

November 2013

FQB47P06

P-Channel QFET® MOSFET

-60 V, -47 A, 26 mΩ

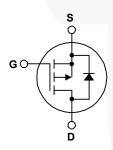
Description

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

- -47 A, -60 V, $R_{DS(on)}$ = 26 m Ω (Max.) @ V_{GS} = .10 V, I_D = -23.5 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		FQB47P06TM_AM002	Unit	
V_{DSS}	Drain-Source Voltage		-60	V	
I _D	Drain Current - Continuous (T _C = 25°C)		-47	Α	
	- Continuous (T _C = 100°C)		-33.2	Α	
I _{DM}	Drain Current - Pulsed	(Note 1)	-188	Α	
V _{GSS}	Gate-Source Voltage		± 25	V	
E _{AS}	Single Pulsed Avalanche Energy	(Note 2)	820	mJ	
I _{AR}	Avalanche Current	(Note 1)	-47	Α	
E _{AR}	Repetitive Avalanche Energy	(Note 1)	16	mJ	
dv/dt	Peak Diode Recovery dv/dt (Note		-7.0	V/ns	
P_{D}	Power Dissipation (T _A = 25°C) *		3.75	W	
	Power Dissipation (T _C = 25°C)		160	W	
	- Derate above 25°C		1.06	W/°C	
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +175	°C	
T _L	Maximum lead temperature for soldering, 1/8" from case for 5 seconds		300	°C	

Thermal Characteristics

Symbol	Parameter	FQB47P06TM_AM002	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max. 0.94		
В	Thermal Resistance, Junction to Ambient (Minimum Pad of 2-oz Copper), Max.	62.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (*1 in ² Pad of 2-oz Copper), Max.	40	

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FQB47P06TM_AM002	FQB47P06	D ² -PAK	Tape and Reel	330 mm	24 mm	800 units

Electrical Characteristics

T_C = 25°C unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Uni
Off Cha	aracteristics					
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_D = -250 \mu\text{A}$	-60			V
ΔBV _{DSS} /ΔT _J	Breakdown Voltage Temperature Coefficient	I_D = -250 μA, Referenced to 25°C		-0.06		V/°(
I _{DSS}	Zara Cata Valtaria Dinin Current	V _{DS} = -60 V, V _{GS} = 0 V			-1	μΑ
	Zero Gate Voltage Drain Current	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	aracteristics					
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = -250 \mu A$	-2.0		-4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = -10 V, I _D = -23.5 A		0.021	0.026	Ω
9 _{FS}	Forward Transconductance	V _{DS} = -30 V, I _D = -23.5 A		21		S
Dynam	ic Characteristics					
C _{iss}	Input Capacitance	$V_{DS} = -25 \text{ V}, V_{GS} = 0 \text{ V},$		2800	3600	pF
C _{oss}	Output Capacitance	f = 1.0 MHz		1300	1700	pF
C _{rss}	Reverse Transfer Capacitance			320	420	pF
Switchi	ing 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	11.6 2032		100	210	ns
t _f	Turn-Off Fall Time	(Note 4)		195	400	ns
Qg	Total Gate Charge	V _{DS} = -48 V, I _D = -47 A,		84	110	nC
Q _{gs}	Gate-Source Charge	V _{GS} = -10 V		18		nC
Q _{gd}	Gate-Drain Charge	(Note 4)	/	44		nC
Drain-S	Source Diode Characteristics a	nd Maximum Ratings			J	
I _S	Maximum Continuous Drain-Source Diode Forward Current				-47	Α
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current				-188	Α
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = -47 A			-4.0	V
	Reverse Recovery Time	$V_{GS} = 0 \text{ V}, I_{S} = -47 \text{ A},$		130		ns
t _{rr}						

- Notes. 1. Repetitive rating: pulse-width limited by maximum junction temperature. 2. L = 0.43 mH, I $_{AS}$ = -47 A, V $_{DD}$ = -25 V, R $_{G}$ = 25 Ω , starting T $_{J}$ = 25°C. 3. I $_{SD}$ ≤ -47 A, di/dt ≤ 300 A/ μ s , V $_{DD}$ ≤ BV $_{DSS}$, starting T $_{J}$ = 25°C. 4. Essentially independent of operating temperature.

Typical Characteristics

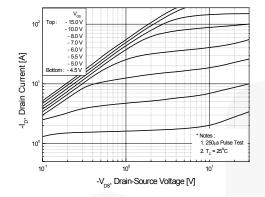


Figure 1. On-Region Characteristics

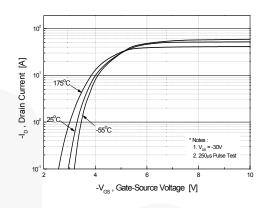


Figure 2. Transfer Characteristics

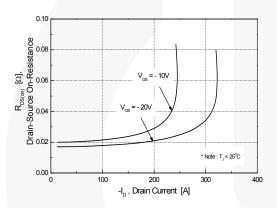


Figure 3. On-Resistance Variation vs.
Drain Current and Gate Voltage

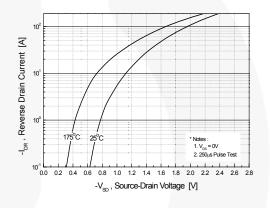
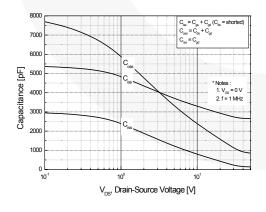
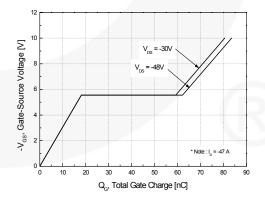


