FAIRCHILD SEMICONDUCTOR®

July 2011

FDS86106

N-Channel Power Trench® MOSFET

100 V, 3.4 A, 105 mΩ

Features

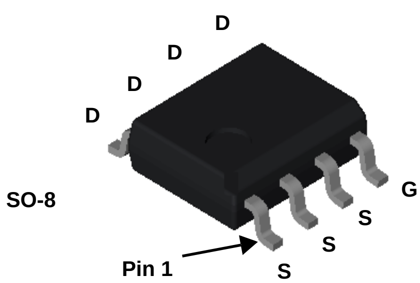
- Max $r_{DS(on)}$ = 105 mΩ at V_{GS} = 10 V, I_D = 3.4 A
- Max $r_{DS(on)}$ = 171 mΩ at V_{GS} = 6 V, I_D = 2.7 A
- High performance trench technology for extremely low $r_{DS(on)}$
- High power and current handling capability in a widely used surface mount package
- 100% UIL Tested
- RoHS Compliant

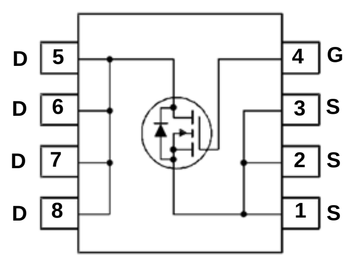
General Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced Power Trench® process that has been optimized for $r_{DS(on)}$, switching performance and ruggedness.

Applications

- Synchronous Rectifier
- Primary Switch For Bridge Topology





MOSFET Maximum Ratings T_A = 25 °C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DS}	Drain to Source Voltage	100	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current -Continuous	3.4	A
	-Pulsed	15	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	13	mJ
P_D	Power Dissipation T_A = 25 °C (Note 1a)	5.0	W
	Power Dissipation T_A = 25 °C (Note 1b)	2.5	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case (Note 1)	2.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	50	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDS86106	FDS86106	SO-8	13 ''	12 mm	2500 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
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	100			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		67		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 80 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20 V, V_{DS} = 0 V			±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 = 250 μA	2	2.9	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		-9		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 3.4 A		83	105	mΩ
		V_{GS} = 6 V, I_D = 2.7 A		115	171	
		V_{GS} = 10 V, I_D = 3.4 A, T_J = 125 °C		143	177	
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 3.4 A		6		S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C_{iss}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0 V, f = 1 MHz		156	208	pF
C_{oss}	Output Capacitance			47	62	pF
C_{rss}	Reverse Transfer Capacitance			2	3	pF
R_g	Gate Resistance			0.9		Ω

Switching Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 50 V, I_D = 3.4 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		5	10	ns
t_r	Rise Time			2	10	ns
$t_{d(off)}$	Turn-Off Delay Time			8	15	ns
t_f	Fall Time			2	10	ns
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0 V to 10 V; V_{DD} = 50 V, I_D = 3.4 A		3	4	nC
	Total Gate Charge	V_{GS} = 0 V to 5 V		1.6	2.3	nC
Q_{gs}	Total Gate Charge			0.8		nC
Q_{gd}	Gate to Drain “Miller” Charge			0.8		nC

Drain-Source Diode Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 3.4 A (Note 2)		0.86	1.3	V
		V_{GS} = 0 V, I_S = 2.1 A (Note 2)		0.83	1.2	
t_{rr}	Reverse Recovery Time	I_F = 3.4 A, di/dt = 100 A/μs		34	54	ns
Q_{rr}	Reverse Recovery Charge			22	35	nC

NOTES:
1. $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.

a) 50 °C/W when mounted on a 1 in^2 pad of 2 oz copper.

b) 125 °C/W when mounted on a minimum pad.

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0 %.
3. Starting T_J = 25 °C; N-ch: L = 3 mH, I_{AS} = 3 A, V_{DD} = 100 V, V_{GS} = 10 V.

