



FQD13N10

N-Channel QFET® MOSFET

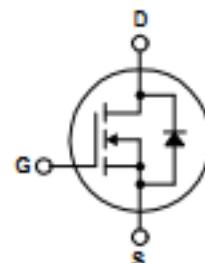
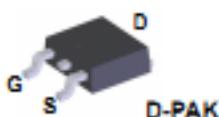
100 V, 10 A, 180 mΩ

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

- 10 A, 100 V, $R_{DS(on)} = 180 \text{ m}\Omega$ (Max.) @ $V_{GS} = 10 \text{ V}$, $I_D = 6 \text{ A}$
- Low Gate Charge (Typ. 12 nC)
- Low C_{RSS} (Typ. 20 pF)
- 100% Avalanche Tested



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

Symbol	Parameter	FQD13N10TM	Unit
V_{DSS}	Drain-Source Voltage	100	V
I_D	Drain Current • Continuous ($T_C = 25^\circ\text{C}$)	10	A
	• Continuous ($T_C = 100^\circ\text{C}$)	8.3	A
I_{DM}	Drain Current • Pulsed	(Note 1)	A
V_{GSS}	Gate-Source Voltage	±26	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 ($T_A = 25^\circ\text{C}$) *	2.5	W
	Power Dissipation ($T_C = 25^\circ\text{C}$)	40	W
	• Derate above 25°C	0.32	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum lead temperature for soldering, .1/8" from case for 5 seconds	300	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	FQD13N10TM	Unit
R_{JC}	Thermal Resistance, Junction to Case, Max.	3.13	$^\circ\text{C/W}$
R_{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
FQD13N10TM	FQD13N10	DPAK	Tape and Reel	330 mm	18 mm	2500 units

Electrical Characteristics

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{\text{GS}} = 0 \text{ V}, I_D = 250 \mu\text{A}$	100	..	..	V
$\Delta \text{BV}_{\text{DSS}} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, Referenced to 25°C	..	0.09	..	$^\circ\text{C}$
$I_{\text{DS}(\text{S})}$	Zero Gate Voltage Drain Current	$V_{\text{DS}} = 100 \text{ V}, V_{\text{GS}} = 0 \text{ V}$	..	..	1	μA
		$V_{\text{DS}} = 80 \text{ V}, T_J = 125^\circ\text{C}$	..	..	10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{\text{GS}} = 25 \text{ V}, V_{\text{DS}} = 0 \text{ V}$	..	..	100	nA
I_{GSR}	Gate-Body Leakage Current, Reverse	$V_{\text{GS}} = -25 \text{ V}, V_{\text{DS}} = 0 \text{ V}$	..	..	-100	nA

On Characteristics

$V_{\text{GS}(\text{th})}$	Gate Threshold Voltage	$V_{\text{DS}} = V_{\text{GS}}, I_D = 250 \mu\text{A}$	2.0	..	4.0	V
$R_{\text{DS(on)}}$	Static Drain-Source On-Resistance	$V_{\text{GS}} = 10 \text{ V}, I_D = 5.0 \text{ A}$	..	0.142	0.18	Ω
G_{FS}	Forward Transconductance	$V_{\text{DS}} = 40 \text{ V}, I_D = 5.0 \text{ A}$	..	6.3	..	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{\text{DS}} = 25 \text{ V}, V_{\text{GS}} = 0 \text{ V}, f = 1.0 \text{ MHz}$	..	345	450	pF
C_{oss}	Output Capacitance		..	100	130	pF
C_{rss}	Reverse Transfer Capacitance		..	20	25	pF

Switching Characteristics

$t_{\text{d(on)}}$	Turn-On Delay Time	$V_{\text{DD}} = 50 \text{ V}, I_D = 12.8 \text{ A}, R_G = 25 \Omega$	..	5	20	ns
t_r	Turn-On Rise Time		..	55	120	ns
$t_{\text{d(off)}}$	Turn-Off Delay Time		..	20	50	ns
t_f	Turn-Off Fall Time		..	25	80	ns
Q_g	Total Gate Charge	$V_{\text{DS}} = 80 \text{ V}, I_D = 12.8 \text{ A}, V_{\text{GS}} = 10 \text{ V}$	..	12	18	nC
Q_{gs}	Gate-Source Charge		..	2.5	..	nC
Q_{gd}	Gate-Drain Charge		..	6.1	..	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	$V_{\text{GS}} = 0 \text{ V}, I_S = 10 \text{ A}$	..	..	1.5	V
t_{rr}	Reverse Recovery Time	$V_{\text{GS}} = 0 \text{ V}, I_S = 12.8 \text{ A}, dI_F / dt = 100 \text{ A}/\mu\text{s}$	..	72	..	ns
Q_{rr}	Reverse Recovery Charge		..	0.17	..	μC

Notes:

1. Repetitive rating: pulse-width limited by maximum junction temperature.

2. $L = 1.43 \text{ mH}, I_{\text{GS}} = 10 \text{ A}, V_{\text{DD}} = 25 \text{ V}, R_G = 25 \Omega$, starting $T_J = 25^\circ\text{C}$.3. $I_{\text{GD}} \leq 12.8 \text{ A}, dI/dt \leq 300 \text{ A}/\mu\text{s}, V_{\text{DD}} \leq 8V_{\text{DSR}}$, starting $T_J = 25^\circ\text{C}$.

4. Essentially independent of operating temperature.