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FDMB2308PZ

Dual Common Drain P-Channel PowerTrench[®] MOSFET -20 V, -7 A, 36 mΩ

Features

- Max $r_{S1S2(on)}$ = 36 mΩ at $V_{GS} = -4.5$ V, $I_D = -5.7$ A
- Max $r_{S1S2(on)}$ = 50 mΩ at $V_{GS} = -2.5$ V, $I_D = -4.6$ A
- Low Profile - 0.8 mm maximum - in the new package MicroFET 2x3 mm
- HBM ESD protection level 2.8 kV (Note 3)
- RoHS Compliant

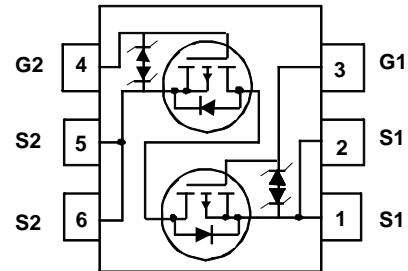
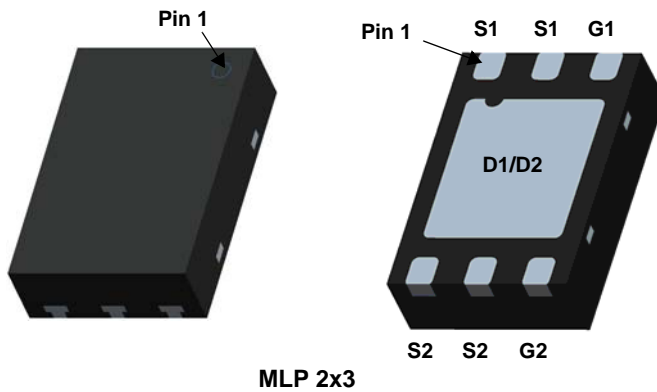


General Description

This device is designed specifically as a single package solution for Li-Ion battery pack protection circuit and other ultra-portable applications. It features two common drain P-channel MOSFETs, which enables bidirectional current flow, on Fairchild's advanced PowerTrench[®] process with state of the art MircoFET Leadframe, the FDMB2308PZ minimizes both PCB space and $r_{S1S2(on)}$.

Application

- Li-Ion Battery Pack



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

| Symbol | Parameter | Ratings | Units |
|----------------|--|-------------|-------|
| V_{S1S2} | Source1 to Source2 Voltage | -20 | V |
| V_{GS} | Gate to Source Voltage | ±12 | V |
| I_{S1S2} | Source1 to Source2 Current -Continuous $T_A = 25$ °C (Note 1a) | -7 | A |
| | -Pulsed | -30 | |
| P_D | Power Dissipation $T_A = 25$ °C (Note 1a) | 2.2 | W |
| | Power Dissipation $T_A = 25$ °C (Note 1b) | 0.8 | |
| T_J, T_{STG} | Operating and Storage Junction Temperature Range | -55 to +150 | °C |

Thermal Characteristics

| | | | | |
|-----------------|---|-----------|-----|------|
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | (Note 1a) | 57 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | (Note 1b) | 161 | |

Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|----------------|------------|---------|-----------|------------|------------|
| 308 | FDMB2308PZ | MLP 2x3 | 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

| | | | | | | |
|------------|--|--|--|--|----------|---------------|
| I_{S1S2} | Zero Gate Voltage Source1 to Source2 Current | $V_{S1S2} = -16\text{ V}$, $V_{GS} = 0\text{ V}$ | | | -1 | μA |
| I_{GSS} | Gate to Source Leakage Current | $V_{GS} = \pm 12\text{ V}$, $V_{S1S2} = 0\text{ V}$ | | | ± 10 | μA |

