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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

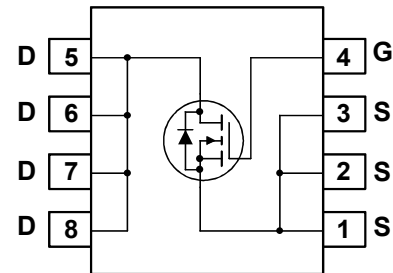
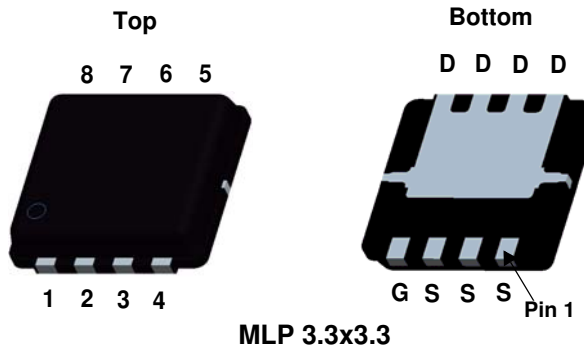


General Description

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



MOSFET Maximum Ratings $T_A = 25^\circ\text{C}$ 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) $T_C = 25^\circ\text{C}$	9.5	A
	-Continuous $T_A = 25^\circ\text{C}$ (Note 1a)	2.2	
	-Pulsed	15	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	6	mJ
P_D	Power Dissipation $T_C = 25^\circ\text{C}$	42	W
	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1a)	2.1	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	3	$^\circ\text{C/W}$
$R_{\theta JA}$	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 $T_J = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	200			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$, referenced to 25°C		199		$\text{mV}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 160\text{V}, V_{GS} = 0\text{V}, T_J = 125^\circ\text{C}$			1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$			± 100	nA

On Characteristics

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

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 100\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$		720	960	pF
C_{oss}	Output Capacitance			41	55	pF
C_{rss}	Reverse Transfer Capacitance			12	20	pF
R_g	Gate Resistance		$f = 1\text{MHz}$		0.7	Ω

Switching Characteristics

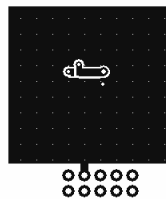
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 100\text{V}, I_D = 2.2\text{A}, V_{GS} = 10\text{V}, R_{GEN} = 24\Omega$		17	31	ns
t_r	Rise Time			13	24	ns
$t_{d(off)}$	Turn-Off Delay Time			29	47	ns
t_f	Fall Time			16	29	ns
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0\text{V to } 10\text{V}, V_{DD} =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

Drain-Source Diode Characteristics

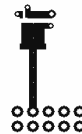
V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 2.2\text{A}$ (Note 2)		0.8	1.2	V
t_{rr}	Reverse Recovery Time	$I_F = 2.2\text{A}, di/dt = 100\text{A}/\mu\text{s}$		69	104	ns
Q_{rr}	Reverse Recovery Charge			114	171	nC

Notes:

1: $R_{\theta JA}$ is determined with the device mounted on a 1in^2 pad 2 oz copper pad on a $1.5 \times 1.5\text{in.}$ 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. $60^\circ\text{C}/\text{W}$ when mounted on a 1in^2 pad of 2 oz copper



b. $135^\circ\text{C}/\text{W}$ when mounted on a minimum pad of 2 oz copper

2: Pulse Test: Pulse Width < $300\mu\text{s}$, Duty cycle < 2.0%.

