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November 2013

FDP030N06

N-Channel PowerTrench[®] MOSFET 60 V, 193 A, 3.2 m Ω

Features

- $R_{DS(on)}$ = 2.6 m Ω (Typ.) @ V_{GS} = 10 V, I_D = 75 A
- · Fast Switching Speed
- · Low Gate Charge
- High Performance Trench Technology for Extremely Low $R_{DS(on)}$
- · High Power and Current Handling Capability
- RoHS Compliant

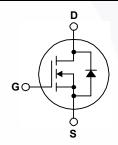
Description

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.

Applications

- Synchronous Rectification for ATX / Server / Telecom PSU
- · Battery Protection Circuit
- · Motor Drives and Uninterruptible Power Supplies
- · Renewable system





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

Symbol		FDP030N06	Unit	
V _{DSS}	Drain to Source Voltage		60	V
V _{GSS}	Gate to Source Voltage		±20	V
		- Continuous (T _C = 25°C, Silicon Limited)		
I _D	Drain Current	- Continuous (T _C = 100°C, Silicon Limited)	136	Α
	- Continuous (T _C = 25°C, Package Limited)		120	
I _{DM}	Drain Current	- Pulsed (Note 1)	772	Α
E _{AS}	Single Pulsed Avalanche Energy (Note 2)		1434	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	6.0	V/ns
D	Dower Dissination	$(T_C = 25^{\circ}C)$	231	W
Power Dissipation		- Derate above 25°C	1.54	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +175	°C
T _L	Maximum Lead Temperature	for Soldering, 1/8" from Case for 5 Seconds	300	οС

Thermal Characteristics

Symbol	Parameter FDP030N06		Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.65	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	- C/VV

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FDP030N06	FDP030N06	TO-220	Tube	N/A	N/A	50 units

Electrical Characteristics $T_C = 25^{\circ}C$ unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
Off Charac	eteristics					
BV _{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{V}, T_C = 25^{\circ}\text{C}$	60	-	-	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 1 mA, Referenced to 25°C	-	0.05	-	V/°C
1	Zero Gate Voltage Drain Current	$V_{DS} = 48 \text{ V}, V_{GS} = 0 \text{ V}$	-	-	1	μА
IDSS	Zero Gate Voltage Drain Current	$V_{DS} = 48 \text{ V}, T_{C} = 150^{\circ}\text{C}$	-	-	500	μΑ
I_{GSS}	Gate to Body Leakage Current	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$	-	-	±100	nA

On Characteristics

V _{GS(th)}	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = 250 \mu\text{A}$	2.5	3.5	4.5	V
R _{DS(on)}	Static Drain to Source On Resistance	$V_{GS} = 10 \text{ V}, I_D = 75 \text{ A}$	-	2.6	3.2	mΩ
9 _{FS}	Forward Transconductance	V _{DS} = 10 V, I _D = 75 A	-	154	-	S

Dynamic Characteristics

C _{iss}	Input Capacitance	V 05 V V 0 V	-	7380	9815	pF
C _{oss}	Output Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz		1095	1455	pF
C _{rss}	Reverse Transfer Capacitance	1 - 1 1/11/12	-	415	625	pF
Q _{g(tot)}	Total Gate Charge at 10V	V _{DS} = 48 V, I _D = 75 A,	-	116	151	nC
Q _{gs}	Gate to Source Gate Charge	V _{GS} = 10 V	-	40	-	nC
Q _{gd}	Gate to Drain "Miller" Charge	(Note 4)	-	35	-	nC

Switching Characteristics

t _{d(on)}	Turn-On Delay Time		-	39	87	ns
t _r	Turn-On Rise Time	$V_{DD} = 30 \text{ V}, I_{D} = 75 \text{ A},$	-	178	366	ns
t _{d(off)}	Turn-Off Delay Time	V_{GS} = 10 V, R_G = 4.7 Ω	-	54	118	ns
t _f	Turn-Off Fall Time	(Note 4)	-	33	76	ns

