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February 2009

FDD8447L_F085

N-Channel PowerTrench[®] MOSFET 40V, 50A, 11.0m Ω

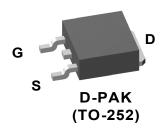
Features

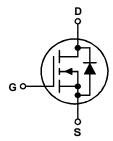
- Typ $r_{DS(on)}$ = 7.0m Ω at V_{GS} = 10V, I_D = 14A
- Typ $r_{DS(on)}$ = 8.5m Ω at V_{GS} = 4.5V, I_D = 11A
- Fast Switching
- Qualified to AEC Q101
- RoHS Compliant

Applications

- Inverter
- Power Supplies
- Automotive Engine Control
- Power Train Management
- Solenoid and Motor Drivers
- Electronic Transmission
- Primary Switch for 12V and 24V Systems







MOSFET Maximum Ratings $T_C = 25^{\circ}C$ unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain to Source Voltage	(Note 1)	40	V
V_{GS}	Gate to Source Voltage		±20	V
	Drain Current Continuous (T _C < 80°C, V _{GS} = 10V)		50	А
'D	Pulsed		See Figure 4	_ A
E _{AS}	Single Pulse Avalanche Energy	(Note 2)	40	mJ
П	Power Dissipation		65	W
P_{D}	Dreate above 25°C		0.43	W/°C
T _J , T _{STG}	Operating and Storage Temperature		-55 to + 175	°C

Thermal Characteristics

$R_{\theta JC}$	Maximum Thermal Resistance Junction to Case	2.3	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-252, 1in ² copper pad area	40	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD8447L	FDD8447L_F085	D-PAK(TO-252)	13"	12mm	2500 units

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	lest Conditions	Min	тур	мах	Units	
Off Cha	racteristics						

B _{VDSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V$	40	-	-	V
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

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = 250 \mu A$	1.0	1.9	3.0	V
` '		I _D = 14A, V _{GS} = 10V	-	7.0	8.5	
r _{DS(on)}	Drain to Source On Resistance	$I_D = 11A, V_{GS} = 4.5V$	-	8.5	11.0	$m\Omega$
,		$I_D = 14A, V_{GS} = 10V, T_J = 125^{\circ}C$	-	10.4	14.0	
g _{FS}	Forward Transconductance	I _D = 14A, V _{DS} = 5V	-	58	-	S

Dynamic Characteristics

C _{iss}	Input Capacitance	.,	.,		1970	-	pF
Coss	Output Capacitance	f = 20V, V _{GS} = f = 1MHz	$V_{DS} = 20V, V_{GS} = 0V,$ f = 1MHz	-	250	-	pF
C _{rss}	Reverse Transfer Capacitance	1 - 11/11/12	1 - 11VII 12		150	-	pF
R_g	Gate Resistance	f = 1MHz		-	1.27	-	Ω
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0$ to 10V	.,	-	37	52	nC
Q _{g(5)}	Total Gate Charge at 5V	$V_{GS} = 0$ to 5V	$\int_{I_D} V_{DD} = 20V$ $I_D = 14A$	-	20	28	nC
Q _{gs}	Gate to Source Gate Charge		$V_{GS} = 10V$	-	6	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		163 .01	-	7	-	nC

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

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
Switch	ing Characteristics					

t _{d(on)}	Turn-On Delay Time		-	12	21	ns
t _r	Rise Time	V _{DD} = 20 V, I _D = 1 A,	1	12	21	ns
t _{d(off)}	Turn-Off Delay Time	V_{GS} = 10 V, R_{GEN} = 6 Ω	-	38	61	ns
t _f	Fall Time		1	9	18	ns

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Voltage	I _{SD} = 14A	-	0.8	1.2	V
t _{rr}	Reverse Recovery Time	L = 14A dl (dt = 100A);;;	-	22	29	ns
Q _{rr}	Reverse Recovery Charge	$I_F = 14A$, $dI_{SD}/dt = 100A/\mu s$	-	11	14	nC

