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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild <a href="general-regarding-numbers-n

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January 2014

FDMS5360L_F085

N-Channel Power Trench® MOSFET **60V**, **60A**, **8.5m** Ω

Features

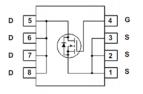
- Typ $r_{DS(on)}$ = 6.5m Ω at V_{GS} = 10V, I_D = 60A
- Typ $Q_{g(tot)}$ = 64nC at V_{GS} = 10V, I_D = 60A
- UIS Capability
- RoHS Compliant
- Qualified to AEC Q101

Applications

- Automotive Engine Control
- Powertrain Management
- Solenoid and Motor Drivers
- Integrated Starter/alternator
- Primary Switch for 12V Systems







For current package drawing, please refer to the Fairchild website at www.fairchildsemi.com/packaging

MOSFET Maximum Ratings T_{.1} = 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
	Drain Current - Continuous (V_{GS} =10) (Note 1) T_C = 25°C		60	^
ID	Pulsed Drain Current	T _C = 25°C	See Figure4	Α
E _{AS}	Single Pulse Avalanche Energy	(Note 2)	115	mJ
D	Power Dissipation		150	W
P_D	Derate above 25°C		1	W/°C
T _J , T _{STG}	Operating and Storage Temperature		-55 to + 175	°C
$R_{\theta JC}$	Thermal Resistance Junction to Case		1	°C/W
$R_{\theta JA}$	Maximum Thermal Resistance Junction to Ambient	(Note 3)	50	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMS5360L	FDMS5360L_F085	Power 56	13"	12mm	3000 units

- 1: Current is limited by junction temperature.
- Starting T_J = 25°C, L = 0.1mH, I_{AS} = 48A, V_{DD} = 60V during inductor charging and V_{DD} = 0V during time in avalanche
 R_{0,JA} is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design. The maximum rating presented here is based on mounting on a 1 in² pad of 2oz copper.

Units

Max

Тур

Electrical Characteristics $T_J = 25^{\circ}C$ unless otherwise noted

Parameter

Off Characteristics								
B _{VDSS}	Drain to Source Breakdown Voltage	I _D = 250μA, \	/ _{GS} = 0V	60	-	-	V	
1	Drain to Source Leakage Current	V _{DS} =60V,	$T_{J} = 25^{\circ}C$	-	-	1	μΑ	
IDSS		$V_{GS} = 0V$	$T_J = 175^{\circ}C(Note 4)$	-	-	1	mA	
I _{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20V$		-	-	±100	nA	

Test Conditions

Min

On Characteristics

Symbol

V _{GS(th)}	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_{C}$	₎ = 250μA	1.0	1.9	3.0	V
	Drain to Source On Resistance	I _D = 60A,	$T_J = 25^{\circ}C$	-	6.5	8.5	mΩ
_		V _{GS} = 10V	$T_J = 175^{\circ}C(Note 4)$	-	14.3	17.5	mΩ
r _{DS(on)}		I _D = 60A,	$T_J = 25^{\circ}C$	-	8.7	10.5	mΩ
		V _{GS} = 4.5V	$T_J = 175^{\circ}C(Note 4)$	-	18.2	21.6	mΩ

Dynamic Characteristics

C _{iss}	Input Capacitance	-V _{DS} = 30V, V _{GS} = 0V, -f = 1MHz		-	3695	-	pF
C _{oss}	Output Capacitance			-	295	-	pF
C _{rss}	Reverse Transfer Capacitance			-	155	-	pF
R_g	Gate Resistance	f = 1MHz		-	1.3	-	Ω
$Q_{g(ToT)}$	Total Gate Charge at 10V	$V_{GS} = 0 \text{ to } 10V$ $V_{DD} = 48V$ $I_{D} = 60A$		-	64	72	nC
$Q_{g(th)}$	Threshold Gate Charge			-	6.5	7.8	nC
Q_{gs}	Gate to Source Gate Charge		_	-	13.8	-	nC
Q_{gd}	Gate to Drain "Miller" Charge			-	13.5	-	nC

