

ON Semiconductor®

FQA11N90-F109

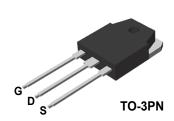
N-Channel QFET[®] MOSFET 900 V, 11.4 A, 960 m Ω

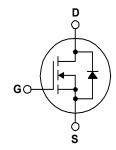
Features

- 11.4 A, 900 V, $R_{DS(on)}$ = 960 m Ω (Max.) @ V_{GS} = 10 V, I_D = 5.7 A
- Low Gate Charge (Typ. 72 nC)
- Low Crss (Typ. 30 pF)
- · 100% Avalanche Tested
- · RoHS compliant

Description

This N-Channel enhancement mode power MOSFET is produced using ON 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, active power factor correction (PFC), and electronic lamp ballasts.





MOSFET Maximum Ratings T_C = 25°C unless otherwise noted.

Symbol	Parameter			FQA11N90-F109	Unit	
V_{DSS}	Drain to Source Voltage			900	V	
I _D	Drain Current	- Continuous (T _C = 25°C)		11.4	Α	
	Diam Current	- Continuous (T _C = 100°C)		7.2	Α	
I _{DM}	Drain Current	- Pulsed	(Note 1)	45.6	Α	
V_{GSS}	Gate to Source Voltage			± 30	V	
E _{AS}	Single Pulsed Avalanche Energy		(Note 2)	1000	mJ	
I _{AR}	Avalanche Current		(Note 1)	11.4	Α	
E _{AR}	Repetitive Avalanche Energy		(Note 1)	30	mJ	
dv/dt	Peak Diode Recovery dv/dt (No		(Note 3)	4.0	V/ns	
P_{D}	Dawer Dissipation	(T _C = 25°C)		300	W	
	Power Dissipation	- Derate Above 25°C		2.38	W/°C	
T _J , T _{STG}	Operating and Storage Temperature Range			-55 to +150	°C	
T _L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds			300	°C	

Thermal Characteristics

Symbol	Parameter	FQA11N90-F109	Unit
$R_{ heta JC}$	Thermal Resistance, Junction to Case, Max	0.42	°C/W
R_{\thetaJA}	Thermal Resistance, Junction to Ambient, Max	40	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FQA11N90	FQA11N90-F109	TO-3PN	Tube	N/A	30 units

Electrical Characteristics $T_C = 25^{\circ}C$ unless otherwise noted.

Symbol	Parameter	Test Conditions	Min	Тур	Max	Unit
Off Cha	racteristics					
BV_{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	900			V
ΔBV_{DSS} / ΔT_{J}	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C		1.0		V/°C
_	Zero Gate Voltage Drain Current	V _{DS} = 900 V, V _{GS} = 0 V			10	μΑ
		V _{DS} = 720 V, T _C = 125°C			100	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	$V_{DS} = V_{GS}, I_{D} = 250 \mu\text{A}$	3.0		5.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	$V_{GS} = 10 \text{ V}, I_D = 5.7 \text{ A}$		0.75	0.96	Ω
9 _{FS}	Forward Transconductance	V _{DS} = 50 V, I _D = 5.7 A		12		S
	c Characteristics			T	T	T _
C _{iss}	Input Capacitance	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V},$		2700	3500	pF
C _{oss}	Output Capacitance	f = 1.0 MHz		260	340	pF
C _{rss}	Reverse Transfer Capacitance			30	40	pF
Switchi	ng Characteristics					
t _{d(on)}	Turn-On Delay Time	V _{DD} = 450 V, I _D = 11.4 A,		65	140	ns
t _r	Turn-On Rise Time	$R_G = 25 \Omega$		135	280	ns
$t_{d(off)}$	Turn-Off Delay Time		-	165	340	ns
t _f	Turn-Off Fall Time	(note 4)	-	90	190	ns
Q_g	Total Gate Charge	V _{DS} = 720 V, I _D = 11.4 A,		72	94	nC
Q_{gs}	Gate-Source Charge	V _{GS} = 10 V		16		nC
Q_{gd}	Gate-Drain Charge	(note 4)		35		nC
Drain-S	ource Diode Characteristics a	nd Maximum Ratings				
I _S	Maximum Continuous Drain-Source Diode Forward Current				11.4	Α
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current				45.6	Α
V_{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 11.4 A			1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 11.4 A,		850		ns
Q _{rr}	Reverse Recovery Charge	dI _F / dt = 100 A/μs		11.2		μС

