



FQB27N25TM_F085/FQI27N25TU_F085

N-Channel MOSFET

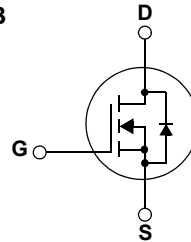
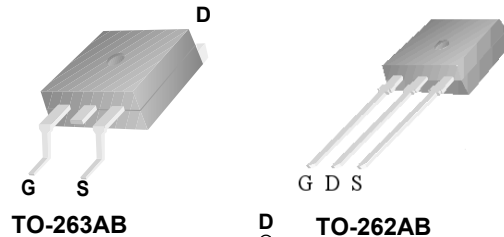
250 V, 25.5 A, 131 mΩ

Features

- Typ $R_{DS(on)}$ = 108mΩ at V_{GS} = 10V, I_D = 25.5A
- Typ $Q_{g(tot)}$ = 45nC at V_{GS} = 10V, I_D = 27A
- UIS Capability
- RoHS Compliant
- Qualified to AEC Q101

Applications

- Automotive Engine Control
- Powertrain Management
- Solenoid and Motor Drivers
- Electronic Steering
- Integrated Starter/Alternator
- Distributed Power Architectures and VRM
- Primary Switch for 12V Systems



For current package drawing, please refer to the Fairchild website at www.fairchildsemi.com/packaging

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

| Symbol | Parameter | Rated | Units |
|-----------------|--|--------------------------|---------------------------|
| V_{DSS} | Drain to Source Voltage | 250 | V |
| V_{GS} | Gate to Source Voltage | ±30 | V |
| I_D | Drain Current - Continuous ($V_{GS}=10$) (Note 1) | $T_C = 25^\circ\text{C}$ | 25.5 |
| | Pulsed Drain Current | $T_C = 25^\circ\text{C}$ | See Figure 4 |
| E_{AS} | Single Pulse Avalanche Energy (Note 2) | 972 | mJ |
| P_D | Power Dissipation | 417 | W |
| | Derate above 25°C | 3.3 | W/ $^\circ\text{C}$ |
| T_J, T_{STG} | Operating and Storage Temperature | -55 to + 150 | $^\circ\text{C}$ |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 0.3 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Maximum Thermal Resistance, Junction to Ambient (Note 3) | 43 | $^\circ\text{C}/\text{W}$ |

Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|----------------|-----------------|----------|-----------|------------|-----------|
| FQB27N25TM | FQB27N25TM_F085 | TO-263AB | 330mm | 24mm | 800 units |
| FQI27N25TU | FQI27N25TU_F085 | TO-262AB | Tube | N/A | 50 units |

Notes:

- 1: Current is limited by bondwire configuration.
- 2: Starting $T_J = 25^\circ\text{C}$, $L = 4.67\text{mH}$, $I_{AS} = 20.4\text{A}$, $V_{DD} = 100\text{V}$ during inductor charging and $V_{DD} = 0\text{V}$ during time in avalanche.
- 3: $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design. The maximum rating presented here is based on mounting on a 1 in² pad of 2oz copper.

FQB27N25TM_F085/FQI27N25TU_F085 N-Channel MOSFET

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

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

Off Characteristics

| | | | | | | |
|------------|-----------------------------------|---|-----|---|-----------|---------------|
| B_{VDSS} | Drain to Source Breakdown Voltage | $I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$ | 250 | - | - | V |
| I_{DSS} | Drain to Source Leakage Current | $V_{DS} = 250\text{V}, T_J = 25^\circ\text{C}$ | - | - | 1 | μA |
| | | $V_{GS} = 0\text{V}, T_J = 150^\circ\text{C}(\text{Note } 4)$ | - | - | 250 | μA |
| I_{GSS} | Gate to Source Leakage Current | $V_{GS} = \pm 30\text{V}$ | - | - | ± 100 | nA |

