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April 2016

FDMS86101

N-Channel PowerTrench® MOSFET 100 V, 60 A, 8 m Ω

Features

- Max $r_{DS(on)}$ = 8 m Ω at V_{GS} = 10 V, I_D = 13 A
- Max $r_{DS(on)}$ = 13.5 m Ω at V_{GS} = 6 V, I_D = 9.5 A
- Advanced Package and Silicon combination for low r_{DS(on)} and high efficiency
- MSL1 robust package design
- 100% UIL tested
- 100% Rg tested
- RoHS Compliant

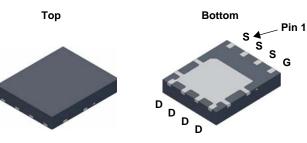


General Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced Power Trench® process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Application

■ DC-DC Conversion





MOSFET Maximum Ratings T_A = 25 °C unless otherwise noted

Symbol	Param	eter		Ratings	Units
V _{DS}	Drain to Source Voltage			100	V
V _{GS}	Gate to Source Voltage			±20	V
	Drain Current -Continuous	T _C = 25 °C		60	
I _D	-Continuous	T _A = 25 °C	(Note 1a)	12.4	Α
	-Pulsed			200	
E _{AS}	Single Pulse Avalanche Energy		(Note 3)	173	mJ
D	Power Dissipation	T _C = 25 °C		104	W
P_{D}	Power Dissipation	T _A = 25 °C	(Note 1a)	2.5	VV
T _J , T _{STG}	Operating and Storage Junction Tempera	ature Range		-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.2	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	50	C/VV

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMS86101	FDMS86101	Power 56	13 "	12 mm	3000 units

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

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
Off Chara	acteristics					
BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V$	100			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μ A, referenced to 25 °C		66		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 80 V, V _{GS} = 0 V			800	nA
I _{GSS}	Gate to Source Leakage Current, Forward	V _{GS} = ±20 V, V _{DS} = 0 V			100	nA

On Characteristics

V _{GS(th)}	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu A$	2.0	2.9	4.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μ A, referenced to 25 °C		-9		mV/°C
		$V_{GS} = 10 \text{ V}, I_D = 13 \text{ A}$		6.3	8	
r _{DS(on)} Static Drain to Source On Resistance	$V_{GS} = 6 \text{ V}, I_D = 9.5 \text{ A}$		8.4	13.5	mΩ	
	$V_{GS} = 10 \text{ V}, I_D = 13 \text{ A}, T_J = 125 ^{\circ}\text{C}$		10.9	14		
9 _{FS}	Forward Transconductance	V _{DS} = 10 V, I _D = 13 A		45		S

Dynamic Characteristics

C _{iss}	Input Capacitance	V 50.V.V 0.V		2255	3000	pF
C _{oss}	Output Capacitance	$V_{DS} = 50 \text{ V}, V_{GS} = 0 \text{ V},$ $f = 1 \text{ MHz}$		460	610	pF
C _{rss}	Reverse Transfer Capacitance	1 - 1 1/11 12		30	45	pF
R_g	Gate Resistance		0.1	1.0	3.0	Ω

Switching Characteristics

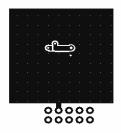
t _{d(on)}	Turn-On Delay Time		$V_{DD} = 50 \text{ V}, I_{D} = 13 \text{ A},$ $V_{GS} = 10 \text{ V}, R_{GEN} = 6 \Omega$		15	27	ns
t _r	Rise Time	V _{DD} = 50 V, I _D = 13			11	20	ns
t _{d(off)}	Turn-Off Delay Time	V _{GS} = 10 V, R _{GEN}			27	44	ns
t _f	Fall Time				7	13	ns
Qg	Total Gate Charge	V _{GS} = 0 V to 10 V			39	55	nC
Qg	Total Gate Charge	$V_{GS} = 0 \text{ V to 5 V}$	$V_{DD} = 50 \text{ V},$		22	31	nC
Q _{gs}	Gate to Source Charge		$I_{D} = 13 \text{ A}$		9.5		nC
Q_{gd}	Gate to Drain "Miller" Charge				10.8		nC

Drain-Source Diode Characteristics

V _{CD} Source to Drain Diode Forward Voltage	Source to Drain Diado, Forward Voltage	$V_{GS} = 0 \text{ V}, I_{S} = 2.1 \text{ A}$ (Note 2)		0.7	1.2	W
	$V_{GS} = 0 \text{ V}, I_{S} = 13 \text{ A}$ (Note 2)		0.8	1.3	v	
t _{rr}	Reverse Recovery Time	I _F = 13 A, di/dt = 100 A/μs		56	90	ns
Q _{rr}	Reverse Recovery Charge			61	98	nC

Notes:

^{1.} R_{0JA} is determined with the device mounted on a 1 in² pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. R_{0JC} is guaranteed by design while R_{0CA} is determined by the user's board design.



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



 b. 125 °C/W when mounted on a minimum pad of 2 oz copper.

- 2. Pulse Test: Pulse Width < 300 $\mu\text{s},$ Duty cycle < 2.0%.
- 3. E_{AS} of 173 mJ is based on starting T_J = 25 °C, L = 0.3 mH, I_{AS} = 34 A, V_{DD} = 75 V, V_{GS} = 10 V. 100% test at L = 0.1 mH, I_{AS} = 49 A.

