ON Semiconductor®

# FDC5661N-F085

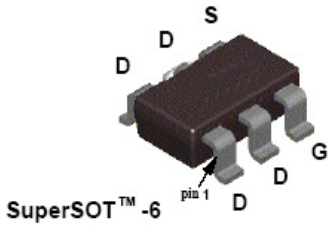
## N-Channel Logic Level PowerTrench® MOSFET 60V, 4A, 60mΩ

### Features

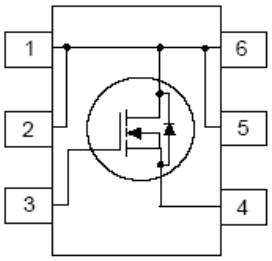
- $R_{DS(on)}$ = 47mΩ at $V_{GS}$ = 10V, $I_D$ = 4.3A
- $R_{DS(on)}$ = 60mΩ at $V_{GS}$ = 4.5V, $I_D$ = 4A
- Typ $Q_{g(TOT)}$ = 14.5nC at $V_{GS}$ = 10V
- Low Miller Charge
- UIS Capability
- RoHS Compliant
- Qualified to AEC Q101

### Applications

- DC/DC converter
- Motor Drives




SuperSOT™ -6




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

| Symbol | Parameter | Ratings | Units |
|---|---|---|---|
| $V_{DSS}$ | Drain to Source Voltage | 60 | V |
| $V_{GS}$ | Gate to Source Voltage | ±20 | V |
| $I_D$ | Drain Current Continuous ($V_{GS}$ = 10V) | 4.3 | A |
| | Pulsed | 20 | |
| $E_{AS}$ | Single Pulse Avalanche Energy (Note 1) | 81 | mJ |
| $P_D$ | Power Dissipation | 1.6 | W |
| $T_J$, $T_{STG}$ | Operating and Storage Temperature | -55 to +150 | °C |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | 30 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance Junction to Ambient TO-263, 1in$^2$ copper pad area | 78 | °C/W |

**Notes:**
1: $E_{AS}$ of 81 mJ is 100% test at L = 14mH, $I_{AS}$ = 3.4A, starting $T_J$ = 25°C

## Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|---|---|---|---|---|---|
| .661N | FDC5661N | SSOT-6 | 7” | 8mm | 3000 units |


September-2017, Rev. 2

Publication Order Number:
FDC5661N-F085/D

## Electrical Characteristics $T_A$ = 25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $B_{VDSS}$ | Drain to Source Breakdown Voltage | $I_D$ = 250μA, $V_{GS}$ = 0V | 60 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 48V, $V_{GS}$ = 0V | - | - | 1 | μA |
| | | $V_{DS}$ = 48V, $V_{GS}$ = 0V, $T_A$ = 150°C | - | - | 250 | μA |
| $I_{GSS}$ | Gate to Source Leakage Current | $V_{GS}$ = ±20V | - | - | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate to Source Threshold Voltage | $V_{GS}$ = $V_{DS}$, $I_D$ = 250μA | 1 | 2.0 | 3 | V |
| $r_{DS(on)}$ | Drain to Source On Resistance | $I_D$ = 4.3A, $V_{GS}$= 10V | - | 38 | 47 | mΩ |
| | | $I_D$ = 4A, $V_{GS}$= 4.5V | - | 46 | 60 | mΩ |
| | | $I_D$ = 4.3A, $V_{GS}$= 10V, $T_J$ = 150°C | - | 69 | 86 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 25V, $V_{GS}$ = 0V, f = 1MHz | - | 763 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 68 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 36 | - | pF |
| $R_G$ | Gate Resistance | f = 1MHz | - | 2.6 | - | Ω |
| $Q_{g(TOT)}$ | Total Gate Charge at 10V | $V_{GS}$ = 0 to 10V, $V_{DD}$ = 30V, $I_D$ = 4.3A | - | 14.5 | 19 | nC |
| $Q_{gs}$ | Gate to Source Gate Charge | | - | 2.4 | - | nC |
| $Q_{gd}$ | Gate to Drain “Miller“ Charge | | - | 2.9 | - | nC |