On Characteristics

| | | | | | | |
|--------------|----------------------------------|--|-----|-----|-----|------------------|
| $V_{GS(th)}$ | Gate to Source Threshold Voltage | $V_{GS} = V_{DS}, I_D = 250\mu\text{A}$ | 3.0 | 4.1 | 5.0 | V |
| $R_{DS(on)}$ | Drain to Source On Resistance | $I_D = 25.5\text{A}, T_J = 25^\circ\text{C}$ | - | 108 | 131 | $\text{m}\Omega$ |
| | | $V_{GS} = 10\text{V}, T_J = 150^\circ\text{C}(\text{Note } 4)$ | - | 265 | 310 | $\text{m}\Omega$ |

Dynamic Characteristics

| | | | | | | |
|--------------|-------------------------------|--|---|------|----|----------|
| C_{iss} | Input Capacitance | $V_{DS} = 25\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$ | - | 1800 | - | pF |
| C_{oss} | Output Capacitance | | - | 350 | - | pF |
| C_{rss} | Reverse Transfer Capacitance | | - | 45 | - | pF |
| R_g | Gate Resistance | $f = 1\text{MHz}$ | - | 0.82 | - | Ω |
| $Q_{g(ToT)}$ | Total Gate Charge at 10V | $V_{GS} = 0 \text{ to } 10\text{V}$ | - | 45 | 49 | nC |
| $Q_{g(th)}$ | Threshold Gate Charge | $V_{GS} = 0 \text{ to } 2\text{V}$ | | | | |
| Q_{gs} | Gate to Source Gate Charge | $V_{DD} = 125\text{V}, I_D = 27\text{A}$ | - | 12 | - | nC |
| Q_{gd} | Gate to Drain "Miller" Charge | | - | 23 | - | nC |

Switching Characteristics

| | | | | | | |
|--------------|----------------|---|---|-----|-----|----|
| t_{on} | Turn-On Time | $V_{DD} = 125\text{V}, I_D = 27\text{A}, V_{GS} = 10\text{V}, R_{GEN} = 25\Omega$ | - | - | 196 | ns |
| $t_{d(on)}$ | Turn-On Delay | | - | 36 | - | ns |
| t_r | Rise Time | | - | 122 | - | ns |
| $t_{d(off)}$ | Turn-Off Delay | | - | 81 | - | ns |
| t_f | Fall Time | | - | 60 | - | ns |
| t_{off} | Turn-Off Time | | - | - | 164 | ns |

Drain-Source Diode Characteristics

| | | | | | | |
|----------|-------------------------------|--|---|-----|------|----|
| V_{SD} | Source to Drain Diode Voltage | $I_{SD} = 25.5\text{A}, V_{GS} = 0\text{V}$ | - | - | 1.5 | V |
| | | $I_{SD} = 12.75\text{A}, V_{GS} = 0\text{V}$ | - | - | 1.25 | V |
| t_{rr} | Reverse--Recovery Time | $I_F = 27\text{A}, dI_{SD}/dt = 100\text{A}/\mu\text{s}$ | - | 205 | 238 | ns |
| Q_{rr} | Reverse--Recovery Charge | $V_{DD} = 200\text{V}$ | - | 1.8 | 2.3 | nC |

Notes:

4: The maximum value is specified by design at $T_J = 150^\circ\text{C}$. Product is not tested to this condition in production.

