

# FDMJ1028N

## N-Channel 2.5V Specified PowerTrench® MOSFET

20V, 3.2A, 90mΩ

### Features

- Max  $r_{DS(on)}$  = 90mΩ at  $V_{GS}$  = 4.5V
- Max  $r_{DS(on)}$  = 130mΩ at  $V_{GS}$  = 2.5V
- Low gate charge
- High performance trench technology for extremely low  $r_{DS(on)}$
- RoHS Compliant

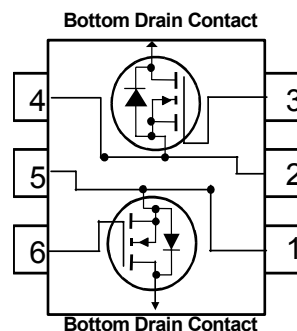
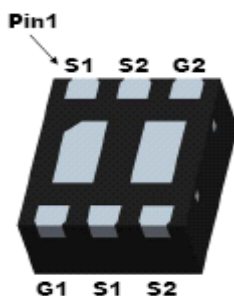


### General Description

This dual N-Channel 2.5V specified MOSFET uses Fairchild's advanced low voltage PowerTrench process. The  $r_{DS(on)}$  and thermal properties of the device are optimized for battery power management applications.

### Applications

- Battery management
- Baseband Switches



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

| Symbol         | Parameter                              | Ratings     | Units |
|----------------|--|-------------|-------|
| $V_{DS}$       | Drain to Source Voltage                | 20          | V     |
| $V_{GS}$       | Gate to Source Voltage                 | ±12         | V     |
| $I_D$          | Drain Current -Continuous              | 3.2         | A     |
|                | -Pulsed                                | 12          |       |
| $P_D$          | Power Dissipation for Single Operation | (Note 1a)   | W     |
|                |  | (Note 1b)   |       |
| $T_J, T_{STG}$ | Operating and Storage Temperature      | -55 to +150 | °C    |

### Thermal Characteristics

|                 |   |           |    |      |
|-----------------|---|-----------|----|------|
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | (Note 1a) | 89 | °C/W |
|-----------------|---|-----------|----|------|

### Package Marking and Ordering Information

| Device Marking | Device    | Reel Size | Tape Width | Quantity   |
|----------------|-----------|-----------|------------|------------|
| 028            | FDMJ1028N | 7"        | 8mm        | 3000 units |

FDMJ1028N N-Channel 2.5V Specified PowerTrench® MOSFET

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

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

#### Off Characteristics

|                                      |   |   |    |    |           |                            |
|--------------------------------------|---|---|----|----|-----------|----------------------------|
| $BV_{DSS}$                           | Drain to Source Breakdown Voltage         | $I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$                | 20 |    |           | V                          |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D = 250\mu\text{A}$ , referenced to $25^\circ\text{C}$ |    | 13 |           | $\text{mV}/^\circ\text{C}$ |
| $I_{DSS}$                            | Zero Gate Voltage Drain Current           | $V_{DS} = 16, V_{GS} = 0\text{V}$                         |    |    | 1         | $\mu\text{A}$              |
| $I_{GSS}$                            | Gate to Source Leakage Current            | $V_{GS} = \pm 12\text{V}, V_{DS} = 0\text{V}$             |    |    | $\pm 100$ | nA                         |

#### On Characteristics (Note 2)

|  |  |  |     |     |     |                            |
|--|--|--|-----|-----|-----|----------------------------|
| $V_{GS(th)}$                           | Gate to Source Threshold Voltage                         | $V_{GS} = V_{DS}, I_D = 250\mu\text{A}$                            | 0.6 | 1.0 | 1.5 | V                          |
| $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | Gate to Source Threshold Voltage Temperature Coefficient | $I_D = 250\mu\text{A}$ , referenced to $25^\circ\text{C}$          |     | -3  |     | $\text{mV}/^\circ\text{C}$ |
| $r_{DS(on)}$                           | Drain to Source On Resistance                            | $V_{GS} = 4.5\text{V}, I_D = 3.2\text{A}$                          |     | 76  | 90  | m $\Omega$                 |
|  |  | $V_{GS} = 2.5\text{V}, I_D = 2.5\text{A}$                          |     | 106 | 130 |                            |
|  |  | $V_{GS} = 4.5\text{V}, I_D = 3.2\text{A}, T_J = 125^\circ\text{C}$ |     | 89  | 132 |                            |
| $g_{FS}$                               | Forward Transconductance                                 | $V_{GS} = 5\text{V}, I_D = 3.2\text{A}$                            |     | 7.5 |     | S                          |

