



ON Semiconductor®

FDMA3028N

Dual N-Channel PowerTrench® MOSFET 30 V, 3.8 A, 68 mΩ

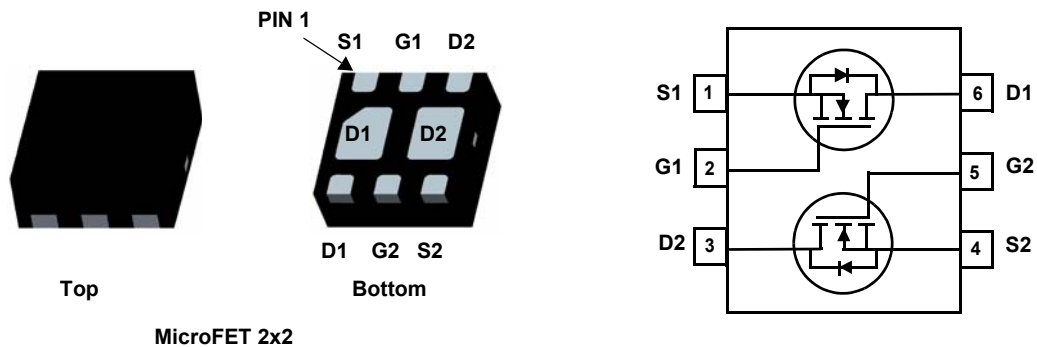
Features

- Max. $R_{DS(on)}$ = 68 mΩ at $V_{GS} = 4.5$ V, $I_D = 3.8$ A
- Max. $R_{DS(on)}$ = 88 mΩ at $V_{GS} = 2.5$ V, $I_D = 3.4$ A
- Max. $R_{DS(on)}$ = 123 mΩ at $V_{GS} = 1.8$ V, $I_D = 2.9$ A
- Low profile - 0.8 mm maximum - in the new package MicroFET 2x2 mm
- RoHS Compliant



General Description

This device is designed specifically as a single package solution for dual switching requirements in cellular handset and other ultra-portable applications. It features two independent N-Channel MOSFETs with low on-state resistance for minimum conduction losses. The MicroFET 2x2 package offers exceptional thermal performance for its physical size and is well suited to linear mode applications.



MOSFET Maximum Ratings $T_A = 25$ °C unless otherwise noted

| Symbol | Parameter | Ratings | Units |
|----------------|--|-------------|-------|
| V_{DS} | Drain to Source Voltage | 30 | V |
| V_{GS} | Gate to Source Voltage | ±12 | V |
| I_D | Drain Current -Continuous (Note 1a) | 3.8 | A |
| | -Pulsed | 16 | |
| P_D | Power Dissipation (Note 1a) | 1.5 | W |
| | Power Dissipation (Note 1b) | 0.7 | |
| T_J, T_{STG} | Operating and Storage Junction Temperature Range | -55 to +150 | °C |

Thermal Characteristics

| $R_{\theta JA}$ | Thermal Resistance for Single Operation, Junction to Ambient | (Note 1a) | 86 | °C/W |
|-----------------|--|-----------|-----|------|
| | Thermal Resistance for Single Operation, Junction to Ambient | (Note 1b) | 173 | |
| | Thermal Resistance for Dual Operation, Junction to Ambient | (Note 1c) | 69 | |
| | Thermal Resistance for Dual Operation, Junction to Ambient | (Note 1d) | 151 | |
| | Thermal Resistance for Single Operation, Junction to Ambient | (Note 1e) | 160 | |
| | Thermal Resistance for Dual Operation, Junction to Ambient | (Note 1f) | 133 | |

Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|----------------|-----------|--------------|-----------|------------|------------|
| 328 | FDMA3028N | 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 |
|--------|-----------|-----------------|-----|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-----|-------|

