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FDB8447L

40V N-Channel PowerTrench® MOSFET

40V, 50A, 8.5mΩ

Features

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

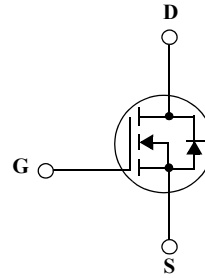
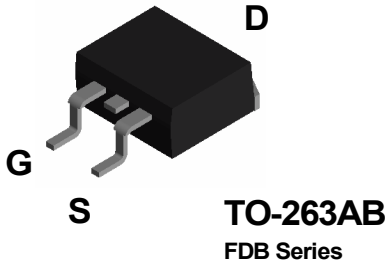


General Description

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.

Application

- Inverter
- Power Supplies



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

Symbol	Parameter	Conditions	Rated Value	Units
V_{DS}	Drain to Source Voltage		40	V
V_{GS}	Gate to Source Voltage		±20	V
I_D	Drain Current -Continuous (Package limited)	$T_C = 25^\circ\text{C}$	50	A
	-Continuous (Silicon limited)	$T_C = 25^\circ\text{C}$ (Note 1)	66	
	-Continuous	$T_A = 25^\circ\text{C}$ (Note 1a)	15	
	-Pulsed		100	
E_{AS}	Drain-Source Avalanche Energy	(Note 3)	153	mJ
P_D	Power Dissipation	$T_C = 25^\circ\text{C}$	60	W
	Power Dissipation	(Note 1a)	3.1	
T_J, T_{STG}	Operating and Storage Junction Temperature Range		-55 to +150	$^\circ\text{C}$

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	(Note 1)	2.1	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	40	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB8447L	FDB8447L	TO-263AB	330mm	24mm	800 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	40			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$, referenced to 25°C		35		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 32\text{V}, V_{GS} = 0\text{V}$			1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$			± 100	nA

On Characteristics (Note 2)

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	1	1.9	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$, referenced to 25°C		-5		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{V}, I_D = 14\text{A}$		7.4	8.5	m Ω
		$V_{GS} = 4.5\text{V}, I_D = 11\text{A}$		8.7	11.0	
		$V_{GS} = 10\text{V}, I_D = 14\text{A}, T_J = 125^\circ\text{C}$		10.8	12.4	
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{V}, I_D = 14\text{A}$		58		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$		1970	2620	pF
C_{oss}	Output Capacitance			250	335	pF
C_{riss}	Reverse Transfer Capacitance			150	225	pF
R_g	Gate Resistance	$f = 1\text{MHz}$		1.0		Ω

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 20\text{V}, I_D = 14\text{A}, V_{GS} = 10\text{V}, R_{GEN} = 6\Omega$		11	20	ns
t_r	Rise Time			6	12	ns
$t_{d(off)}$	Turn-Off Delay Time			28	45	ns
t_f	Fall Time			4	10	ns
$Q_{g(TOT)}$	Total Gate Charge, $V_{GS} = 10\text{V}$	$V_{DD} = 20\text{V}, I_D = 14\text{A}, V_{GS} = 10\text{V}$		37	52	nC
$Q_{g(TOT)}$	Total Gate Charge, $V_{GS} = 5\text{V}$			20	28	nC
Q_{gs}	Gate to Source Gate Charge			6		nC
Q_{gd}	Gate to Drain "Miller" Charge			7		nC

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 14\text{A}$ (Note 2)		0.8	1.2	V
t_{rr}	Reverse Recovery Time	$I_F = 14\text{A}, di/dt = 100\text{A}/\mu\text{s}$		28	42	ns
Q_{rr}	Reverse Recovery Charge			24	36	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.

- a. $40^\circ\text{C}/\text{W}$ when mounted on a 1 in^2 pad of 2 oz copper
- b. $62.5^\circ\text{C}/\text{W}$ when mounted on a minimum pad.

