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FQD19N10

N-Channel QFET® MOSFET

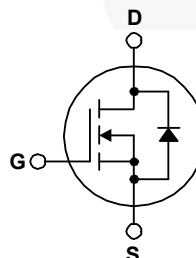
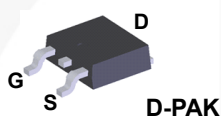
100 V, 15.6 A, 100 mΩ

Description

This N-Channel enhancement mode power MOSFET is produced using Fairchild 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, audio amplifier, DC motor control, and variable switching power applications.

Features

- 15.6 A, 100 V, $R_{DS(on)} = 100 \text{ m}\Omega$ (Max.) @ $V_{GS} = 10 \text{ V}$, $I_D = 7.8 \text{ A}$
- Low Gate Charge (Typ. 19 nC)
- Low C_{rss} (Typ. 32 pF)
- 100% Avalanche Tested



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter		FQD19N10TM	Unit
V _{DSS}	Drain-Source Voltage		100	V
I _D	Drain Current	- Continuous (T _C = 25°C)	15.6	A
		- Continuous (T _C = 100°C)	9.8	A
I _{DM}	Drain Current	- Pulsed (Note 1)	62.4	A
V _{GSS}	Gate-Source Voltage		± 25	V
E _{AS}	Single Pulsed Avalanche Energy (Note 2)		220	mJ
I _{AR}	Avalanche Current (Note 1)		15.6	A
E _{AR}	Repetitive Avalanche Energy (Note 1)		5.0	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		6.0	V/ns
P _D	Power Dissipation (T _A = 25°C) *		2.5	W
	Power Dissipation (T _C = 25°C)		50	W
	- Derate above 25°C		0.4	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +150	°C
T _L	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds		300	°C

Thermal Characteristics

Symbol	Parameter	FQD19N10TM	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	2.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Minimum Pad of 2-oz Copper), Max.	110	
	Thermal Resistance, Junction to Ambient (*1 in ² Pad of 2-oz Copper), Max.	50	

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FQD19N10TM	FQD19N10	D-PAK	Tape and Reel	330 mm	16 mm	2500 units

Electrical Characteristics T_C = 25°C unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	100	--	--	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C	--	0.1	--	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 100 V, V _{GS} = 0 V	--	--	1	μA
		V _{DS} = 80 V, T _C = 125°C	--	--	10	μA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 25 V, V _{DS} = 0 V	--	--	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -25 V, V _{DS} = 0 V	--	--	-100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 μA	2.0	--	4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 7.8 A	--	0.078	0.1	Ω
g _{FS}	Forward Transconductance	V _{DS} = 40 V, I _D = 7.8 A	--	11	--	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz	--	600	780	pF
C _{oss}	Output Capacitance		--	165	215	pF
C _{rss}	Reverse Transfer Capacitance		--	32	40	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = 50 V, I _D = 19 A, R _G = 25 Ω (Note 4)	--	7.5	25	ns
t _r	Turn-On Rise Time		--	150	310	ns
t _{d(off)}	Turn-Off Delay Time		--	20	50	ns
t _f	Turn-Off Fall Time		--	65	140	ns
Q _g	Total Gate Charge	V _{DS} = 80 V, I _D = 19 A, V _{GS} = 10 V (Note 4)	--	19	25	nC
Q _{gs}	Gate-Source Charge		--	3.9	--	nC
Q _{gd}	Gate-Drain Charge		--	9.0	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	15.6	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	62.4	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 15.6 A	--	--	1.5	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 19 A,	--	78	--	ns
Q _{rr}	Reverse Recovery Charge	dI _F / dt = 100 A/μs	--	200	--	nC

Notes:

1. Repetitive rating : pulse-width limited by maximum junction temperature.
2. L = 1.35 mH, I_{AS} = 15.6 A, V_{DD} = 25 V, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 19 A, di/dt ≤ 300 A/μs, V_{DD} ≤ BV_{DSS}, starting T_J = 25°C.
4. Essentially independent of operating temperature.

