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November 2013

FQD13N06

N-Channel QFET® MOSFET 60 V, 10 A, 140 mΩ

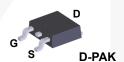
Description

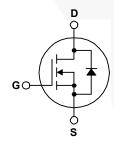
This N-Channel enhancement mode power MOSFET is • 10 A, 60 V, $R_{DS(on)}$ = 140 m Ω (Max.) @ V_{GS} = 10 V, produced using Fairchild Semiconductor's proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state

Low Gate Charge (Typ. 5.8 nC) resistance, and to provide superior switching performance • Low Crss (Typ. 15 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

- $I_D = 5.0 A$





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

Symbol	Parameter	FQD13N06TM	Unit
V _{DSS}	Drain-Source Voltage	60	V
I _D	Drain Current - Continuous (T _C = 25°C)	10	Α
	- Continuous (T _C = 100°C)	6.3	Α
I _{DM}	Drain Current - Pulsed (No	ote 1) 40	Α
V _{GSS}	Gate-Source Voltage	± 25	V
E _{AS}	Single Pulsed Avalanche Energy (No	ote 2) 85	mJ
I _{AR}	Avalanche Current (No	ote 1) 10	Α
E _{AR}	Repetitive Avalanche Energy (No.	ote 1) 2.8	mJ
dv/dt	Peak Diode Recovery dv/dt (No	ote 3) 7.0	V/ns
P _D	Power Dissipation (T _A = 25°C) *	2.5	W
_	Power Dissipation (T _C = 25°C)	28	W
	- Derate above 25°C	0.22	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +150	°C
T _L	Maximum lead temperature for soldering, 1/8" from case for 5 seconds	300	°C

Thermal Characteristics

Symbol	Parameter	FQD13N06TM	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	4.5	
Ъ	Thermal Resistance, Junction to Ambient (Minimum Pad of 2-oz Copper), Max.	110	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (*1 in ² Pad of 2-oz Copper), Max.	50	

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FQD13N06TM	FQD13N06	DPAK	Tape and Reel	330 mm	16 mm	2500 units

Symbol	Parameter	Parameter Test Conditions		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}	Zoro Coto Voltago Droin Current	V _{DS} = 60 V, V _{GS} = 0 V		-	1	μА
	Zero Gate Voltage Drain Current	V _{DS} = 48 V, T _C = 125°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 = 5.0 A		0.11	0.14	Ω
9 _{FS}	Forward Transconductance	V _{DS} = 25 V, I _D = 5.0 A		4.9		S
Dynam	ic Characteristics					
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V,		240	310	pF
C _{oss}	Output Capacitance	f = 1.0 MHz	\	90	120	pF
C _{rss}	Reverse Transfer Capacitance			15	20	pF
Switch	ing Characteristics					
$t_{d(on)}$	Turn-On Delay Time	V _{DD} = 30 V, I _D = 6.5 A,		5	20	ns
t _r	Turn-On Rise Time	$R_G = 25 \Omega$		25	60	ns
$t_{d(off)}$	Turn-Off Delay Time	3		8	25	ns
t _f	Turn-Off Fall Time	(Note 4)		15	40	ns
Q_g	Total Gate Charge	V _{DS} = 48 V, I _D = 13 A,		5.8	7.5	nC
Q _{gs}	Gate-Source Charge	V _{GS} = 10 V		2.0		nC
		7	1	2.5		nC

Drain-Source Diode Characteristics and Maximum Ratings

I _S	Maximum Continuous Drain-Source Diode Forward Current				10	Α
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current				40	Α
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 10 A			1.5	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 13 A,		39	/	ns
Q _{rr}	Reverse Recovery Charge $dI_F / dt = 100 A/\mu s$			40		nC

- Notes: 1. Repetitive rating : pulse-width limited by maximum junction temperature. 2. L = 990 μ H, I_{AS} = 10 A, V_{DD} = 25 V, R_G = 25 Ω , starting T_J = 25°C. 3. I_{SD} \leq 13 A, di/dt \leq 300 A/us, V_{DD} \leq BV_{DSS}, starting T_J = 25°C. 4. Essentially independent of operating temperature.

