

October 2013

FQB30N06L

N-Channel QFET® MOSFET

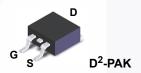
60 V, 32 A, 35 mΩ

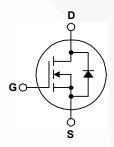
Description

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

- 32 A, 60 V, $R_{DS(on)}$ = 35 m Ω (Max) @V_{GS} = 10 V, I_D = 16 A
- Low Gate Charge (Typ. 15 nC)
- Low Crss (Typ. 50 pF)
- · 100% Avalanche Tested
- 175°C Maximum Junction Temperature Rating





Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter		FQB30N06LTM	Unit
V_{DSS}	Drain-Source Voltage		60	V
I _D	Drain Current - Continuous (T _C = 25°	C)	32	Α
	- Continuous (T _C = 100)°C)	22.6	А
I _{DM}	Drain Current - Pulsed	(Note 1)	128	Α
V _{GSS}	Gate-Source Voltage		± 20	V
E _{AS}	Single Pulsed Avalanche Energy	(Note 2)	350	mJ
I _{AR}	Avalanche Current	(Note 1)	32	Α
E _{AR}	Repetitive Avalanche Energy	(Note 1)	7.9	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	7.0	V/ns
P_{D}	Power Dissipation (T _A = 25°C) *		3.75	W
	Power Dissipation (T _C = 25°C)		79	W
	- Derate above 25°C		0.53	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	FQB30N06LTM	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	1.90	
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 in² pad of 2 oz copper), Max.	40	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FQB30N06L	FQB30N06LTM	D2-PAK	330mm	24mm	800

Test Conditions

Min

Typ May Unit

Electrical Characteristics T_C = 25°C unless otherwise noted

Farameter	lest Conditions	IVIII	тур	IVIAX	Unit
aracteristics					
Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	60			V
Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C		0.06		V/°C
Zana Cata Valtana Duain Cumant	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
Gate-Body Leakage Current, Forward	V _{GS} = 20 V, V _{DS} = 0 V			100	nA
Gate-Body Leakage Current, Reverse	V _{GS} = -20 V, V _{DS} = 0 V			-100	nA
	Drain-Source Breakdown Voltage Breakdown Voltage Temperature Coefficient Zero Gate Voltage Drain Current Gate-Body Leakage Current, Forward	tracteristics Drain-Source Breakdown Voltage $V_{GS} = 0 \text{ V}$, $I_D = 250 \text{ μA}$ Breakdown Voltage Temperature Coefficient $I_D = 250 \text{ μA}$, Referenced to 25°C Zero Gate Voltage Drain Current $V_{DS} = 60 \text{ V}$, $V_{GS} = 0 \text{ V}$ $V_{DS} = 48 \text{ V}$, $V_{CS} = 150 \text{ °C}$ Gate-Body Leakage Current, Forward $V_{GS} = 20 \text{ V}$, $V_{DS} = 0 \text{ V}$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	1.0		2.5	V	
R _{DS(on)}	Static Drain-Source	V _{GS} = 10 V, I _D = 16 A		0.027	0.035	0	
, ,	On-Resistance	$V_{GS} = 5 \text{ V}, I_D = 16 \text{ A}$		0.035	0.045	Ω	
9 _{FS}	Forward Transconductance	V _{DS} = 25 V, I _D = 16 A	-	24		S	

Dynamic Characteristics

C _{iss}	Input Capacitance	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V},$	 800	1040	pF
C _{oss}	Output Capacitance	f = 1.0 MHz	 270	350	pF
C _{rss}	Reverse Transfer Capacitance		 50	65	pF

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	V _{DD} = 30 V, I _D = 16 A,		15	40	ns
t _r	Turn-On Rise Time	$R_G = 25 \Omega$		210	430	ns
t _{d(off)}	Turn-Off Delay Time	1.13		60	130	ns
t _f	Turn-Off Fall Time	(Note 4)	/	110	230	ns
Q_g	Total Gate Charge	V _{DS} = 48 V, I _D = 32 A,		15	20	nC
Q_{gs}	Gate-Source Charge	V _{GS} = 5 V		3.5		nC
Q _{gd}	Gate-Drain Charge	(Note 4)		8.5		nC

