FAIRCHILD SEMICONDUCTOR®

September 2012

FDMS8090

PowerTrench® Power Stage

100 V Symmetric Dual N-Channel MOSFET

Features

- Max $r_{DS(on)}$ = 13 mΩ at V_{GS} = 10 V, I_D = 10 A
- Max $r_{DS(on)}$ = 20 mΩ at V_{GS} = 6 V, I_D = 8 A
- Low inductance packaging shortens rise/fall times, resulting in lower switching losses
- MOSFET integration enables optimum layout for lower circuit inductance and reduced switch node ringing
- 100% UIL tested
- RoHS Compliant

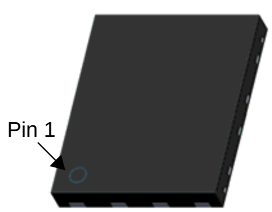
General Description

This device includes two fast switching (Qgd minimized) 100V N-Channel MOSFETs in a dual Power 56 (5 mm X 6 mm MLP) package. The package is enhanced for exceptional thermal performance.

Applications

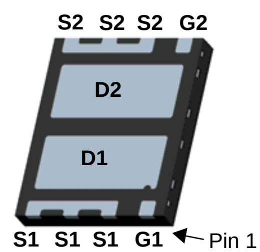
- Bridge Topologies
- Synchronous Rectifier Pair
- Motor Drives

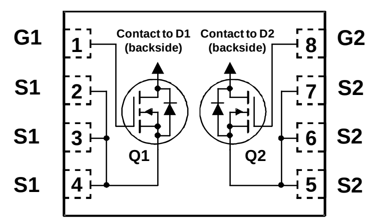
Top



Power 56

Bottom





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	T_C = 25 °C		40	A
	-Continuous	T_A = 25 °C	(Note 1a)	10	
	-Pulsed		(Note 4)	120	
E_{AS}	Single Pulse Avalanche Energy		(Note 3)	253	mJ
P_D	Power Dissipation	T_C = 25 °C		59	W
	Power Dissipation	T_A = 25 °C	(Note 1a)	2.2	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case		2.1	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	55	

Package Marking and Ordering Information

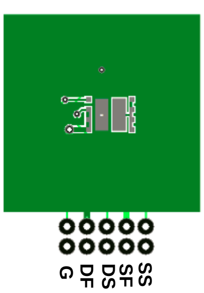
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMS8090	FDMS8090	Power 56	13 ”	12 mm	3000 units

Electrical Characteristics T_J = 25 °C unless otherwise noted

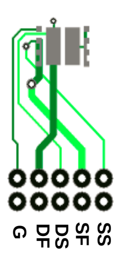
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	100			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		70		mV/°C
I_{DSS}	Zero Gate Voltage 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						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	2.0	3.0	4.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		-10		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 10 A		11	13	mΩ
		V_{GS} = 6 V, I_D = 8 A		15	20	
		V_{GS} = 10 V, I_D = 10 A, T_J = 125 °C		18	20	
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 10 A		24		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0 V, f = 1 MHz		1285	1800	pF
C_{oss}	Output Capacitance			301	400	pF
C_{rss}	Reverse Transfer Capacitance			16	28	pF
R_g	Gate Resistance		0.1	1.7	3.5	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 50 V, I_D = 10 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		10.6	21	ns
t_r	Rise Time			4.6	10	ns
$t_{d(off)}$	Turn-Off Delay Time			17.4	31	ns
t_f	Fall Time			4	10	ns
Q_g	Total Gate Charge	V_{GS} = 0 V to 10 V; V_{DD} = 50 V, I_D = 10 A		19	27	nC
Q_g	Total Gate Charge	V_{GS} = 0 V to 5 V; V_{DD} = 50 V, I_D = 10 A		10	15	nC
Q_{gs}	Gate to Source Charge	V_{DD} = 50 V, I_D = 10 A		6.1		nC
Q_{gd}	Gate to Drain "Miller" Charge	V_{DD} = 50 V, I_D = 10 A		4.1		nC
Drain-Source Diode Characteristics						
V_{SD}	Source-Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 2 A (Note 2)		0.7	1.2	V
		V_{GS} = 0 V, I_S = 10 A (Note 2)		0.8	1.3	
t_{rr}	Reverse Recovery Time	I_F = 10 A, di/dt = 100 A/μs		49	78	ns
Q_{rr}	Reverse Recovery Charge			54	86	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. 55 °C/W when mounted on a 1 in^2 pad of 2 oz copper.



