June 2014

# FDMA905P

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

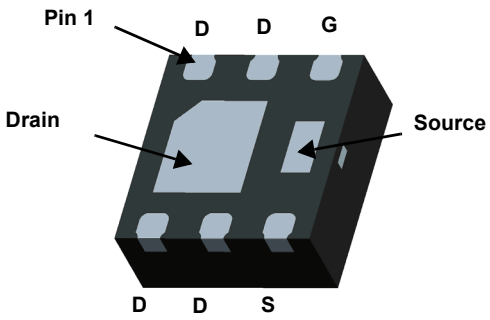
### Features

- 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

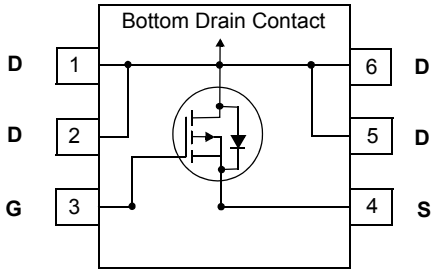
### General Description

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 |

## 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 %.

## Typical Characteristics $T_J$ = 25 °C unless otherwise noted

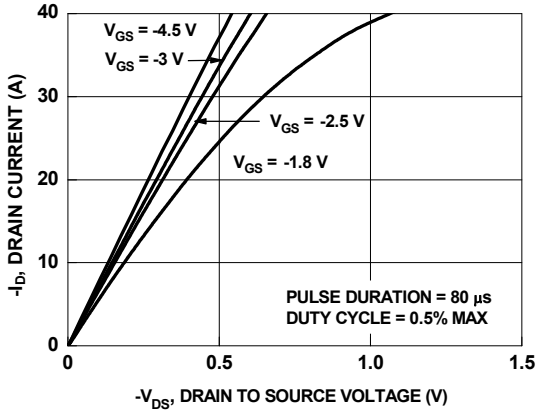



**Figure 1. On-Region Characteristics**

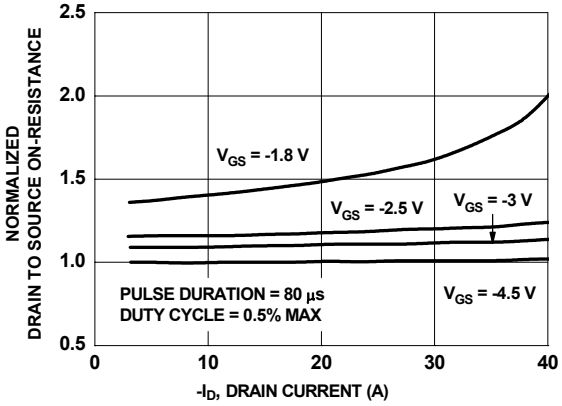



**Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage**

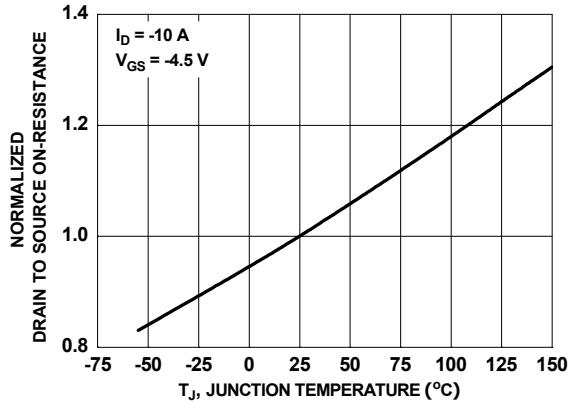