2: Pulse Test: Pulse Width $< 300\mu\text{s}$, Duty cycle $< 2.0\%$.

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

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

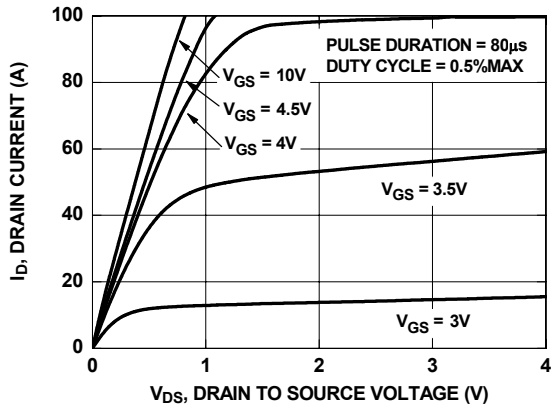


Figure 1. On Region Characteristics

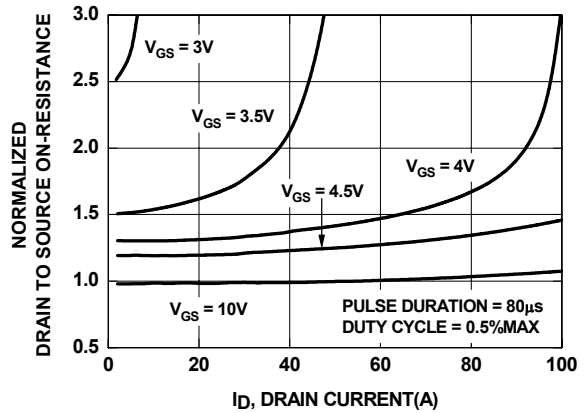


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

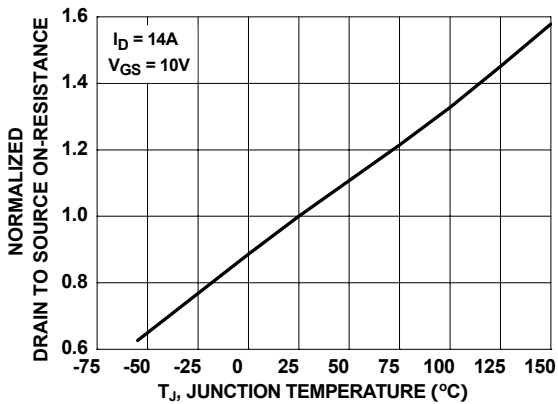


Figure 3. Normalized On Resistance vs Junction Temperature

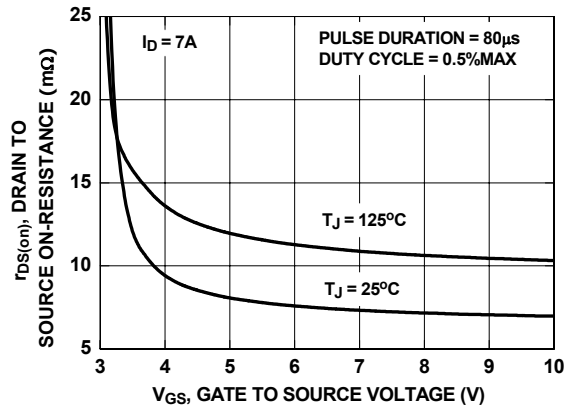