#### Dynamic Characteristics

|           |                              |  |                   |     |   |    |
|-----------|------------------------------|--|-------------------|-----|---|----|
| $C_{iss}$ | Input Capacitance            | $V_{DS} = 10\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$ |                   | 200 |   | pF |
| $C_{oss}$ | Output Capacitance           |  |                   | 50  |   | pF |
| $C_{rss}$ | Reverse Transfer Capacitance |  |                   | 30  |   | pF |
| $R_G$     | Gate Resistance              |  | $f = 1\text{MHz}$ |     | 1 |    |

#### Switching Characteristics (Note 2)

|              |                            |  |  |     |    |    |
|--------------|----------------------------|--|--|-----|----|----|
| $t_{d(on)}$  | Turn-On Delay Time         | $V_{DD} = 10\text{V}, I_D = 1\text{A}, V_{GS} = 4.5\text{V}, R_{GS} = 6\Omega$ |  | 7   | 14 | ns |
| $t_r$        | Rise Time                  |  |  | 8   | 16 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time        |  |  | 11  | 20 | ns |
| $t_f$        | Fall Time                  |  |  | 2   | 4  | ns |
| $Q_{g(tot)}$ | Total Gate Charge at 10V   | $V_{DD} = 15\text{V}, V_{GS} = 3.2\text{V}, V_{GS} = 4.5\text{V}$              |  | 2   | 3  | nC |
| $Q_{gs}$     | Gate to Source Gate Charge |  |  | 0.4 |    | nC |
| $Q_{gd}$     | Gate to Drain Charge       |  |  | 1.0 |    | nC |

#### Drain-Source Diode Characteristics

|          |                                    |  |  |     |     |    |
|----------|------------------------------------|--|--|-----|-----|----|
| $V_{SD}$ | Drain-Source Diode Forward Voltage | $V_{GS} = 0\text{V}, I_S = 1.16\text{A}$               |  | 0.8 | 1.2 | V  |
| $t_{rr}$ | Diode Reverse Recovery Time        | $I_F = 3.2\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$ |  | 11  |     | ns |
| $Q_{rr}$ | Diode Reverse Recovery Charge      |  |  | 2.5 |     | nC |

#### Notes

1:  $R_{\theta JA}$  is determined with the device mounted on a  $1\text{in}^2$  pad 2 oz copper pad on a  $1.5 \times 1.5$  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.  $89^\circ\text{C}/\text{W}$  when mounted on a  $1\text{in}^2$  pad of 2 oz copper



