# MOSFET – P-Channel POWERTRENCH®

## -12 V, -8 A, 22 mΩ

# FDME905PT

| $V_{DS}$ | $I_D$ MAX | $R_{DS(on)}$ MAX |
|---|---|---|
| −12 V | −8 A | 22 mΩ |

### General Description

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

The MicroFET™ 1.6x1.6 Thin package offers exceptional thermal performance for its physical size and is well suited to switching and linear mode applications.

### Features

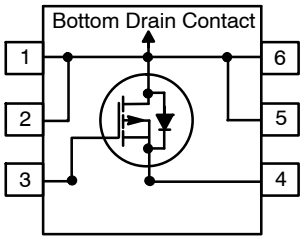
- Max $R_{DS(on)}$ = 22 mΩ at $V_{GS}$ = −4.5 V, $I_D$ = −8 A
- Max $R_{DS(on)}$ = 26 mΩ at $V_{GS}$ = −2.5 V, $I_D$ = −7.3 A
- Max $R_{DS(on)}$ = 97 mΩ at $V_{GS}$ = −1.8 V, $I_D$ = −3.8 A
- Low Profile: 0.55 mm Maximum in the New Package MicroFET 1.6x1.6 Thin
- Free from Halogenated Compounds and Antimony Oxides
- These Devices are Pb−Free and are RoHS Compliant

### MOSFET MAXIMUM RATINGS ($T_A$ = 25°C, Unless otherwise specified)

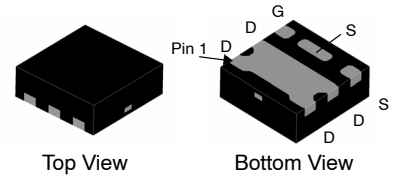
| Symbol | Parameter | Ratings | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain to Source Voltage | −12 | V |
| $V_{GS}$ | Gate to Source Voltage | ±8 | V |
| $I_D$ | Drain Current<br>Continuous ($T_A$ = 25°C) (Note 1a)<br>Pulsed | <br>−8<br>−30 | A |
| $P_D$ | Power Dissipation<br>($T_A$ = 25°C) (Note 1a)<br>($T_A$ = 25°C) (Note 1b) | <br>2.1<br>0.7 | W |
| $T_J$, $T_{STG}$ | Operating and Storage Junction Temperature Range | −55 to +150 | °C |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### ELECTRICAL CONNECTION




P-Channel MOSFET




**MicroFET (UDFN6) CASE 517DV**

### MARKING DIAGRAM




| | |
|---|---|
| &Z | = Assembly Plant Code |
| &2 | = 2−Digit Date Code (YW) |
| &K | = 2−Digit Lot Traceability Code |
| E95 | = Specific Device Code |

### ORDERING INFORMATION

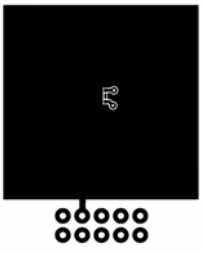
See detailed ordering and shipping information on page 2 of this data sheet.

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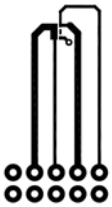
## THERMAL CHARACTERISTICS

| Symbol | Parameter | Ratings | Unit |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 4.5 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 1a) | 60 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 1b) | 175 | °C/W |

1. Repetitive rating: pulse−width limited by maximum junction temperature.



a) 60 °C/W when mounted on a 1 $in^2$ pad of 2 oz copper



b). 175 °C/W when mounted on a minimum pad of 2 oz copper

## PACKAGE MARKING AND ORDERING INFORMATION

| Device Marking | Device | Package | Reel Size† | Tape Width | Quantity |
|---|---|---|---|---|---|
| E95 | FDME905PT | MicroFET 1.6x1.6 Thin (Pb−Free / Halide Free) | 7″ | 8 mm | 5,000 Units |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

