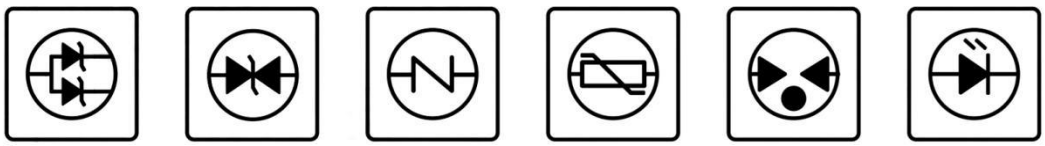
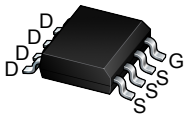
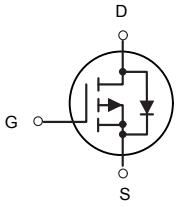
# MSKSEMI
SEMICONDUCTOR




# Product data sheet




SOP-8




P-Channel MOSFET

## Description

The AO4407-MS 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

$V_{DS}$ = -30V $I_D$ = -12A

$R_{DS(ON)}$ < 9.5mΩ@ $V_{GS}$=10V

## Application

Battery protection

Load switch

Uninterruptible power supply

## Absolute Maximum Ratings (Tc=25℃ unless otherwise noted )

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | -30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_A$=25℃ | Drain Current[3], $V_{GS}$ @ 10V | -12 | A |
| $I_D$@$T_A$=70℃ | Drain Current[3], $V_{GS}$ @ 10V | -9.1 | A |
| $I_{DM}$ | Pulsed Drain Current[1] | -40 | A |
| $P_D$@$T_A$=25℃ | Total Power Dissipation | 2.5 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |
| Rthj-a | Maximum Thermal Resistance, Junction-ambient[3] | 50 | ℃/W |

## Electrical Characteristics@$T_j$=25°C(unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=-250uA | -30 | - | - | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=-10V, $I_D$=-10A | - | 9.5 | 15 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-6A | - | 15 | 25 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=-250uA | -1 | - | -2.5 | V |
| $g_{fs}$ | Forward Transconductance | $V_{DS}$=-10V, $I_D$=-10A | - | 22 | - | S |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=-24V, $V_{GS}$=0V | - | - | -10 | uA |
| $I_{GSS}$ | Gate-Source Leakage | $V_{GS}$=±20V, $V_{DS}$=0V | - | - | ±100 | nA |
| $Q_g$ | Total Gate Charge | $I_D$=-6A<br>$V_{DS}$=-15V<br>$V_{GS}$=-4.5V | - | 28 | 45 | nC |
| $Q_{gs}$ | Gate-Source Charge | | - | 7 | - | nC |
| $Q_{gd}$ | Gate-Drain ("Miller") Charge | | - | 11 | - | nC |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DS}$=-15V<br>$I_D$=-1A<br>$R_G$=3.3Ω<br>$V_{GS}$=-10V | - | 13 | - | ns |
| $t_r$ | Rise Time | | - | 10 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 80 | - | ns |
| $t_f$ | Fall Time | | - | 37 | - | ns |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V $V_{DS}$=-15V f=1.0MHz | - | 2940 | 4700 | pF |
| $C_{oss}$ | Output Capacitance | | - | 290 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 210 | - | pF |
| $R_g$ | Gate Resistance | f=1.0MHz | - | 6.2 | 12.4 | Ω |
| $V_{SD}$ | Forward On Voltage[2] | $I_S$=-2.1A, $V_{GS}$=0V | - | - | -1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_S$=-10A, $V_{GS}$=0V, dI/dt=100A/μs | - | 19 | - | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | - | 6 | - | nC |

Notes:

1.Pulse width limited by Max. junction temperature.

2.Pulse test

3.Surface mounted on 1 $in^2$ copper pad of FR4 board, t ≤ 10s ; 125 ℃/W when mounted on Min. copper pad.

