

FDMA1027P

Dual P-Channel PowerTrench® MOSFET

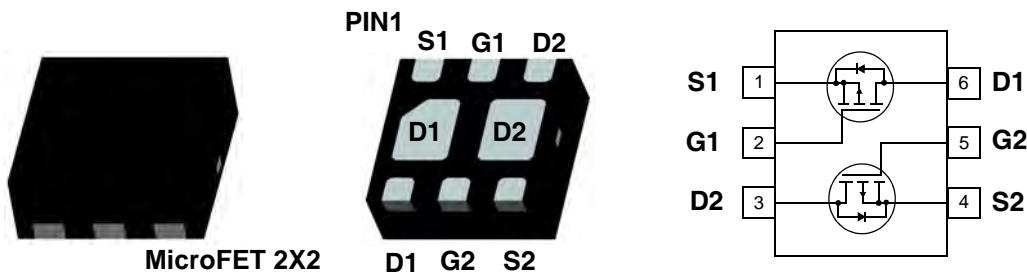
General Description

This device is designed specifically as a single package solution for the battery charge switch in cellular handset and other ultra-portable applications. It features two independent P-Channel MOSFETs with low on-state resistance for minimum conduction losses. When connected in the typical common source configuration, bi-directional current flow is possible.

The MicroFET 2x2 package offers exceptional thermal performance for its physical size and is well suited to linear mode applications.

Features

- -3.0 A, -20V. $R_{DS(ON)} = 120\text{ m}\Omega @ V_{GS} = -4.5\text{ V}$
 $R_{DS(ON)} = 160\text{ m}\Omega @ V_{GS} = -2.5\text{ V}$
 $R_{DS(ON)} = 240\text{ m}\Omega @ V_{GS} = -1.8\text{ V}$
- Low Profile - 0.8 mm maximum - in the new package MicroFET 2x2 mm
- RoHS Compliant



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

| Symbol | Parameter | Ratings | Units |
|----------------|--|-------------|------------------|
| V_{DSS} | MOSFET Drain-Source Voltage | -20 | V |
| V_{GSS} | MOSFET Gate-Source Voltage | ± 8 | V |
| I_D | Drain Current -Continuous | -3.0 | A |
| | -Pulsed | -6 | |
| P_D | Power dissipation for Single Operation | 1.4 | W |
| | Power dissipation for Single Operation | 0.7 | |
| 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) | 86 (Single Operation) | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | (Note 1b) | 173 (Single Operation) | |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | | 69 (Dual Operation) | |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | | 151 (Dual Operation) | |

Package Marking and Ordering Information

| Device Marking | Device | Reel Size | Tape Width | Quantity |
|----------------|-----------|-----------|------------|------------|
| 027 | FDMA1027P | 7" | 8mm | 3000 units |

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

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

Off Characteristics

| | | | | | | |
|--------------------------------------|---|---|-----|-----|-----------|----------------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS} = 0V, I_D = -250\mu A$ | -20 | - | - | V |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D = -250\mu A$, Referenced to 25°C | - | -12 | - | mV/ $^\circ\text{C}$ |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = -16V, V_{GS} = 0V$ | - | - | -1 | μA |
| I_{GSS} | Gate-Body Leakage, | $V_{GS} = \pm 8V, V_{DS} = 0V$ | - | - | ± 100 | nA |

