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November 2013

FQB6N80

N-Channel QFET® MOSFET

800 V, 5.8 A, 1.95 Ω

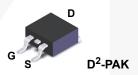
Description

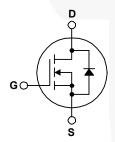
This N-Channel enhancement mode power MOSFET is • 5.8 A, 800 V, $R_{DS(on)}$ = 1.95 Ω (Max.) @ V_{GS} = 10 V, produced using Fairchild Semiconductor's proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state • Low Gate Charge (Typ. 31 nC) resistance, and to provide superior switching performance • Low Crss (Typ. 14 pF) and high avalanche energy strength. These devices are suitable for switched mode power supplies, active power • 100% Avalanche Tested factor correction (PFC), and electronic lamp ballasts.

Features

- $I_D = 2.9 A$

- · RoHS Compiant





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

Symbol	Parameter	FQB6N80TM	Unit
V_{DSS}	Drain-Source Voltage	800	V
I _D	Drain Current - Continuous (T _C = 25°C)	5.8	Α
	- Continuous (T _C = 100°C)	3.67	А
I _{DM}	Drain Current - Pulsed (No	ote 1) 23.2	Α
V _{GSS}	Gate-Source Voltage	± 30	V
E _{AS}	Single Pulsed Avalanche Energy (No	ote 2) 680	mJ
I _{AR}	Avalanche Current (No	ote 1) 5.8	Α
E _{AR}	Repetitive Avalanche Energy (No	ote 1) 15.8	mJ
dv/dt	Peak Diode Recovery dv/dt (No	(Note 3) 4.0	
P_{D}	Power Dissipation (T _A = 25°C) *	3.13	W
	Power Dissipation (T _C = 25°C)	158	W
	- Derate above 25°C	1.27	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +150	°C
T _L	Maximum lead temperature for soldering,	300	°C
	1/8" from case for 5 seconds.		

Thermal Characteristics

Symbol	Parameter	FQB6N80TM	Unit
R_{\thetaJC}	Thermal Resistance, Junction to Case, Max.	0.79	
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
FQB6N80TM	FQB6N80	D ² -PAK	Tape and Reel	330 mm	24 mm	800 units

Flectrical Characteristics

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
Off Cha	aracteristics					
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	800			V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	:	0.9		V/°C
I _{DSS} Zer	Zero Gate Voltage Drain Current	V _{DS} = 800 V, V _{GS} = 0 V			10	μΑ
		V _{DS} = 640 V, T _C = 125°C			100	μΑ
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 30 V, V _{DS} = 0 V			100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -30 V, V _{DS} = 0 V			-100	nA
On Cha	aracteristics					
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = 250 \mu\text{A}$	3.0		5.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 2.9 A	-	1.5	1.95	Ω
9 _{FS}	Forward Transconductance	V _{DS} = 50 V, I _D = 2.9 A		5.9		S
	ic Characteristics			+	+	
C _{iss}	Input Capacitance	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V},$		1150	1500	pF
C _{oss}	Output Capacitance	f = 1.0 MHz		125	160	pF
C _{rss}	Reverse Transfer Capacitance			14	18	pF
Switchi	ing Characteristics					
t _{d(on)}	Turn-On Delay Time	V _{DD} = 400 V, I _D = 5.8 A,		30	70	ns
t _r	Turn-On Rise Time	$R_{G} = 25 \Omega$		70	150	ns
t _{d(off)}	Turn-Off Delay Time	116 20 32		65	140	ns
t _f	Turn-Off Fall Time	(Note 4		45	100	ns
Qg	Total Gate Charge	V _{DS} = 640 V, I _D = 5.8 A,		31		nC
Q _{gs}	Gate-Source Charge	V _{GS} = 10 V		7.1		nC
Q _{gd}	Gate-Drain Charge	(Note 4)		15		nC
Drain-S	Source Diode Characteristics a	nd Maximum Ratings				
I _S	Maximum Continuous Drain-Source Diode Forward Current				5.8	Α
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current				23.2	Α
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 5.8 A			1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 5.8 A,		650		ns
_		11 / 11 400 4/				