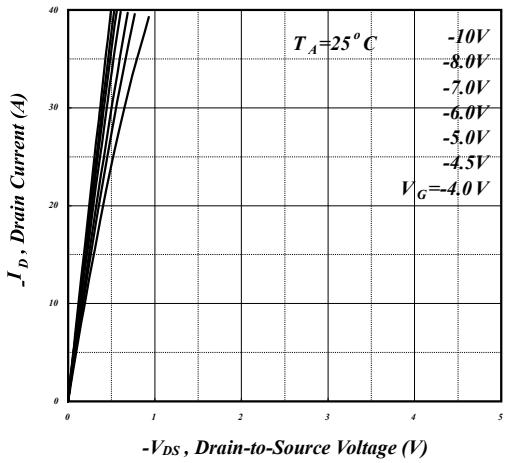



Fig 1. Typical Output Characteristics

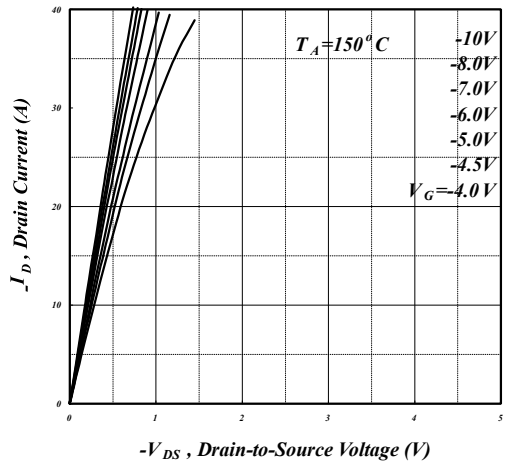



Fig 2. Typical Output Characteristics

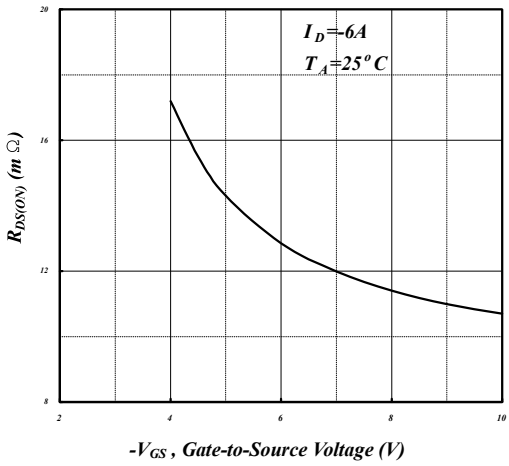



Fig 3. On-Resistance v.s. Gate Voltage

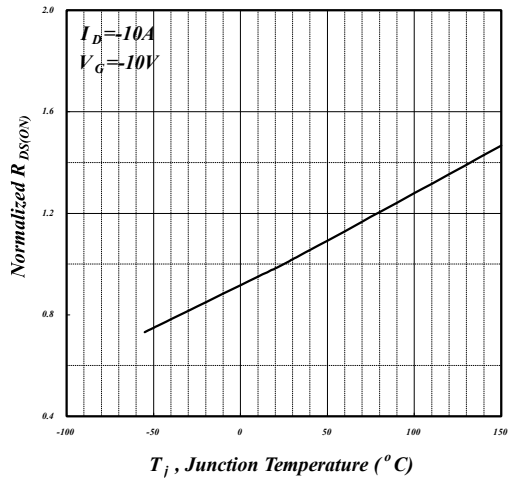
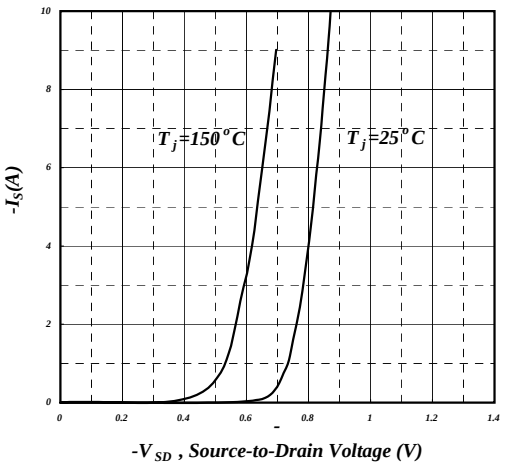