**Figure 3. Normalized On-Resistance vs Junction Temperature**

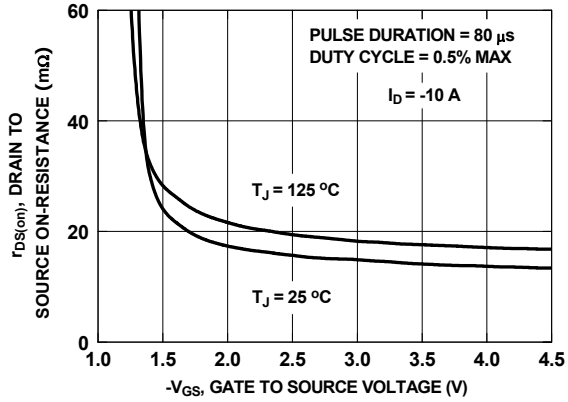



**Figure 4. On-Resistance vs Gate to Source Voltage**

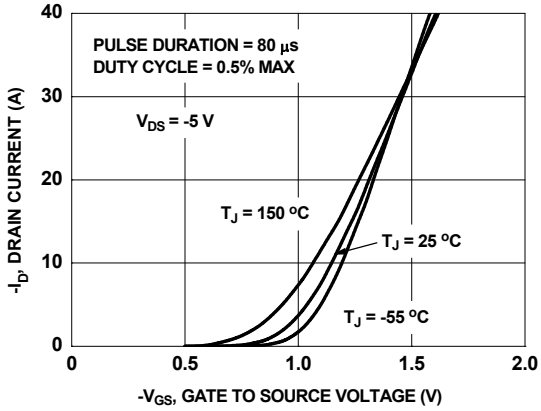



**Figure 5. Transfer Characteristics**

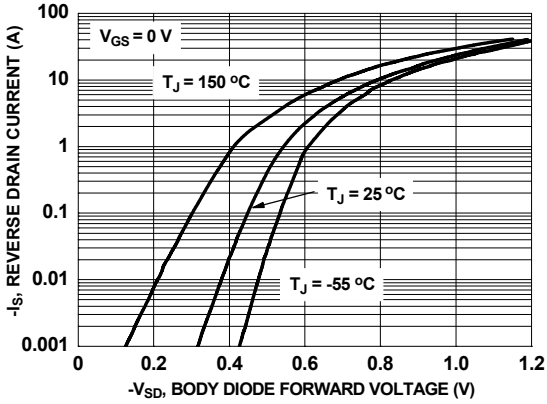



**Figure 6. Source to Drain Diode Forward Voltage vs Source Current**

## Typical Characteristics $T_J$ = 25 °C unless otherwise noted

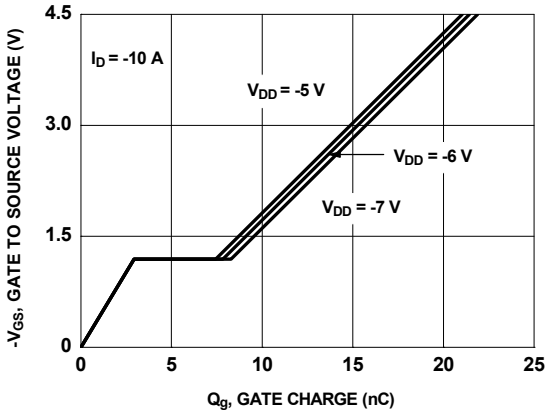



**Figure 7. Gate Charge Characteristics**

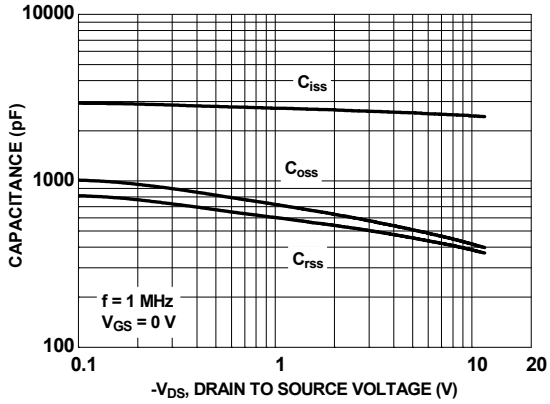



