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October 2013

FQB30N06L

N-Channel QFET® MOSFET

60 V, 32 A, 35 mΩ

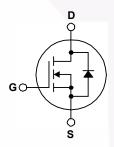
Description

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	Α
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 Rar	nge	-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.		°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	330mm 24mm	

Electrical Characteristics $T_C = 25^{\circ}C$ unless otherwise noted

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} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C		0.06		V/°C
I _{DSS}	Zana Oata Vallana Busin Ourrant	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} = 20 V, V _{DS} = 0 V			100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -20 V, V _{DS} = 0 V			-100	nA

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
g _{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	G .		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	$dI_F / dt = 100 A/\mu s$	 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

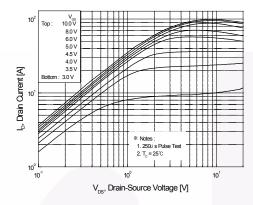


Figure 1. On-Region Characteristics

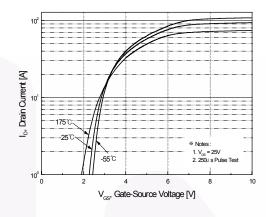


Figure 2. Transfer Characteristics

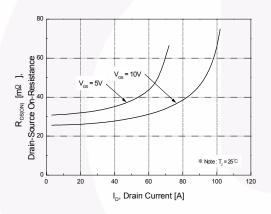


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