Off Characteristics

| | | | | | | |
|--------------------------------------|---|---|----|----|-----------|----------------------|
| BV_{DSS} | Drain to Source Breakdown Voltage | $I_D = 250\text{ }\mu\text{A}$, $V_{GS} = 0\text{ V}$ | 30 | | | V |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D = 250\text{ }\mu\text{A}$, referenced to $25\text{ }^\circ\text{C}$ | | 23 | | mV/ $^\circ\text{C}$ |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 24\text{ V}$, $V_{GS} = 0\text{ V}$ | | | 1 | μA |
| I_{GSS} | Gate to Source Leakage Current | $V_{GS} = \pm 12\text{ V}$, $V_{DS} = 0\text{ V}$ | | | ± 100 | nA |

On Characteristics

| | | | | | | |
|--|--|--|-----|-----|-----|----------------------|
| $V_{GS(th)}$ | Gate to Source Threshold Voltage | $V_{GS} = V_{DS}$, $I_D = 250\text{ }\mu\text{A}$ | 0.6 | 0.9 | 1.5 | 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 $25\text{ }^\circ\text{C}$ | | -3 | | mV/ $^\circ\text{C}$ |
| $r_{DS(on)}$ | Static Drain to Source On Resistance | $V_{GS} = 4.5\text{ V}$, $I_D = 3.8\text{ A}$ | | 46 | 68 | m Ω |
| | | $V_{GS} = 2.5\text{ V}$, $I_D = 3.4\text{ A}$ | | 56 | 88 | |
| | | $V_{GS} = 1.8\text{ V}$, $I_D = 2.9\text{ A}$ | | 80 | 123 | |
| | | $V_{GS} = 4.5\text{ V}$, $I_D = 3.8\text{ A}$, $T_J = 125\text{ }^\circ\text{C}$ | | 72 | 108 | |
| g_{FS} | Forward Transconductance | $V_{DS} = 5\text{ V}$, $I_D = 3.8\text{ A}$ | | 15 | | S |

Dynamic Characteristics

| | | | | | | |
|-----------|------------------------------|--|--|-----|-----|----------|
| C_{iss} | Input Capacitance | $V_{DS} = 15\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$ | | 282 | 375 | pF |
| C_{oss} | Output Capacitance | | | 40 | 55 | pF |
| C_{rss} | Reverse Transfer Capacitance | | | 29 | 45 | pF |
| R_g | Gate Resistance | | | 2.4 | | Ω |

Switching Characteristics

| | | | | | | |
|--------------|-------------------------------|--|--|-----|-----|-----|
| $t_{d(on)}$ | Turn-On Delay | $V_{DD} = 15\text{ V}$, $I_D = 3.8\text{ A}$, $V_{GS} = 4.5\text{ V}$, $R_{GEN} = 6\text{ }\Omega$ | | 5.3 | 11 | ns |
| t_r | Rise Time | | | 3 | 10 | ns |
| $t_{d(off)}$ | Turn-Off Delay | | | 15 | 27 | ns |
| t_f | Fall Time | | | 2.5 | 10 | ns |
| $Q_{g(TOT)}$ | Total Gate Charge | | $V_{DD} = 15\text{ V}$, $I_D = 3.8\text{ A}$ $V_{GS} = 5\text{ V}$ | | 3.7 | 5.2 |
| Q_{gs} | Gate to Source Charge | | | 0.4 | | nC |
| Q_{gd} | Gate to Drain "Miller" Charge | | | 1 | | nC |

Drain-Source Diode Characteristics

| | | | | | | |
|----------|---------------------------------------|---|--|-----|-----|----|
| V_{SD} | Source to Drain Diode Forward Voltage | $V_{GS} = 0\text{ V}$, $I_S = 1.3\text{ A}$ (Note 2) | | 0.7 | 1.2 | V |
| t_{rr} | Reverse Recovery Time | $I_F = 3.8\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$ | | 12 | 22 | ns |
| Q_{rr} | Reverse Recovery Charge | | | 3.3 | 10 | nC |

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

Notes:

