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# FDMA86108LZ

## Single N-Channel PowerTrench<sup>®</sup> MOSFET

100 V, 2.2 A, 243 mΩ

### Features

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

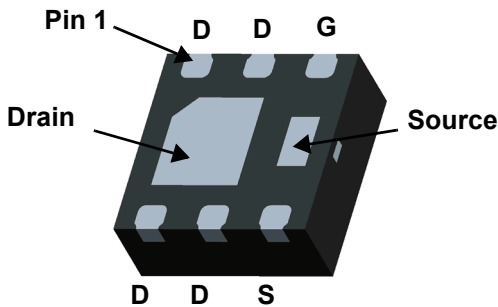


### General Description

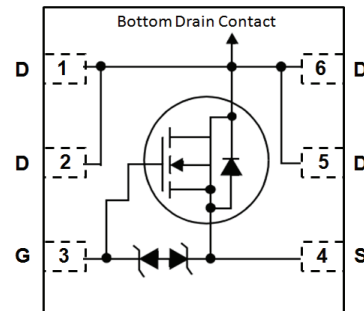
This device has been designed to provide maximum efficiency and thermal performance for synchronous buck converters. The low  $r_{DS(on)}$  and gate charge provide excellent switching performance.

### Application

- DC – DC Buck Converters



MicroFET 2X2 (Bottom View)



### MOSFET Maximum Ratings $T_A = 25\text{ °C}$ unless otherwise noted

Symbol	Parameter	Rated Value	Units
$V_{DS}$	Drain to Source Voltage	100	V
$V_{GS}$	Gate to Source Voltage	±20	V
$I_D$	Drain Current -Continuous	2.2	A
	-Pulsed	6	
$P_D$	Power Dissipation	2.4	W
	Power Dissipation	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 $T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted

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

$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = 250\text{ }\mu\text{A}, V_{GS} = 0\text{ V}$	100			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , referenced to $25\text{ }^\circ\text{C}$		74		mV/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 80\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$			$\pm 10$	$\mu\text{A}$

#### On Characteristics

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

#### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		116	163	pF
$C_{oss}$	Output Capacitance			23	35	pF
$C_{riss}$	Reverse Transfer Capacitance			1	5	pF
$R_g$	Gate Resistance		0.1	1.0	3.0	$\Omega$

#### Switching Characteristics

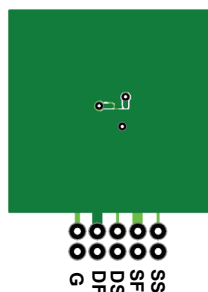
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50\text{ V}, I_D = 2.2\text{ A}, V_{GS} = 10\text{ V}, R_{GEN} = 6\text{ }\Omega$		4.2	10	ns	
$t_r$	Rise Time			1.7	10	ns	
$t_{d(off)}$	Turn-Off Delay Time			7.6	15	ns	
$t_f$	Fall Time			1.7	10	ns	
$Q_{g(TOT)}$	Total Gate Charge		$V_{GS} = 0\text{ V to } 10\text{ V}$		2.1	3.0	nC
$Q_{g(TOT)}$	Total Gate Charge	$V_{GS} = 0\text{ V to } 4.5\text{ V}$	$V_{DD} = 50\text{ V}, I_D = 2.2\text{ A}$		1.1	1.6	nC
$Q_{gs}$	Gate to Source Charge				0.5	nC	
$Q_{gd}$	Gate to Drain "Miller" Charge				0.5	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)		0.9	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = 2.2\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		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 in<sup>2</sup> 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.



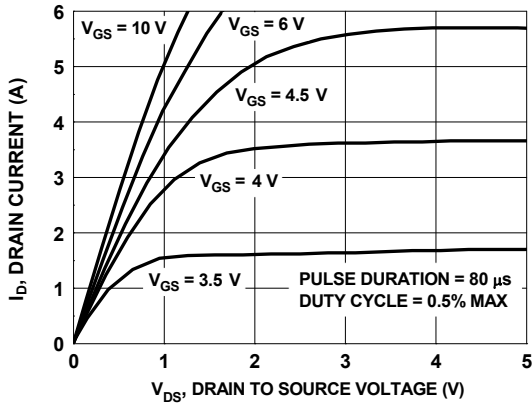
a. 52  $^\circ\text{C}/\text{W}$  when mounted on a 1 in<sup>2</sup> pad of 2 oz copper.

b. 145  $^\circ\text{C}/\text{W}$  when mounted on a minimum pad of 2 oz copper.