Typical Characteristics

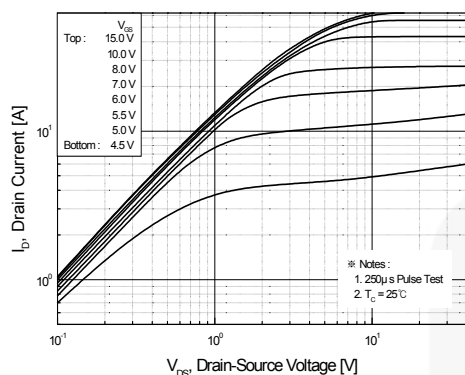


Figure 1. On-Region Characteristics

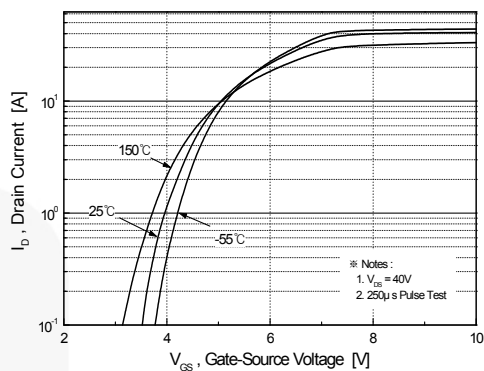


Figure 2. Transfer Characteristics

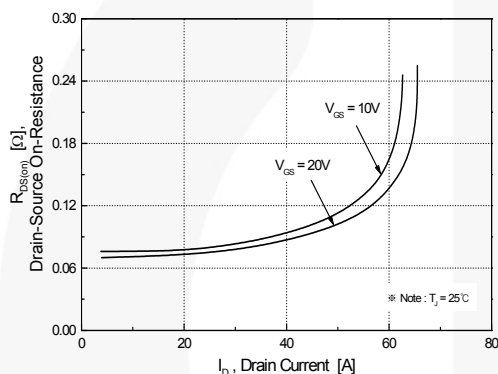


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

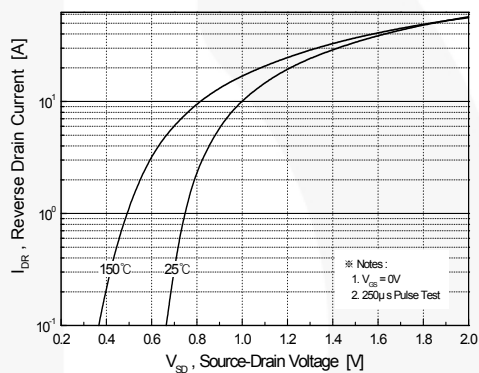


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

