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March 2015

FDD8447L 40V N-Channel PowerTrench MOSFET 40V, 50A, $8.5 m\Omega$

Features

- Max $r_{DS(on)}$ = 8.5m Ω at V_{GS} = 10V, I_D = 14A
- Max $r_{DS(on)}$ = 11.0m Ω at V_{GS} = 4.5V, I_D = 11A
- Fast Switching
- RoHS Compliant

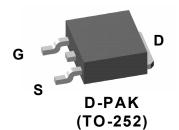


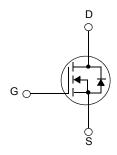
General Description

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	
	-Continuous (Silicon limited) T _C = 25°C		57	A	
ID	-Continuous	T _A = 25°C	(Note 1a)	15.2	A
	-Pulsed			100	
I _S	Max Pulse Diode Current			100	Α
E _{AS}	Drain-Source Avalanche Energy		(Note 3)	153	mJ
	Power Dissipation T _C = 25°C			44	
P_D	T _A = 25°C (Note 1a)			3.1	W
	T _A = 25°C		(Note 1b)	1.3	
T _J , T _{STG}	Operating and Storage Junction Temperature Range	;		-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case		2.8	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Not	e 1a)	40	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Not	e 1b)	96	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD8447L	FDD8447L	D-PAK(TO-252)	13"	16mm	2500 units

Electrical Characteristics $T_J = 25^{\circ}C$ 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 = 250μA, referenced to 25°C		35		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 32V, V_{GS} = 0V$			1	μΑ
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20V, V_{GS} = 0V$			±100	nA

On Characteristics (Note 2)

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu A$	1.0	1.9	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I _D = 250μA, referenced to 25°C		-5		mV/°C
		V _{GS} = 10V, I _D = 14A		7.0	8.5	
r _{DS(on)}	Static Drain to Source On Resistance	$V_{GS} = 4.5V, I_D = 11A$		8.5	11.0	mΩ
, ,		V _{GS} = 10V, I _D = 14A, T _J =125°C		10.4	14.0	
9 _{FS}	Forward Transconductance	V _{DS} = 5V, I _D = 14A		58		S

Dynamic Characteristics

C _{iss}	Input Capacitance	\\ - 20\\ \\ - 0\\	1970	pF
Coss	Output Capacitance	$V_{DS} = 20V, V_{GS} = 0V,$ f = 1MHz	250	pF
C _{rss}	Reverse Transfer Capacitance	1 - 1101112	150	pF
R _a	Gate Resistance	f = 1MHz	1.27	Ω

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	.,	12	21	ns
t _r	Rise Time	$V_{DD} = 20V, I_{D} = 1A$ $V_{GS} = 10V, R_{GEN} = 6\Omega$	12	21	ns
t _{d(off)}	Turn-Off Delay Time	V _{GS} = 10V, R _{GEN} = 002	38	61	ns
t _f	Fall Time		9	18	ns
$Q_{g(TOT)}$	Total Gate Charge, V _{GS} = 10V		37	52	nC
$Q_{g(TOT)}$	Total Gate Charge, V _{GS} = 5V	$V_{DD} = 20V, I_D = 14A$ $V_{GS} = 10V$	20	28	nC
Q_{gs}	Gate to Source Gate Charge	V _{GS} - 10V	6		nC
Q_{gd}	Gate to Drain "Miller" Charge		7		nC

Drain-Source Diode Characteristics

I_S	Maximum Continuous Drain-Source Diode	Maximum Continuous Drain-Source Diode Forward Current			2.6	Α
V_{SD}	Source to Drain Diode Forward Voltage	V _{GS} = 0V, I _S = 14A	(Note 2)	8.0	1.2	V
t _{rr}	Reverse Recovery Time	1 - 14A di/dt - 100/	V/o	22		ns
Q _{rr}	Reverse Recovery Charge	I _F = 14A, di/dt = 100A/μs		11		nC

Notes:

^{1:} R_{0,IA} 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_{0,IC} is guaranteed by design while R_{0,IA} is determined by the user's board design.

a. 40°C/W when mounted on a 1 in2 pad of 2 oz copper

b. 96°C/W when mounted on a minimum pad.

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

^{3:} Starting TJ = 25° C, L = 1mH, IAS = 17.5A, VDD = 40V, VGS = 10V.