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

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

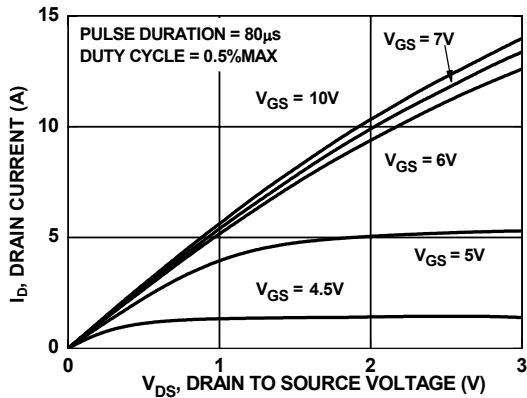


Figure 1. On-Region Characteristics

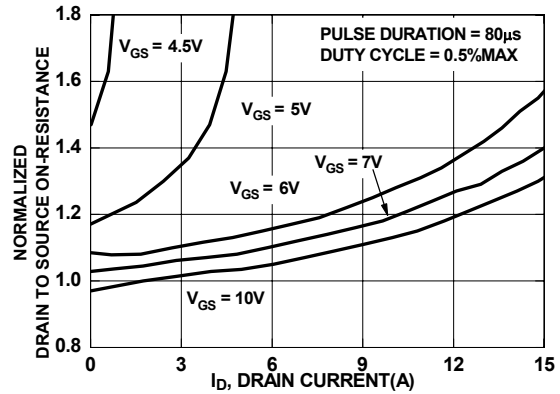


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

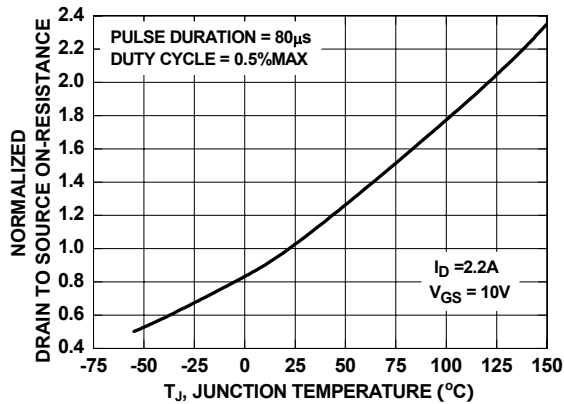


Figure 3. Normalized On-Resistance vs Junction Temperature

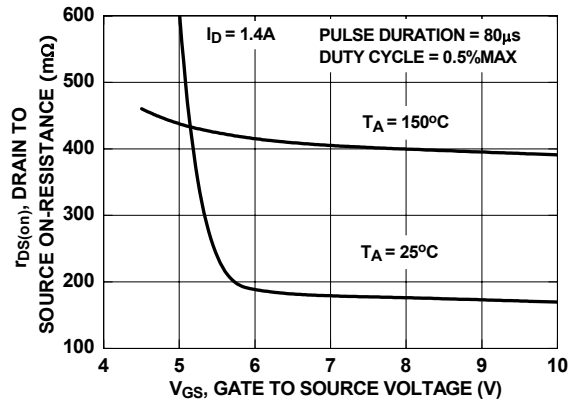


Figure 4. On-Resistance vs Gate to Source Voltage

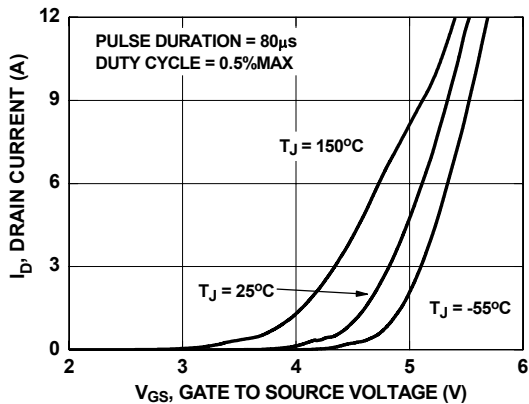