Figure 4. On-Resistance vs Gate to Source Voltage

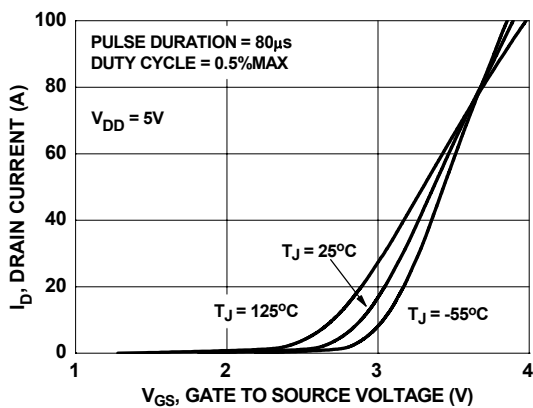


Figure 5. Transfer Characteristics

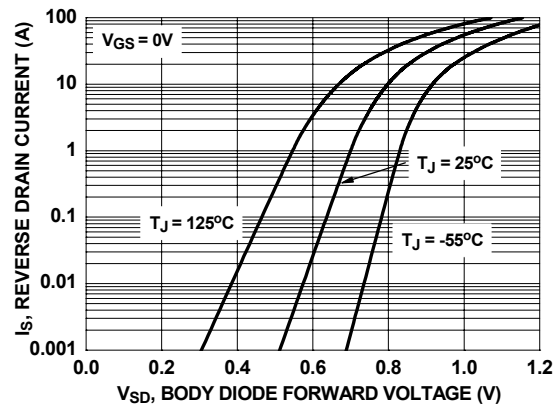


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

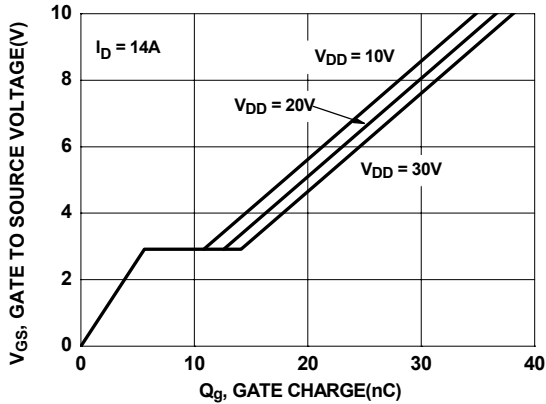


Figure 7. Gate Charge Characteristics

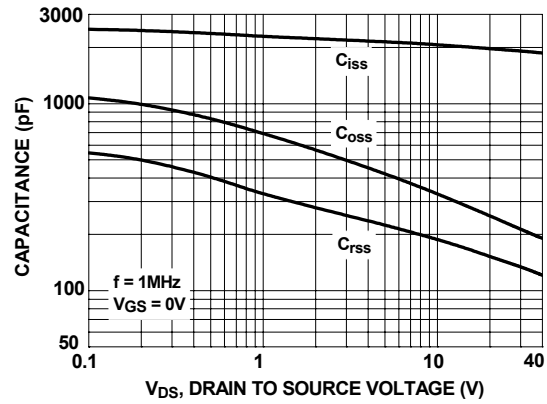


Figure 8. Capacitance vs Drain to Source Voltage

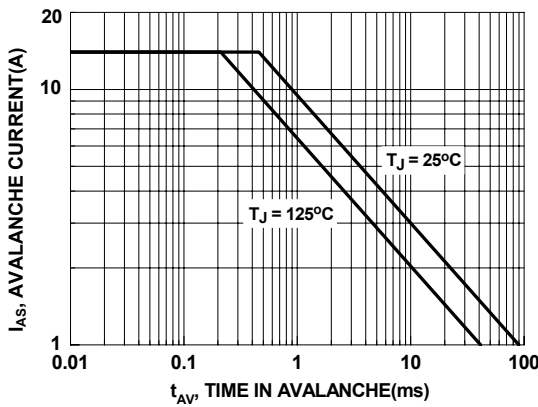


Figure 9. Unclamped Inductive Switching Capability