On Characteristics (Note 2)

| | | | | | | |
|--|--|--|------|------|------|----------------------|
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = -250\mu A$ | -0.4 | -0.7 | -1.3 | V |
| $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | Gate Threshold Voltage Temperature Coefficient | $I_D = -250\mu A$, Referenced to 25°C | - | 2 | - | mV/ $^\circ\text{C}$ |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance | $V_{GS} = -4.5V, I_D = -3.0A$ | - | 90 | 120 | m Ω |
| | | $V_{GS} = -2.5V, I_D = -2.5A$ | - | 120 | 160 | |
| | | $V_{GS} = -1.8V, I_D = -1.0A$ | - | 172 | 240 | |
| | | $V_{GS} = -4.5V, I_D = -3.0A$ $T_J = 125^\circ\text{C}$ | - | 118 | 160 | |
| $I_{D(on)}$ | On-State Drain Current | $V_{GS} = -4.5V, V_{DS} = -5V$ | -20 | - | - | A |
| g_{FS} | Forward Transconductance | $V_{DS} = -5V, I_D = -3.0A$ | - | 7 | - | S |

Dynamic Characteristics

| | | | | | | |
|-----------|------------------------------|---|---|-----|---|----|
| C_{iss} | Input Capacitance | $V_{DS} = -10V, V_{GS} = 0V$, $f = 1.0\text{MHz}$ | - | 435 | - | pF |
| C_{oss} | Output Capacitance | | - | 80 | - | pF |
| C_{rss} | Reverse Transfer Capacitance | | - | 45 | - | pF |

Switching Characteristics (Note 2)

| | | | | | | |
|--------------|---------------------|---|---|-----|----|----|
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD} = -10V, I_D = -1A$ $V_{GS} = -4.5V, R_{GEN} = 6\Omega$ | - | 9 | 18 | ns |
| t_r | Turn-On Rise Time | | - | 11 | 19 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | - | 15 | 27 | ns |
| t_f | Turn-Off Fall Time | | - | 6 | 12 | ns |
| Q_g | Total Gate Charge | $V_{DS} = -10V, I_D = -3.0A$, $V_{GS} = -4.5V$ | - | 4 | 6 | nC |
| Q_{gs} | Gate-Source Charge | | - | 0.8 | - | nC |
| Q_{gd} | Gate-Drain Charge | | - | 0.9 | - | nC |

Drain-Source Diode Characteristics and Maximum Ratings

| | | | | | | |
|----------|---|--------------------------------------|---|------|------|----|
| I_S | Maximum Continuous Drain-Source Diode Forward Current | - | - | -1.1 | A | |
| V_{SD} | Drain-Source Diode Forward Voltage | $V_{GS} = 0V, I_S = -1.1 A$ (Note 2) | - | -0.8 | -1.2 | V |
| t_{rr} | Diode Reverse Recovery Time | $I_F = -3.0A, dI_F/dt = 100A/\mu s$ | - | 17 | - | ns |
| Q_{rr} | Diode Reverse Recovery Charge | | - | 6 | - | nC |

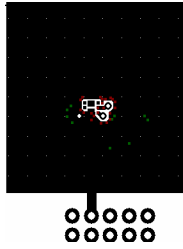
Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

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) $R_{\theta JA} = 86^\circ\text{C/W}$ when mounted on a 1in² pad of 2 oz copper, 1.5" x 1.5" x 0.062" thick PCB

(b) $R_{\theta JA} = 173^\circ\text{C/W}$ when mounted on a minimum pad of 2 oz copper



