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FAIRCHILD SEMICONDUCTOR®

FDMA905P

October 2011

Single P-Channel PowerTrench® MOSFET
-12 V, -10 A, 16 mΩ

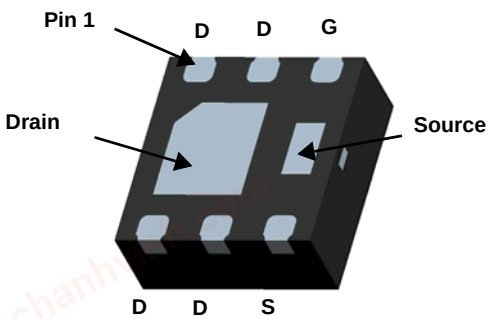
Features

- Max $r_{DS(on)}$ = 16 mΩ at V_{GS} = -4.5 V, I_D = -10 A
- Max $r_{DS(on)}$ = 21 mΩ at V_{GS} = -2.5 V, I_D = -8.9 A
- Max $r_{DS(on)}$ = 82 mΩ at V_{GS} = -1.8 V, I_D = -4.5 A
- Low profile - 0.8 mm maximum - in the new package MicroFET 2X2 mm
- Free from halogenated compounds and antimony oxides
- RoHS Compliant

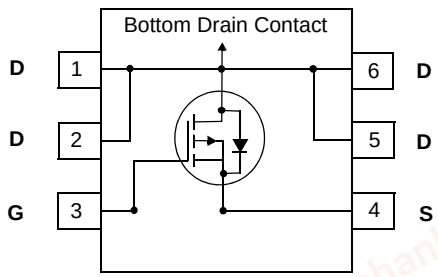
General Description

This device is designed specifically for battery charge or load switching in cellular handset and other ultraportable applications. It features a MOSFET with low on-state resistance.

The MicroFET 2X2 package offers exceptional thermal performance for its physical size and is well suited to linear mode applications.



MicroFET 2X2 (Bottom View)



MOSFET Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DS}	Drain to Source Voltage		-12	V
V_{GS}	Gate to Source Voltage		±8	V
I_D	Drain Current -Continuous	(Note 1a)	-10	A
	-Pulsed		-40	
P_D	Power Dissipation	(Note 1a)	2.4	W
	Power Dissipation	(Note 1b)	0.9	
T_J, T_{STG}	Operating and Storage Junction Temperature Range		-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case		6.9	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	52	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1b)	145	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
A95	FDMA905P	MicroFET 2X2	7 ”	8 mm	3000 units

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Electrical Characteristics T_J = 25°C unless otherwise noted

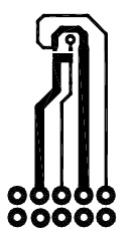
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = -250 μA, V_{GS} = 0V	-12			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = -250 μA, referenced to 25 °C		-4.3		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -9.6 V, V_{GS} = 0 V			-1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±8 V, V_{DS} = 0 V			±100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = -250 μA	-0.4	-0.7	-1.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = -250 μA, referenced to 25 °C		2.6		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = -4.5 V, I_D = -10 A		14	16	mΩ
		V_{GS} = -2.5 V, I_D = -8.9 A		17	21	
		V_{GS} = -1.8 V, I_D = -4.5 A		21	82	
		V_{GS} = -4.5 V, I_D = -10 A, T_J = 125 °C		16	21	
g_{FS}	Forward Transconductance	V_{DD} = -5 V, I_D = -10 A		50		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = -6 V, V_{GS} = 0 V, f = 1 MHz		2559	3405	pF
C_{oss}	Output Capacitance			490	735	pF
C_{rss}	Reverse Transfer Capacitance			437	655	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = -6 V, I_D = -10 A, V_{GS} = -4.5 V, R_{GEN} = 6 Ω		11	20	ns
t_r	Rise Time			11	20	ns
$t_{d(off)}$	Turn-Off Delay Time			120	192	ns
t_f	Fall Time			59	94	ns
Q_g	Total Gate Charge	V_{DD} = -6 V, I_D = -10 A, V_{GS} = -4.5 V		21	29	nC
Q_{gs}	Gate to Source Charge			3.5		nC
Q_{gd}	Gate to Drain “Miller” Charge			4.2		nC
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = -2 A (Note 2)		-0.6	-1.2	V
		V_{GS} = 0 V, I_S = -10 A (Note 2)		-0.8	-1.2	
t_{rr}	Reverse Recovery Time	I_F = -10 A, di/dt = 100 A/μs		21	34	ns
Q_{rr}	Reverse Recovery Charge			6.1	12	nC

Notes:

1. $R_{\theta JA}$ is determined with the device mounted on a 1 in^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. 52 °C/W when mounted on a 1 in^2 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 %.

