

## FDMA7632

### Single N-Channel PowerTrench® MOSFET

30 V, 9 A, 19 mΩ

#### Features

- Max  $r_{DS(on)} = 19 \text{ m}\Omega$  at  $V_{GS} = 10 \text{ V}$ ,  $I_D = 9 \text{ A}$
- Max  $r_{DS(on)} = 30 \text{ m}\Omega$  at  $V_{GS} = 4.5 \text{ V}$ ,  $I_D = 7 \text{ A}$
- Low Profile - 0.8 mm maximum - in the new package MicroFET 2x2 mm
- Free from halogenated compounds and antimony oxides
- RoHS compliant

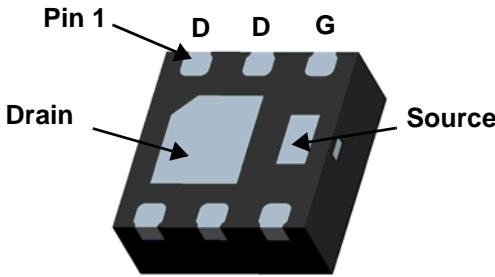


#### General Description

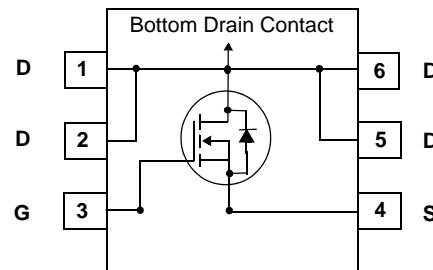
This device has been designed to provide maximum efficiency and thermal performance for synchronous buck converters. The low  $r_{DS(on)}$  and gate charge provide excellent switching performance.

#### Application

- DC – DC Buck Converters



MicroFET 2x2 (Bottom View)



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

| Symbol         | Parameter   | Ratings     | Units            |
|----------------|---|-------------|------------------|
| $V_{DSS}$      | Drain to Source Voltage   | 30          | V                |
| $V_{GSS}$      | Gate to Source Voltage  | $\pm 20$    | V                |
| $I_D$          | Drain Current -Continuous $T_A = 25 \text{ }^\circ\text{C}$ (Note 1a) | 9           | A                |
|                | -Pulsed   | 24          |                  |
| $P_D$          | Power Dissipation $T_A = 25 \text{ }^\circ\text{C}$ (Note 1a)         | 2.4         | W                |
|                | Power Dissipation $T_A = 25 \text{ }^\circ\text{C}$ (Note 1b)         | 0.9         |                  |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range                      | -55 to +150 | $^\circ\text{C}$ |

#### Thermal Characteristics

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

#### Package Marking and Ordering Information

| Device Marking | Device   | Package      | Reel Size | Tape Width | Quantity   |
|----------------|----------|--------------|-----------|------------|------------|
| 632            | FDMA7632 | MicroFET 2x2 | 7 "       | 8 mm       | 3000 units |

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

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|--------|-----------|-----------------|-----|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-----|-------|

**Off Characteristics**

|  |   |  |    |    |     |                            |
|--|---|--|----|----|-----|----------------------------|
| $\text{BV}_{\text{DSS}}$                           | Drain to Source Breakdown Voltage         | $I_D = 250 \mu\text{A}, V_{GS} = 0 \text{ V}$              | 30 |    |     | V                          |
| $\frac{\Delta \text{BV}_{\text{DSS}}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D = 250 \mu\text{A}$ , referenced to $25^\circ\text{C}$ |    | 16 |     | $\text{mV}/^\circ\text{C}$ |
| $I_{\text{DSS}}$                                   | Zero Gate Voltage Drain Current           | $V_{DS} = 24 \text{ V}, V_{GS} = 0 \text{ V}$              |    |    | 1   | $\mu\text{A}$              |
| $I_{\text{GSS}}$                                   | Gate to Source Leakage Current            | $V_{GS} = 20 \text{ V}, V_{DS} = 0 \text{ V}$              |    |    | 100 | $\text{nA}$                |