a) 86°C/W when mounted on a 1in² pad of 2 oz copper



b) 173°C/W when mounted on a minimum pad of 2 oz copper

Scale 1: 1 on letter size paper

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

Typical Characteristics

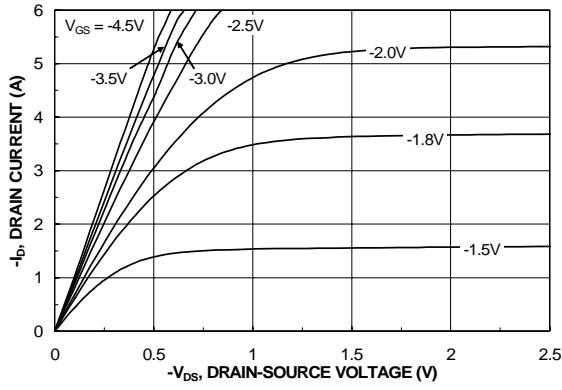


Figure 1. On-Region Characteristics

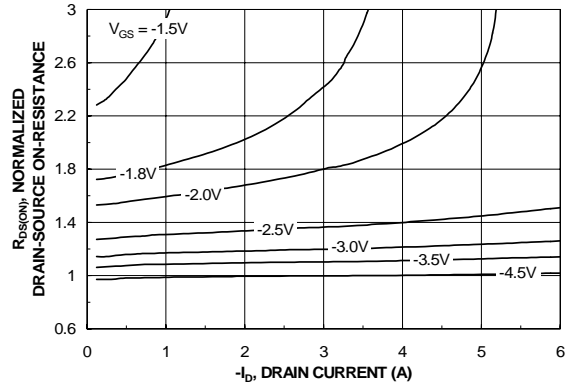


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

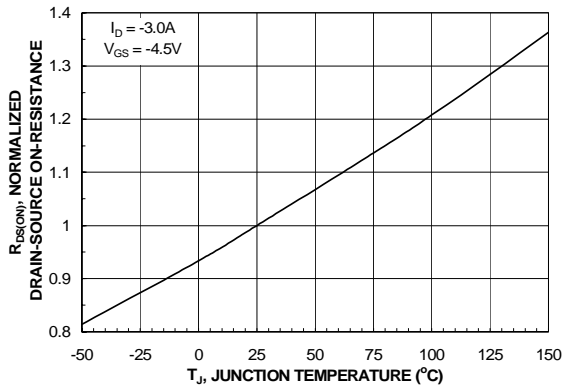


Figure 3. On-Resistance Variation with Temperature

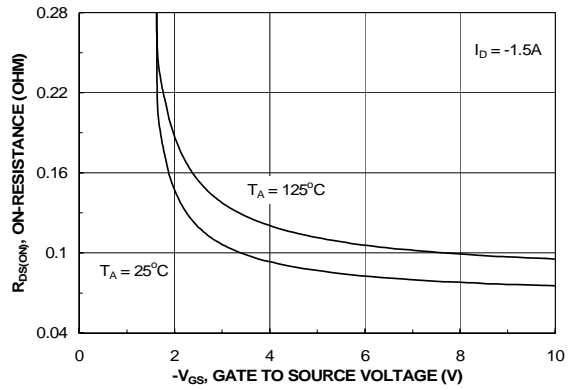


Figure 4. On-Resistance Variation with Gate-to-Source Voltage