## Switching Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $t_{on}$ | Turn-On Time | $V_{DD}$ = 30V, $I_D$ = 4.3A, $V_{GS}$ = 10V, $R_{GS}$ = 6Ω | - | - | 17.6 | ns |
| $t_{d(on)}$ | Turn-On Delay Time | | - | 7.2 | - | ns |
| $t_r$ | Rise Time | | - | 1.6 | - | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | - | 19.3 | - | ns |
| $t_f$ | Fall Time | | - | 3.1 | - | ns |
| $t_{off}$ | Turn-Off Time | | - | - | 36 | ns |
| **Drain-Source Diode Characteristics** | | | | | | |
| $V_{SD}$ | Source to Drain Diode Voltage | $I_{SD}$ = 4.3A | - | 0.8 | 1.25 | V |
| | | $I_{SD}$ = 2.1A | - | 0.8 | 1.0 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_{SD}$ = 4.3A, $dI_{SD}/dt$ = 100A/μs | - | 18.4 | 24 | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | - | 10.0 | 13 | nC |

## Typical Characteristics

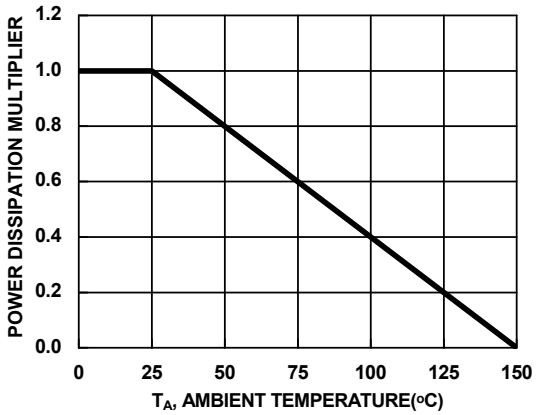



Figure 1. Normalized Power Dissipation vs Ambient Temperature

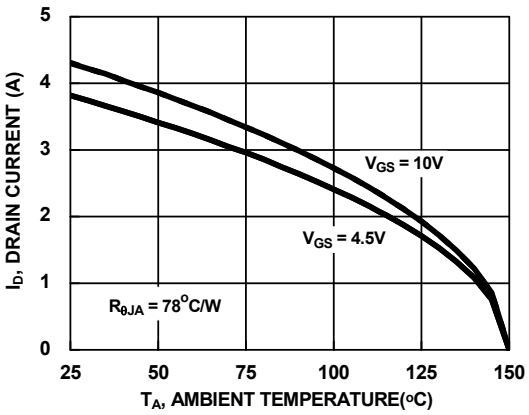



Figure 2. Maximum Continuous Drain Current vs Ambient Temperature

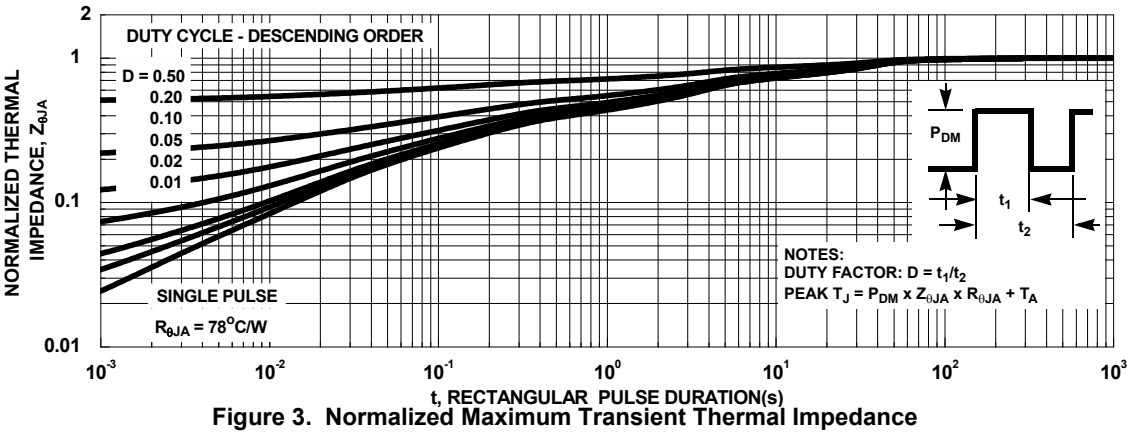



Figure 3. Normalized Maximum Transient Thermal Impedance

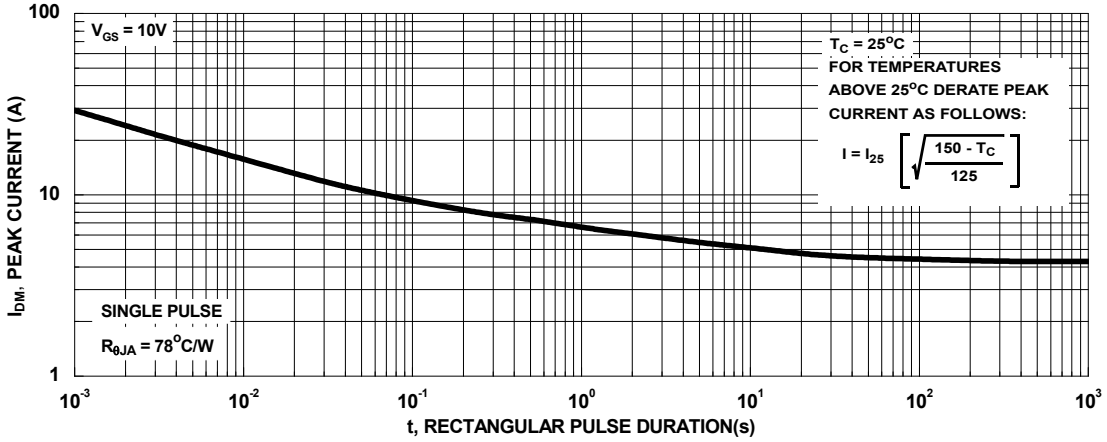



Figure 4. Peak Current Capability

## Typical Characteristics

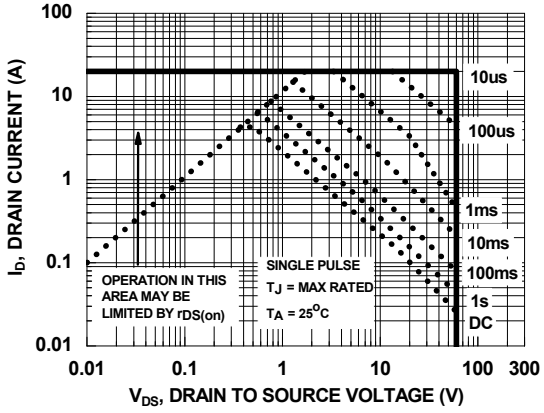



**Figure 5. Forward Bias Safe Operating Area**

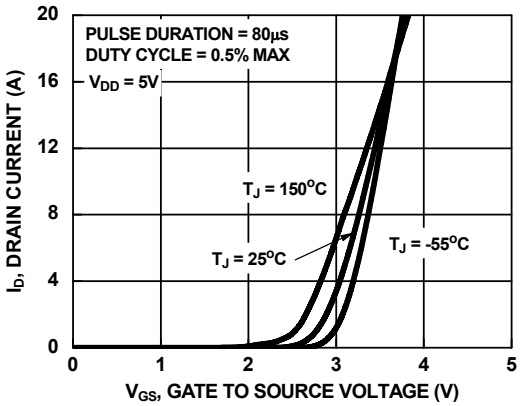



**Figure 6. Transfer Characteristics**

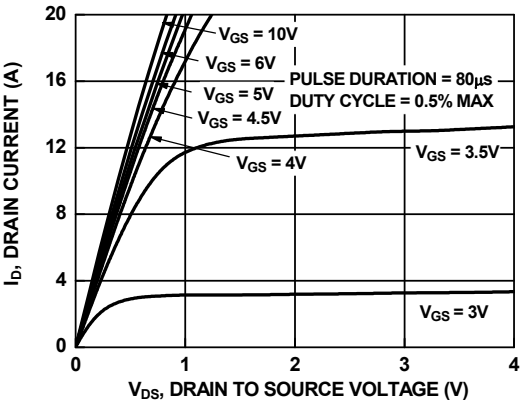



**Figure 7. Saturation Characteristics**

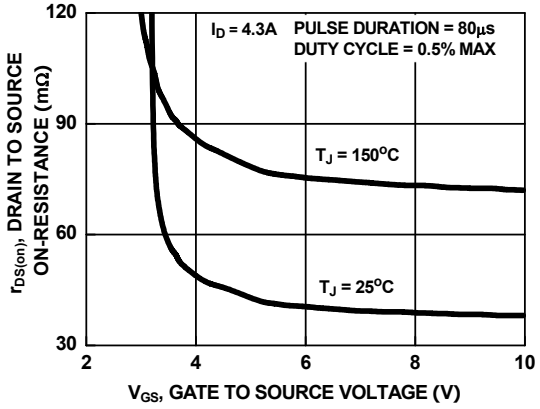



