FDP030N06B_F102

N-Channel PowerTrench® MOSFET

60V, 195A, 3.1mΩ

Features

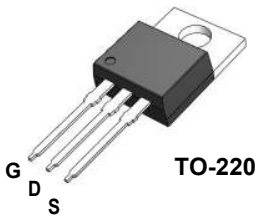
- $R_{DS(on)}$ = 2.67mΩ (Typ.) @ V_{GS} = 10V, I_D = 100A
- Low FOM $R_{DS(on)}$*Q_G
- Low reverse recovery charge, Q_{rr}
- Soft reverse recovery body diode
- Enables highly efficiency in synchronous rectification
- Fast Switching Speed
- 100% UIL Tested
- RoHS Compliant

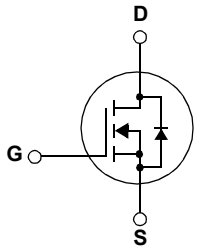
Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench® process that has been tailored to minimize the on-state resistance while maintaining superior switching performance.

Application

- Synchronous Rectification for ATX / Server / Telecom PSU
- Battery Protection Circuit
- DC motor drives and Uninterruptible Power Supplies





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

Symbol	Parameter		FDP030N06B_F102	Units
V_{DSS}	Drain to Source Voltage		60	V
V_{GSS}	Gate to Source Voltage		±20	V
I_D	Drain Current	- Continuous (T_C = 25°C, Silicon Limited)	195*	A
		- Continuous (T_C = 100°C, Silicon Limited)	138*	
		- Continuous (T_C = 25°C, Package Limited)	120	
I_{DM}	Drain Current	- Pulsed (Note 1)	780	A
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	600	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	6.0	V/ns
P_D	Power Dissipation	(T_C = 25°C)	205	W
		- Derate above 25°C	1.37	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

* Package limitation current is 120A.

Thermal Characteristics

Symbol	Parameter	FDP030N06B_F102	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max	0.73	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max	62.5	

Package Marking and Ordering Information

Device Marking	Device	Package	Description	Quantity
FDP030N06B	FDP030N06B_F102	TO-220	F102: Trimmed Leads	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	60	-	-	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25°C	-	0.03	-	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 48V, V_{GS} = 0V	-	-	1	μA
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	-	4	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 100A	-	2.67	3.1	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 10V, I_D = 100A	-	206	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 30V, V_{GS} = 0V f = 1MHz	-	6035	8030	pF
C_{oss}	Output Capacitance		-	1685	2240	pF
C_{rss}	Reverse Transfer Capacitance		-	55	-	pF
$C_{oss(er)}$	Energy Related Output Capacitance	V_{DS} = 30V, V_{GS} = 0V	-	2619	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10V	V_{DS} = 30V, I_D = 100A V_{GS} = 10V (Note 4)	-	76	99	nC
Q_{gs}	Gate to Source Gate Charge		-	29	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	12	-	nC
$V_{plateau}$	Gate Plateau Volatge		-	5.2	-	V
Q_{oss}	Output Charge	V_{DS} = 30V, V_{GS} = 0V	-	92.4	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 30V, I_D = 100A V_{GS} = 10V, R_{GEN} = 4.7Ω (Note 4)	-	32	74	ns
t_r	Turn-On Rise Time		-	33	76	ns
$t_{d(off)}$	Turn-Off Delay Time		-	56	122	ns
t_f	Turn-Off Fall Time		-	23	56	ns
ESR	Equivalent Series Resistance (G-S)	Drain Open, f = 1MHz	-	2.0	-	Ω
Drain-Source Diode Characteristics						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	195*	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	780	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 100A	-	-	1.25	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_{SD} = 100A dI_F/dt = 100A/μs	-	71	-	ns
Q_{rr}	Reverse Recovery Charge		-	78	-	nC

Notes:
1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 3mH, I_{AS} = 20A, Starting T_J = 25°C
3. I_{SD} ≤ 100A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Figure 1. On-Region Characteristics

