

# EVVOSEMI<sup>®</sup>

THINK CHANGE DO



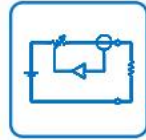
ESD



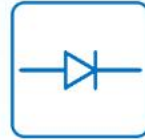
TVS



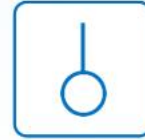
MOS



LDO



Diode



Sensor



DC-DC

## Product Specification

|              |             |            |
|--------------|-------------|------------|
| ▶ Domestic   | Part Number | FDN5630    |
| ▶ Overseas   | Part Number | FDN5630-EV |
| ▶ Equivalent | Part Number | FDN5630    |

EV is the abbreviation of name EVVO

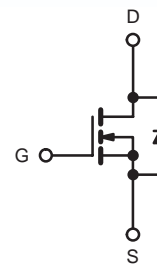
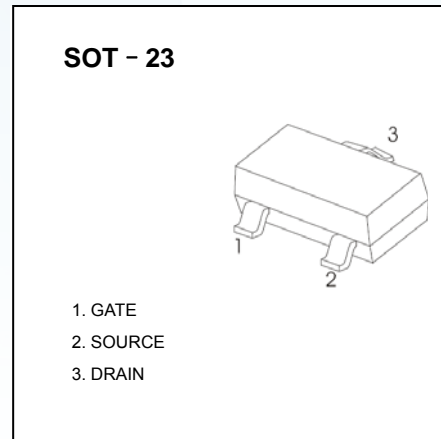
## N-Channel 60-V (D-S) MOSFET

### PRODUCT SUMMARY

| V <sub>DS</sub> (V) | R <sub>DS(on)</sub> (mΩ)      | I <sub>D</sub> (A) <sup>a</sup> | Q <sub>g</sub> (Typ.) |
|---------------------|-------------------------------|---------------------------------|-----------------------|
| 60                  | 85 at V <sub>GS</sub> = 10 V  | 4.0                             | 2.1 nC                |
|                     | 96 at V <sub>GS</sub> = 4.5 V | 3.8                             |                       |

### APPLICATIONS

- Battery Switch
- DC/DC Converter



N-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS T<sub>A</sub> = 25 °C, unlc

| Parameter  | Symbol                            | Limit                  | Unit |
|--|-----------------------------------|------------------------|------|
| Drain-Source Voltage                               | V <sub>DS</sub>                   | 60                     | V    |
| Gate-Source Voltage                                | V <sub>GS</sub>                   | ± 20                   |      |
| Continuous Drain Current (T <sub>J</sub> = 150 °C) | I <sub>D</sub>                    | T <sub>C</sub> = 25 °C | A    |
|  |                                   | T <sub>C</sub> = 70 °C |      |
|  |                                   | T <sub>A</sub> = 25 °C |      |
|  |                                   | T <sub>A</sub> = 70 °C |      |
| Pulsed Drain Current                               | I <sub>DM</sub>                   | 12                     | A    |
| Continuous Source-Drain Diode Current              | I <sub>S</sub>                    | T <sub>C</sub> = 25 °C |      |
|  |                                   | T <sub>A</sub> = 25 °C |      |
| Avalanche Current                                  | I <sub>AS</sub>                   | 6                      | mJ   |
| Single-Pulse Avalanche Energy                      | E <sub>AS</sub>                   | 1.8                    |      |
| Maximum Power Dissipation                          | P <sub>D</sub>                    | T <sub>C</sub> = 25 °C | W    |
|  |                                   | T <sub>C</sub> = 70 °C |      |
|  |                                   | T <sub>A</sub> = 25 °C |      |
|  |                                   | T <sub>A</sub> = 70 °C |      |
| Operating Junction and Storage Temperature Range   | T <sub>J</sub> , T <sub>stg</sub> | - 55 to 150            | °C   |

### THERMAL RESISTANCE RATINGS

| Parameter                                   | Symbol            | Typical | Maximum | Unit |
|---|-------------------|---------|---------|------|
| Maximum Junction-to-Ambient <sup>b, d</sup> | R <sub>thJA</sub> | 90      | 115     | °C/W |
| Maximum Junction-to-Foot (Drain)            | R <sub>thJF</sub> | 60      | 75      |      |

Notes:

- Based on T<sub>C</sub> = 25 °C.
- Surface Mounted on 1" x 1" FR4 board.
- t = 5 s.
- Maximum under Steady State conditions is 120 °C/W.

