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November 2013

FQPF3N25

N-Channel QFET® MOSFET

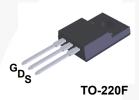
250 V, 2.3 A, 2.2 Ω

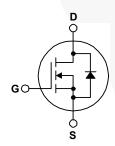
Description

These N-Channel enhancement mode power field effect transistors are produced using Fairchild's proprietary, planar stripe, DMOS technology. This advanced technology has been especially tailored to minimize onstate resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switching DC/DC converters, switch mode power supply.

Features

- 2.3 A, 250 V, $R_{DS(on)}$ = 2.2 Ω (Max.) @ V_{GS} = 10 V, I_D = 1.15 A
- Low Gate Charge (Typ. 4.0 nC)
- Low Crss (Typ. 4.7 pF)
- 100% Avalanche Tested





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

Symbol	Parameter		FQPF3N25	Unit	
V _{DSS}	Drain-Source Voltage		250	V	
I _D	Drain Current - Continuous (T _C = 25°	C)	2.3	А	
	- Continuous (T _C = 100°C)		1.45	А	
I _{DM}	Drain Current - Pulsed	(Note 1)	9.2	A	
V _{GSS}	Gate-Source Voltage		± 30	V	
E _{AS}	Single Pulsed Avalanche Energy	(Note 2)	40	mJ	
I _{AR}	Avalanche Current	(Note 1)	2.3	А	
E _{AR}	Repetitive Avalanche Energy	(Note 1)	2.7	mJ	
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	5.5	V/ns	
P_{D}	Power Dissipation (T _C = 25°C)		27	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 purposes, 1/8" from case for 5 seconds		300	°C	

Thermal Characteristics

Symbol	Parameter	FQPF3N25	Unit	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	4.63	°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
FQPF3N25	FQPF3N25	TO-220F	Tube	N/A	N/A	50 units

Electrical Characteristics T_C = 25°C unless otherwise noted.

Symbol	Parameter	Test Conditions	Min	Тур	Max	Unit
Off Cha	aracteristics					
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	250			V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, Referenced to 25°C		0.24		V/°C
I _{DSS}	Zana Oata Valla va Basis Oassat	V _{DS} = 250 V, V _{GS} = 0 V		-	1	μΑ
4	Zero Gate Voltage Drain Current	V _{DS} = 200 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	$V_{DS} = V_{GS}, I_{D} = 250 \mu\text{A}$	3.0		5.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 1.15 A		1.75	2.2	Ω
g _{FS}	Forward Transconductance	$V_{DS} = 50 \text{ V}, I_{D} = 1.15 \text{ A}$	\.\.\.	1.4		S
	ic Characteristics				I	
C _{iss}	Input Capacitance	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V},$		130	170	pF
C _{oss}	Output Capacitance	f = 1.0 MHz		30	40	pF
C _{rss}	Reverse Transfer Capacitance			4.7	6.1	pF
Switchi	ing Characteristics					
t _{d(on)}	Turn-On Delay Time	$V_{DD} = 125 \text{ V}, I_D = 2.8 \text{ A},$		6.6	23	ns
t _r	Turn-On Rise Time	$R_G = 25 \Omega$		25	60	ns
t _{d(off)}	Turn-Off Delay Time			5.5	21	ns
t _f	Turn-Off Fall Time	(Note 4)		20	50	ns
Q_g	Total Gate Charge	$V_{DS} = 200 \text{ V}, I_{D} = 2.8 \text{ A},$		4.0	5.2	nC
Q_{gs}	Gate-Source Charge	V _{GS} = 10 V		1.1		nC
Q _{gd}	Gate-Drain Charge	(Note 4)	/	2.2		nC
	Source Diode Characteristics a	nd Maximum Ratings				
I _S	Maximum Continuous Drain-Source Diode Forward Current				2.3	Α
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current				9.2	Α
V _{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_{S} = 2.3 \text{ A}$			1.5	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 2.8 A,		100		ns
Q _{rr}	Reverse Recovery Charge	dl _F / dt = 100 A/μs		0.3	//	μС

- **Notes:**1. Repetitive rating : pulse-width limited by maximum junction temperature.
 2. L = 12 mH, I_{AS} = 2.3 A, V_{DD} = 50 V, R_{G} = 25 Ω , starting T_{J} = 25°C.
 3. I_{SD} ≤ 2.8 A, di/dt ≤ 300 A/ μ s, V_{DD} ≤ BV $_{DSS}$, starting T_{J} = 25°C.
 4. Essentially independent of operating temperature.