Drain-Source Diode Characteristics

I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	193	Α
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		A -	-	772	Α
V_{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0 V, I _{SD} = 75 A	-	-	1.3	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _{SD} = 75 A,	-	46	-	ns
Q _{rr}	Reverse Recovery Charge	$dI_F/dt = 100 A/\mu s$	-	50	-	nC

Notes:

- 1. Repetitive rating: pulse-width limited by maximum junction temperature.
- 2. L = 0.51 mH, I_{AS} = 75 A, V_{DD} = 50 V, R_G = 25 Ω , starting T_J = 25°C.
- 3. $I_{SD} \le 75$ A, di/dt ≤ 450 A/ μ s, $V_{DD} \le BV_{DSS}$, starting $T_J = 25^{\circ}C$.
- 4. Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

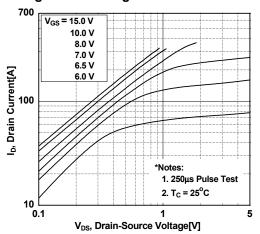


Figure 3. On-Resistance Variation vs.

Drain Current and Gate Voltage

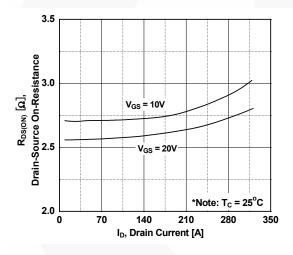


Figure 5. Capacitance Characteristics

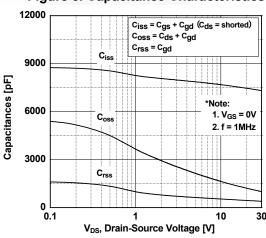


Figure 2. Transfer Characteristics

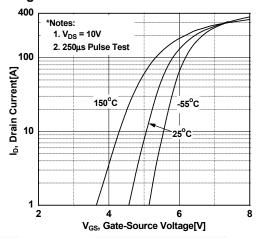


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

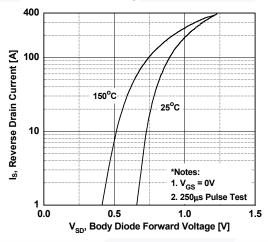
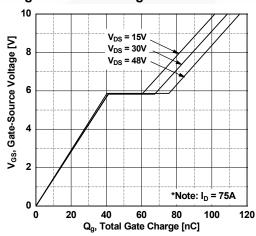


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

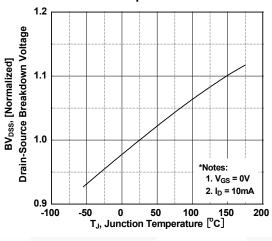


Figure 8. On-Resistance Variation vs. Temperature

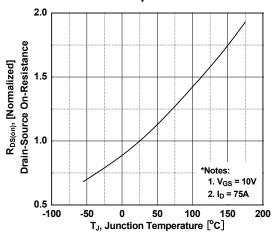


Figure 9. Maximum Safe Operating Area

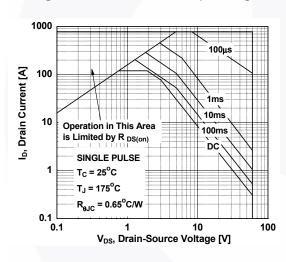


Figure 10. Maximum Drain Current vs. Case Temperature

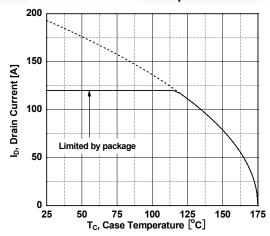
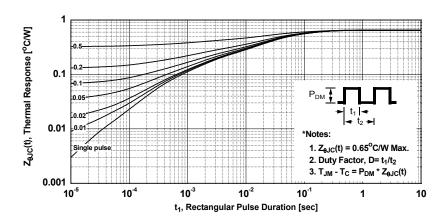


