FAIRCHILD

March 2015

FDMA86108LZ

Single N-Channel PowerTrench® MOSFET

100 V, 2.2 A, 243 mΩ

Features

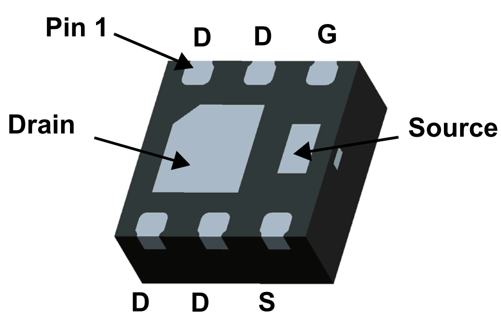
- Max $r_{DS(on)}$ = 243 mΩ at V_{GS} = 10 V, I_D = 2.2 A
- Max $r_{DS(on)}$ = 366 mΩ at V_{GS} = 4.5 V, I_D = 1.8 A
- Low Profile - 0.8 mm Maximum in the New Package MicroFET 2x2 mm
- Free from Halogenated Compounds and Antimony Oxides
- RoHS Compliant

General Description

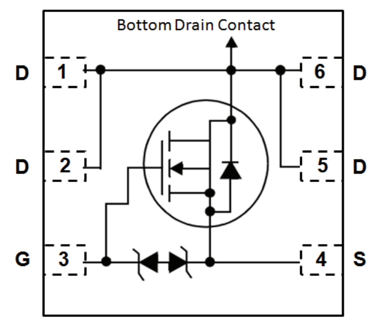
This device has been designed to provide maximum efficiency and thermal performance for synchronous buck converters. The low $r_{DS(on)}$ and gate charge provide excellent switching performance.

Application

- DC – DC Buck Converters



MicroFET 2X2 (Bottom View)



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_A = 25 °C	(Note 1a)	2.2	A
		-Pulsed		(Note 3)	6	
P_D	Power Dissipation		T_A = 25 °C	(Note 1a)	2.4	W
	Power Dissipation		T_A = 25 °C	(Note 1b)	0.9	
T_J, T_{STG}	Operating and Storage Junction Temperature Range				-55 to +150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	52	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1b)	145	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
108	FDMA86108LZ	MicroFET 2X2	7 ”	8 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 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		74		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			±10	μA

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 μA	1.0	2.2	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		-5		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 2.2 A		188	243	mΩ
		V_{GS} = 4.5 V, I_D = 1.8 A		275	366	
		V_{GS} = 10 V, I_D = 2.2 A, T_J = 125 °C		345	446	
g_{FS}	Forward Transconductance	V_{DD} = 5 V, I_D = 2.2 A		3.7		S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
C_{iss}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0 V, f = 1 MHz		116	163	pF
C_{oss}	Output Capacitance			23	35	pF
C_{rss}	Reverse Transfer Capacitance			1	5	pF
R_g	Gate Resistance		0.1	1.0	3.0	Ω

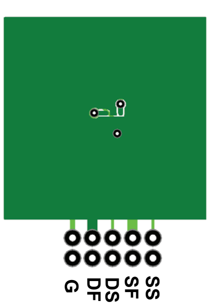
Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 50V, I_D = 2.2 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		4.2	10	ns
t_r	Rise Time			1.7	10	ns
$t_{d(off)}$	Turn-Off Delay Time			7.6	15	ns
t_f	Fall Time			1.7	10	ns
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0 V to 10 V; V_{DD} = 50 V, I_D = 2.2 A		2.1	3.0	nC
$Q_{g(TOT)}$	Total Gate Charge	V_{GS} = 0 V to 4.5 V; V_{DD} = 50 V, I_D = 2.2 A		1.1	1.6	nC
Q_{gs}	Gate to Source Charge	V_{DD} = 50 V, I_D = 2.2 A		0.5		nC
Q_{gd}	Gate to Drain "Miller" Charge			0.5		nC

Drain-Source Diode Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 2.2 A (Note 2)		0.9	1.2	V
t_{rr}	Reverse Recovery Time	I_F = 2.2 A, di/dt = 100 A/μs		32	51	ns
Q_{rr}	Reverse Recovery Charge			20	32	nC

NOTES:
1. $R_{\theta JA}$ 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. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.



a. 52 °C/W when mounted on a 1 in² pad of 2 oz copper.

b. 145 °C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.
3. Pulse Id measured at 250μs, refer to Fig 11 SOA graph for more details.