On Characteristics

| | | | | | | |
|----------------|---|--|------|------|------|------------|
| $V_{GS(th)}$ | Gate to Source Threshold Voltage | $V_{GS} = V_{S1S2}$, $I_{S1S2} = -250\text{ }\mu\text{A}$ | -0.6 | -0.9 | -1.5 | V |
| $r_{S1S2(on)}$ | Static Source1 to Source2 On Resistance | $V_{GS} = -4.5\text{ V}$, $I_{S1S2} = -5.7\text{ A}$ | | 27 | 36 | m Ω |
| | | $V_{GS} = -2.5\text{ V}$, $I_{S1S2} = -4.6\text{ A}$ | | 36 | 50 | |
| | | $V_{GS} = -4.5\text{ V}$, $I_{S1S2} = -5.7\text{ A}$, $T_J = 125\text{ }^\circ\text{C}$ | | 35 | 49 | |
| g_{FS} | Forward Transconductance | $V_{S1S2} = -5\text{ V}$, $I_{S1S2} = -5.7\text{ A}$ | | 29 | | S |

Dynamic Characteristics

| | | | | | | |
|-----------|------------------------------|---|--|------|------|----|
| C_{iss} | Input Capacitance | $V_{S1S2} = -10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$ | | 2280 | 3030 | pF |
| C_{oss} | Output Capacitance | | | 361 | 540 | pF |
| C_{rss} | Reverse Transfer Capacitance | | | 339 | 510 | pF |

Switching Characteristics

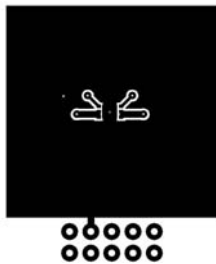
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|--------------|----------------------------------|--|--|-----|-----|----|
| $t_{d(on)}$ | Turn-On Delay Time | $V_{S1S2} = -10\text{ V}$, $I_{S1S2} = -5.7\text{ A}$ $V_{GS} = -4.5\text{ V}$, $R_{GEN} = 6\text{ }\Omega$ | | 14 | 25 | ns |
| t_r | Rise Time | | | 33 | 52 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | | 74 | 118 | ns |
| t_f | Fall Time | | | 58 | 93 | ns |
| Q_g | Total Gate Charge | | $V_{S1S2} = -10\text{ V}$, $I_{S1S2} = -5.7\text{ A}$, $V_{G1S1} = -4.5\text{ V}$, $V_{G2S2} = 0\text{ V}$ | | 22 | 30 |
| Q_{gs} | Gate1 to Source1 Charge | | | 3.6 | | nC |
| Q_{gd} | Gate1 to Source2 "Miller" Charge | | | 7.7 | | nC |

Source1- Source2 Diode Characteristics

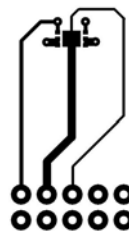
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|-----------|--|--|--|----|------|---|
| I_{fss} | Maximum Continuous Source1-Source2 Diode Forward Current | | | | -5.7 | A |
| V_{fss} | Source1 to Source2 Diode Forward Voltage | $V_{G1S1} = 0\text{ V}$, $V_{G2S2} = -4.5\text{ V}$, $I_{fss} = -5.7\text{ A}$ (Note 2) | | -1 | -1.6 | V |

NOTES:

1. $R_{\theta JA}$ is determined with the device mounted on a 1 in² pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a. 57 $^\circ\text{C/W}$ when mounted on a 1 in² pad of 2 oz copper



