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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_questions@onsemi.com.

FAIRCHILD

July 2016

FDMC2610
N-Channel UltraFET Trench® MOSFET
200V, 9.5A, 200mΩ

Features

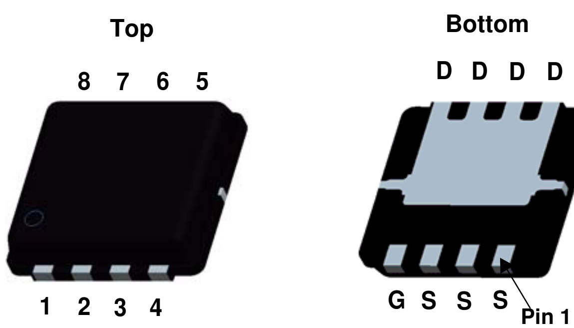
- Max $r_{DS(on)}$ = 200mΩ at V_{GS} = 10V, I_D = 2.2A
- Max $r_{DS(on)}$ = 215mΩ at V_{GS} = 6V, I_D = 1.5A
- Low Profile - 1mm Max in a Power 33
- RoHS Compliant

General Description

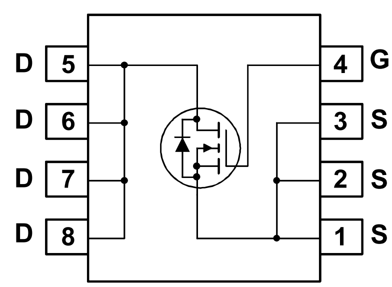
This N-Channel MOSFET is a rugged gate version of Fairchild Semiconductor's advanced Power Trench process. It has been optimized for power management applications.

Application

- DC - DC Conversion



MLP 3.3x3.3



MOSFET Maximum Ratings T_A = 25°C unless otherwise noted.

Symbol	Parameter	Ratings	Units
V_{DS}	Drain to Source Voltage	200	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current -Continuous (Silicon limited) T_C = 25°C	9.5	A
	-Continuous T_A = 25°C (Note 1a)	2.2	
	-Pulsed	15	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	6	mJ
P_D	Power Dissipation T_C = 25°C	42	W
	Power Dissipation T_A = 25°C (Note 1a)	2.1	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	3	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	60	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMC2610	FDMC2610	MLP 3.3x3.3	13 ”	12 mm	3000 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	$I_D = 250\mu A$, $V_{GS} = 0V$	200			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu A$, referenced to 25°C		199		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 160V$, $V_{GS} = 0V$			1	µA
		$V_{DS} = 160V$, $V_{GS} = 0V$, $T_J = 125°C$			100	µA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20V$, $V_{DS} = 0V$			±100	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\mu A$	2	3.2	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\mu A$, referenced to 25°C		-9.9		mV/°C
$r_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = 10V$, $I_D = 2.2A$		175	200	mΩ
		$V_{GS} = 6V$, $I_D = 1.5A$		188	215	mΩ
		$V_{GS} = 10V$, $I_D = 2.2A$, $T_J = 125°C$		347	397	mΩ
g_{FS}	Forward Transconductance	$V_{DS} = 5V$, $I_D = 2.2A$		7		S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
C_{iss}	Input Capacitance	$V_{DS} = 100V$, $V_{GS} = 0V$, f = 1MHz		720	960	pF
C_{oss}	Output Capacitance			41	55	pF
C_{rss}	Reverse Transfer Capacitance			12	20	pF
R_g	Gate Resistance	f = 1MHz		0.7		Ω

Switching Characteristics

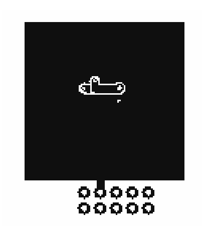
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 100V$, $I_D = 2.2A$, $V_{GS} = 10V$, $R_{GEN} = 24\Omega$		17	31	ns
t_r	Rise Time			13	24	ns
$t_{d(off)}$	Turn-Off Delay Time			29	47	ns
t_f	Fall Time			16	29	ns
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0V$ to $10V$; $V_{DD} = 100V$, $I_D = 2.2A$		12.3	18	nC
Q_{gs}	Gate to Source Gate Charge	$V_{DD} = 100V$, $I_D = 2.2A$		3		nC
Q_{gd}	Gate to Drain "Miller" Charge			3.6		nC

