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November 2013

FDP80N06

N-Channel UniFETTM MOSFET 60 V, 80 A, 10 m Ω

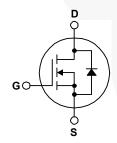
Features

- $R_{DS(on)} = 8.5 \text{ m}\Omega \text{ (Typ.)} @ V_{GS} = 10 \text{ V}, I_D = 40 \text{ A}$
- Low Gate Charge (Typ. 57nC)
- Low C_{rss} (Typ. 145pF)
- · Fast Switching
- · Improved dv/dt Capability
- · RoHS Compliant

Description

UniFET™ MOSFET is Fairchild Semiconductor's high voltage MOSFET family based on planar stripe and DMOS technology. This MOSFET is tailored to reduce on-state resistance, and to provide better switching performance and higher avalanche energy strength. This device family is suitable for switching power converter applications such as power factor correction (PFC), flat panel display (FPD) TV power, ATX and electronic lamp ballasts.





$\begin{tabular}{lll} \textbf{Absolute Maximum Ratings} & T_C = 25°C unless otherwise noted. \end{tabular}$

Symbol		Parameter		Ratings	Units
V _{DSS}	Drain to Source Voltage			60	V
V _{GSS}	Gate to Source Voltage			±20	V
	Drain Current	- Continuous (T _C = 25°C)		80	А
ID	Diamounem	- Continuous (T _C = 100°C)		65	^
I _{DM}	Drain Current	- Pulsed	(Note 1)	320	Α
E _{AS}	Single Pulsed Avalanche	Energy	(Note 2)	480	mJ
I _{AR}	Avalanche Current		(Note 1)	80	Α
E _{AR}	Repetitive Avalanche Ene	rgy	(Note 1)	17.6	mJ
dv/dt	Peak Diode Recovery dv/o	it	(Note 3)	4.5	V/ns
D	Dower Dissipation	(T _C = 25°C)		176	W
P_{D}	Power Dissipation	- Derate above 25°C		1.17	W/°C
T _J , T _{STG}	Operating and Storage Te	mperature Range		-55 to +175	°C
T _L	Maximum Lead Temperat 1/8" from Case for 5 Seco			300	°C

Thermal Characteristics

Symbol	Parameter Ratings			
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.85	°C/W	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max. 62.5		· C/VV	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP80N06	FDP80N06	TO-220	Tube	N/A	50 units

Electrical Characteristics TC = 25°C unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Units
Off Charac	eteristics					
BV _{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V, T_J = 25^{\circ} C$	60	-	-	V
ΔBV _{DSS} / ΔΤ _J	Breakdown Voltage Temperature Coefficient	I _D = 250μA, Referenced to 25°C	-	0.075	-	V/°C
1	Zero Gate Voltage Drain Current	$V_{DS} = 60V, V_{GS} = 0V$	-	-	1	μА
IDSS	Zelo Gale Voltage Dialii Curient	$V_{DS} = 48V, T_{C} = 150^{\circ}C$	-	-	10	μΑ
I _{GSS}	Gate to Body Leakage Current	$V_{GS} = \pm 20V$, $V_{DS} = 0V$	-	-	±100	nA

On Characteristics

V _{GS(th)}	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = 250 \mu A$	2.0		4.0	V
R _{DS(on)}	Static Drain to Source On Resistance	$V_{GS} = 10V, I_{D} = 40A$	-	8.5	10	$m\Omega$
9 _{FS}	Forward Transconductance	$V_{DS} = 25V, I_{D} = 40A$	-	67	-	S

Dynamic Characteristics

C _{iss}	Input Capacitance	V 25V V 2V	-	2450	3190	pF
C _{oss}	Output Capacitance	$V_{DS} = 25V, V_{GS} = 0V$ f = 1MHz	-	910	1190	pF
C _{rss}	Reverse Transfer Capacitance	1 - 1101112	\ -	145	190	pF

