FAIRCHILD SEMICONDUCTOR®

October 2007

FDD5810

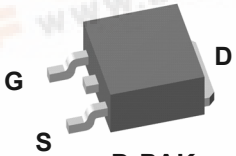
N-Channel Logic Level Trench® MOSFET 60V, 36A, 27mΩ

Features

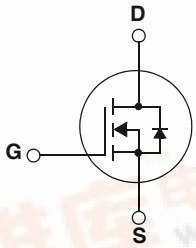
- $R_{DS(ON)}$ = 22mΩ (Typ.), V_{GS} = 5V, I_D = 29A
- $Q_{g(5)}$ = 13nC (Typ.), V_{GS} = 5V
- Low Miller Charge
- Low Q_{rr} Body Diode
- UIS Capability (Single Pulse / Repetitive Pulse)
- Qualified to AEC Q101
- RoHS Compliant

Applications

- Motor / Body Load Control
- ABS Systems
- Powertrain Management
- Injection System
- DC-DC converters and Off-line UPS
- Distributed Power Architecture and VRMs
- Primary Switch for 12V and 24V systems



D-PAK
(TO-252)



Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain to Source Voltage	60	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current Continuous (V_{GS} = 10V)	37	A
	Drain Current Continuous (V_{GS} = 5V)	33	A
	Continuous (T_A = 25°C, V_{GS} = 10V, with $R_{\theta JA}$ = 52°C/W)	7.4	A
	Pulsed	Figure 4	A
E_{AS}	Single Pulse Avalanche Energy (Note 1)	45	mJ
P_D	Power Dissipation	72	W
	Derate above 25°C	0.48	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 TO-252	2.1	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-252, 1in^2 copper pad area	52	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDD5810	FDD5810	TO-252AA	330mm	16mm	2500 units

Electrical Characteristics T_J = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
B_{VDSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 48V, V_{GS} = 0V	-	-	1	μA
		V_{DS} = 48V, V_{GS} = 0V, T_C = 150°C	-	-	250	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(TH)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA	1	1.6	2	V
$R_{DS(ON)}$	Drain to Source On Resistance	I_D = 32A, V_{GS} = 10V	-	18	22	mΩ
		I_D = 29A, V_{GS} = 5V	-	22	27	mΩ
		I_D = 32A, V_{GS} = 10V, T_J = 175°C	-	43	53	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	-	1420	1890	pF
C_{oss}	Output Capacitance		-	150	200	pF
C_{rss}	Reverse Transfer Capacitance		-	65	100	pF
R_G	Gate Resistance	f = 1MHz	-	3.5	-	Ω
Q_g	Total Gate Charge at 10V	V_{GS} = 0V to 10V, V_{DD} = 30V, I_D = 35A	-	24	34	nC
Q_g	Total Gate Charge at 5V	V_{GS} = 0V to 5V, V_{DD} = 30V, I_D = 35A	-	13	18	nC
$Q_{g(th)}$	Threshold Gate Charge	V_{GS} = 0V to 1V, V_{DD} = 30V, I_D = 35A	-	1.3	-	nC
Q_{gs}	Gate to Source Gate Charge	V_{DD} = 30V, I_D = 35A	-	4.0	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau	V_{DD} = 30V, I_D = 35A	-	2.7	-	nC
Q_{gd}	Gate to Drain “Miller” Charge	V_{DD} = 30V, I_D = 35A	-	5.0	-	nC

Switching Characteristics

t_{on}	Turn-On Time	V_{DD} = 30V, I_D = 35A V_{GS} = 5V, R_{GS} = 11Ω	-	-	130	ns
$t_{d(on)}$	Turn-On Delay Time		-	12	-	ns
t_r	Rise Time		-	75	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	26	-	ns
t_f	Fall Time		-	34	-	ns
t_{off}	Turn-Off Time		-	-	90	ns

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Voltage	I_{SD} = 32A	-	-	1.25	V
		I_{SD} = 16A	-	-	1.0	V
t_{rr}	Reverse Recovery Time	I_F = 35A, di/dt = 100A/μs	-	-	39	ns
Q_{rr}	Reverse Recovery Charge	I_F = 35A, di/dt = 100A/μs	-	-	35	nC

Notes:
1: Starting T_J = 25°C, L = 110μH, I_{AS} = 28A, V_{DD} = 54V, V_{GS} = 10V.

