**FAIRCHILD**

SEMICONDUCTOR®

FDI8441

N-Channel PowerTrench® MOSFET
40V, 80A, 2.7mΩ

Features

- Typ $r_{DS(on)}$ = 2.2mΩ at V_{GS} = 10V, I_D = 80A

- Typ $Q_{g(10)}$ = 215nC at V_{GS} = 10V

- Low Miller Charge

- Low Q_{rr} Body Diode

- UIS Capability (Single Pulse and Repetitive Pulse)

- Qualified to AEC Q101

- RoHS Compliant

Applications

- Automotive Engine Control

- Powertrain Management

- Solenoid and Motor Drivers

- Electronic Steering

- Integrated Starter / Alternator

- Distributed Power Architectures and VRMs

- Primary Switch for 12V Systems

100% RoHS COMPLIANT

SOURCE DRAIN GATE

DRAIN (FLANGE) TO-262AB FDI SERIES

D

G

S
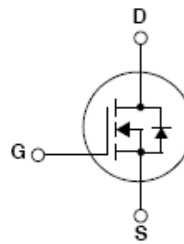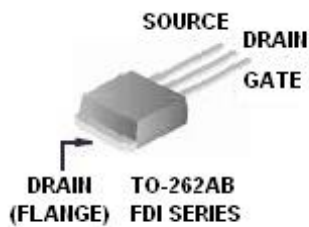
MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

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 (T_C < 160°C, V_{GS} = 10V)		80	A
	Continuous (T_{amb} = 25°C, V_{GS} = 10V, with $R_{\theta JA}$ = 43°C/W)		26	
	Pulsed		See Figure 4	
E_{AS}	Single Pulse Avalanche Energy	(Note 1)	947	mJ
P_D	Power dissipation		300	W
	Derate above 25°C		2	W/°C
T_J, T_{STG}	Operating and Storage Temperature		-55 to 175	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case		0.5	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	(Note 2)	62	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient, 1in^2 copper pad area		43	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDI8441	FDI8441	TO-262AB	Tube	NA	50 units

Electrical Characteristics T_J = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units

Off Characteristics

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
B_{VDSS}	Drain to Source Breakdown Voltage	I_D = 250mA, V_{GS} = 0V		40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 32V V_{GS} = 0V		-	-	1	μA
			T_J = 150°C	-	-	250	
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V		-	-	±100	nA

On Characteristics

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA		2	2.8	4	V
$r_{DS(on)}$	Drain to Source On Resistance	I_D = 80A, V_{GS} = 10V		-	2.2	2.7	mΩ
		I_D = 80A, V_{GS} = 10V, T_J = 175°C		-	3.8	4.7	

Dynamic Characteristics

Symbol	Parameter	Test Conditions			Min	Typ	Max	Units
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz			-	15000	-	pF
C_{oss}	Output Capacitance				-	1250	-	pF
C_{rss}	Reverse Transfer Capacitance				-	685	-	pF
R_G	Gate Resistance	V_{GS} = 0.5V, f = 1MHz			-	1.1	-	Ω
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{GS} = 0 to 10V			-	215	280	nC
$Q_{g(TH)}$	Threshold Gate Charge	V_{GS} = 0 to 2V	V_{DD} = 20V I_D = 35A I_g = 1mA		-	29	38	nC
Q_{gs}	Gate to Source Gate Charge				-	60	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau				-	32	-	nC
Q_{gd}	Gate to Drain "Miller" Charge				-	49	-	nC

Electrical Characteristics $T_J = 25°C$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Switching Characteristics						
$t_{(on)}$	Turn-On Time		-	-	77	ns
$t_{d(on)}$	Turn-On Delay Time		-	23	-	ns
t_r	Turn-On Rise Time	$V_{DD} = 20V, I_D = 35A$	-	24	-	ns
$t_{d(off)}$	Turn-Off Delay Time	$V_{GS} = 10V, R_{GS} = 1.5\Omega$	-	75	-	ns
t_f	Turn-Off Fall Time		-	17.9	-	ns
t_{off}	Turn-Off Time		-	-	147	ns
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Voltage	$I_{SD} = 35A$	-	0.8	1.25	V
		$I_{SD} = 15A$	-	0.8	1.0	V
t_{rr}	Reverse Recovery Time	$I_F = 35A, di/dt = 100A/\mu s$	-	52	68	ns
Q_{rr}	Reverse Recovery Charge	$I_F = 35A, di/dt = 100A/\mu s$	-	76	99	nC

Notes:
1: Starting $T_J = 25°C$, L = 0.46mH, $I_{AS} = 64A$.
2: Pulse width = 100s.