Figure 5. Transfer Characteristics

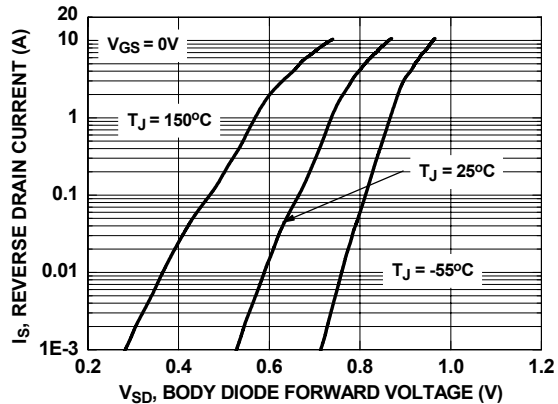


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

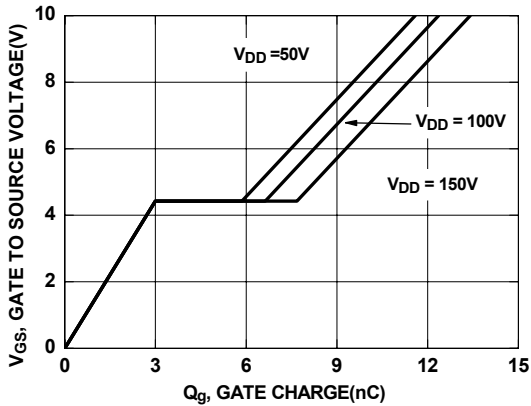


Figure 7. Gate Charge Characteristics

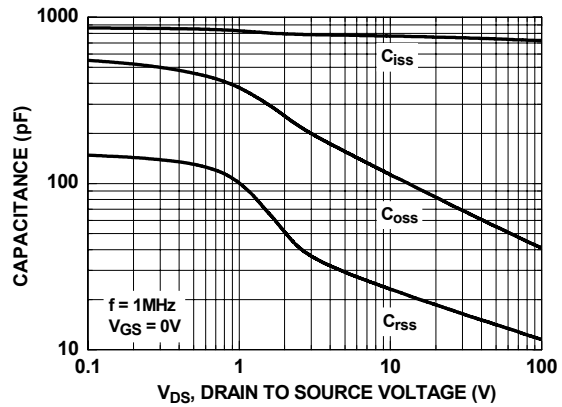


Figure 8. Capacitance vs Drain to Source Voltage

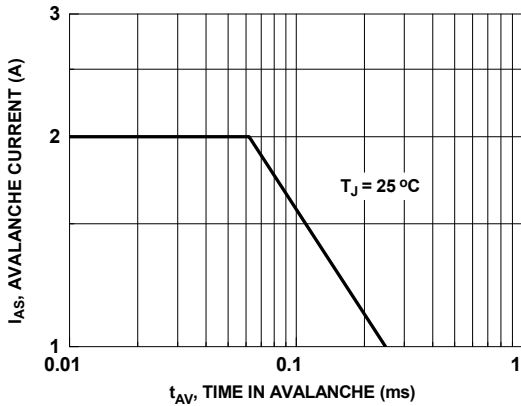


Figure 9. Unclamped Inductive Switching Capability

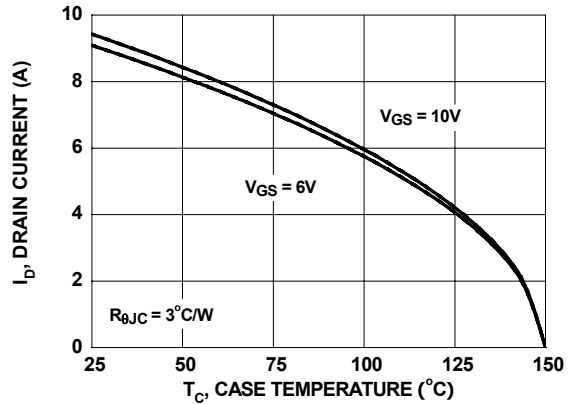


Figure 10. Maximum Continuous Drain Current vs Case Temperature