Typical Characteristics

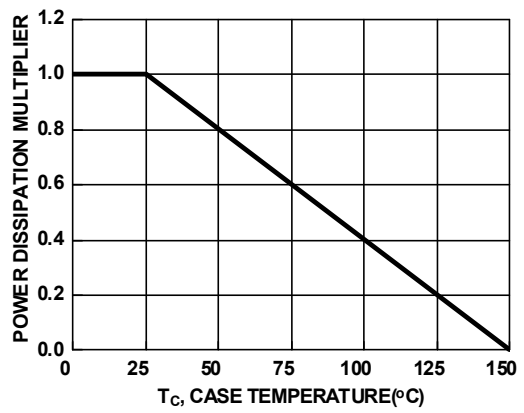


Figure 1. Normalized Power Dissipation vs. Case Temperature

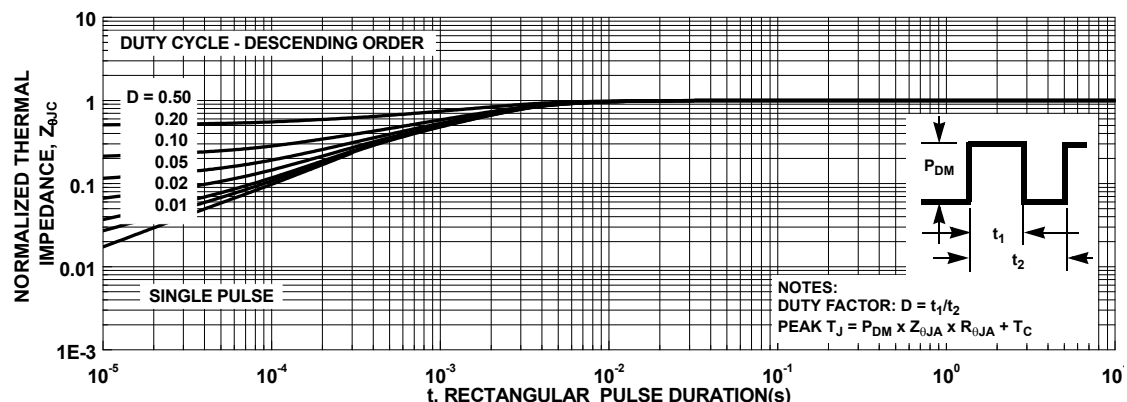


Figure 2. Normalized Maximum Transient Thermal Impedance

Typical Characteristics

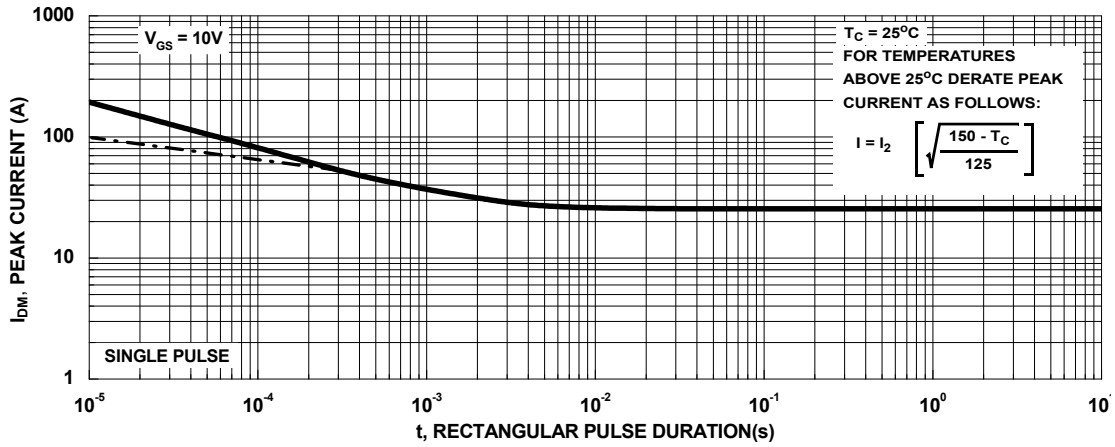


Figure 3. Peak Current Capability

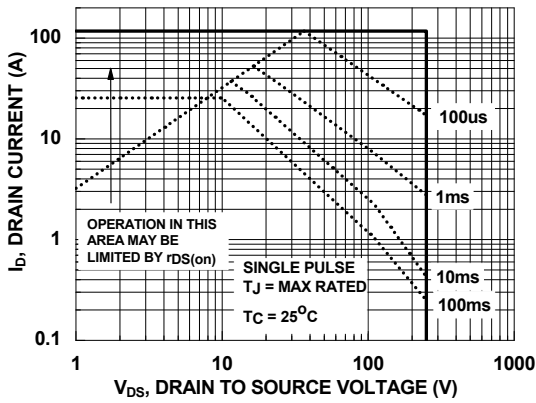
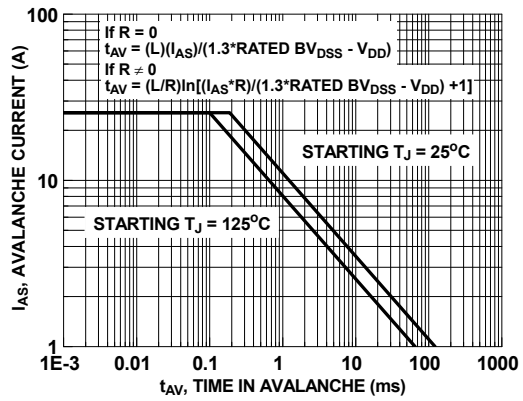


