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November 2013

FQPF70N10

N-Channel QFET[®] MOSFET 100 V, 35 A, 23 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, audio amplifier, DC motor control, and variable switching power applications.

Features

- 35 A, 100 V, $R_{DS(on)}$ = 23 m Ω (Max.) @ V_{GS} = 10 V, I_D = 17.5 A
- Low Gate Charge (Typ. 85 nC)
- · Low Crss (Typ. 150 pF)
- 100% Avalanche Teste
- 175°C Maximum Juntion. Imperature Rating





Absolute Max num latings 7.c = 25°C unit ss of their vise noted.

Symbol	Para neter		FQPF70N10	Unit
V _{DSS}	rain ource Voltage		100	V
	Surrent - Continuous (T) = 25°C	2/2	35	Α
	- Continuous (T _C = 100°	°C)	24.7	Α
I _{DM}	Drain Current - Pulced	(Note 1)	140	Α
7 5	Galc-Source Voltage		± 25	V
E _{AS}	Single Pused Avalenche Energy	(Note 2)	1300	mJ
JAR	Avalanche Curi en	(Note 1)	35	Α
EAR	Repetitive A clanche Energy	(Note 1)	6.2	mJ
dv/dt	Peak bio te Recovery dv/dt	(Note 3)	6.0	V/ns
P _D	Power Dissipation (T _C = 25°C)		62	W
	- Derate above 25°C		0.41	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +175	°C
T _L	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 seconds		300	°C

Thermal Characteristics

Symbol	Parameter	FQPF70N10	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	2.42	°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
FQPF70N10	FQPF70N10	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	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	100			V
ΔBV_{DSS} / ΔT_{J}	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C		0.1		V/°C
I _{DSS}	Zoro Cata Valtaga Drain Current	V _{DS} = 100 V, V _{GS} = 0 V				μΑ
Zero Gate Voltage Drain Current	Zero Gate voltage Drain Current	V _{DS} = 80 V, T _C = 150°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	•		J	n.A
On Cha	racteristics				N	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 A	.0	\	4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _L 7 5 A		0.019	0.023	Ω

Dynamic Characteristics

 g_{FS}

Forward Transconductance

•			_		1.0	
C _{iss}	Input Capacitance	/ _{DS} = 2, /, V _{GS} = 0 /,	0	2500	3300	pF
C _{oss}	Output Capacitance	1.0 MHz	, <u>;</u>	720	940	pF
C _{rss}	Reverse Transfer Car Sital.	100.	Ì	150	200	pF

Switching Chara

t _{d(on)}	Turn-On elay Time $V_{DD} = 70 \text{ V}$, $I_D = 70 \text{ A}$,		30	70	ns
t _r	T On e Time $R_3 = 25 \Omega$		470	950	ns
t _{d(off)}	ſurn-O" De		130	270	ns
t _f	Note 4)	/	160	330	ns
	To the Charge $V_{DS} = 20 \text{ V}, I_D = 70 \text{ A},$		85	110	nC
Q _{gs}	Sate-Source Charge V _{GS} = 10 V		16		nC
Q _{gd}	Gate-Drain Charge (Note 4)		42		nC

Drain-Source Diode Characteristics and Maximum Ratings

5	Maximum Continuous Drain-Source Diode Forward Current				35	Α
'SM	Maximum Pulsou Drain-Source Diode Forward Current				140	Α
V _{SD}	Drain-Sourc ว Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_S = 35 \text{ A}$			1.5	V
t _{rr}	Reverse Recovery Time	$V_{GS} = 0 \text{ V}, I_{S} = 70 \text{ A},$		110		ns
Q _{rr}	Reverse Recovery Charge	$dI_F / dt = 100 A/\mu s$		430		nC

- Notes: Notes: Notes: A Repetitive Rating: Pulse width limited by maximum junction temperature.
 2. L = 1.59 mH, I_{AS} = 35 A, V_{DD} = 25 V, R_{G} = 25 Ω , starting T_{J} = 25°C.
 3. I_{SD} ≤ 70 A, di/dt ≤ 300 A/µs, V_{DD} ≤ BV_{DSS}, starting T_{J} = 25°C.
 4. Essentially independent of operating temperature.

Typical Characteristics

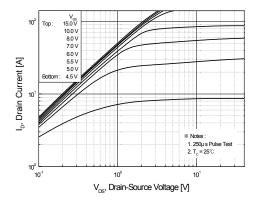


Figure 1. On-Region Characteristics

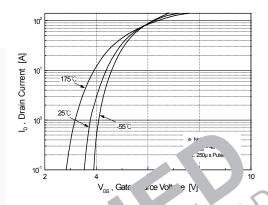
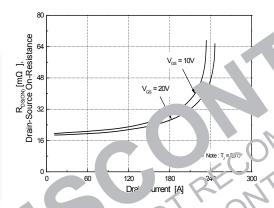


Fig: 2. Tru sfer acteristics



Figure? Jn-Resistance Variation vs

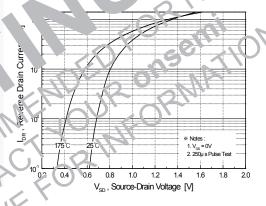


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

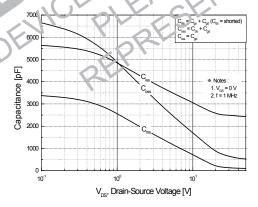


Figure 5. Capacitance Characteristics

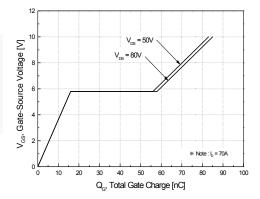
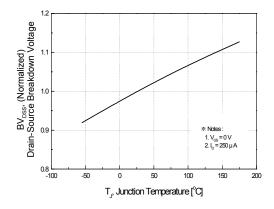