b. 161 $^\circ\text{C/W}$ when mounted on a minimum pad of 2 oz copper

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

3. The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

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

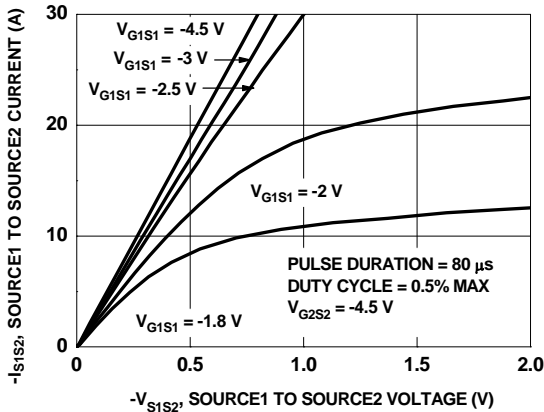


Figure 1. On-Region Characteristics

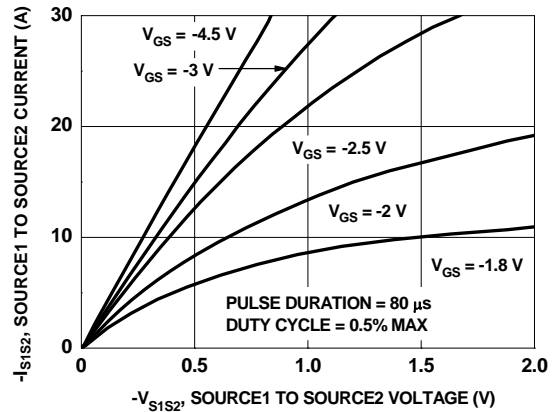


Figure 2. On-Region Characteristics

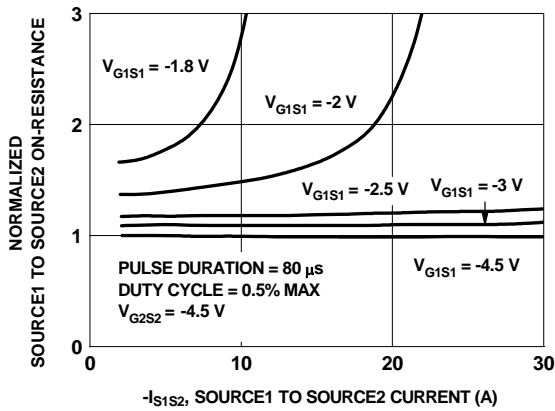


Figure 3. Normalized On-Resistance vs Source1 to Source2 Current and Gate Voltage

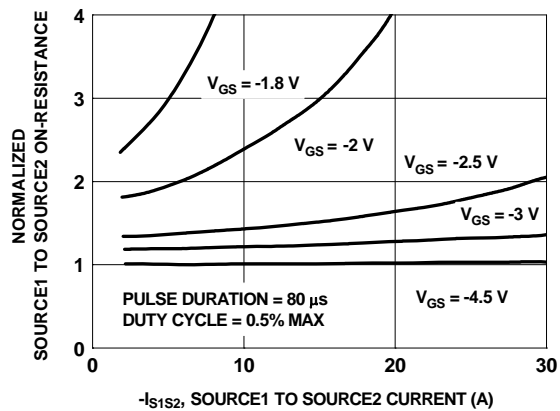


Figure 4. Normalized On-Resistance vs Source1 to Source2 Current and Gate Voltage