Typical Characteristics T_J = 25 °C unless otherwise noted

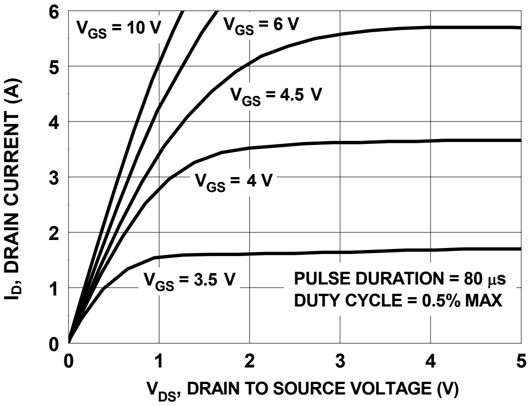


Figure 1. On Region Characteristics

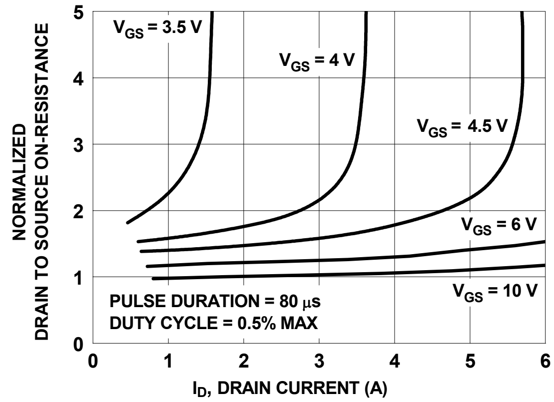


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

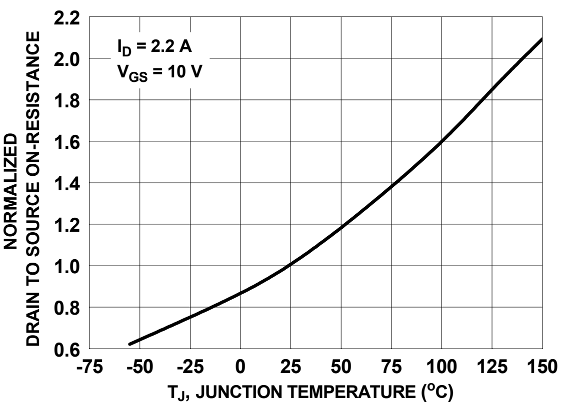


Figure 3. Normalized On Resistance vs. Junction Temperature

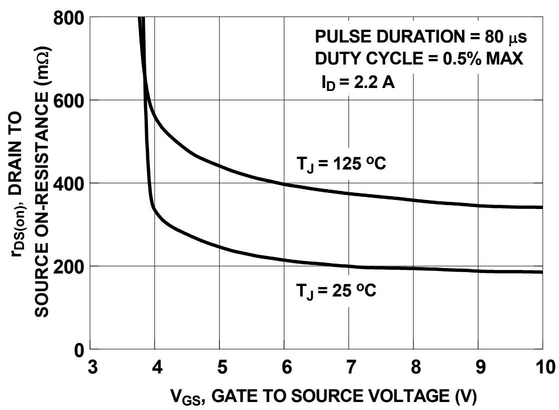


Figure 4. On-Resistance vs. Gate to Source Voltage

