

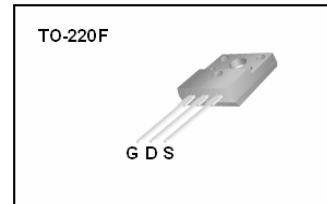
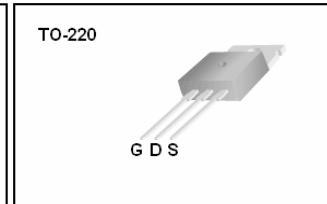
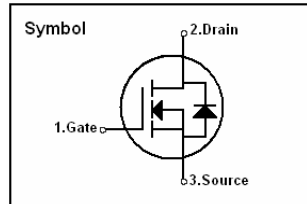


# FQP8N60/FQPF8N60

## 600V N-Channel MOSFET

### Features

- 7.5A,600V,RDS(on)=1.0Ω@VGS=10V
- Low gate charge
- Low  $C_{rss}$  (typical 23pF)
- Fast switching
- 100% Avalanche Tested
- Improved dv/dt capability
- ROHS product



### General Description

This Power MOSFET is produced using AOKE's advanced planar stripe, DMOS technology. This latest technology has been especially designed to minimize on-state resistance, have a high rugged avalanche characteristics. These devices are well suited for high efficiency switch mode power supplies, active power factor correction, electronic lamp ballasts based on half bridge topology.

### Absolute Maximum Ratings

Symbol	Parameter	FQP8N60	FQPF8N60	Units
VDSS	Drain to Source Voltage	600		V
ID	Continuous Drain Current(@TC = 25°C)	7.5	7.5*	A
	Continuous Drain Current(@TC = 100°C)	4.4	4.4*	A
IDM	Drain Current Pulsed (Note 1)	28	28*	A
VGS	Gate to Source Voltage	±30		V
EAS	Single Pulsed Avalanche Energy (Note 2)	420		mJ
EAR	Repetitive Avalanche Energy (Note 1)	14.7		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.5		V/ns
PD	Total Power Dissipation(@TC = 25 °C)	147	48	W
	Derating Factor above 25 °C	1.18	0.38	W/ °C
TSTG, TJ	Operating Junction Temperature & Storage Temperature	-55 ~ 150		°C
TL	Maximum Lead Temperature for soldering purpose, 1/8 from Case for 5 seconds.	300		°C

### Thermal Characteristics

Symbol	Parameter	FQP8N60	FQPF8N60	Units
RθJC	Thermal Resistance, Junction-to-Case	0.85	2.6	°C/W
RθCS	Thermal Resistance, Case-to-Sink Typ	0.5	0.5	°C/W
RθJA	Thermal Resistance, Junction-to-Ambient	62.5	62.5	°C/W

# FQP8N60/FQPF8N60

## Electrical Characteristics (TC = 25 °C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250uA	600	-	-	V
$\Delta$ BV <sub>DSS</sub> $\Delta$ T <sub>J</sub>	Breakdown Voltage Temperature coefficient	I <sub>D</sub> = 250uA, referenced to 25 °C	-	0.65	-	V/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> = 600V, V <sub>GS</sub> = 0V	-	-	10	uA
		V <sub>DS</sub> = 480V, T <sub>C</sub> = 125 °C	-	-	100	uA
I <sub>GSS</sub>	Gate-Source Leakage, Forward	V <sub>GS</sub> = 30V, V <sub>DS</sub> = 0V	-	-	100	nA
	Gate-source Leakage, Reverse	V <sub>GS</sub> = -30V, V <sub>DS</sub> = 0V	-	-	-100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250uA	2.0	-	4.0	V
R <sub>DS(ON)</sub>	Static Drain-Source On-state Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 3.75A	-	1.0	1.2	Ω
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25V, f = 1MHz	-	1380	1800	pF
C <sub>oss</sub>	Output Capacitance		-	115	150	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	23	30	
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> = 300V, I <sub>D</sub> = 7.5A, R <sub>G</sub> = 25Ω (Note 4, 5)	-	30	70	ns
t <sub>r</sub>	Rise Time		-	80	170	
t <sub>d(off)</sub>	Turn-off Delay Time		-	125	260	
t <sub>f</sub>	Fall Time		-	85	180	
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 480V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 7.5A (Note 4, 5)	-	40	48	nC
Q <sub>gs</sub>	Gate-Source Charge		-	6	-	
Q <sub>gd</sub>	Gate-Drain Charge(Miller Charge)		-	20	-	

## Drain-Source Diode Ratings and Characteristics

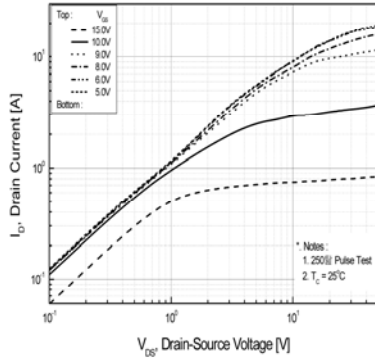
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
I <sub>S</sub>	Continuous Source Current	Integral Reverse p-n Junction	-	-	7.5	A
I <sub>SM</sub>	Pulsed Source Current	Diode in the MOSFET	-	-	28	
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> = 7.5A, V <sub>GS</sub> = 0V	-	-	1.4	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> = 7.5A, V <sub>GS</sub> = 0V, dI <sub>F</sub> /dt = 100A/us	-	415	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	I <sub>S</sub> = 7.5A, V <sub>GS</sub> = 0V, dI <sub>F</sub> /dt = 100A/us	-	4.6	-	uC

