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May 2007



FDP8447L

N-Channel PowerTrench[®] MOSFET 40V, 50A, 8.7m Ω

Features

- Max $r_{DS(on)} = 8.7 \text{m}\Omega$ at $V_{GS} = 10 \text{V}$, $I_D = 14 \text{A}$
- Max $r_{DS(on)} = 11.2m\Omega$ at $V_{GS} = 4.5V$, $I_D = 11A$
- Fast Switching
- RoHS Compliant

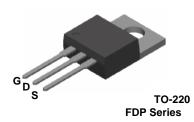


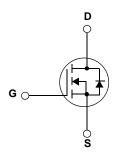
General Description

This N-Channel MOSFET has been produced using Fairchild Semiconductor's proprietary PowerTrench technology to deliver low $r_{DS(on)}$ and optimized BV_{DSS} capability to offer superior performance benefit in the application.

Applications

- Inverter
- Power Supplies





MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter		Ratings	Units	
V_{DS}	Drain to Source Voltage			40	V
V_{GS}	Gate to Source Voltage			±20	V
	Drain Current -Continuous (Package limited)	T _C = 25°C		50	
I _D	-Continuous (Silicon limited)	T _C = 25°C		65	Λ.
	-Continuous	T _A = 25°C	(Note 1)	12	Α
	-Pulsed			100	
E _{AS}	Drain-Source Avalanche Energy		(Note 3)	153	mJ
Б	Power Dissipation	T _C = 25°C		60	W
P_{D}	Power Dissipation $T_A = 25^{\circ}C$ (Note 1)		(Note 1)	2	VV
T _J , T _{STG}	Operating and Storage Junction Temperature Range			-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case		2.1	°C/W
R _{e,IA}	Thermal Resistance, Junction to Ambient	(Note 1)	62.5	C/VV

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDP8447L	FDP8447L	TO-220AB	Tube	N/A	50units

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

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
Off Chara	acteristics					
BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V$	40			V
$\frac{\Delta BV_{DSS}}{\Delta T_{J}}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$, referenced to 25°C		34		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 32V,			1	μΑ
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20V, V_{DS} = 0V$			±100	nA

On Characteristics

V _{GS(th)}	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu A$	1	1.7	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I _D = 250μA, referenced to 25°C		-6		mV/°C
		V _{GS} = 10V, I _D = 14A		7.7	8.7	
r _{DS(on)}	r _{DS(on)} Static Drain to Source On Resistance	$V_{GS} = 4.5V, I_D = 11A$		8.9	11.2	mΩ
	$V_{GS} = 10V$, $I_D = 14A$, $T_J = 125$ °C		12.1	13.7		
g _{FS}	Forward Transconductance	$V_{DD} = 5V, I_{D} = 14A$		74		S

Dynamic Characteristics

C _{iss}	Input Capacitance	V 20V V 0V	1880	2500	pF
Coss	Output Capacitance	$V_{DS} = 20V, V_{GS} = 0V,$ f = 1MHz	245	325	pF
C _{rss}	Reverse Transfer Capacitance	1 - 11/11/12	150	225	pF
R_g	Gate Resistance	f = 1MHz	1.4		Ω

Switching Characteristics

t _{d(on)}	Turn-On Delay Time		$V_{DD} = 20V, I_{D} = 14A,$ $V_{GS} = 10V, R_{GEN} = 6\Omega$		9	18	ns
t _r	Rise Time	$V_{DD} = 20V, I_D = 12V_{DD} = $			7	14	ns
t _{d(off)}	Turn-Off Delay Time	V _{GS} = 10V, K _{GEN}			28	45	ns
t _f	Fall Time				4	10	ns
Q_g	Total Gate Charge	V _{GS} = 0V to 10V	.,		35	49	nC
Qg	Total Gate Charge	$V_{GS} = 0V \text{ to } 5V$	$V_{DD} = 20V,$ $I_{D} = 14A$		19	27	nC
Q _{gs}	Gate to Source Charge		1 _D = 14A		4.7		nC
Q_{gd}	Gate to Drain "Miller" Charge				6.2		nC

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Forward Voltage	V _{GS} = 0V, I _S = 14A (Note 2)		0.8	1.2	V
t _{rr}	Reverse Recovery Time	L = 14A di/dt = 100A/vo		28	42	ns
Q _{rr}	Reverse Recovery Charge	I _F = 14A, di/dt = 100A/μs		22	33	nC

 $R_{0,IC}$ is guaranteed by design while $R_{0,IC}$ is guaranteed by design while $R_{0,IC}$ is guaranteed by design while $R_{0,IC}$ is guaranteed by design by the user's board design.