**On Characteristics**

|   |  |   |     |     |     |                            |
|---|--|---|-----|-----|-----|----------------------------|
| $V_{GS(\text{th})}$                           | Gate to Source Threshold Voltage                         | $V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$                            | 1.0 | 2.1 | 3.0 | V                          |
| $\frac{\Delta V_{GS(\text{th})}}{\Delta T_J}$ | Gate to Source Threshold Voltage Temperature Coefficient | $I_D = 250 \mu\text{A}$ , referenced to $25^\circ\text{C}$          |     | -6  |     | $\text{mV}/^\circ\text{C}$ |
| $r_{DS(\text{on})}$                           | Static Drain to Source On Resistance                     | $V_{GS} = 10 \text{ V}, I_D = 9 \text{ A}$                          |     | 14  | 19  |                            |
|   |  | $V_{GS} = 4.5 \text{ V}, I_D = 7 \text{ A}$                         |     | 20  | 30  | $\text{m}\Omega$           |
|   |  | $V_{GS} = 10 \text{ V}, I_D = 9 \text{ A}, T_J = 125^\circ\text{C}$ |     | 19  | 25  |                            |
| $g_{FS}$                                      | Forward Transconductance                                 | $V_{DS} = 5 \text{ V}, I_D = 9 \text{ A}$                           |     | 35  |     | S                          |

**Dynamic Characteristics**

|           |                              |  |  |     |     |          |
|-----------|------------------------------|--|--|-----|-----|----------|
| $C_{iss}$ | Input Capacitance            | $V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}$<br>$f = 1.0 \text{ MHz}$ |  | 570 | 760 | pF       |
| $C_{oss}$ | Output Capacitance           |  |  | 195 | 260 | pF       |
| $C_{rss}$ | Reverse Transfer Capacitance |  |  | 25  | 40  | pF       |
| $R_g$     | Gate Resistance              |  |  | 1.5 |     | $\Omega$ |

**Switching Characteristics**

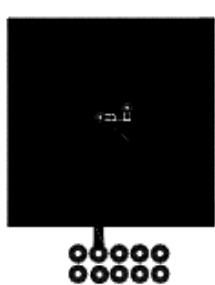
|                     |                               |  |  |     |    |    |
|---------------------|-------------------------------|--|--|-----|----|----|
| $t_{d(\text{on})}$  | Turn-On Delay Time            | $V_{DD} = 15 \text{ V}, I_D = 9 \text{ A}$<br>$V_{GS} = 10 \text{ V}, R_{\text{GEN}} = 6 \Omega$ |  | 6   | 12 | ns |
| $t_r$               | Rise Time                     |  |  | 2   | 10 | ns |
| $t_{d(\text{off})}$ | Turn-Off Delay Time           |  |  | 14  | 25 | ns |
| $t_f$               | Fall Time                     |  |  | 2   | 10 | ns |
| $Q_g$               | Total Gate Charge             | $V_{GS} = 0 \text{ V} \text{ to } 10 \text{ V}$  |  | 9.3 | 13 | nC |
|                     | Total Gate Charge             | $V_{GS} = 0 \text{ V} \text{ to } 4.5 \text{ V}$   | $V_{DD} = 15 \text{ V}, I_D = 9 \text{ A}$ | 4.4 | 6  | nC |
| $Q_{gs}$            | Gate to Source Gate Charge    |  |  | 1.9 |    | nC |
| $Q_{gd}$            | Gate to Drain "Miller" Charge |  |  | 1.5 |    | nC |

**Drain-Source Diode Characteristics**

|          |   |  |          |     |     |    |
|----------|---|--|----------|-----|-----|----|
| $I_S$    | Maximum Continuous Drain-Source Diode Forward Current |  |          | 2   | A   |    |
| $V_{SD}$ | Source to Drain Diode Forward Voltage                 | $V_{GS} = 0 \text{ V}, I_S = 2 \text{ A}$              | (Note 2) | 0.8 | 1.2 | V  |
| $t_{rr}$ | Reverse Recovery Time                                 | $I_F = 9 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s}$ |          | 18  | 32  | ns |
| $Q_{rr}$ | Reverse Recovery Charge                               |  |          | 5   | 10  | nC |

## NOTES:

1.  $R_{\text{QJA}}$  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.  $R_{\text{QJC}}$  is guaranteed by design while  $R_{\text{QCA}}$  is determined by the user's board design.



