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November 2013

FQP14N30

N-Channel QFET[®] MOSFET 300 V, 14.4 A, 290 m Ω

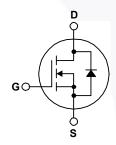
Description

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, active power factor correction (PFC), and electronic lamp ballasts.

Features

- 14.4 A, 300 V, $R_{DS(on)}$ = 290 m Ω (Max.) @ V_{GS} = 10 V, I_D = 7.2 A
- · Low Gate Charge (Typ. 30 nC)
- · Low Crss (Typ. 23 pF)
- · 100% Avalanche Tested





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

Symbol	Parameter		FQP14N30	Unit
V _{DSS}	Drain-Source Voltage		300	V
I _D	Drain Current - Continuous (T _C = 25°C)	14.4	A
	- Continuous (T _C = 100°	C)	9.1	Α
I _{DM}	Drain Current - Pulsed	(Note 1)	57.6	Α
V _{GSS}	Gate-Source Voltage		± 30	V
E _{AS}	Single Pulsed Avalanche Energy	(Note 2)	600	mJ
I _{AR}	Avalanche Current	(Note 1)	14.4	Α
E _{AR}	Repetitive Avalanche Energy	(Note 1)	14.7	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	4.5	V/ns
P_{D}	Power Dissipation (T _C = 25°C)		147	W
	- Derate above 25°C		1.18	W/°C
T _J , T _{STG}	Operating and Storage Temperature Rang	е	-55 to +150	°C
T _L	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 seconds		300	°C

Thermal Characteristics

Symbol	Parameter	FQP14N30	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	0.85	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	62.5	°C/W

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FQP14N30	FQP14N30	TO-220	Tube	N/A	N/A	50 units

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curicai	Gnara	ctei	ารแน

T_C = 25°C unless otherwise noted.

Symbol	Parameter	Test Conditions	Min	Тур	Max	Unit
Off Cha	aracteristics					
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	300			V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C		0.34		V/°C
I _{DSS}	Zero Ooto Valta va Brain Ourrant	V _{DS} = 300 V, V _{GS} = 0 V			1	μΑ
	Zero Gate Voltage Drain Current	V _{DS} = 240 V, T _C = 125°C			10	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	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	3.0		5.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 7.2 A		0.23	0.29	Ω
g _{FS}	Forward Transconductance	V _{DS} = 50 V, I _D = 7.2 A		9.5		S
C _{iss}	ic Characteristics Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V,		1050	1360	pF
C _{oss}	Output Capacitance	f = 1.0 MHz		200	260	pF
C _{rss}	Reverse Transfer Capacitance			23	30	pF
Switch	ing Characteristics					
t _{d(on)}	Turn-On Delay Time	V - 150 V I - 14 4 A		22	55	ns
t _r	Turn-On Rise Time	V_{DD} = 150 V, I_{D} = 14.4 A, R_{G} = 25 Ω		145	300	ns
t _{d(off)}	Turn-Off Delay Time	1\(\text{G} = 20 \(\text{22}\)		45	100	ns
t _f	Turn-Off Fall Time	(Note 4)	/	70	150	ns
Qg	Total Gate Charge	V _{DS} = 240 V, I _D = 14.4 A,		30	40	nC
Q _{gs}	Gate-Source Charge	V _{GS} = 10 V	A	7.5		nC
Q _{gd}	Gate-Drain Charge	(Note 4)		13	- /	nC
	Source Diode Characteristics a	nd Maximum Ratings	•			
I _S	Maximum Continuous Drain-Source Did				14.4	Α
I _{SM}	Maximum Pulsed Drain-Source Diode F	Forward Current			57.6	Α
- ••						

Q_{rr}

 t_{rr}

 V_{SD}

Notes: 1. Repetitive Rating : Pulse width limited by maximum junction temperature. 2. L = 4.8 mH, I_{AS} = 14.4 A, V_{DD} = 50 V, R_G = 25 Ω , starting T_J = 25°C. 3. I_{SD} \leq 14.4 A, di/dt \leq 200 A/µs, V_{DD} \leq BV_{DSS}, starting T_J = 25°C. 4. Essentially independent of operating temperature.

