

MOSFET - N-Channel, QFET

800 V, 1.5 A, 6.3 m Ω

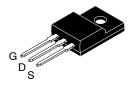
FQPF2N80

Description

This N-Channel enhancement mode power MOSFET is produced using **onsemi**'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.

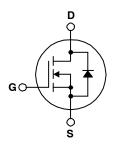
Features

- 1.5 A, 800 V, $R_{DS(on)} = 6.3 \Omega$ (Max.) @ $V_{GS} = 10$ V, ID = 0.75 A
- Low Gate Charge (Typ. 12 nC)
- Low C_{rss} (Typ. 5.5 pF)
- 100% Avalanche Tested

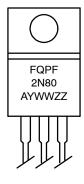


TO-220 Fullpack, 3-Lead / TO-220F-3SG CASE 221AT

N-CHANNEL MOSFET



MARKING DIAGRAM



FQPF2N80 = Specific Device Code
A = Assembly Location
YWW = Date Code (Year & Week)
ZZ = Assembly Lot

ORDERING INFORMATION

Device	Package	Shipping
FQPF2N80	TO-220 Fullpack	1,000 Units / Tube

1

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^{\circ}C$ unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{DSS}	Drain-Source Voltage		800	V
I _D	Drain Current	- Continuous (T _C = 25°C) - Continuous (T _C = 100°C)	1.5 0.95	A A
I _{DM}	Drain Current	- Pulsed (Note 1)	6.0	Α
V _{GSS}	Gate-Source Voltage		±30	V
E _{AS}	Single Pulsed Avalanche Energy (Note 2)		180	mJ
I _{AR}	Avalanche Current (Note 1)		1.5	Α
E _{AR}	Repetitive Avalanche Energy (Note 1)		3.5	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		4.0	V/ns
P _D	Power Dissipation (T _C = 25°C) – Derate Above 25°C		35 0.28	W W/°C
$T_{J_i} T_{STG}$	Operating and Storage Temperature Range		-55 to +150	°C
TL	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds		300	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{ heta JC}$	Thermal Resistance, Junction-to-Case, Max.	3.57	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	62.5	°C/W

ELECTRICAL CHARACTERISTICS ($T_C = 25^{\circ}C$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Тур	Max	Unit		
OFF CHAR	OFF CHARACTERISTICS							
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	800	_	=	V		
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I_D = 250 μ A, Referenced to 25°C	-	0.9	-	V/°C		
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 800 V, V _{GS} = 0 V V _{DS} = 640 V, T _C = 125°C	-	- -	10 100	μ Α μ Α		
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 30 V, V _{DS} = 0 V	-	_	100	nA		
I _{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -30 \text{ V}, V_{DS} = 0 \text{V}$	-	_	-100	nA		
ON CHARA	ON CHARACTERISTICS							
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 = 0.75 A	-	4.6	6.3	Ω		
9 _{FS}	Forward Transconductance	V _{DS} = 50 V, I _D = 0.75 A	-	2.2	-	S		
DYNAMIC CHARACTERISTICS								
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz	-	425	550	pF		
C _{oss}	Output Capacitance]	-	45	60	pF		
C _{rss}	Reverse Transfer Capacitance	1	-	5.5	7.0	pF		

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)(continued)

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
SWITCHIN	G CHARACTERISTICS	•	•	•		•
t _{d(on)}	Turn-On Delay Time	$\begin{array}{c} V_{DD} = 400 \text{ V, } I_{D} = 2.4 \text{ A,} \\ R_{G} = 25 \Omega \text{ (Note 4)} \end{array}$	-	12	35	ns
t _r	Turn-On Rise Time		-	30	70	ns
t _{d(off)}	Turn-Off Delay Time		-	25	60	ns
t _f	Turn-Off Fall Time		-	28	65	ns
Qg	Total Gate Charge	V _{DS} = 640 V, I _D = 2.4 A, V _{GS} = 10 V (Note 4)	-	12	15	nC
Q _{gs}	Gate-Source Charge		-	2.6	-	nC
Q_{gd}	Gate-Drain Charge		-	6.0	-	nC
RAIN-SC	DURCE DIODE CHARACTERISTICS AND M	NAXIMUM RATINGS				
IS	Maximum Continuous Drain-Source Diode Forward Current		-	_	1.5	Α
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		-	-	6.0	Α
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_S = 1.5 \text{ A}$	-	-	1.4	V
t _{rr}	Reverse Recovery Time	$V_{GS} = 0 \text{ V, I}_{S} = 2.4 \text{ A,}$ $dI_{F}/dt = 100 \text{ A/}\mu\text{s}$	-	480	_	ns
Q _{rr}	Reverse Recovery Charge		_	2.0	-	μС

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

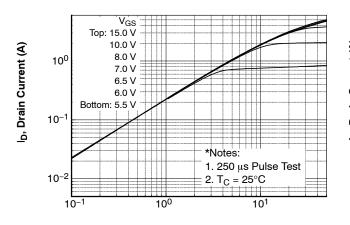
1. Repetitive rating: pulse–width limited by maximum junction temperature.