\mathbf{Q}_{rr}

- 1. Repetitive rating : pulse-width limited by maximum junction temperature.
- 2. L = 38 mH, I_{AS} = 5.8 A, V_{DD} = 50 V, R_G = 25 Ω , starting T_J = 25°C. 3. I_{SD} \leq 5.8 A, di/dt \leq 200 A/ μ s , V_{DD} \leq BV_{DSS}, starting T_J = 25°C. 4. Essentially independent of operating temperature.

Reverse Recovery Charge

 μC

5.7

 $dI_F / dt = 100 A/\mu s$

Typical Characteristics

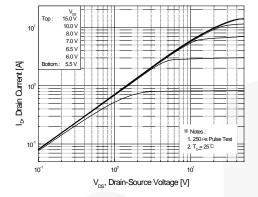


Figure 1. On-Region Characteristics

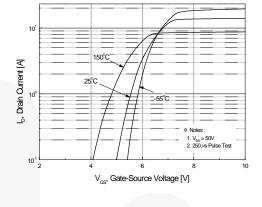


Figure 2. Transfer Characteristics

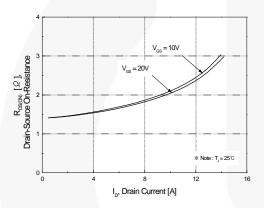


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

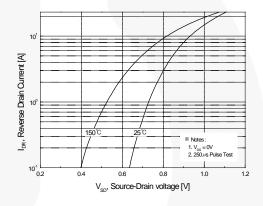


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

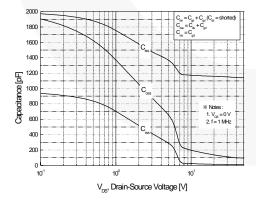


Figure 5. Capacitance Characteristics

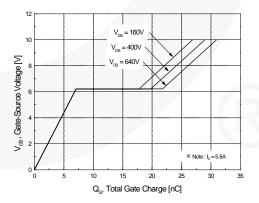


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

