



## Description

The AO3402 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.

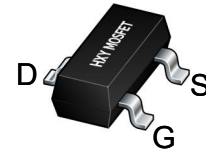
## General Features

$V_{DS} = 30V$   $I_D = 5A$

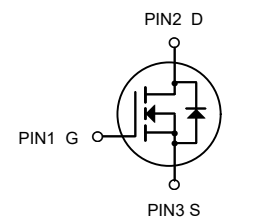
$R_{DS(ON)} < 42m\Omega$  @  $V_{GS} = 10V$

## Application

Battery protection  
Load switch  
Uninterruptible power supply



SOT-23



N-Channel MOSFET

## Package Marking and Ordering Information

| Product ID | Pack   | Marking | Qty(PCS) |
|------------|--------|---------|----------|
| AO3402     | SOT-23 | A29T    | 3000     |

## Absolute Maximum Ratings ( $T_A = 25^\circ C$ unless otherwise noted)

| Symbol          | Parameter                                        | Limit      | Unit         |
|-----------------|--------------------------------------------------|------------|--------------|
| $V_{DS}$        | Drain-Source Voltage                             | 30         | V            |
| $V_{GS}$        | Gate-Source Voltage                              | $\pm 12$   | V            |
| $I_D$           | Drain Current-Continuous                         | 5          | A            |
| $I_{DM}$        | Drain Current-Pulsed (Note 1)                    | 14.4       | A            |
| $P_D$           | Maximum Power Dissipation                        | 1          | W            |
| $T_J, T_{STG}$  | Operating Junction and Storage Temperature Range | -55 To 150 | $^\circ C$   |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient (Note 2) | 125        | $^\circ C/W$ |



**Electrical Characteristics ( $T_J=25^\circ\text{C}$ , unless otherwise noted)**

| Symbol       | Parameter                                      | Conditions                                                 | Min. | Typ. | Max.      | Unit      |
|--------------|------------------------------------------------|------------------------------------------------------------|------|------|-----------|-----------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage                 | $V_{GS}=0V$ , $I_D=250\mu A$                               | 30   | ---  | ---       | V         |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=10V$ , $I_D=3A$                                    | ---  | 33   | 42        | $m\Omega$ |
|              |                                                | $V_{GS}=4.5V$ , $I_D=2A$                                   | ---  | 38   | 48        |           |
| $V_{GS(th)}$ | Gate Threshold Voltage                         | $V_{GS}=V_{DS}$ , $I_D=250\mu A$                           | 0.4  | ---  | 1.2       | V         |
| $I_{DSS}$    | Drain-Source Leakage Current                   | $V_{DS}=16V$ , $V_{GS}=0V$ , $T_J=25^\circ\text{C}$        | ---  | ---  | 1         | $\mu A$   |
|              |                                                | $V_{DS}=16V$ , $V_{GS}=0V$ , $T_J=55^\circ\text{C}$        | ---  | ---  | 5         |           |
| $I_{GSS}$    | Gate-Source Leakage Current                    | $V_{GS}=\pm 12V$ , $V_{DS}=0V$                             | ---  | ---  | $\pm 100$ | nA        |
| $g_{fs}$     | Forward Transconductance                       | $V_{DS}=5V$ , $I_D=3A$                                     | ---  | 10.5 | ---       | S         |
| $Q_g$        | Total Gate Charge (4.5V)                       | $V_{DS}=15V$ , $V_{GS}=4.5V$ , $I_D=3A$                    | ---  | 4.6  | ---       | nC        |
| $Q_{gs}$     | Gate-Source Charge                             |                                                            | ---  | 0.7  | ---       |           |
| $Q_{gd}$     | Gate-Drain Charge                              |                                                            | ---  | 1.5  | ---       |           |
| $T_{d(on)}$  | Turn-On Delay Time                             | $V_{DD}=10V$ , $V_{GS}=4.5V$ , $R_G=3.3\Omega$<br>$I_D=3A$ | ---  | 1.6  | ---       | ns        |
| $T_r$        | Rise Time                                      |                                                            | ---  | 42   | ---       |           |
| $T_{d(off)}$ | Turn-Off Delay Time                            |                                                            | ---  | 14   | ---       |           |
| $T_f$        | Fall Time                                      |                                                            | ---  | 7    | ---       |           |
| $C_{iss}$    | Input Capacitance                              | $V_{DS}=15V$ , $V_{GS}=0V$ , $f=1\text{MHz}$               | ---  | 310  | ---       | pF        |
| $C_{oss}$    | Output Capacitance                             |                                                            | ---  | 49   | ---       |           |
| $C_{rss}$    | Reverse Transfer Capacitance                   |                                                            | ---  | 35   | ---       |           |