2. L = 150 mH, I_{AS} = 1.5 A, V_{DD} = 50 V, R_{G} = 25 Ω , starting T_{J} = 25°C.

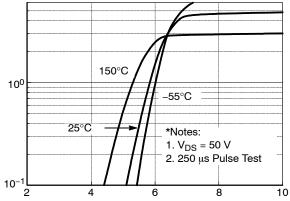
3. $I_{SD} \le 2.4$ A, di/dt ≤ 200 A/ μ s, $V_{DD} \le BV_{DSS}$, starting T_{J} = 25°C.

4. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS



I_D, Drain Current (A)



V_{DS}, Drain-Source Voltage (V)

Figure 1. On-Region Characteristics

V_{GS}, Gate-Source Voltage (V)

Figure 2. Transfer Characteristics

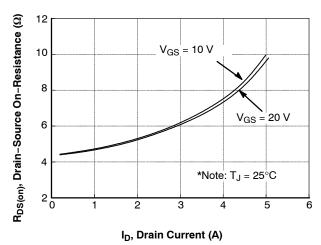
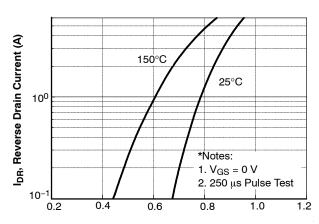
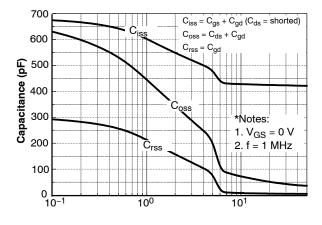


Figure 3. On–Resistance Variation vs. Drain Current and Gate Voltage

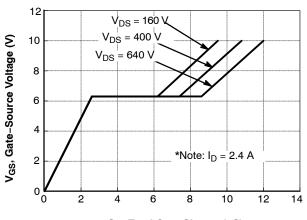


V_{SD}, Source-Drain Voltage (A)

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



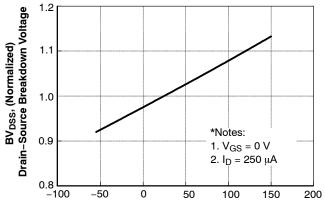
V_{DS}, Drain-Source Voltage (V)
Figure 5. Capacitance Characteristics



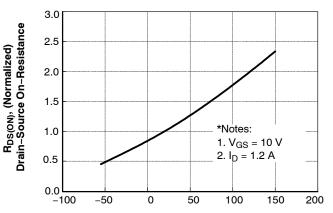
Q_G, Total Gate Charge (nC)

Figure 6. Gate Charge Characteristics

TYPICAL CHARACTERISTICS (continued)



ď

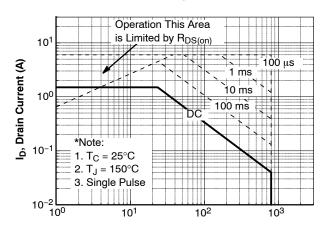


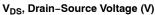
T_J, Junction Temperature (°C)

Figure 7. Breakdown Voltage Variation vs. Temperature

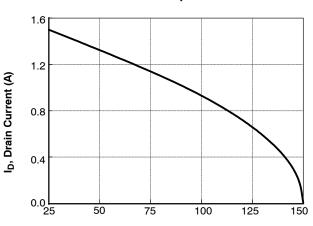
T_J, Junction Temperature (°C)

Figure 8. On–Resistance Variation vs. Temperature





. DS, 21am comes remage (1)



T_C, Case Temperature (°C)