b.  $156^\circ\text{C}/\text{W}$  when mounted on a minimum pad of 2 oz copper

Scale 1 : 1 on letter size paper

2: Pulse Test: Pulse Width <  $3000\mu\text{s}$ , Duty Cycle < 2.0%

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

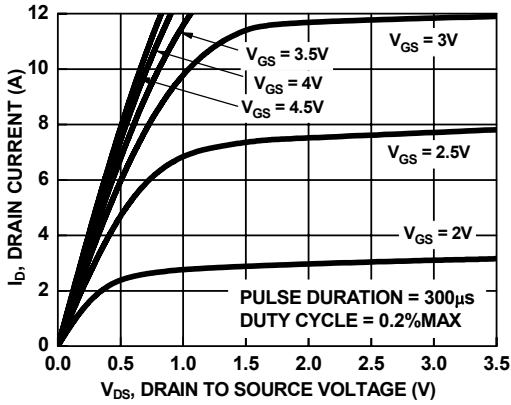


Figure 1. On Region Characteristics

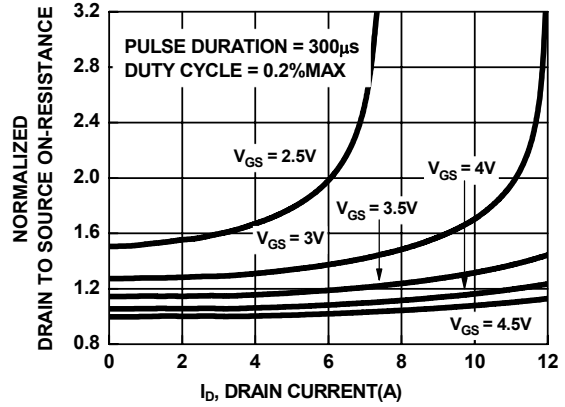


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

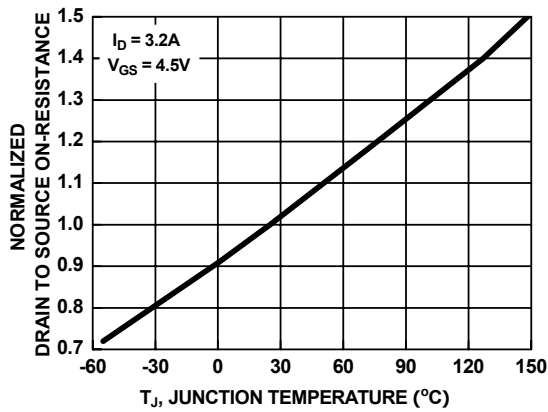


Figure 3. Normalized On Resistance vs Junction Temperature

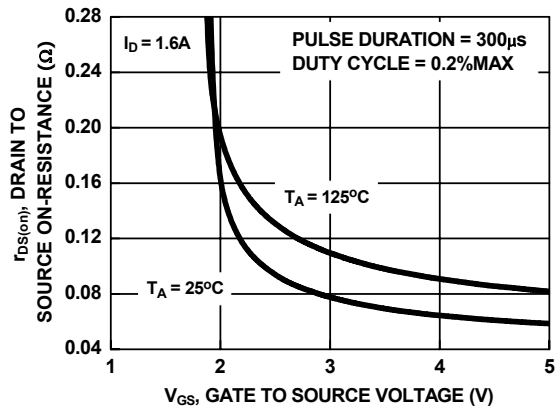


Figure 4. On-Resistance vs Gate to Source Voltage

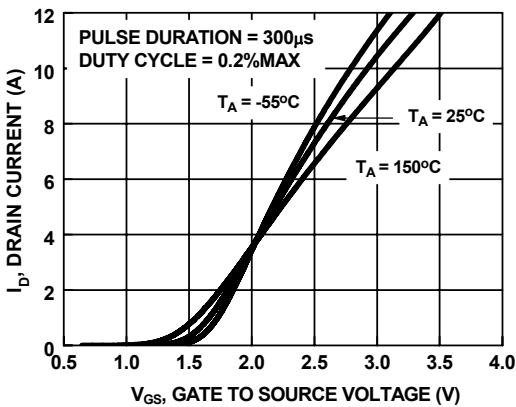


Figure 5. Transfer Characteristics

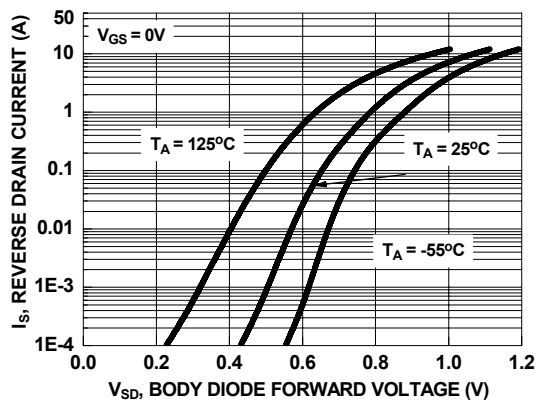
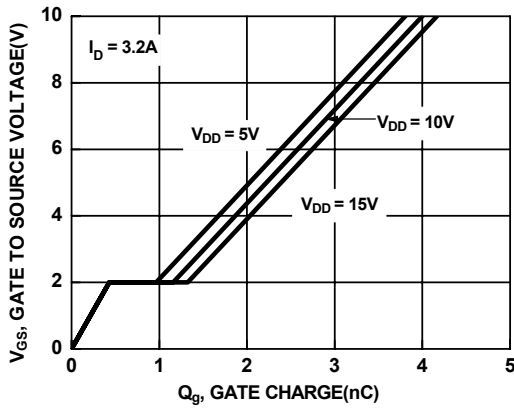
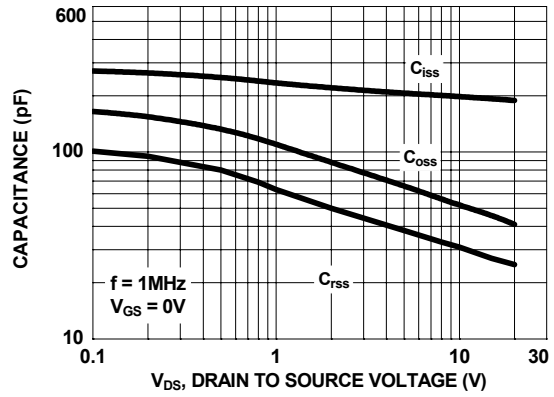