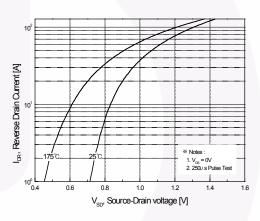


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

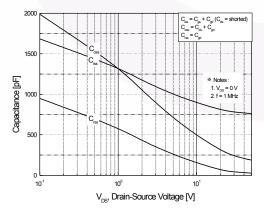


Figure 5. Capacitance Characteristics

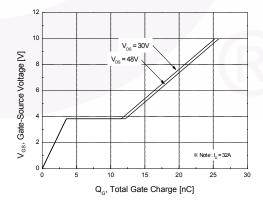


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

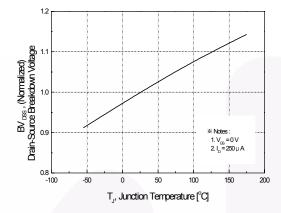


Figure 7. Breakdown Voltage Variation vs. Temperature

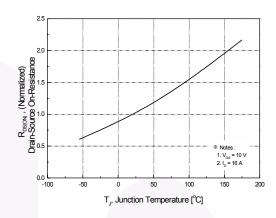


Figure 8. On-Resistance Variation vs. Temperature

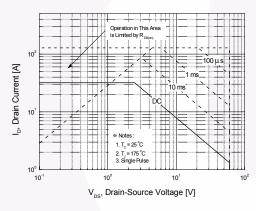


Figure 9. Maximum Safe Operating Area

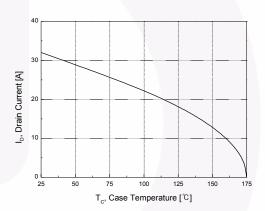


Figure 10. Maximum Drain Current vs Case Temperature

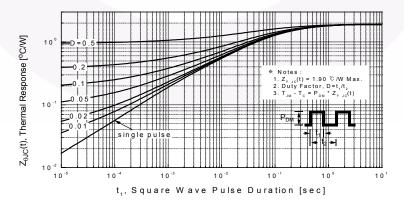


Figure 11. Transient Thermal Response Curve



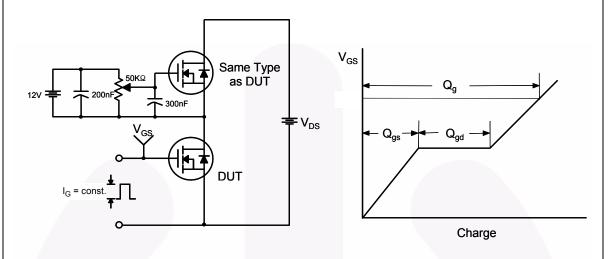


Figure 13. Resistive Switching Test Circuit & Waveforms

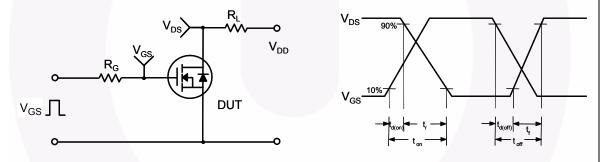
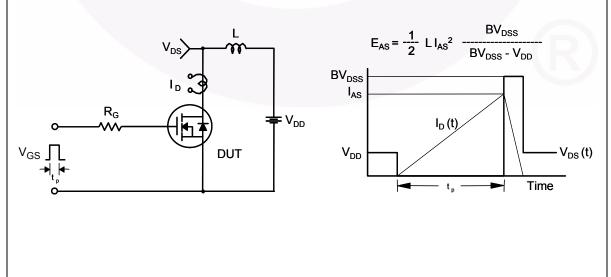
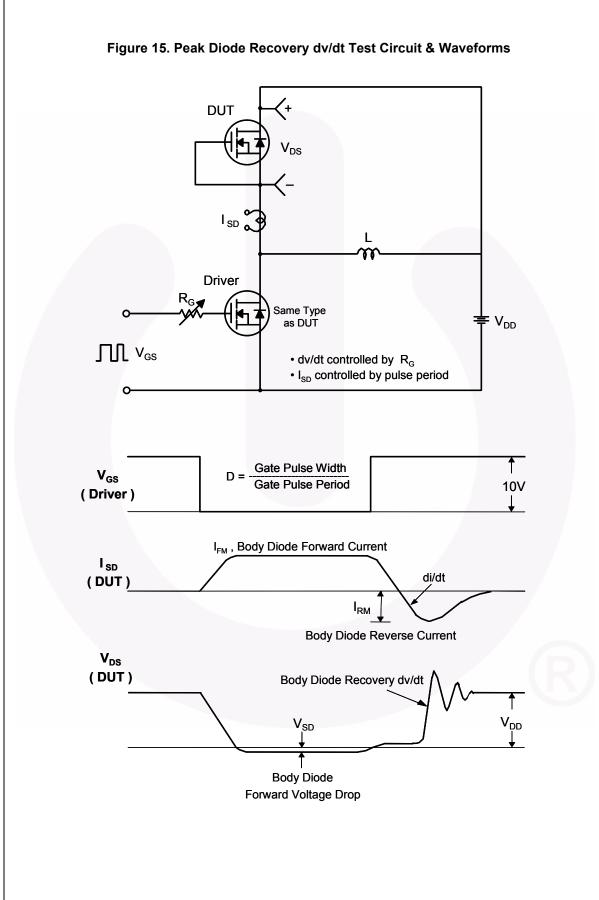


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms





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Mechanical Dimensions

TO-263 2L (D²PAK)

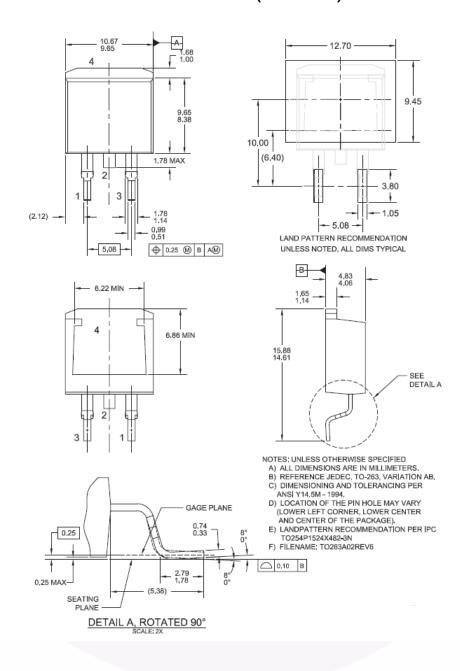


Figure 16. 2LD, TO263, Surface Mount

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Dimension in Millimeters





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