FDP8447L

N-Channel PowerTrench® MOSFET

40V, 50A, 8.7mΩ

Features

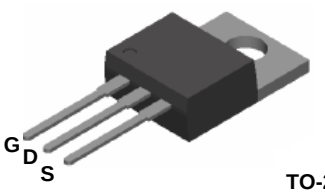
- Max $r_{DS(on)}$ = 8.7mΩ at V_{GS} = 10V, I_D = 14A
- Max $r_{DS(on)}$ = 11.2mΩ at V_{GS} = 4.5V, I_D = 11A
- Fast Switching
- RoHS Compliant

General Description

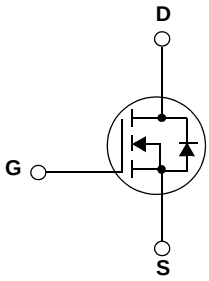
This N-Channel MOSFET has been produced using Fairchild Semiconductor's proprietary PowerTrench technology to deliver low $r_{DS(on)}$ and optimized BV_{DSS} capability to offer superior performance benefit in the application.

Applications

- Inverter
- Power Supplies



TO-220
FDP Series



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
I_D	Drain Current -Continuous (Package limited)	T_C = 25°C		50	A
	-Continuous (Silicon limited)	T_C = 25°C		65	
	-Continuous	T_A = 25°C	(Note 1)	12	
	-Pulsed			100	
E_{AS}	Drain-Source Avalanche Energy		(Note 3)	153	mJ
P_D	Power Dissipation	T_C = 25°C		60	W
	Power Dissipation	T_A = 25°C	(Note 1)	2	
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
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1)	62.5	

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°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	40			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, referenced to 25°C		34		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 32V,			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V, V_{DS} = 0V			±100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA	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
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10V, I_D = 14A		7.7	8.7	mΩ
		V_{GS} = 4.5V, I_D = 11A		8.9	11.2	
		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_{DS} = 20V, V_{GS} = 0V, f = 1MHz		1880	2500	pF
C_{oss}	Output Capacitance			245	325	pF
C_{rss}	Reverse Transfer Capacitance			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} = 6Ω		9	18	ns
t_r	Rise Time			7	14	ns
$t_{d(off)}$	Turn-Off Delay Time			28	45	ns
t_f	Fall Time			4	10	ns
Q_g	Total Gate Charge	V_{GS} = 0V to 10V; V_{DD} = 20V, I_D = 14A		35	49	nC
Q_g	Total Gate Charge	V_{GS} = 0V to 5V; V_{DD} = 20V, I_D = 14A		19	27	nC
Q_{gs}	Gate to Source Charge	V_{DD} = 20V, I_D = 14A		4.7		nC
Q_{gd}	Gate to Drain “Miller” Charge	V_{DD} = 20V, I_D = 14A		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	I_F = 14A, di/dt = 100A/μs		28	42	ns
Q_{rr}	Reverse Recovery Charge			22	33	nC

NOTES:
1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user’s board design.
2. Pulse Test: Pulse Width < 300μs, Duty cycle < 2.0%.
3. Starting T_J = 25°C, L = 1mH, I_{AS} = 17.5A, V_{DD} = 40V, V_{GS} = 10V.