## N-Channel 60-V (D-S) MOSFET

### MOSFET SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted

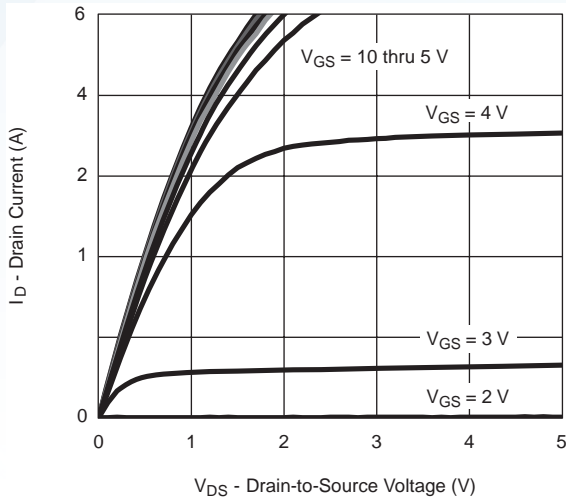
| Parameter                                      | Symbol                  | Test Conditions  | Min.               | Typ. | Max.      | Unit          |
|--|-------------------------|--|--------------------|------|-----------|---------------|
| <b>Static</b>                                  |                         |  |                    |      |           |               |
| Drain-Source Breakdown Voltage                 | $V_{DS}$                | $V_{DS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$  | 60                 |      |           | V             |
| $V_{DS}$ Temperature Coefficient               | $\Delta V_{DS}/T_J$     | $I_D = 250\text{ }\mu\text{A}$   |                    | 55   |           | mV/°C         |
| $V_{GS(th)}$ Temperature Coefficient           | $\Delta V_{GS(th)}/T_J$ |  |                    | -5   |           |               |
| Gate-Source Threshold Voltage                  | $V_{GS(th)}$            | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$  | 1                  |      | 3         | V             |
| Gate-Source Leakage                            | $I_{GSS}$               | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$  |                    |      | $\pm 100$ | nA            |
| Zero Gate Voltage Drain Current                | $I_{DSS}$               | $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$  |                    |      | 1         | $\mu\text{A}$ |
|  |                         | $V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$  |                    |      | 10        |               |
| On-State Drain Current <sup>a</sup>            | $I_{D(on)}$             | $V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$   | 8                  |      |           | A             |
| Drain-Source On-State Resistance <sup>a</sup>  | $R_{DS(on)}$            | $V_{GS} = 10\text{ V}, I_D = 1.9\text{ A}$   |                    | 75   | 85        | m $\Omega$    |
|  |                         | $V_{GS} = 4.5\text{ V}, I_D = 1.7\text{ A}$  |                    | 86   | 96        |               |
| Forward Transconductance <sup>a</sup>          | $g_{fs}$                | $V_{DS} = 15\text{ V}, I_D = 1.9\text{ A}$   |                    | 5    |           | S             |
| <b>Dynamic<sup>b</sup></b>                     |                         |  |                    |      |           |               |
| Input Capacitance                              | $C_{iss}$               | $V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$  |                    | 180  |           | pF            |
| Output Capacitance                             | $C_{oss}$               |  |                    | 22   |           |               |
| Reverse Transfer Capacitance                   | $C_{rss}$               |  |                    | 13   |           |               |
| Total Gate Charge                              | $Q_g$                   | $V_{DS} = 30\text{ V}, V_{GS} = 10\text{ V}, I_D = 1.9\text{ A}$   |                    | 4.2  | 6.1       | nC            |
|  |                         |  |                    | 2.1  | 3.2       |               |
| Gate-Source Charge                             | $Q_{gs}$                | $V_{DS} = 30\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 1.9\text{ A}$  |                    | 0.7  |           |               |
| Gate-Drain Charge                              | $Q_{gd}$                |  |                    | 1    |           |               |
| Gate Resistance                                | $R_g$                   |  | $f = 1\text{ MHz}$ | 0.6  | 2.2       | 5.1           |
| Turn-On Delay Time                             | $t_{d(on)}$             | $V_{DD} = 30\text{ V}, R_L = 20\text{ }\Omega$<br>$I_D \cong 1.5\text{ A}, V_{GEN} = 10\text{ V}, R_G = 1\text{ }\Omega$ |                    | 4    | 6         | ns            |
| Rise Time                                      | $t_r$                   |  |                    | 10   | 15        |               |
| Turn-Off Delay Time                            | $t_{d(off)}$            |  |                    | 10   | 15        |               |
| Fall Time                                      | $t_f$                   |  |                    | 7    | 10.5      |               |
| Turn-On Delay Time                             | $t_{d(on)}$             | $V_{DD} = 30\text{ V}, R_L = 20\text{ }\Omega$<br>$I_D = 1.5\text{ A}, V_{GEN} = 4.5\text{ V}, R_G = 1\text{ }\Omega$    |                    | 15   | 23        | ns            |
| Rise Time                                      | $t_r$                   |  |                    | 16   | 24        |               |
| Turn-Off Delay Time                            | $t_{d(off)}$            |  |                    | 11   | 17        |               |
| Fall Time                                      | $t_f$                   |  |                    | 11   | 17        |               |
| <b>Drain-Source Body Diode Characteristics</b> |                         |  |                    |      |           |               |
| Continuous Source-Drain Diode Current          | $I_S$                   | $T_C = 25\text{ }^\circ\text{C}$   |                    |      | 2.19      | A             |
| Pulse Diode Forward Current <sup>a</sup>       | $I_{SM}$                |  |                    |      | 7         |               |
| Body Diode Voltage                             | $V_{SD}$                | $I_S = 1.5\text{ A}$   |                    | 0.8  | 1.2       | V             |
| Body Diode Reverse Recovery Time               | $t_{rr}$                | $I_F = 1.5\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$                                   |                    | 15   | 23        | ns            |
| Body Diode Reverse Recovery Charge             | $Q_{rr}$                |  |                    | 10   | 15        | nC            |
| Reverse Recovery Fall Time                     | $t_a$                   |  |                    | 12   |           | ns            |
| Reverse Recovery Rise Time                     | $t_b$                   |  |                    | 3    |           |               |

