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June 2008

FDH5500

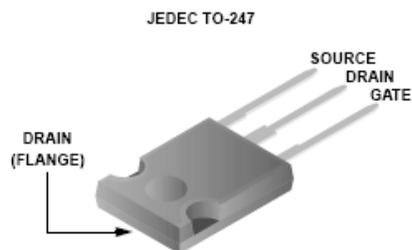## N-Channel UltraFET Power MOSFET

55V, 75A, 7mΩ

Features

■ Typ $r_{DS(on)}$ = 5.2mΩ at V_{GS} = 10V, I_D = 75A

■ Typ $Q_{g(10)}$ = 118nC at V_{GS} = 10V

■ Simulation Models
  -Temperature Compensated PSPICE and SABER^{TM} Models

■ Peak Current vs Pulse Width Curve

■ UIS Rating Curve

■ Related Literature

  -TB334, "Guidelines for Soldering Surface Mount Componets to PC Boards"

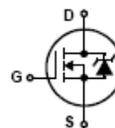■ Qualified to AEC Q101

■ RoHS Compliant

Applications

■ DC Linear Mode Control

■ Solenoid and Motor Control

■ Switching Regulators

■ Automotive Systems

100% RoHS COMPLIANT

Package

JEDEC TO-247

SOURCE
DRAIN
GATE

DRAIN
(FLANGE)

Symbol

D

G

S

FDH5500 Rev. A1

www.fairchildsemi.com

MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain to Source Voltage	(Note 1)	55	V
V_{DGR}	Drain to Gate Voltage (R_{GS} = 20kΩ)	(Note 1)	55	V
V_{GS}	Gate to Source Voltage		±20	V
I_D	Drain Current Continuous (T_C < 135°C, V_{GS} = 10V)		75	A
	Pulsed		See Figure 4	
E_{AS}	Single Pulse Avalanche Energy	(Note 2)	864	mJ
P_D	Power Dissipation		375	W
	Dreate above 25°C		2.5	W/°C
T_J, T_{STG}	Operating and Storage Temperature		-55 to + 175	°C
T_L	Max. Lead Temp. for Soldering (at 1.6mm from case for 10sec)		300	
T_{pkg}	Max. Package Temp. for Soldering (Package Body for 10sec)		260	

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case	0.4	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-247, 1in^2 copper pad area	30	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDH5500	FDH5500	TO-247	Tube	N/A	30 units

Electrical Characteristics T_C = 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 = 250µA, V_{GS} = 0V		55	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 50V, V_{GS} = 0V		-	-	1	µA
		V_{DS} = 45V	T_C = 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_{GS} = V_{DS}, I_D = 250µA	2	2.9	4	V
$r_{DS(on)}$	Drain to Source On Resistance	I_D = 75A, V_{GS}= 10V	-	5.2	7	mΩ

Dynamic Characteristics

Symbol	Parameter	Test Conditions			Min	Typ	Max	Units
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz			-	3565	-	pF
C_{oss}	Output Capacitance				-	1310	-	pF
C_{rss}	Reverse Transfer Capacitance				-	395	-	pF
$Q_{g(TOT)}$	Total Gate Charge at 20V	V_{GS} = 0 to 20V	V_{DD} = 30V I_D = 75A R_L = 0.4Ω I_g = 1.0mA		-	206	268	nC
$Q_{g(10)}$	Total Gate Charge at 10V	V_{GS} = 0 to 10V			-	118	153	nC
$Q_{g(TH)}$	Threshold Gate Charge	V_{GS} = 0 to 2V			-	6.2	8.1	nC
Q_{gs}	Gate to Source Gate Charge				-	17.8	-	nC
Q_{gd}	Gate to Drain "Miller" Charge				-	51	-	nC

Electrical Characteristics $T_C = 25^oC$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Switching Characteristics						
t_{on}	Turn-On Time	V_{DD} = 30V, I_D = 75A, R_L = 0.4Ω, V_{GS} = 10V, R_{GS} = 2.5Ω	-	-	185	ns
$t_{d(on)}$	Turn-On Delay Time		-	13.7	-	ns
t_r	Rise Time		-	102	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	34	-	ns
t_f	Fall Time		-	22	-	ns
t_{off}	Turn-Off Time		-	-	91	ns
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Voltage	I_{SD} = 75A	-	1	1.25	V
t_{rr}	Reverse Recovery Time	I_F = 75A, dI_{SD}/dt = 100A/μs	-	60	78	ns
Q_{rr}	Reverse Recovery Charge		-	77	100	nC