Drain-Source Diode Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0V$, $I_S = 2.2A$ (Note 2)		0.8	1.2	V
t_{rr}	Reverse Recovery Time	$I_F = 2.2A$, $di/dt = 100A/\mu s$		69	104	ns
Q_{rr}	Reverse Recovery Charge			114	171	nC

Notes:

1: $R_{\theta JA}$ is determined with the device mounted on a 1in^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. 60°C/W when mounted on a 1 in^2 pad of 2 oz copper

b. 135°C/W when mounted on a minimum pad of 2 oz copper

2: Pulse Test: Pulse Width < 300µs, Duty cycle < 2.0%.

3. Starting $T_J = 25$ °C; N-ch: L = 3 mH, $I_{AS} = 2$ A, $V_{DD} = 200$ V, $V_{GS} = 10$ V.

Typical Characteristics T_J = 25°C unless otherwise noted.

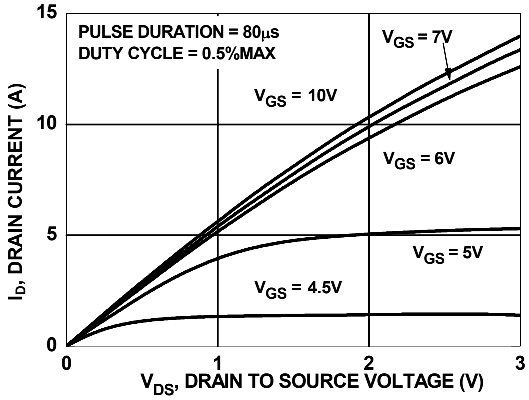


Figure 1. On-Region Characteristics

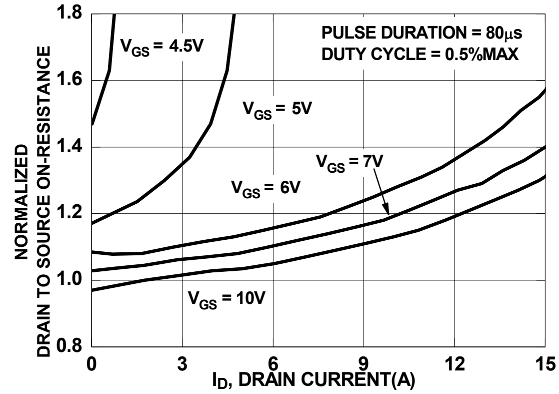


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

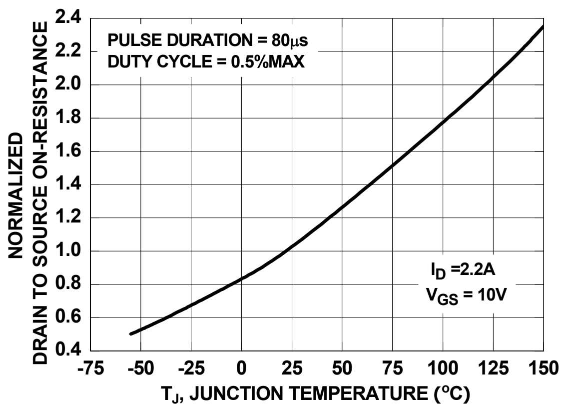


Figure 3. Normalized On-Resistance vs Junction Temperature

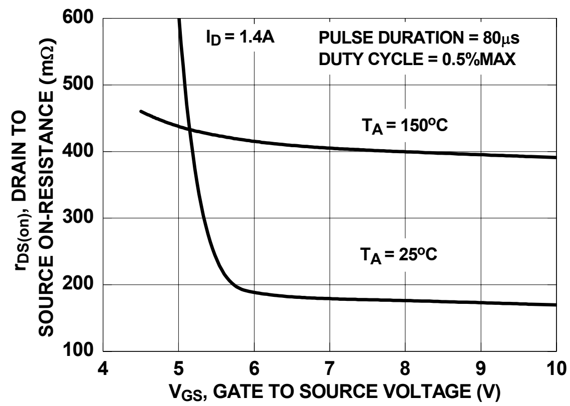


Figure 4. On-Resistance vs Gate to Source Voltage

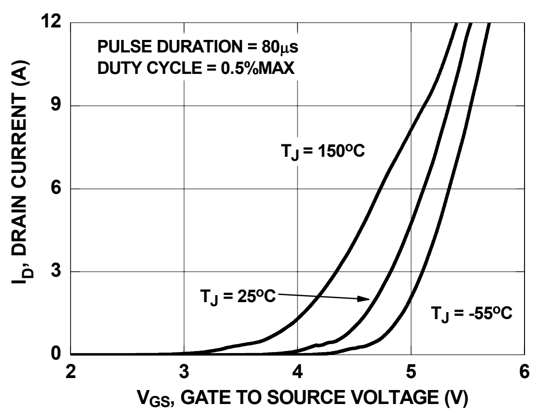


Figure 5. Transfer Characteristics

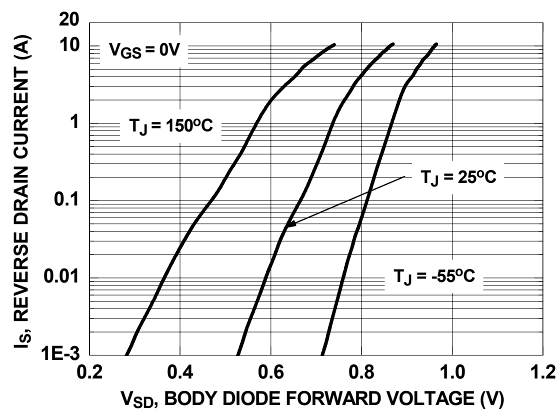


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25°C unless otherwise noted.

