

August 2013

FQPF7N65C

N-Channel QFET® MOSFET

650 V, 7 A, 1.4 Ω

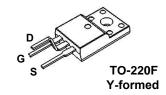
Description

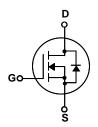
This N-Channel enhancement mode power MOSFET is $^{\circ}$ 7 A, 650 V, $R_{DS(on)} = 1.4 \Omega$ (Max.) @ $V_{GS} = 10$ V, $I_D = 3.5$ A produced using Fairchild Semiconductor®'s proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to • Low C_{rss} (Typ. 12 pF) reduce on-state resistance, and to provide superior • 100% Avalanche Tested 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

- Low Gate Charge (Typ. 28 nC)







Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter		FQPF7N65C / FQPF7N65CYDTU	Unit	
V _{DSS}	Drain-Source Voltage		650	V	
I _D	Drain Current - Continuous (T _C = 25°C)		7 *	Α	
	- Continuous (T _C = 100°C)		4.2 *	Α	
I _{DM}	Drain Current - Pulsed	(Note 1)	28 *	Α	
V _{GSS}	Gate-Source Voltage		± 30	V	
E _{AS}	Single Pulsed Avalanche Energy	(Note 2)	212	mJ	
I _{AR}	Avalanche Current	(Note 1)	7	Α	
E _{AR}	Repetitive Avalanche Energy	(Note 1)	1.6	mJ	
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	4.5	V/ns	
P_{D}	Power Dissipation (T _C = 25°C)		52	W	
	- Derate above 25°C		0.42	W/°C	
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +150	°C	
T _L	Maximum lead temperature for soldering purposes,		300	°C	
'L	1/8" from case for 5 seconds		300	C	

^{*} Drain current limited by maximum junction temperature.

Thermal Characteristics

	Symbol	Parameter	FQPF7N65C / FQPF7N65CYDTU	Unit
	$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	2.4	°C/W
_	R_{\thetaJA}	Thermal Resistance, Junction-to-Ambient, Max.	62.5	°C/W

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FQPF7N65C	FQPF7N65C	TO-220F	-	-	50
FQPF7N65C	FQPF7N65CYDTU	TO-220F (Y-formed)	-	-	50

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	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	650			V
ΔBV_{DSS} / ΔT_{J}	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C		0.8		V/°C
I _{DSS}	Zoro Cata Valtaga Drain Current	V _{DS} = 650 V, V _{GS} = 0 V			1	μΑ
	Zero Gate Voltage Drain Current $V_{DS} = 520 \text{ V}, T_C = 125^{\circ}\text{C}$			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	racteristics					
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	2.0		4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 3.5 A		1.2	1.4	Ω
9 _{FS}	Forward Transconductance	V _{DS} = 40 V, I _D = 3.5 A		8		S

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V,		955	1245	pF
Coss	Output Capacitance	f = 1.0 MHz	-	100	130	pF
C _{rss}	Reverse Transfer Capacitance		-	12	16	pF

Switching Characteristics

	_				
t _{d(on)}	Turn-On Delay Time	V _{DD} = 325 V, I _D = 7A,	 20	50	ns
t _r	Turn-On Rise Time	$R_G = 25 \Omega$	 50	110	ns
t _{d(off)}	Turn-Off Delay Time	· · ·	 90	190	ns
t _f	Turn-Off Fall Time	(Note 4)	 55	120	ns
Qg	Total Gate Charge	V _{DS} = 520 V, I _D = 7A,	 28	36	nC
Q _g Q _{gs}	Gate-Source Charge	V _{GS} = 10 V	 4.5		nC
Q _{gd}	Gate-Drain Charge	(Note 4)	 12		nC

Drain-Source Diode Characteristics and Maximum Ratings

I _S	Maximum Continuous Drain-Source Diode Forward Current				7	Α
I _{SM}	Maximum Pulsed Drain-Source Diode F		-	28	Α	
V _{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0 \text{ V, } I_{S} = 7A$			1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 7A,		400		ns
Q _{rr}	Reverse Recovery Charge	dI _F / dt = 100 A/μs		3.3		μС

Notes:

- **Notes:**1. Repetitive Rating : Pulse width limited by maximum junction temperature 2. L = 8mH, I_{AS} = 7A, V_{DD} = 50V, R_{G} = 25 Ω , Starting T_{J} = 25°C 3. I_{SD} ≤ 7A, di/dt ≤ 200A/ μ s, V_{DD} ≤ BV $_{DSS}$, Starting T_{J} = 25°C 4. Essentially independent of operating temperature