Switching Characteristics

t _{d(on)}	Turn-On Delay Time			- \	32	75	ns
t _r	Turn-On Rise Time	$V_{DD} = 30V, I_{D} = 80A$		-	259	528	ns
t _{d(off)}	Turn-Off Delay Time	$R_G = 25\Omega$		-	136	282	ns
t _f	Turn-Off Fall Time		(Note 4)	-	113	236	ns
Q _{g(tot)}	Total Gate Charge at 10V	V _{DS} = 48V, I _D = 80A		-	57	74	nC
Q _{gs}	Gate to Source Gate Charge	V _{GS} = 10V		-	15	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		(Note 4)	- /	24	-	nC

Drain-Source Diode Characteristics

I_S	Maximum Continuous Drain to Source Dioc	Maximum Continuous Drain to Source Diode Forward Current		-	80	Α
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	320	Α
V_{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _{SD} = 80A	-	-	1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0V, I _{SD} = 80A	-	64	_	ns
Q _{rr}	Reverse Recovery Charge	$dI_F/dt = 100A/\mu s$	-	127	-	nC

- **Notes:**1: Repetitive Rating: Pulse width limited by maximum junction temperature.
 2: L = 0.15mH, $I_{AS} = 80A$, $V_{DD} = 50V$, $R_C = 25\Omega$, Starting $T_J = 25^{\circ}C$.
 3: $I_{SD} \le 80A$, $di/dt \le 200A/\mu s$, $V_{DD} \le BV_{DSS}$, Starting $T_J = 25^{\circ}C$.
 4: Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

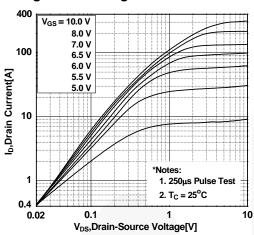


Figure 3. On-Resistance Variation vs.

Drain Current and Gate Voltage

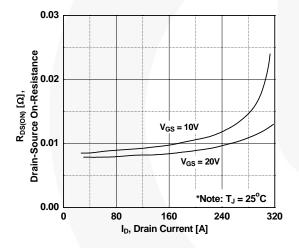


Figure 5. Capacitance Characteristics

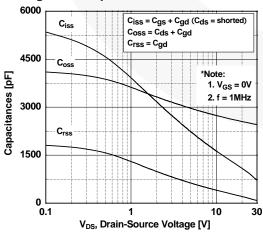


Figure 2. Transfer Characteristics

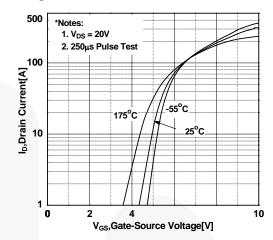


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

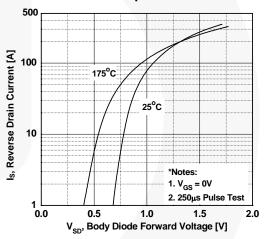
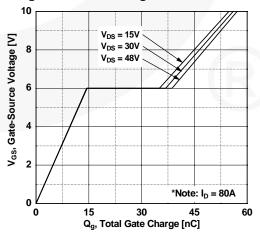