**Figure 8. Drain to Source On-Resistance Variation vs Gate to Source Voltage**

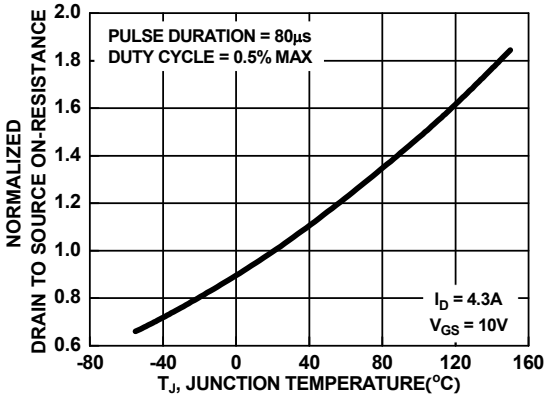



**Figure 9. Normalized Drain to Source On Resistance vs Junction Temperature**

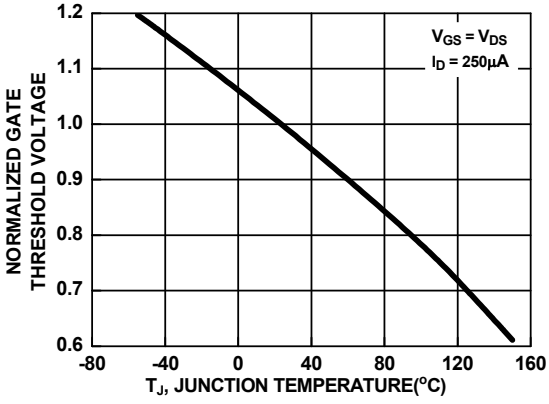



**Figure 10. Normalized Gate Threshold Voltage vs Junction Temperature**

## Typical Characteristics

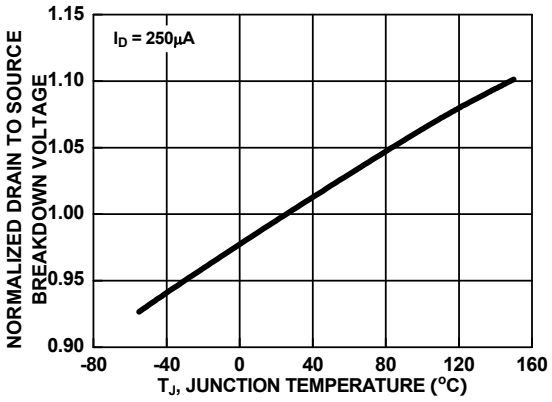



**Figure 11. Normalized Drain to Source Breakdown Voltage vs Junction Temperature**

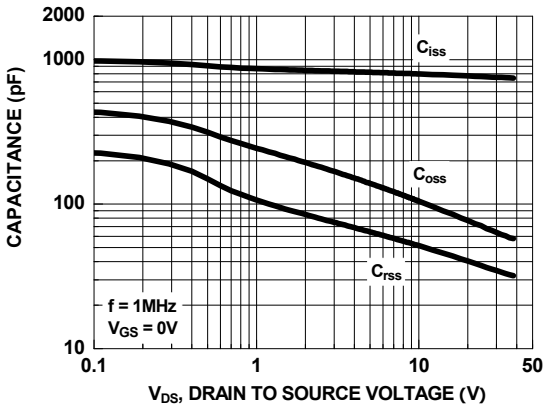



**Figure 12. Capacitance vs Drain to Source Voltage**

**Figure 14.**

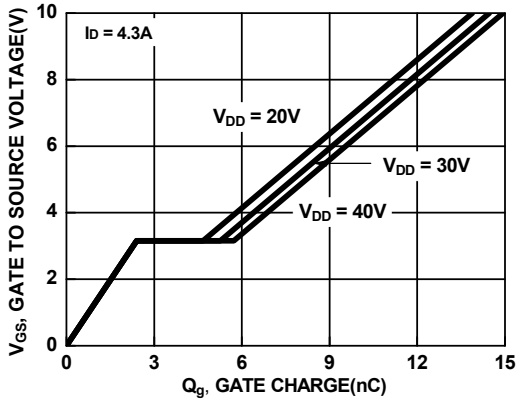



**Figure 13. Gate Charge vs Gate to Source Voltage**

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