1. $R_{\theta JA}$ is determined with the device mounted on a 1 in² 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) $R_{\theta JA} = 86\text{ }^\circ\text{C/W}$ when mounted on a 1 in² pad of 2 oz copper, 1.5 " x 1.5 " x 0.062 " thick PCB. For single operation.
- (b) $R_{\theta JA} = 173\text{ }^\circ\text{C/W}$ when mounted on a minimum pad of 2 oz copper. For single operation.
- (c) $R_{\theta JA} = 69\text{ }^\circ\text{C/W}$ when mounted on a 1 in² pad of 2 oz copper, 1.5 " x 1.5 " x 0.062 " thick PCB. For dual operation.
- (d) $R_{\theta JA} = 151\text{ }^\circ\text{C/W}$ when mounted on a minimum pad of 2 oz copper. For dual operation.
- (e) $R_{\theta JA} = 160\text{ }^\circ\text{C/W}$ when mounted on a 30mm² pad of 2 oz copper. For single operation.
- (f) $R_{\theta JA} = 133\text{ }^\circ\text{C/W}$ when mounted on a 30mm² pad of 2 oz copper. For dual operation.



a. $86\text{ }^\circ\text{C/W}$ when mounted on a 1 in² pad of 2 oz copper



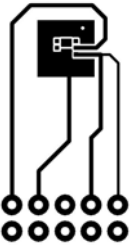
b. $173\text{ }^\circ\text{C/W}$ when mounted on a minimum pad of 2 oz copper



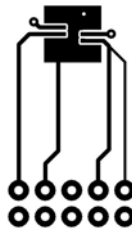
c. $69\text{ }^\circ\text{C/W}$ when mounted on a 1 in² pad of 2 oz copper