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature





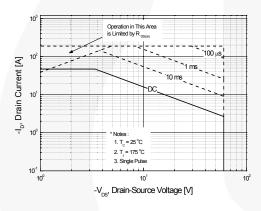
Typical Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

 T_{J} , Junction Temperature [°C]

150

Figure 8. On-Resistance Variation vs. Temperature



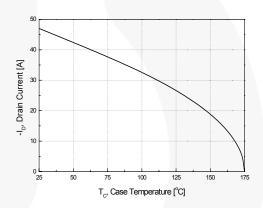


Figure 9. Maximum Safe Operating Area

Figure 10. Maximum Drain Current vs. Case Temperature

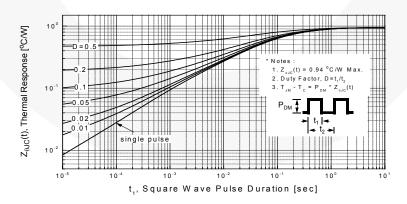


Figure 11. Transient Thermal Response Curve

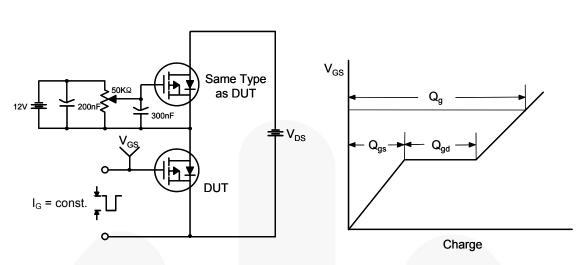


Figure 12. Gate Charge Test Circuit & Waveform

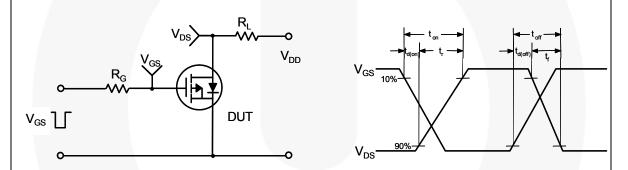


Figure 13. Resistive Switching Test Circuit & Waveforms

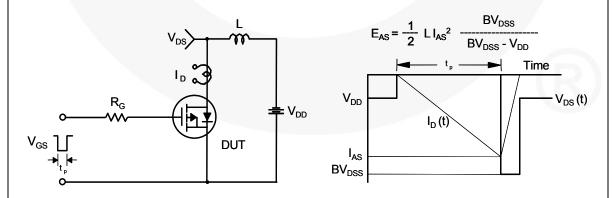
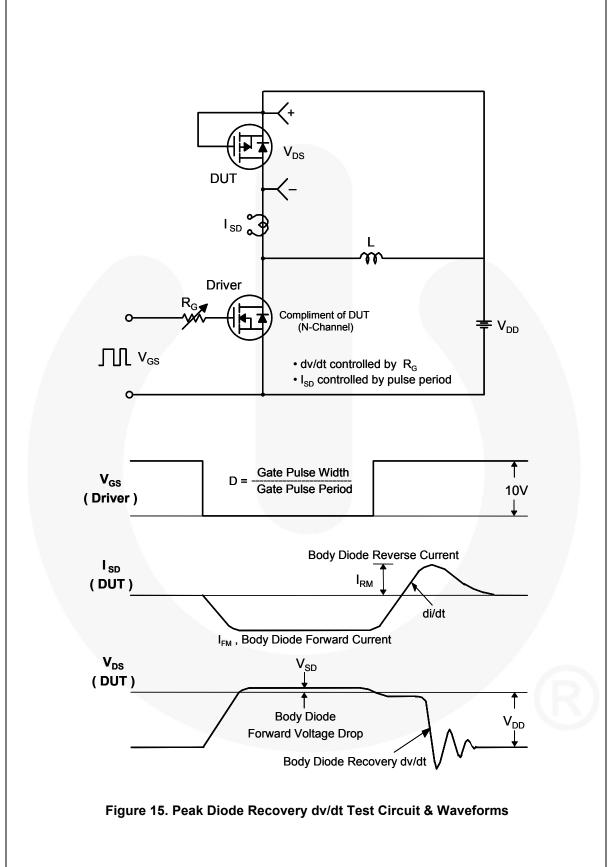


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions

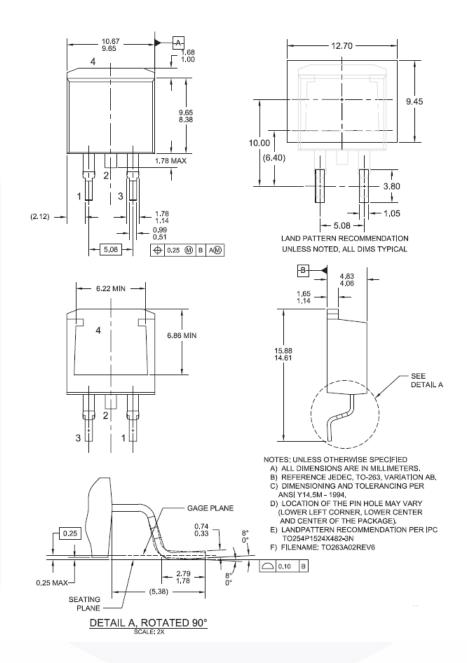


Figure 16. TO263 (D²PAK), Molded, 2-Lead, Surface Mount

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