- 1. Repetitive Rating : Pulse width limited by maximum junction temperature.
- 2. L = 15 mH, I_{AS} = 11.4 A, V_{DD} = 50 V, R_G = 25 Ω , starting T_J = 25°C.
- $3.~I_{SD} \leq 11.4~A,~di/dt \leq 200~A/\mu s,~V_{DD} \leq BV_{DSS,}~starting~~T_J = 25^{\circ}C.$
- 4. Essentially independent of operating temperature.

Typical Characteristics

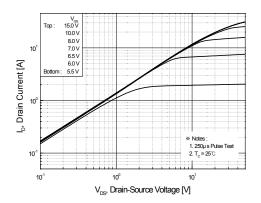


Figure 1. On-Region Characteristics

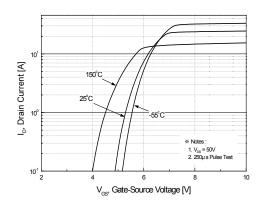


Figure 2. Transfer Characteristics

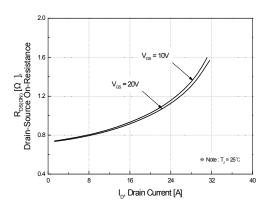


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

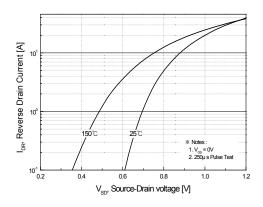


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

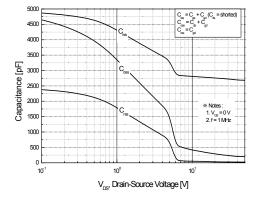


Figure 5. Capacitance Characteristics

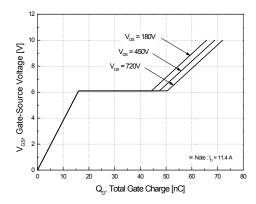


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

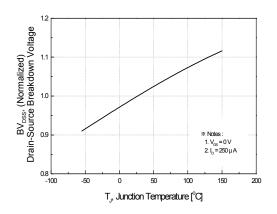
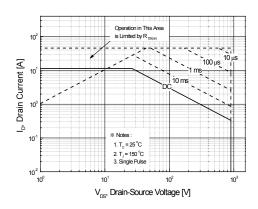