Figure 4. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 5. Unclamped Inductive Switching Capability

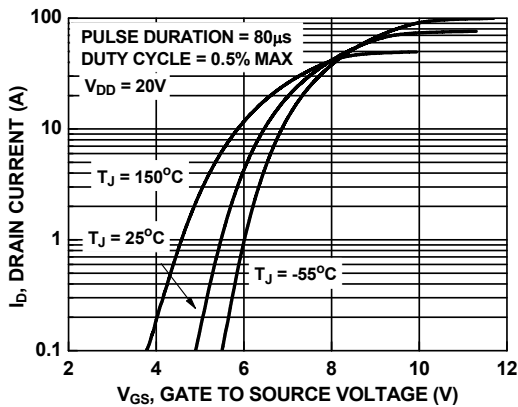


Figure 6. Transfer Characteristics

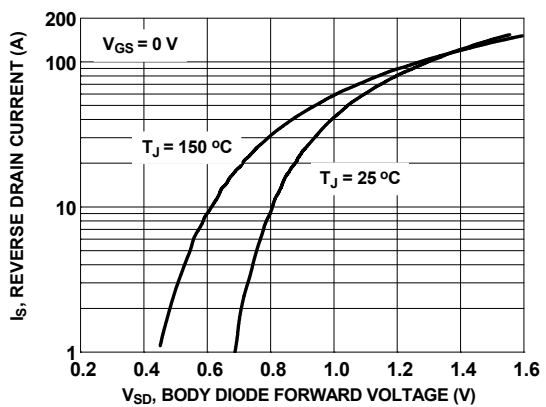


Figure 7. Forward Diode Characteristics

Typical Characteristics

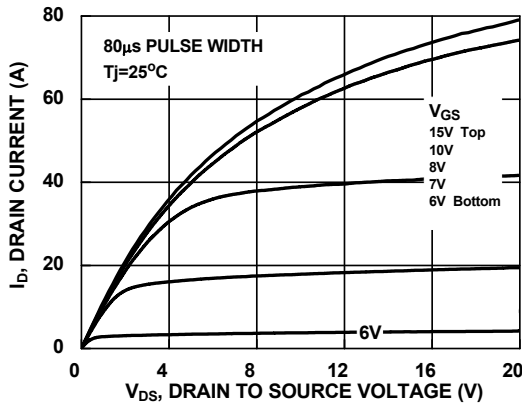


Figure 8. Saturation Characteristics

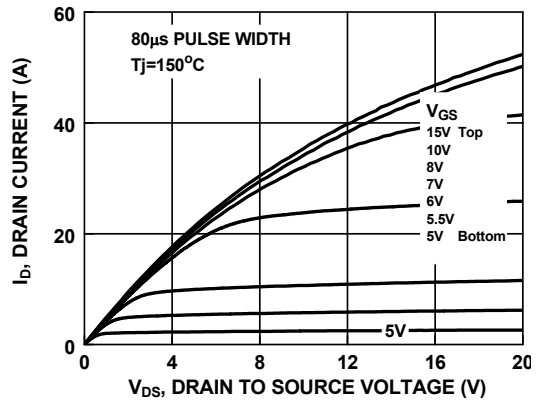


Figure 9. Saturation Characteristics

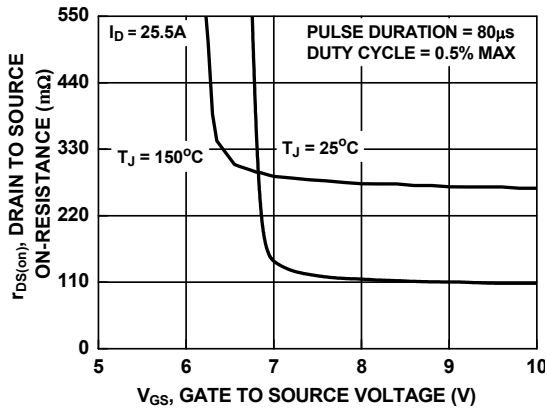


Figure 10. $R_{DS(on)}$ vs. Gate Voltage

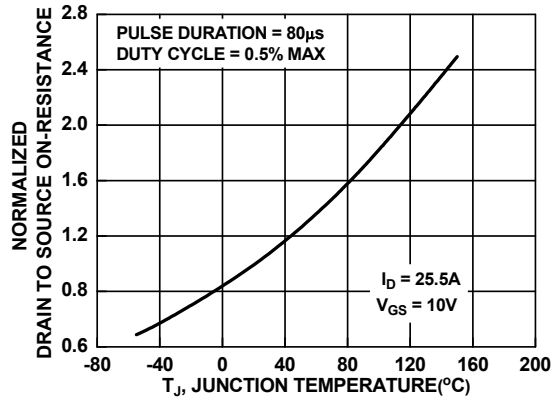