Typical Characteristics T_J = 25°C unless otherwise noted

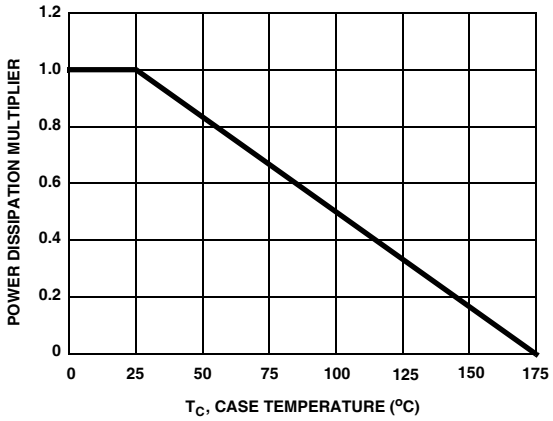


Figure 1. Normalized Power Dissipation vs Case Temperature

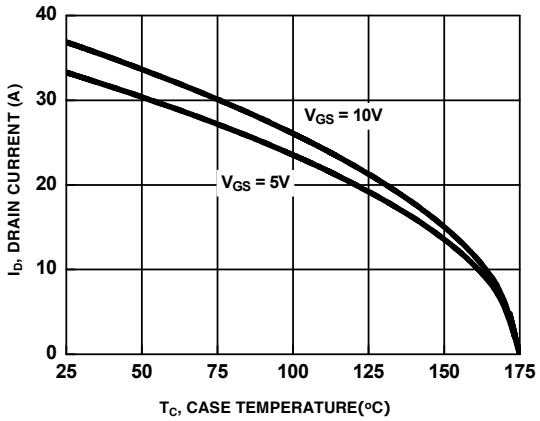


Figure 2. Maximum Continuous Drain Current vs Case Temperature

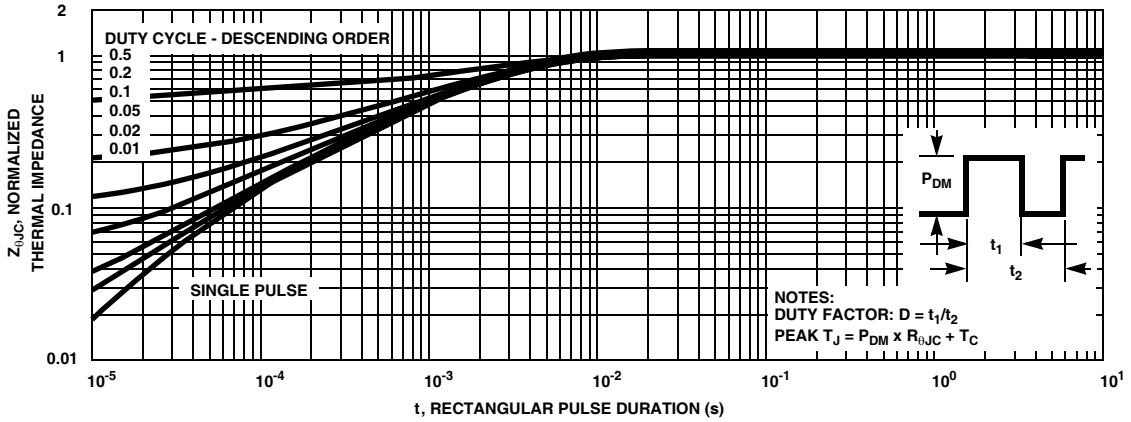