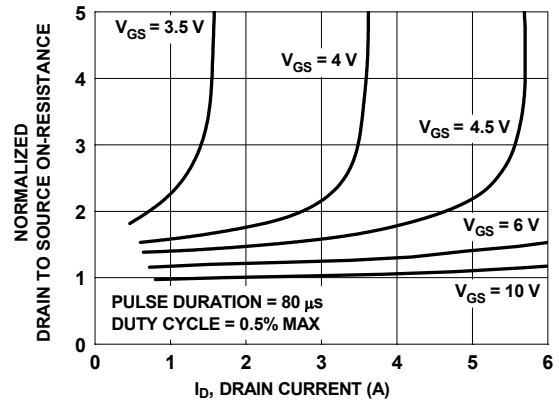
2. Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty cycle < 2.0%.

3. Pulse  $I_d$  measured at 250 $\mu\text{s}$ , refer to Fig 11 SOA graph for more details.

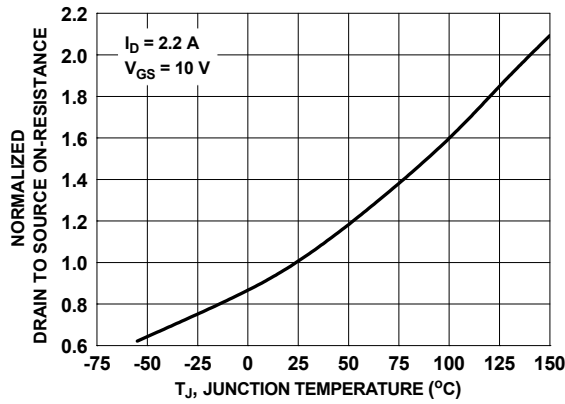
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



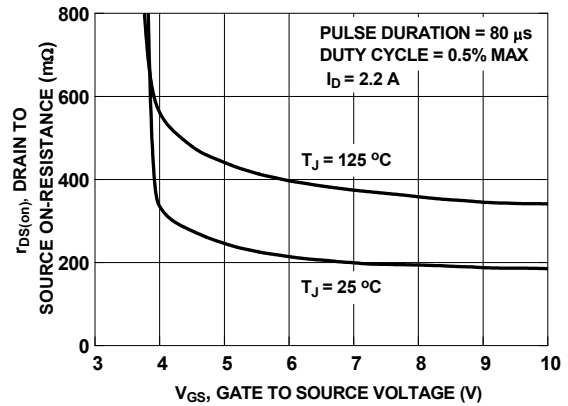
**Figure 1. On Region Characteristics**



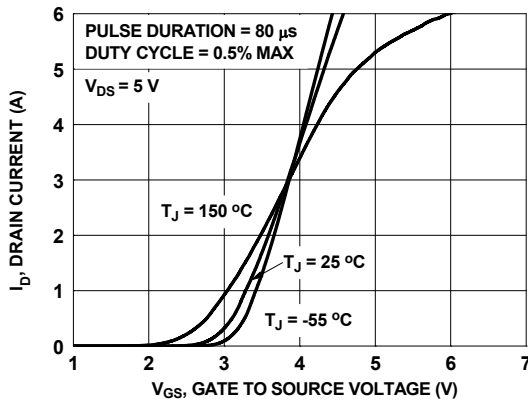
**Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage**