Drain-Source Diode Characteristics and Maximum Ratings

I _S	Maximum Continuous Drain-Source Diode Forward Current		 	32	Α
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		 -	128	Α
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 32 A	 	1.5	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 32 A,	 60		ns
Q _{rr}	Reverse Recovery Charge	dI _F / dt = 100 A/μs	 90		nC

- **Notes:** 1. Repetitive Rating : Pulse width limited by maximum junction temperature 2. L = $400\mu H$, $I_{AS} = 32A$, $V_{DD} = 25V$, $R_{G} = 25 \Omega$, Starting $T_{J} = 25^{\circ}C$ 3. $I_{SD} \le 32A$, di/dt $\le 300A/us$, $V_{DD} \le BV_{DSS}$, Starting $T_{J} = 25^{\circ}C$ 4. Essentially independent of operating temperature

Typical Characteristics

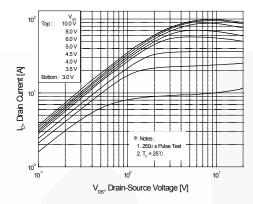


Figure 1. On-Region Characteristics

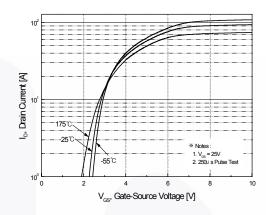


Figure 2. Transfer Characteristics

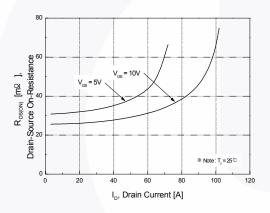


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

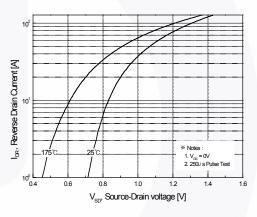


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

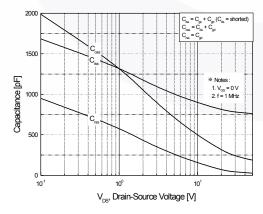


Figure 5. Capacitance Characteristics

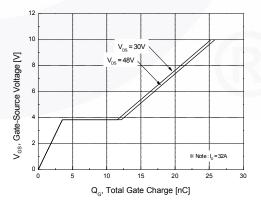