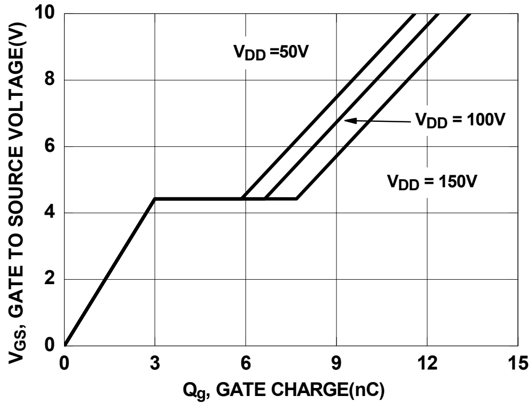


Figure 7. Gate Charge Characteristics

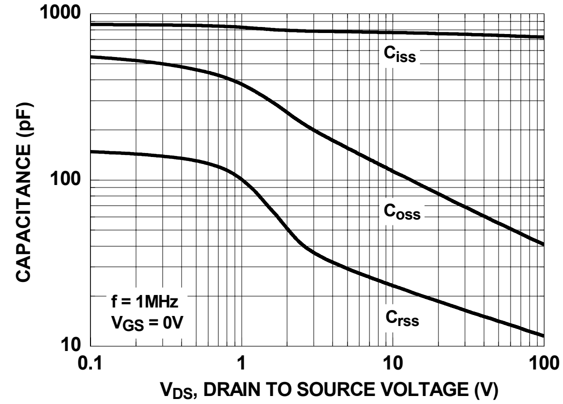


Figure 8. Capacitance vs Drain to Source Voltage

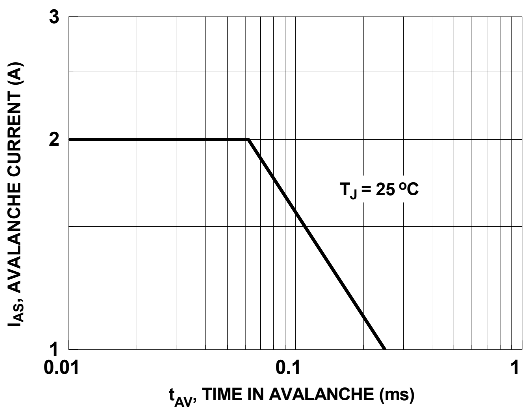


Figure 9. Unclamped Inductive Switching Capability

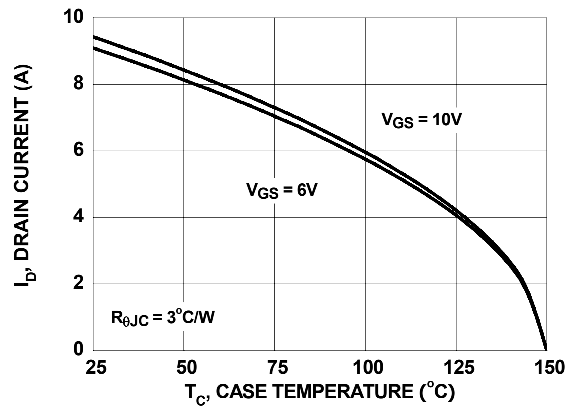


Figure 10. Maximum Continuous Drain Current vs Case Temperature