Figure 11. Transient Thermal Response Curve



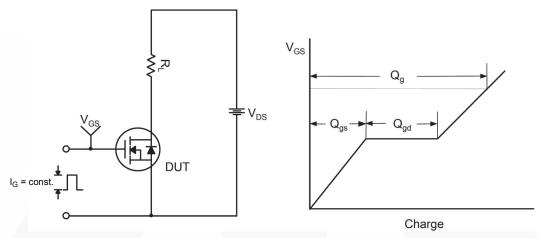


Figure 12. Gate Charge Test Circuit & Waveform

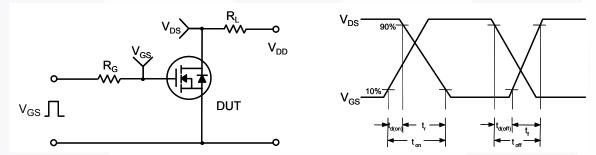


Figure 13. Resistive Switching Test Circuit & Waveforms

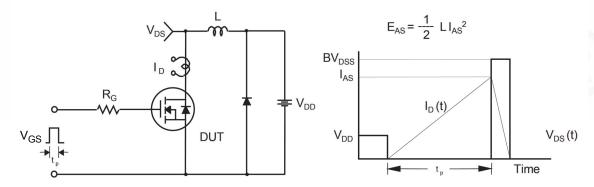


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

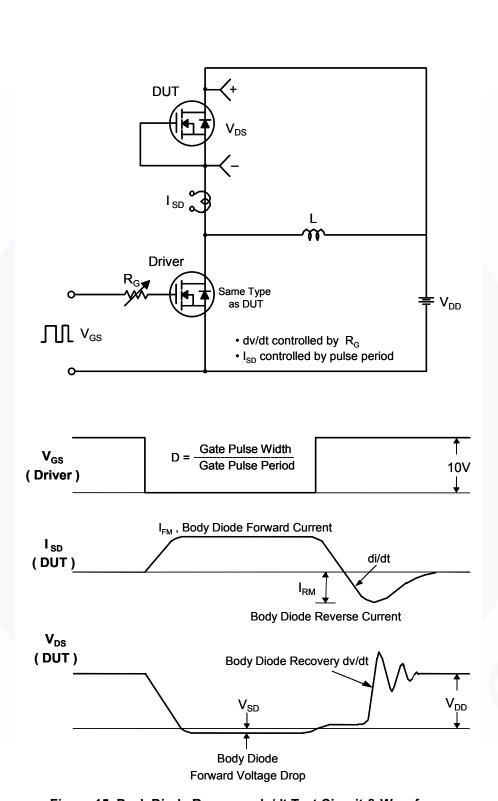


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

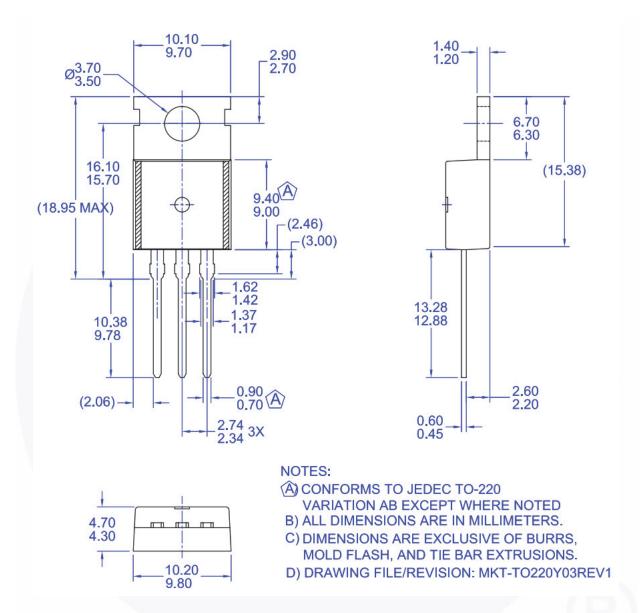


Figure 16. TO220, Molded, 3-Lead, Non Jedec Variation AB

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