Typical Characteristics

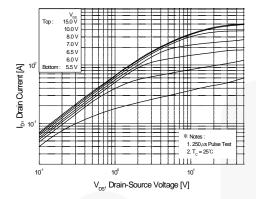


Figure 1. On-Region Characteristics

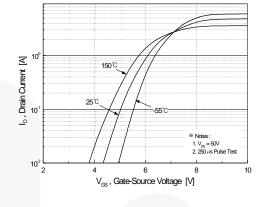


Figure 2. Transfer Characteristics

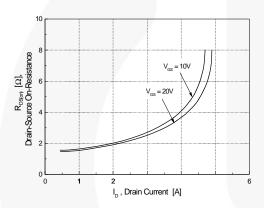


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

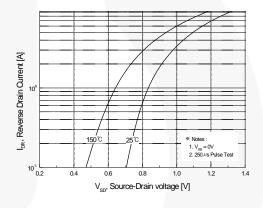


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

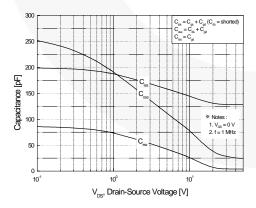


Figure 5. Capacitance Characteristics

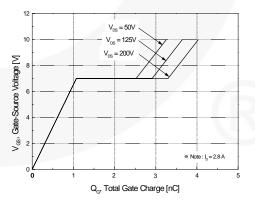


Figure 6. Gate Charge Characteristics

Typical Characteristics (continued)

