优尚

YOUSHANG SEMICONDUCTOR

# 设计研发新型功率器件

## 各类小信号开关

## 中低压及高压大电流等场效应管

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## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$ | $I_D$ max $T_A$ = +25°C |
|---|---|---|
| 30V | 14mΩ @ $V_{GS}$ = 10V | 8.0A |
| | 20mΩ @ $V_{GS}$ = 4.5V | 6.7A |

## Mechanical Data

- 14mΩ @ $V_{GS}$ = 10V
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage

## Description and Applications

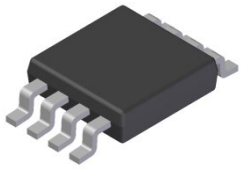
This new generation MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

- DC-DC Converters
- Power management functions

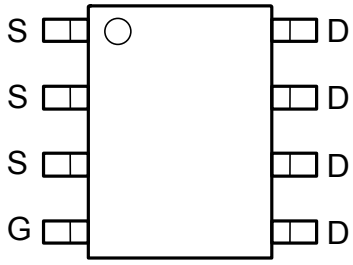
## Mechanical Data

- Case: SO-8
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram
- Terminals: Finish - Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.072 grams (approximate)

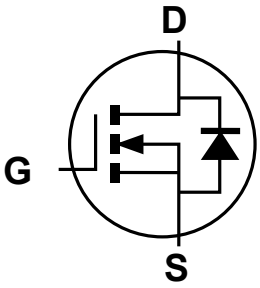
SO-8



Top View




Top View
Internal Schematic




Equivalent circuit

## Maximum Ratings (@ $T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Units |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | 30 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±20 | V |
| Drain Current (Note 5) $V_{GS}$ = 10V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 8.0<br>6.4 | A |
| Drain Current (Note 5) $V_{GS}$ = 4.5V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 6.7<br>5.3 | A |
| Pulsed Drain Current (Note 6) | | | $I_{DM}$ | 50 | A |

## Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Total Power Dissipation (Note 5) | $P_D$ | 1.46 | W |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 86 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## Electrical Characteristics (@ $T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 7)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 30 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250μA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | — | — | 1 | μA | $V_{DS}$ = 30V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±100 | nA | $V_{GS}$ = ±20V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 7)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | 0.8 | 1.2 | 1.6 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | — | 11<br>14 | 14<br>20 | mΩ | $V_{GS}$ = 10V, $I_D$ = 8A<br>$V_{GS}$ = 4.5V, $I_D$ = 7A |
| Forward Transconductance | $g_{fs}$ | — | 8 | — | S | $V_{DS}$ = 10V, $I_D$ = 8A |
| Diode Forward Voltage (Note 7) | $V_{SD}$ | — | 0.72 | 0.94 | V | $V_{GS}$ = 0V, $I_S$ = 1A |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 798 | — | pF | $V_{DS}$ = 10V, $V_{GS}$ = 0V<br>f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 128 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 122 | — | pF | |
| Gate Resistance | $R_G$ | — | 1.37 | — | Ω | $V_{DS}$ = 0V, $V_{GS}$ = 0V, f = 1.0MHz |
| Total Gate Charge | $Q_g$ | — | 8.7 | — | nC | $V_{GS}$ = 5V, $V_{DS}$ = 15V, $I_D$ = 9A |
| Gate-Source Charge | $Q_{gs}$ | — | 1.7 | — | | |
| Gate-Drain Charge | $Q_{gd}$ | — | 2.4 | — | | |
| Turn-On Delay Time | $t_{d(on)}$ | — | 5.03 | — | ns | $V_{DD}$ = 15V, $V_{GEN}$ = 10V,<br>$R_L$ = 15Ω, $R_G$ = 6.0Ω, $I_D$ = 1A |
| Rise Time | $t_r$ | — | 4.50 | — | | |
| Turn-Off Delay Time | $t_{d(off)}$ | — | 26.33 | — | | |
| Fall Time | $t_f$ | — | 8.55 | — | | |

Notes: 5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
6. Repetitive rating, pulse width limited by junction temperature.
7. Short duration pulse test used to minimize self-heating effect.