## ELECTRICAL CHARACTERISTICS ($T_J$ = 25°C unless otherwise noted)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| $BV_{DSS}$ | Drain to Source Breakdown Voltage | $I_D$ = −250 μA, $V_{GS}$ = 0 V | −12 | − | − | V |
| $\Delta BV_{DSS}/\Delta T_J$ | Breakdown Voltage Temperature Coefficient | $I_D$ = −250 μA, referenced to 25°C | − | −8.7 | − | 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, Forward | $V_{GS}$ = ±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 |
| $\Delta V_{GS(th)}/\Delta T_J$ | Gate to Source Threshold Voltage Temperature Coefficient | $I_D$ = −250 μA, referenced to 25°C | − | 2.5 | − | mV/°C |
| $R_{DS(on)}$ | Drain to Source On Resistance | $V_{GS}$ = −4.5 V, $I_D$ = −8 A<br>$V_{GS}$ = −2.5 V, $I_D$ = −7.3 A<br>$V_{GS}$ = −1.8 V, $I_D$ = −3.8 A,<br>$V_{GS}$ = −4.5 V, $I_D$ = −8 A, $T_J$ = 125°C | −<br>−<br>−<br>− | 18<br>22<br>28<br>23 | 22<br>26<br>97<br>32 | mΩ |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = −5 V, $I_D$ = −8 A | − | 38 | − | S |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = −6 V, $V_{GS}$ = 0 V, f = 1 MHz | − | 1740 | 2315 | pF |
| $C_{oss}$ | Output Capacitance | | − | 350 | 525 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | − | 311 | 465 | pF |

**ELECTRICAL CHARACTERISTICS** ($T_J$ = 25°C unless otherwise noted) (continued)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **SWITCHING CHARACTERISTICS** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$ = −6 V, $I_D$ = −8 A, $V_{GS}$ = −4.5 V, $R_{GEN}$ = 6 Ω | – | 9.5 | 19 | ns |
| $t_r$ | Rise Time | | – | 8 | 16 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | – | 90 | 144 | ns |
| $t_f$ | Fall Time | | – | 42 | 67 | ns |
| $Q_g$ | Total Gate Charge | $V_{DD}$ = −6 V, $I_D$ = −8 A $V_{GS}$ = −4.5 V | – | 14 | 20 | nC |
| $Q_{gs}$ | Gate to Source Gate Charge | | – | 2.4 | – | nC |
| $Q_{gd}$ | Gate to Drain “Miller” Charge | | – | 3 | – | nC |
| **DRAIN-SOURCE DIODE CHARACTERISTICS** | | | | | | |
| $V_{SD}$ | Source to Drain Diode Forward Voltage | $V_{GS}$ = 0 V, $I_S$ = −8 A (Note 2) | – | −0.8 | −1.2 | V |
| | | $V_{GS}$ = 0 V, $I_S$ = −1.8 A (Note 2) | – | −0.7 | −1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_F$ = −8 A, di/dt = 100 A/μs | – | 17 | 31 | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | – | 4.5 | 10 | nC |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.

## TYPICAL CHARACTERISTICS

($T_J$ = 25°C UNLESS OTHERWISE NOTED)

