



## Description

The FDN5630 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

## General Features

$V_{DS} = 60V$   $I_D = 3A$

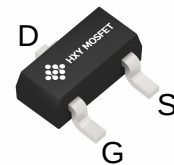
$R_{DS(ON)} < 85m\Omega$  @  $V_{GS}=10V$

## Application

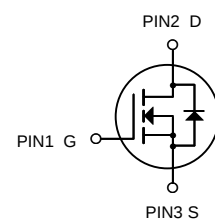
Battery protection

Load switch

Uninterruptible power supply



SOT-23



N-Channel MOSFET

## Ordering Information

| Product ID | Pack   | Marking | Qty(PCS) |
|------------|--------|---------|----------|
| FDN5630    | SOT-23 | S10     | 3000PCS  |

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

| Symbol          | Parameter                                        | Limit      | Unit          |
|-----------------|--------------------------------------------------|------------|---------------|
| $V_{DS}$        | Drain-Source Voltage                             | 60         | V             |
| $V_{GS}$        | Gate-Source Voltage                              | $\pm 20$   | V             |
| $I_D$           | Drain Current-Continuous                         | 3          | A             |
| $I_{DM}$        | Drain Current-Pulsed (Note 1)                    | 10         | A             |
| $P_D$           | Maximum Power Dissipation                        | 1.7        | W             |
| $T_J, T_{STG}$  | Operating Junction and Storage Temperature Range | -55 To 150 | $^{\circ}C$   |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient (Note 2) | 73.5       | $^{\circ}C/W$ |



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

|                                           |              |                                                         |     |     |           |            |
|-------------------------------------------|--------------|---------------------------------------------------------|-----|-----|-----------|------------|
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                             | -   | -   | $\pm 100$ | nA         |
| <b>On Characteristics</b> (Note 3)        |              |                                                         |     |     |           |            |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                           | 0.8 | 1.3 | 2.0       | V          |
| Drain-Source On-State Resistance          | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=3A$                                    | -   | 72  | 85        | m $\Omega$ |
|                                           |              | $V_{GS}=4.5V, I_D=1.5A$                                 | -   | 85  | 103       | m $\Omega$ |
| Forward Transconductance                  | $g_{FS}$     | $V_{DS}=15V, I_D=2A$                                    |     | 3   | -         | S          |
| <b>Dynamic Characteristics</b> (Note4)    |              |                                                         |     |     |           |            |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=30V, V_{GS}=0V,$<br>$F=1.0MHz$                  | -   | 510 | -         | PF         |
| Output Capacitance                        | $C_{oss}$    |                                                         | -   | 34  | -         | PF         |
| Reverse Transfer Capacitance              | $C_{rss}$    |                                                         | -   | 26  | -         | PF         |
| <b>Switching Characteristics</b> (Note 4) |              |                                                         |     |     |           |            |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DD}=30V, I_D=1.5A$<br>$V_{GS}=10V, R_{GEN}=1\Omega$ | -   | 6   | -         | nS         |
| Turn-on Rise Time                         | $t_r$        |                                                         | -   | 15  | -         | nS         |
| Turn-Off Delay Time                       | $t_{d(off)}$ |                                                         | -   | 15  | -         | nS         |
| Turn-Off Fall Time                        | $t_f$        |                                                         | -   | 10  | -         | nS         |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=30V, I_D=3A,$<br>$V_{GS}=4.5V$                  | -   | 7.5 | -         | nC         |
| Gate-Source Charge                        | $Q_{gs}$     |                                                         | -   | 1.4 | -         | nC         |
| Gate-Drain Charge                         | $Q_{gd}$     |                                                         | -   | 3   | -         | nC         |
| <b>Drain-Source Diode Characteristics</b> |              |                                                         |     |     |           |            |
| Diode Forward Voltage (Note 3)            | $V_{SD}$     | $V_{GS}=0V, I_S=3A$                                     | -   | -   | 1.2       | V          |
| Diode Forward Current (Note 2)            | $I_S$        |                                                         | -   | -   | 3         | A          |