d. $151\text{ }^\circ\text{C/W}$ when mounted on a minimum pad of 2 oz copper



e. $160\text{ }^\circ\text{C/W}$ when mounted on 30mm² pad of 2 oz copper



f. $133\text{ }^\circ\text{C/W}$ when mounted on 30mm² of 2 oz copper

2. Pulse Test : Pulse Width < 300 us, Duty Cycle < 2.0%

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

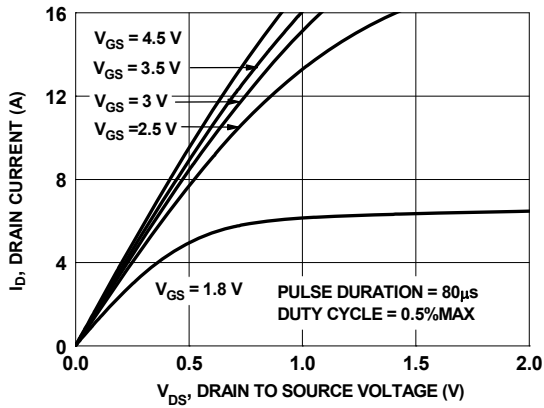


Figure 1. On Region Characteristics

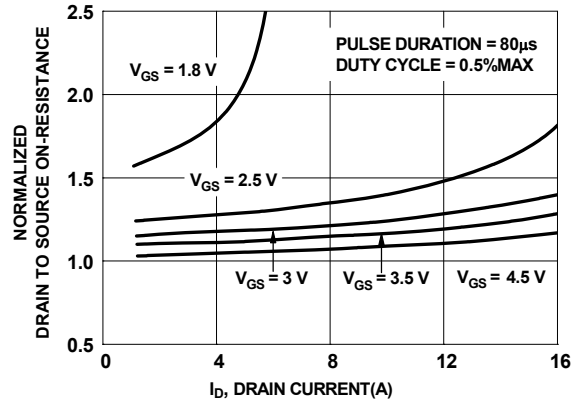


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