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 certification.
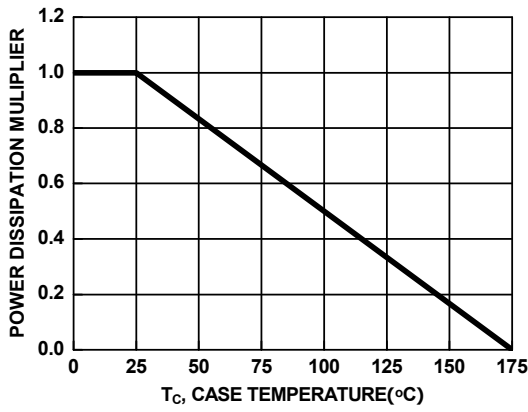
Typical Characteristics

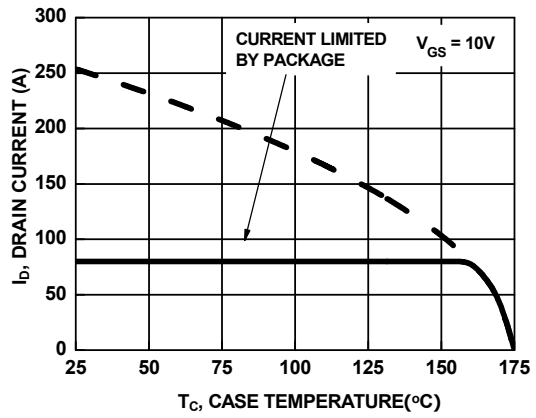**Figure 1. Normalized Power Dissipation vs Case Temperature**

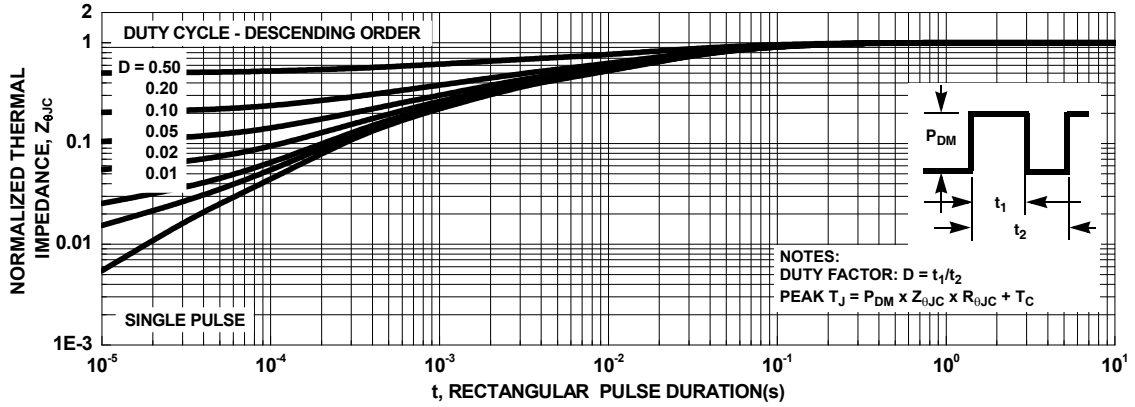**Figure 2. Maximum Continuous Drain Current vs Case Temperature**

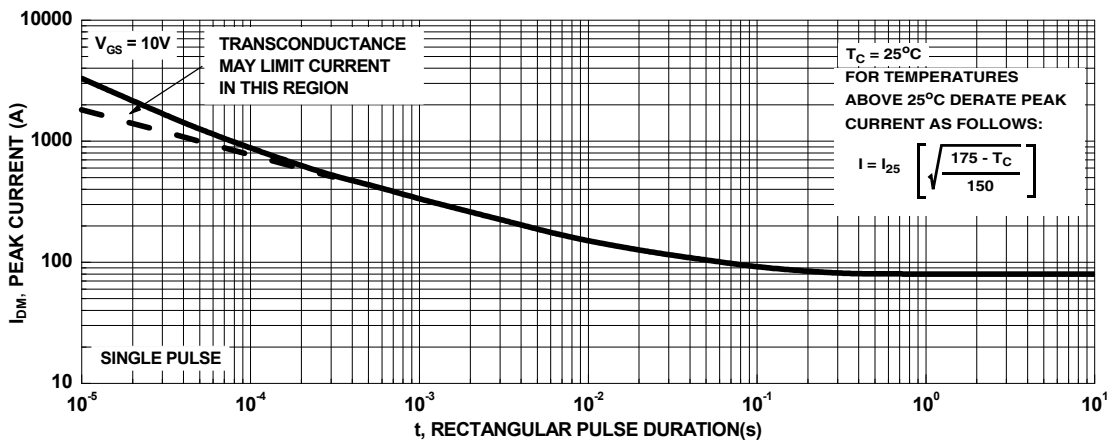**Figure 3. Normalized Maximum Transient Thermal Impedance**