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production



## Typical Electrical and Thermal Characteristics

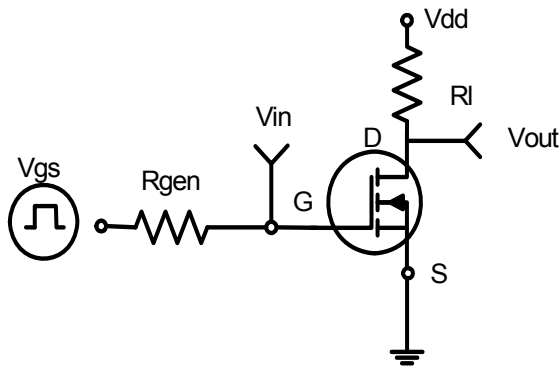


Figure 1: Switching Test Circuit

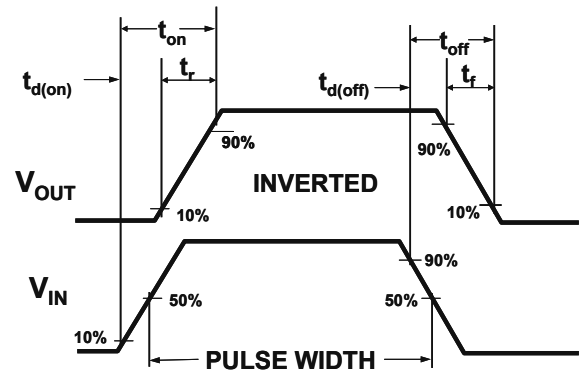


Figure 2: Switching Waveforms

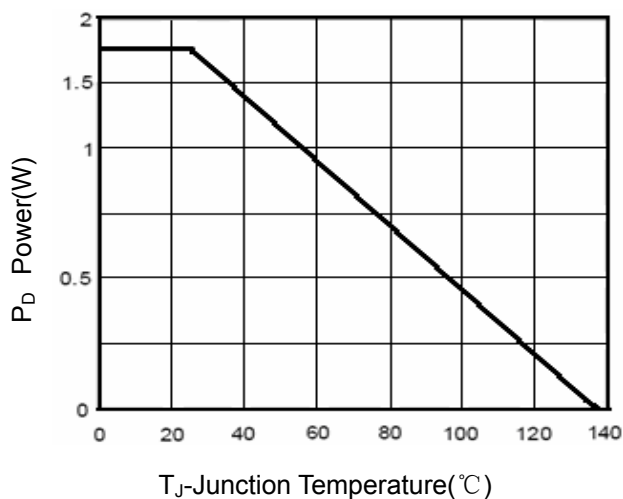


Figure 3 Power Dissipation

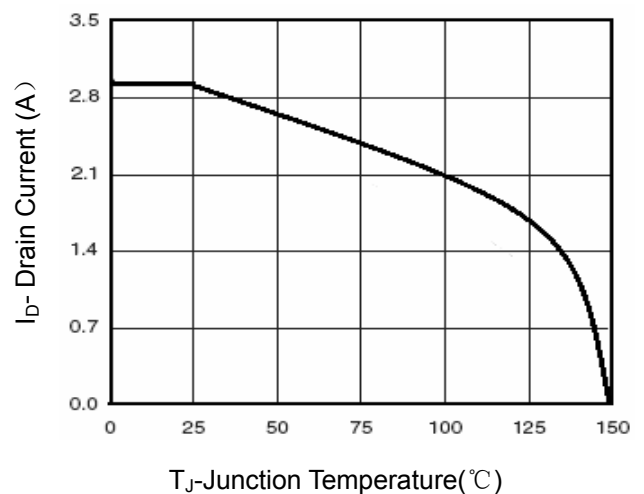


Figure 4 Drain Current

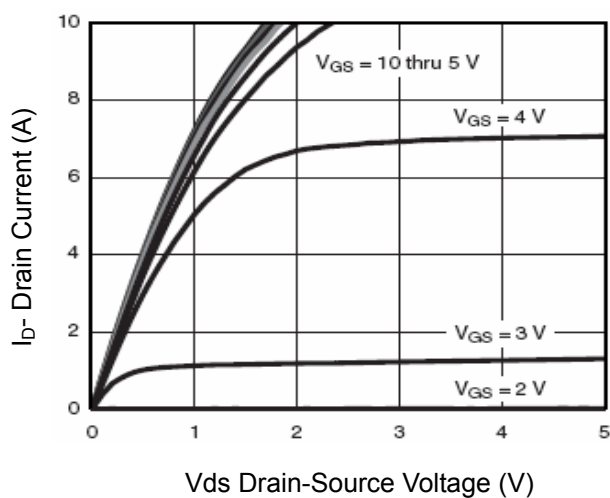


Figure 5 Output Characteristics

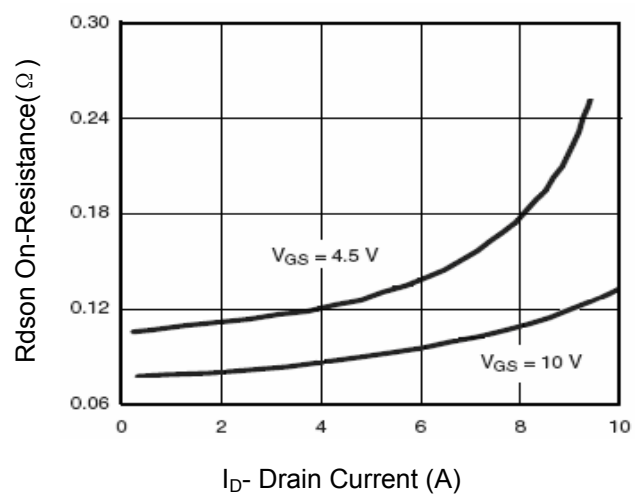


Figure 6 Drain-Source On-Resistance

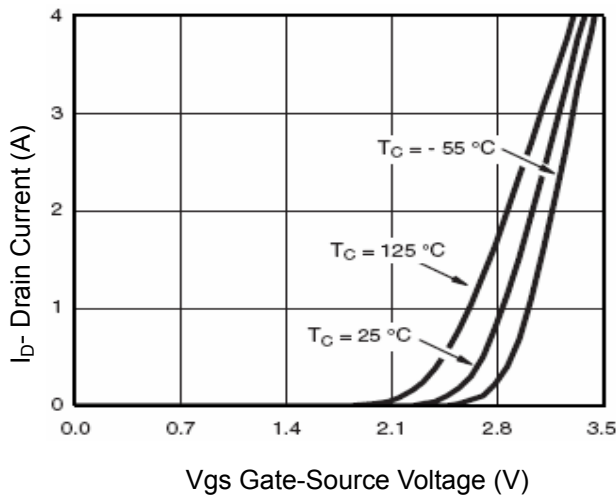