Figure 3. Normalized Maximum Transient Thermal Impedance

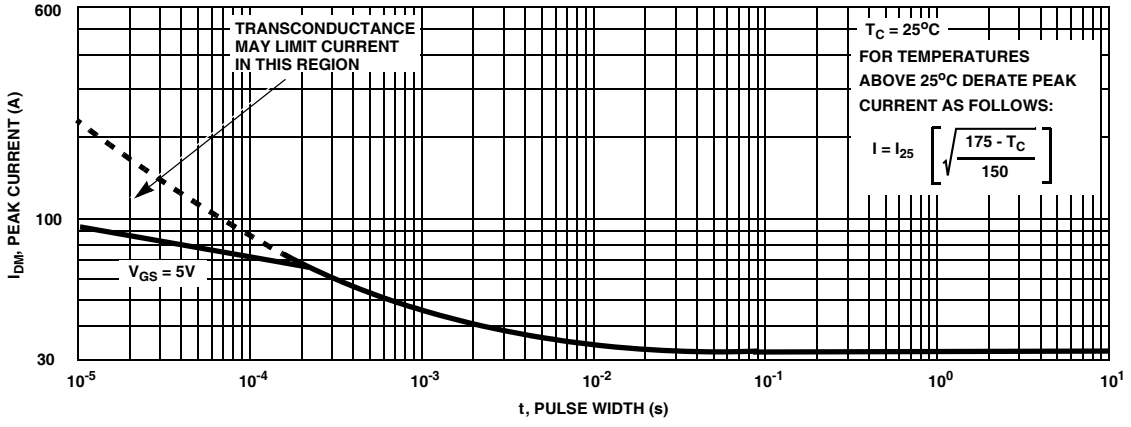


Figure 4. Peak Current Capability

Typical Characteristics T_J = 25°C unless otherwise noted

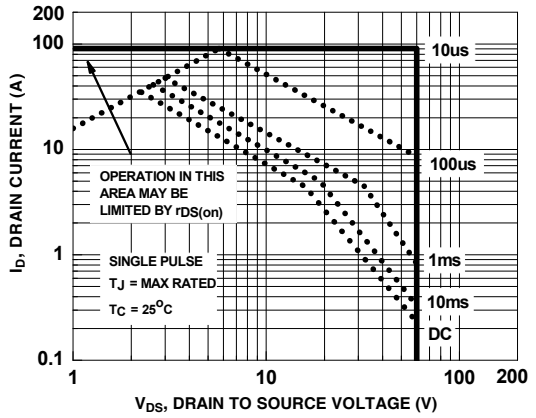
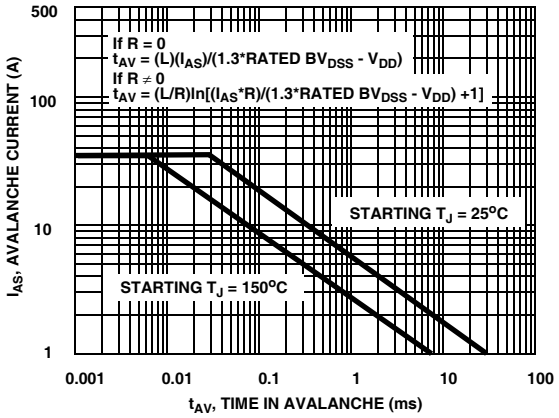