**Figure 8. Capacitance vs Drain to Source Voltage**

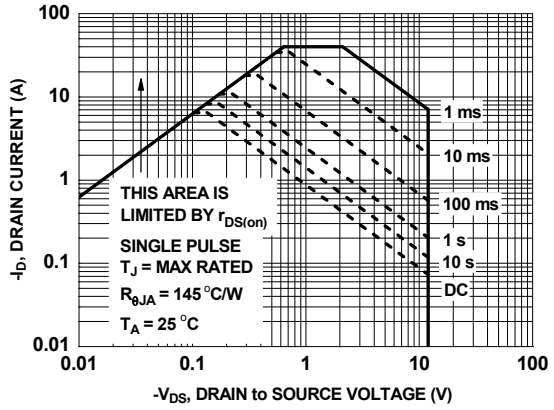



**Figure 9. Forward Bias Safe Operating Area**

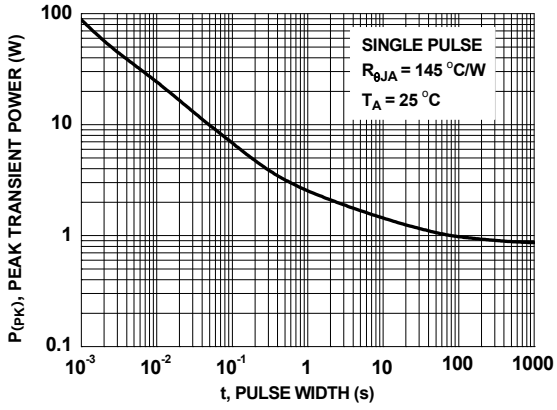



**Figure 10. Single Pluse Maximum Power Dissipation**

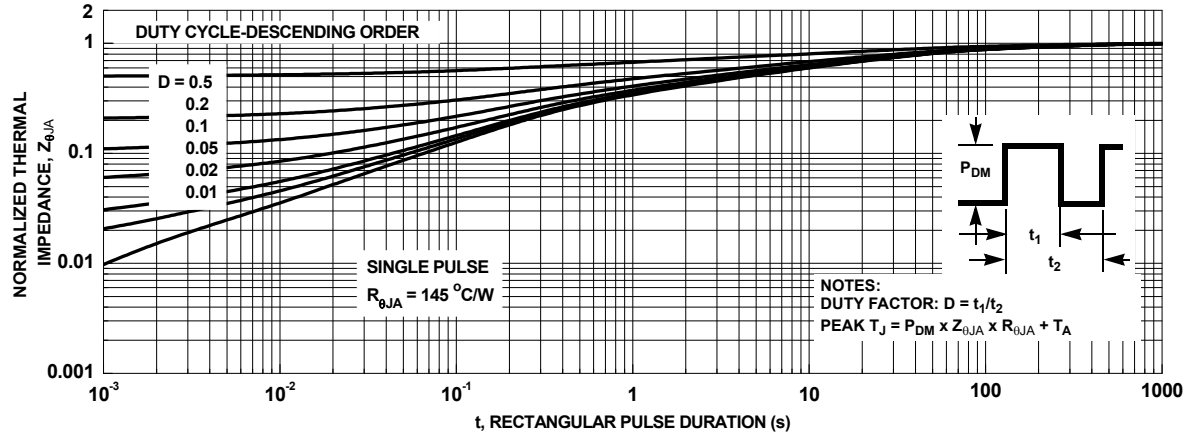
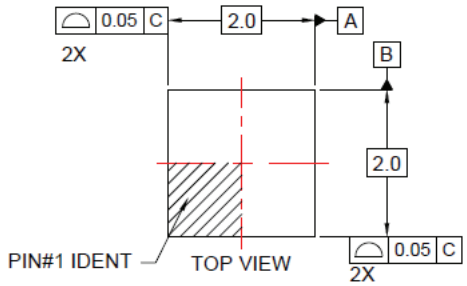
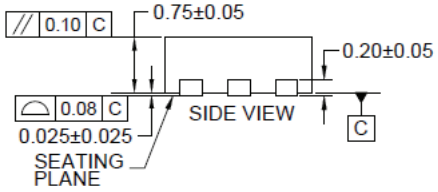
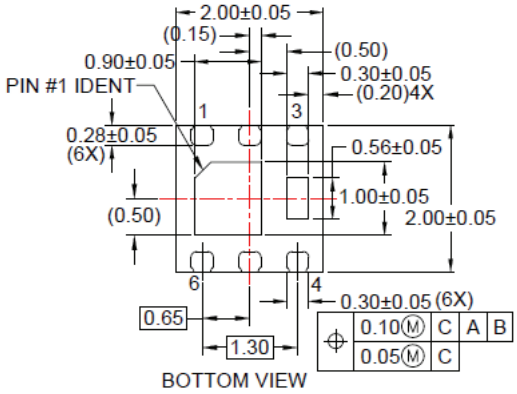


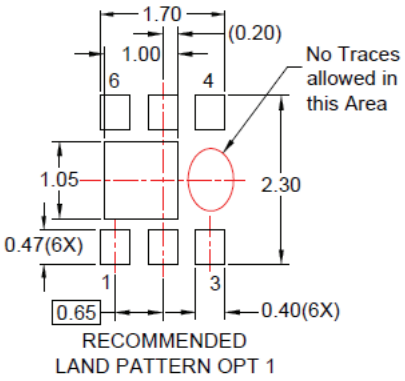

**Figure 11. Junction-to-Ambient Transient Thermal Response Curve**

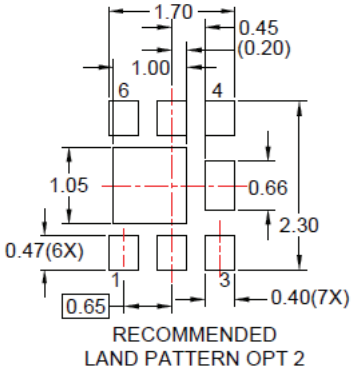
## Dimensional Outline and Pad Layout

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