1: Starting T_J = 25°C to 175°C. 2: Starting T_J = 25°C, L = 0.05mH, I_{AS} = 40A

This product has been designed to meet the extreme test conditions and environment demanded by the automotive industry. For a copy of the requirements, see AEC Q101 at: http://www.aecouncil.com/
All Fairchild Semiconductor products are manufactured, assembled and tested under ISO9000 and QS9000 quality systems

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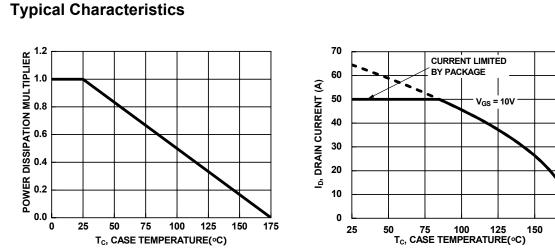
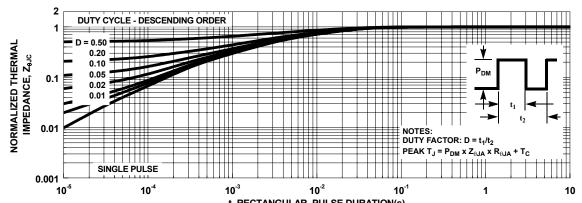


Figure 1. Normalized Power Dissipation vs Case Temperature

Figure 2. Maximum Continuous Drain Current vs Case Temperature



t, RECTANGULAR PULSE DURATION(s)
Figure 3. Normalized Maximum Transient Thermal Impedance

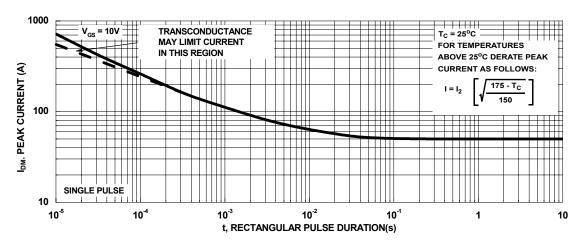


Figure 4. Peak Current Capability

Typical Characteristics

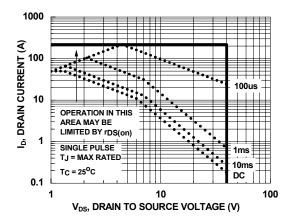
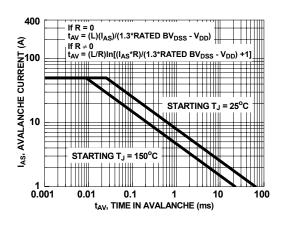