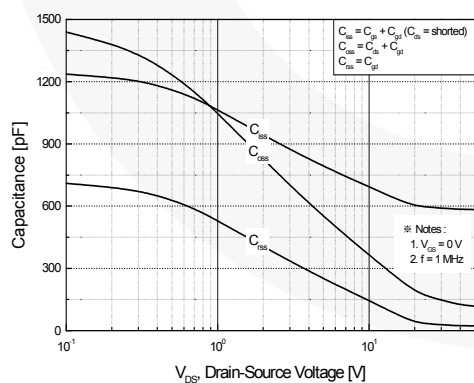


Figure 5. Capacitance Characteristics

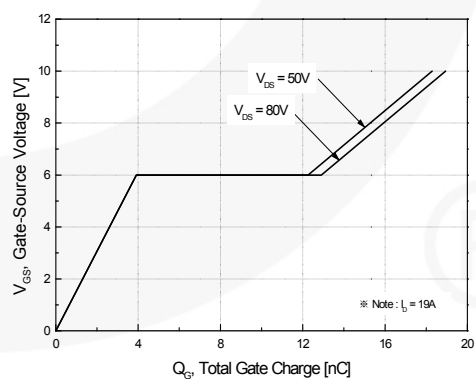


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

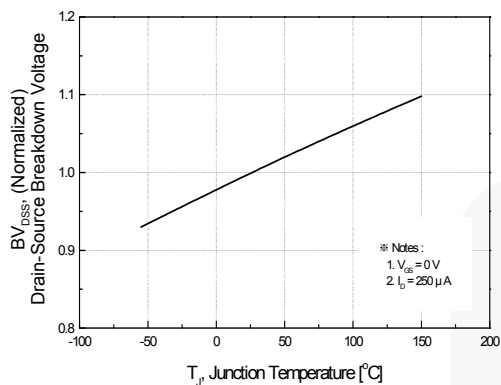


Figure 7. Breakdown Voltage Variation vs. Temperature

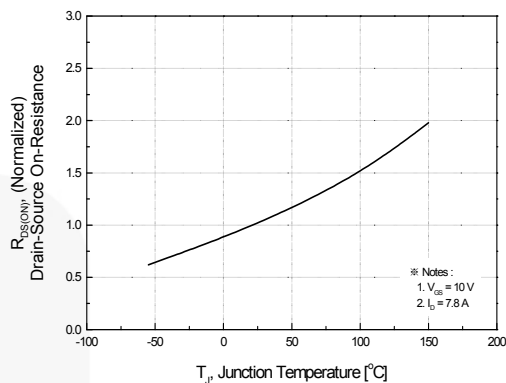


Figure 8. On-Resistance Variation vs. Temperature