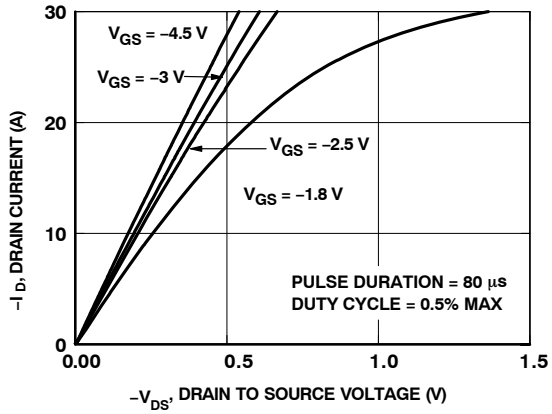



**Figure 1. On-Region Characteristics**

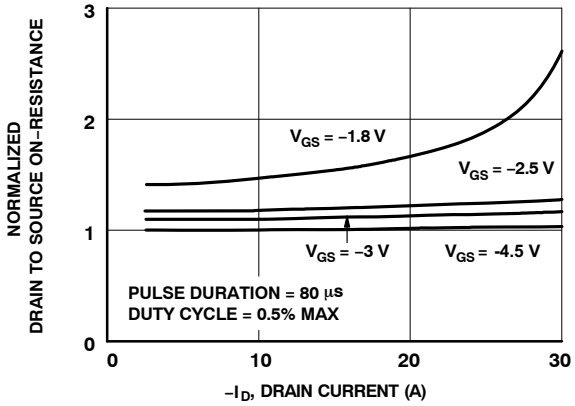



**Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage**

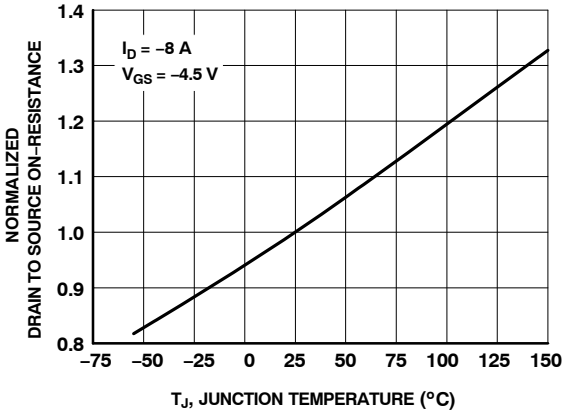



**Figure 3. Normalized On-Resistance vs. Junction Temperature**

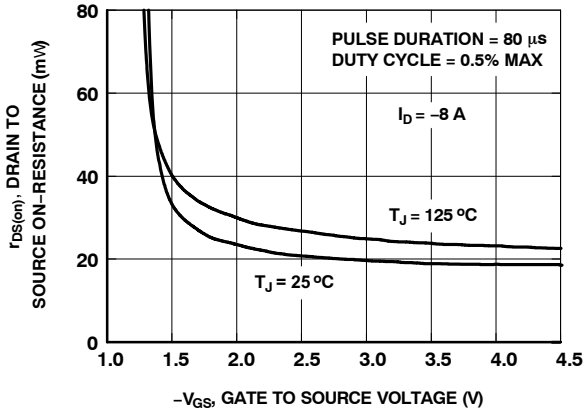



**Figure 4. On-Resistance vs. Gate to Source Voltage**

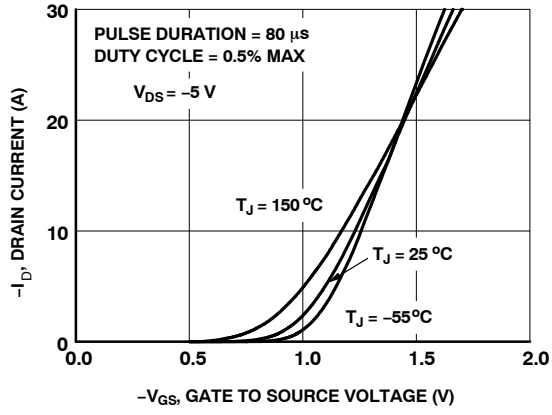



**Figure 5. Transfer Characteristics**

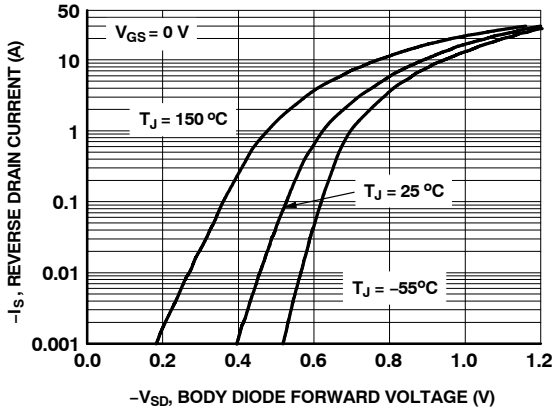



**Figure 6. Source to Drain Diode Forward Voltage vs. Source Current**

## TYPICAL CHARACTERISTICS

($T_J$ = 25°C UNLESS OTHERWISE NOTED)