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Typical Characteristics T_J = 25 °C unless otherwise noted

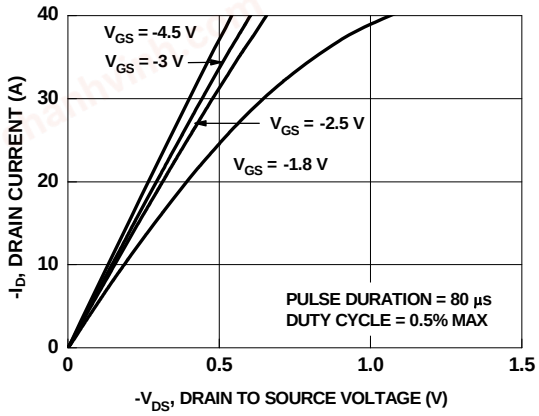


Figure 1. On-Region Characteristics

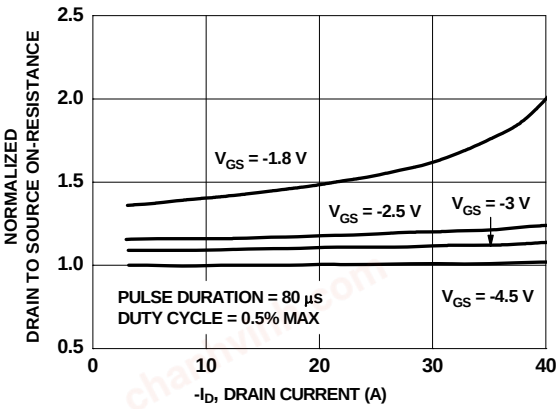


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

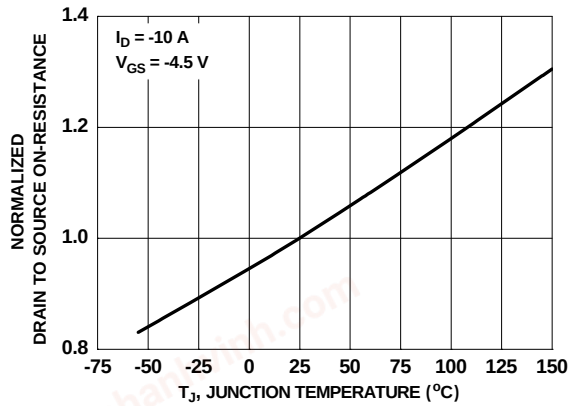


Figure 3. Normalized On-Resistance vs Junction Temperature

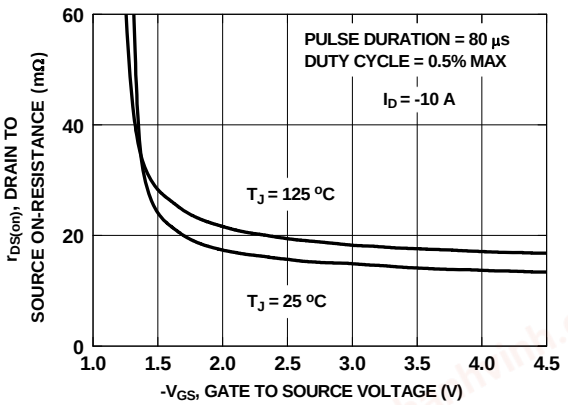


Figure 4. On-Resistance vs Gate to Source Voltage

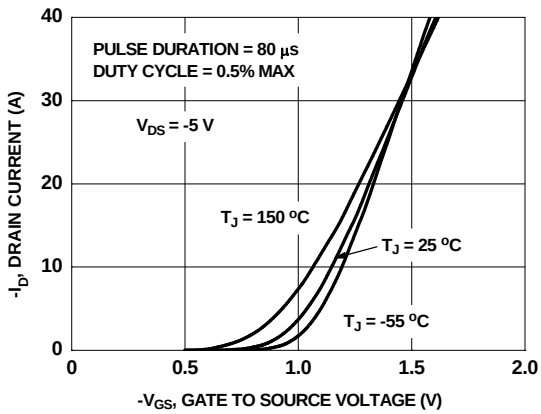


Figure 5. Transfer Characteristics

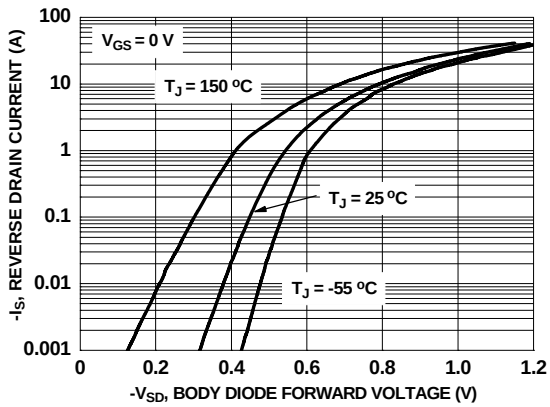


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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Typical Characteristics T_J = 25 °C unless otherwise noted