Fig 4. Normalized On-Resistance v.s. Junction Temperature




Reverse Diode

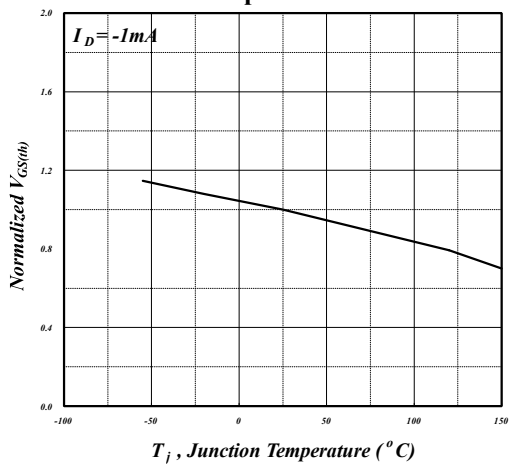



Fig 6. Gate Threshold Voltage v.s. Junction Temperatur

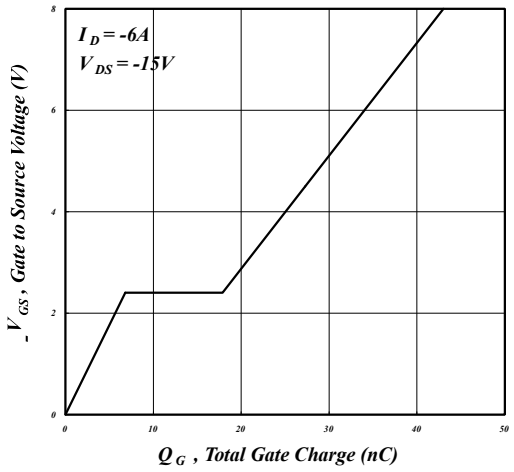



Fig 7. Gate Charge Characteristics

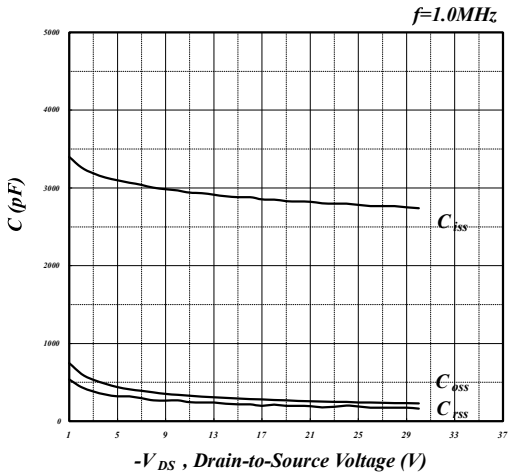



Fig 8. Typical Capacitance Characteristics

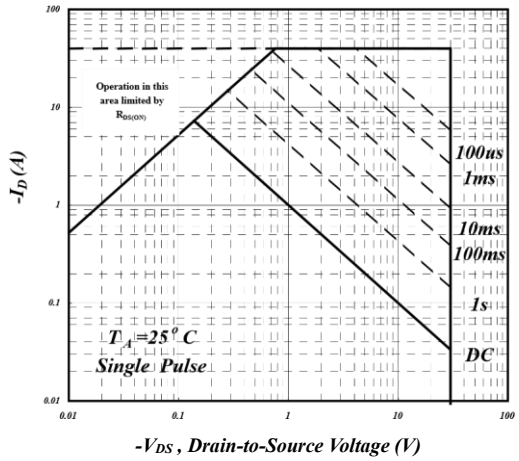



Fig 9. Maximum Safe Operating Area

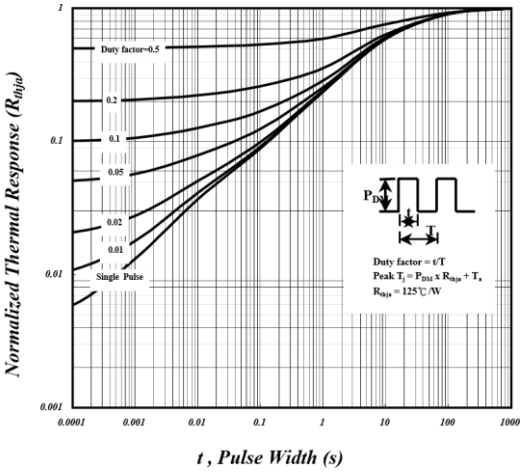



Fig 10. Effective Transient Thermal Impedance

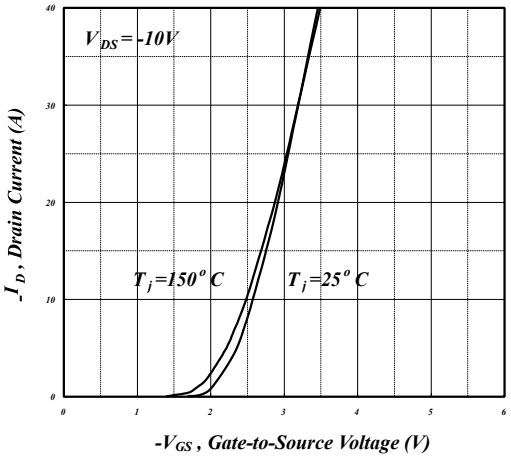