Typical Characteristics T_J = 25 °C unless otherwise noted

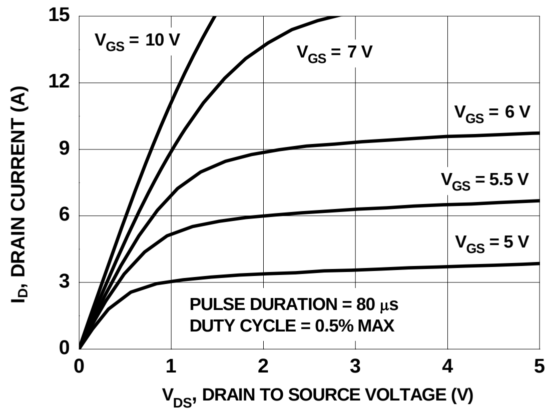


Figure 1. On-Region Characteristics

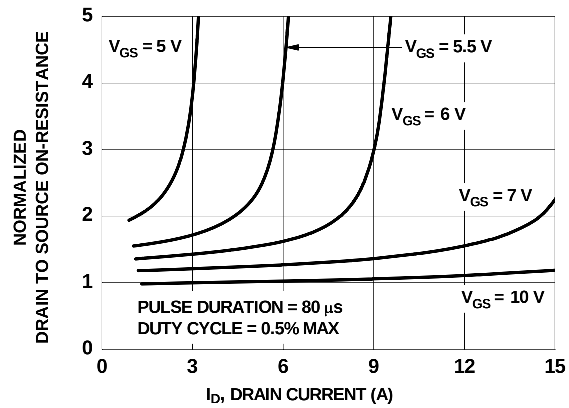


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

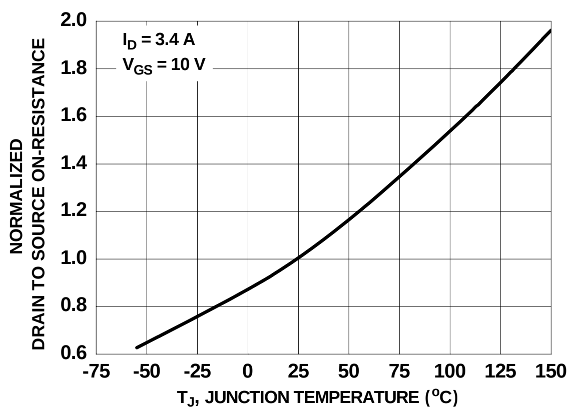


Figure 3. Normalized On-Resistance vs Junction Temperature

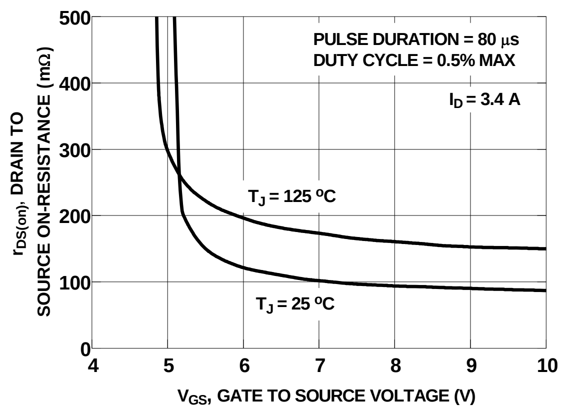


Figure 4. On-Resistance vs Gate to Source Voltage

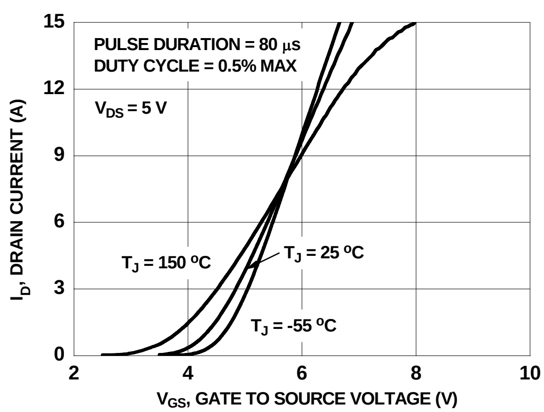


Figure 5. Transfer Characteristics

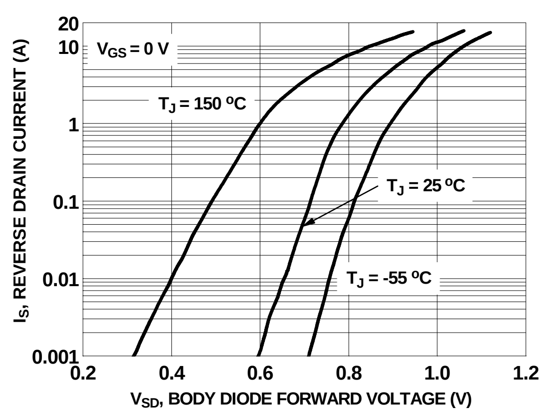


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25 °C unless otherwise noted