Notes:
1: Starting T_J = 25^oC to175^oC.
2: Starting T_J = 25^oC, L = 0.48mH, I_{AS} = 60A

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.
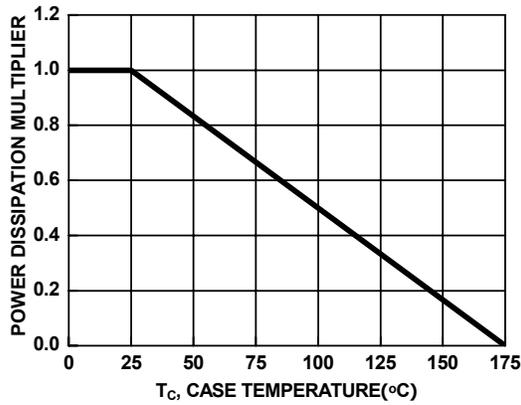
<div style="text-align: right">**FDH5500 N-Channel UltraFET Power MOSFET**</div>

Typical Characteristics

Figure 1. Normalized Power Dissipation vs Case Temperature
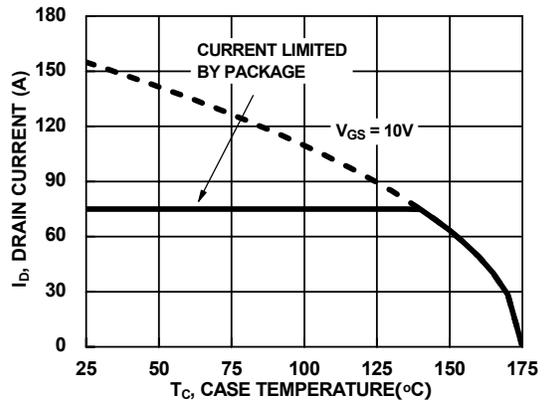
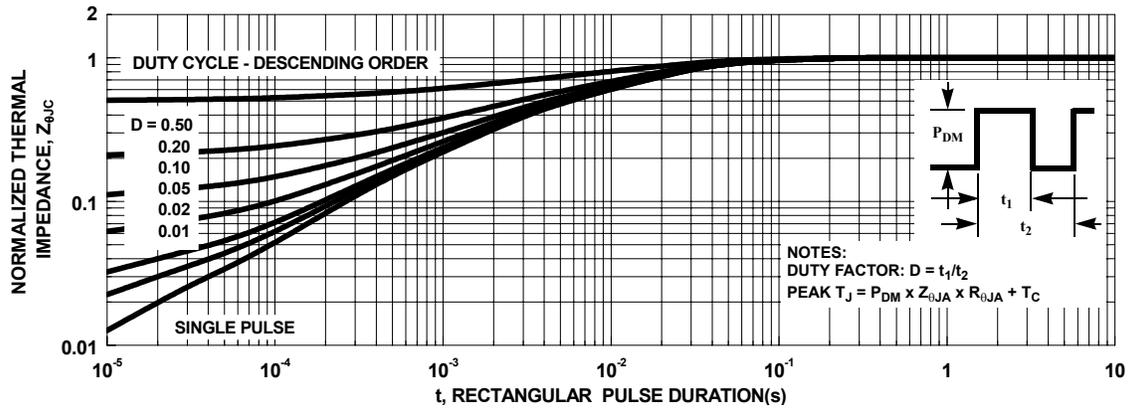Figure 2. Maximum Continuous Drain Current vs Case Temperature

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

Figure 3. Normalized Maximum Transient Thermal Impedance

$T_C = 25^oC$
FOR TEMPERATURES ABOVE 25^oC DERATE PEAK CURRENT AS FOLLOWS:

$$I = I_2 \left[\sqrt{\frac{175 - T_C}{150}} \right]$$
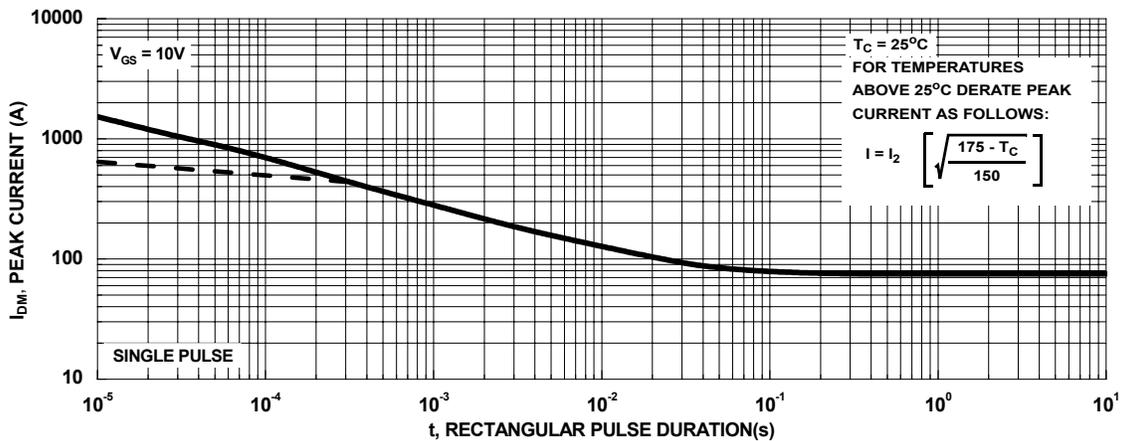
Figure 4. Peak Current Capability

Typical Characteristics
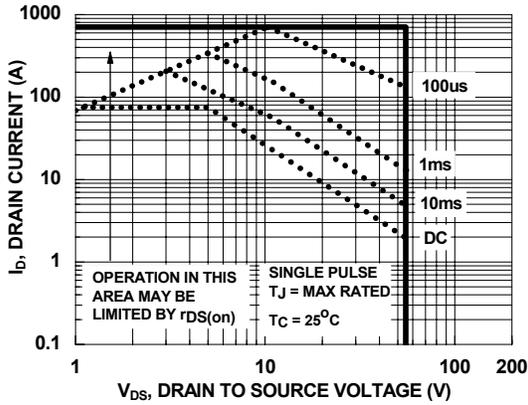
Figure 5. Forward Bias Safe Operating Area
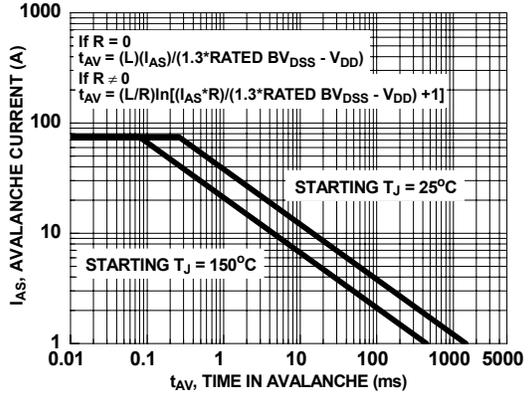
NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

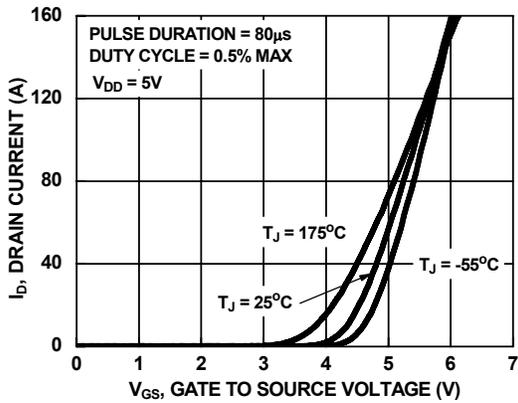**Figure 6. Unclamped Inductive Switching Capability**
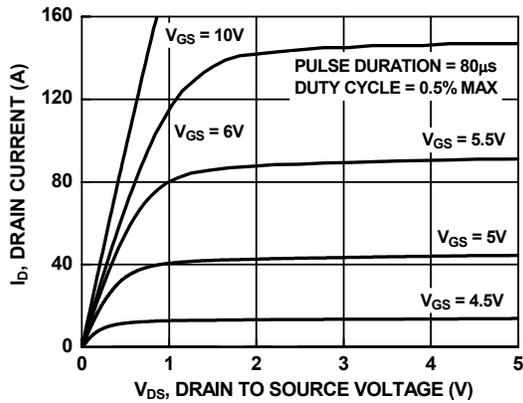