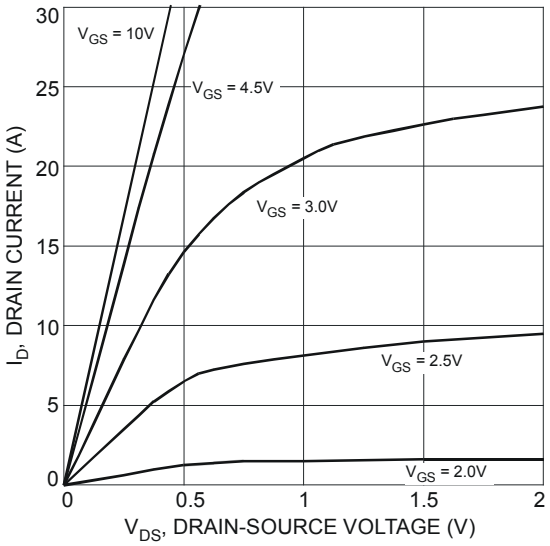


Fig. 1 Typical Output Characteristic

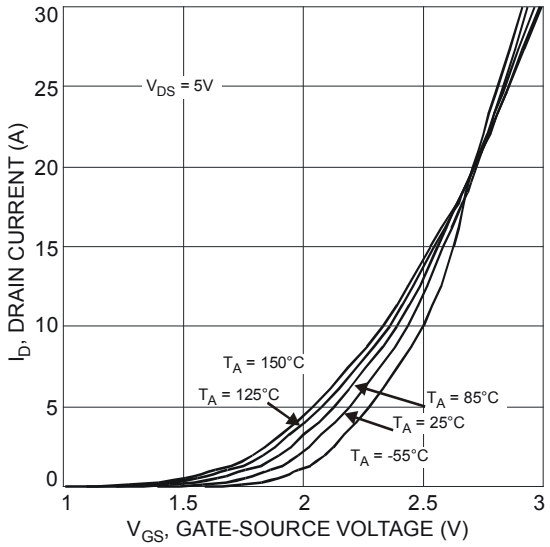


Fig. 2 Typical Transfer Characteristic

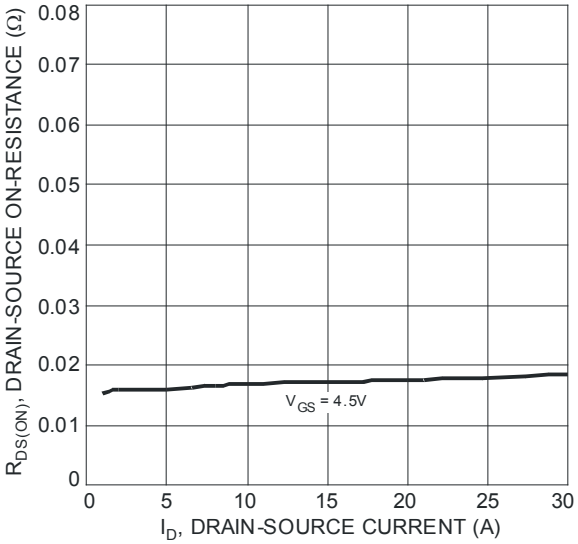


Fig. 3 Typical On-Resistance
vs. Drain Current and Gate Voltage

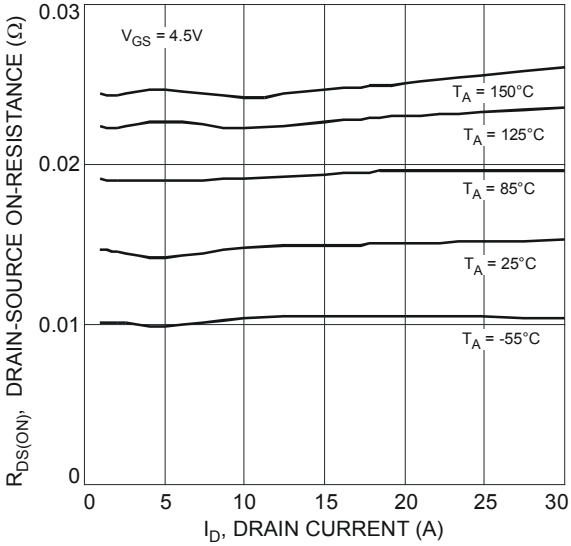


Fig. 4 Typical On-Resistance
vs. Drain Current and Temperature

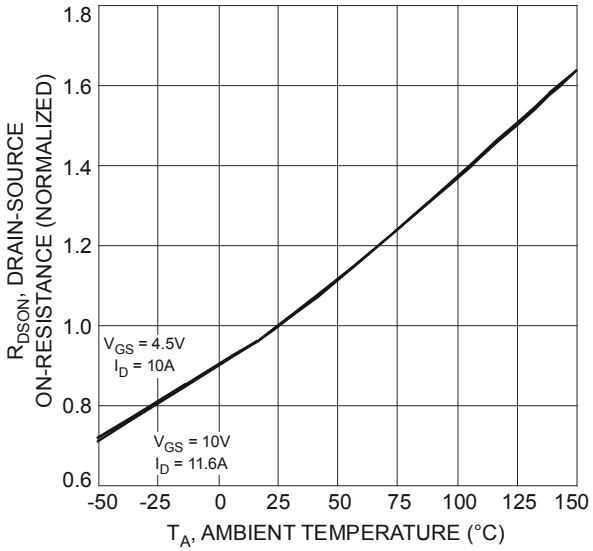


Fig. 5 On-Resistance Variation with Temperature