Switching Characteristics

t _{on}	Turn-On Time	V_{DD} = 30V, I_{D} = 60A, V_{GS} = 10V, R_{GEN} = 6 Ω	-	-	40	ns
t _{d(on)}	Turn-On Delay Time		-	22	-	ns
t _r	Rise Time		-	14	-	ns
t _{d(off)}	Turn-Off Delay Time		-	79	-	ns
t _f	Fall Time		-	16	-	ns
t _{off}	Turn-Off Time		-	-	104	ns

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Voltage	I _{SD} = 60A, V _{GS} = 0V	-	-	1.25	V
T _{rr}	Reverse Recovery Time	$I_F = 60A$, $dI_{SD}/dt = 100A/\mu s$,	-	36	41	ns
Q _{rr}	Reverse Recovery Charge	V _{DD} =48V	-	36	45	nC

Notes

4: The maximum value is specified by design at T_J = 175°C. Product is not tested to this condition in production.

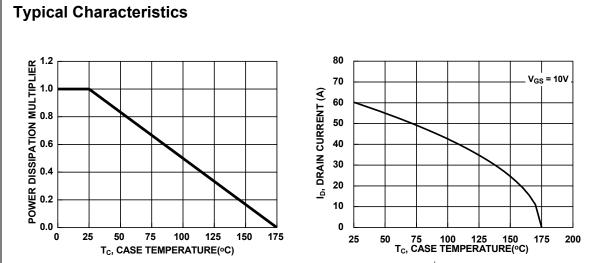


Figure 1. Normalized Power Dissipation vs Case Temperature

Figure 2. Maximum Continuous Drain Current vs Case Temperature

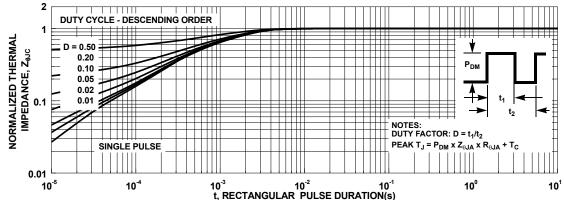


Figure 3. Normalized Maximum Transient Thermal Impedance

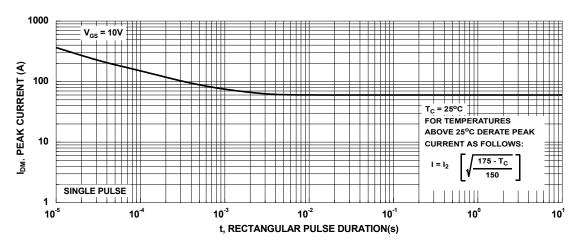


Figure 4. Peak Current Capability

Typical Characteristics

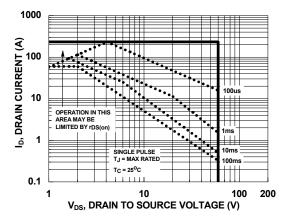
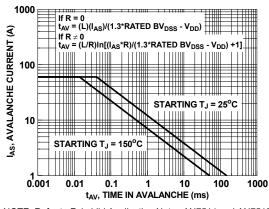