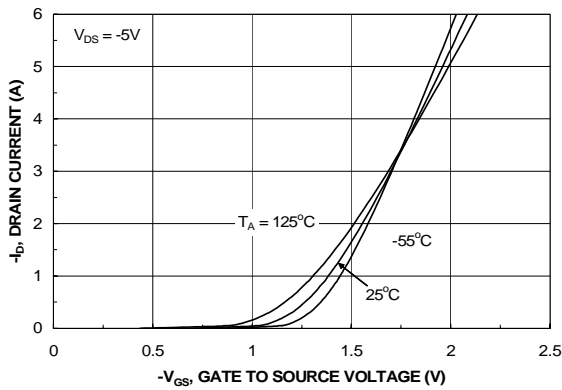


Figure 5. Transfer Characteristics

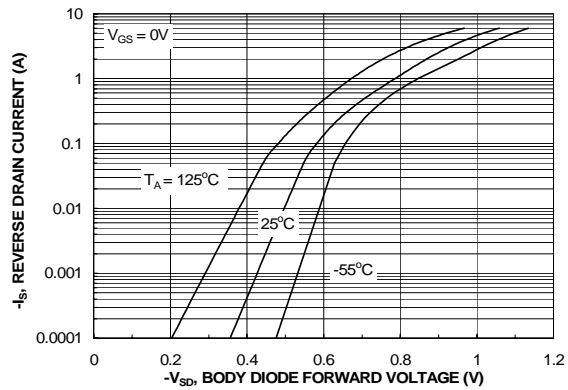


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

Typical Characteristics

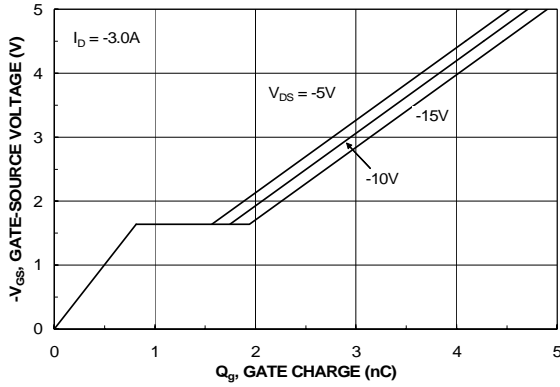


Figure 7. Gate Charge Characteristics

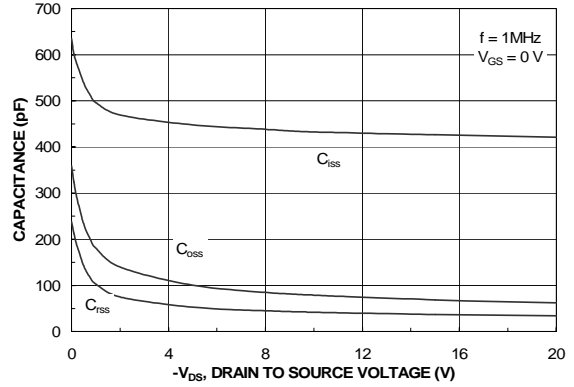


Figure 8. Capacitance Characteristics

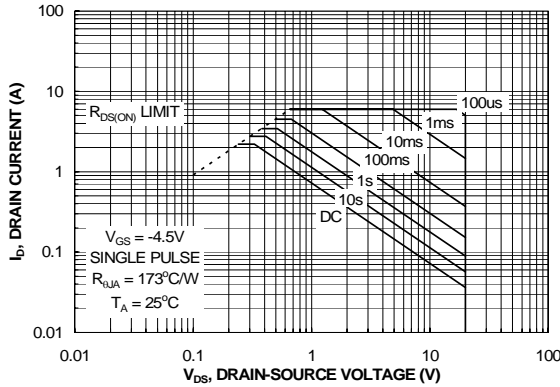


Figure 9. Maximum Safe Operation Area

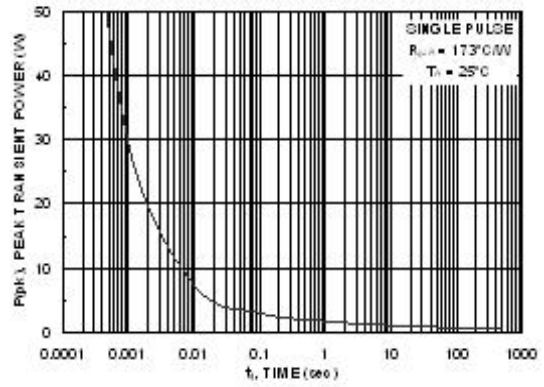


Figure 10. Single Pulse Maximum Power Dissipation

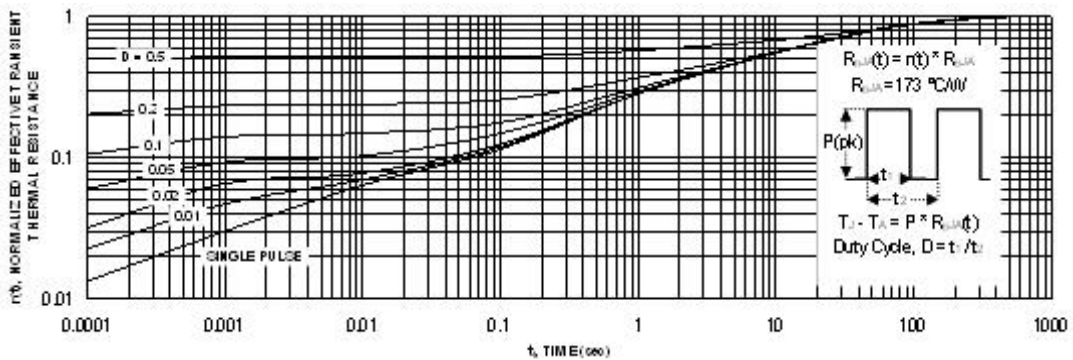
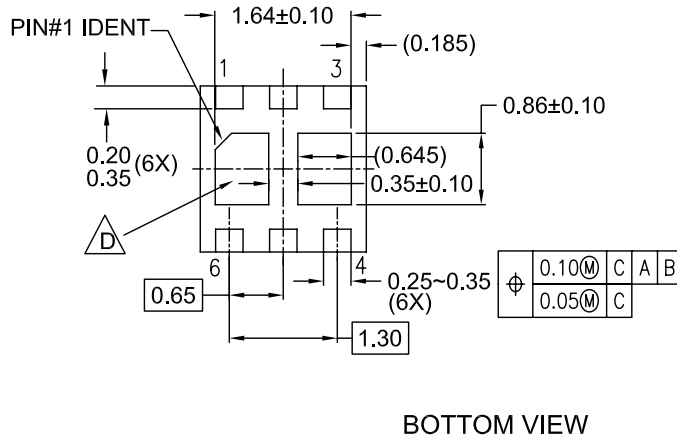