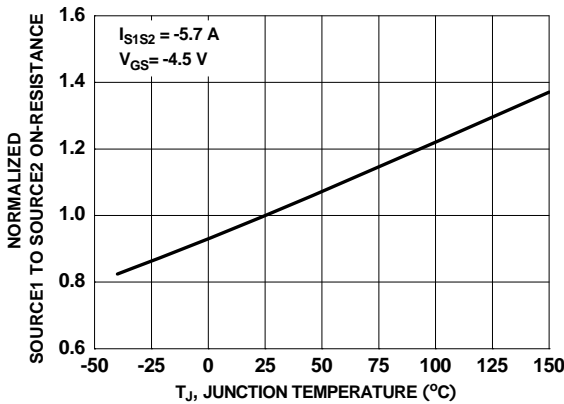


Figure 5. Normalized On Resistance vs Junction Temperature

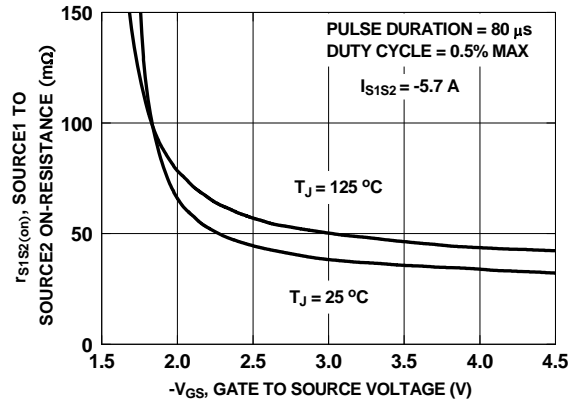


Figure 6. On Resistance vs Gate to Source Voltage

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

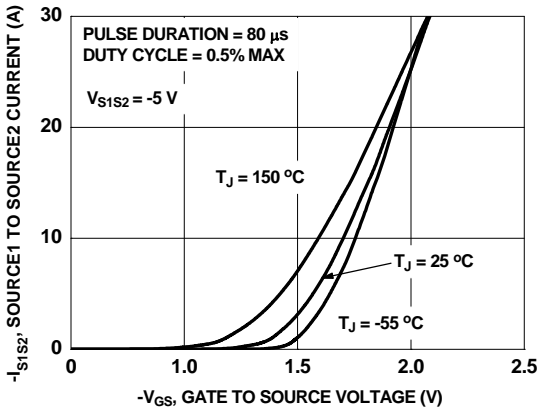


Figure 7. Transfer Characteristics

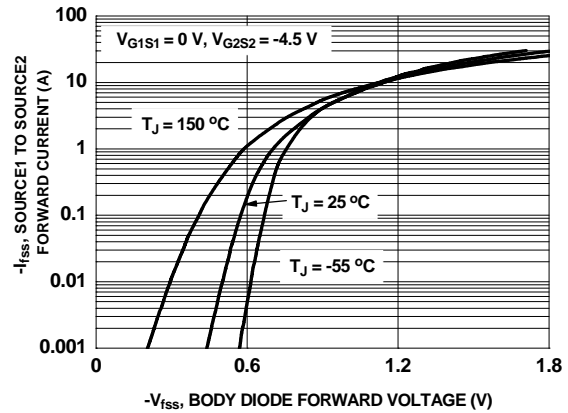


Figure 8. Source1 to Source2 Diode Forward Voltage vs Source Current