Figure 7. Breakdown Voltage Variation vs. Temperature

Figure 8. On-Resistance Variation vs. Temperature



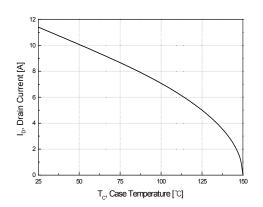


Figure 9. Maximum Safe Operating Area

Figure 10. Maximum Drain Current vs. Case Temperature

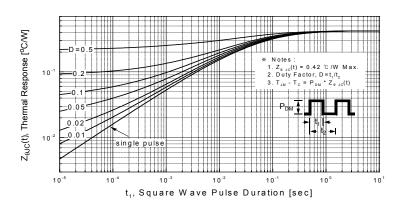


Figure 11. Transient Thermal Response Curve

Figure 12. Gate Charge Test Circuit & Waveform

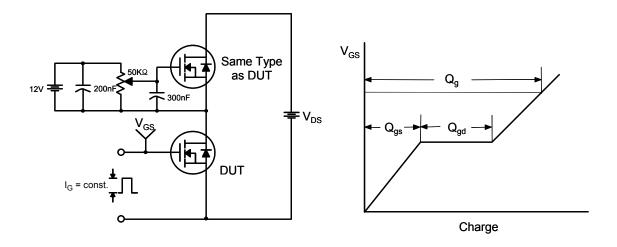


Figure 13. Resistive Switching Test Circuit & Waveforms

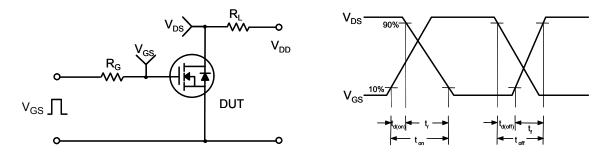


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

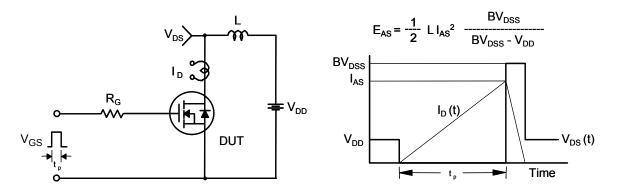
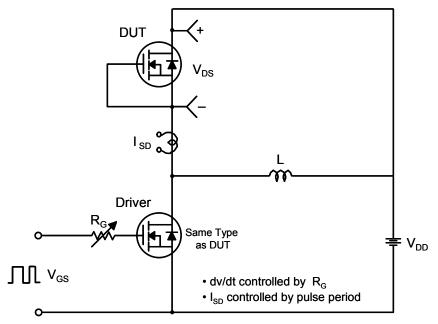
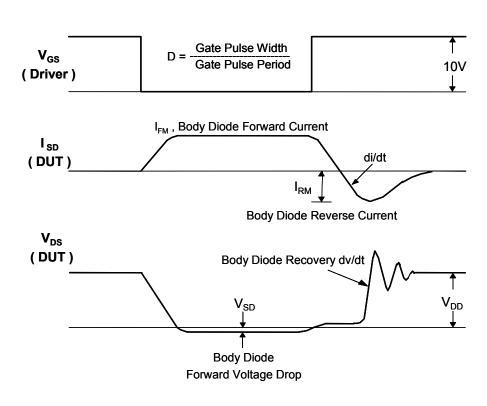
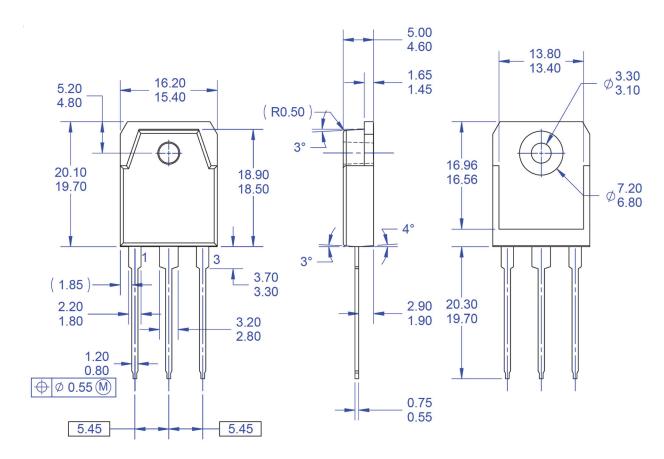


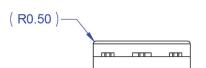
Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms





Mechanical Dimensions





- NOTES: UNLESS OTHERWISE SPECIFIED
- A) THIS PACKAGE CONFORMS TO EIAJ SC-65 PACKAGING STANDARD.
- ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSION AND TOLERANCING PER ASME14.5-2009.
- D) DIMENSIONS ARE EXCLUSSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSSIONS.
 E) DRAWING FILE NAME: TO3PN03AREV1.
- F) FAIRCHILD SEMICONDUCTOR.

Figure 16. TO3PN, 3-Lead, Plastic, EIAJ SC-65

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Dimension in Millimeters

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