b. 138 °C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.
3. E_{AS} of 253 mJ is based on starting T_J = 25 °C; N-ch: L = 3 mH, I_{AS} = 13 A, V_{DD} = 100 V, V_{GS} = 10 V. 100% test at L = 0.3 mH, I_{AS} = 29 A.
4. Pulsed Id limited by junction temperature,td<=10uS. Please refer to SOA curve for more details.

Typical Characteristics T_J = 25 °C unless otherwise noted

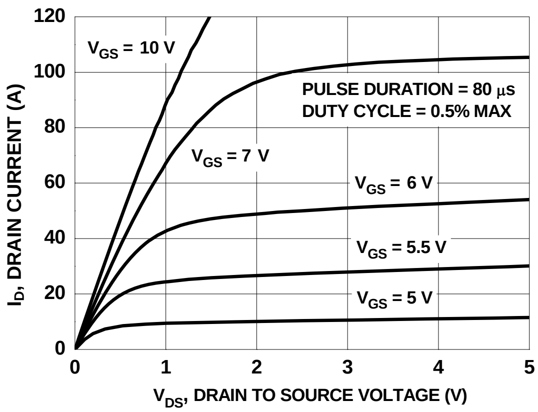


Figure 1. On Region Characteristics

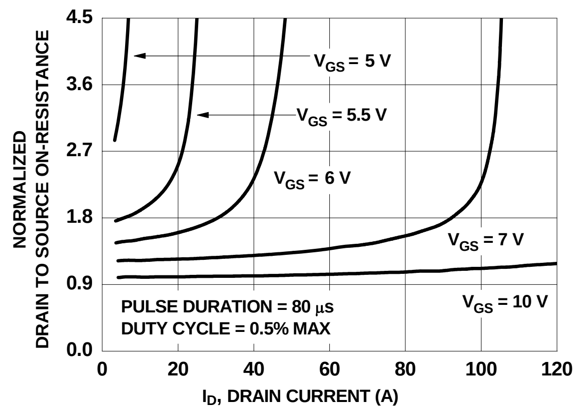


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

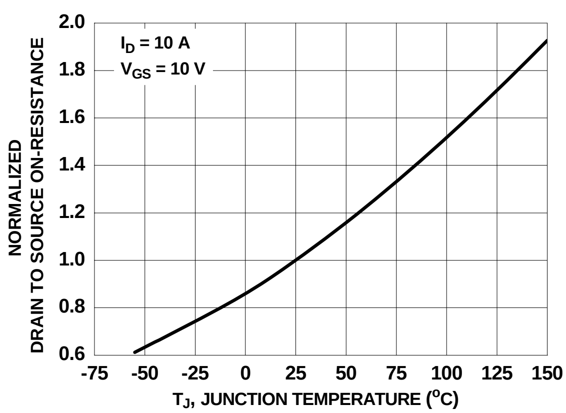


Figure 3. Normalized On Resistance vs Junction Temperature

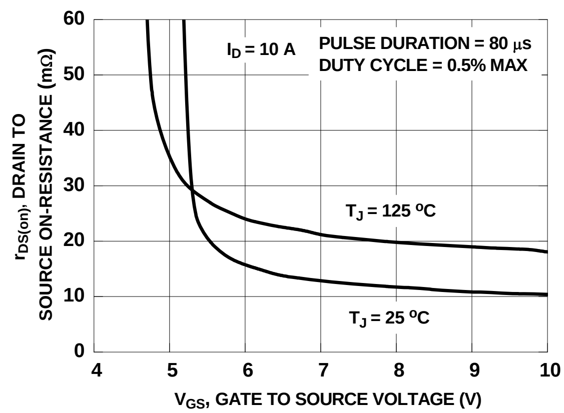


Figure 4. On-Resistance vs Gate to Source Voltage

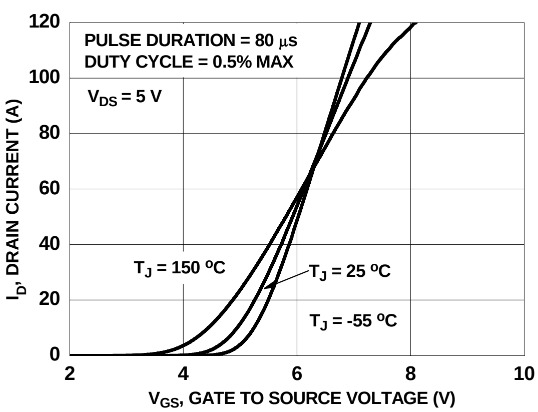


Figure 5. Transfer Characteristics

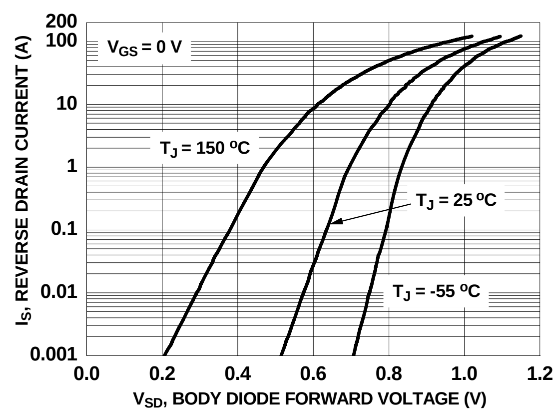


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25 °C unless otherwise noted