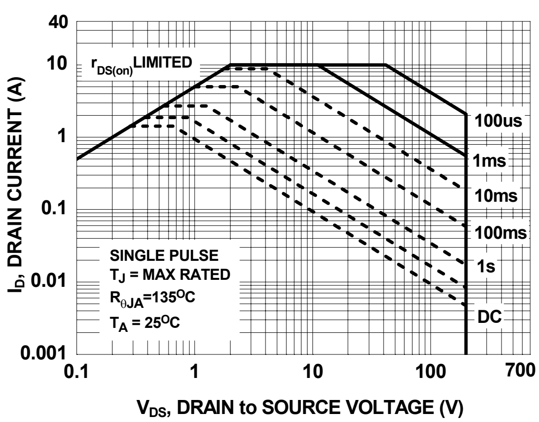


Figure 11. Forward Bias Safe Operating Area

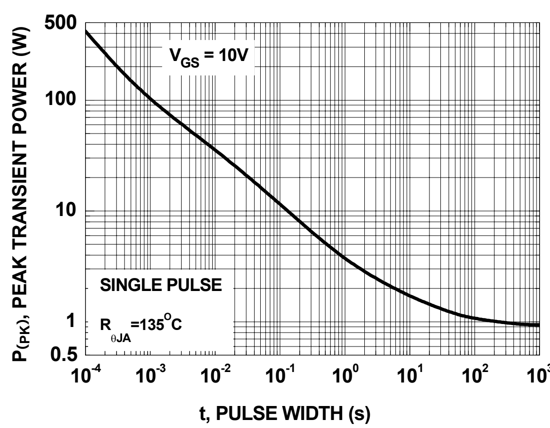


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25°C unless otherwise noted.

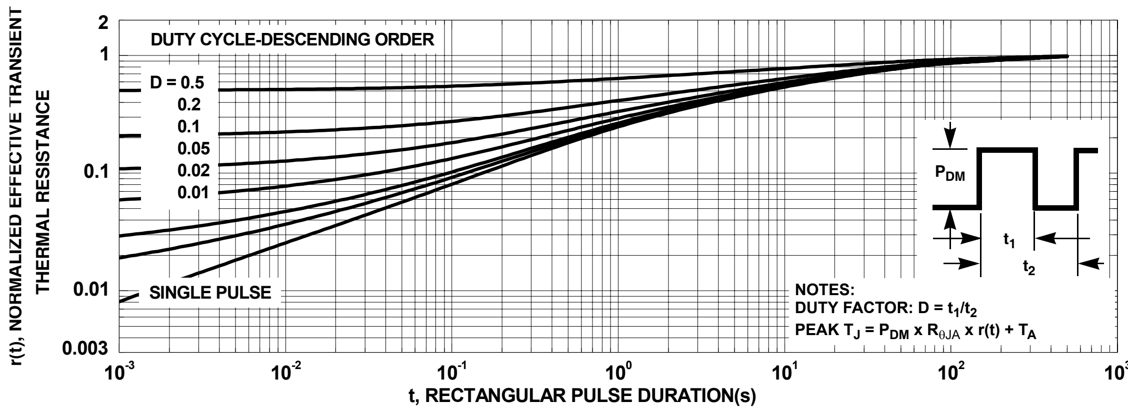
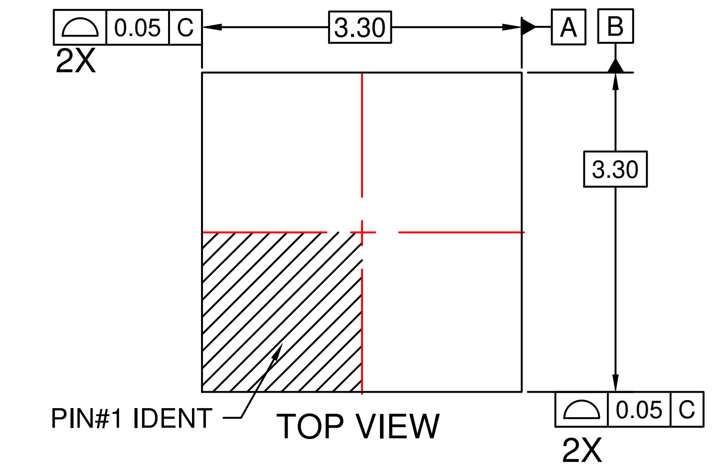
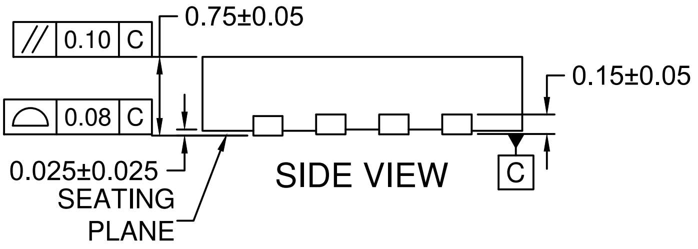