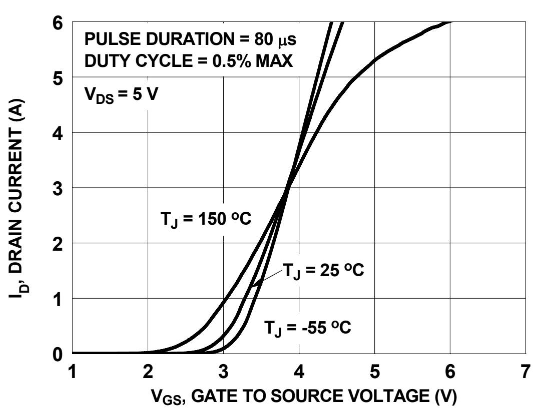


Figure 5. Transfer Characteristics

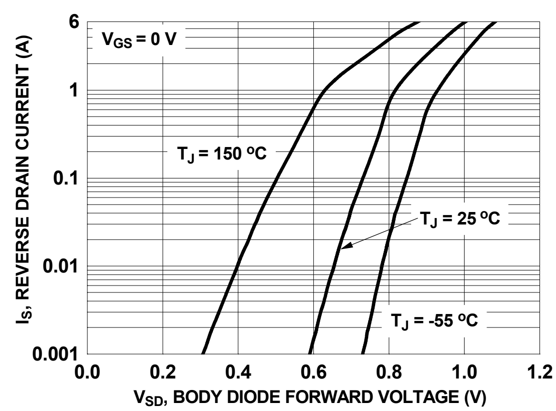


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

Typical Characteristics T_J = 25 °C unless otherwise noted

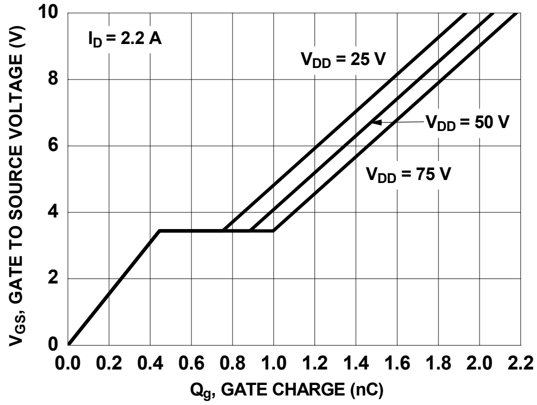


Figure 7. Gate Charge Characteristics

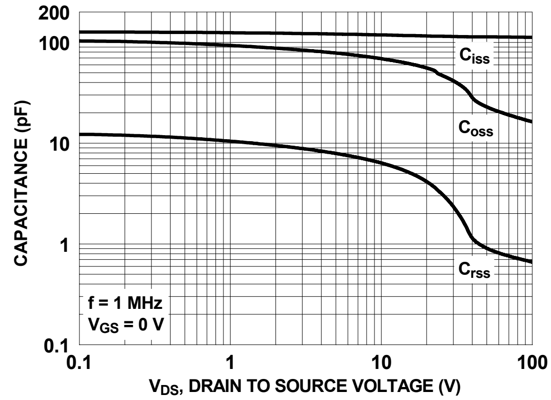


Figure 8. Capacitance vs. Drain to Source Voltage

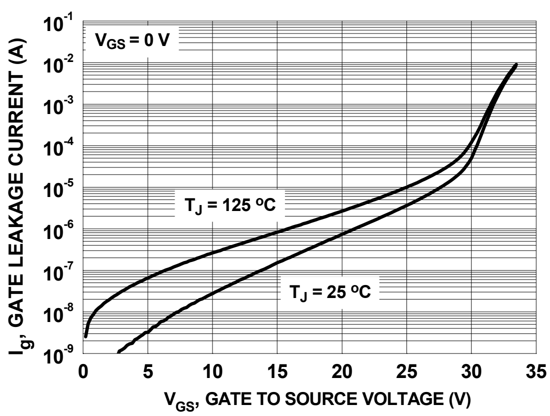


