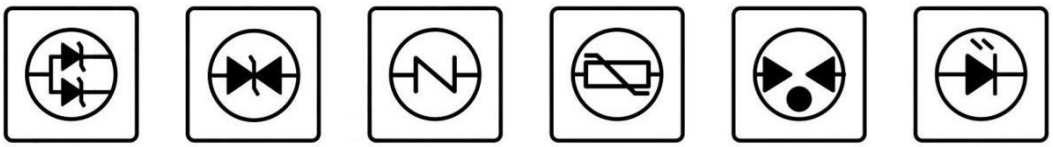
MSKSEMI 美森科
SEMICONDUCTOR




# AO3415

**Product specification**

## Features

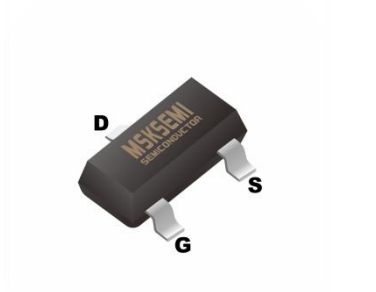
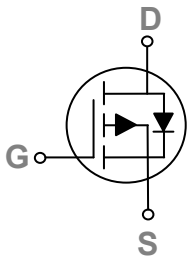
- -20V,-4.5A, RDS(ON)=40mΩ@VGS=-4.5V
- Improved dv/dt capability
- Fast switching
- Green Device Available

## Applications

- Notebook
- Load Switch
- Hend-Held Instruments

| BVDSS | RDSON | ID |
|---|---|---|
| -20V | 40mΩ | -4.5A |

## Reference News

| PACKAGE OUTLINE | PIN Configuration | Marking |
|---|---|---|
|  SOT-23-3L |  | AF** ※ |

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

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | -20 | V |
| $V_{GS}$ | Gate-Source Voltage | ±12 | V |
| $I_D$ | Drain Current – Continuous ($T_C$=25℃) | -4.5 | A |
| | Drain Current – Continuous ($T_C$=100℃) | -2.7 | A |
| $I_{DM}$ | Drain Current – Pulsed[1] | -18 | A |
| $P_D$ | Power Dissipation ($T_C$=25℃) | 1.5 | W |
| | Power Dissipation – Derate above 25℃ | 0.012 | W/℃ |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

## Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 80 | ℃/W |

## 0Electrical Characteristics (TJ=25 ℃, unless otherwise noted)

### Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=-250uA | -20 | --- | --- | V |
| $\triangle BV_{DSS}/\triangle T_J$ | $BV_{DSS}$ Temperature Coefficient | Reference to 25℃ , $I_D$=-1mA | --- | -0.02 | --- | V/℃ |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=-20V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | -1 | uA |
| | | $V_{DS}$=-16V , $V_{GS}$=0V , $T_J$=125℃ | --- | --- | -10 | uA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$= ±12V , $V_{DS}$=0V | --- | --- | ±100 | nA |

### On Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=-4.5V , $I_D$=-3A | --- | 40 | 52 | mΩ |
| | | $V_{GS}$=-2.5V , $I_D$=-2A | --- | 47 | 65 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =-250uA | -0.3 | -0.65 | -1.0 | V |
| $\triangle V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | 2 | --- | mV/℃ |
| gfs | Forward Transconductance | $V_{DS}$=-10V , $I_S$=-3A | --- | 7 | --- | S |

### Dynamic and switching Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge[2,3] | $V_{DS}$=-10V , $V_{GS}$=-4.5V , $I_D$=-3A | --- | 9.6 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge[2,3] | | --- | 1.6 | --- | |
| $Q_{gd}$ | Gate-Drain Charge[2,3] | | --- | 2 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time[2,3] | $V_{DD}$=-10V , $V_{GS}$=-4.5V , $R_G$=25Ω $I_D$=-1A | --- | 6 | --- | nS |
| $T_r$ | Rise Time[2,3] | | --- | 21.6 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time[2,3] | | --- | 51 | --- | |
| $T_f$ | Fall Time[2,3] | | --- | 13.8 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=-10V , $V_{GS}$=0V , F=1MHz | --- | 850 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 70 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 55 | --- | |

### Drain-Source Diode Characteristics and Maximum Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current | $V_G$=$V_D$=0V , Force Current | --- | --- | -4.5 | A |
| $I_{SM}$ | Pulsed Source Current | | --- | --- | -9.0 | A |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V , $I_S$=-1A , $T_J$=25℃ | --- | --- | -1.2 | V |

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
3. Essentially independent of operating temperature.

