



FQA28N15 / FQA28N15_F109 150V N-Channel MOSFET

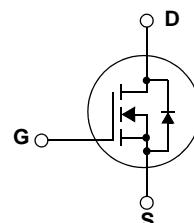
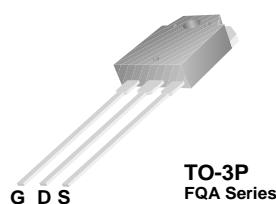
Features

- 33A, 150V, $R_{DS(on)} = 0.09\Omega$ @ $V_{GS} = 10$ V
- Low gate charge (typical 40 nC)
- Low Crss (typical 50pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- 175°C maximum junction temperature rating

Description

These N-Channel enhancement mode power field effect transistors are produced using Fairchild's proprietary, planar stripe, DMOS technology.

This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficient switched mode power supplies, active power factor correction, electronic lamp ballast based on half bridge topology.



Absolute Maximum Ratings

Symbol	Parameter	FQA28N15	Units
V_{DSS}	Drain-Source Voltage	150	V
I_D	Drain Current - Continuous ($T_C = 25^\circ C$)	33	A
	- Continuous ($T_C = 100^\circ C$)	23.3	A
I_{DM}	Drain Current - Pulsed	(Note 1)	A
V_{GSS}	Gate-Source Voltage	± 25	V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	mJ
I_{AR}	Avalanche Current	(Note 1)	A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	V/ns
P_D	Power Dissipation ($T_C = 25^\circ C$)	227	W
	- Derate above $25^\circ C$	1.52	W/ $^\circ C$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	$^\circ C$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	0.66	$^\circ C/W$
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink	0.24	--	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	$^\circ C/W$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FQA28N15	FQA28N15	TO-3P	--	--	30
FQA28N15	FQA28N15_F109	TO-3PN	--	--	30

Electrical Characteristics

$T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units	
Off Characteristics							
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$	150	--	--	V	
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, Referenced to 25°C	--	0.17	--	$\text{V}/^\circ\text{C}$	
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 150 \text{ V}$, $V_{GS} = 0 \text{ V}$	--	--	1	μA	
		$V_{DS} = 120 \text{ V}$, $T_C = 150^\circ\text{C}$	--	--	10	μA	
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 25 \text{ V}$, $V_{DS} = 0 \text{ V}$	--	--	100	nA	
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -25 \text{ V}$, $V_{DS} = 0 \text{ V}$	--	--	-100	nA	
On Characteristics							
$V_{GS(\text{th})}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$	2.0	--	4.0	V	
$R_{DS(\text{on})}$	Static Drain-Source On-Resistance	$V_{GS} = 10 \text{ V}$, $I_D = 16.5 \text{ A}$	--	0.067	0.09	Ω	
g_{FS}	Forward Transconductance	$V_{DS} = 40 \text{ V}$, $I_D = 16.5 \text{ A}$	(Note 4)	--	20	--	S
Dynamic Characteristics							
C_{iss}	Input Capacitance	$V_{DS} = 25 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1.0 \text{ MHz}$	--	1250	1600	pF	
C_{oss}	Output Capacitance		--	260	340	pF	
C_{rss}	Reverse Transfer Capacitance		--	50	65	pF	
Switching Characteristics							
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 75 \text{ V}$, $I_D = 28 \text{ A}$, $R_G = 25 \Omega$	--	17	45	ns	
t_r	Turn-On Rise Time		--	180	370	ns	
$t_{d(off)}$	Turn-Off Delay Time		--	100	210	ns	
t_f	Turn-Off Fall Time		--	115	240	ns	
Q_g	Total Gate Charge	$V_{DS} = 120 \text{ V}$, $I_D = 28 \text{ A}$, $V_{GS} = 10 \text{ V}$	--	40	52	nC	
Q_{gs}	Gate-Source Charge		--	7.9	--	nC	
Q_{gd}	Gate-Drain Charge		--	20	--	nC	
Drain-Source Diode Characteristics and Maximum Ratings							
I_S	Maximum Continuous Drain-Source Diode Forward Current	--	--	33	--	A	
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	132	--	A	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}$, $I_S = 33 \text{ A}$	--	--	1.5	V	
t_{rr}	Reverse Recovery Time	$V_{GS} = 0 \text{ V}$, $I_S = 28 \text{ A}$, $dI_F / dt = 100 \text{ A}/\mu\text{s}$	--	100	--	ns	
Q_{rr}	Reverse Recovery Charge		--	0.4	--	μC	