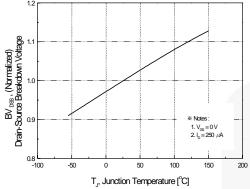


Figure 7. Breakdown Voltage Variation vs Temperature

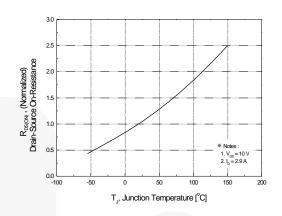


Figure 8. On-Resistance Variation vs Temperature

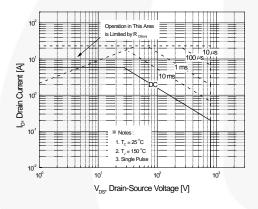


Figure 9. Maximum Safe Operating Area

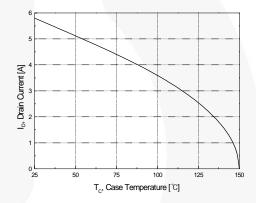


Figure 10. Maximum Drain Current vs Case Temperature

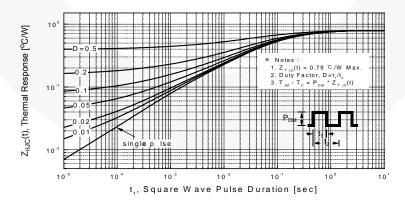


Figure 11. Transient Thermal Response Curve

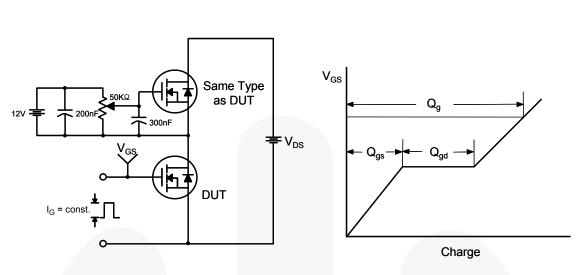


Figure 12. Gate Charge Test Circuit & Waveform

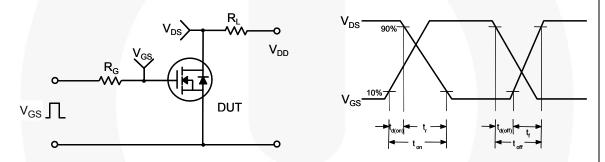


Figure 13. Resistive Switching Test Circuit & Waveforms

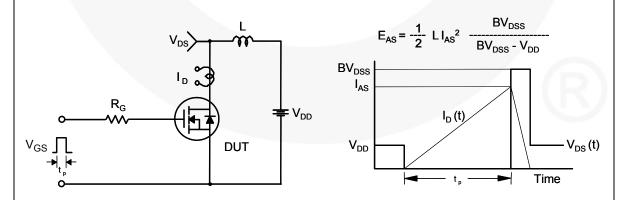
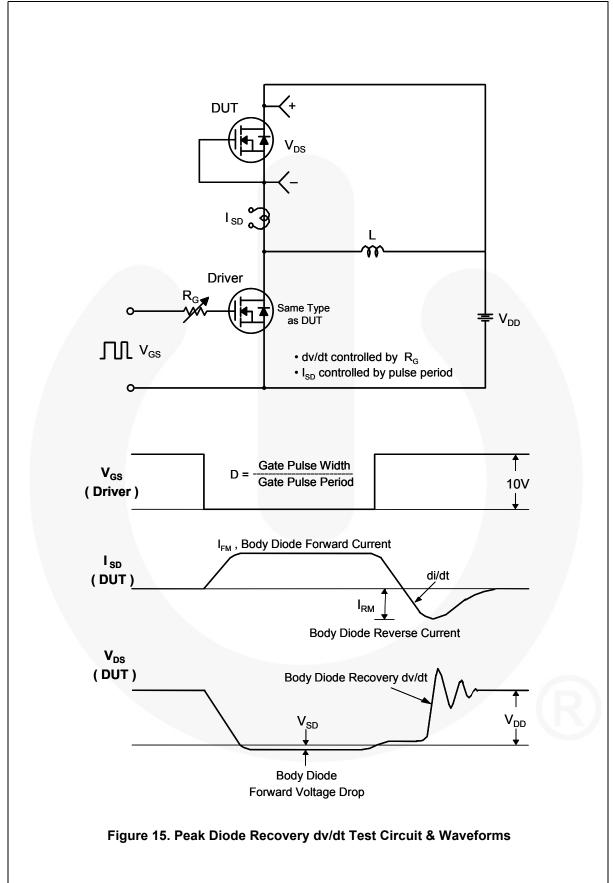


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions

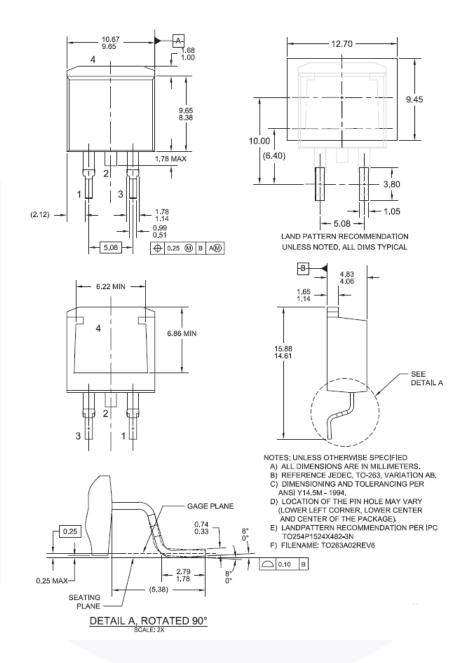


Figure 16. TO263 (D²PAK), Molded, 2-Lead, Surface Mount

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