Typical Characteristics

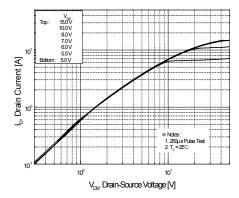


Figure 1. On-Region Characteristics

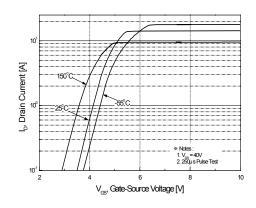


Figure 2. Transfer Characteristics

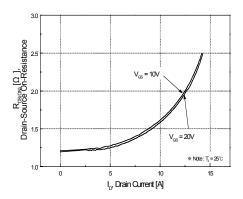


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

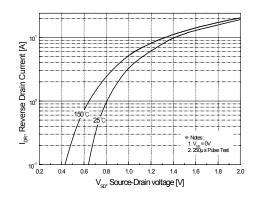


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

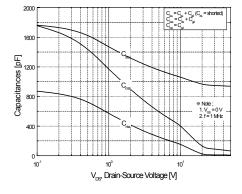


Figure 5. Capacitance Characteristics

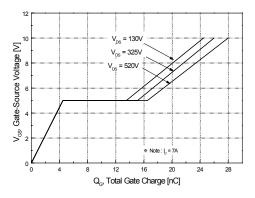
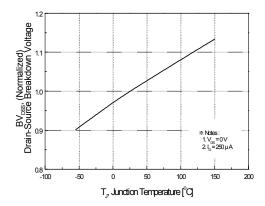


Figure 6. Gate Charge Characteristics

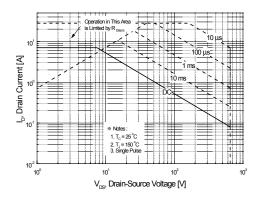
Typical Characteristics (Continued)