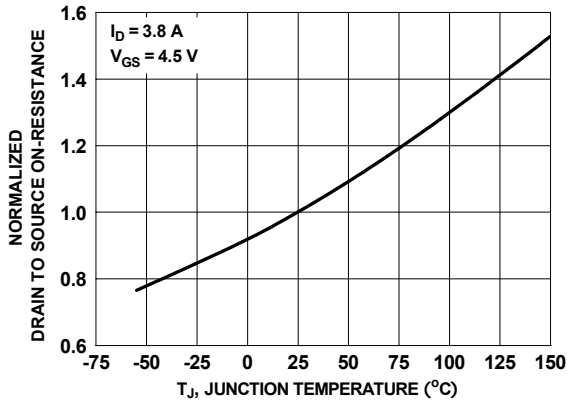


Figure 3. Normalized On Resistance vs. Junction Temperature

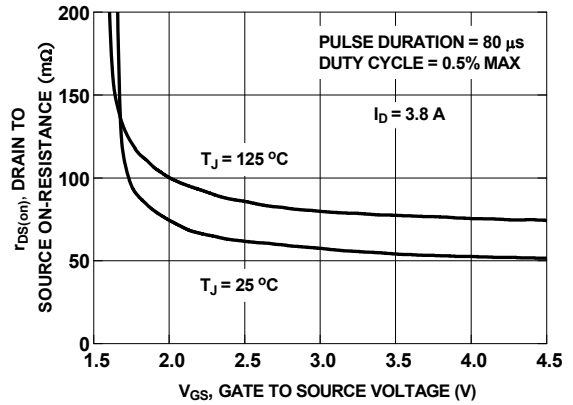


Figure 4. On-Resistance vs Gate to Source Voltage

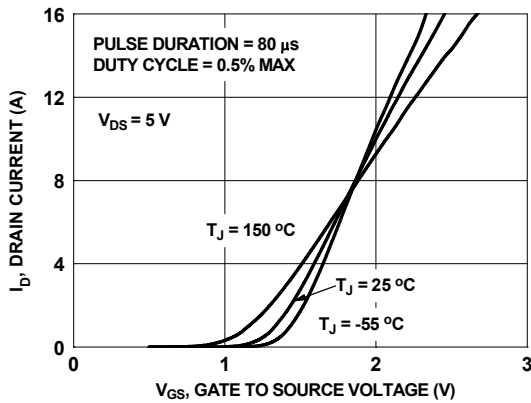


Figure 5. Transfer Characteristics

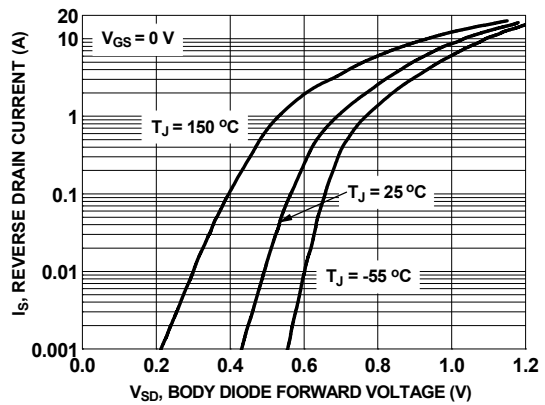


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

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

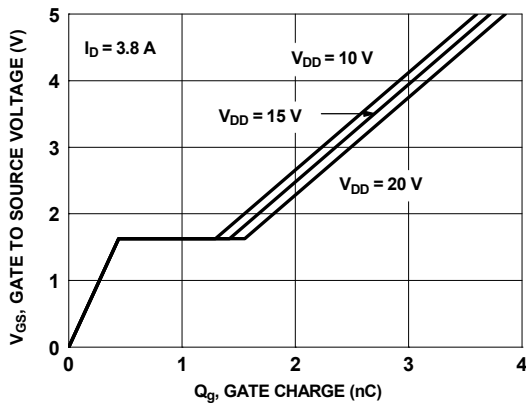


Figure 7. Gate Charge Characteristics