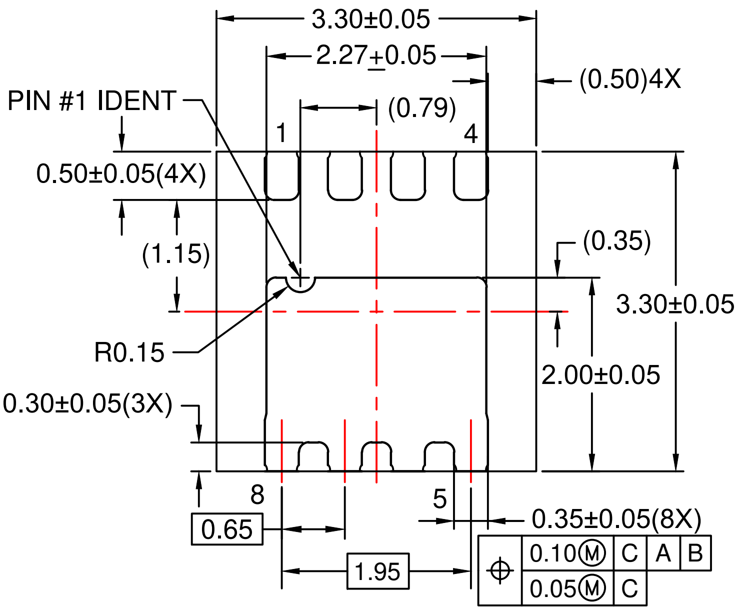
Figure 13. Transient Thermal Response Curve



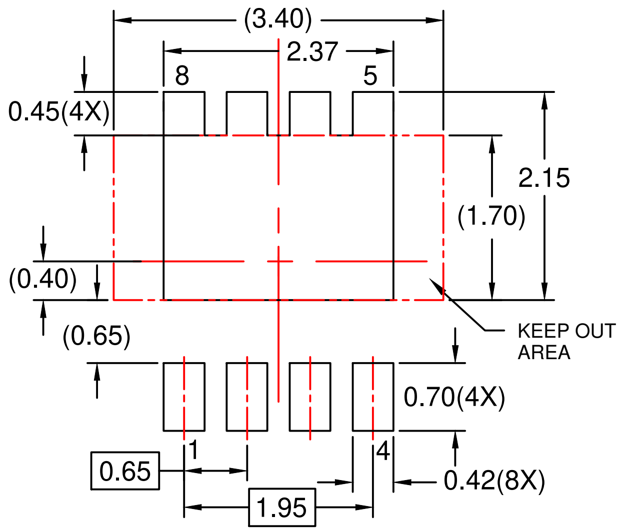
TOP VIEW



SIDE VIEW



BOTTOM VIEW



RECOMMENDED LAND PATTERN

NOTES:

A. DOES NOT CONFORM TO JEDEC REGISTRATION MO-229

B. DIMENSIONS ARE IN MILLIMETERS.

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

D. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.

E. DRAWING FILENAME: MKT-MLP08Srev3.

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