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FDME430NT

N-Channel PowerTrench® MOSFET 30 V, 6 A, 40 mΩ

Features

- Max $r_{DS(on)}$ = 40 mΩ at $V_{GS} = 4.5$ V, $I_D = 6$ A
- Max $r_{DS(on)}$ = 51 mΩ at $V_{GS} = 2.5$ V, $I_D = 5$ A
- Max $r_{DS(on)}$ = 71 mΩ at $V_{GS} = 1.8$ V, $I_D = 4$ A
- Low profile: 0.55 mm maximum in the new package MicroFET 1.6x1.6 Thin
- Free from halogenated compounds and antimony oxides
- RoHS Compliant

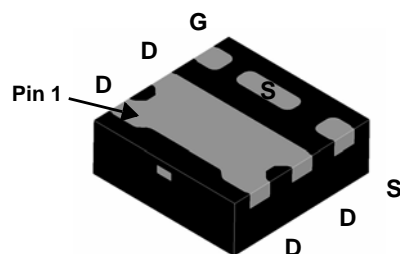


General Description

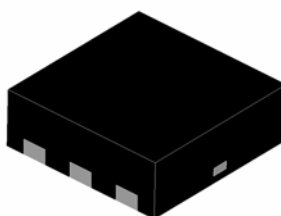
This single N-Channel MOSFET has been designed using Fairchild Semiconductor's advanced PowerTrench® process to optimize the $r_{DS(on)}$ @ $V_{GS} = 1.8$ V on special MicroFET leadframe.

Applications

- Li-Ion Battery Pack
- Baseband Switch
- Load Switch
- DC-DC Conversion

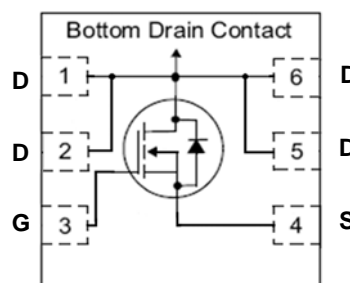


BOTTOM



TOP

MicroFET 1.6x1.6 Thin



MOSFET Maximum Ratings $T_A = 25^\circ\text{C}$ 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 $T_A = 25^\circ\text{C}$ (Note 1a) | 6 | A |
| | -Pulsed | 30 | |
| P_D | Power Dissipation for Single Operation $T_A = 25^\circ\text{C}$ (Note 1a) | 2.1 | W |
| | Power Dissipation for Single Operation $T_A = 25^\circ\text{C}$ (Note 1b) | 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) | 60 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 1b) | 175 | |

Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|----------------|-----------|-----------------------|-----------|------------|------------|
| YA | FDME430NT | MicroFET 1.6x1.6 Thin | 7" | 8 mm | 5000 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 $25\text{ }^{\circ}\text{C}$ | | 22 | | 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 | 0.8 | 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/ $^{\circ}\text{C}$ |
| $r_{DS(on)}$ | Drain to Source On Resistance | $V_{GS} = 4.5\text{ V}$, $I_D = 6\text{ A}$ | | 25 | 40 | m Ω |
| | | $V_{GS} = 2.5\text{ V}$, $I_D = 5\text{ A}$ | | 29 | 51 | |
| | | $V_{GS} = 1.8\text{ V}$, $I_D = 4\text{ A}$ | | 38 | 71 | |
| | | $V_{GS} = 4.5\text{ V}$, $I_D = 6\text{ A}$, $T_J = 125\text{ }^{\circ}\text{C}$ | | 34 | 54 | |
| g_{FS} | Forward Transconductance | $V_{DS} = 5\text{ V}$, $I_D = 6\text{ A}$ | | 31 | | S |

Dynamic Characteristics

| | | | | | | |
|-----------|------------------------------|--|--|-----|-----|----|
| C_{iss} | Input Capacitance | $V_{DS} = 15\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$ | | 572 | 760 | pF |
| C_{oss} | Output Capacitance | | | 74 | 100 | pF |
| C_{rss} | Reverse Transfer Capacitance | | | 51 | 75 | pF |

Switching Characteristics

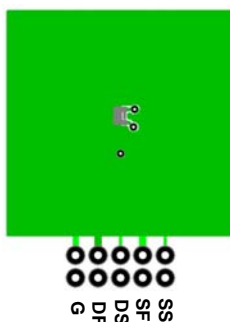
| | | | | | | |
|--------------|-------------------------------|--|--|-----|----|----|
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD} = 15\text{ V}$, $I_D = 6\text{ A}$, $V_{GS} = 4.5\text{ V}$, $R_{GEN} = 6\text{ }\Omega$ | | 7 | 14 | ns |
| t_r | Rise Time | | | 3 | 10 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | | 19 | 34 | ns |
| t_f | Fall Time | | | 3.3 | 10 | ns |
| Q_g | Total Gate Charge | $V_{DD} = 15\text{ V}$, $I_D = 6\text{ A}$, $V_{GS} = 4.5\text{ V}$ | | 6.5 | 9 | nC |
| Q_{gs} | Gate to Source Gate Charge | | | 0.9 | | nC |
| Q_{gd} | Gate to Drain "Miller" Charge | | | 1.6 | | nC |