### ※ NOTES

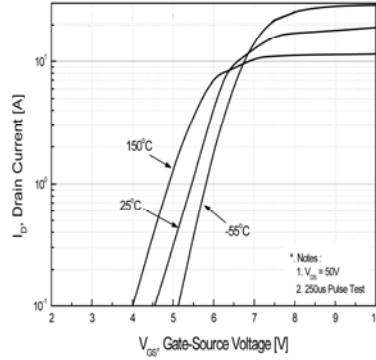
- Pulse width limited by maximum junction temperature
- L = 15.7mH, I<sub>AS</sub> = 7.5A, V<sub>DD</sub> = 50V, R<sub>G</sub> = 25Ω, Starting T<sub>J</sub> = 25°C
- I<sub>SD</sub> ≤ 7.5A, di/dt ≤ 300A/us, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub> = 25°C
- Pulse Test : Pulse Width ≤ 300us, Duty Cycle ≤ 2%
- Essentially independent of operating temperature

# FQP8N60/FQPF8N60

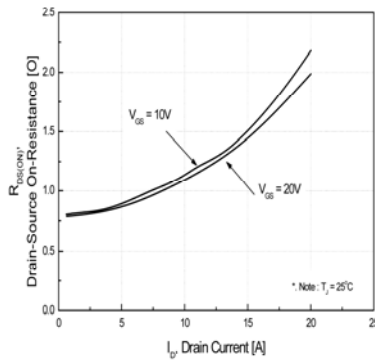
**Fig 1. On-State Characteristics**



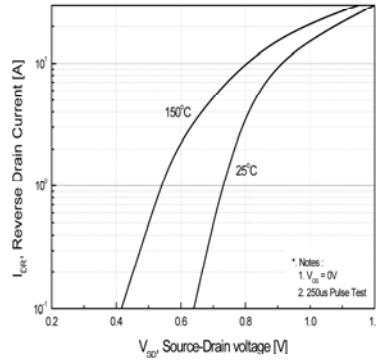
**Fig 2. Transfer characteristics**



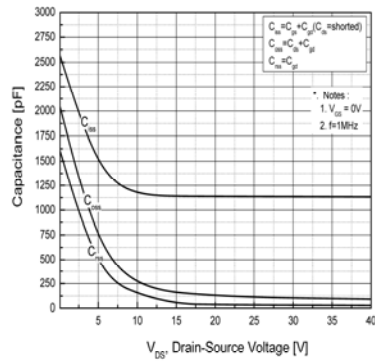
**Fig 3. On Resistance Variation vs. Drain Current and Gate Voltage**



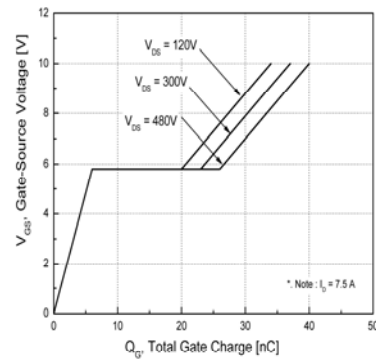
**Fig 4. On State Current vs. Source-Drain voltage**



**Fig 5. Capacitance Characteristics (Non-Repetitive)**

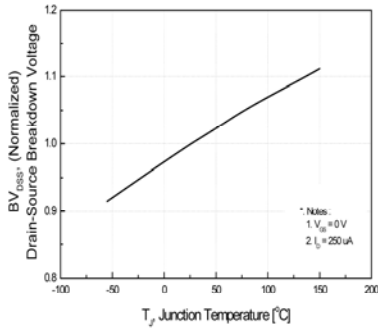


**Fig 6. Gate Charge Characteristics**

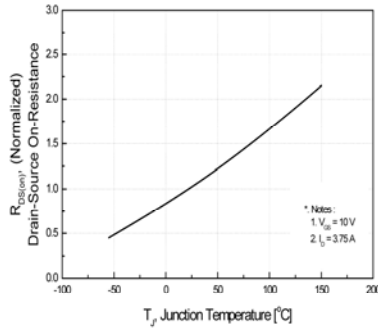


# FQP8N60/FQPF8N60

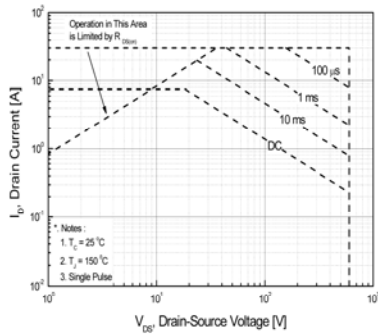
**Fig 7. Breakdown Voltage Variation vs. Junction Temperature**