Figure 9. Gate Leakage Current vs. Gate to Source Voltage

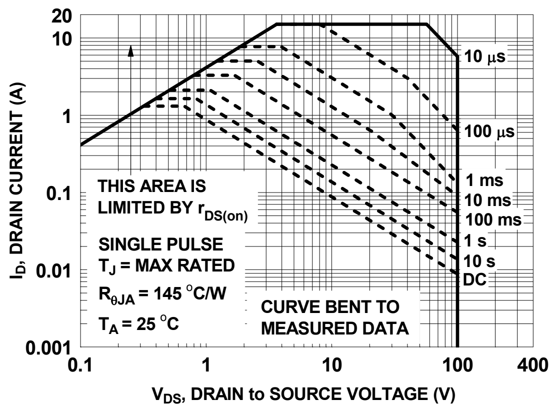


Figure 10. Forward Bias Safe Operating Area

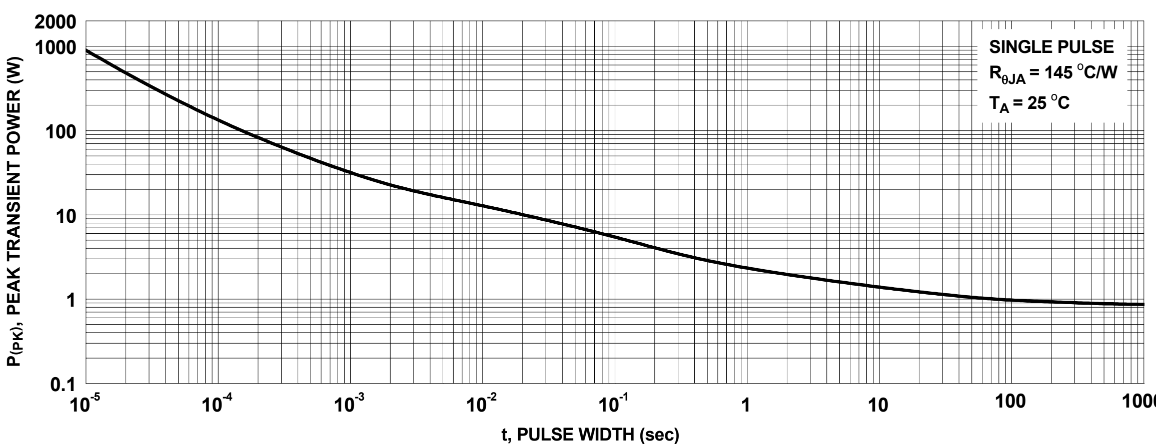


Figure 11. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25 °C unless otherwise noted

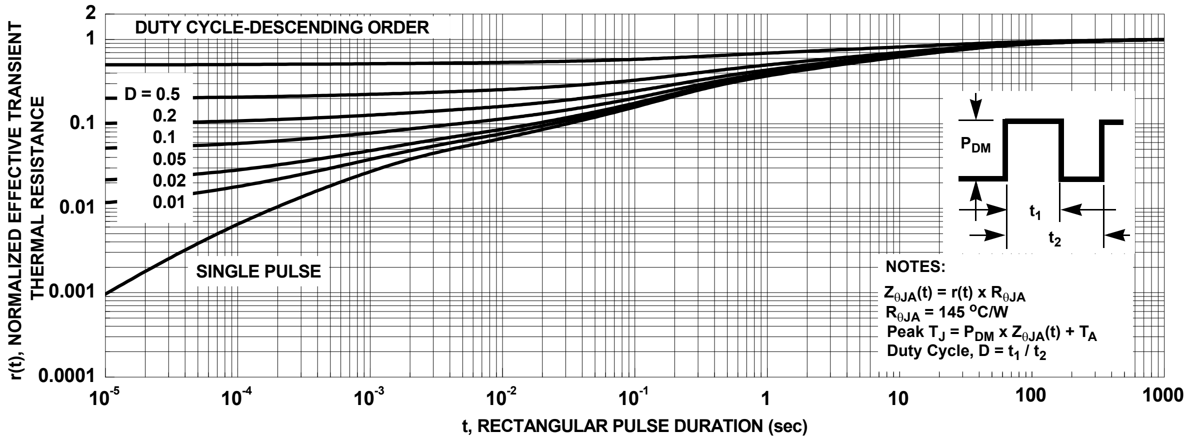
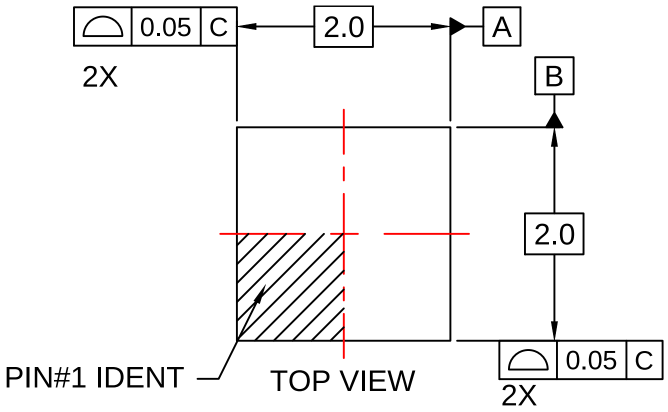
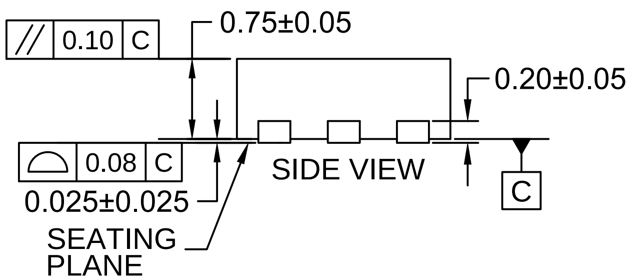
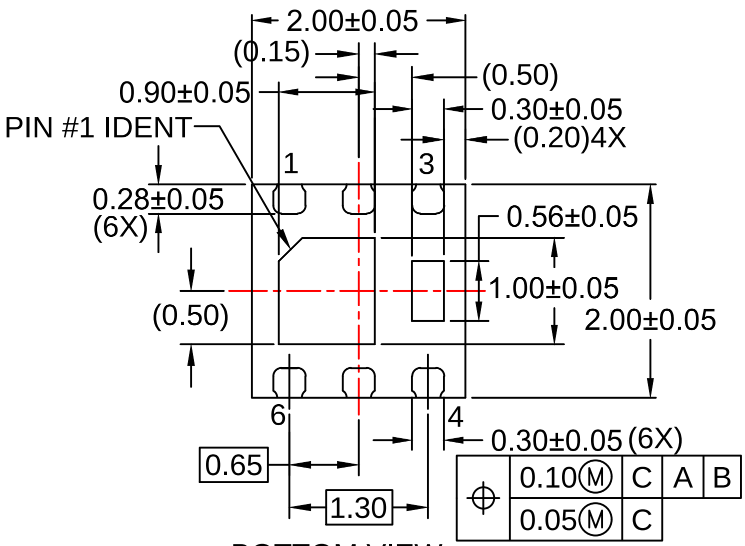