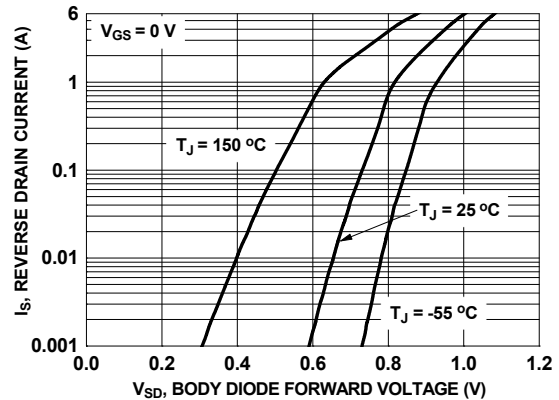
**Figure 3. Normalized On Resistance vs. Junction Temperature**



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

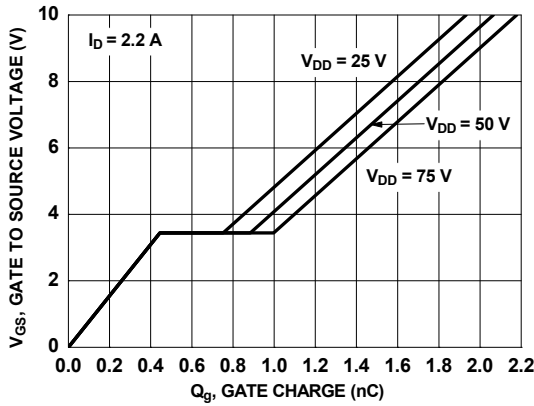


**Figure 5. Transfer Characteristics**

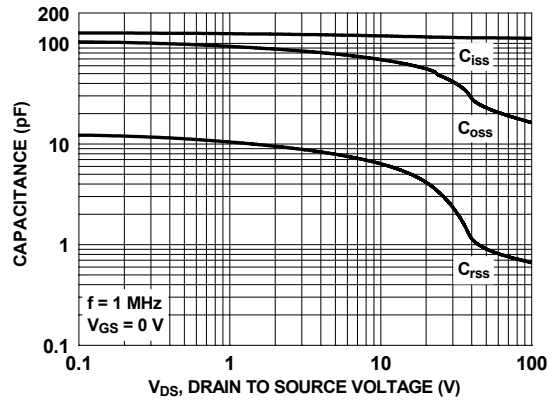


**Figure 6. Source to Drain Diode Forward Voltage vs. Source Current**

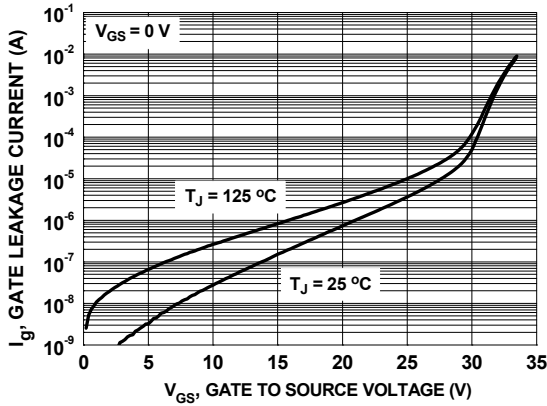
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



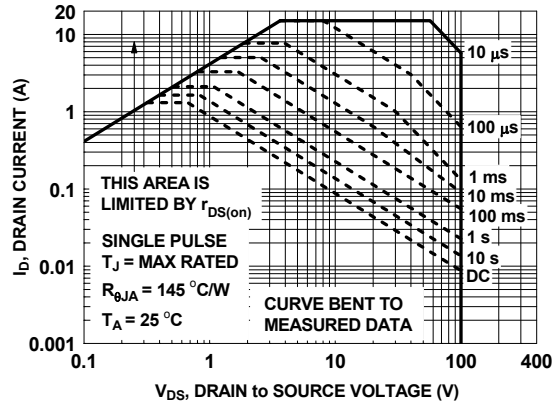
**Figure 7. Gate Charge Characteristics**