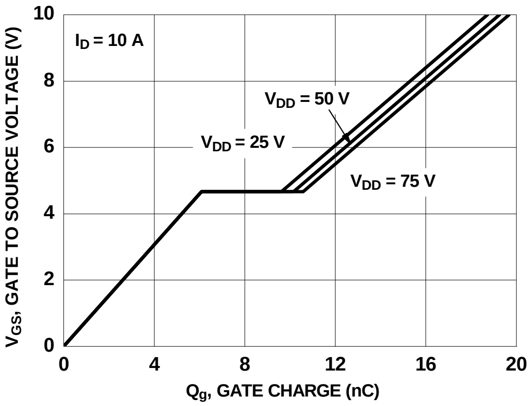


Figure 7. Gate Charge Characteristics

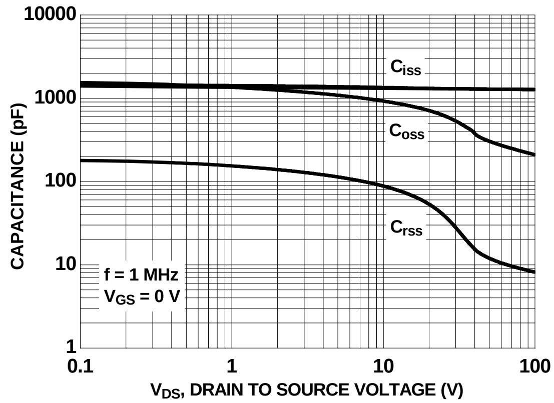


Figure 8. Capacitance vs Drain to Source Voltage

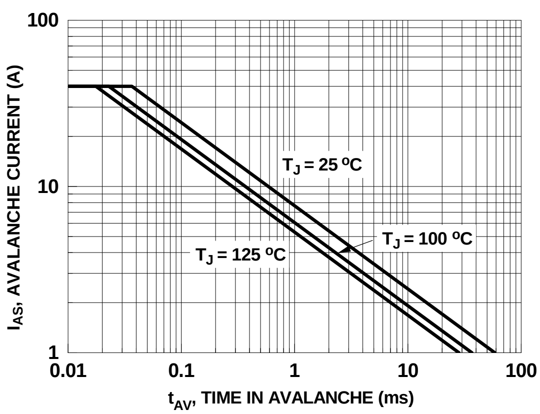


Figure 9. Unclamped Inductive Switching Capability

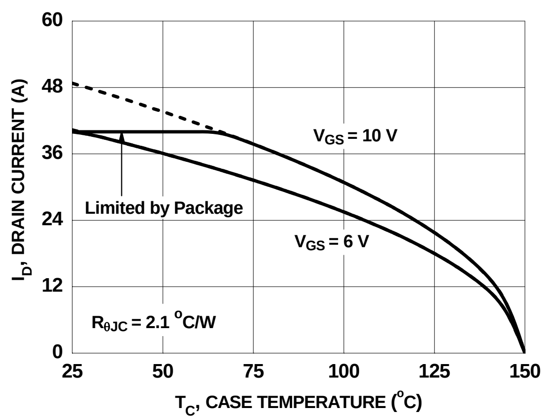


Figure 10. Maximum Continuous Drain Current vs Case Temperature

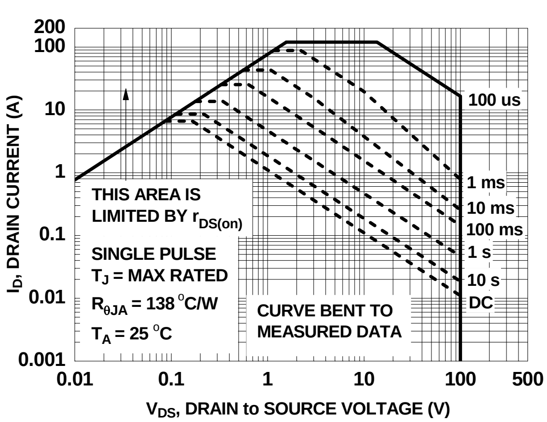


Figure 11. Forward Bias Safe Operating Area

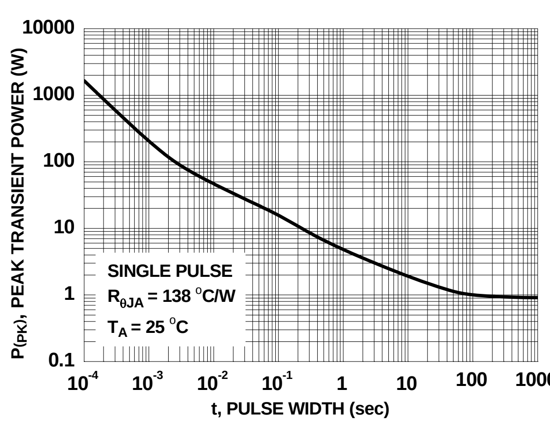


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25 °C unless otherwise noted