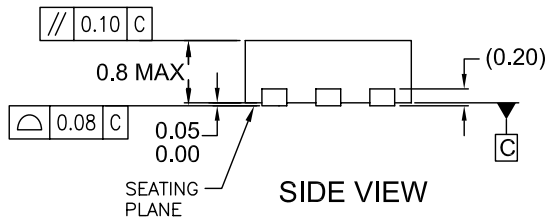
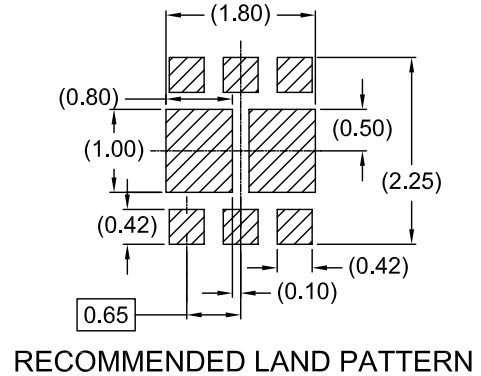
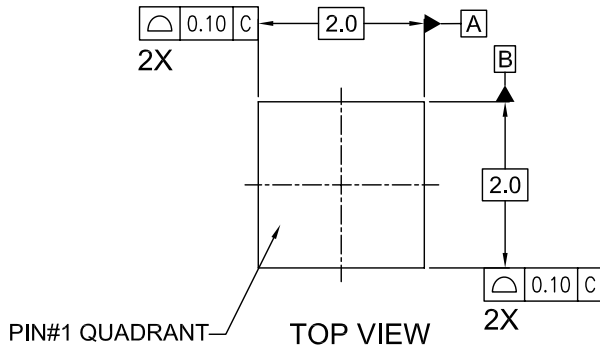


Figure 11. Transient Thermal Response Curve

Thermal characterization performed using the conditions described in Note 1b. Transient thermal response will change depending on the circuit board design.

Dimensional Outline and Pad Layout









NOTES:

- A. CONFORMS TO JEDEC REGISTRATION MO-229, VARIATION VCCC EXCEPT AS NOTED.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994
- D. NON-JEDEC DUAL DAP
- E. DRAWING FILE NAME : MLP06Jrev3



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