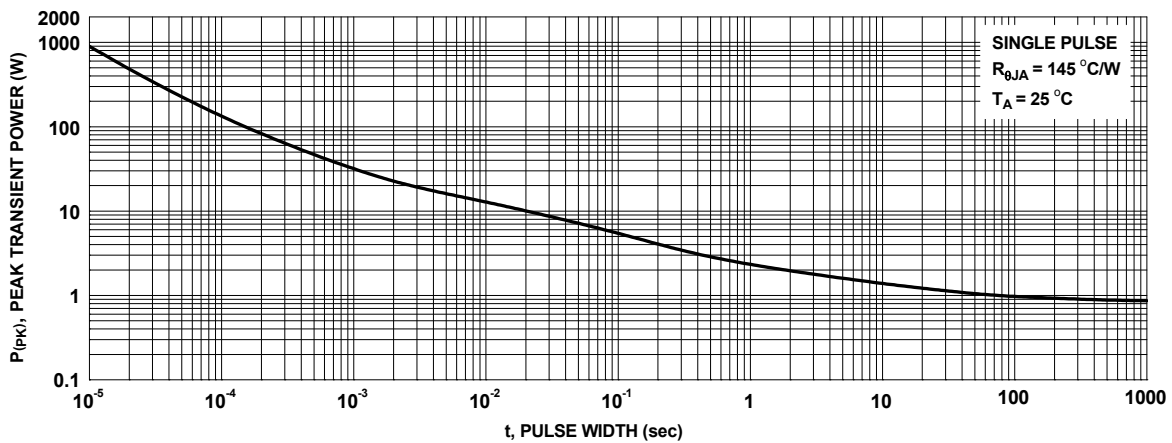
**Figure 8. Capacitance vs. Drain to Source Voltage**