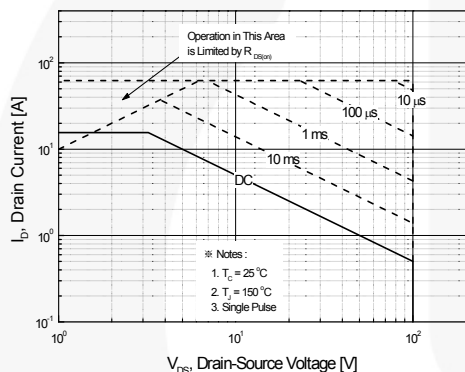


Figure 9. Maximum Safe Operating Area

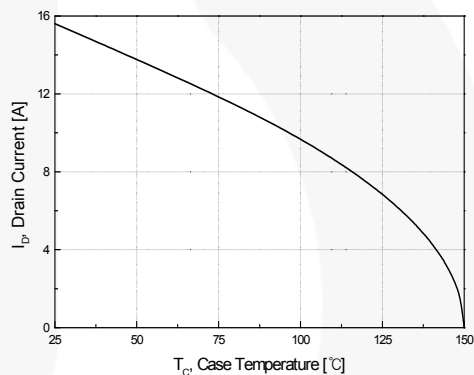


Figure 10. Maximum Drain Current vs. Case Temperature

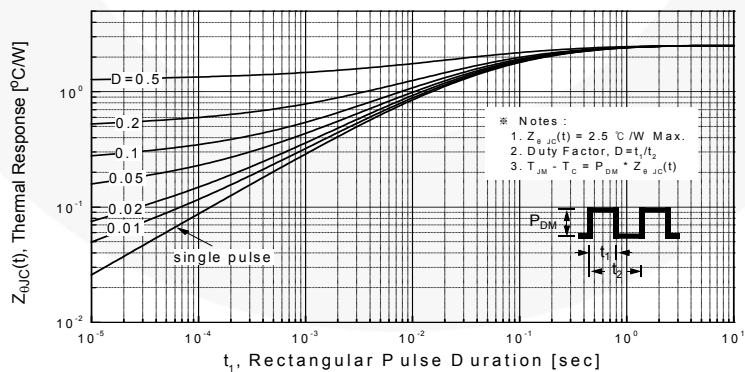


Figure 11. Transient Thermal Response Curve



Figure 12. Gate Charge Test Circuit & Waveform

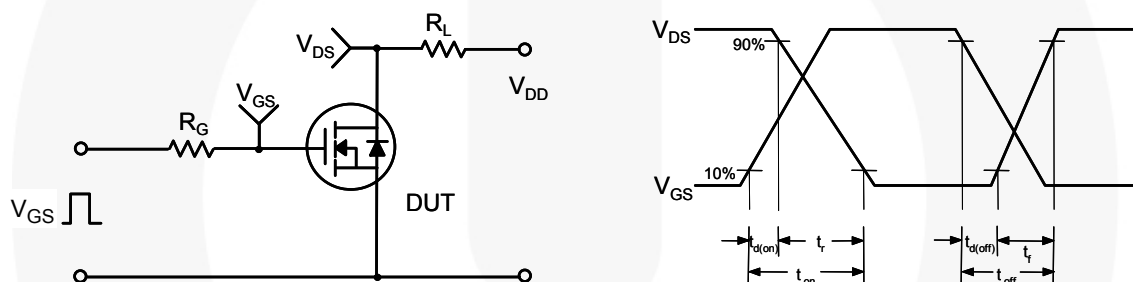