Drain-Source Diode Forward Voltage

Reverse Recovery Time

Reverse Recovery Charge

1.5

200

1.5

V

ns

μС

 $V_{GS} = 0 \text{ V}, I_{S} = 14.4 \text{ A}$

V_{GS} = 0 V, I_S = 14.4 A,

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

Typical Characteristics

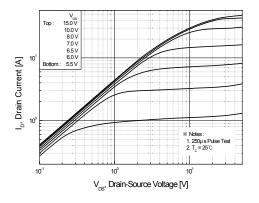


Figure 1. On-Region Characteristics

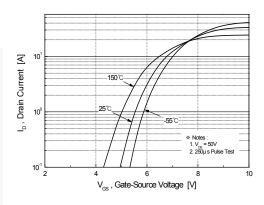


Figure 2. Transfer Characteristics

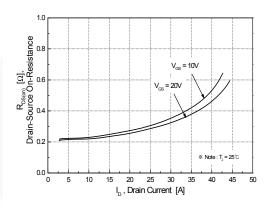


Figure 3. On-Resistance Variation vs.

Drain Current and Gate Voltage

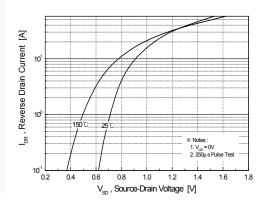


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

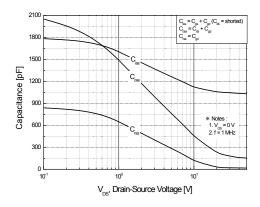


Figure 5. Capacitance Characteristics

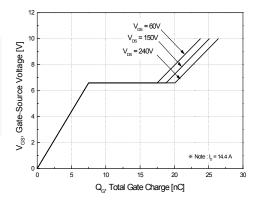


Figure 6. Gate Charge Characteristics

Typical Characteristics (continued)

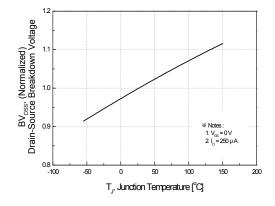
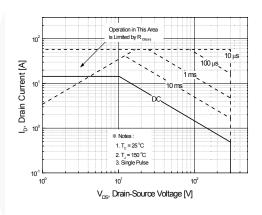