## Notes:

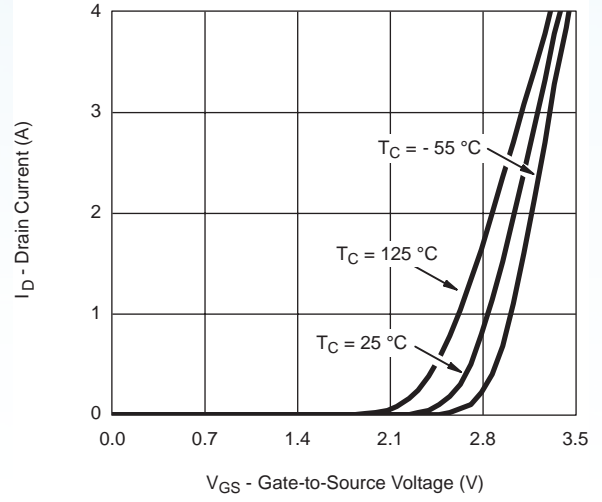
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 b. Guaranteed by design, not subject to production testing.

N-Channel 60-V (D-S) MOSFET

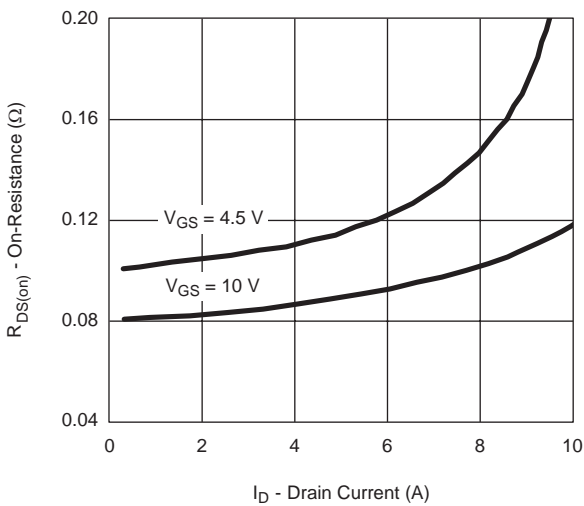
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