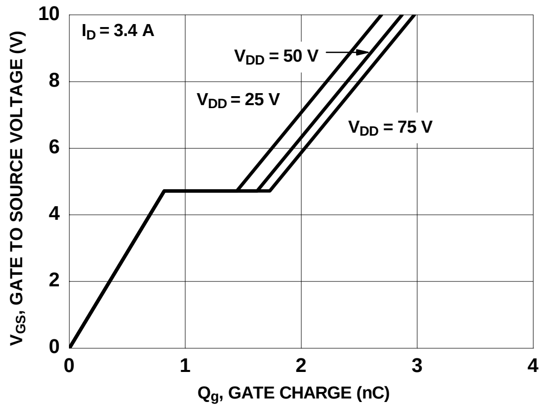


Figure 7. Gate Charge Characteristics

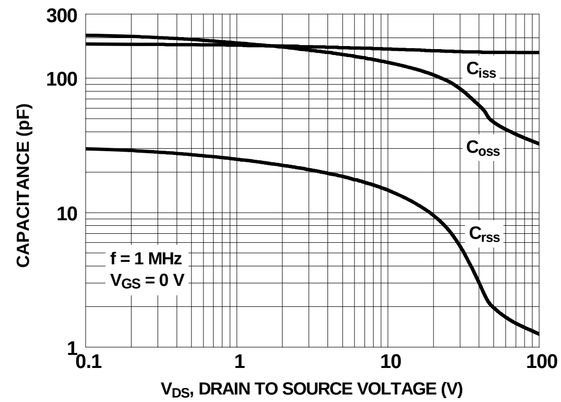


Figure 8. Capacitance vs Drain to Source Voltage

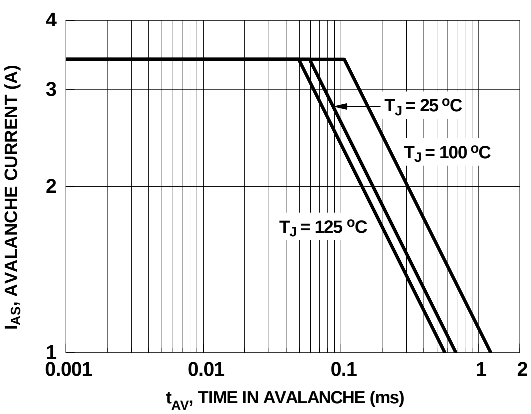


Figure 9. Unclamped Inductive Switching Capability

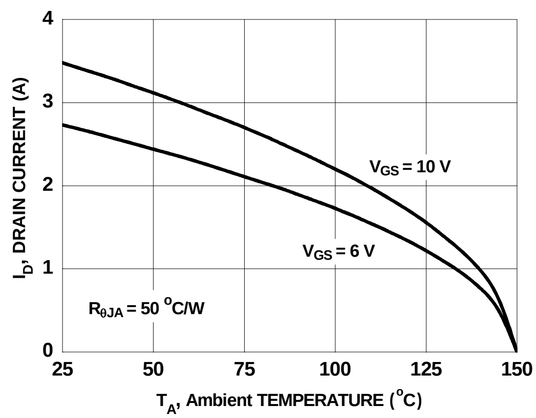


Figure 10. Maximum Continuous Drain Current vs Ambient Temperature