Figure 13. Resistive Switching Test Circuit & Waveforms

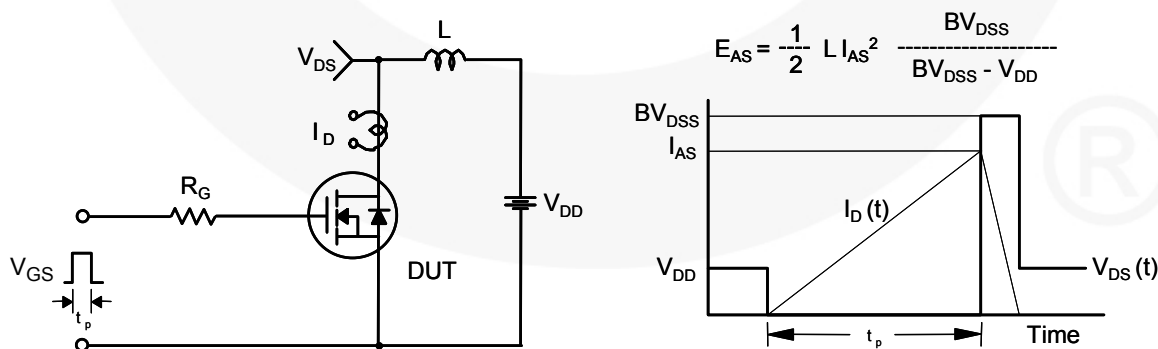


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

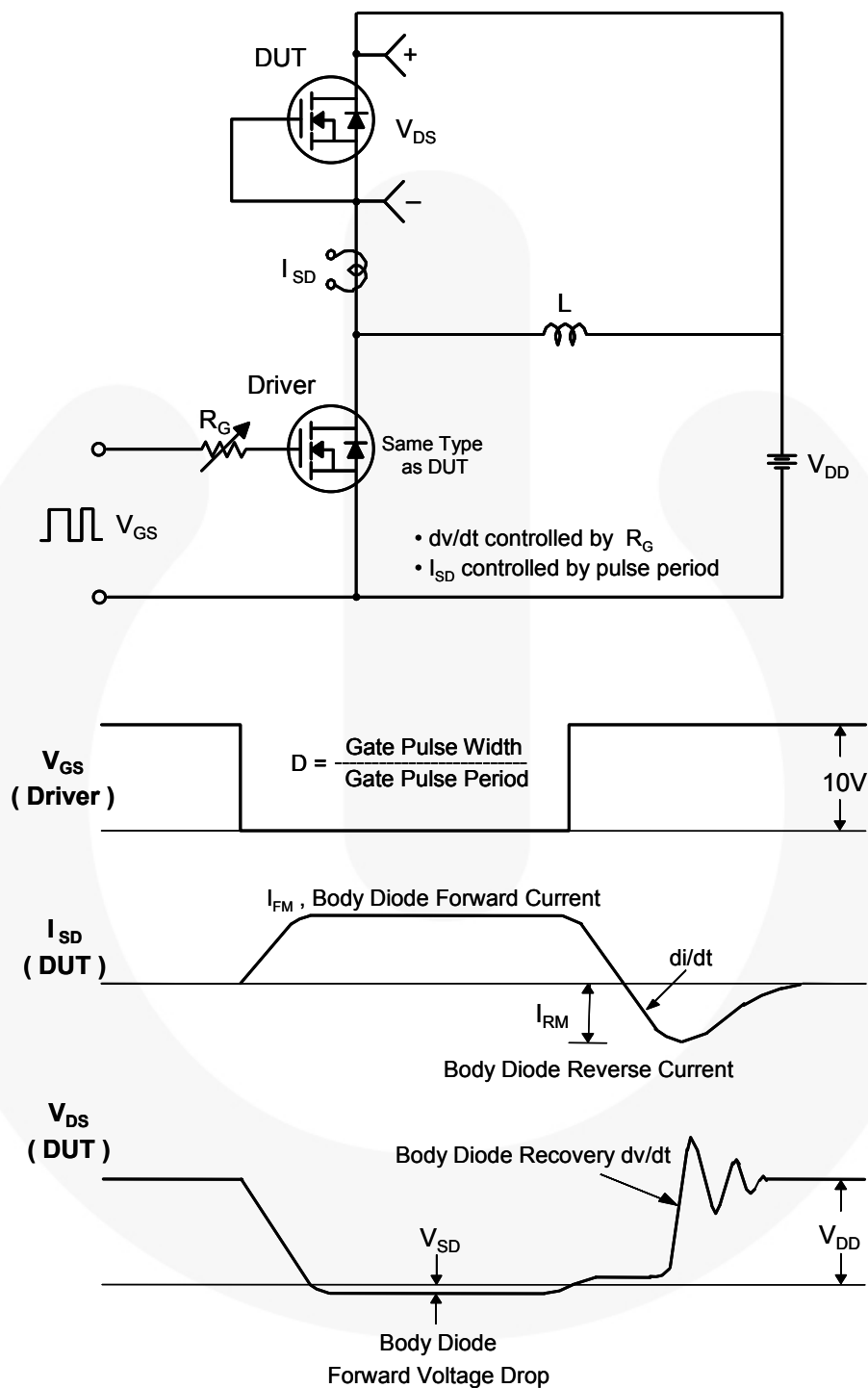


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

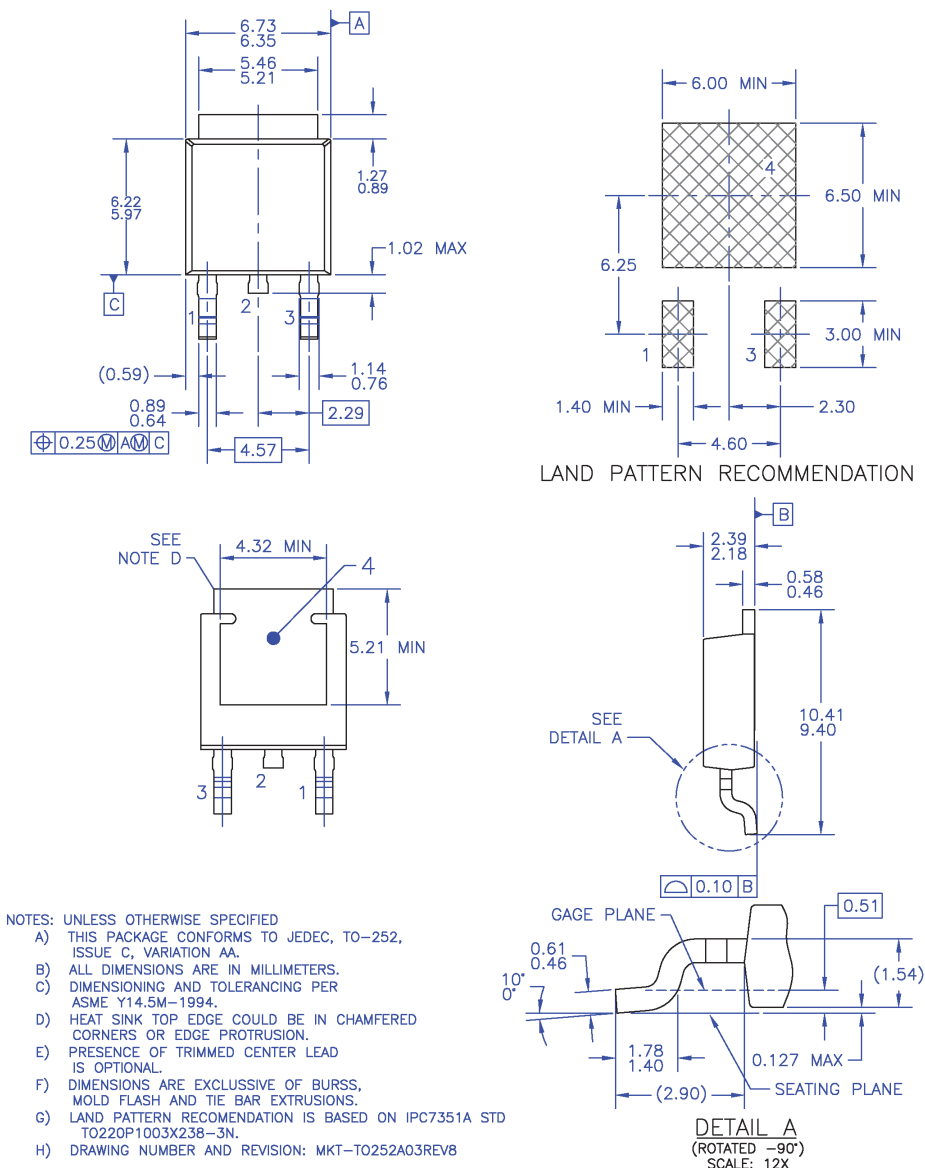


Figure 16. TO252 (D-PAK), Molded, 3-Lead, Option AA&AB

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