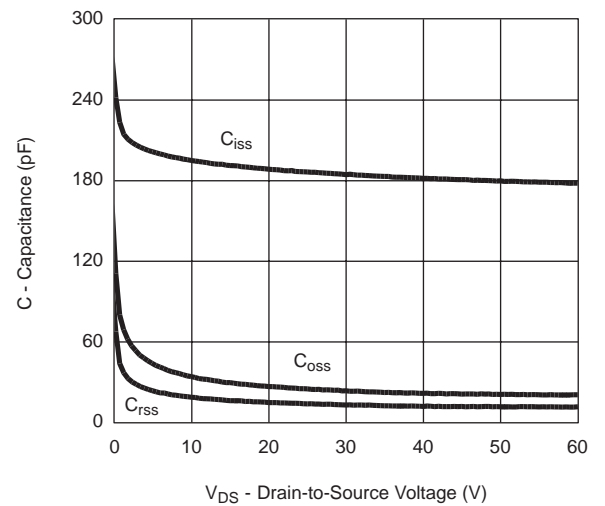
Output Characteristics



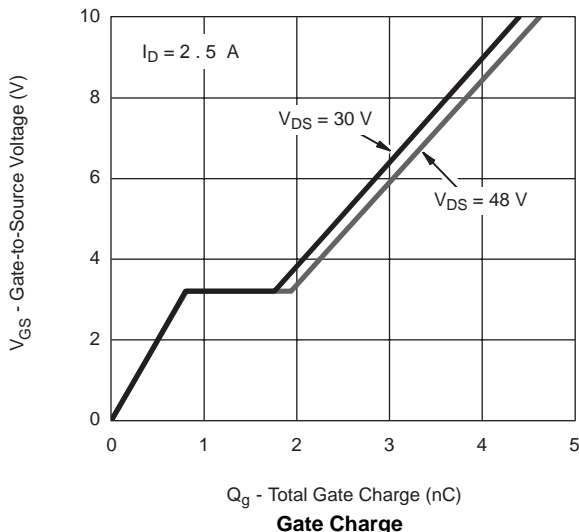
Transfer Characteristics



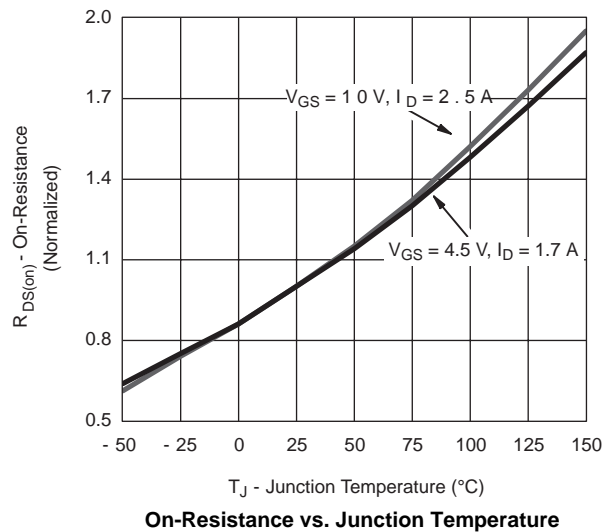
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



