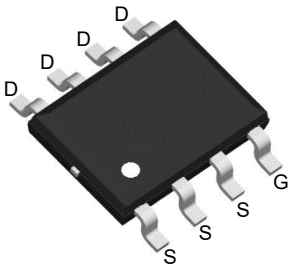
# -30$V_{DS}$/±20$V_{GS}$ P-Channel Advanced Mode MOSFET

## Features

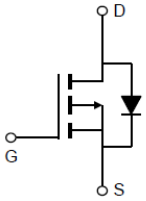
- $V_{DS}$=-30V,$I_D$=-15A
- $R_{DS(ON)}$=7.5mΩ（TYP.）$V_{GS}$=-10V
- $R_{DS(ON)}$=12mΩ（TYP.）$V_{GS}$=-4.5V
- Fast Switching
- Low On-Resistance

SOP8




## Applications

- Switch switching
- Power management in portable/desktop PCs




## Ordering Information

| Device | package | Device Marking | Package Qty. |
|---|---|---|---|
| AO4409 | SOP-8 | 4409 | 3000/PCS |

## Absolute Maximum Ratings ($T_a$=25℃,unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage ($V_{GS}$=0V) | $V_{DS}$ | -30 | V |
| Gate-Source Voltage ($V_{GS}$=0V,static) | $V_{GS}$ | ±20 | V |
| Continuous Drain Current ($T_a$=25℃) | $I_D$ | -15 | A |
| Continuous Drain Current ($T_a$=70℃) | | -11 | A |
| Pulesd Drain Current | $I_{DM}$ | -80 | A |
| Avalanche Energy, Single Pulsed | $E_{AS}$ | 135 | mJ |
| Maximum Power Dissipation ($T_a$=25℃) | $P_D$ | 3.1 | W |
| Maximum Power Dissipation ($T_a$=70℃) | | 2 | W |
| Operating,Storage Temperature Range | $T_J$,$T_{STG}$ | -55~150 | ℃ |

## Thermal Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Thermal Resistance,Junction-to-Case | $R_{\theta JC}$ | - | 75 | - | ℃/ W |
| Thermal Resistance,Junction-to-Ambient | $R_{\theta JA}$ | - | 24 | - | ℃/ W |

## Electrical Characteristics

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V,$I_D$=-250μA | -30 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-30V, $V_{GS}$=0V | - | - | -1 | μA |
| Gate -Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V, $V_{DS}$=0V | - | - | ±100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$= $V_{GS}$,$I_D$=-250μA | -1.4 | -1.9 | -2.4 | V |
| Drain-Source On-stage Resistance | $R_{DS(ON)}$ | $V_{GS}$=-10V,$I_D$=-1A | - | 7 | 10 | mΩ |
| | | $V_{GS}$=-4.5V,$I_D$=-1A | - | 10 | 15 | |

## Dynamic Characteristics

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Input capacitance | $C_{iss}$ | $V_{DS}$=-15V | - | 5270 | - | pF |
| Output capacitance | $C_{oss}$ | $V_{GS}$=0V | - | 945 | - | |
| Reverse transfer capacitance | $C_{rss}$ | f=1MHz | - | 745 | - | |
| Gate Resistance | $R_g$ | f=1MHz | - | 2 | - | Ω |
| Total Gate Charge | $Q_g$ | $V_{DS}$=-15V | - | 46 | - | nC |
| Gate Source Charge | $Q_{gs}$ | $V_{GS}$=-10V | - | 15.5 | - | |
| Gate Drain Charge | $Q_{gd}$ | $I_D$=-15A | - | 18 | - | |
| Turn-on delay Time | $t_{d(on)}$ | $V_{GS}$=-10V | - | 14 | - | ns |
| Rise time | $t_r$ | $V_{DS}$=-15V | - | 16 | - | |
| Turn-off delay Time | $t_{d(off)}$ | $R_L$=1Ω | - | 74 | - | |
| Fall time | $t_f$ | $R_G$=3Ω | - | 37 | - | |

## Reverse Diode Characteristics

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Body Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V,$I_{SD}$=-1A | - | -0.8 | -1 | V |
| Reverse Recovery Time | $t_{rr}$ | $V_{GS}$=0V,$I_{SD}$=-15A | - | 37 | - | ns |
| Reverse Recovery Charge | $Q_{rr}$ | $d_i/d_t$=100A/μs | - | 5.3 | - | nC |