25 ()08 UESTS 20 0.05

Figure 7. Breakdown Voltage Variation vs Temperature

Figure 8. On-Resistance Variation vs Temperature



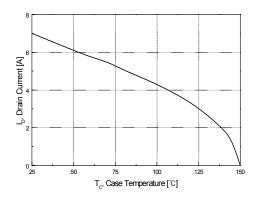


Figure 9. Maximum Safe Operating Area

Figure 10. Maximum Drain Current vs Case Temperature

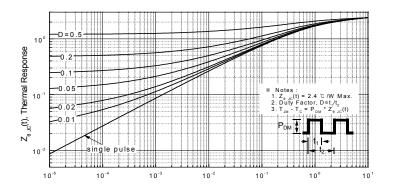


Figure 11 . Transient Thermal Response Curve



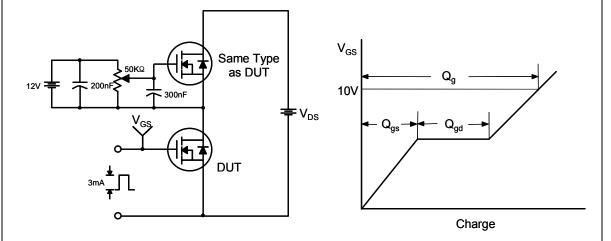


Figure 13. Resistive Switching Test Circuit & Waveforms

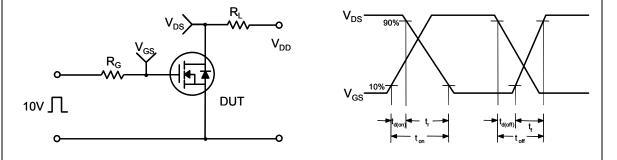
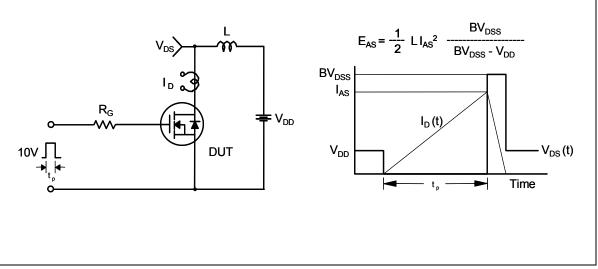
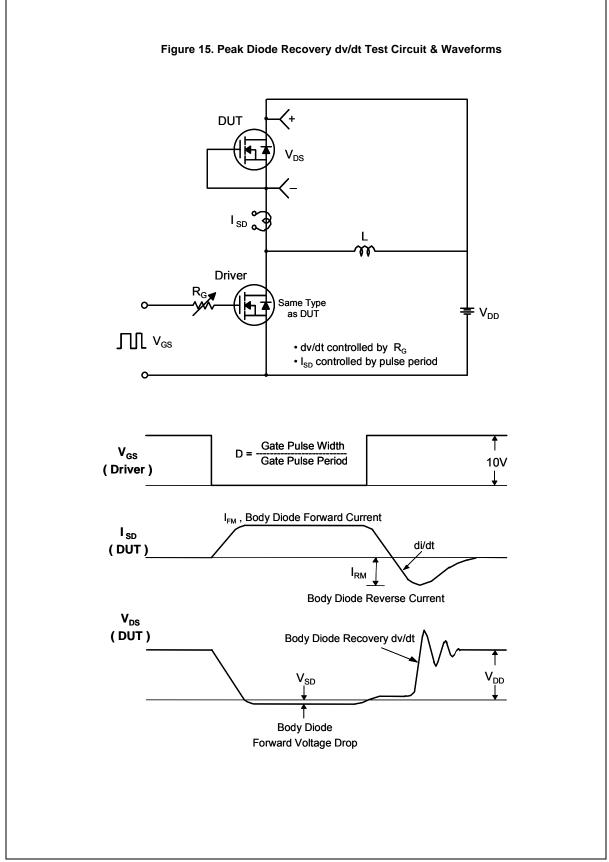


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms





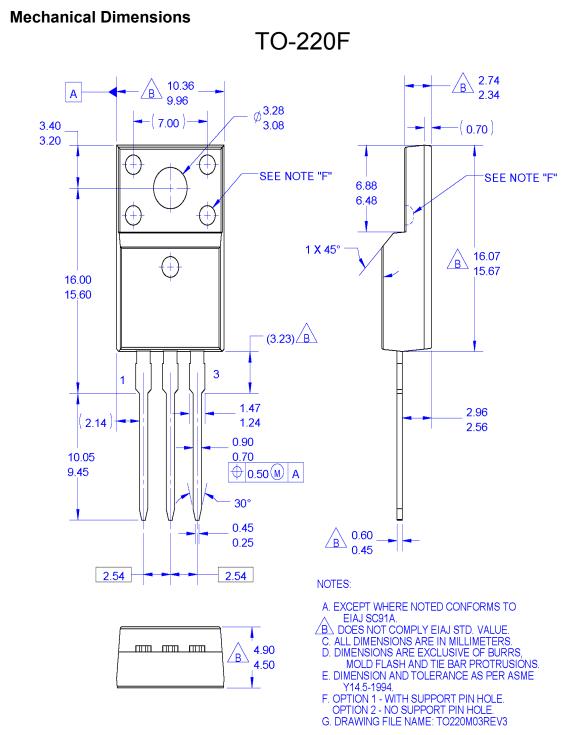


Figure 16. TO-220F 3L - TO220, Molded, 3LD, Full Pack, EIAJ SC91, Straight lead

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Dimensions in Millimeters

Mechanical Dimensions

TO-220F (Y-formed)

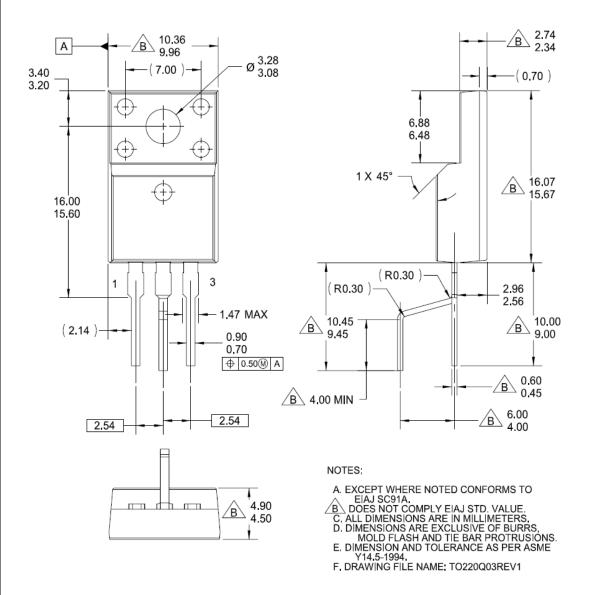


Figure 17. TO-220F 3L - TO220, Molded, 3LD, Full Pack, EIAJ SC91, Y formed lead

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Dimensions in Millimeters





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