Figure 7 Transfer Characteristics

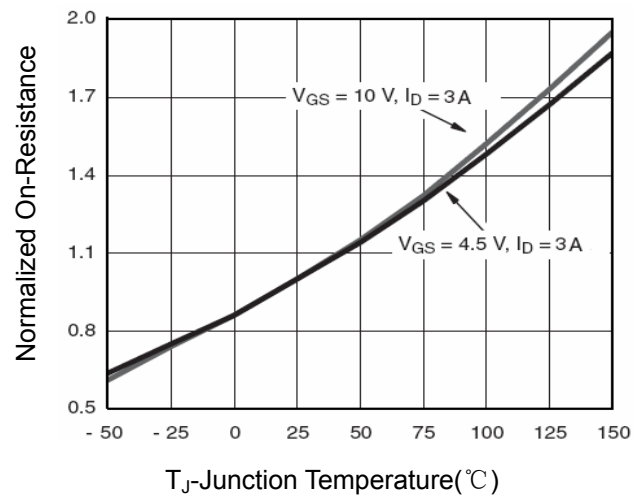


Figure 8 Drain-Source On-Resistance

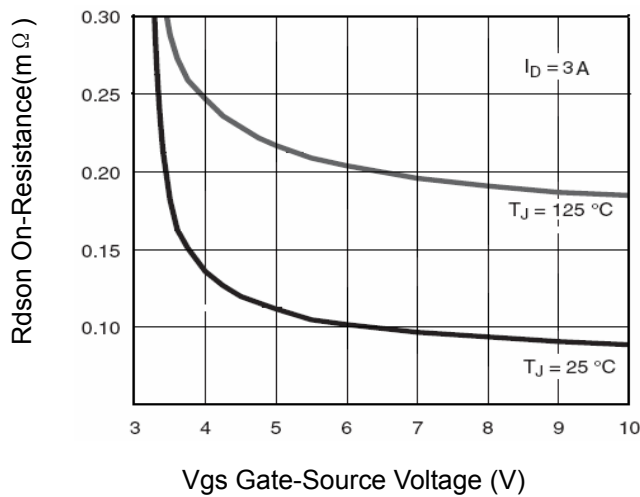


Figure 9 Rdson vs Vgs

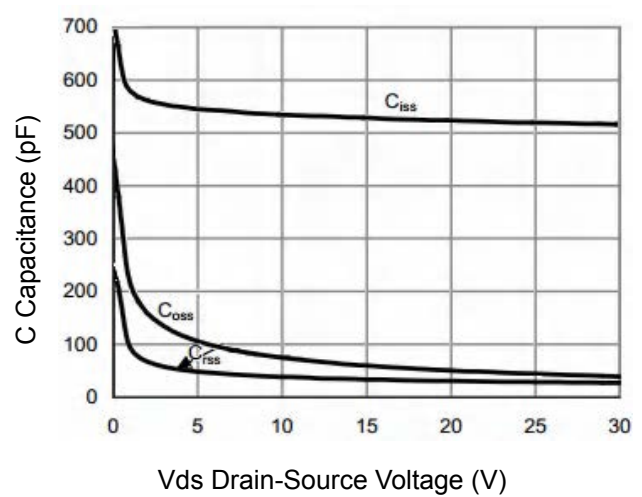


Figure 10 Capacitance vs Vds

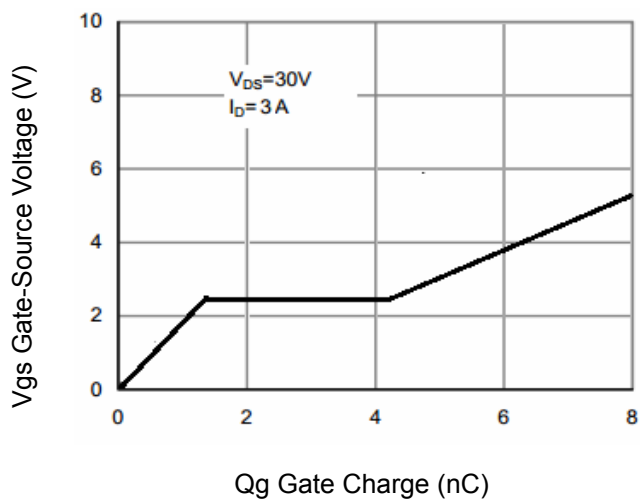


Figure 11 Gate Charge

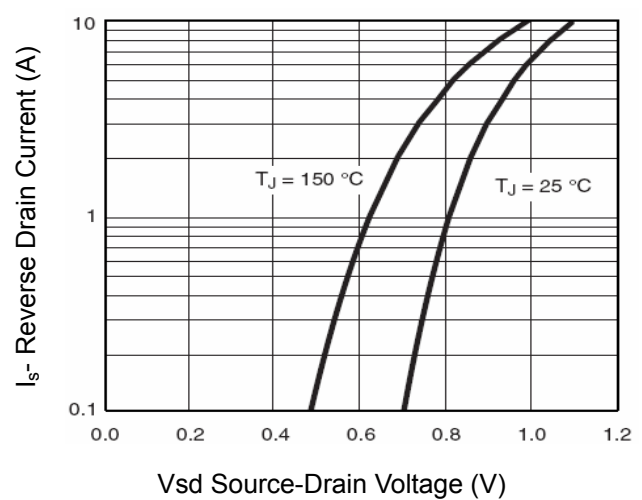


Figure 12 Source- Drain Diode Forward

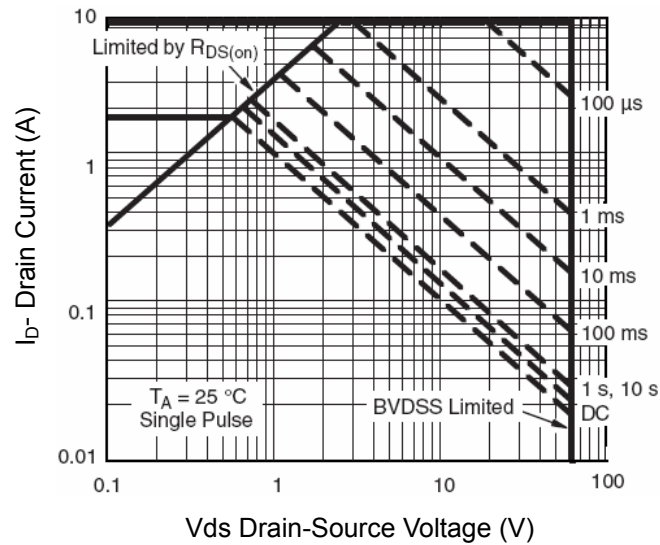


Figure 13 Safe Operation Area

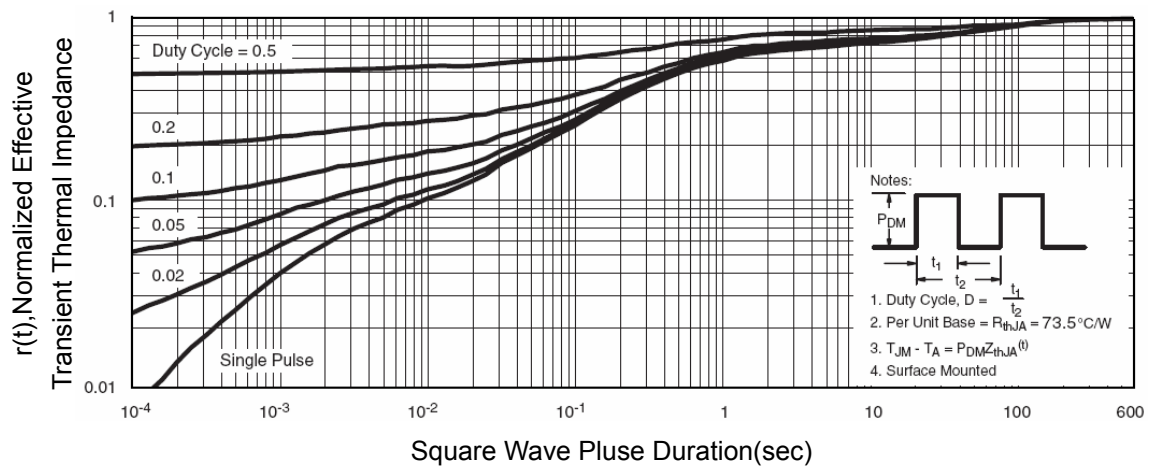


Figure 14 Normalized Maximum Transient Thermal Impedance



## SOT-23 Package Outline Dimensions



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 0.900                     | 1.150 | 0.035                | 0.045 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                     | 1.050 | 0.035                | 0.041 |
| b      | 0.300                     | 0.500 | 0.012                | 0.020 |
| c      | 0.080                     | 0.150 | 0.003                | 0.006 |
| D      | 2.800                     | 3.000 | 0.110                | 0.118 |
| E      | 1.200                     | 1.400 | 0.047                | 0.055 |
| E1     | 2.250                     | 2.550 | 0.089                | 0.100 |
| e      | 0.950 TYP                 |       | 0.037 TYP            |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.550 REF                 |       | 0.022 REF            |       |
| L1     | 0.300                     | 0.500 | 0.012                | 0.020 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |

## SOT-23 Suggested Pad Layout



Note:  
1. Controlling dimension: in millimeters.  
2. General tolerance:  $\pm 0.05\text{mm}$ .  
3. The pad layout is for reference purposes only.



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