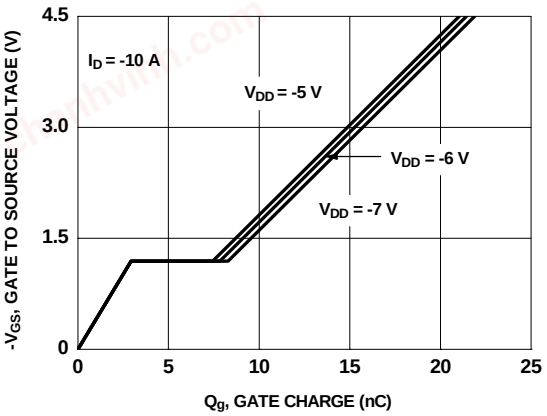


Figure 7. Gate Charge Characteristics

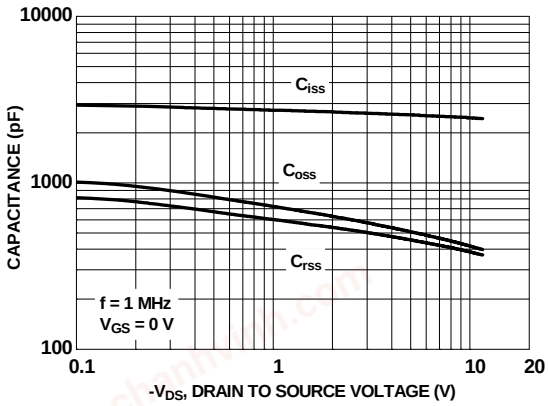


Figure 8. Capacitance vs Drain to Source Voltage

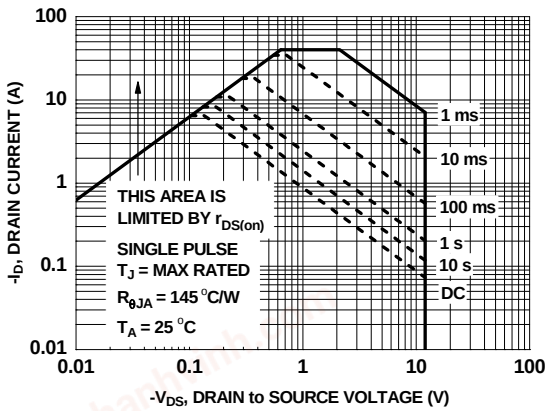


Figure 9. Forward Bias Safe Operating Area

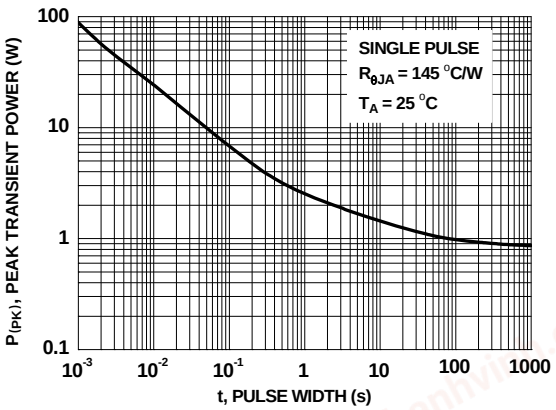


Figure 10. Single Pluse Maximum Power Dissipation

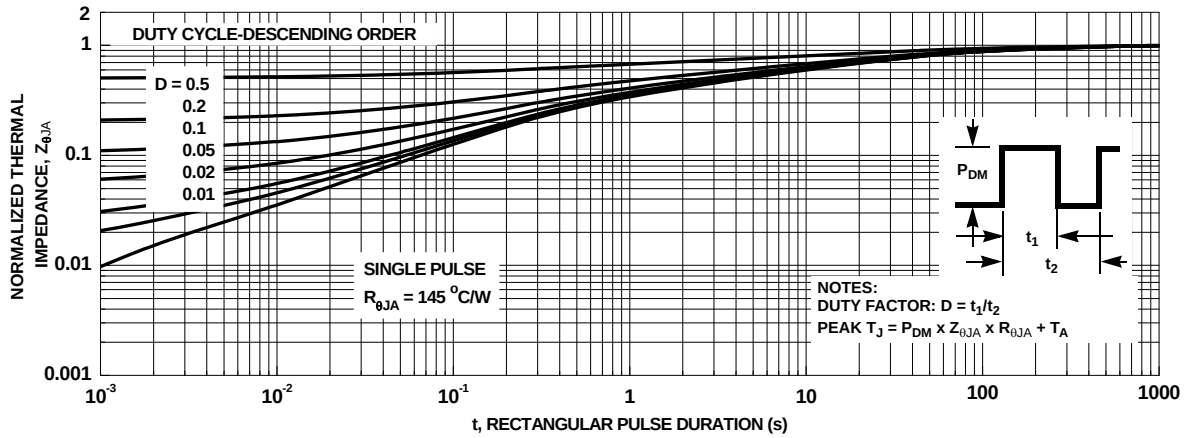
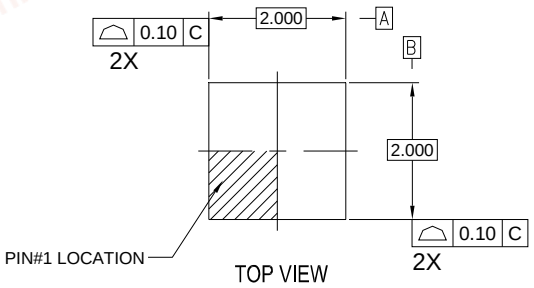
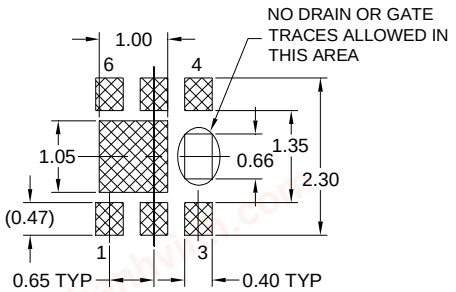


Figure 11. Junction-to-Ambient Transient Thermal Response Curve