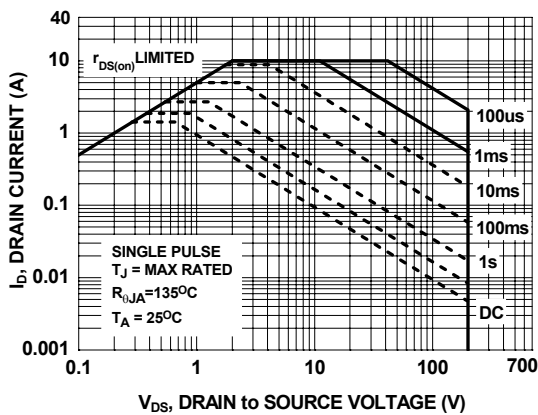


Figure 11. Forward Bias Safe Operating Area

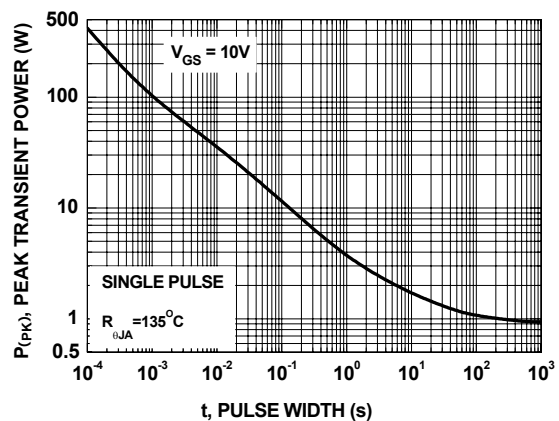


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

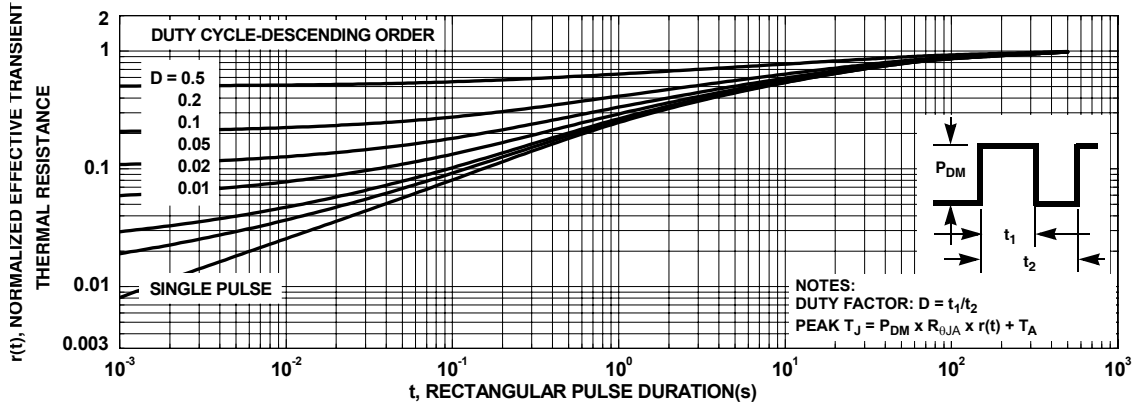
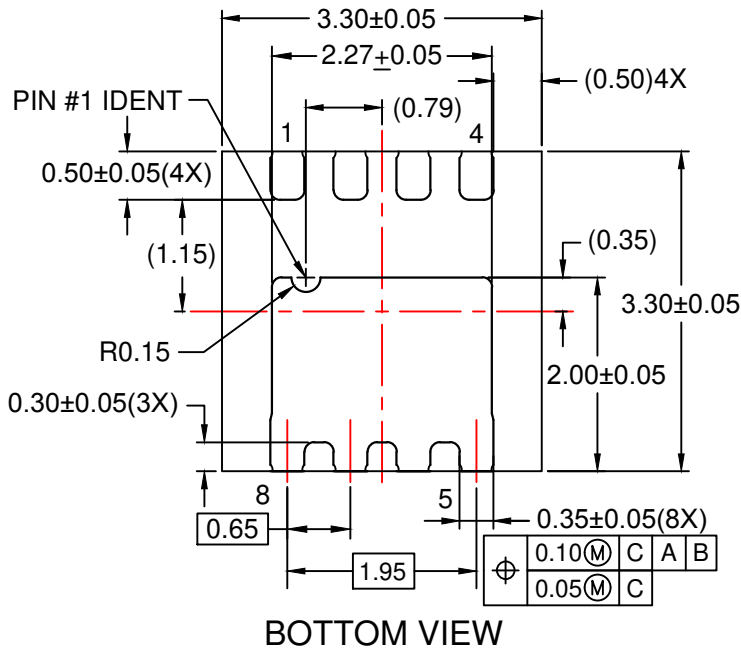
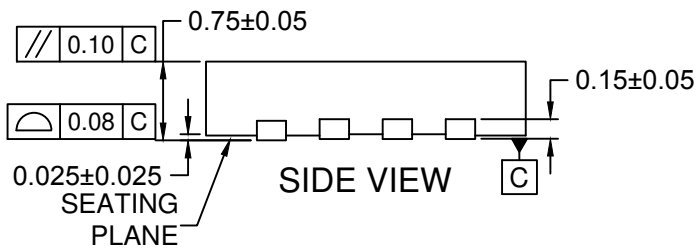
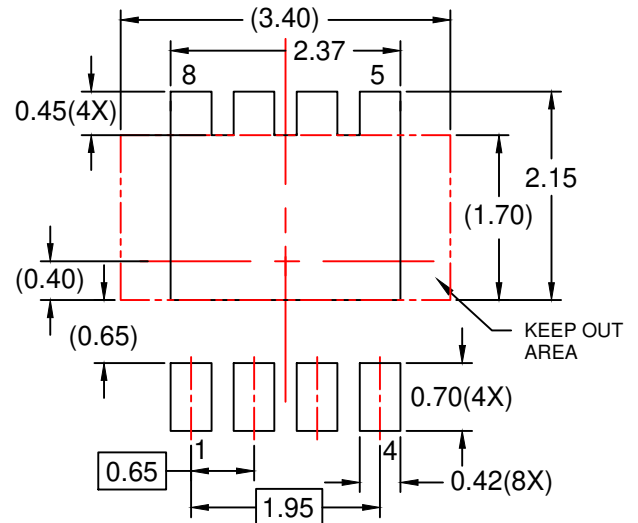
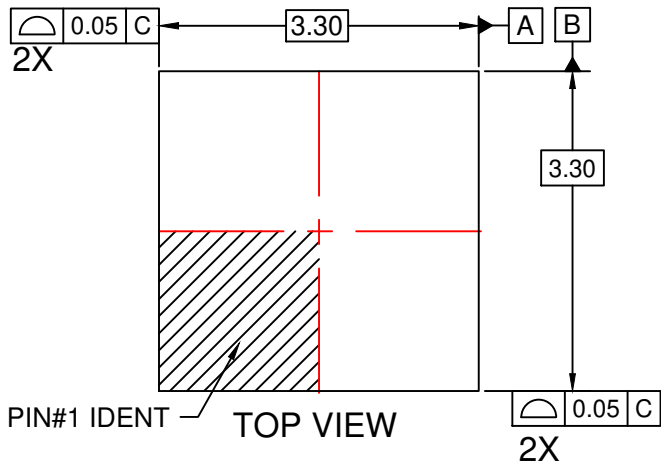


Figure 13. Transient Thermal Response Curve



NOTES:

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