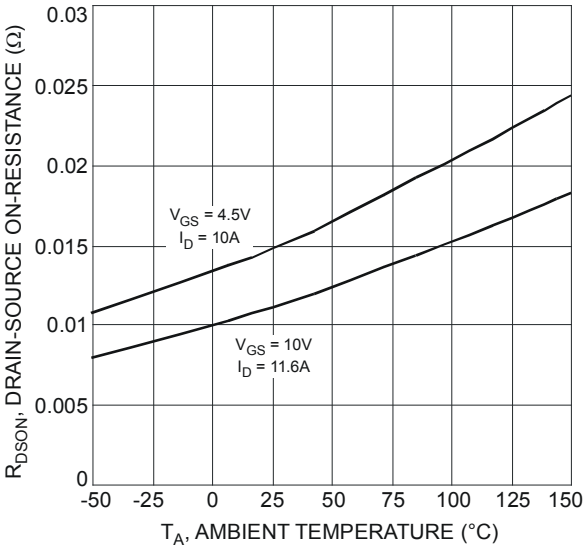


Fig. 6 On-Resistance Variation with Temperature

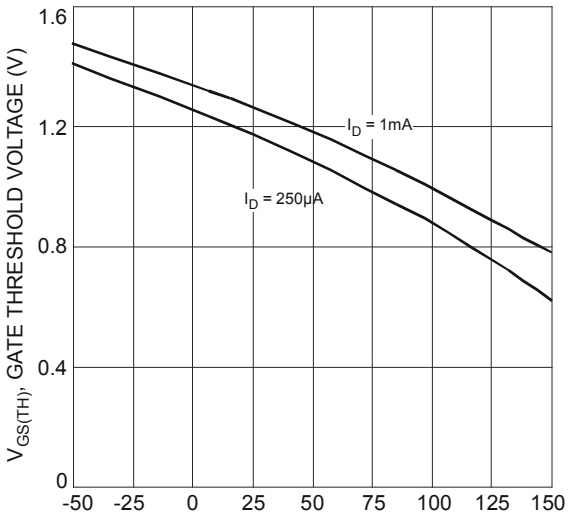


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

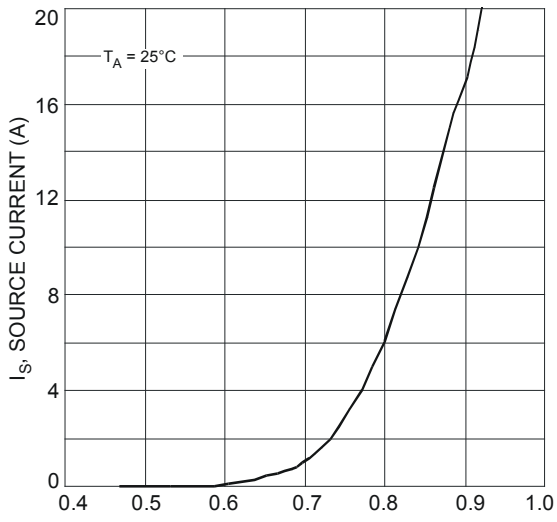


Fig. 8 Diode Forward Voltage vs. Current

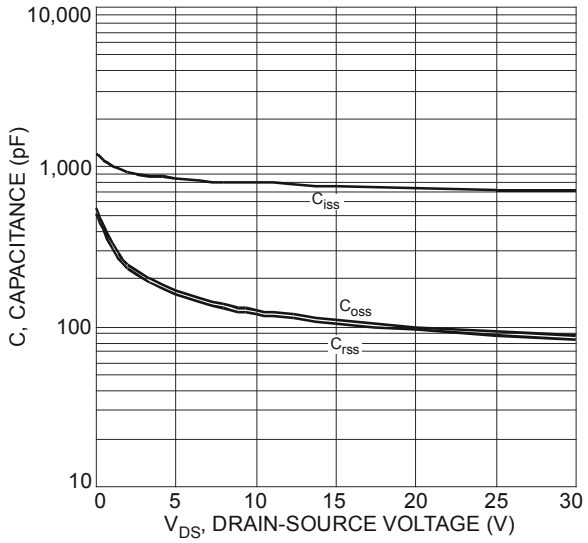


Fig. 9 Typical Total Capacitance

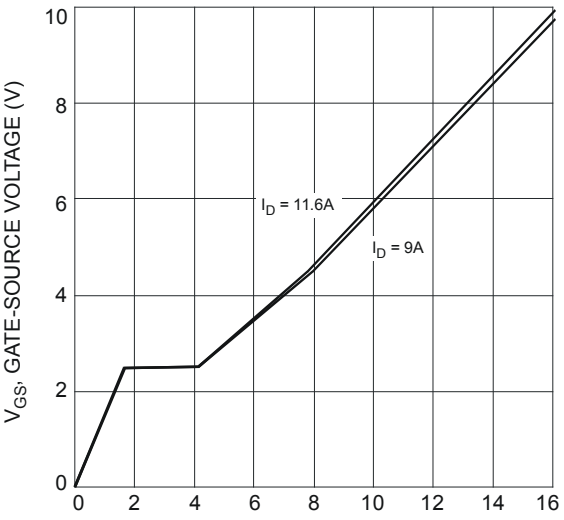


Fig. 10 Total Gate Charge