Typical Characteristics

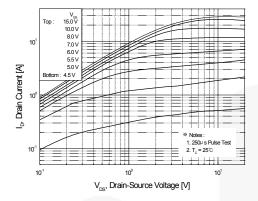


Figure 1. On-Region Characteristics

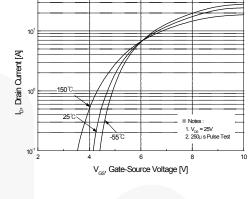


Figure 2. Transfer Characteristics

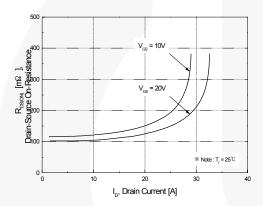


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

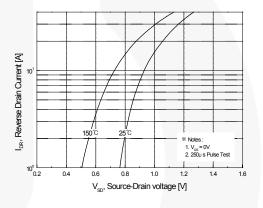


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

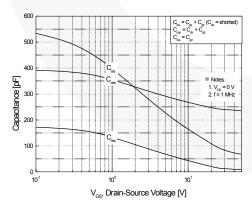


Figure 5. Capacitance Characteristics

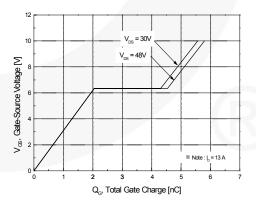


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

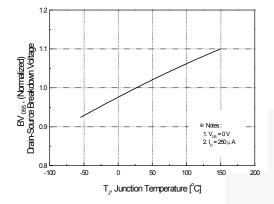


Figure 7. Breakdown Voltage Variation vs. Temperature

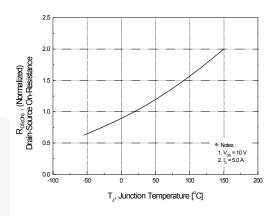


Figure 8. On-Resistance Variation vs. Temperature

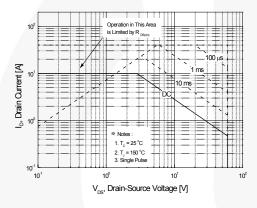


Figure 9. Maximum Safe Operating Area

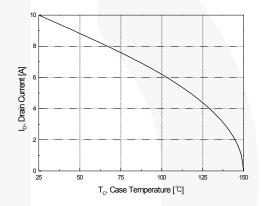


Figure 10. Maximum Drain Current vs. Case Temperature

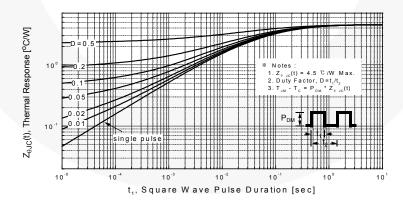


Figure 11. Transient Thermal Response Curve

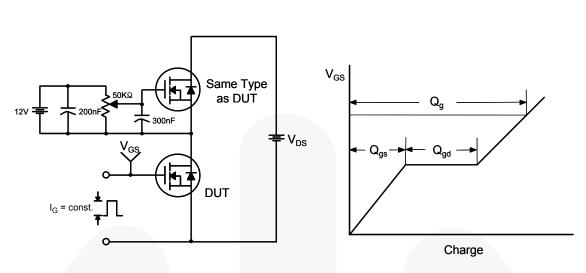


Figure 12. Gate Charge Test Circuit & Waveform

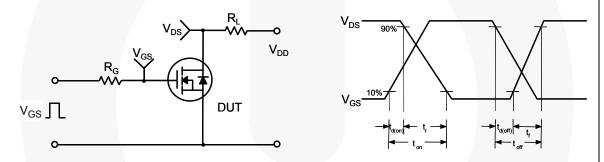


Figure 13. Resistive Switching Test Circuit & Waveforms

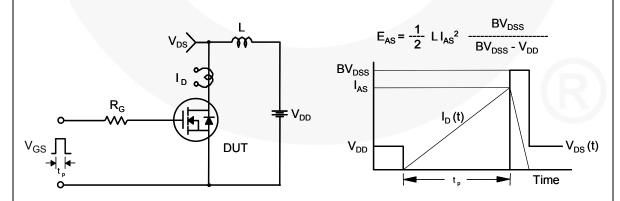
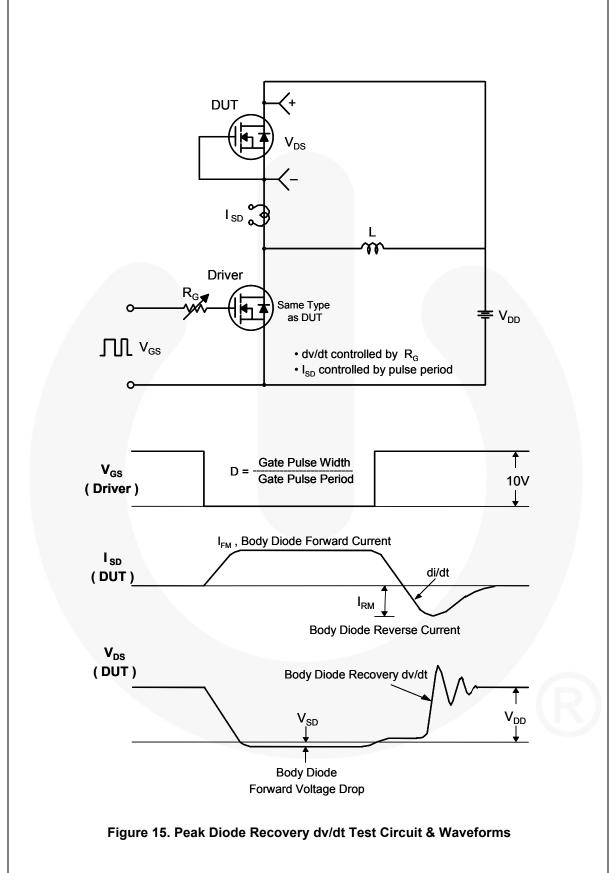


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions

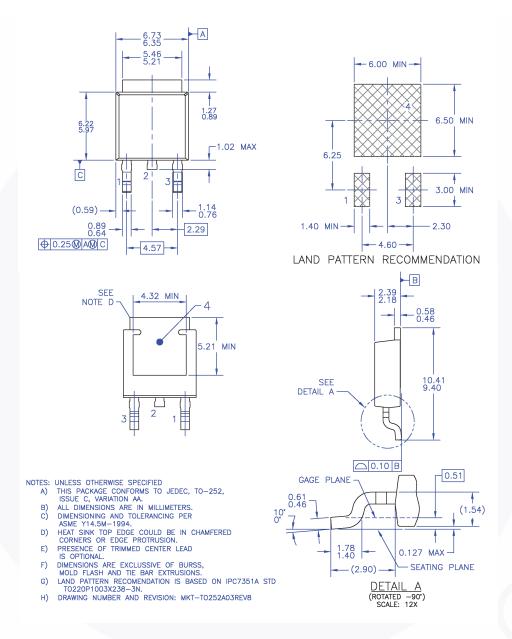


Figure 16. TO252 (D-PAK), Molded, 3-Lead, Option AA&AB

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