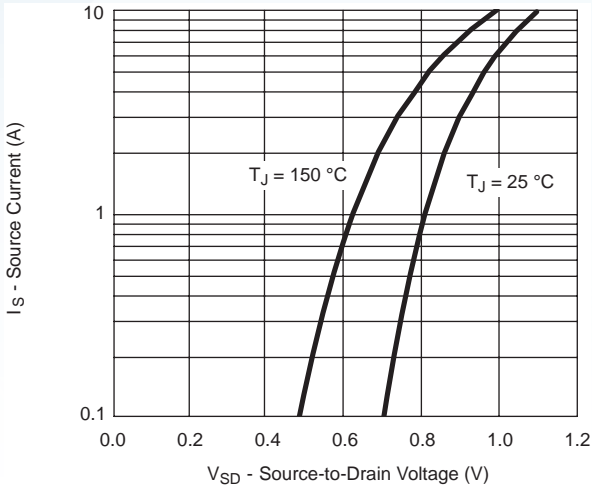
Gate Charge



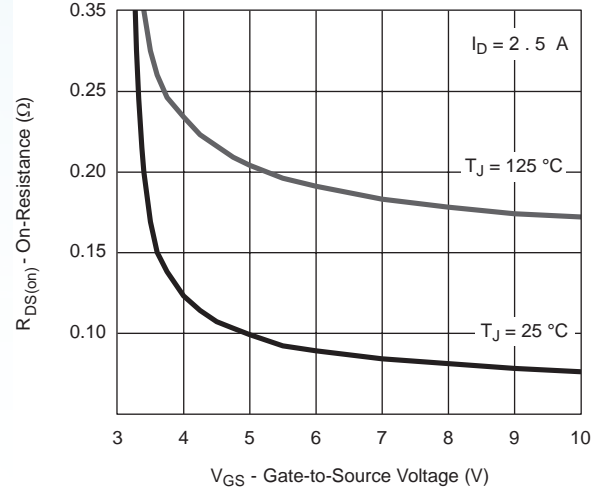
On-Resistance vs. Junction Temperature

N-Channel 60-V (D-S) MOSFET

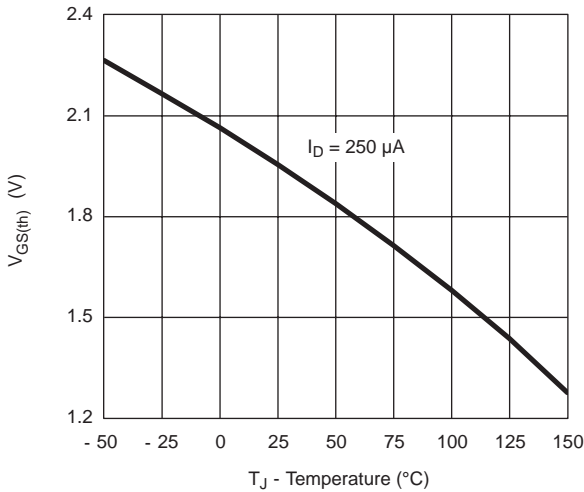
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



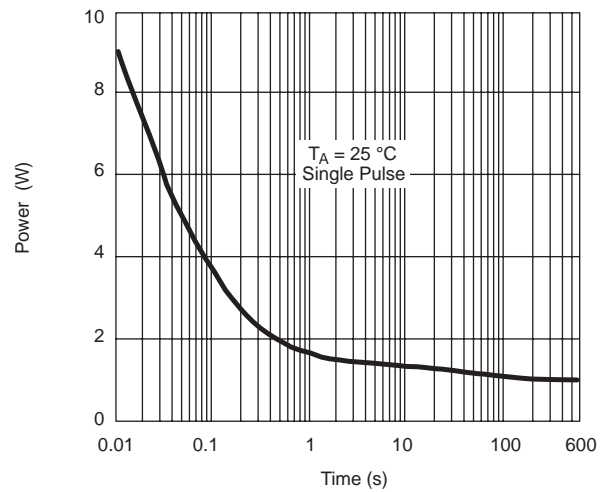
Source-Drain Diode Forward Voltage



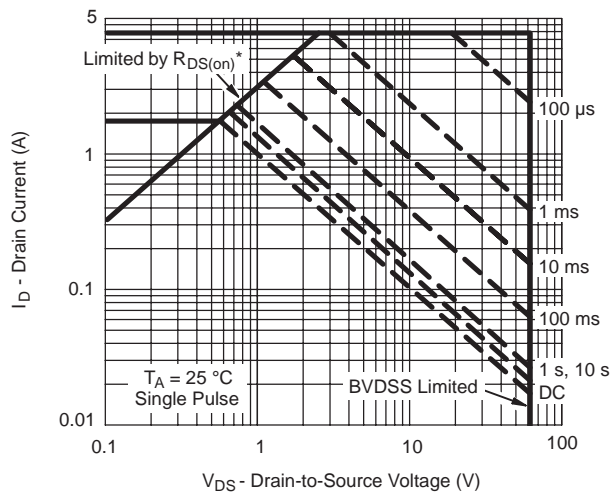
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power