Figure 7. Breakdown Voltage Variation vs. Temperature

Figure 8. On-Resistance Variation vs. Temperature



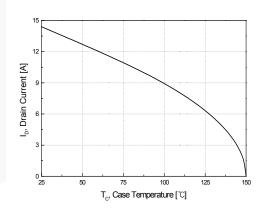


Figure 9. Maximum Safe Operating Area

Figure 10. Maximum Drain Current vs. Case Temperature

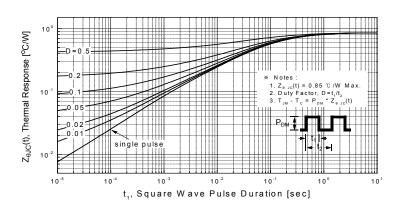


Figure 11. Transient Thermal Response Curve

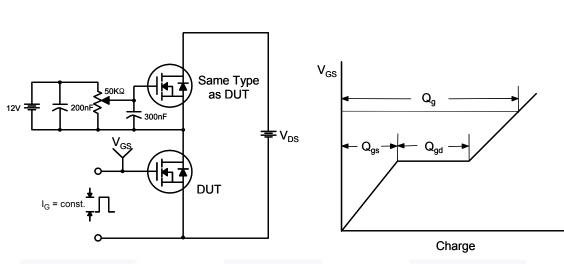


Figure 12. Gate Charge Test Circuit & Waveform

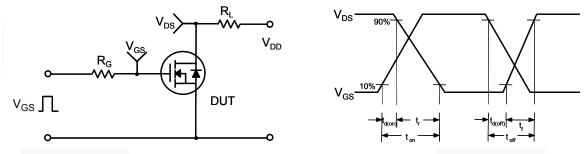


Figure 13. Resistive Switching Test Circuit & Waveforms

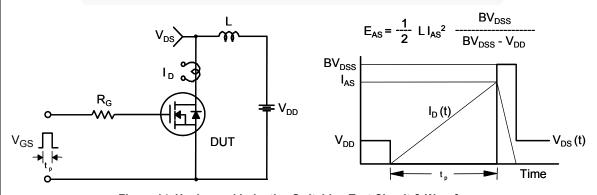
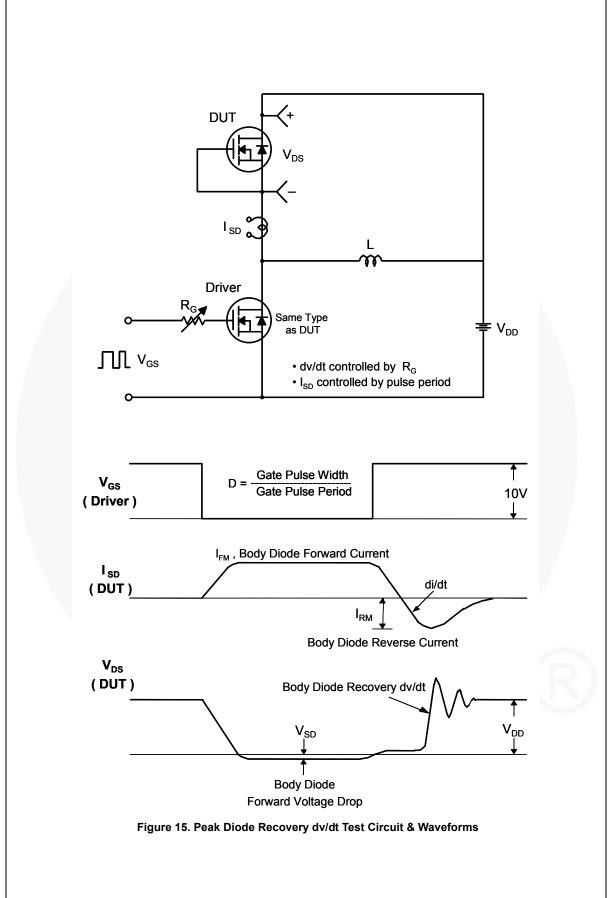
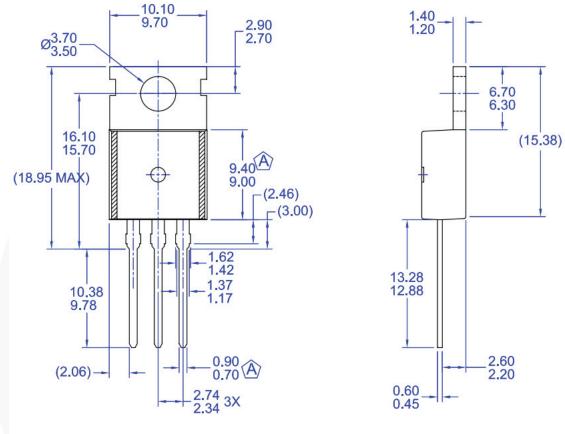
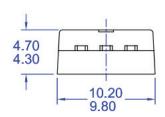


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions





NOTES:

- (A) CONFORMS TO JEDEC TO-220 VARIATION AB EXCEPT WHERE NOTED
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- D) DRAWING FILE/REVISION: MKT-TO220Y03REV1

Figure 16. TO220, Molded, 3-Lead, Jedec Variation AB

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