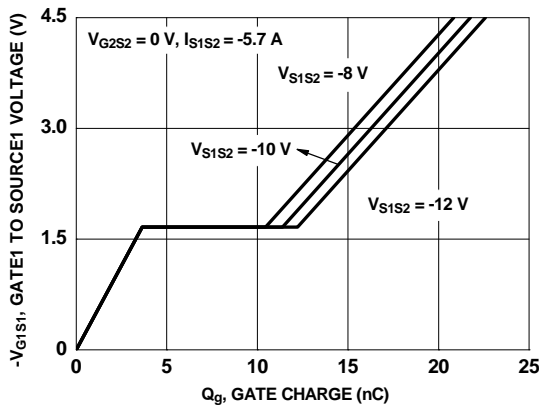


Figure 9. Gate Charge Characteristics

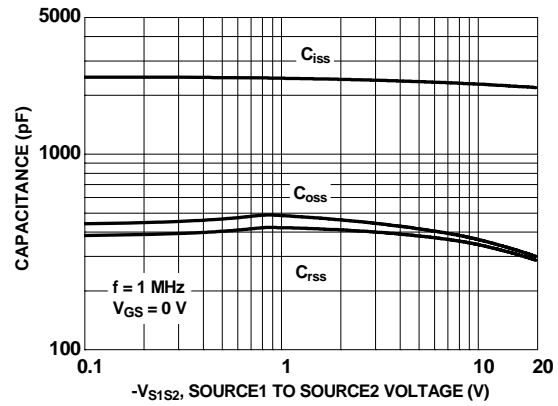


Figure 10. Capacitance vs Source1 to Source2 Voltage

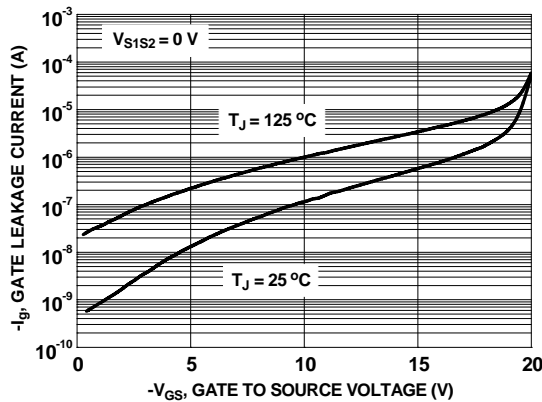


Figure 11. Gate Leakage Current vs Gate to Source Voltage

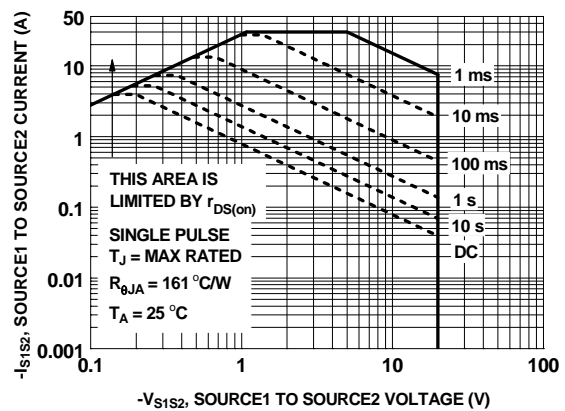


Figure 12. Forward Bias Safe Operating Area

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

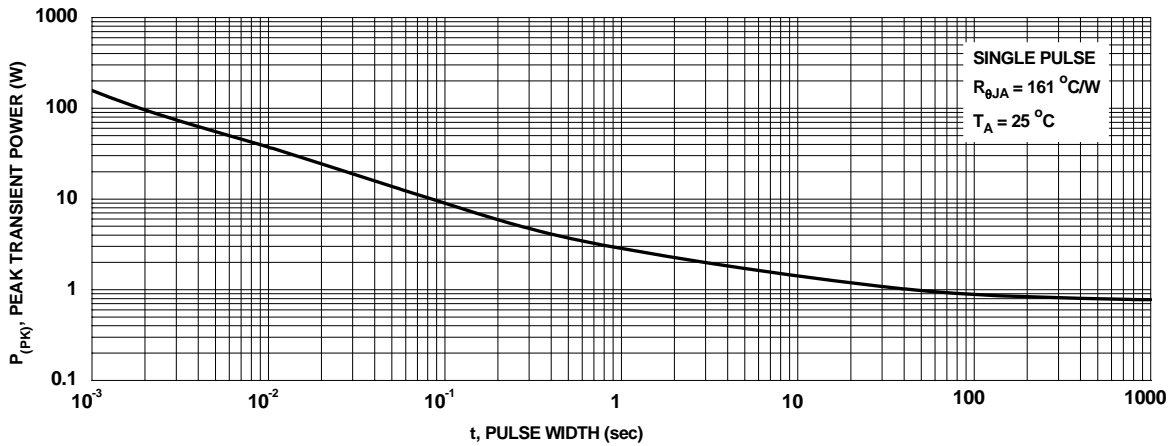