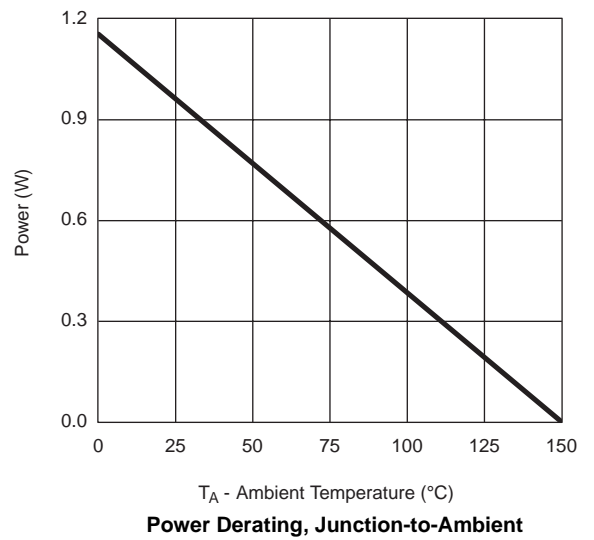
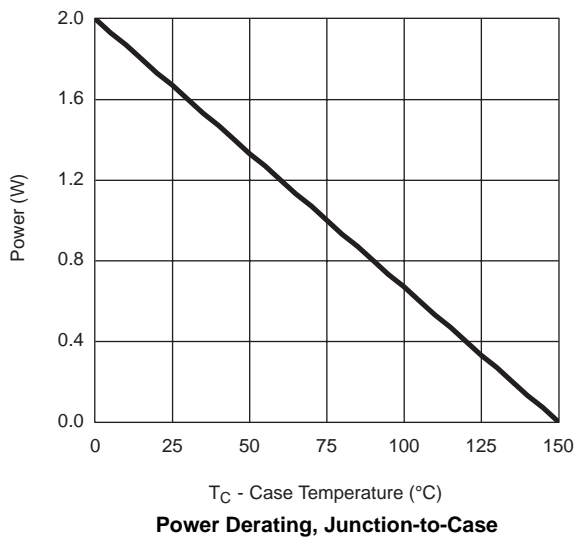
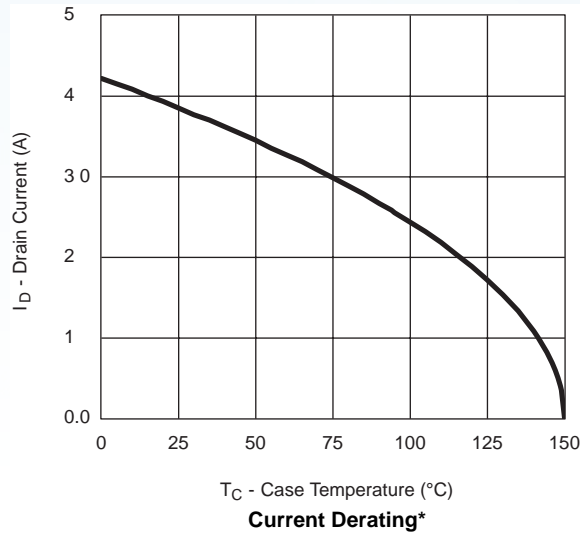