2. Pulse Test: Pulse Width < 300 μ s, Duty cycle < 2.0%.

3. Starting $T_J = 25^{\circ}$ C, L = 1mH, $I_{AS} = 17.5$ A, $V_{DD} = 40$ V, $V_{GS} = 10$ V.

Typical Characteristics T_J = 25°C unless otherwise noted

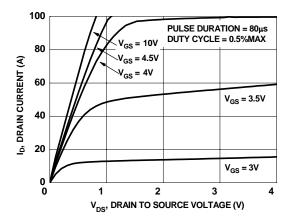


Figure 1. On-Region Characteristics

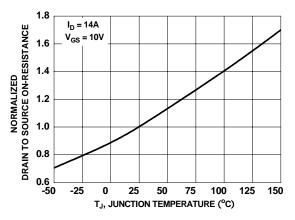


Figure 3. Normalized On-Resistance vs Junction Temperature

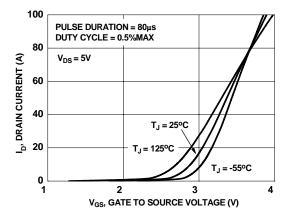


Figure 5. Transfer Characteristics

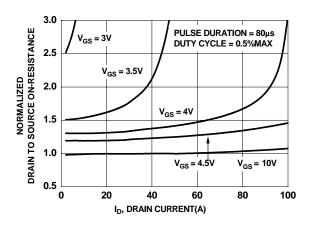


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

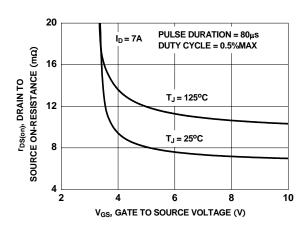


Figure 4. On-Resistance vs Gate to Source Voltage

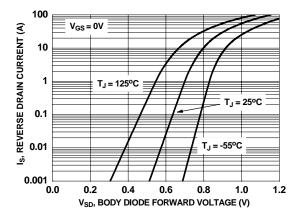


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25°C unless otherwise noted

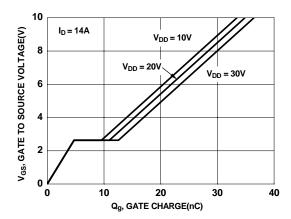


Figure 7. Gate Charge Characteristics

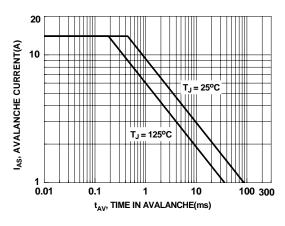


Figure 9. Unclamped Inductive Switching Capability

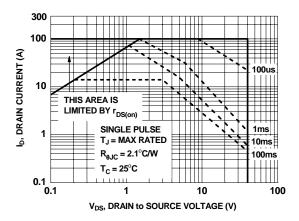


Figure 11. Forward Bias Safe Operating Area

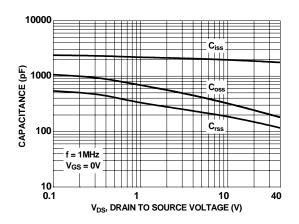


Figure 8. Capacitance vs Drain to Source Voltage

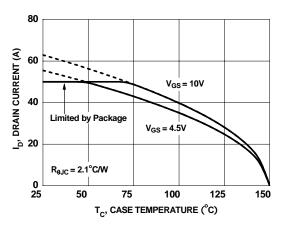


Figure 10. Maximum Continuous Drain Current vs Case Temperature

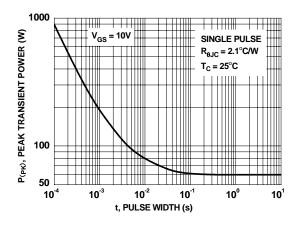


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25°C unless otherwise noted

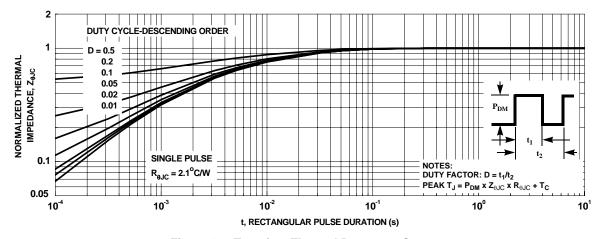


Figure 13. Transient Thermal Response Curve





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