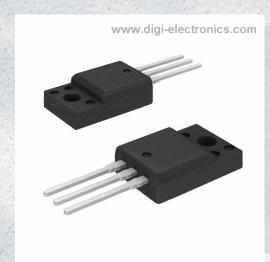


# FQPF20N06 Datasheet



https://www.DiGi-Electronics.com

DiGi Electronics Part Number FQPF20N06-DG

Manufacturer onsemi

Manufacturer Product Number FQPF20N06

Description MOSFET N-CH 60V 15A TO220F

Detailed Description N-Channel 60 V 15A (Tc) 30W (Tc) Through Hole TO

-220F-3



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

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# **Purchase and inquiry**

Manufacturer Product Number:	Manufacturer:
FQPF20N06	onsemi
Series:	Product Status:
QFET®	Obsolete
FET Type:	Technology:
N-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
60 V	15A (Tc)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ ld, Vgs:
10V	60mOhm @ 7.5A, 10V
Vgs(th) (Max) @ ld:	Gate Charge (Qg) (Max) @ Vgs:
4V @ 250μA	15 nC @ 10 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±25V	590 pF @ 25 V
FET Feature:	Power Dissipation (Max):
	30W (Tc)
Operating Temperature:	Mounting Type:
-55°C ~ 175°C (TJ)	Through Hole
Supplier Device Package:	Package / Case:
TO-220F-3	TO-220-3 Full Pack
Base Product Number:	
FQPF20	

# **Environmental & Export classification**

8541.29.0095

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	Not Applicable
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	



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**November 2013** 

## FQPF20N06

# N-Channel QFET<sup>®</sup> MOSFET 60 V, 15 A, 60 m $\Omega$

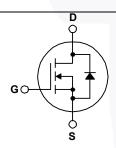
### **Description**

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**

- 15 A, 60 V,  $R_{DS(on)}$  = 60 m $\Omega$  (Max.) @  $V_{GS}$  = 10 V,  $I_D$  = 7.5 A
- Low Gate Charge (Typ. 11.5 nC)
- · Low Crss (Typ. 25 pF)
- · 100% Avalanche Tested
- · 175°C Maximum Junction Temperature Rating





## Absolute Maximum Ratings T<sub>C</sub> = 25°C unless otherwise noted.

Symbol	Parameter		FQPF20N06	Unit
$V_{DSS}$	Drain-Source Voltage		60	V
I <sub>D</sub>	Drain Current - Continuous (T <sub>C</sub> = 25°C)		15	А
	- Continuous (T <sub>C</sub> = 100°C	()	10.7	Α
I <sub>DM</sub>	Drain Current - Pulsed	(Note 1)	60	Α
V <sub>GSS</sub>	Gate-Source Voltage		± 25	V
E <sub>AS</sub>	Single Pulsed Avalanche Energy	(Note 2)	155	mJ
I <sub>AR</sub>	Avalanche Current	(Note 1)	15	Α
E <sub>AR</sub>	Repetitive Avalanche Energy	(Note 1)	3.0	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		7.0	V/ns
$P_{D}$	Power Dissipation (T <sub>C</sub> = 25°C)		30	W
	- Derate above 25°C		0.2	W/°C
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range		-55 to +175	°C
T <sub>L</sub>	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 seconds		300	°C

### **Thermal Characteristics**

Symbol	Parameter	FQPF20N06	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	5.00	°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
FQPF20N06	FQPF20N06	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 <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	60			V
ΔBV <sub>DSS</sub> / ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25°C		0.07		V/°C
I <sub>DSS</sub>	Zees Onto Valle on Dunin Comment	V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V			1	μΑ
	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 48 V, T <sub>C</sub> = 150°C			10	μΑ
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	V <sub>GS</sub> = 25 V, V <sub>DS</sub> = 0 V			100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	V <sub>GS</sub> = -25 V, V <sub>DS</sub> = 0 V			-100	nA
On Cha	aracteristics					
V <sub>GS(th)</sub>	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	2.0		4.0	V
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 7.5 A		0.048	0.06	Ω
9 <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 25 V, I <sub>D</sub> = 7.5 A		10		S
Dynam	ic Characteristics					
C <sub>iss</sub>	Input Capacitance	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V},$		450	590	pF
Coss	Output Capacitance	f = 1.0 MHz		170	220	pF
C <sub>rss</sub>	Reverse Transfer Capacitance			25	35	pF
Switchi	ing Characteristics					
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = 30 V, I <sub>D</sub> = 10 A,		5	20	ns
t <sub>r</sub>	Turn-On Rise Time	$R_G = 25 \Omega$		45	100	ns
t <sub>d(off)</sub>	Turn-Off Delay Time			20	50	ns
t <sub>f</sub>	Turn-Off Fall Time	(Note 4)	/	25	60	ns
Qg	Total Gate Charge	V <sub>DS</sub> = 48 V, I <sub>D</sub> = 20 A,		11.5	15	nC
Ω	Cata Sauraa Charga	101/		2		nC