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

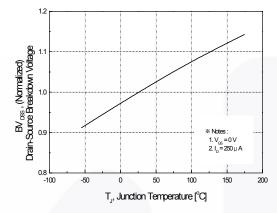


Figure 7. Breakdown Voltage Variation vs. Temperature

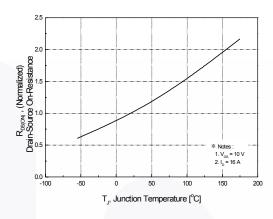


Figure 8. On-Resistance Variation vs. Temperature

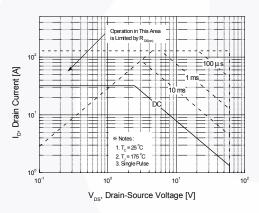


Figure 9. Maximum Safe Operating Area

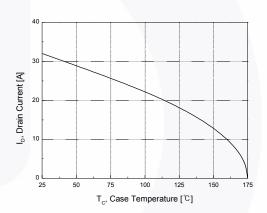


Figure 10. Maximum Drain Current vs Case Temperature

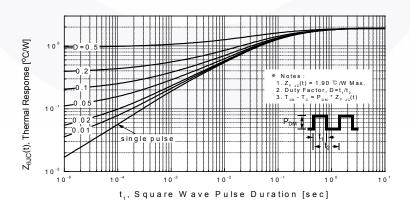


Figure 11. Transient Thermal Response Curve

Figure 12. Gate Charge Test Circuit & Waveform

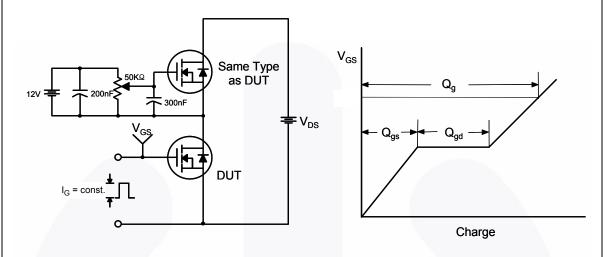


Figure 13. Resistive Switching Test Circuit & Waveforms

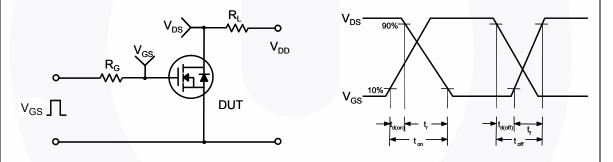
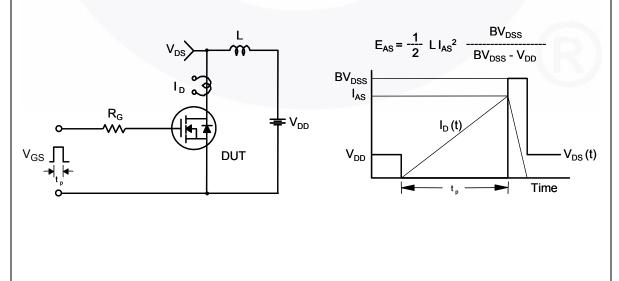
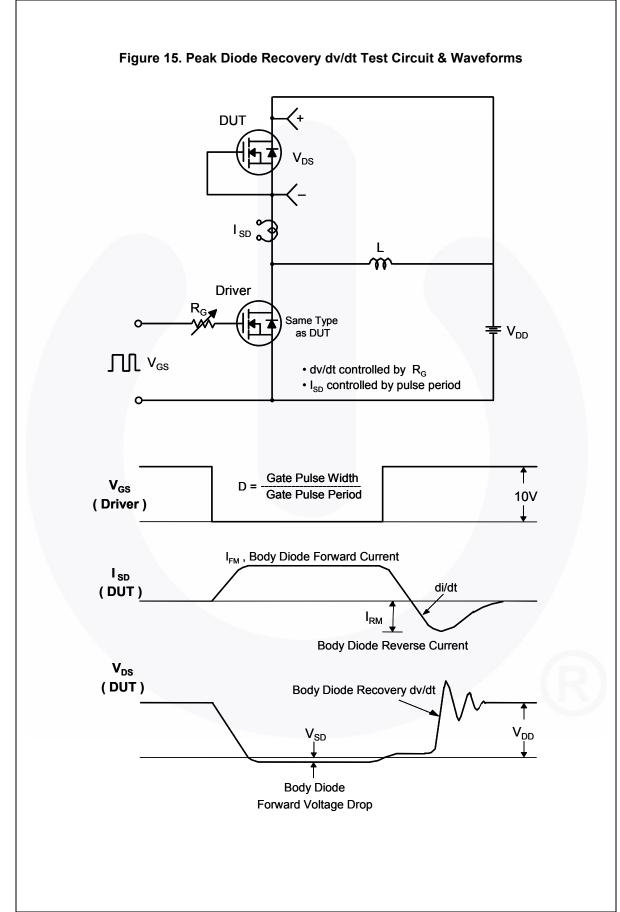


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms





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Mechanical Dimensions

TO-263 2L (D²PAK)

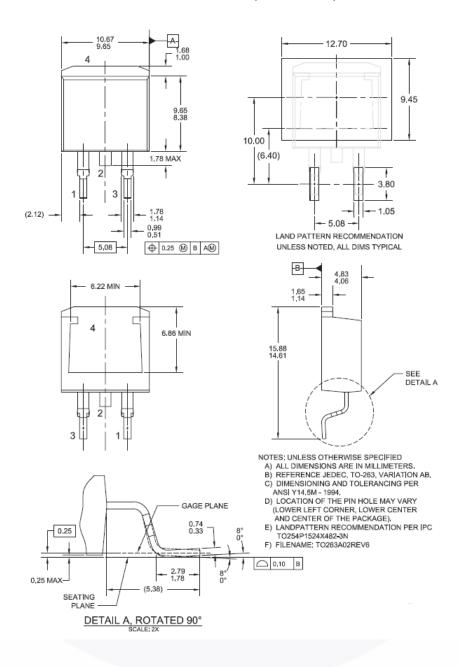


Figure 16. 2LD, TO263, Surface Mount

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Dimension in Millimeters





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Rev 166

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