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November 2013

FQB11P06

P-Channel QFET® MOSFET

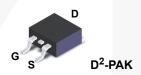
-60 V, -11.4 A, 175 mΩ

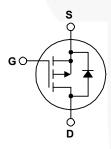
Description

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

- -11.4 A, -60 V, $R_{DS(on)}$ = 175 m Ω (Max.) @ V_{GS} = -10 V, I_D = -5.7 A
- Low Gate Charge (Typ. 13 nC)
- Low Crss (Typ. 45 pF)
- 100% Avalanche Tested
- 175°C Maximum Junction Temperature Rating





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

Symbol	Parameter		FQB11P06TM	Unit
V _{DSS}	Drain-Source Voltage		-60	V
I _D	Drain Current - Continuous (T _C = 25°C)		-11.4	Α
	- Continuous (T _C = 100°C)		-8.05	Α
I _{DM}	Drain Current - Pulsed	(Note 1)	-45.6	Α
V _{GSS}	Gate-Source Voltage		± 25	V
E _{AS}	Single Pulsed Avalanche Energy (Note 2		160	mJ
I _{AR}	Avalanche Current	(Note 1)	-11.4	Α
E _{AR}	Repetitive Avalanche Energy	(Note 1)	5.3	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	-7.0	V/ns
P_{D}	Power Dissipation (T _A = 25°C) *		3.13	W
	Power Dissipation (T _C = 25°C)		53	W
	- Derate above 25°C		0.35	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	FQB11P06TM	Unit
R_{\thetaJC}	Thermal Resistance, Junction to Case, Max.	2.85	
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
FQB11P06TM	FQB11P06	D ² -PAK	Tape and Reel	330 mm	24 mm	800 units

Symbol	Parameter	Test Conditions	ı	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 2	5°C		-0.07		V/°(
I _{DSS}	Zana Cata Valta na Duain Cumant	V _{DS} = -60 V, V _{GS} = 0 V				-1	μΑ
Zero Gate Voltage	Zero Gate Voltage Drain Current	$V_{DS} = -48 \text{ V}, T_{C} = 150^{\circ}\text{C}$				-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 = -5.7 A			0.14	0.175	Ω
9 _{FS}	Forward Transconductance	V _{DS} = -30 V, I _D = -5.7 A			5.1		S
	ic Characteristics				100	550	
Ciss	Input Capacitance	$V_{DS} = -25 \text{ V}, V_{GS} = 0 \text{ V},$			420	550	pF
Coss	Output Capacitance	f = 1.0 MHz			195	250	pF
C _{rss}	Reverse Transfer Capacitance				45	60	pF
Switch	ing Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = -30 V, I _D = -5.7 A,			6.5	25	ns
t _r	Turn-On Rise Time	$V_{DD} = -30 \text{ V}, I_D = -3.7 \text{ A},$ $R_G = 25 \Omega$			40	90	ns
t _{d(off)}	Turn-Off Delay Time				15	40	ns
t _f	Turn-Off Fall Time	(No	ote 4)		45	100	ns
Qg	Total Gate Charge	V _{DS} = -48 V, I _D = -11.4 A,			13	17	nC
Q _{gs}	Gate-Source Charge	V _{GS} = -10 V			2.0		nC
Q _{gd}	Gate-Drain Charge	(No	ote 4)	/	6.3		nC
Drain-S	Source Diode Characteristics ar	nd Maximum Ratings					
Drain-S	Source Diode Characteristics at Maximum Continuous Drain-Source Dio					-11.4	Α
I _S		ode Forward Current				-11.4 -45.6	A A
I _S	Maximum Continuous Drain-Source Dic	ode Forward Current			 		
	Maximum Continuous Drain-Source Did Maximum Pulsed Drain-Source Diode F	ode Forward Current Forward Current			 83	-45.6	Α

- Notes:
 1. Repetitive rating : pulse-width limited by maximum junction temperature.
 2. L = 1.44 mH, I_{AS} = -11.4 A, V_{DD} = -25 V, R_G = 25 Ω , starting T_J = 25°C.
 3. I_{SD} ≤ -11.4 A, di/dt ≤ 300 A/µs, V_{DD} ≤ BV_{DSS}, starting T_J = 25°C .
 4. Essentially independent of operating temperature

Typical Characteristics

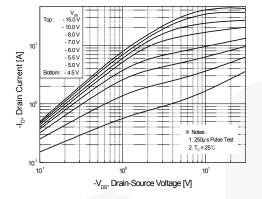


Figure 1. On-Region Characteristics

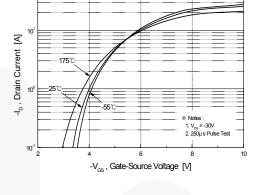


Figure 2. Transfer Characteristics

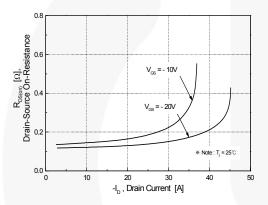


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

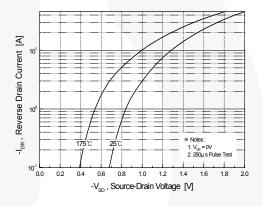


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

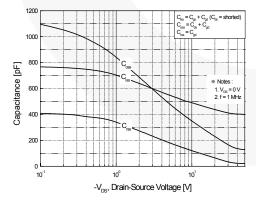


Figure 5. Capacitance Characteristics

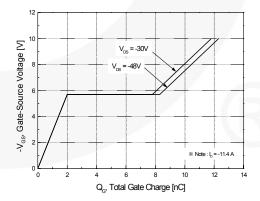


Figure 6. Gate Charge Characteristics

Drain-Source Breakdown Voltage 10 *Notes:: 1.V^{cs} = 0.0 2 l^c = -50 h y

-100

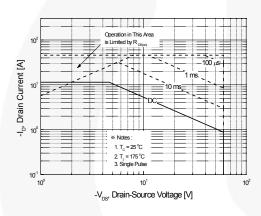
Typical Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