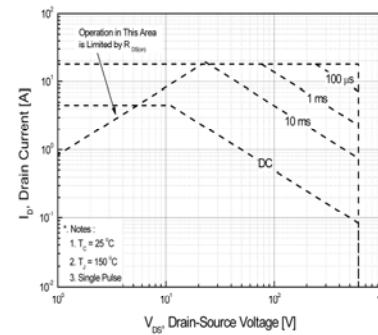
**Fig 8. On-Resistance Variation vs. Junction Temperature**



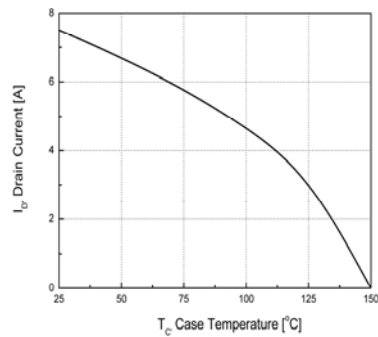
**Fig 9-1. Maximum Safe Operating Area for FQP8N60**



**Fig 9-2. Maximum Safe Operating Area for FQPF8N60**



**Fig 10. Maximum Drain Current vs. Case Temperature**



# FQP8N60/FQPF8N60

Fig 11-1 . Transient Thermal Response Curve for FQP8N60

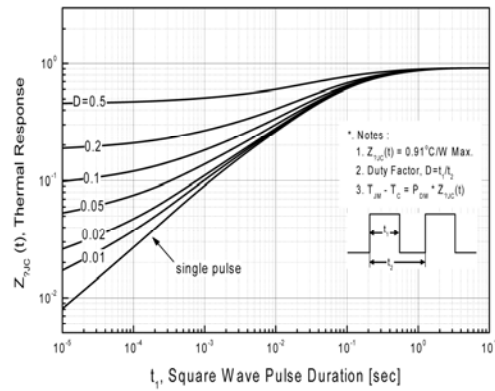
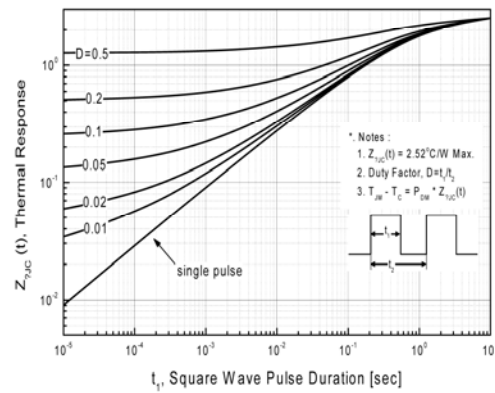


Fig 11-2 . Transient Thermal Response Curve for FQPF8N60



# FQP8N60/FQPF8N60

Fig. 12. Gate Charge Test Circuit & Waveforms

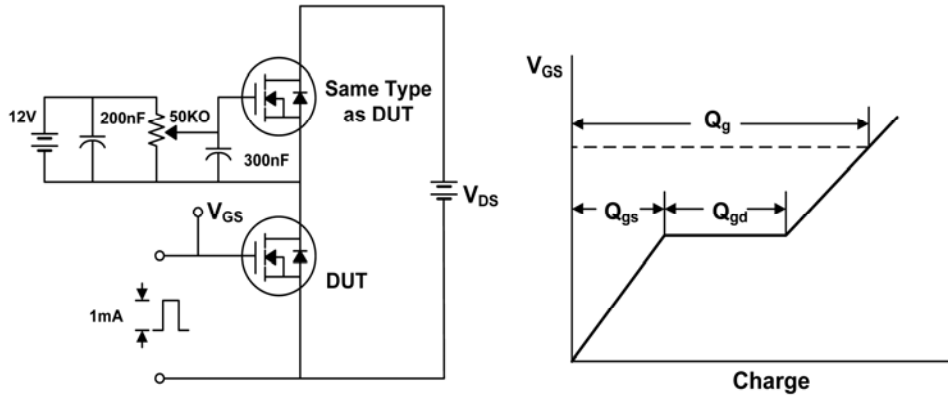


Fig. 13. Switching Time Test Circuit & Waveforms

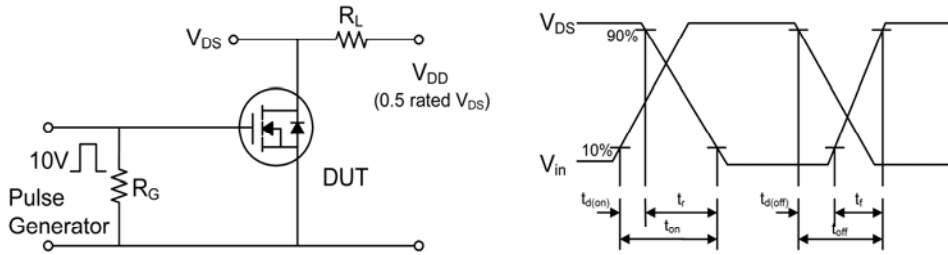


Fig. 14. Unclamped Inductive Switching Test Circuit & Waveforms