Typical Characteristics T_J = 25°C unless otherwise noted

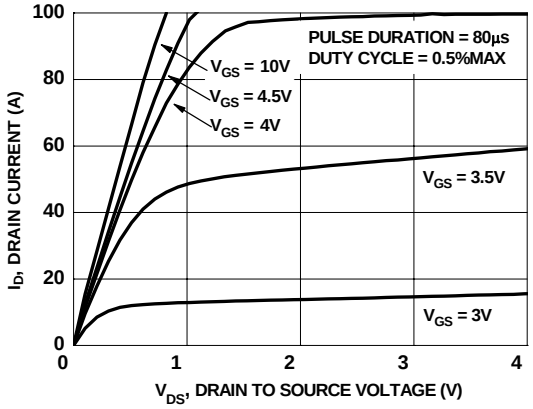


Figure 1. On-Region Characteristics

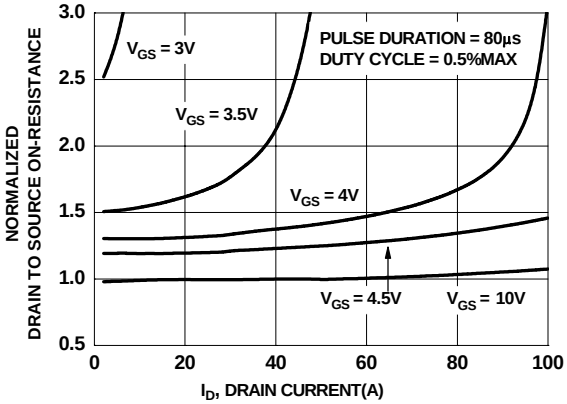


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

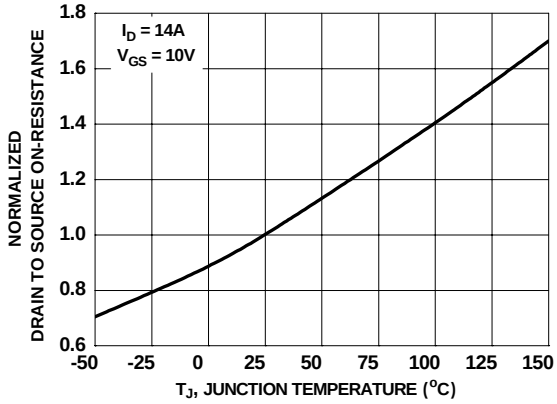


Figure 3. Normalized On-Resistance vs Junction Temperature

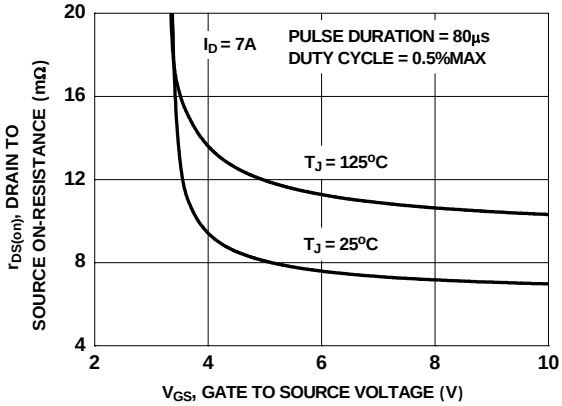


Figure 4. On-Resistance vs Gate to Source Voltage

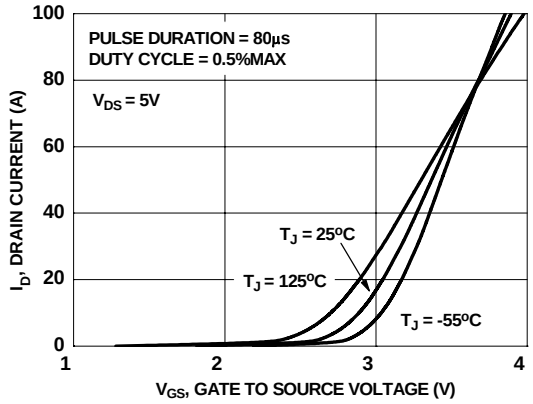


Figure 5. Transfer Characteristics

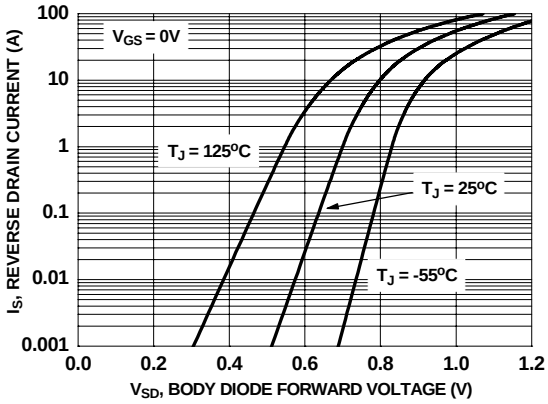


Figure 6. Source to Drain Diode Forward Voltage vs Source Current