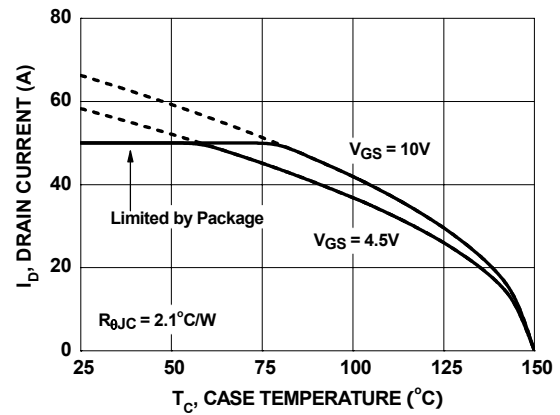


Figure 10. Maximum Continuous Drain Current vs Case Temperature

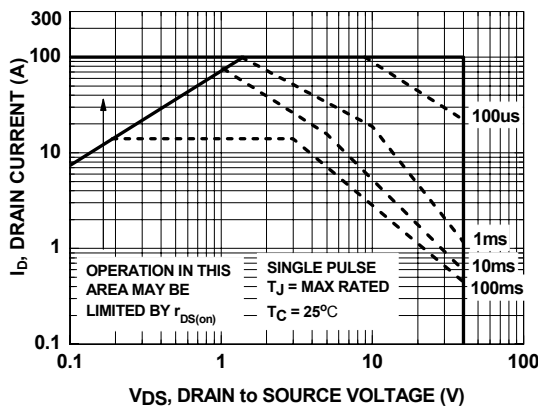


Figure 11. Forward Bias Safe Operating Area

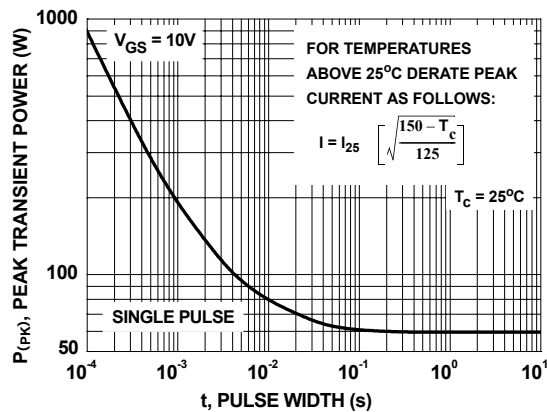


Figure 12. Single Pulse Maximum Power Dissipation

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

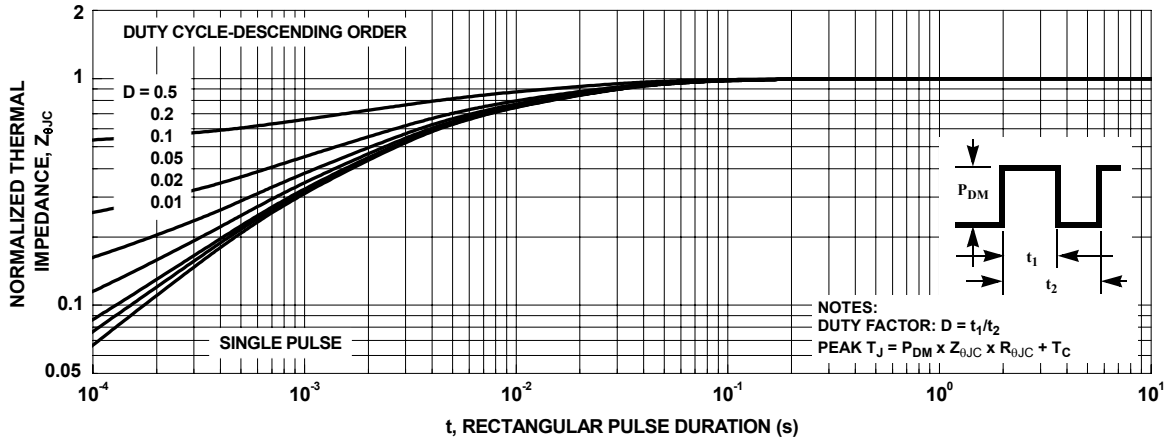



Figure 13. Transient Thermal Response Curve

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