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

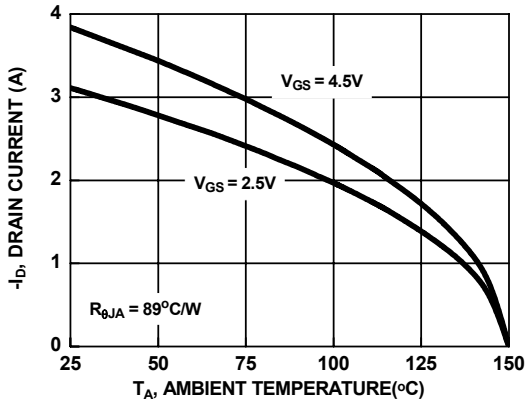
**Typical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted



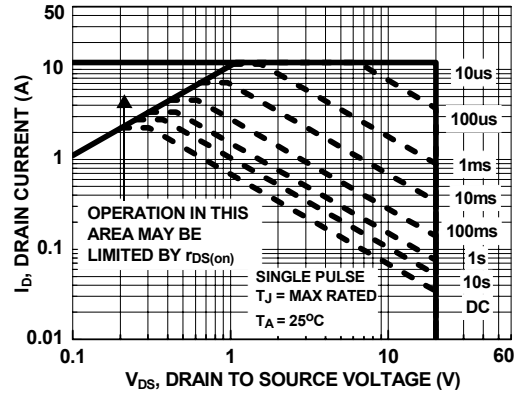
**Figure 7. Gate Charge Characteristics**



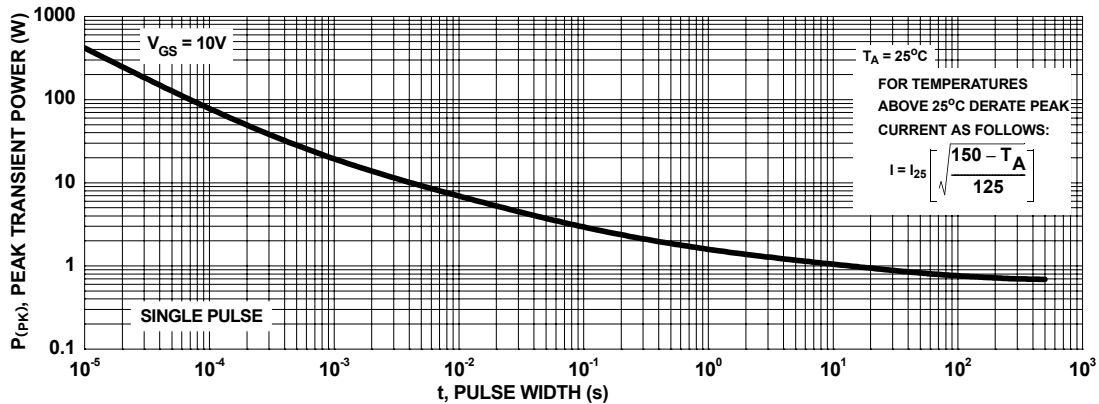
**Figure 8. Capacitance vs Drain to Source Voltage**