Fig 11. Transfer Characteristics

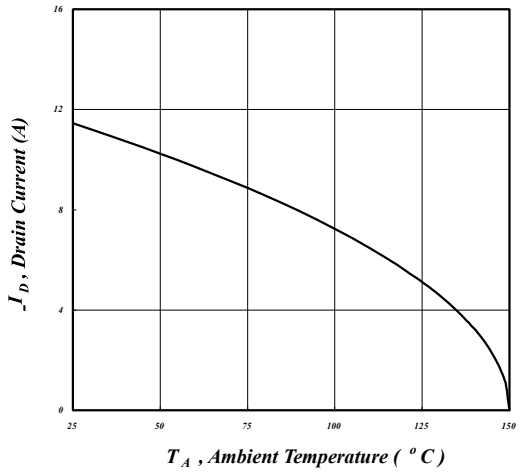



Fig 12. Drain Current v.s. Ambient Temperature

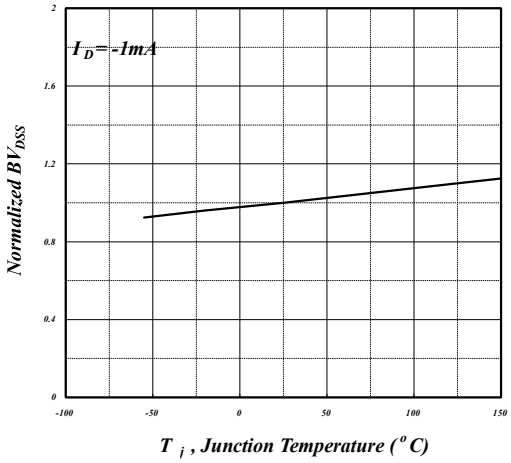



Fig 13. Normalized $BV_{DSS}$ v.s. JunctionTemperature

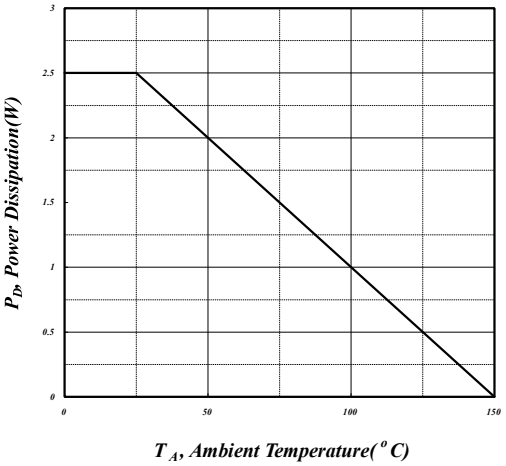



Fig 14. Total Power Dissipation

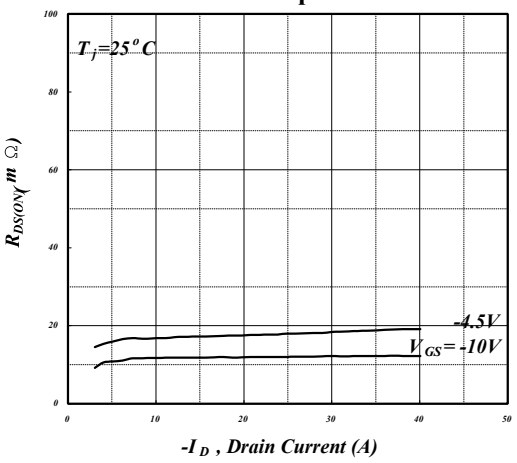
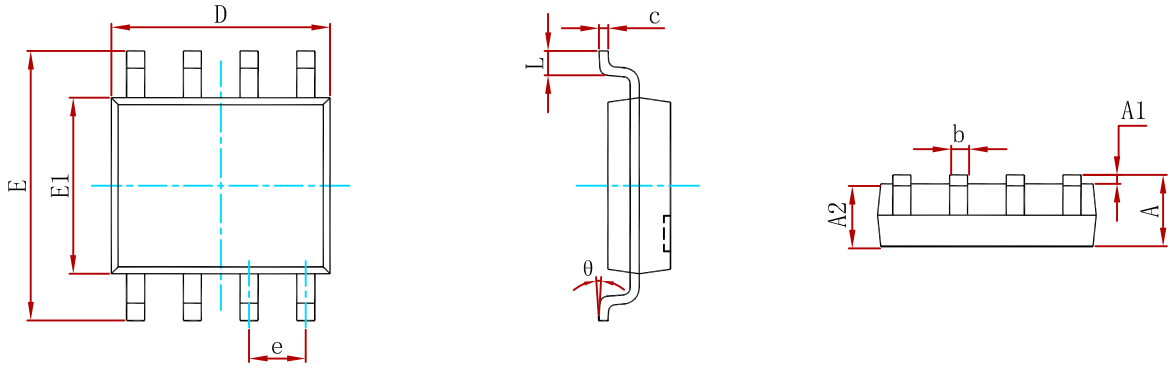


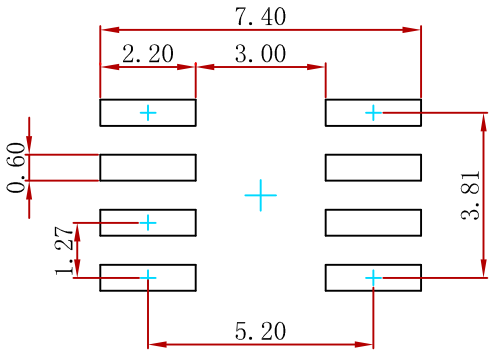

Fig 15. Typ. Drain-Source on State Resistance

## PACKAGE MECHANICAL DATA




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | **Min** | **Max** | **Min** | **Max** |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.007 | 0.010 |
| D | 4.800 | 5.000 | 0.189 | 0.197 |
| e | 1.270 (BSC) | | 0.050 (BSC) | |
| E | 5.800 | 6.200 | 0.228 | 0.244 |
| E1 | 3.800 | 4.000 | 0.150 | 0.157 |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |

## Suggested Pad Layout




Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only.

## REEL SPECIFICATION

| P/N | PKG | QTY |
|---|---|---|
| AO4407-MS | SOP-8 | 3000 |

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