Figure 13. Single Pulse Maximum Power Dissipation

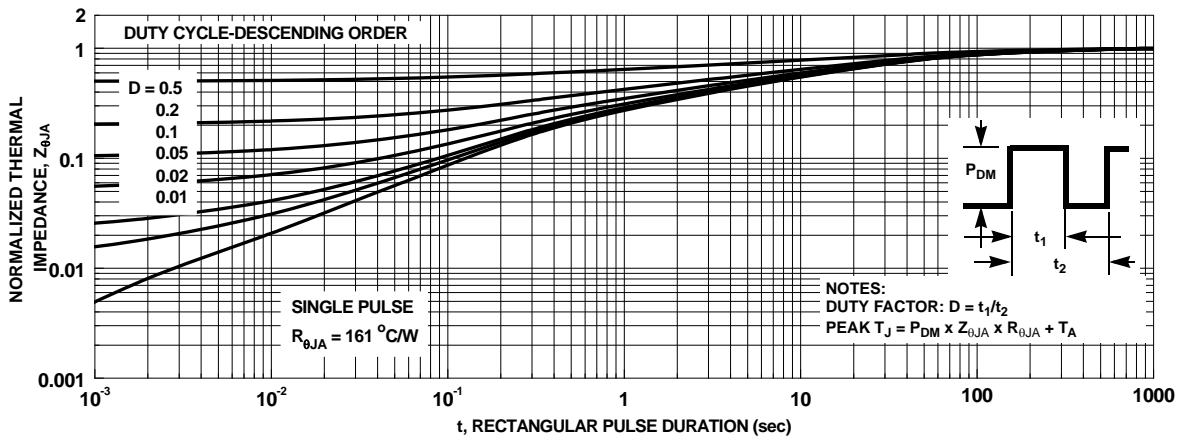
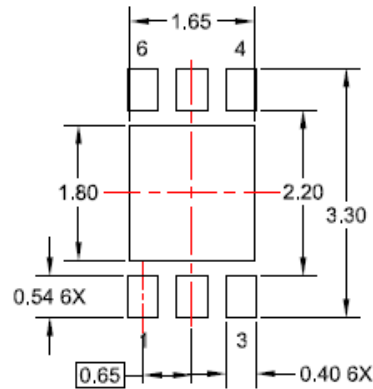
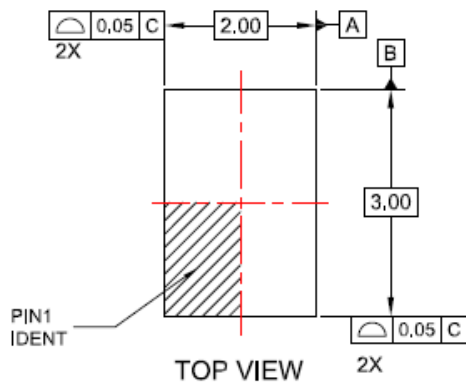
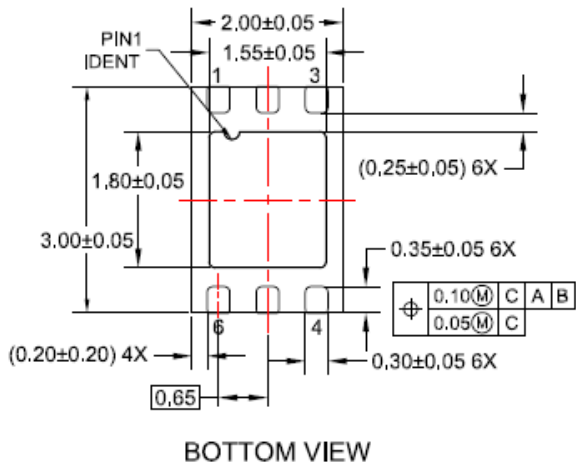
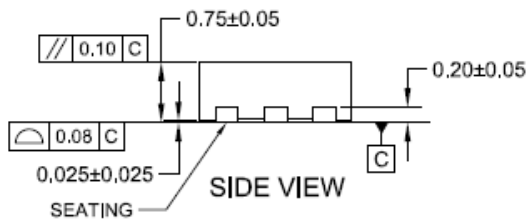


Figure 14. Junction-to-Ambient Transient Thermal Response Curve

Dimensional Outline and Pad Layout



RECOMMENDED LAND PATTERN



NOTES:

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