## Electrical Characteristics Diagrames

**Figure 1. On-Regin Characteristics**

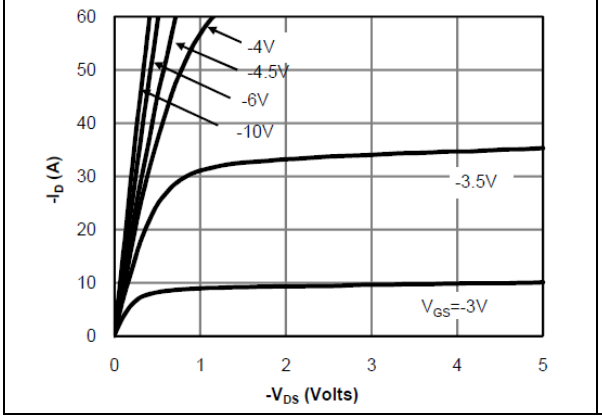



**Figure 2. Transfer Characteristics**

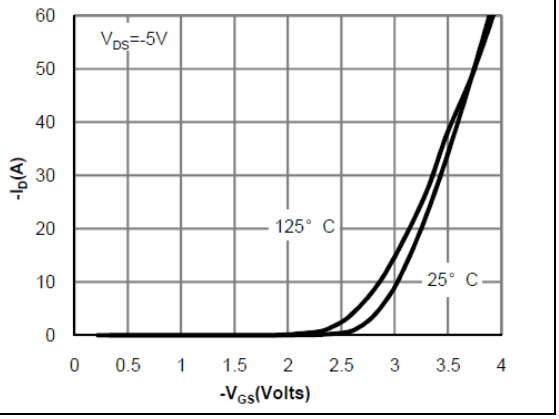



**Figure 3. On-Resistance vs. Drain Current and Gate Voltage**

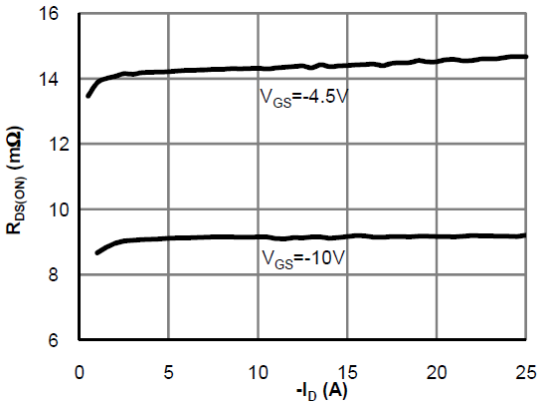



**Figure 4. On-Resistance vs. Junction Temperature**

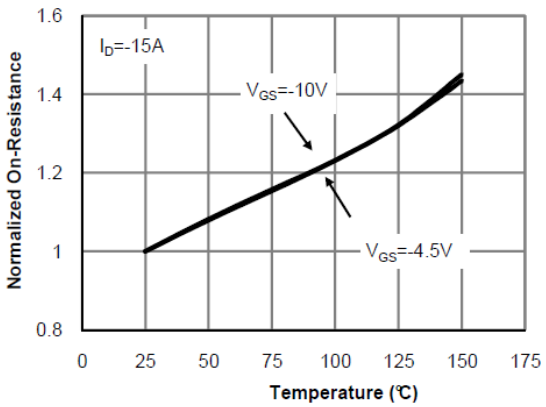



**Figure 5. On-Resistance vs. Gate-Source Voltage**

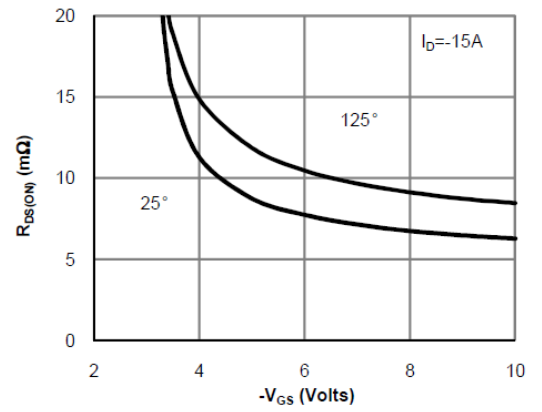



