FDP047N10

N-Channel PowerTrench® MOSFET

100V, 164A, 4.7mΩ

Description

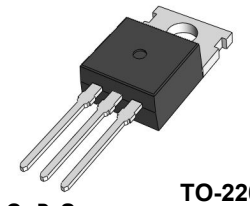
- $R_{DS(on)}$ = 3.9mΩ (Typ.) @ V_{GS} = 10V, I_D = 75A
- Fast switching speed
- Low gate charge
- High performance trench technology for extremely low $R_{DS(on)}$
- High power and current handing capability
- RoHS compliant

General Description

This N-Channel MOSFET is producedusing Fairchild Semiconductor's advance PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

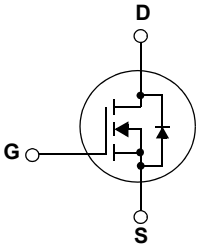
Application

- DC to DC converters / Synchronous Rectification



G D S

TO-220



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

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain to Source Voltage		100	V
V_{GSS}	Gate to Source Voltage		±20	V
I_D	Drain Current - Continuous (T_C = 25°C, Silicon Limited)		164*	A
	- Continuous (T_C = 100°C, Silicon Limited)		116*	A
	- Continuous (T_C = 25°C, Package Limited)		120	A
I_{DM}	Drain Current - Pulsed	(Note 1)	656*	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	1153	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	4.5	V/ns
P_D	Power Dissipation	(T_C = 25°C)	375	W
		- Derate above 25°C	2.5	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +175	°C
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds		300	°C

*Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 120A.

Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.4	°C/W
$R_{\theta CS}$	Thermal Resistance, Case to Sink Typ.	0.5	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62.5	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP047N10	FDP047N10	TO-220	-	-	50

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V, T_J = 25°C	100	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25°C	-	0.1	-	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 100V, V_{GS} = 0V	-	-	1	μA
		V_{DS} = 100V, V_{GS} = 0V, T_C = 150°C	-	-	500	
I_{GSS}	Gate to Body Leakage Current	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA	2.5	3.5	4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 75A	-	3.9	4.7	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 10V, I_D = 75A (Note 4)	-	170	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V f = 1MHz	-	11500	15265	pF
C_{oss}	Output Capacitance		-	1120	1500	pF
C_{rss}	Reverse Transfer Capacitance		-	455	680	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 50V, I_D = 75A V_{GS} = 10V, R_{GEN} = 25Ω (Note 4, 5)	-	174	358	ns
t_r	Turn-On Rise Time		-	386	782	ns
$t_{d(off)}$	Turn-Off Delay Time		-	344	698	ns
t_f	Turn-Off Fall Time		-	244	499	ns
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{DS} = 80V, I_D = 75A V_{GS} = 10V (Note 4, 5)	-	160	210	nC
Q_{gs}	Gate to Source Gate Charge		-	56	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	36	-	nC
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	164	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	656	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 75A	-	-	1.25	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_{SD} = 75A dI_F/dt = 100A/μs (Note 4)	-	88	-	ns
Q_{rr}	Reverse Recovery Charge		-	245	-	nC

Notes:
1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 0.41mH, I_{AS} = 75A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 75A, di/dt ≤ 200A/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

Typical Performance Characteristics

Figure 1. On-Region Characteristics

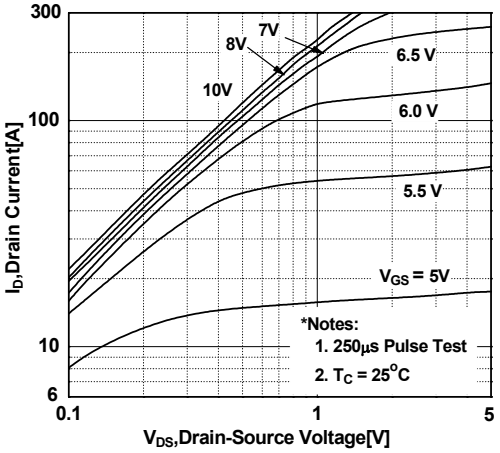


Figure 2. Transfer Characteristics

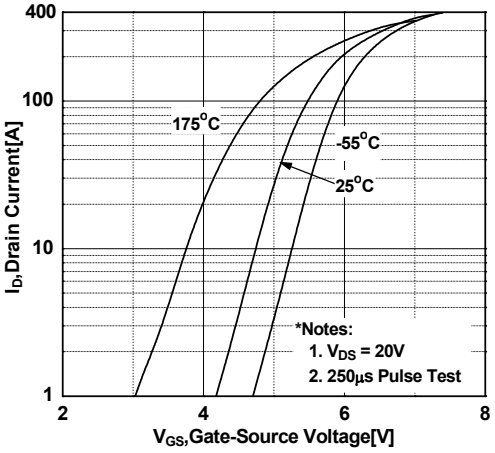


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

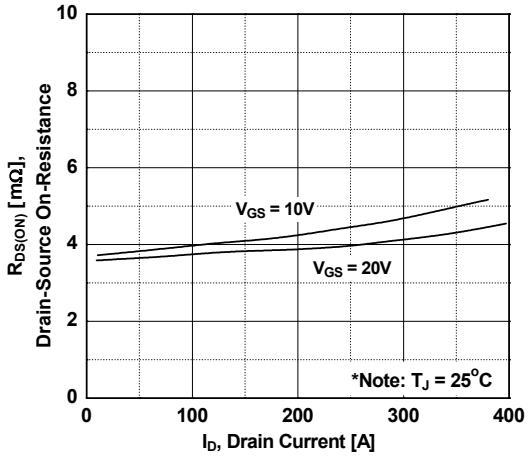


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

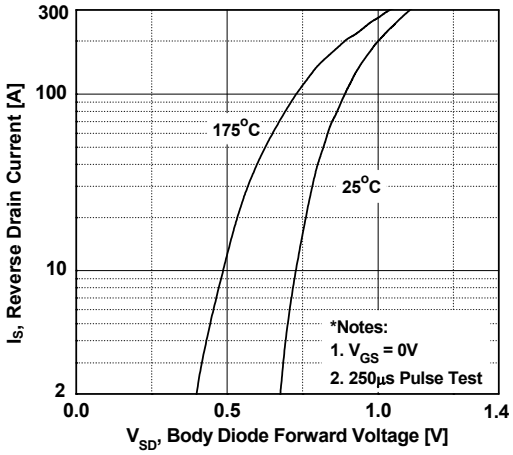


Figure 5. Capacitance Characteristics

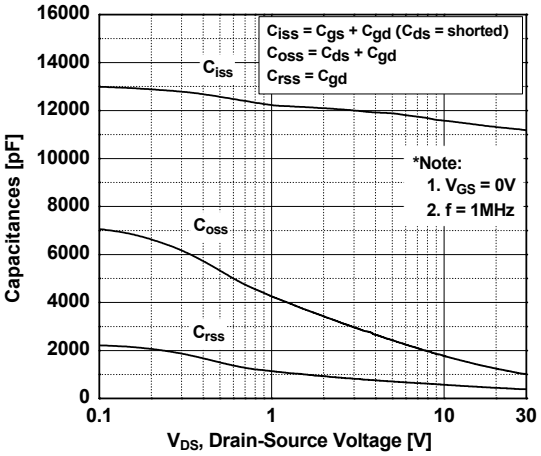


Figure 6. Gate Charge Characteristics