NOTES:
DUTY FACTOR: D = t_1/t_2
PEAK T_J = P_{DM} x $Z_{\theta JC}$ x $R_{\theta JC}$ + T_C

Figure 4. Peak Current Capability

V_{GS} = 10V

TRANSCONDUCTANCE
MAY LIMIT CURRENT
IN THIS REGION

T_C = 25°C
FOR TEMPERATURES
ABOVE 25°C DERATE PEAK
CURRENT AS FOLLOWS:

$$I = I_{25} \left[\sqrt{\frac{175 - T_C}{150}} \right]$$
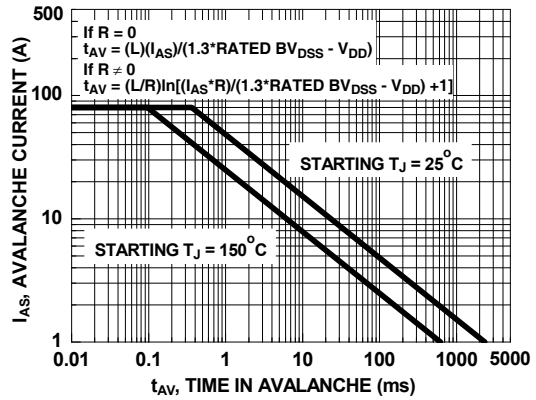
SINGLE PULSE

Typical Characteristics
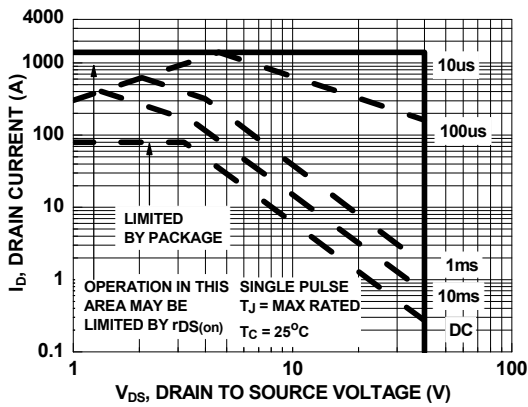
Figure 5. Forward Bias Safe Operating Area

NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

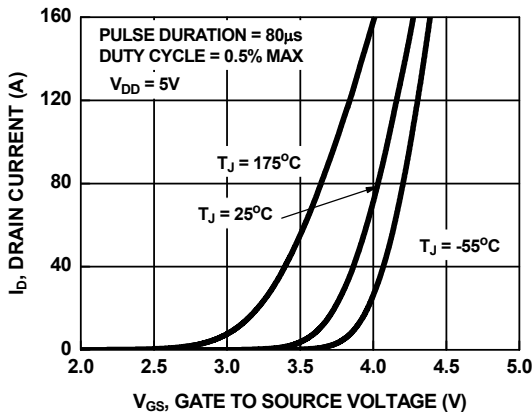Figure 6. Unclamped Inductive Switching Capability