T_., Junction Temperature [°C]

150

Figure 8. On-Resistance Variation vs. Temperature



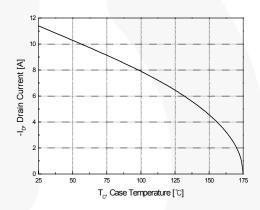


Figure 9. Maximum Safe Operating Area

Figure 10. Maximum Drain Current vs. Case Temperature

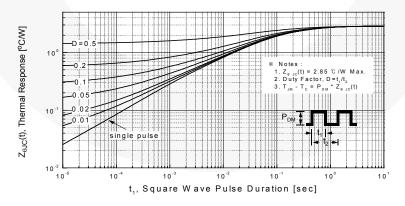


Figure 11. Transient Thermal Response Curve

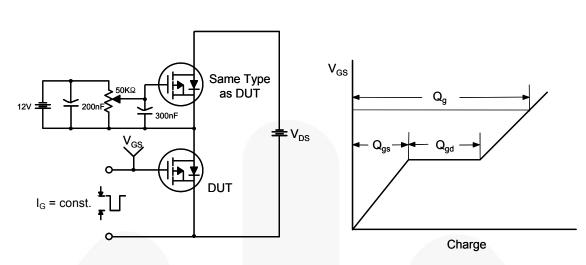


Figure 12. Gate Charge Test Circuit & Waveform

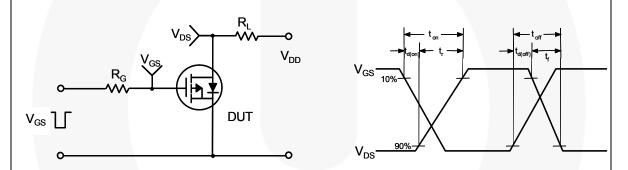


Figure 13. Resistive Switching Test Circuit & Waveforms

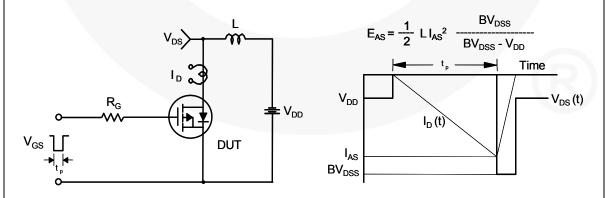
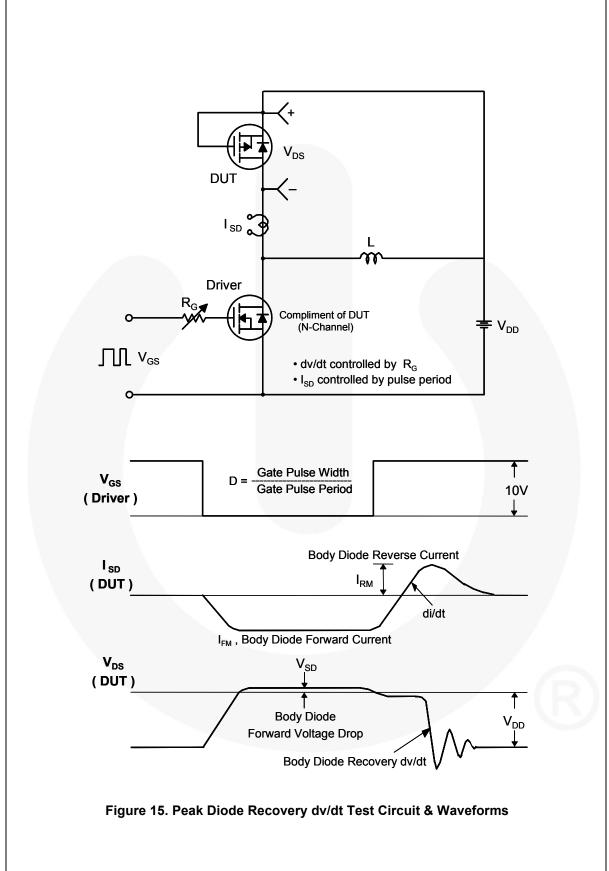


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions

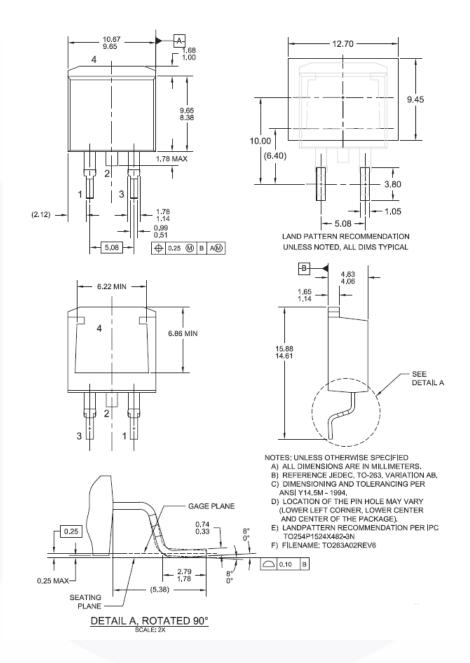


Figure 16. TO263 (D²PAK), Molded, 2-Lead, Surface Mount

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