Figure 11. Normalized $R_{DS(on)}$ vs. Junction Temperature

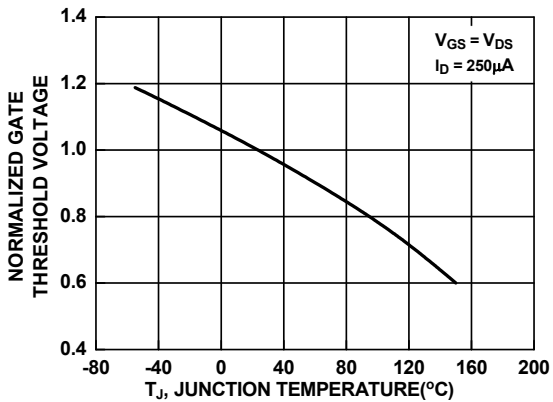


Figure 12. Normalized Gate Threshold Voltage vs. Temperature

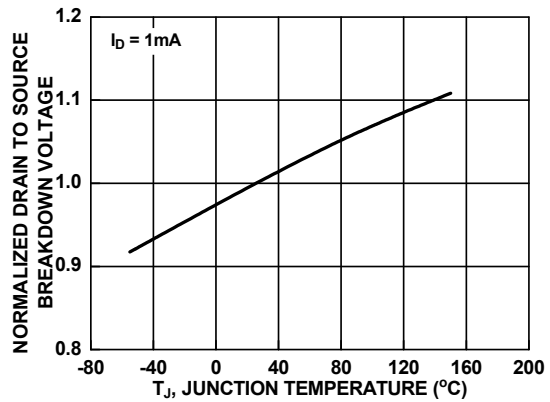


Figure 13. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

Typical Characteristics

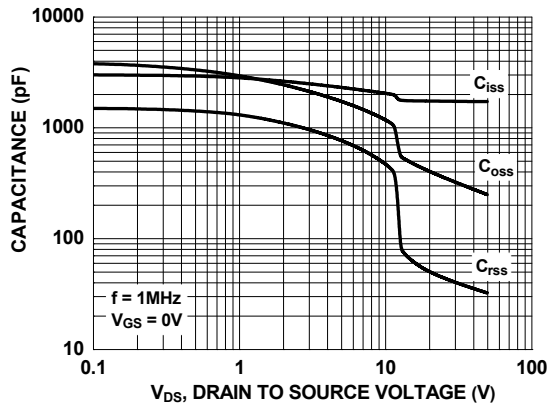


Figure 14. Capacitance vs. Drain to Source Voltage

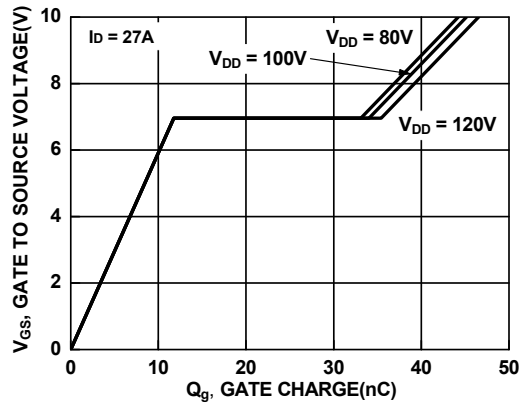







Figure 15. Gate Charge vs. Gate to Source Voltage



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