Drain-Source Diode Characteristics

| | | | | | | |
|----------|---------------------------------------|---|--|-----|-----|----|
| V_{SD} | Source to Drain Diode Forward Voltage | $V_{GS} = 0\text{ V}$, $I_S = 6\text{ A}$ (Note 2) | | 0.8 | 1.2 | V |
| | | $V_{GS} = 0\text{ V}$, $I_S = 1.6\text{ A}$ (Note 2) | | 0.7 | 1.2 | V |
| t_{rr} | Reverse Recovery Time | $I_F = 6\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$ | | 12 | 22 | ns |
| Q_{rr} | Reverse Recovery Charge | | | 2.9 | 10 | nC |

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. 60 $^{\circ}\text{C}/\text{W}$ when mounted on a 1 in² pad of 2 oz copper.



b. 175 $^{\circ}\text{C}/\text{W}$ 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

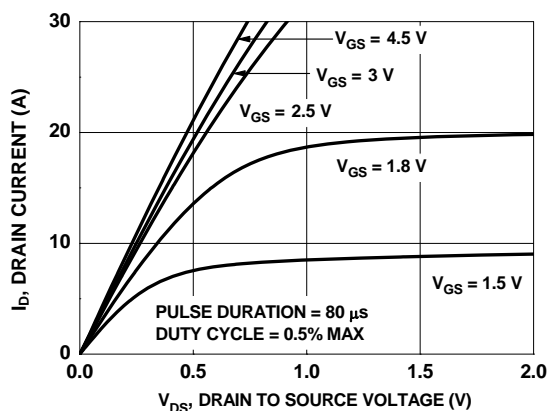


Figure 1. On Region Characteristics

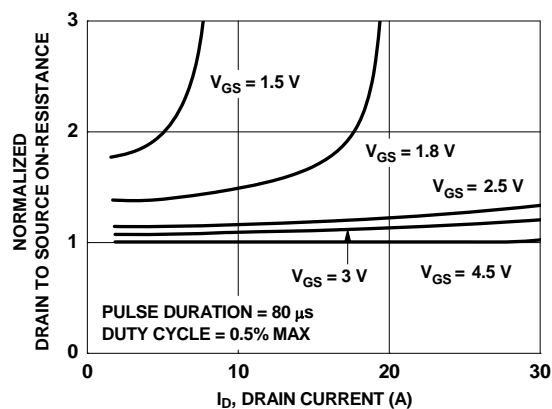


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

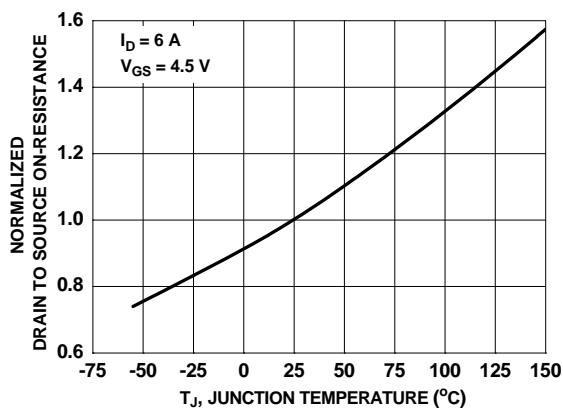


Figure 3. Normalized On Resistance vs Junction Temperature

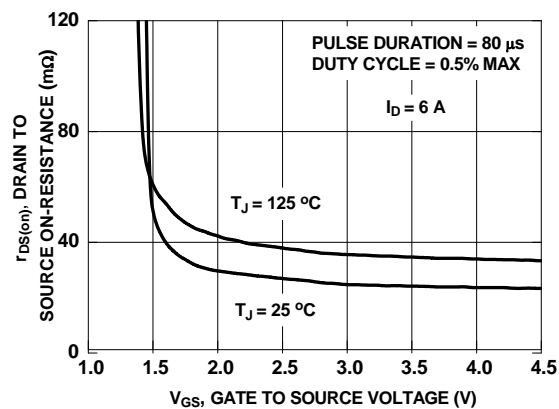


Figure 4. On-Resistance vs Gate to Source Voltage

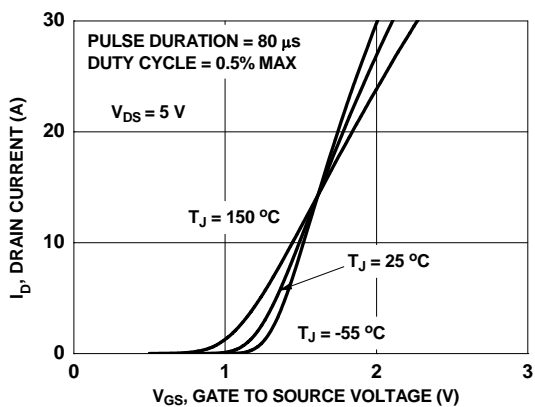


Figure 5. Transfer Characteristics

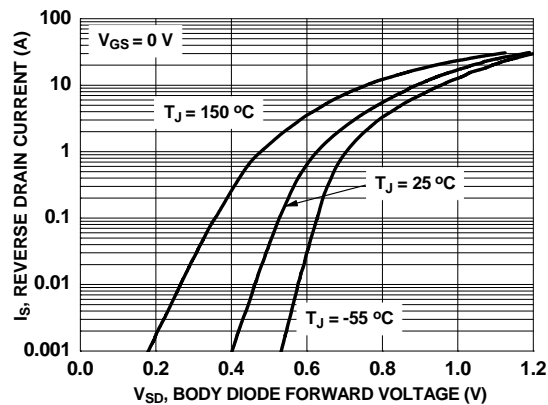


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

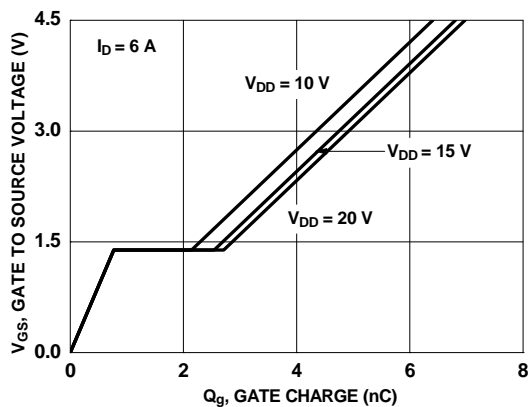


Figure 7. Gate Charge Characteristics

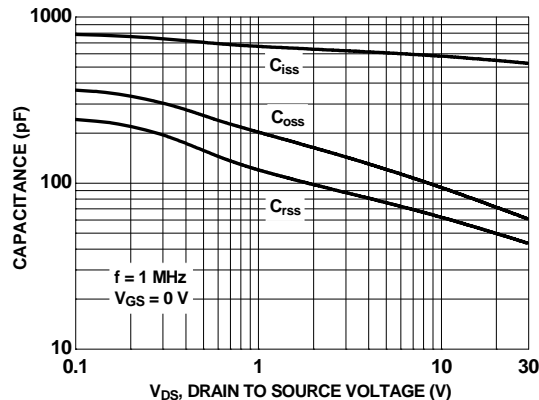


Figure 8. Capacitance vs Drain to Source Voltage