## **Drain-Source Diode Characteristics and Maximum Ratings**

I <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current		 	15	Α
I <sub>SM</sub>	Maximum Pulsed Drain-Source Diode Forward Current		 	60	Α
V <sub>SD</sub>	Drain-Source Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 15 A	 	1.5	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 20 A,	 43		ns
Q <sub>rr</sub>	Reverse Recovery Charge	dI <sub>F</sub> / dt = 100 A/μs	 50		nC

V<sub>GS</sub> = 10 V

 $Q_{gs}$ 

 $Q_{gd}$ 

- **Notes:** 1. Repetitive Rating : Pulse width limited by maximum junction temperature. 2. L = 800  $\mu$ H, I<sub>AS</sub> = 15 A, V<sub>DD</sub> = 25 V, R<sub>G</sub> = 25  $\Omega$ , starting T<sub>J</sub> = 25°C. 3. I<sub>SD</sub>  $\leq$  20 A, di/dt  $\leq$  300 A/ $\mu$ s, V<sub>DD</sub>  $\leq$  BV<sub>DSS</sub>, starting T<sub>J</sub> = 25°C. 4. Essentially independent of operating temperature.

Gate-Source Charge

Gate-Drain Charge

3

4.5

(Note 4)

nC

nC

## **Typical Characteristics**

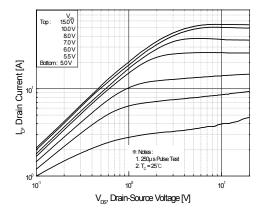


Figure 1. On-Region Characteristics

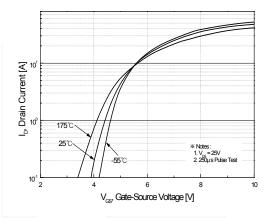


Figure 2. Transfer Characteristics

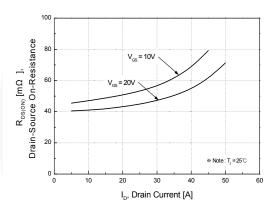


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

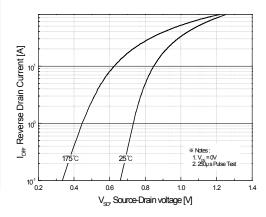


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

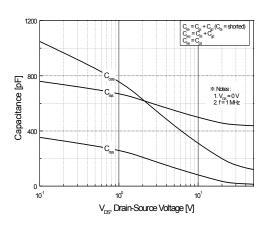


Figure 5. Capacitance Characteristics

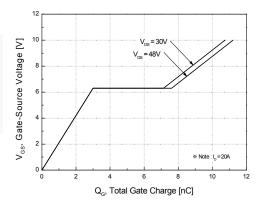


Figure 6. Gate Charge Characteristics

# Typical Characteristics (continued)

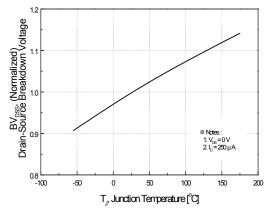
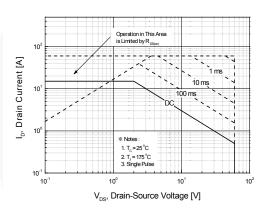


Figure 7. Breakdown Voltage Variation vs. Temperature

Figure 8. On-Resistance Variation vs. Temperature



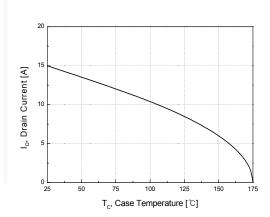


Figure 9. Maximum Safe Operating Area

Figure 10. Maximum Drain Current vs. Case Temperature

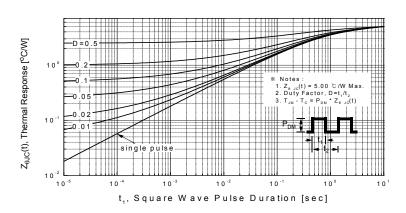
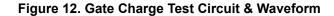