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

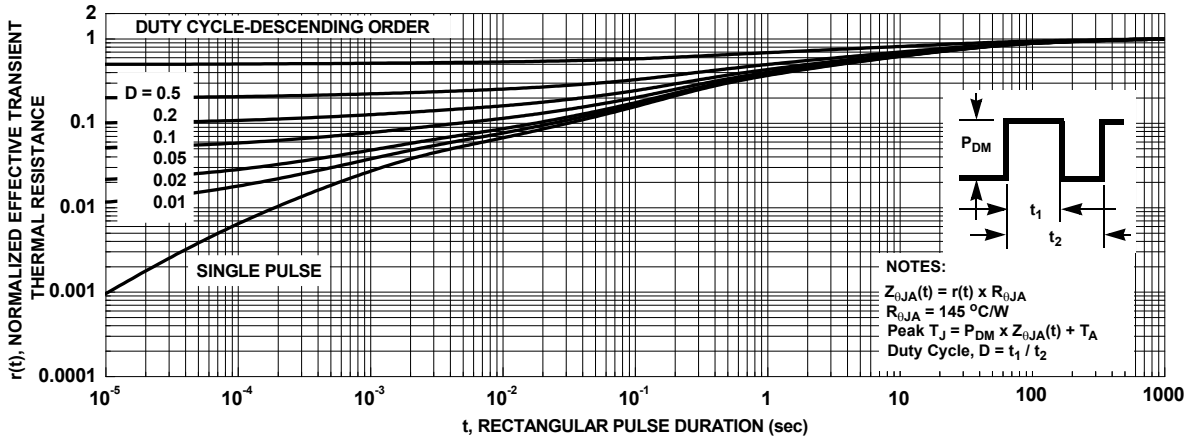


**Figure 10. Forward Bias Safe Operating Area**

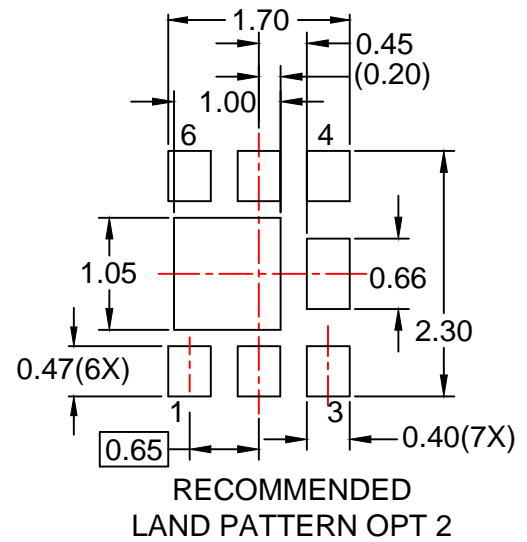
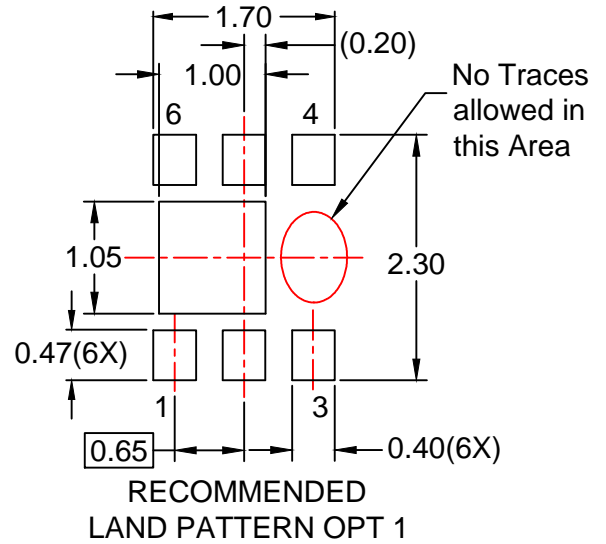
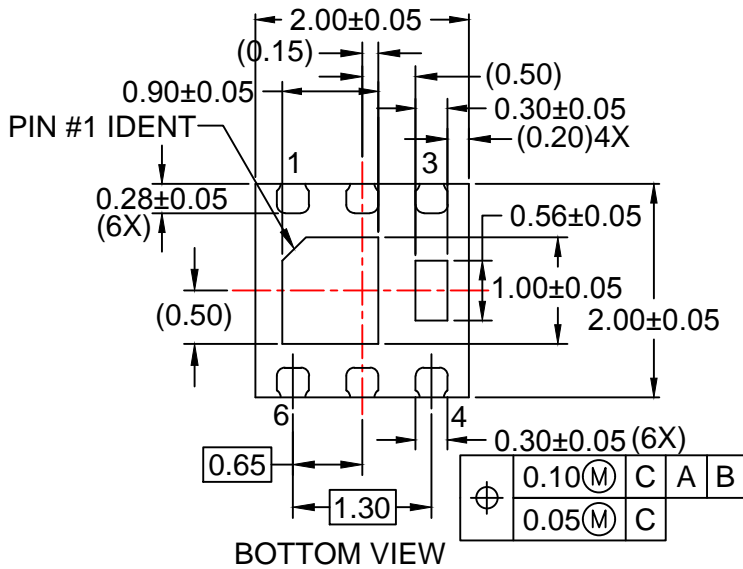
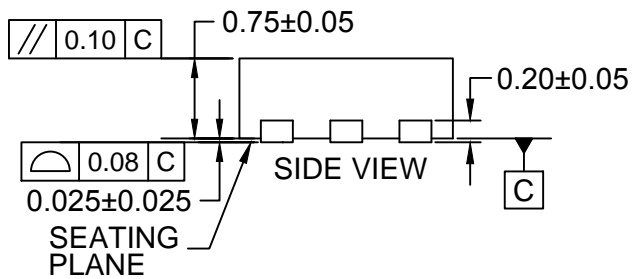
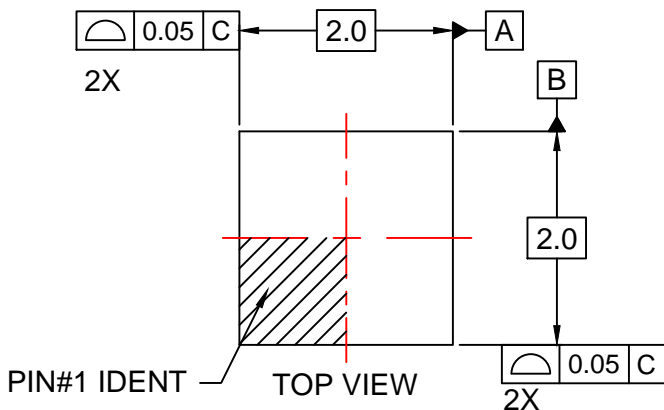


**Figure 11. Single Pulse Maximum Power Dissipation**

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



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



**NOTES:**

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