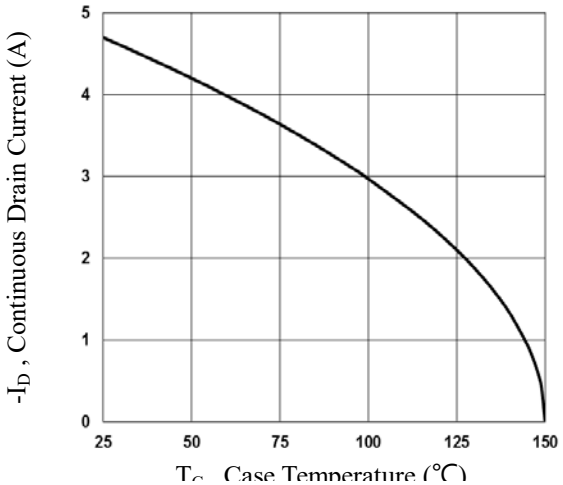



**Fig.1 Continuous Drain Current vs. $T_C$**

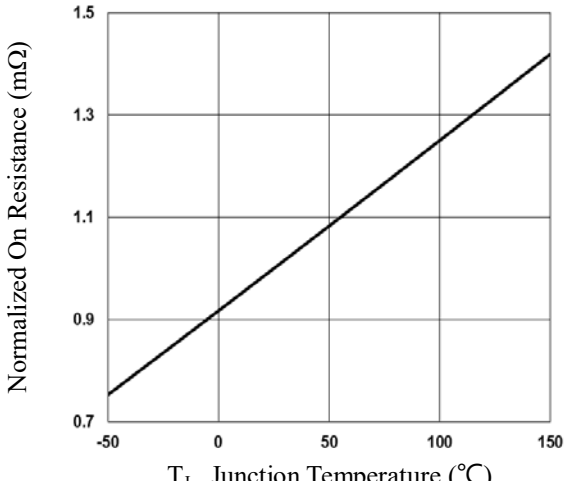



**Fig.2 Normalized RDSON vs. $T_J$**

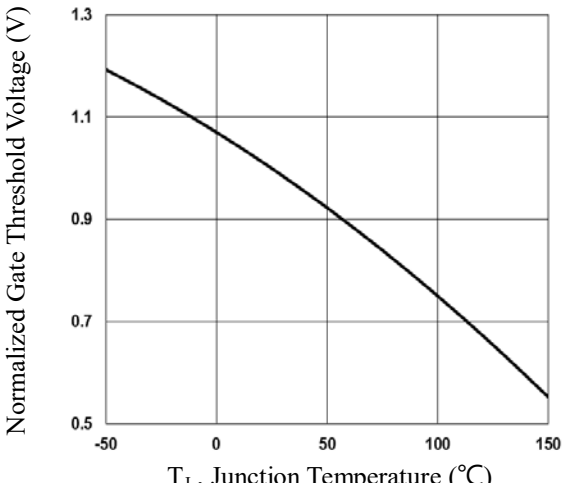



**Fig.3 Normalized $V_{th}$ vs. $T_J$**

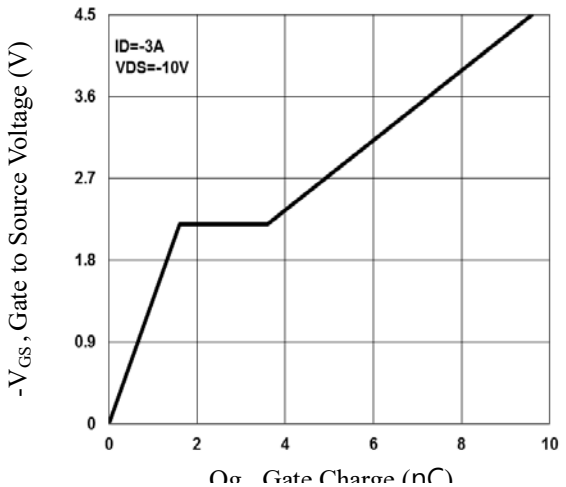



**Fig.4 Gate Charge Waveform**

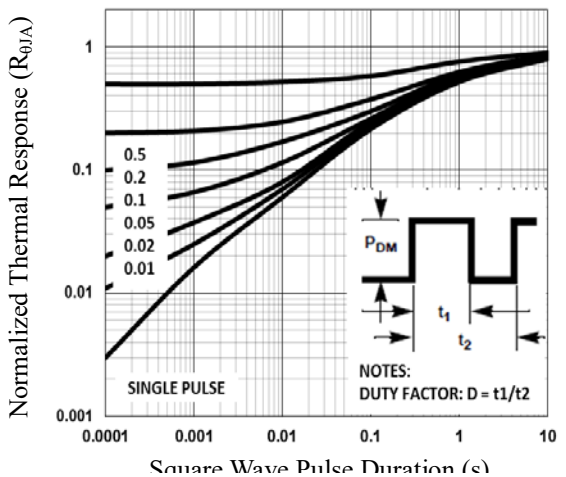



**Fig.5 Normalized Transient Impedance**

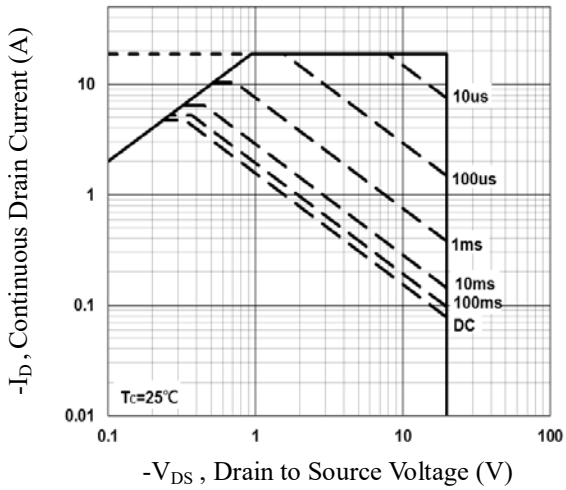



**Fig.6 Maximum Safe Operation Area**

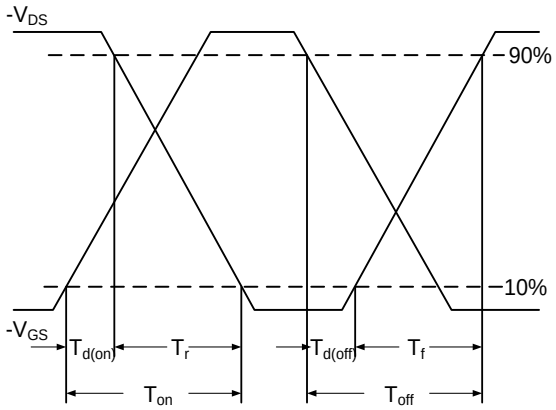



**Fig.7 Switching Time Waveform**

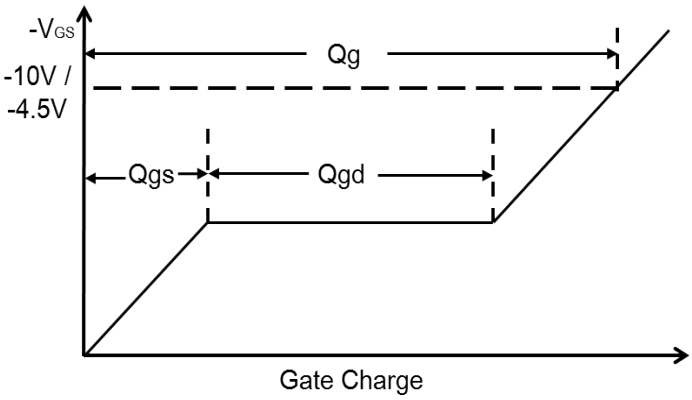
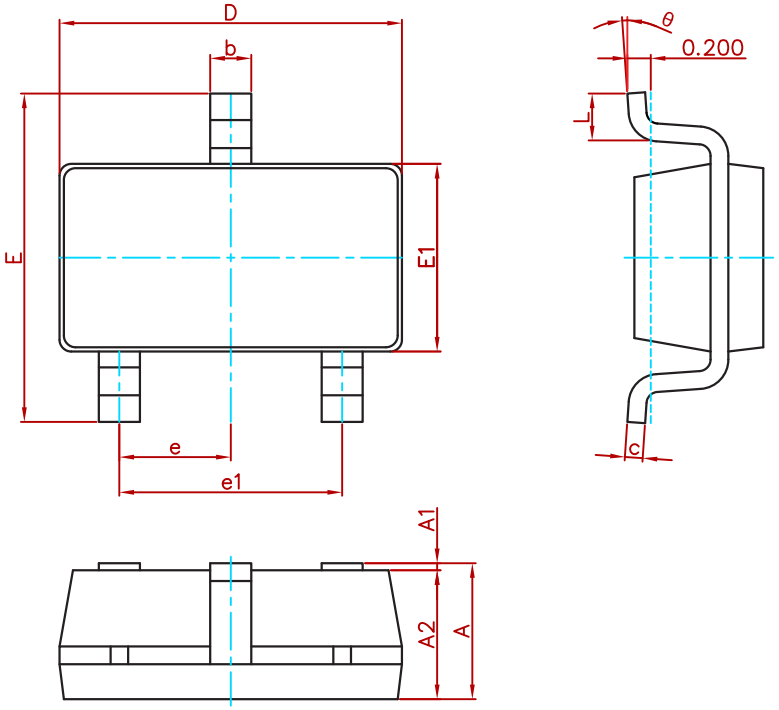


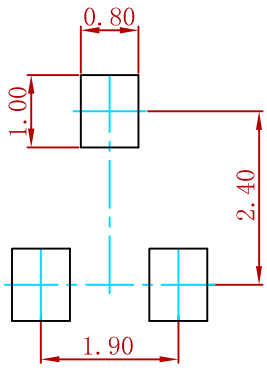

**Fig.8 Gate Charge Waveform**

## PACKAGE MECHANICAL DATA




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| D | 2.820 | 3.020 | 0.111 | 0.119 |
| E1 | 1.500 | 1.700 | 0.059 | 0.067 |
| E | 2.650 | 2.950 | 0.104 | 0.116 |
| e | 0.950(BSC) | | 0.037(BSC) | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.300 | 0.600 | 0.012 | 0.024 |
| θ | 0° | 8° | 0° | 8° |

## Suugested Pad Layout




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

## REELSPECIFICATION

| P/N | PKG | QTY |
|---|---|---|
| AO3415 | SOT-23-3L | 3000 |

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