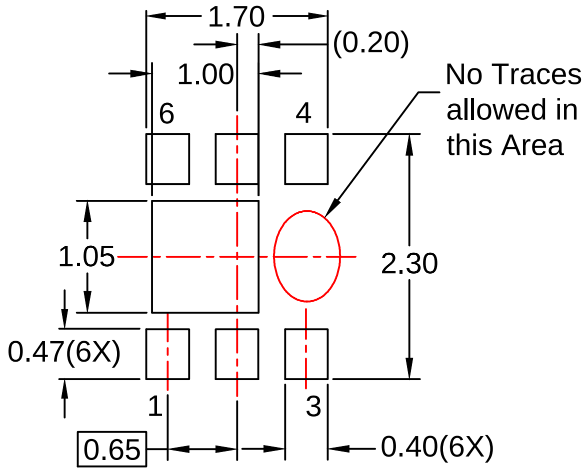
Figure 12. Junction-to-Ambient Transient Thermal Response Curve



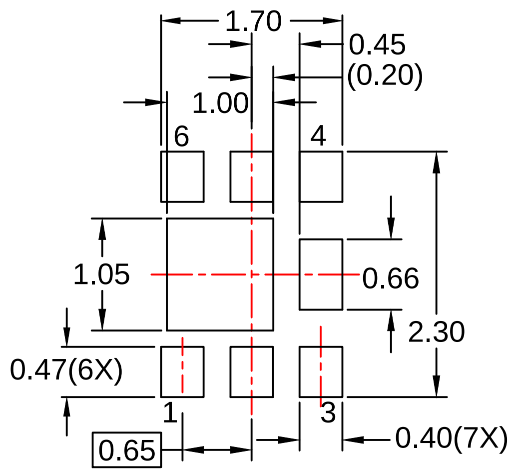




BOTTOM VIEW



RECOMMENDED
LAND PATTERN OPT 1



RECOMMENDED
LAND PATTERN OPT 2

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B. DIMENSIONS ARE IN MILLIMETERS.

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

D. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.

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