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

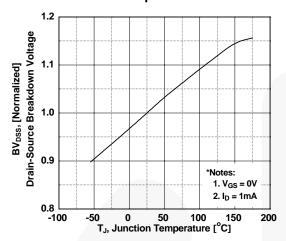


Figure 9. Maximum Safe Operating Area

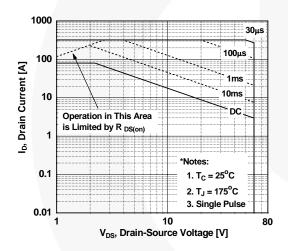


Figure 8. On-Resistance Variation vs. Temperature

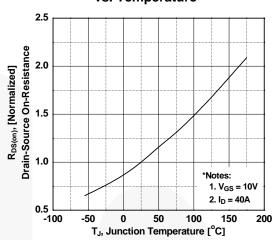


Figure 10. Maximum Drain Current vs. Case Temperature

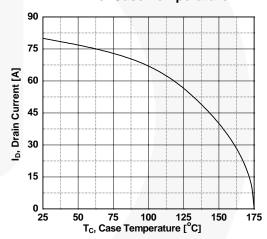


Figure 11. Transient Thermal Response Curve

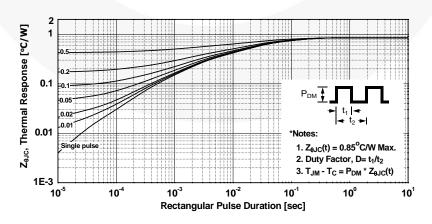


Figure 12. Gate Charge Test Circuit & Waveform

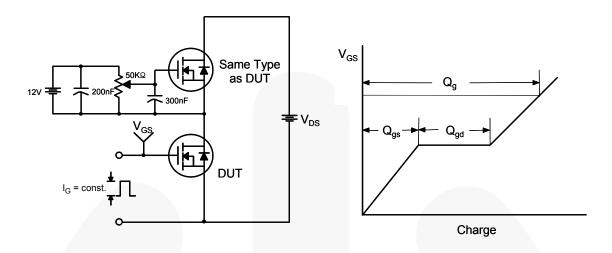


Figure 13. Resistive Switching Test Circuit & Waveforms

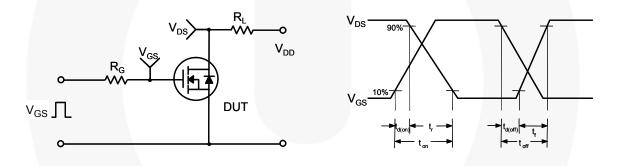
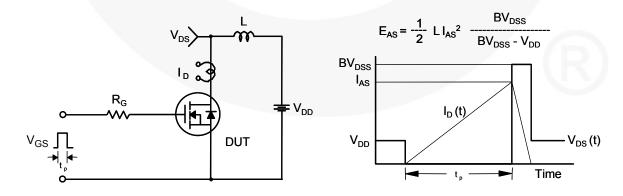


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms



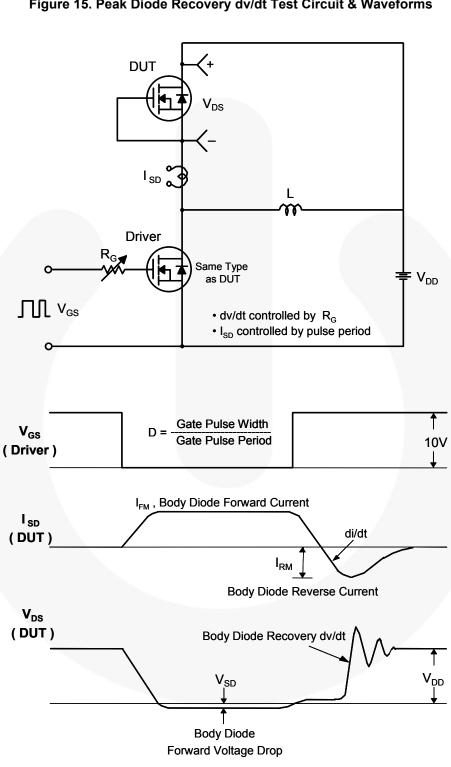


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

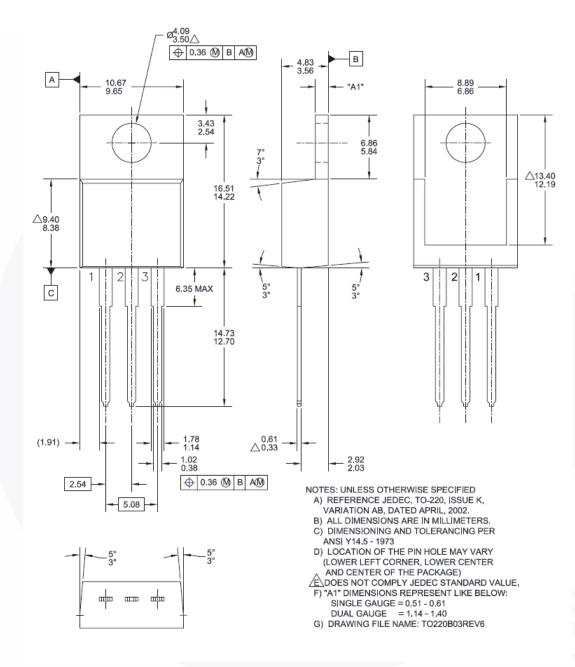


Figure 16. TO-220, Molded, 3Lead, Jedec Variation AB

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