**Figure 6. Body-Diode Characteristics**

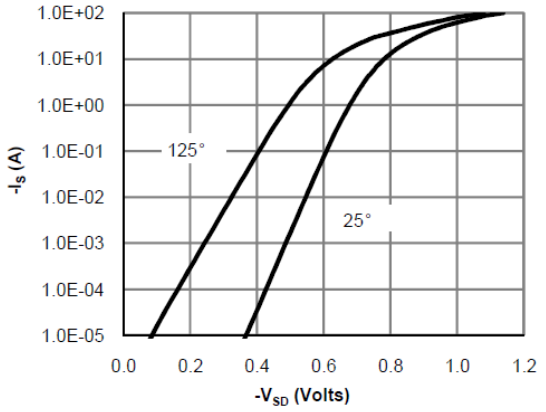


**Figure 7. Gate-Charge Characteristics**

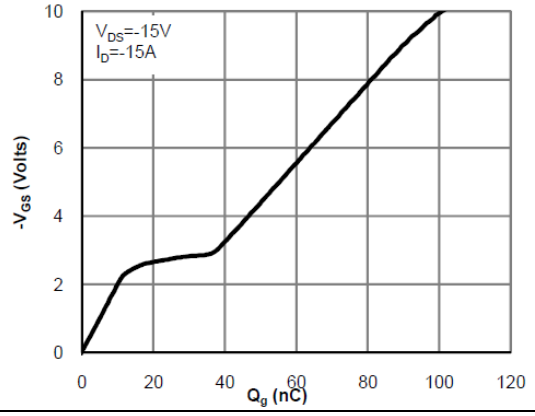



**Figure 8. Capacitance Characteristics**

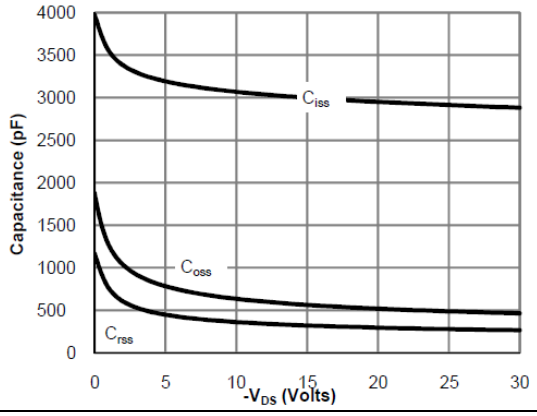



**Figure 9. Maximum Forward Biased Safe Operating Area**

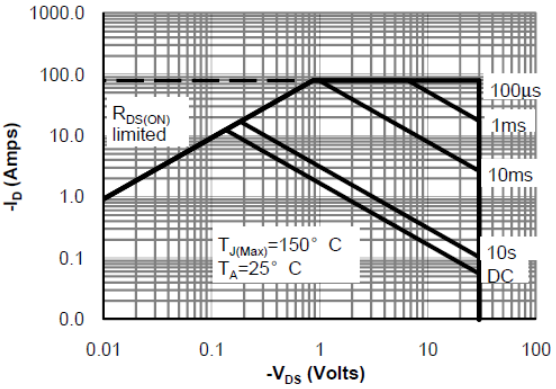



**Figure 10. Single Pulse Power Rating Junction-to-Ambient**

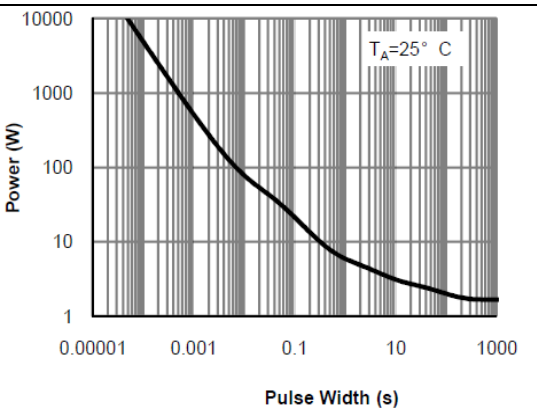
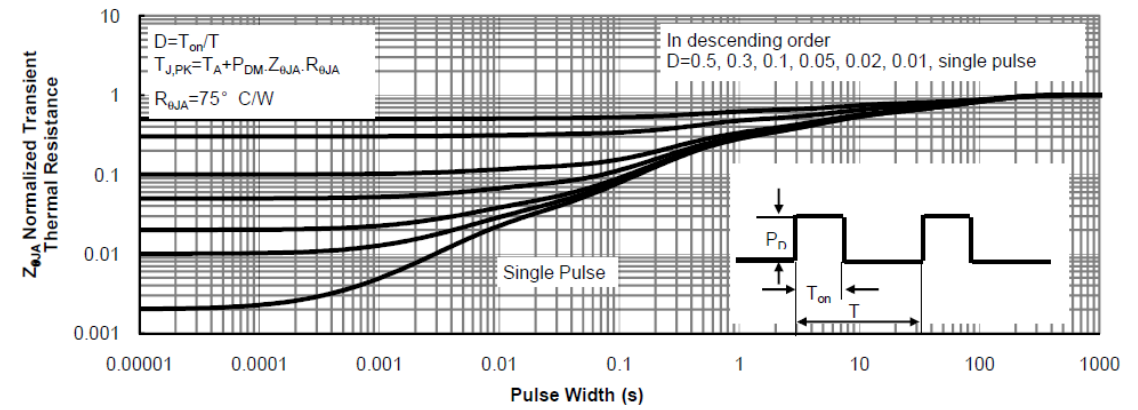
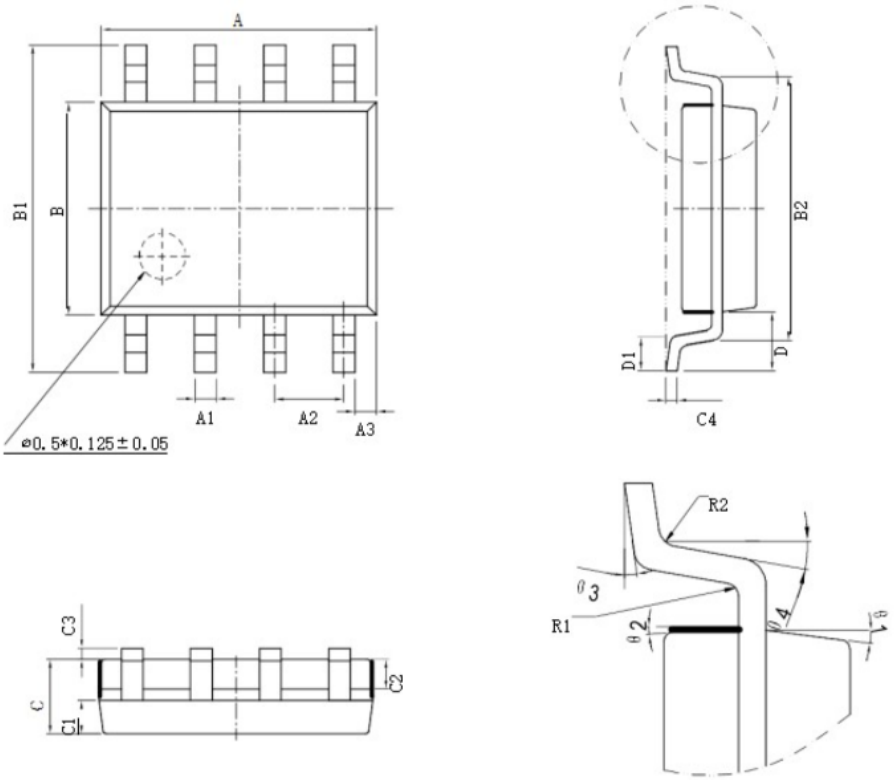



**Figure 11. Normalized Maximum Transient Thermal Impedance**



## Physical Dimensions

### SOP8




| 符号 | 尺寸（mm） | | 符号 | 尺寸（mm） | |
|---|---|---|---|---|---|
| | 最小值 | 最大值 | | 最小值 | 最大值 |
| A | 4.80 | 5.00 | C3 | 0.05 | 0.20 |
| A1 | 0.356 | 0.456 | C4 | 0.203 | 0.233 |
| A2 | 1.27 TYP | | D | 1.05 TYP | |
| A3 | 0.345 TYP | | D1 | 0.40 | 0.80 |
| B | 3.80 | 4.00 | R1 | 0.20 TYP | |
| B1 | 5.80 | 6.20 | R2 | 0.20 TYP | |
| B2 | 5.00 TYP | | θ1 | 17° TYP4 | |
| C | 1.30 | 1.60 | θ2 | 13° TYP4 | |
| C1 | 0.55 | 0.65 | θ3 | 0° ~ 8° | |
| C2 | 0.55 | 0.65 | θ4 | 4° ~ 12° | |