Typical Characteristics T_J = 25 °C unless otherwise noted

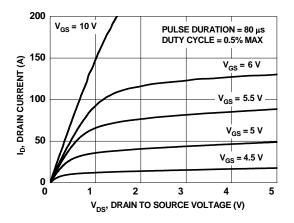


Figure 1. On Region Characteristics

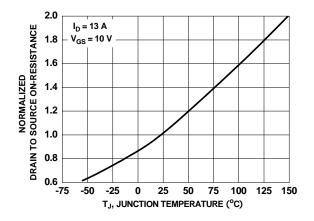


Figure 3. Normalized On Resistance vs Junction Temperature

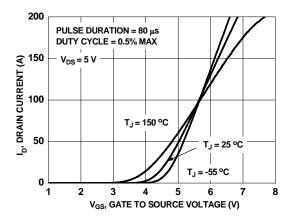


Figure 5. Transfer Characteristics

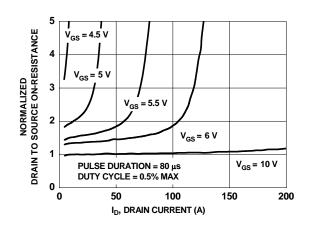


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

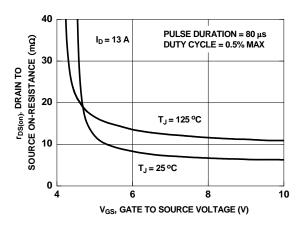


Figure 4. On-Resistance vs Gate to Source Voltage

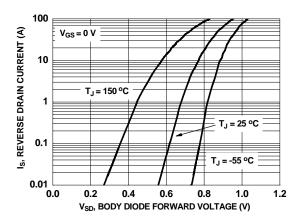


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

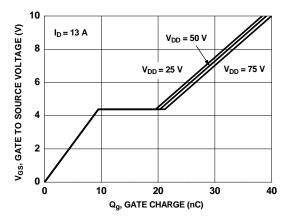


Figure 7. Gate Charge Characteristics

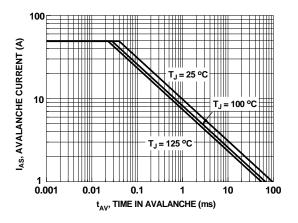


Figure 9. Unclamped Inductive Switching Capability

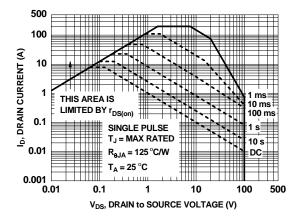


Figure 11. Forward Bias Safe Operating Area

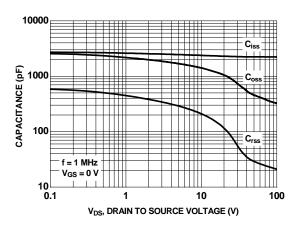


Figure 8. Capacitance vs Drain to Source Voltage

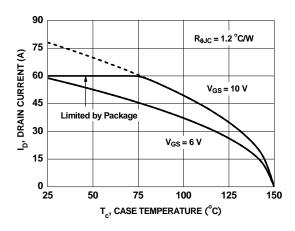


Figure 10. Maximum Continuous Drain Current vs Case Temperature

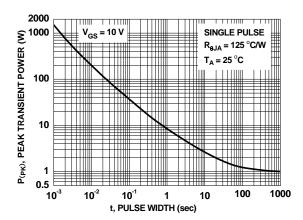


Figure 12. Single Pulse Maximum Power Dissipation

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

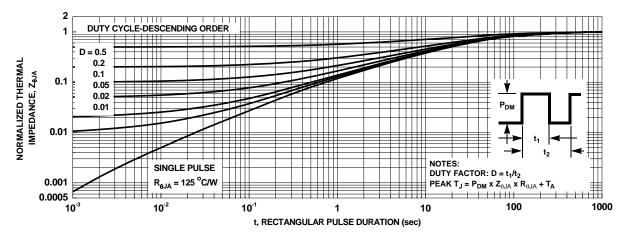
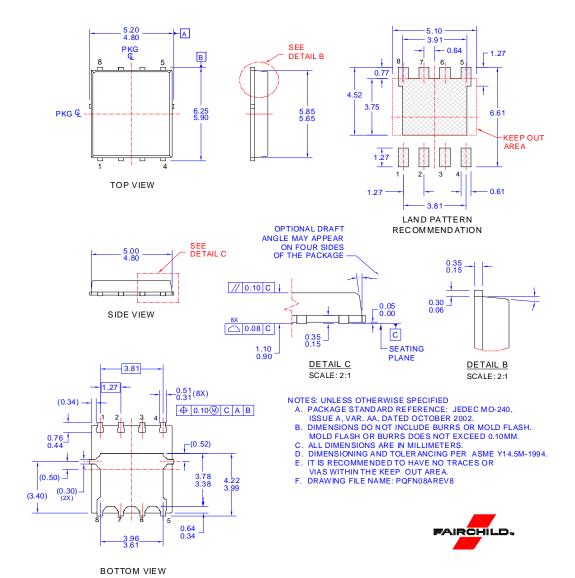


Figure 13. Junction-to-Ambient Transient Thermal Response Curve

Dimensional Outline and Pad Layout







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