a. 52 °C/W when mounted on a 1 in<sup>2</sup> 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**  $T_J = 25^\circ\text{C}$  unless otherwise noted

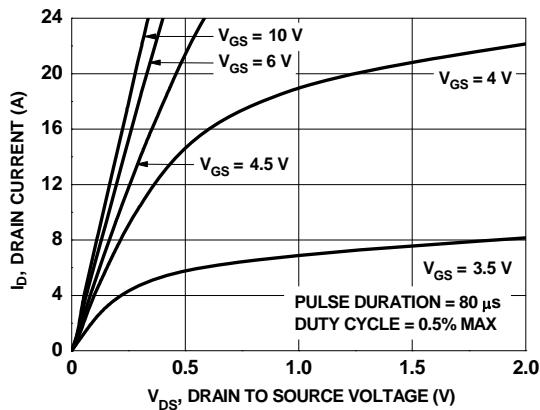


Figure 1. On-Region Characteristics

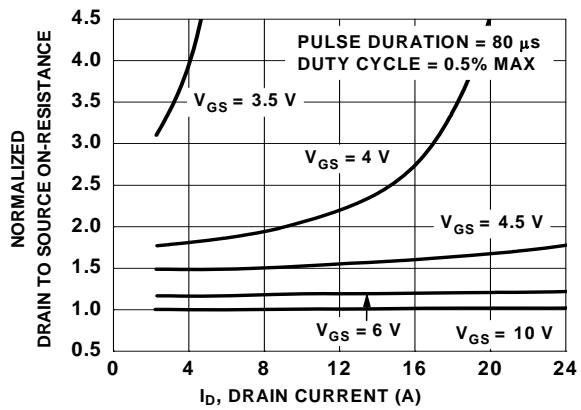


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

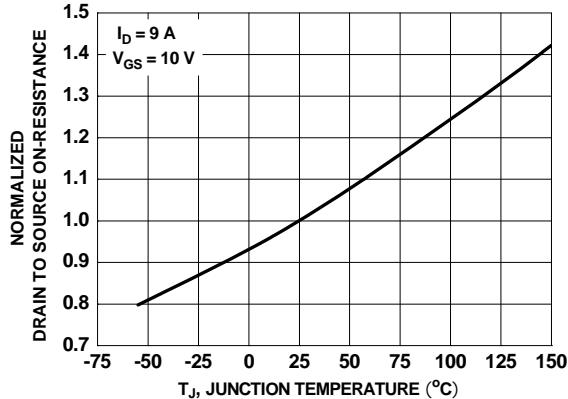


Figure 3. Normalized On-Resistance vs Junction Temperature

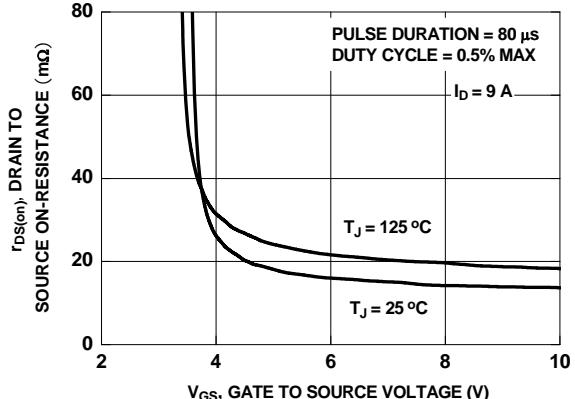


