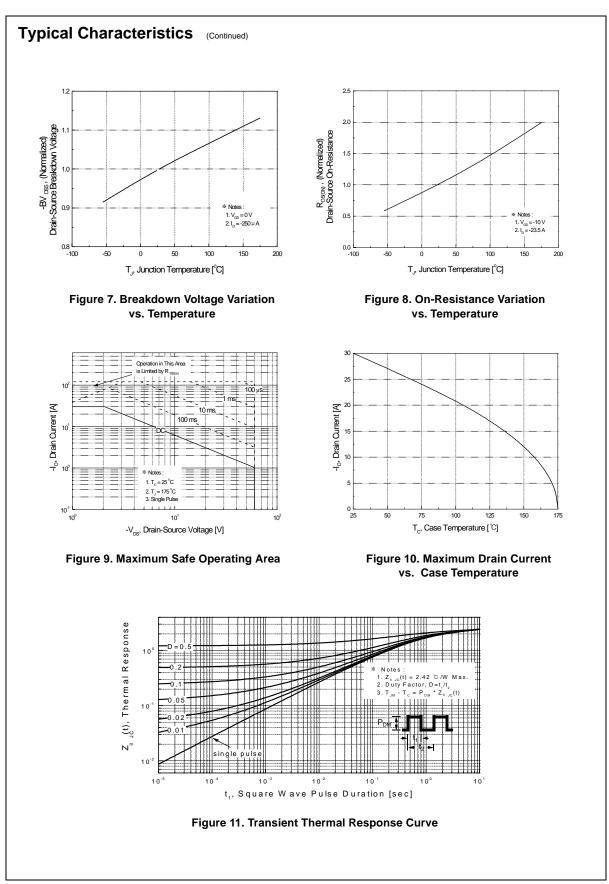
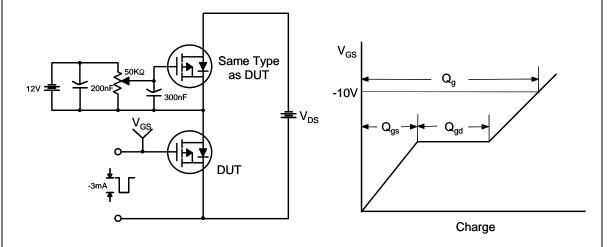


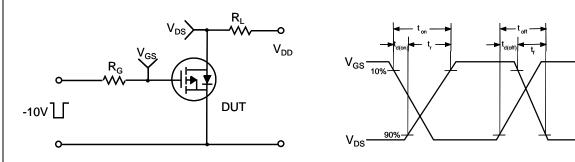
Figure 6. Gate Charge Characteristics



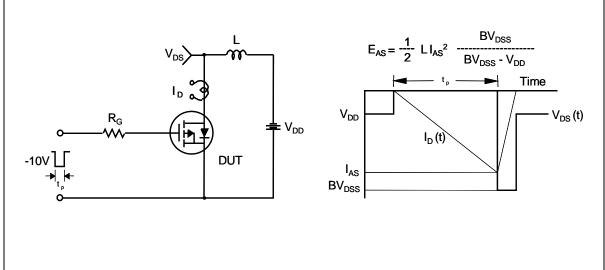
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



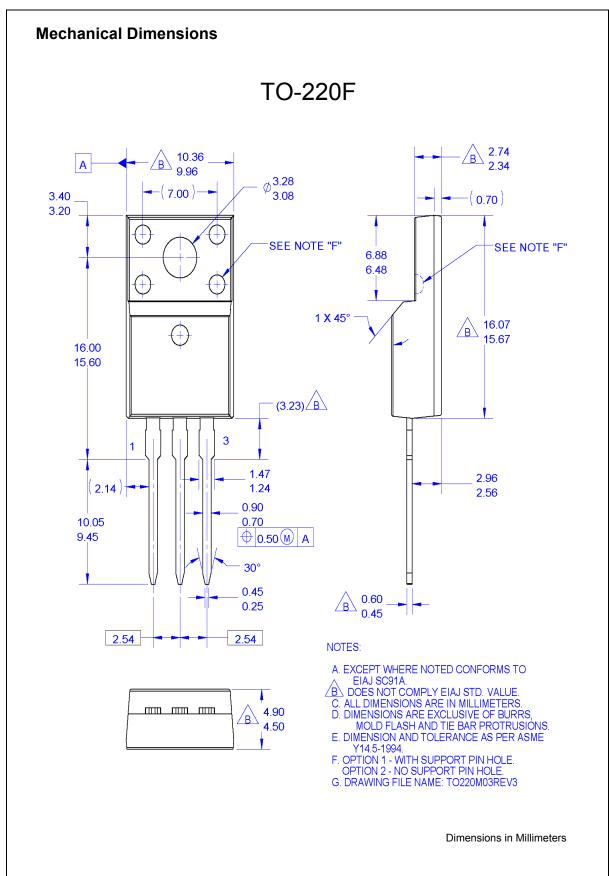
Unclamped Inductive Switching Test Circuit & Waveforms

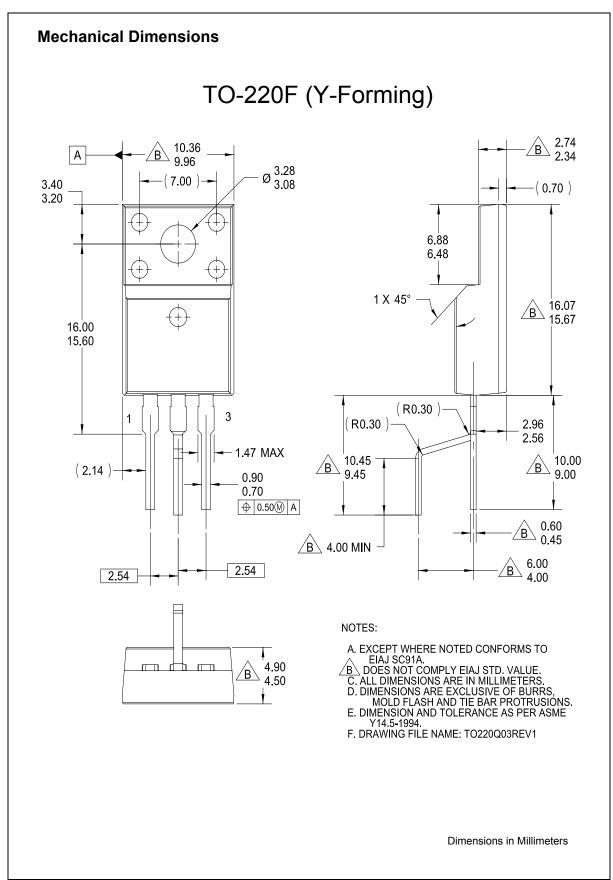


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Peak Diode Recovery dv/dt Test Circuit & Waveforms DUT Driver Compliment of DUT V_{DD} (N-Channel) • dv/dt controlled by R_G • I_{SD} controlled by pulse period Gate Pulse Width V_{GS} Gate Pulse Period 10V (Driver) **Body Diode Reverse Current** I_{SD} (DUT) I_{RM} di/dt I_{FM} , Body Diode Forward Current \mathbf{V}_{DS} (DUT) Body Diode Forward Voltage Drop Body Diode Recovery dv/dt

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