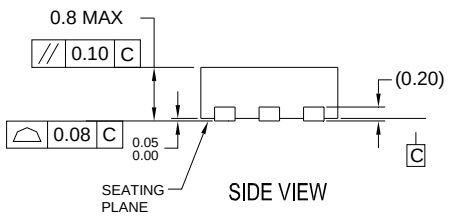
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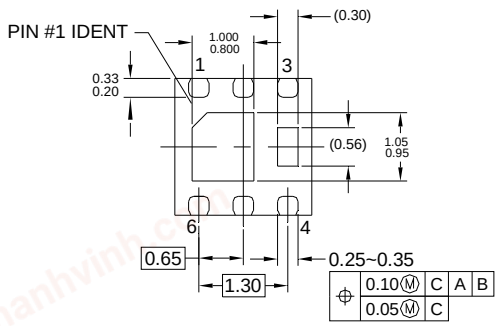
Dimensional Outline and Pad Layout

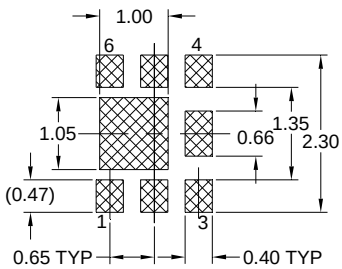




RECOMMENDED LAND PATTERN OPT 1







RECOMMENDED LAND PATTERN OPT 2

NOTES:

A. DOES NOT FULLY CONFORM TO JEDEC REGISTRATION MO-229 DATED AUG/2003

B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994

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Rev. I58