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

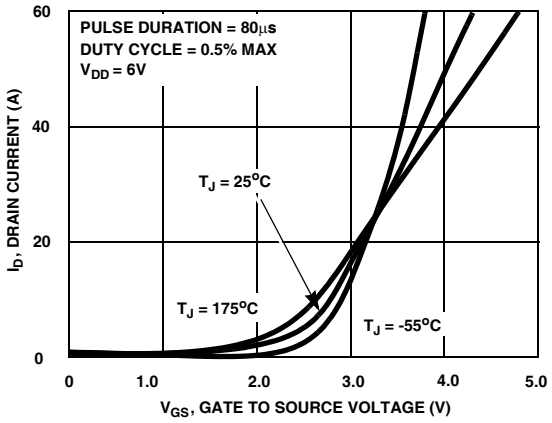


Figure 7. Transfer Characteristics

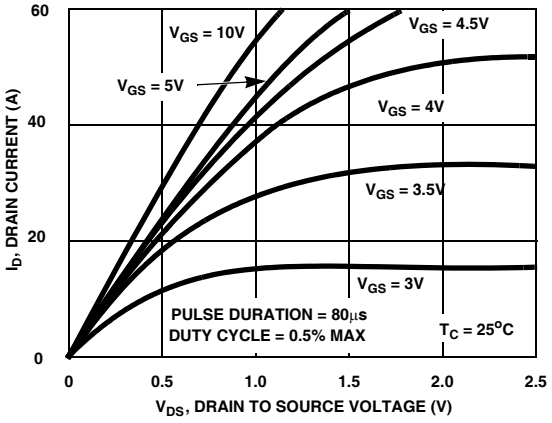


Figure 8. Saturation Characteristics

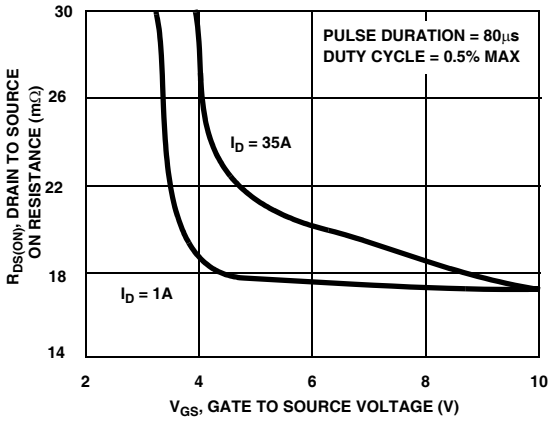


Figure 9. Drain to Source On Resistance vs Gate Voltage and Drain Current

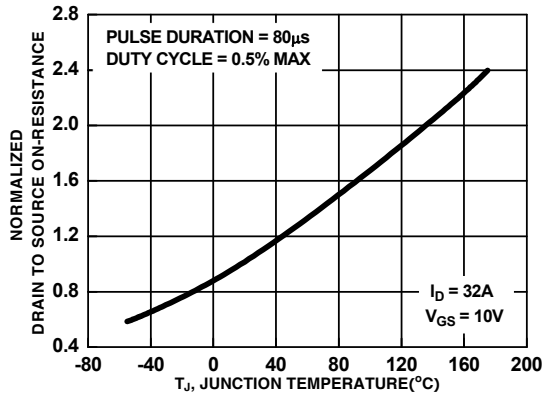


Figure 10. Normalized Drain to Source On Resistance vs Junction Temperature

Typical Characteristics T_J = 25°C unless otherwise noted

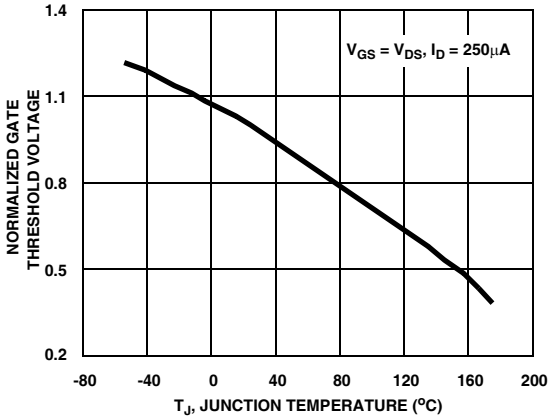


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

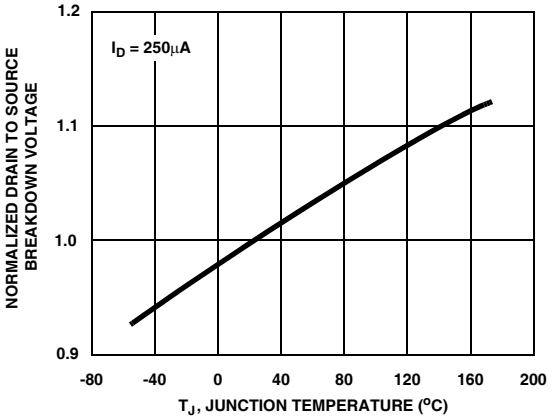


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

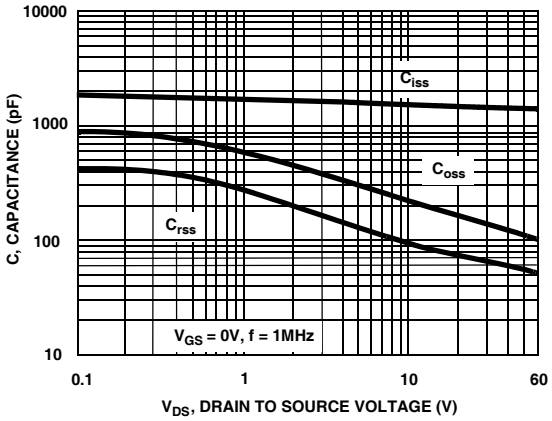


Figure 13. Capacitance vs Drain to Source Voltage

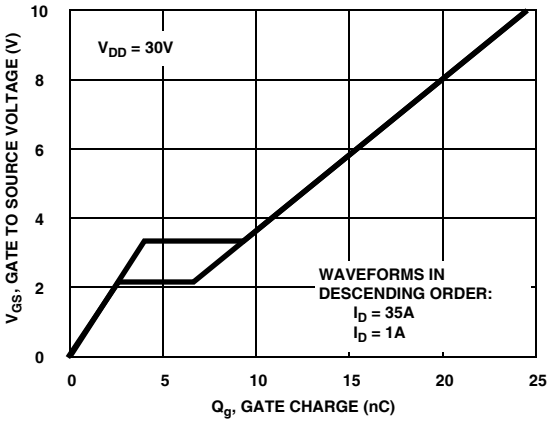


Figure 14. Gate Charge Waveforms for Constant Gate Current

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