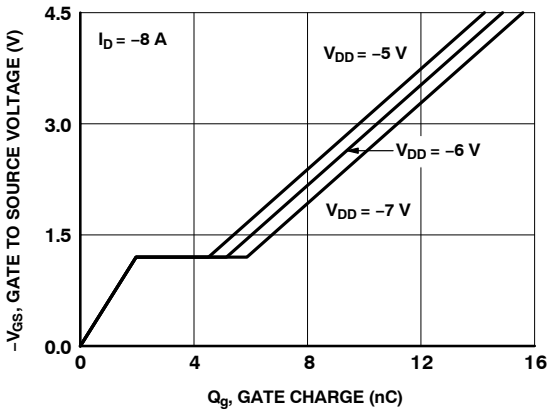



**Figure 7. Gate Charge Characteristics**

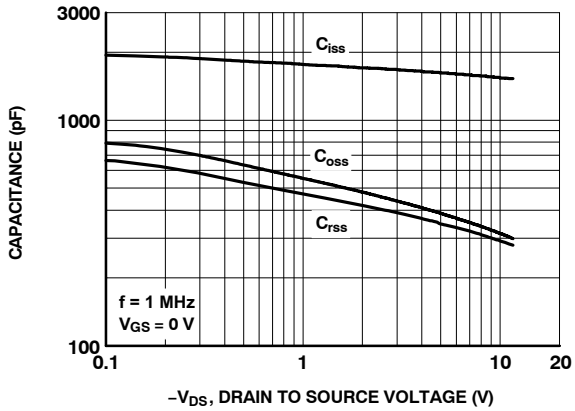



**Figure 8. Capacitance vs. Drain to Source Voltage**

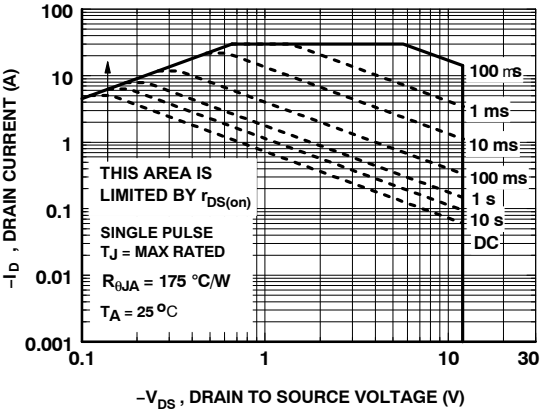



**Figure 9. Forward Bias Safe Operating Area**

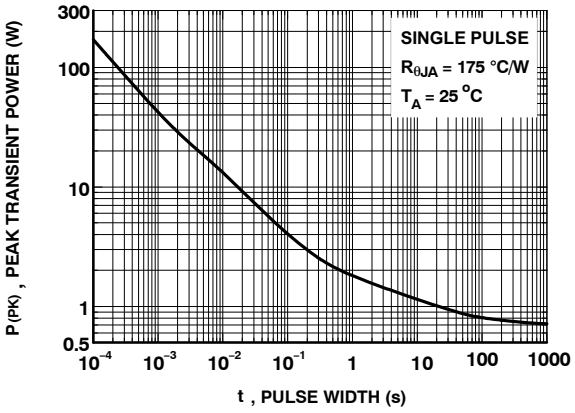



**Figure 10. Single Pulse Maximum Power Dissipation**

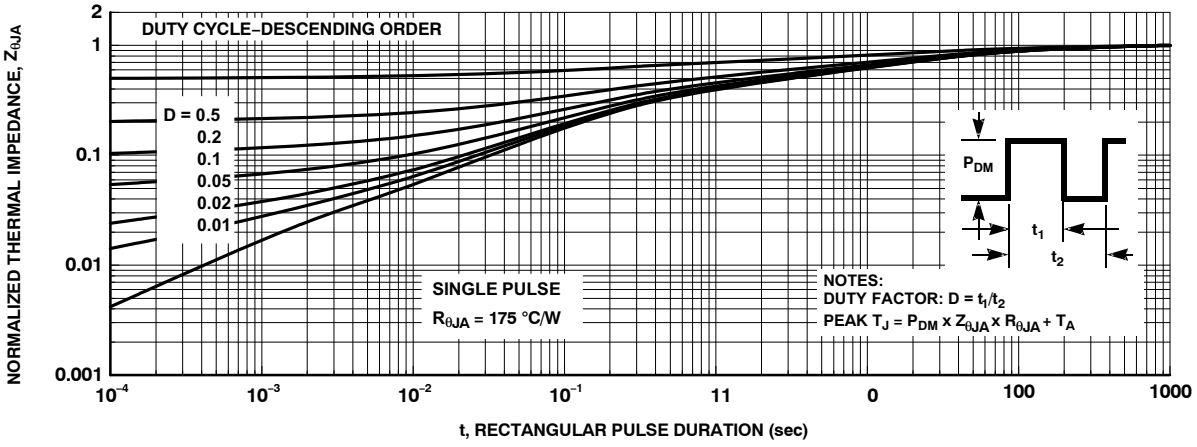
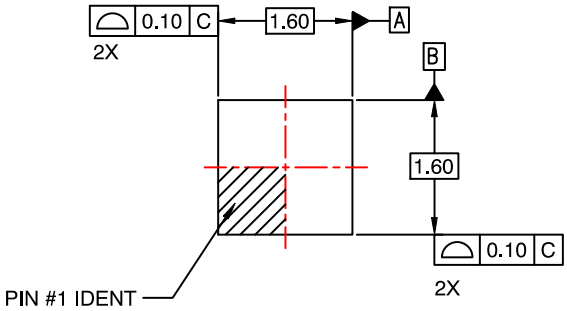



**Figure 11. Junction-to-Ambient Transient Thermal Response Curve**

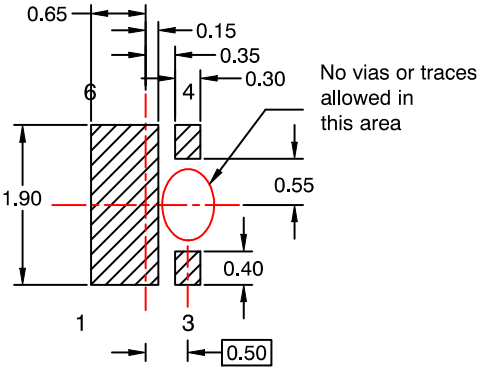