Figure 7. Transfer Characteristics

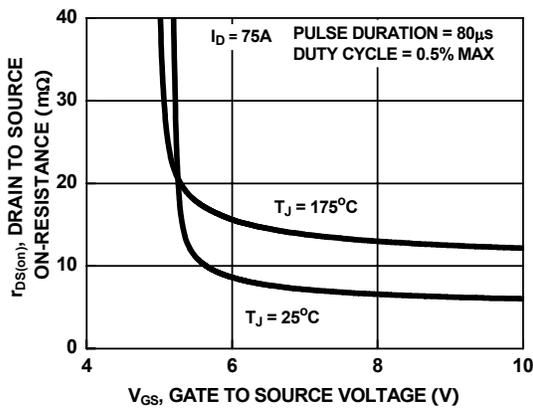**Figure 8. Saturation Characteristics**

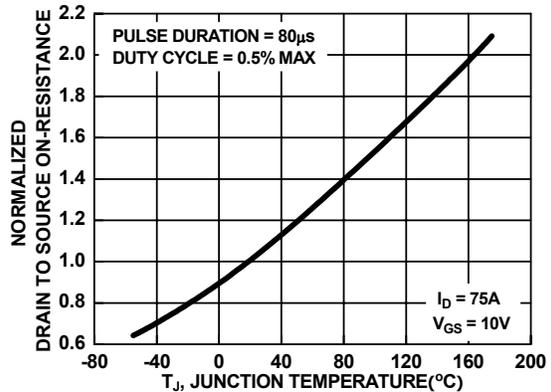**Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage**

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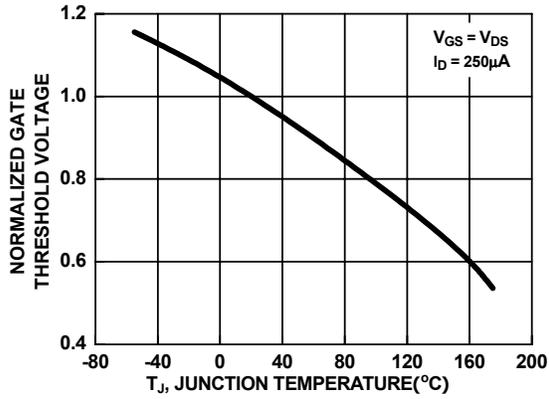
Typical Characteristics

Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature
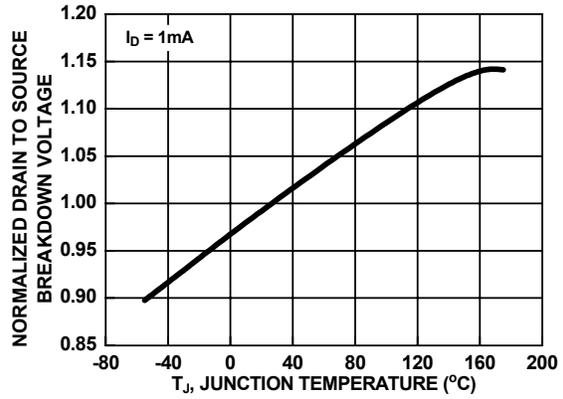

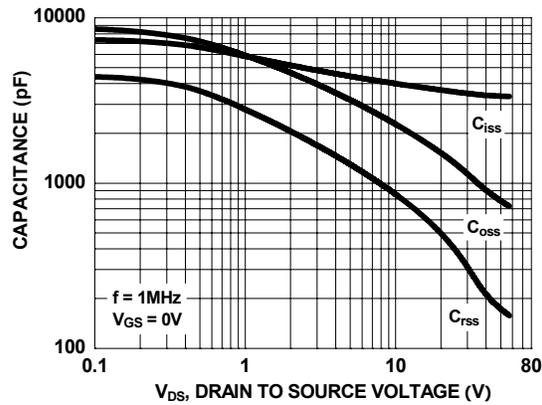**Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature**

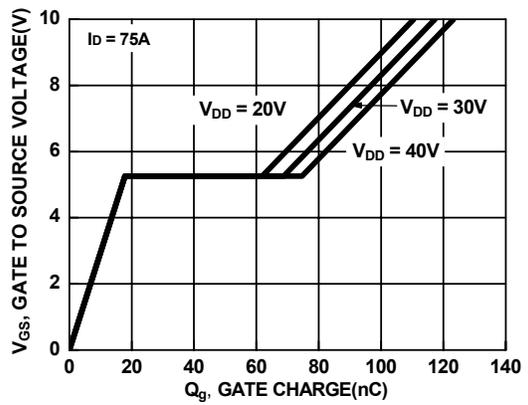**Figure 13. Capacitance vs Drain to Source Voltage**

Figure 14. Gate Charge vs Gate to Source Voltage

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Rev. I34