Figure 6. Gate Charge Characteristics

Typical Characteristics (continued)



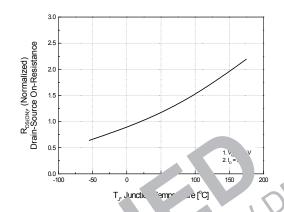
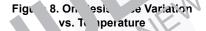
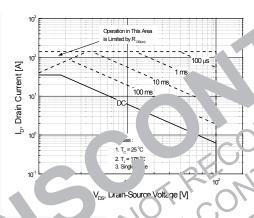
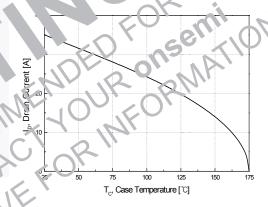


Figure 7. Breakdown Voltage Variation vs. Temperature







Maximum Cafe Operating Area

Figure 10. Maximum Drain Current vs. Case Temperature

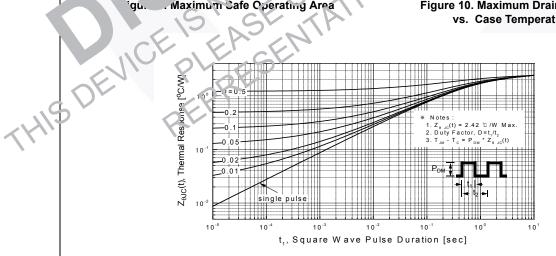


Figure 11. Transient Thermal Response Curve

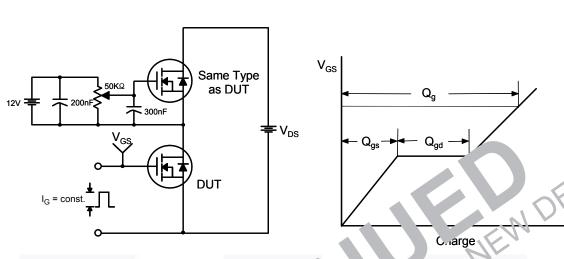


Figure 12. Gate Charge Test 'it & 'ave



Figure 13 Resistive Switching Test Circuit & Waveforms

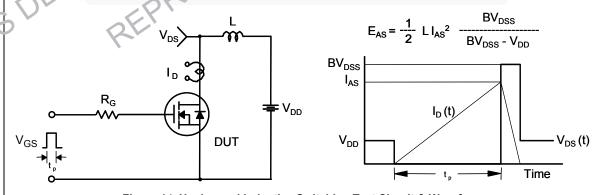
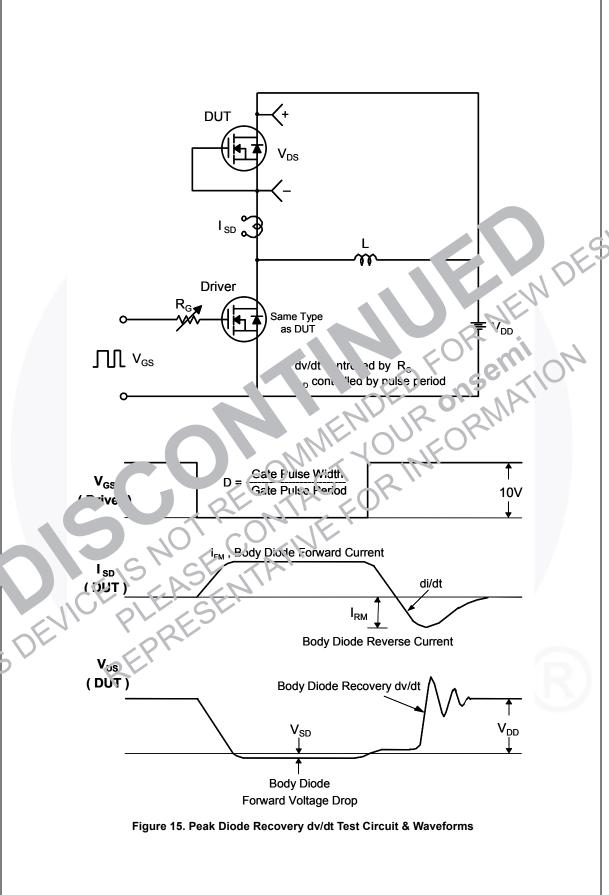


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions 2.74 10.36 Α 2.34 9.96 Ø^{3.28} 7.00 3.08 3.40 0.70 3.20 SEE NOTE "F" SEE NOTE "F" 6.88 6.48 1 X 45° 16.00 15.60 (3.23)2.14 10.05 9.45 NOTES IIS DEV A. EXCEPT WHERE NOTED CONFORMS TO EIAJ SC91A B DOES NOT COMPLY EIAJ STD. VALUE. C. ALL DIMENSIONS ARE IN MILLIMETERS. D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS. 4.90 4.50 E. DIMENSION AND TOLERANCE AS PER ASME Y14.5-1994. F. OPTION 1 - WITH SUPPORT PIN HOLE. OPTION 2 - NO SUPPORT PIN HOLE. G. DRAWING FILE NAME: TO220M03REV3

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

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