Figure 11. Transient Thermal Response Curve



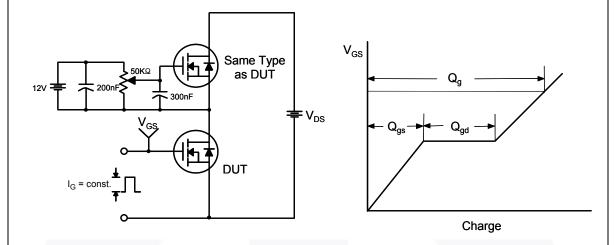


Figure 13. Resistive Switching Test Circuit & Waveforms

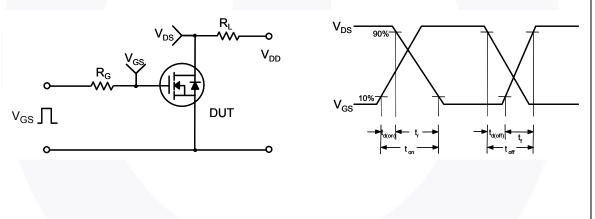
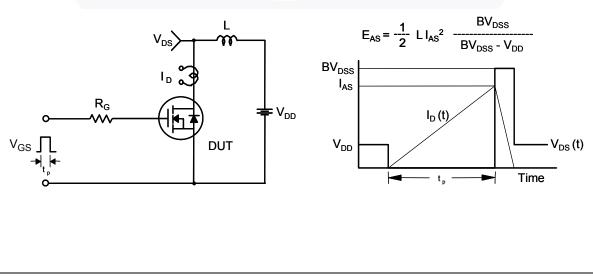
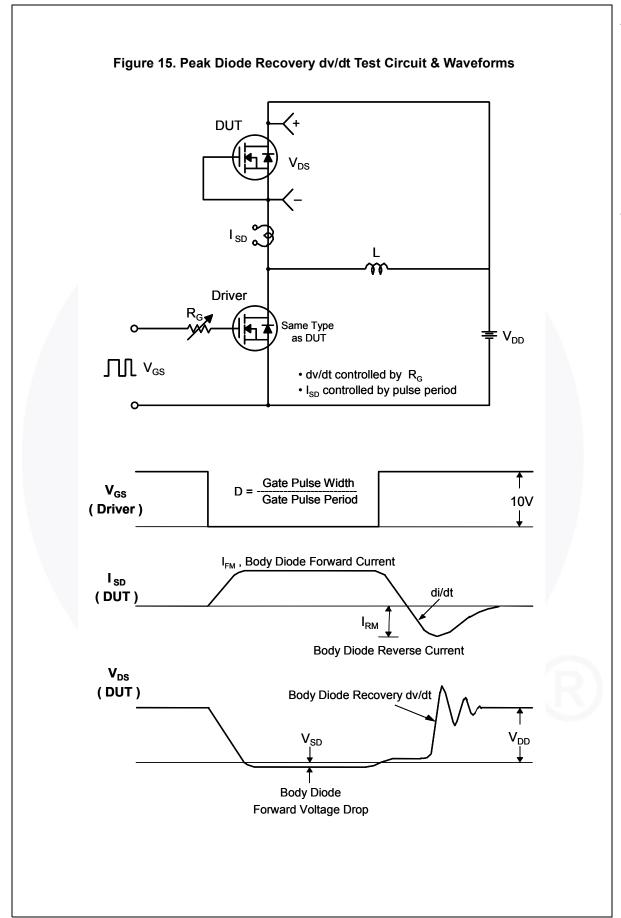


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms





### **Mechanical Dimensions**

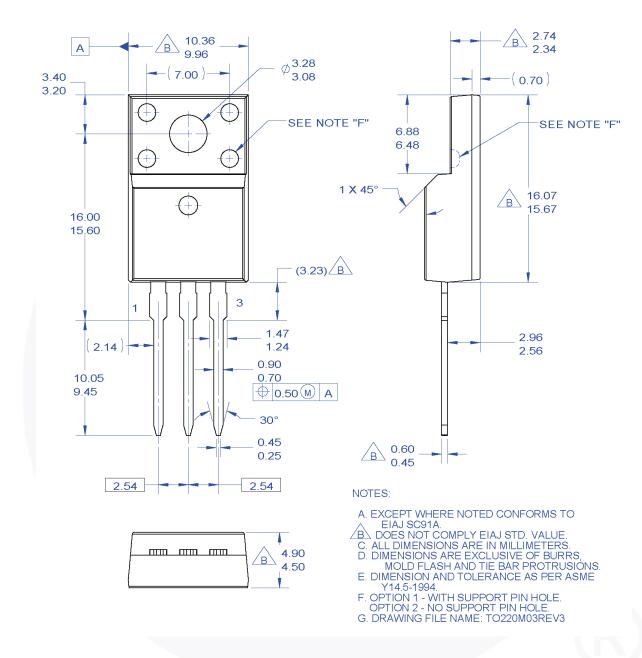


Figure 16. TO220, Molded, 3-Lead, Full Pack, EIAJ SC91, Straight Lead

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