Typical Characteristics

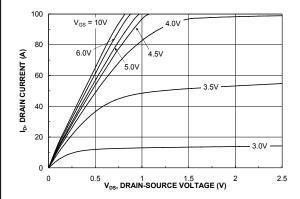


Figure 1. On-Region Characteristics

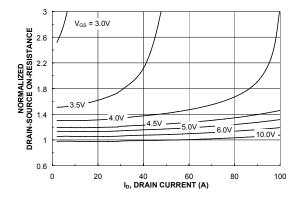


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

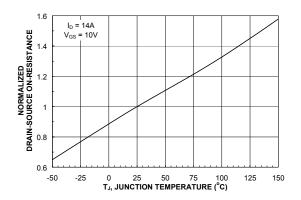


Figure 3. On-Resistance Variation with Temperature

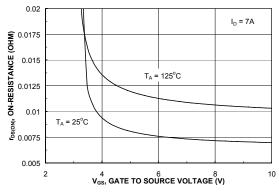


Figure 4. On-Resistance Variation with Gate-to-Source Voltage

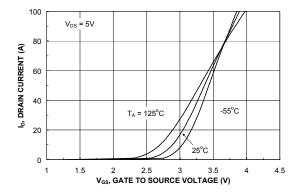


Figure 5. Transfer Characteristics

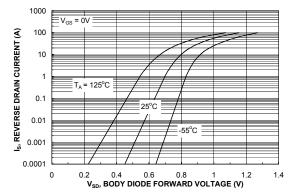


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

Typical Characteristics

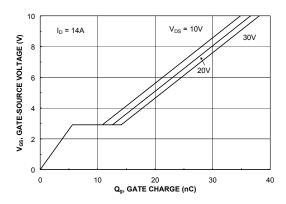


Figure 7. Gate Charge Characteristics

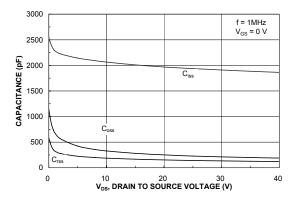


Figure 8. Capacitance Characteristics

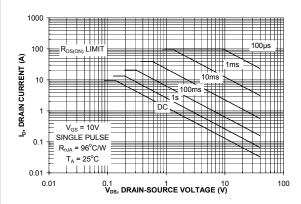


Figure 9. Maximum Safe Operating Area

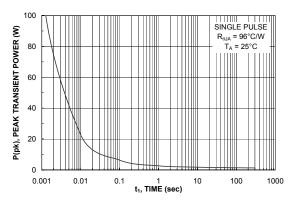


Figure 10. Single Pulse Maximum Power Dissipation

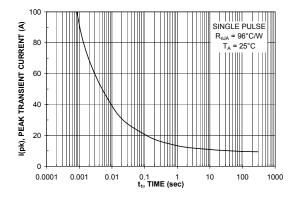


Figure 11. Single Pulse Maximum Peak Current

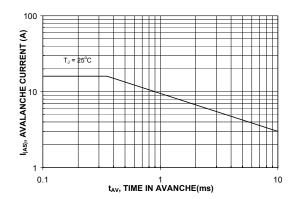


Figure 12. Unclamped Inductive Switching Capability

Typical Characteristics

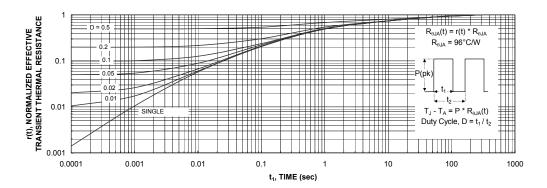
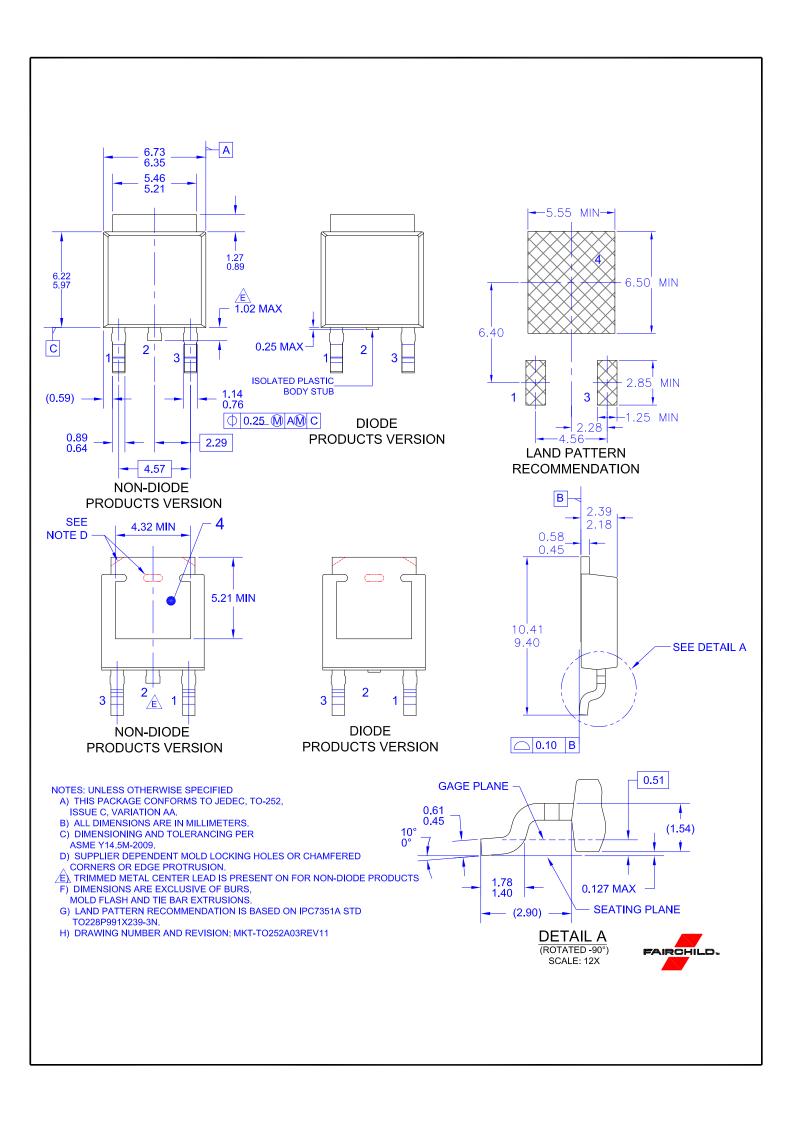


Figure 13. Transient Thermal Response Curve

Thermal characterization performed using the conditions described in Note 1b. Transient thermal response will change depending on the circuit board design.



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