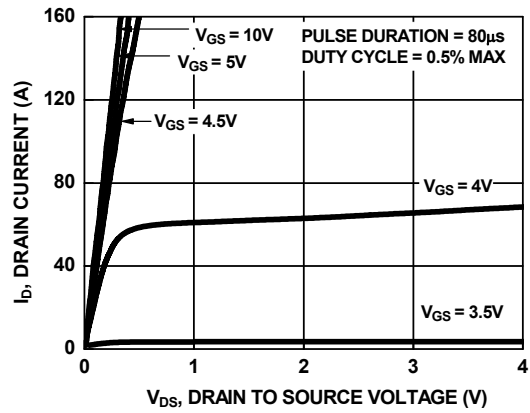

Figure 7. Transfer Characteristics

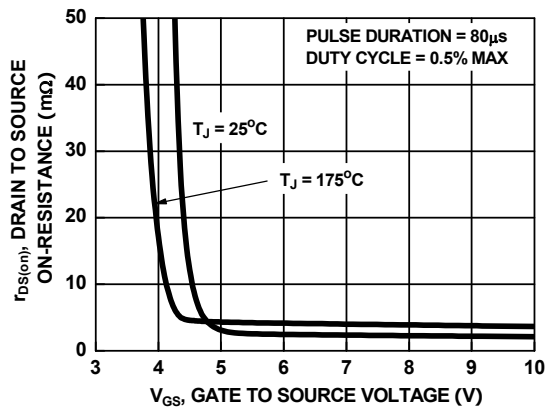Figure 8. Saturation Characteristics

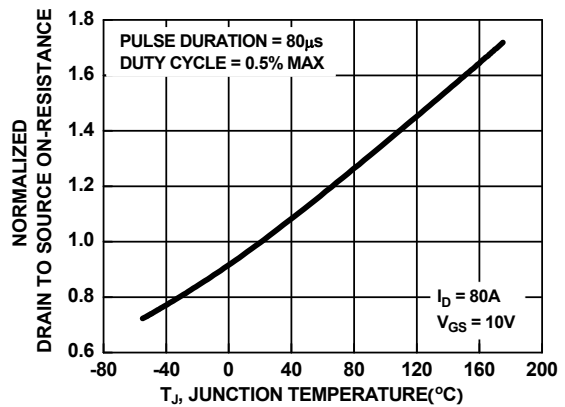Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage

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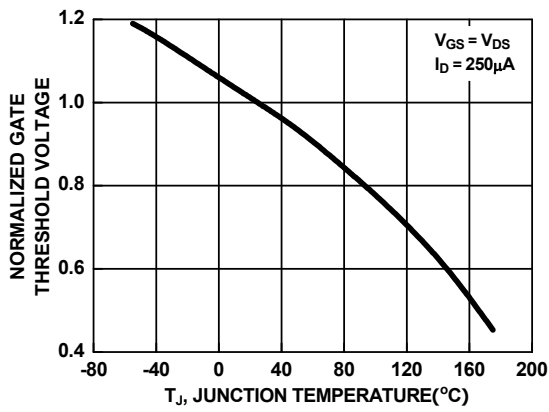
Typical Characteristics

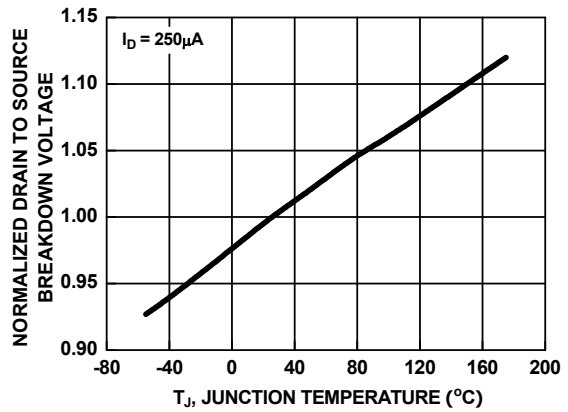Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

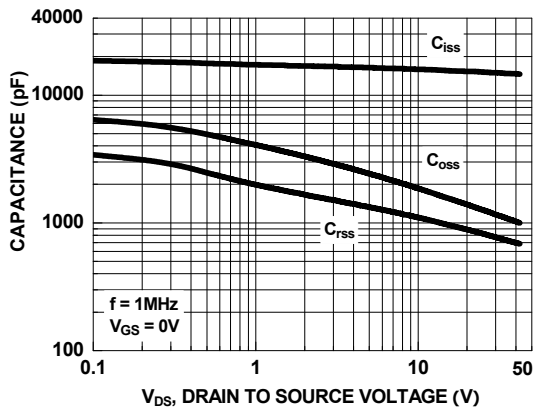Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

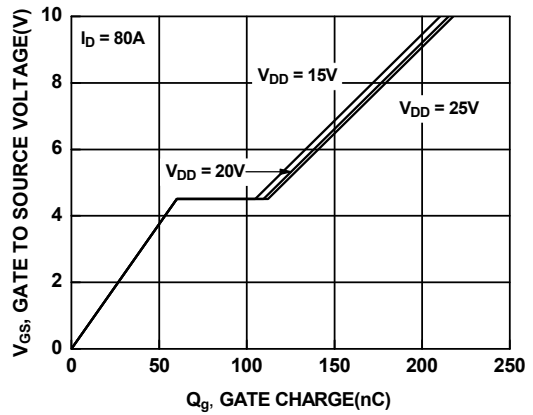Figure 13. Capacitance vs Drain to Source Voltage

Figure 14. Gate Charge vs Gate to Source Voltage

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