Figure 4. On-Resistance vs Gate to Source Voltage

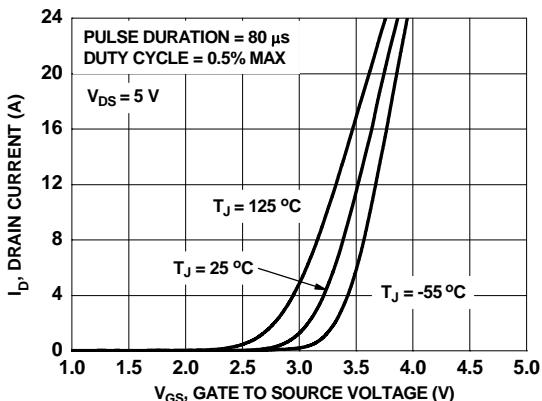


Figure 5. Transfer Characteristics

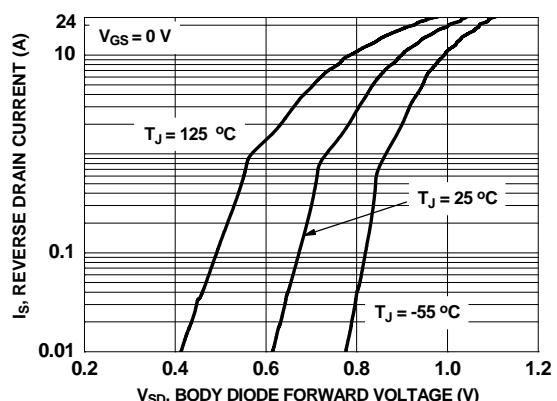


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

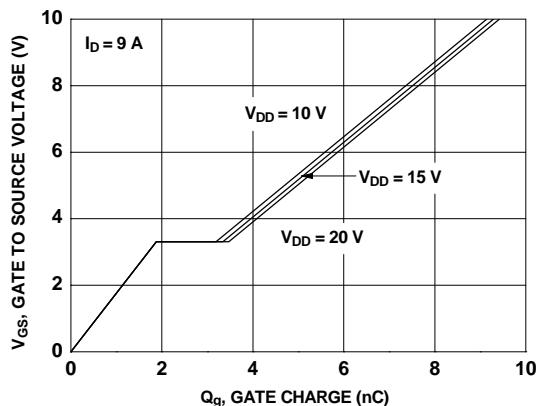


Figure 7. Gate Charge Characteristics

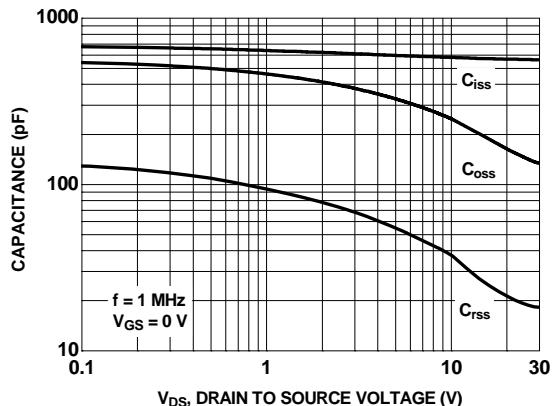


Figure 8. Capacitance vs Drain to Source Voltage

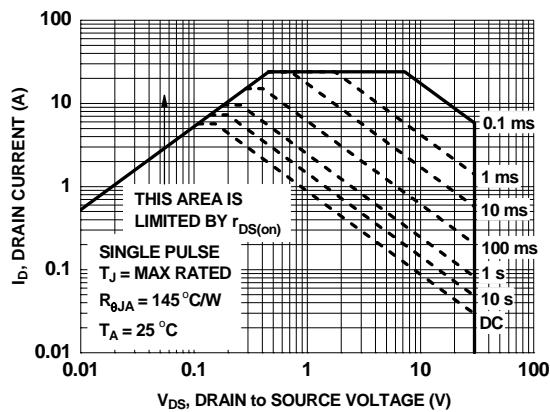


Figure 9. Forward Bias Safe Operating Area