Figure 10. Maximum Drain Current vs. Case Temperature



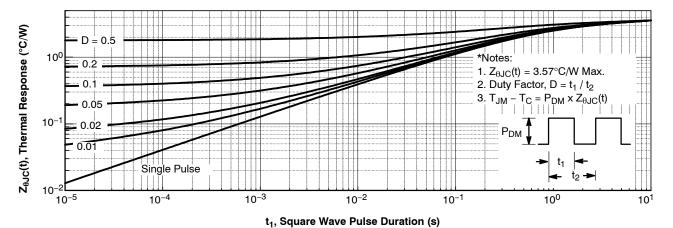


Figure 11. Transient Thermal Response Curve

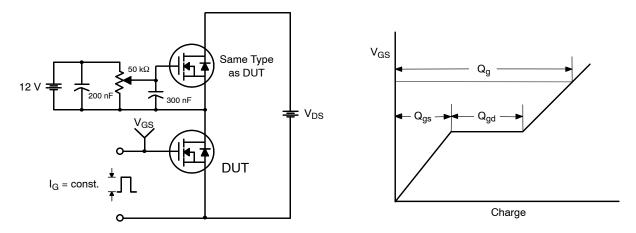


Figure 12. Gate Charge Test Circuit & Waveform

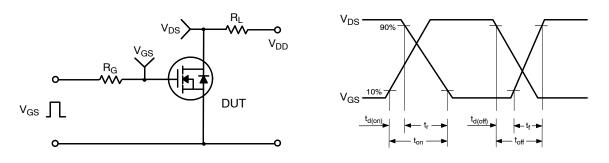


Figure 13. Resistive Switching Test Circuit & Waveforms

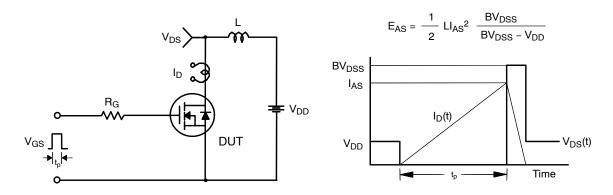
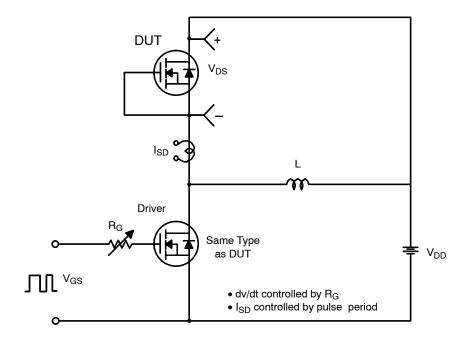


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms



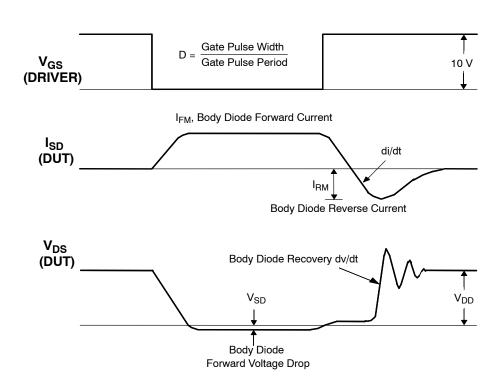
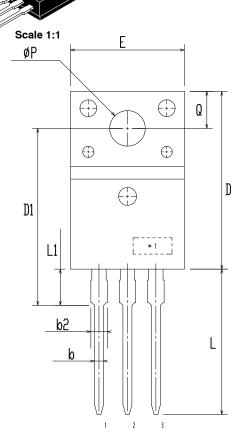


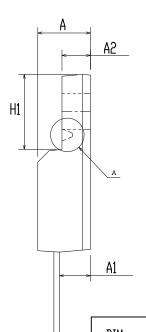
Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

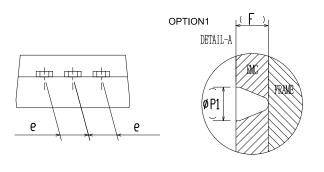


TO-220 Fullpack, 3-Lead / TO-220F-3SG CASE 221AT ISSUE B

DATE 19 JAN 2021







אזת ו	THECHHICKS			
DIM	MIN	NDM	MAX	
Α	4.50	4.70	4.90	
A1	2.56	2.76	2.96	
A2	2.34	2.54	2.74	
b	0.70	0.80	0.90	
b2	~	~	1.47	
С	0.45	0.50	0.60	
D	15.67	15.87	16.07	
D1	15.60	15.80	16.00	
E	9,96	10.16	10.36	
е	2.34	2.54	2.74	
F	~	0.84	*	
H1	6.48	6.68	6.88	
L	12.78	12.98	13.18	
L1	3.03	3.23	3.43	
ØΡ	2.98	3.18	3.38	
ø P1	~	1.00	~	
Q	3.20	3.30	3.40	

MILLIMITERS

NOTES:

- A. DIMENSION AND TOLERANCE AS ASME Y14.5-2009
- B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUCSIONS.

C

C. OPTION 1 - WITH SUPPORT PIN HOLE OPTION 2 - NO SUPPORT PIN HOLE

DOCUMENT NUMBER:		Electronic versions are uncontrolled except when accessed directly from the Document Repository Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.		
DESCRIPTION:	TO-220 FULLPACK, 3-LEAD / TO-220F-3SG		PAGE 1 OF 1	

onsemi and ONSEMI are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, ONSEMI., and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "onsemi" or its affiliates and/or subsidiaries in the United States and/or other countries. onsemi owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of onsemi's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. onsemi reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and onsemi makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems. or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

 $\textbf{Technical Library:} \ \underline{www.onsemi.com/design/resources/technical-documentation}$

onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at

www.onsemi.com/support/sales