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**UDFN6 1.6x1.6, 0.5P**
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ISSUE O

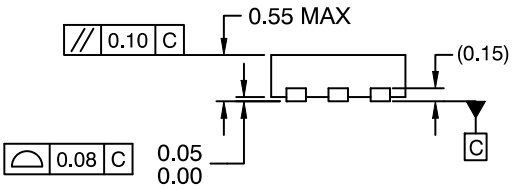
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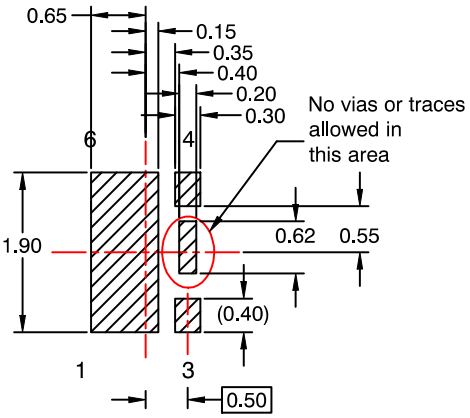

TOP VIEW



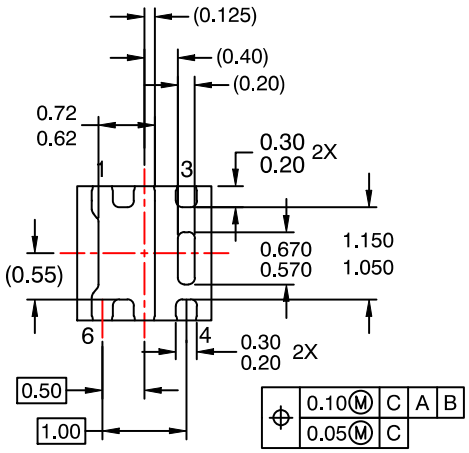

RECOMMENDED LAND PATTERN OPT 1




SIDE VIEW




RECOMMENDED LAND PATTERN OPT 2




BOTTOM VIEW

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

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