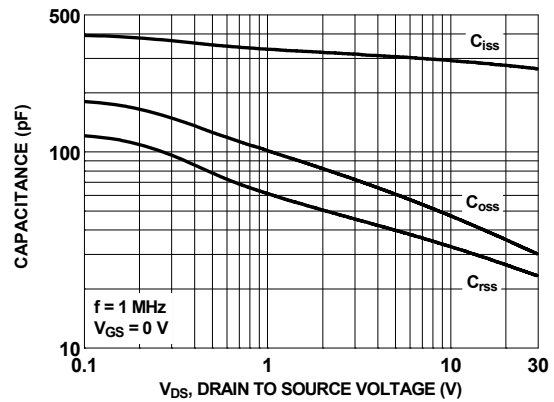


Figure 8. Capacitance vs. Drain to Source Voltage

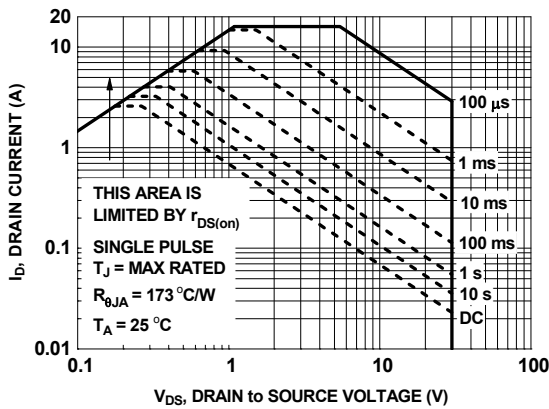


Figure 9. Forward Bias Safe Operating Area

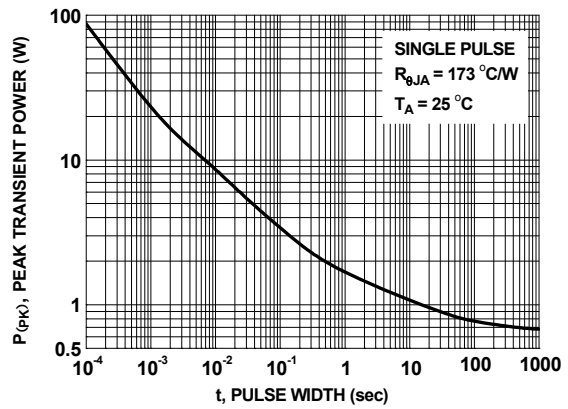


Figure 10. Single-Pulse Maximum Power Dissipation

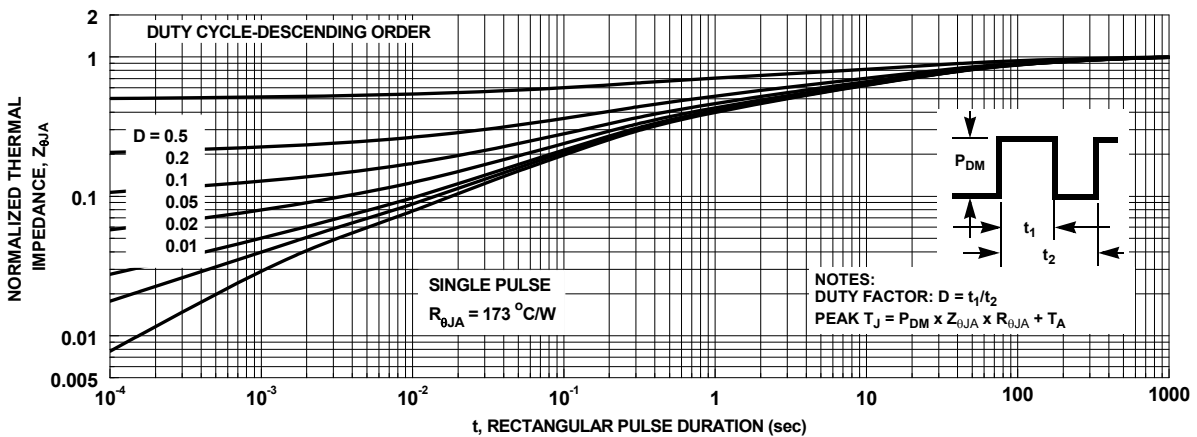
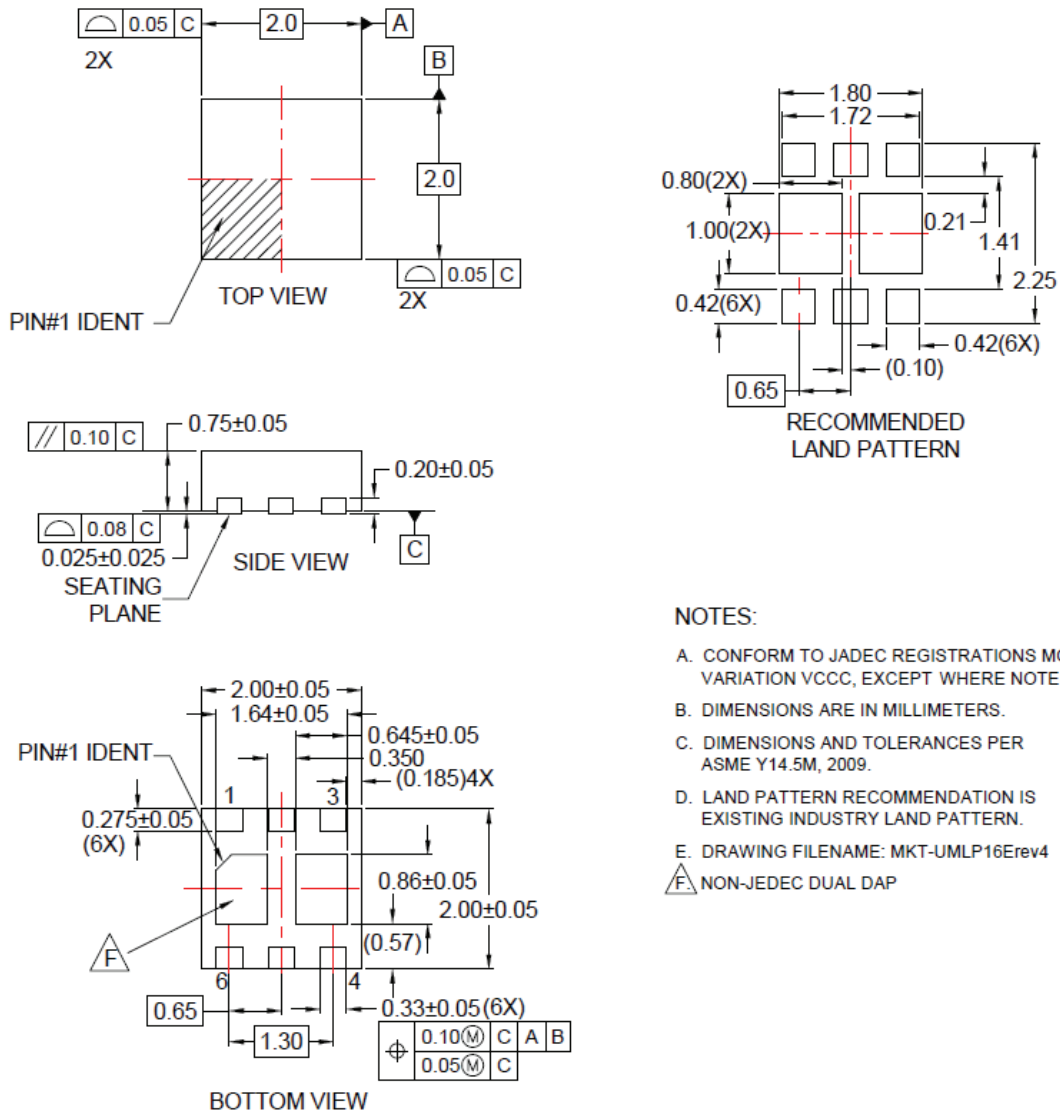


Figure 11. Junction-to-Ambient Transient Thermal Response Curve

Dimensional Outline and Pad Layout



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