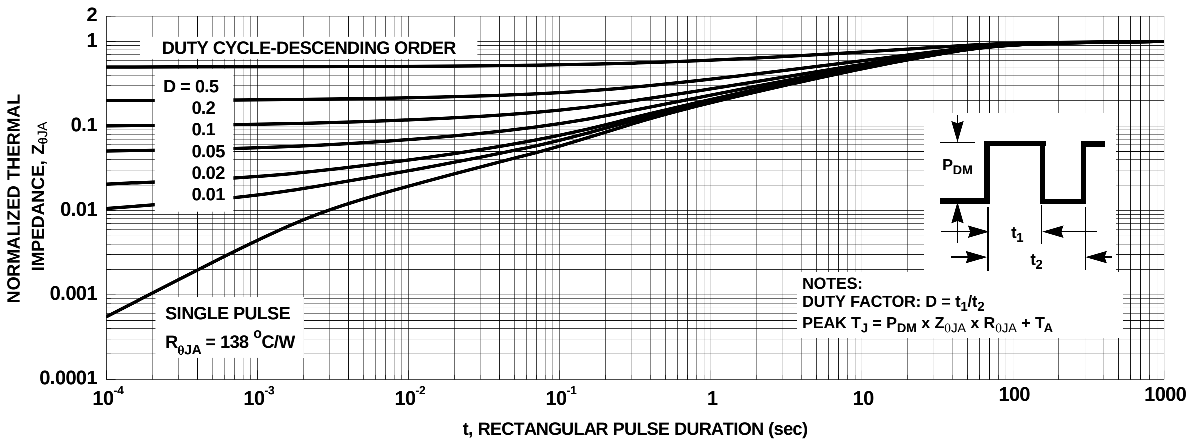
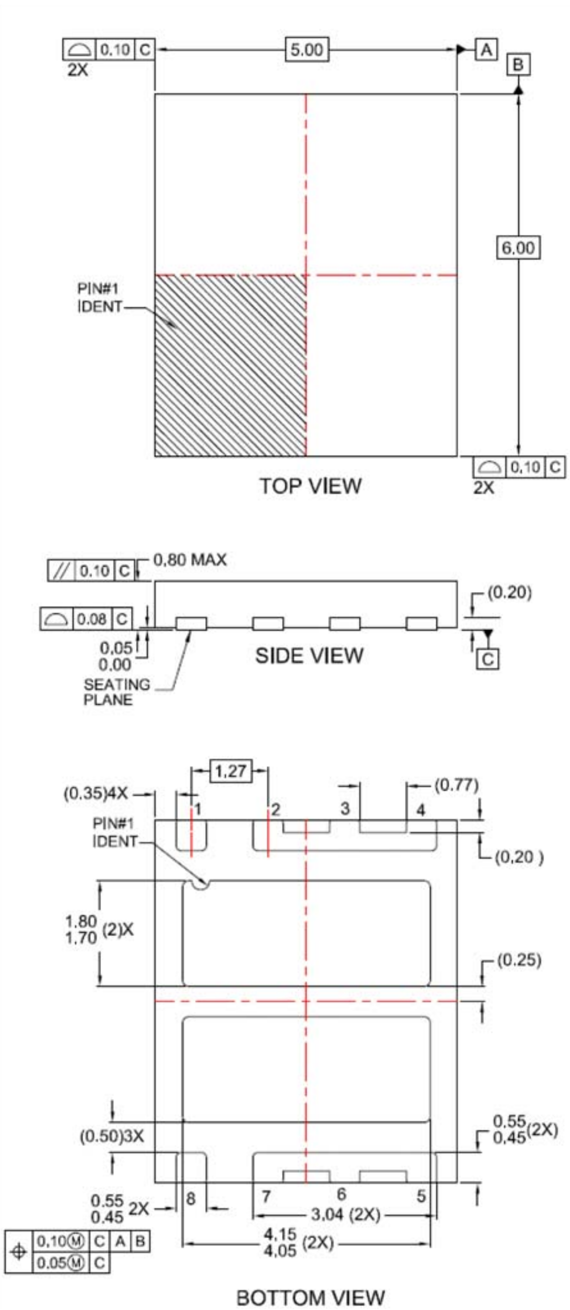
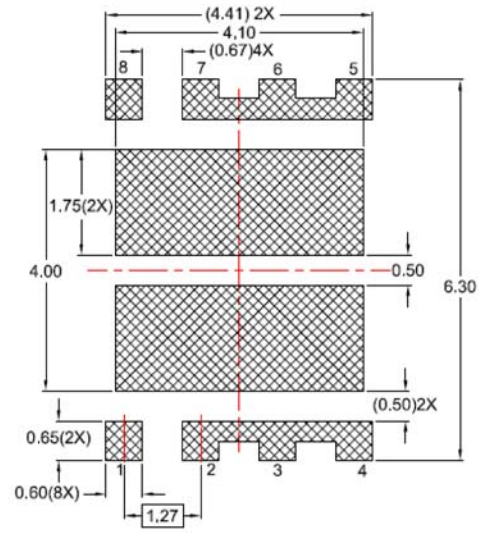


Figure 13. Junction-to-Ambient Transient Thermal Response Curve

Dimensional Outline and Pad Layout





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C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.

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