NOTES:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L = 0.46\text{mH}$, $I_{AS} = 33\text{A}$, $V_{DD} = 25\text{V}$, $R_G = 25 \Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 28\text{A}$, $di/dt \leq 300\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$
5. Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1. On-Region Characteristics

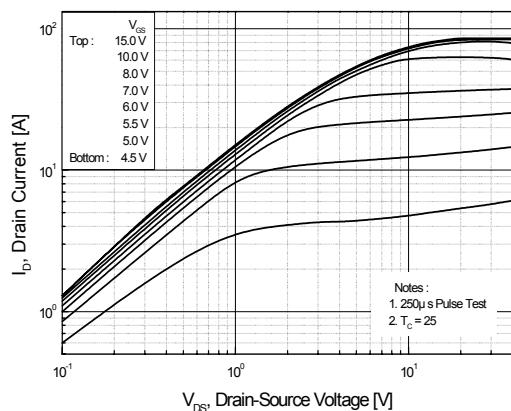


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

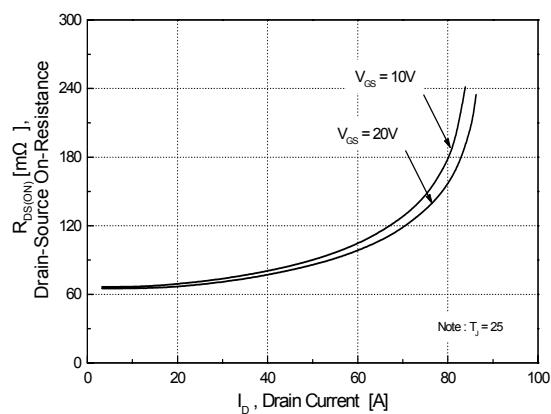


Figure 5. Capacitance Characteristics

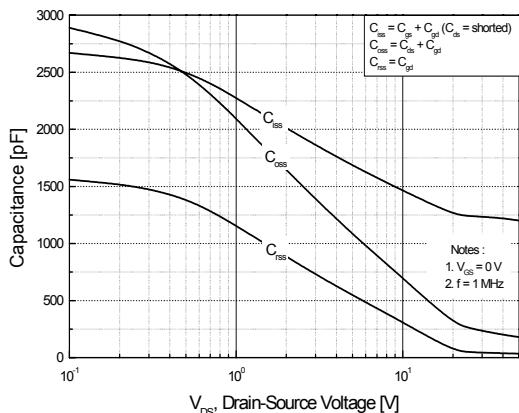


Figure 2. Transfer Characteristics

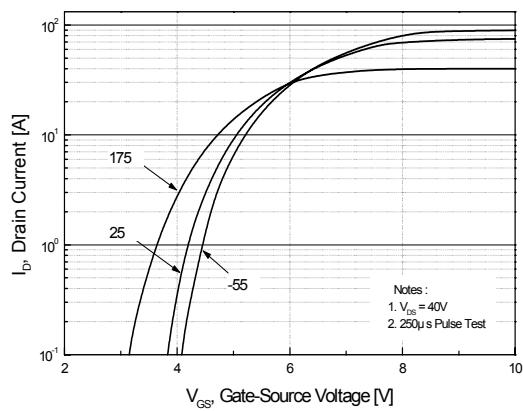


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

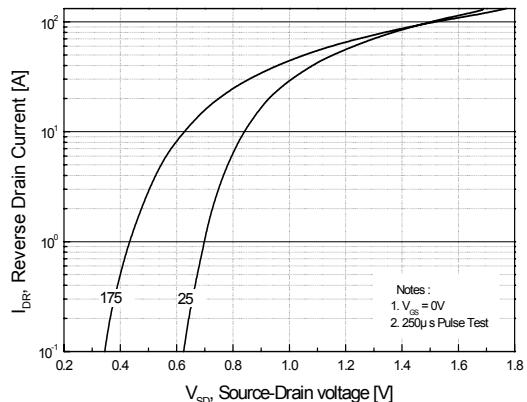


Figure 6. Gate Charge Characteristics