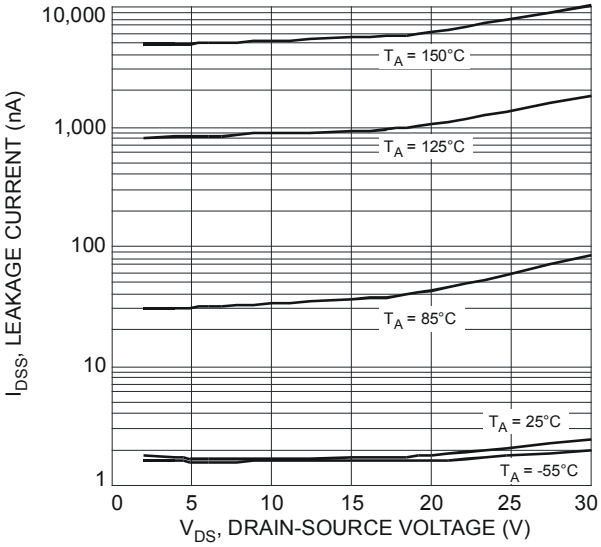


Fig. 11 Typical Leakage Current vs. Drain-Source Voltage

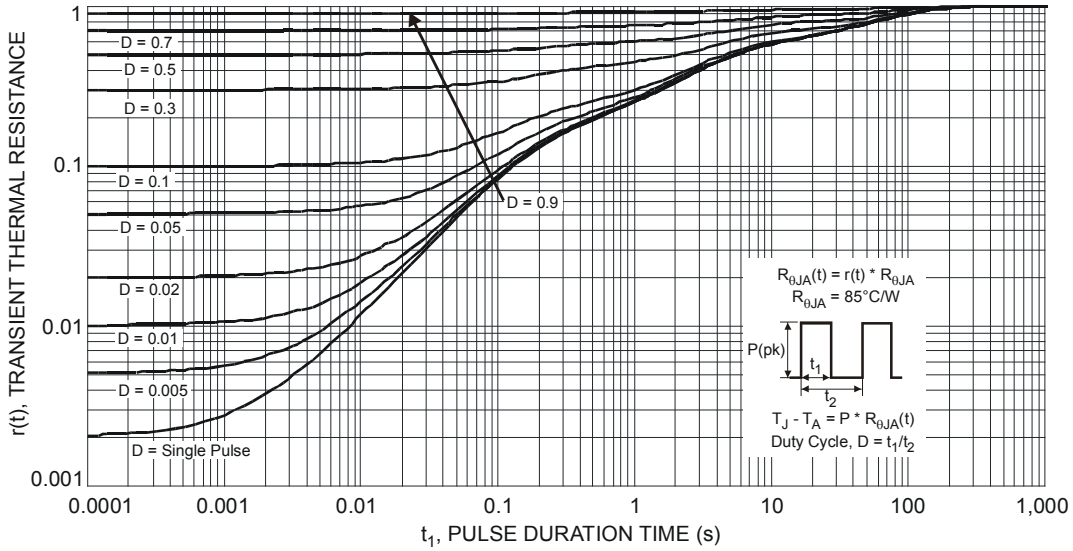
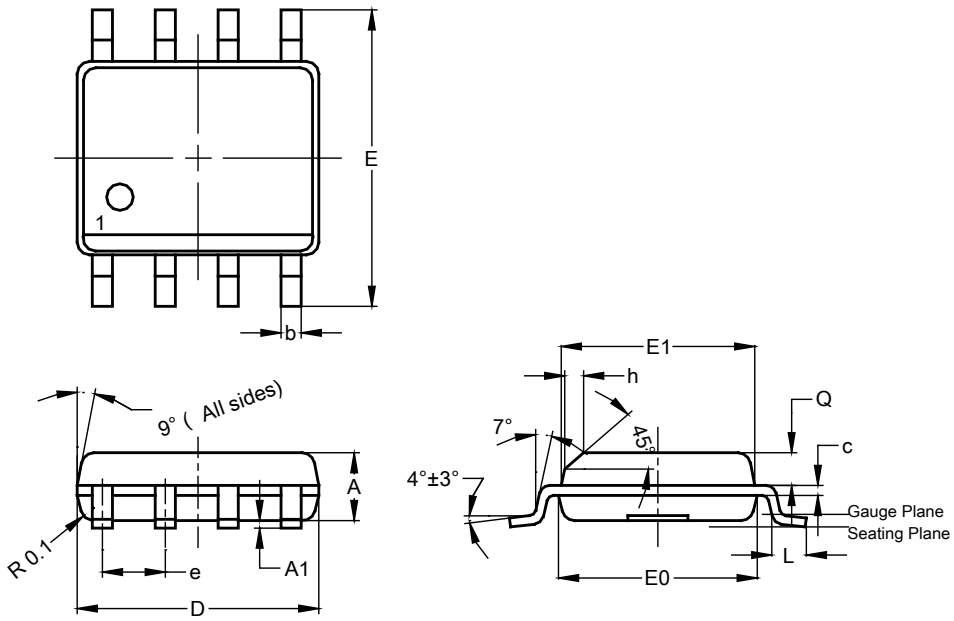


Fig. 12 Transient Thermal Response

## Package Outline Dimensions

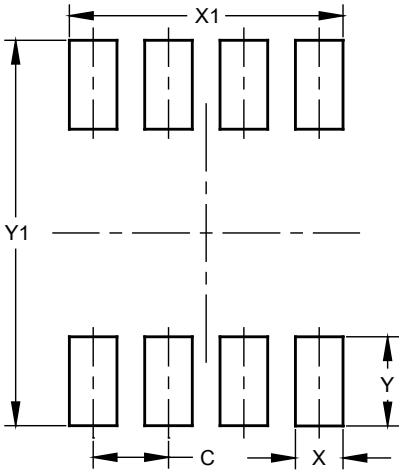
**SO-8**




| SO-8 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 1.40 | 1.50 | 1.45 |
| **A1** | 0.10 | 0.20 | 0.15 |
| **b** | 0.30 | 0.50 | 0.40 |
| **c** | 0.15 | 0.25 | 0.20 |
| **D** | 4.85 | 4.95 | 4.90 |
| **E** | 5.90 | 6.10 | 6.00 |
| **E1** | 3.80 | 3.90 | 3.85 |
| **E0** | 3.85 | 3.95 | 3.90 |
| **e** | -- | -- | 1.27 |
| **h** | - | -- | 0.35 |
| **L** | 0.62 | 0.82 | 0.72 |
| **Q** | 0.60 | 0.70 | 0.65 |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

**SO-8**




| Dimensions | Value (in mm) |
|---|---|
| **C** | 1.27 |
| **X** | 0.802 |
| **X1** | 4.612 |
| **Y** | 1.505 |
| **Y1** | 6.50 |