\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

Safe Operating Area

**N-Channel 60-V (D-S) MOSFET**

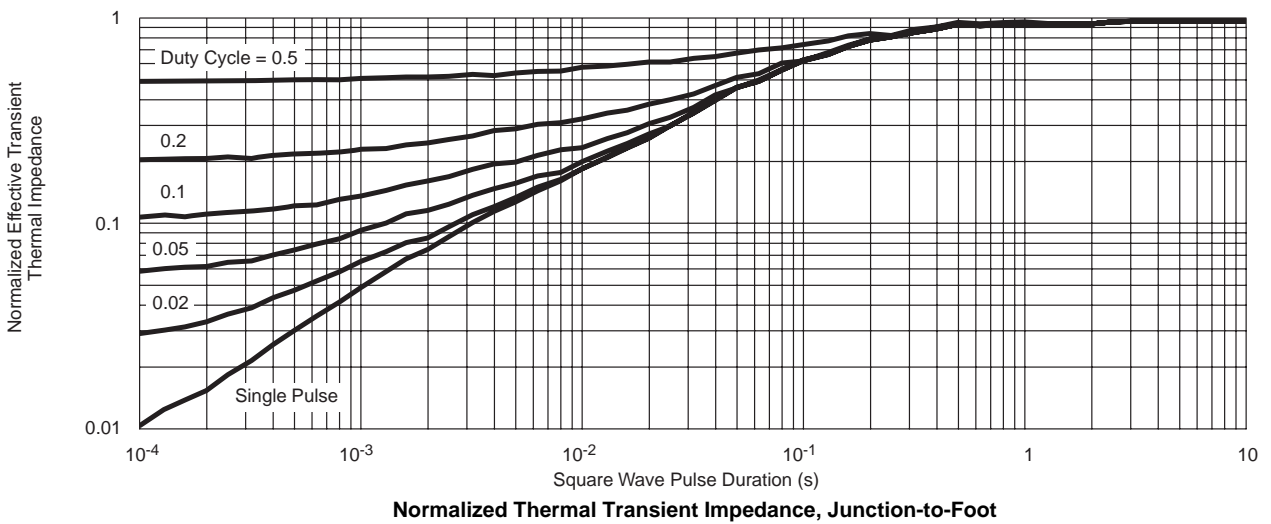
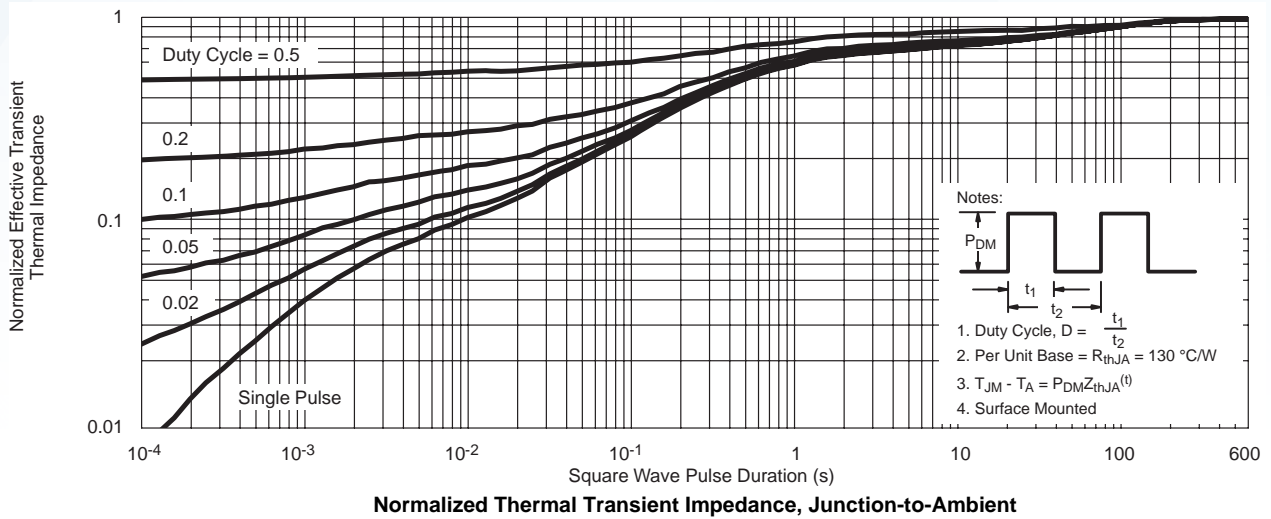
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



\* The power dissipation  $P_D$  is based on  $T_{J(max.)} = 150$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

## N-Channel 60-V (D-S) MOSFET

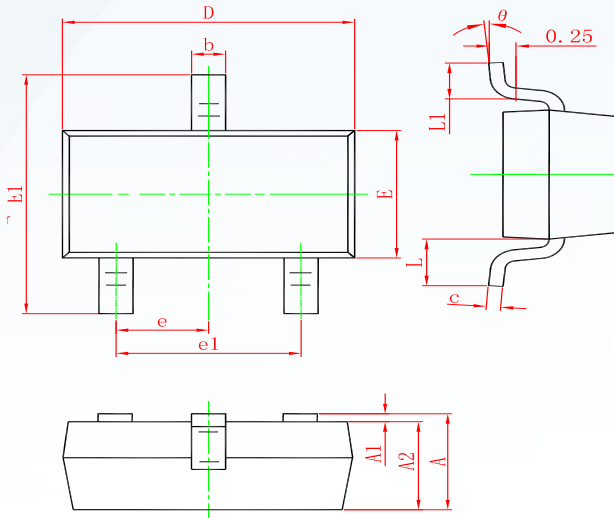
**THERMAL RATINGS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)





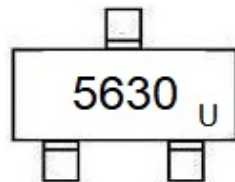
**N-Channel 60-V (D-S) MOSFET**

**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 |
| theta  | 0°                        | 8°    | 0°                   | 8°    |

**Marking**



**Ordering information**

| Order code | Package | Baseqty | Deliverymode  |
|------------|---------|---------|---------------|
| FDN5630    | SOT-23  | 3000    | Tape and reel |



## Disclaimer

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