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching

Capability

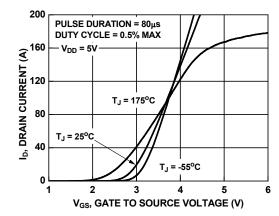


Figure 7. Transfer Characteristics

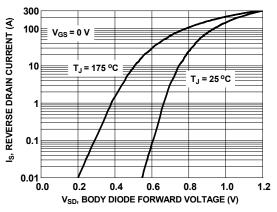


Figure 8. Forward Diode Characteristics

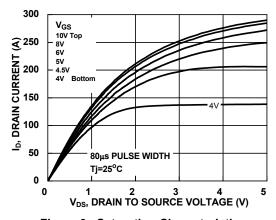


Figure 9. Saturation Characteristics

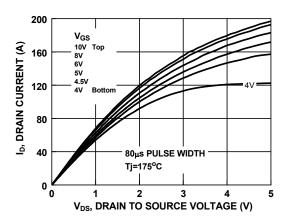


Figure 10. Saturation Characteristics

Typical Characteristics

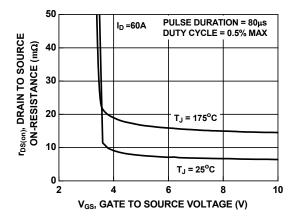


Figure 11. Rdson vs Gate Voltage

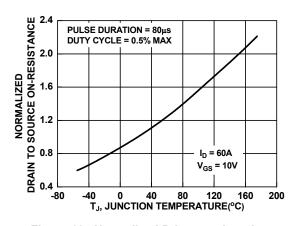


Figure 12. Normalized Rdson vs Junction Temperature

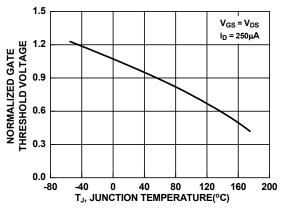


Figure 13. Normalized Gate Threshold Voltage vs
Temperature

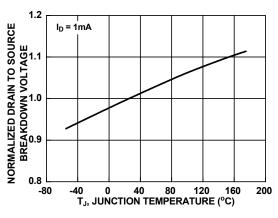


Figure 14. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

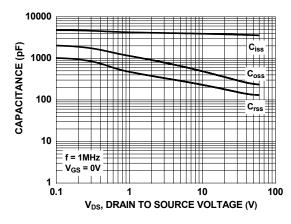


Figure 15. Capacitance vs Drain to Source Voltage

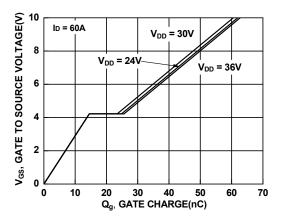
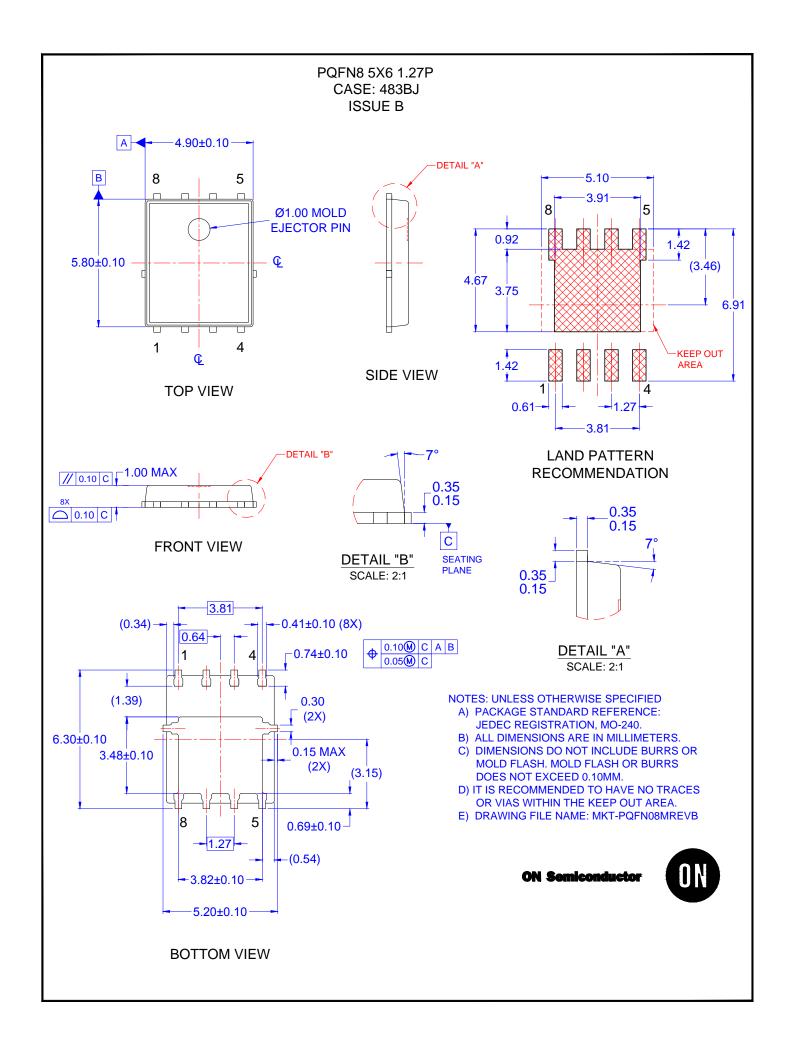


Figure 16. Gate Charge vs Gate to Source Voltage



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