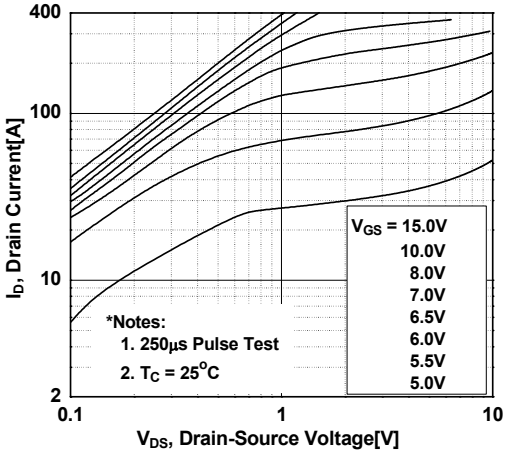


Figure 2. Transfer Characteristics

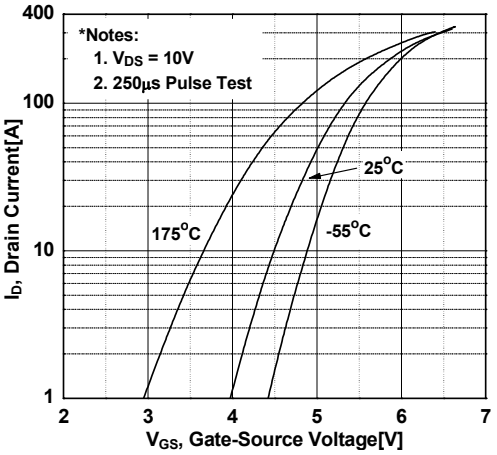


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

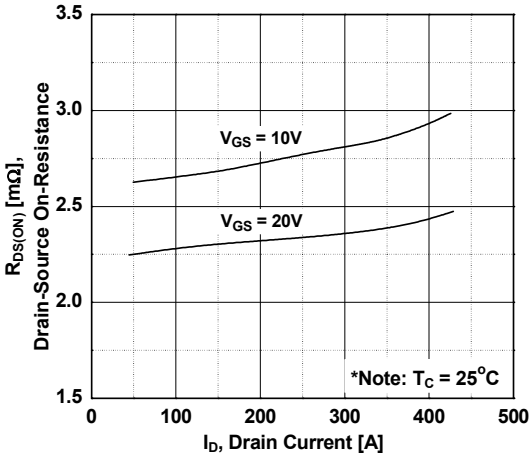


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

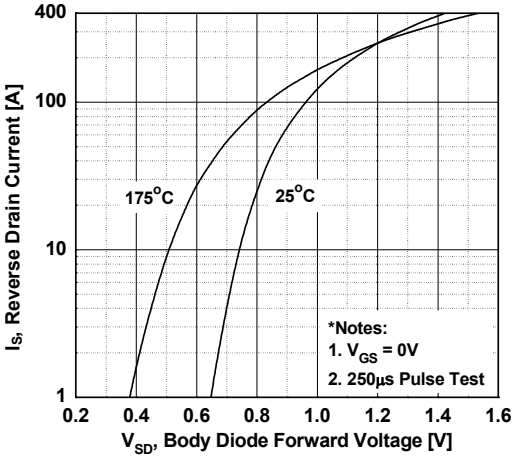


Figure 5. Capacitance Characteristics

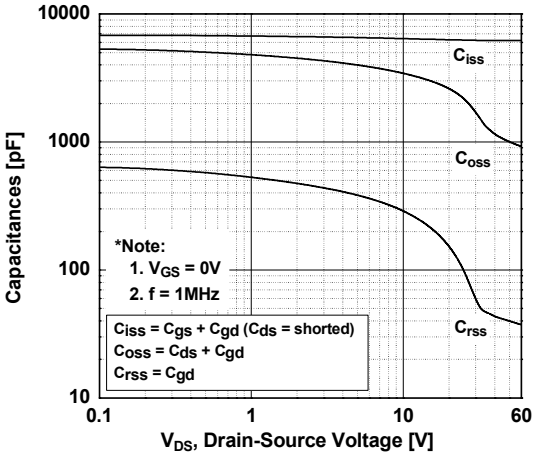


Figure 6. Gate Charge Characteristics