**Figure 9. Maximum Continuous Drain Current vs Ambient Temperature**



**Figure 10. Forward Bias Safe Operating Area**



**Figure 11. Single Pulse Maximum Power Dissipation**

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

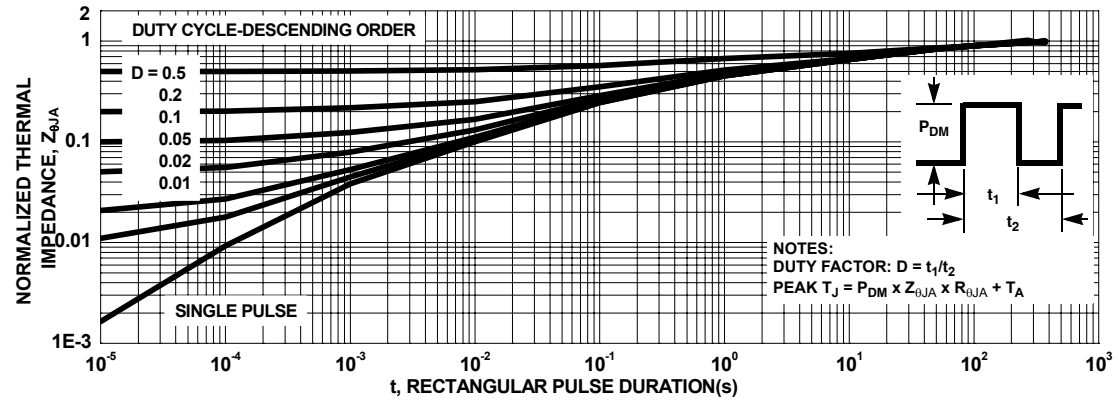
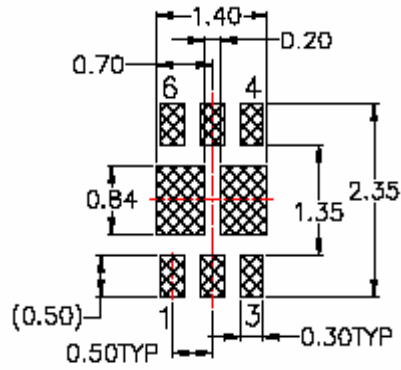
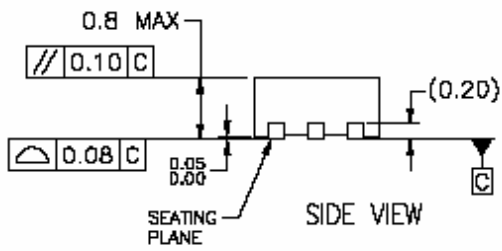
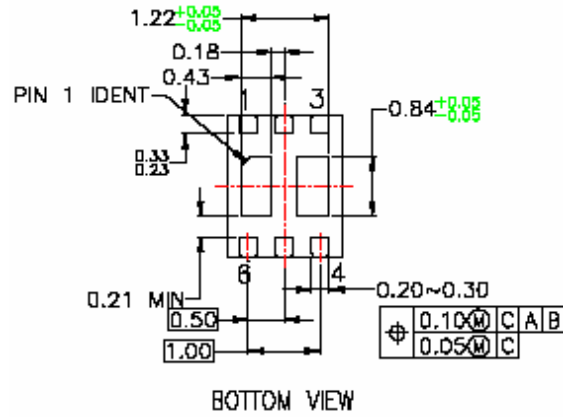
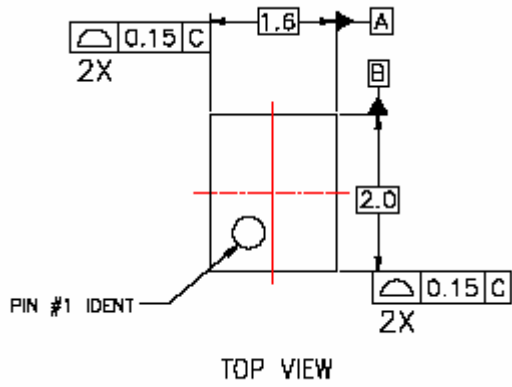


Figure 12. Transient Thermal Response Curve

Dimensional Outline and Pad Layout



RECOMMENDED LAND PATTERN

NOTES:

- A. NON JEDEC REGISTRATION MOLDED PACKAGE OUTLINE,
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994

MLP06Xrev1

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