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching

Capability

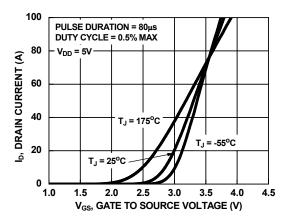


Figure 7. Transfer Characteristics

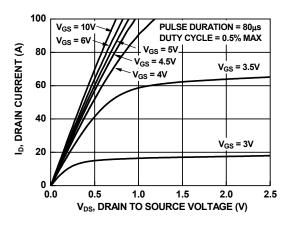


Figure 8. Saturation Characteristics

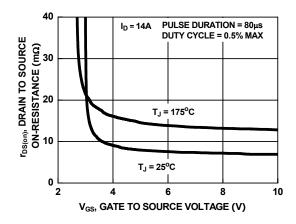


Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage

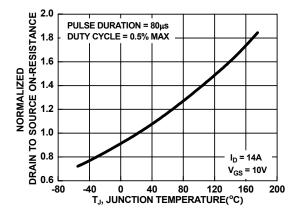


Figure 10. Normalized Drain to Source On Resistance vs Junction Temperature

Typical Characteristics

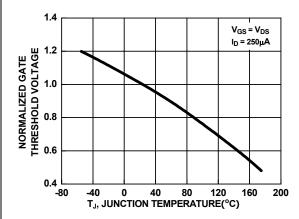


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

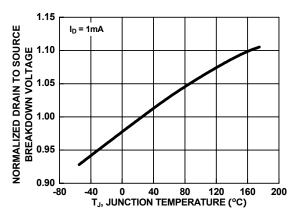


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

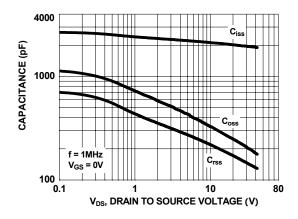


Figure 13. Capacitance vs Drain to Source Voltage

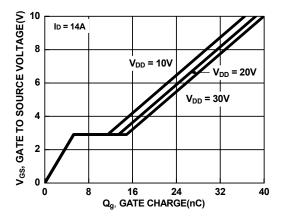
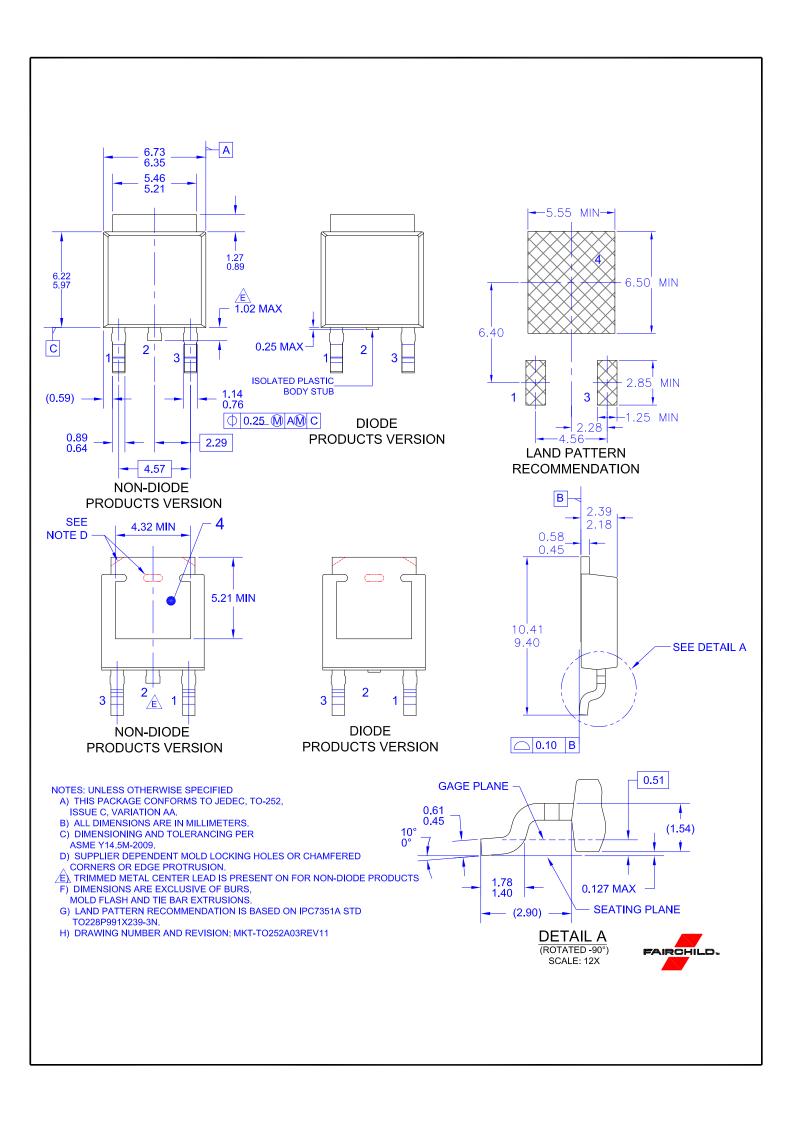


Figure 14. Gate Charge vs Gate to Source Voltage



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