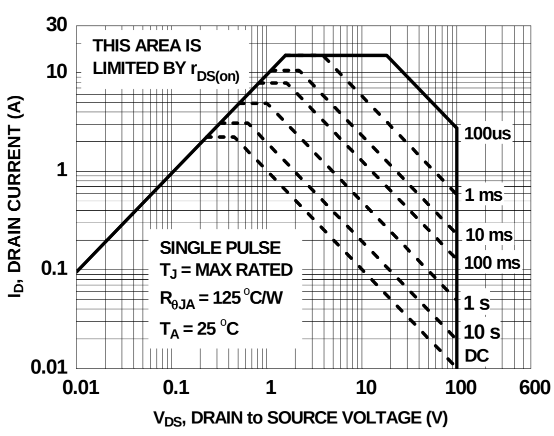


Figure 11. Forward Bias Safe Operating Area

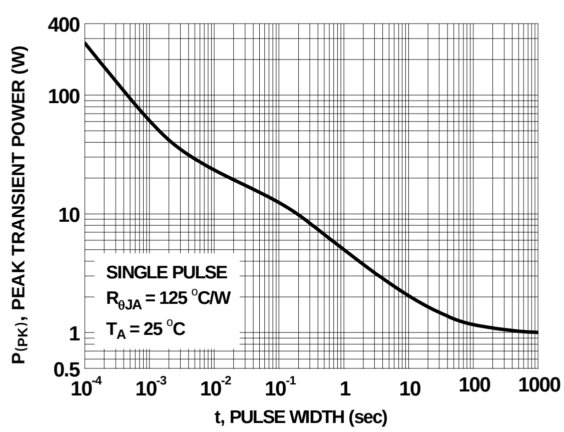


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25 °C unless otherwise noted

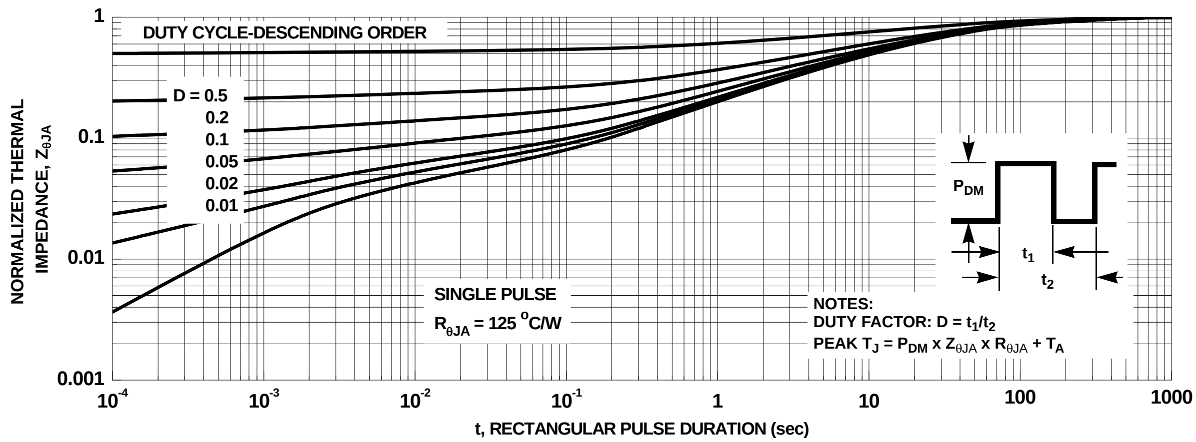


Figure 13. Junction-to-Ambient Transient Thermal Response Curve

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