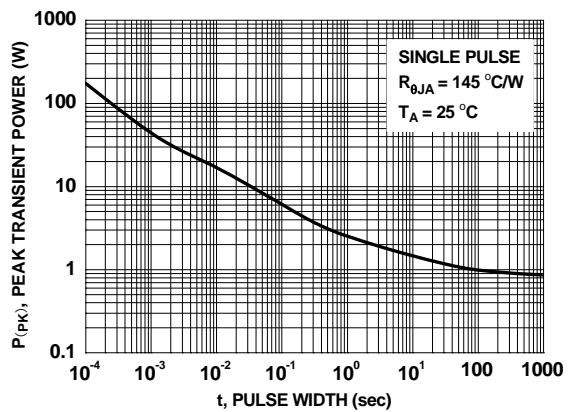


Figure 10. Single Pulse Maximum Power Dissipation

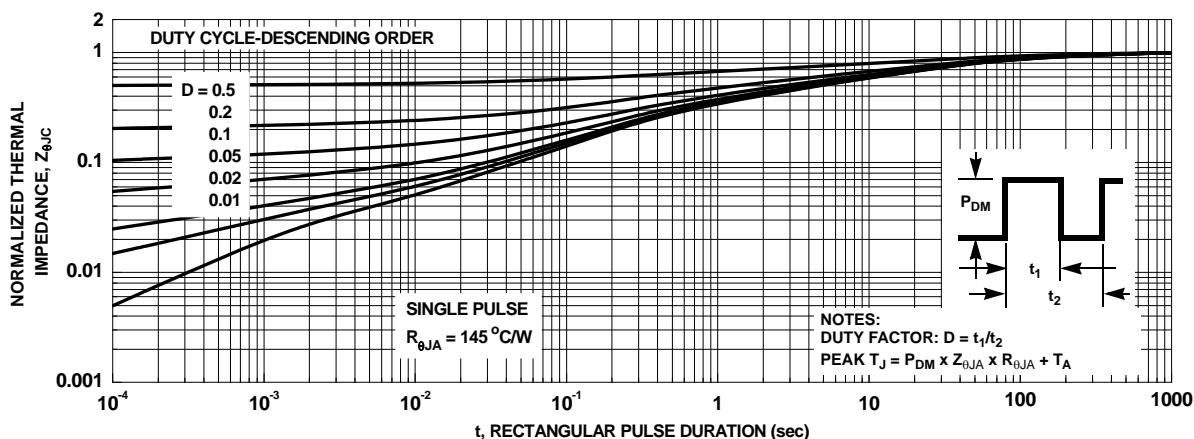
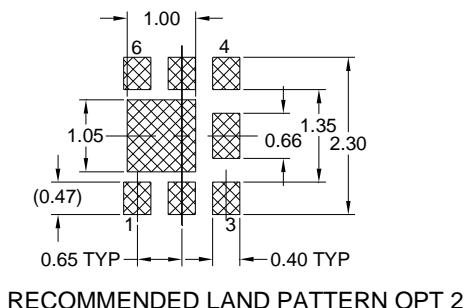
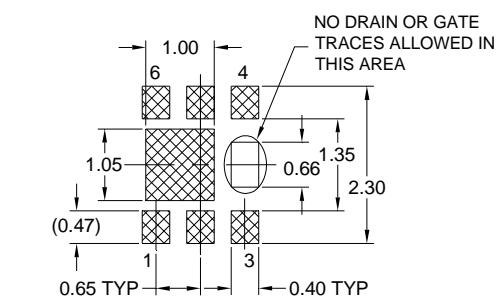
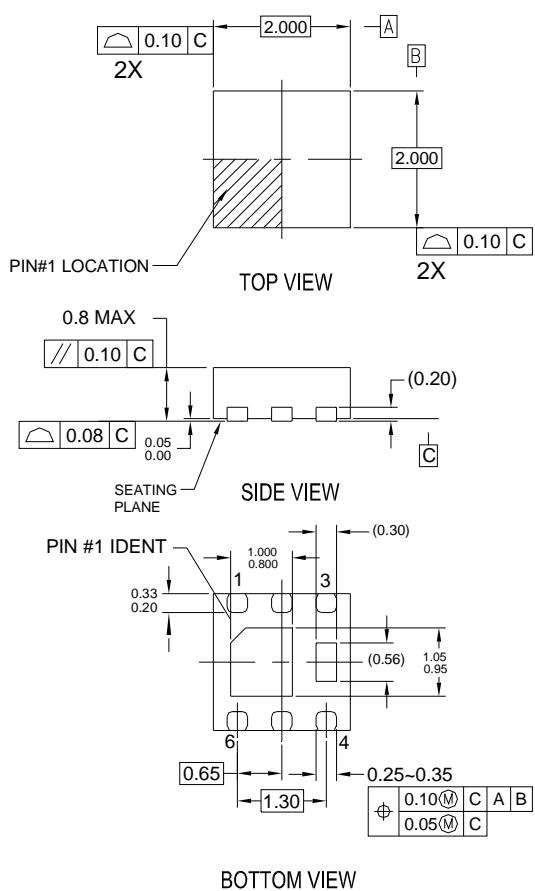


Figure 11. Transient Thermal Response Curve

## Dimensional Outline and Pad Layout



### 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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