



FQB10N20 / FQI10N20

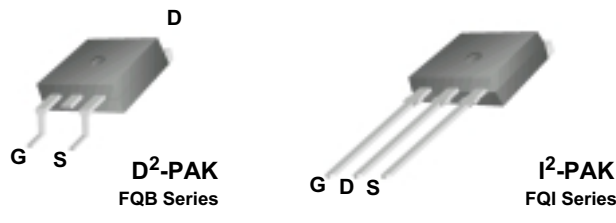
200V N-Channel MOSFET

General 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 efficiency switching DC/DC converters, switch mode power supply, DC-AC converters for uninterrupted power supply, motor control.

Features

- 10A, 200V, $R_{DS(on)} = 0.36\Omega @ V_{GS} = 10V$
- Low gate charge (typical 13.5 nC)
- Low Crss (typical 13 pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter	FQB10N20 / FQI10N20	Units
V _{DSS}	Drain-Source Voltage	200	V
I _D	Drain Current - Continuous (T _C = 25°C)	10	A
	- Continuous (T _C = 100°C)	6.3	A
I _{DM}	Drain Current - Pulsed (Note 1)	40	A
V _{GSS}	Gate-Source Voltage	± 30	V
E _{AS}	Single Pulsed Avalanche Energy (Note 2)	180	mJ
I _{AR}	Avalanche Current (Note 1)	10	A
E _{AR}	Repetitive Avalanche Energy (Note 1)	8.7	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.5	V/ns
P _D	Power Dissipation (T _A = 25°C) *	3.13	W
	Power Dissipation (T _C = 25°C)	87	W
	- Derate above 25°C	0.70	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +150	°C
T _L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	°C

Thermal Characteristics

Symbol	Parameter	Typ	Max	Units
R _{θJC}	Thermal Resistance, Junction-to-Case	--	1.44	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient *	--	40	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	--	62.5	°C/W

* When mounted on the minimum pad size recommended (PCB Mount)

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	200	--	--	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C	--	0.19	--	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 200 V, V _{GS} = 0 V	--	--	1	μA
		V _{DS} = 160 V, T _C = 125°C	--	--	10	μA
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 Characteristics

V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 μA	3.0	--	5.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 5 A	--	0.28	0.36	Ω
g _{FS}	Forward Transconductance	V _{DS} = 40 V, I _D = 5 A (Note 4)	--	6.7	--	S

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz	--	510	670	pF
C _{oss}	Output Capacitance		--	95	130	pF
C _{rss}	Reverse Transfer Capacitance		--	13	17	pF

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	V _{DD} = 100 V, I _D = 10 A, R _G = 25 Ω (Note 4, 5)	--	13	40	ns
t _r	Turn-On Rise Time		--	90	190	ns
t _{d(off)}	Turn-Off Delay Time		--	26	70	ns
t _f	Turn-Off Fall Time		--	50	110	ns
Q _g	Total Gate Charge		V _{DS} = 160 V, I _D = 10 A, V _{GS} = 10 V (Note 4, 5)	--	13.5	18
Q _{gs}	Gate-Source Charge	--		3.8	--	nC
Q _{gd}	Gate-Drain Charge	--		5.5	--	nC

Drain-Source Diode Characteristics and Maximum Ratings

I _S	Maximum Continuous Drain-Source Diode Forward Current	--	--	10	A	
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	40	A	
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 10 A	--	--	1.5	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 10 A, di _F / dt = 100 A/μs (Note 4)	--	130	--	ns
Q _{rr}	Reverse Recovery Charge		--	0.6	--	μC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 2.7mH, I_{AS} = 10A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
3. I_{SD} ≤ 10A, di/dt ≤ 300A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

Typical Characteristics

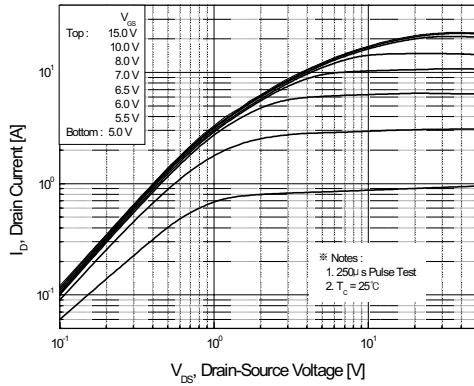


Figure 1. On-Region Characteristics

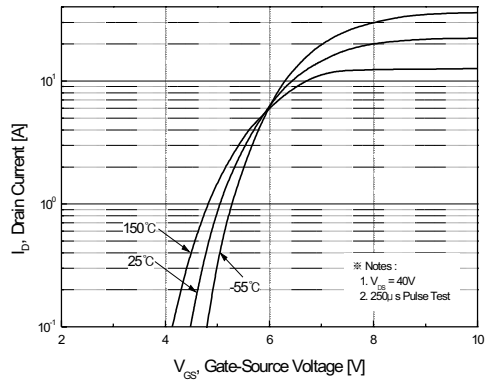


Figure 2. Transfer Characteristics

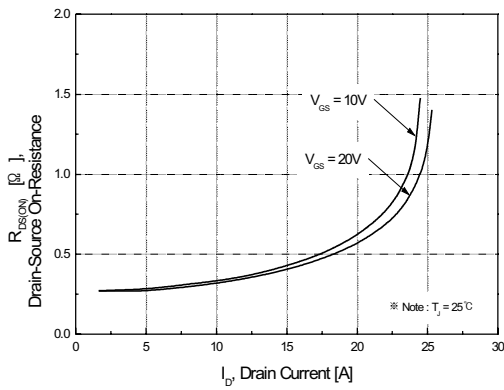


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

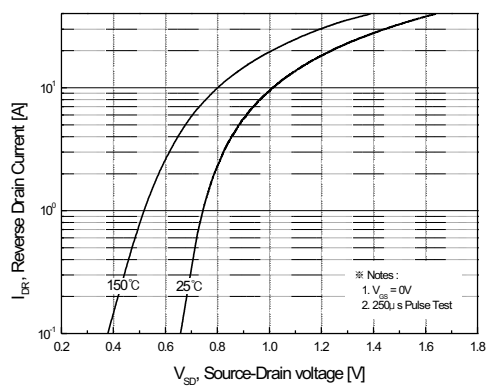


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

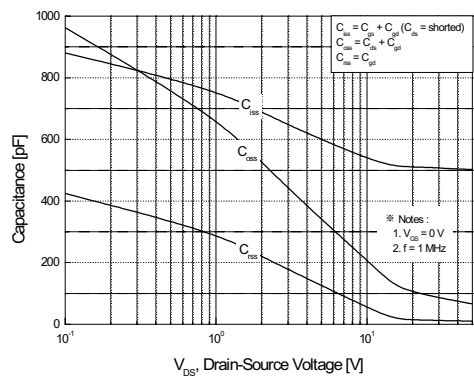


Figure 5. Capacitance Characteristics

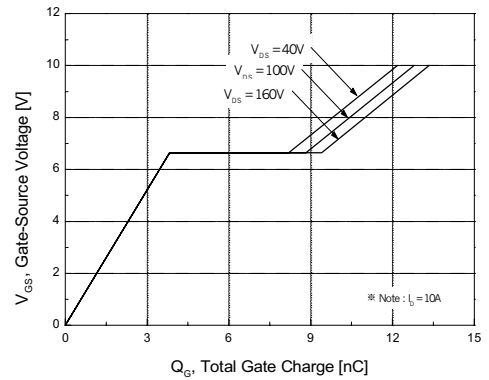


Figure 6. Gate Charge Characteristics