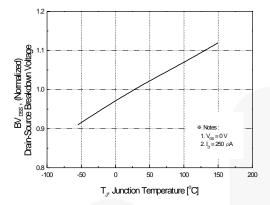


Figure 7. Breakdown Voltage Variation vs. Temperature

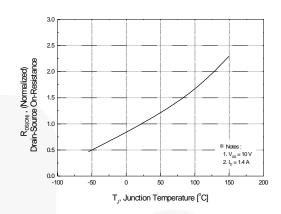


Figure 8. On-Resistance Variation vs. Temperature

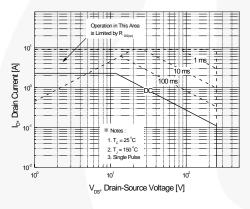


Figure 9. Maximum Safe Operating Area

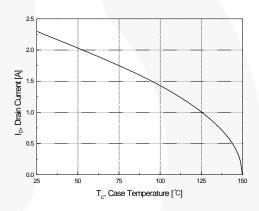


Figure 10. Maximum Drain Current vs. Case Temperature

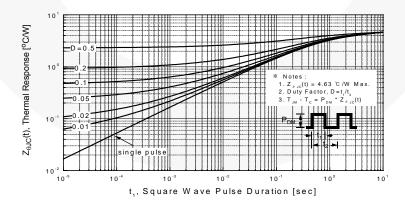


Figure 11. Transient Thermal Response Curve

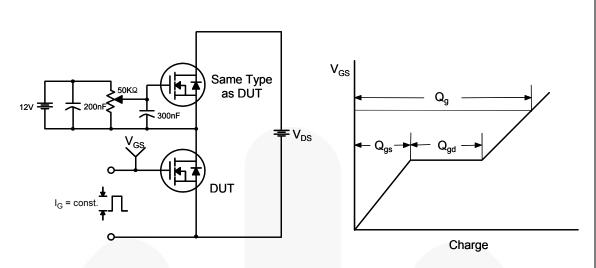


Figure 12. Gate Charge Test Circuit & Waveform

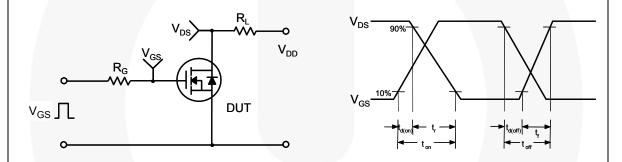


Figure 13. Resistive Switching Test Circuit & Waveforms

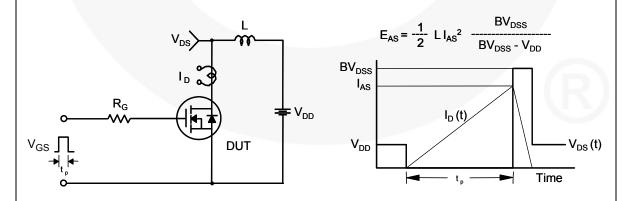
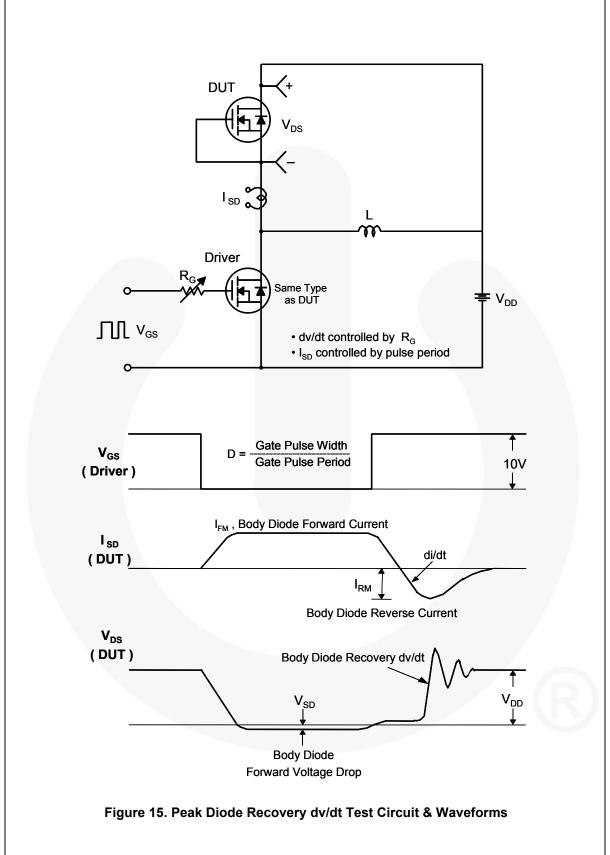


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions

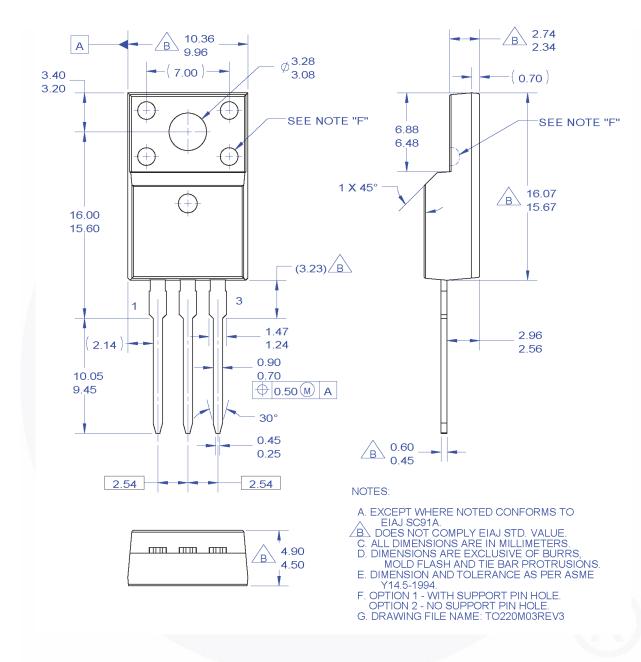


Figure 16. TO220, Molded, 3-Lead, Full Pack, EIAJ SC91, Straight Lead

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Rev. 166

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