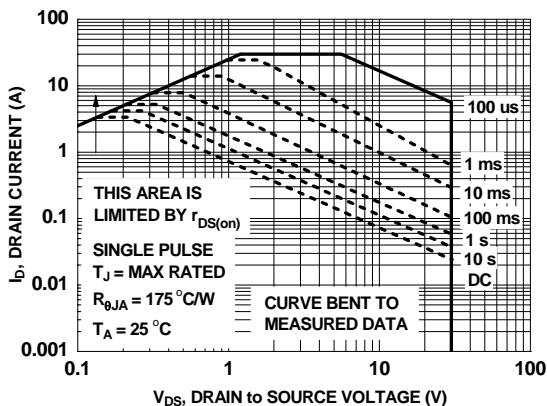


Figure 9. Forward Bias Safe Operating Area

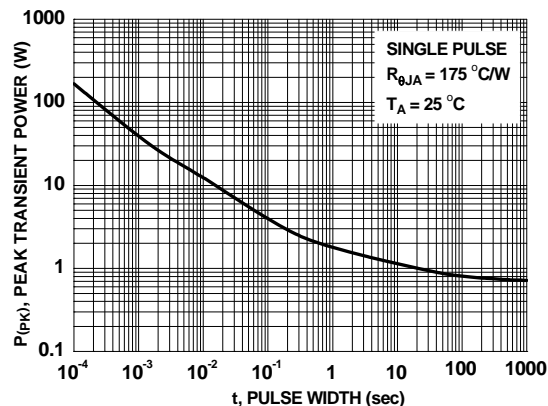


Figure 10. Single Pulse Maximum Power Dissipation

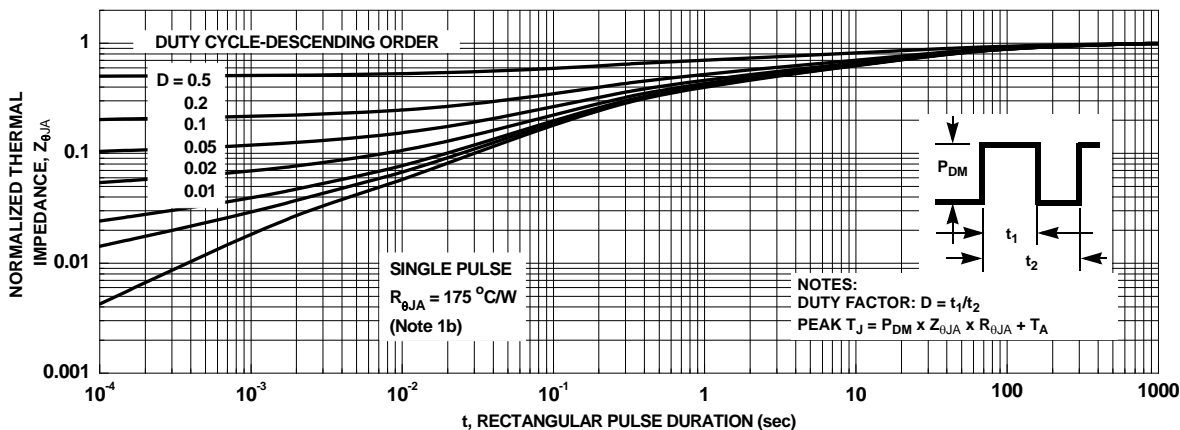
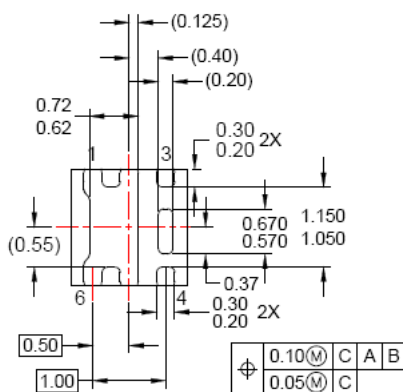
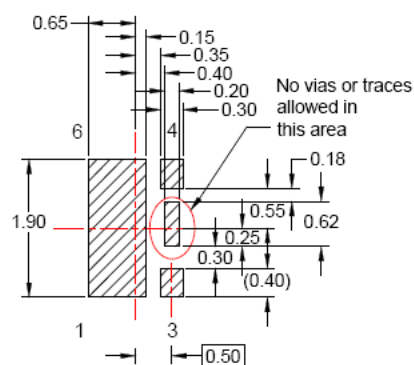
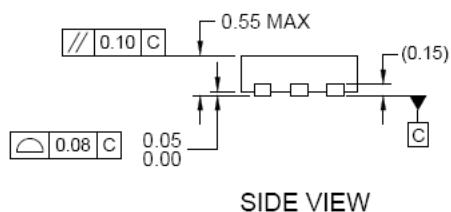
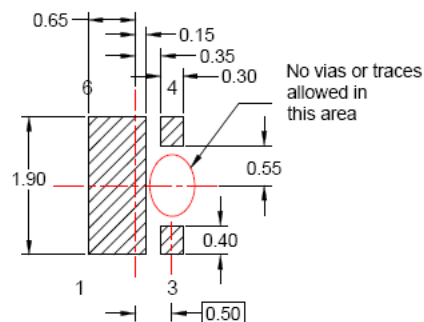
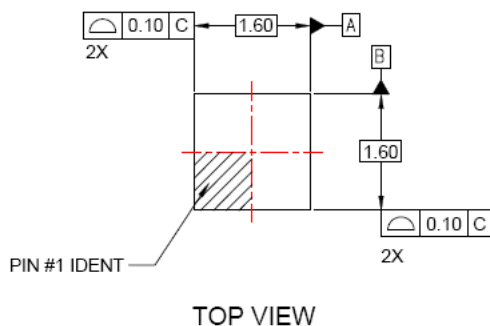


Figure 11. Junction-to-Ambient Transient Thermal Response Curve


Dimensional Outline and Pad Layout



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 - B. DIMENSIONS ARE IN MILLIMETERS.
 - C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
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