**Diode Characteristics**

| Symbol   | Parameter                                | Conditions                                      | Min. | Typ. | Max. | Unit |
|----------|------------------------------------------|-------------------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current <sup>1,4</sup> | $V_G=V_D=0V$ , Force Current                    | ---  | ---  | 3.6  | A    |
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup>       | $V_{GS}=0V$ , $I_S=1A$ , $T_J=25^\circ\text{C}$ | ---  | ---  | 1.2  | V    |

Note :

1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.

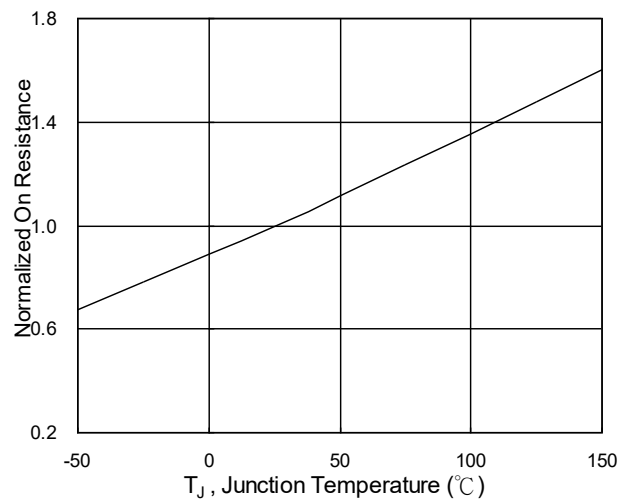
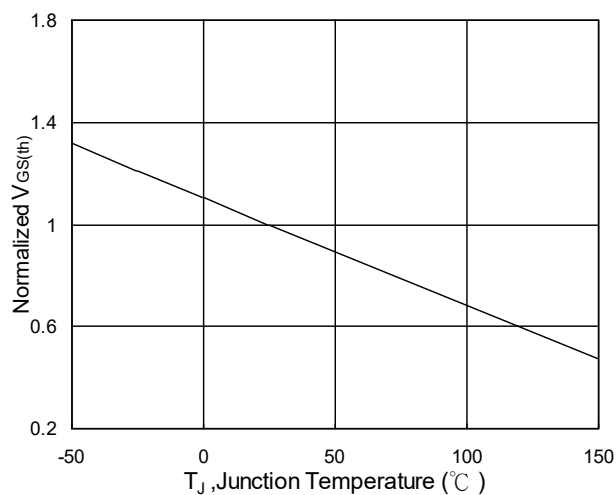
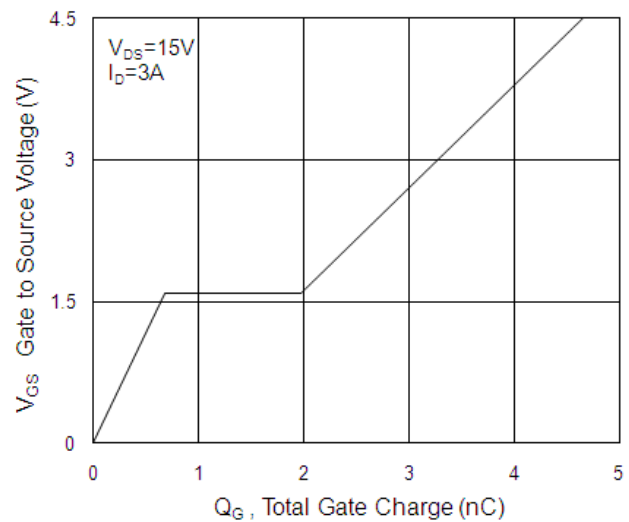
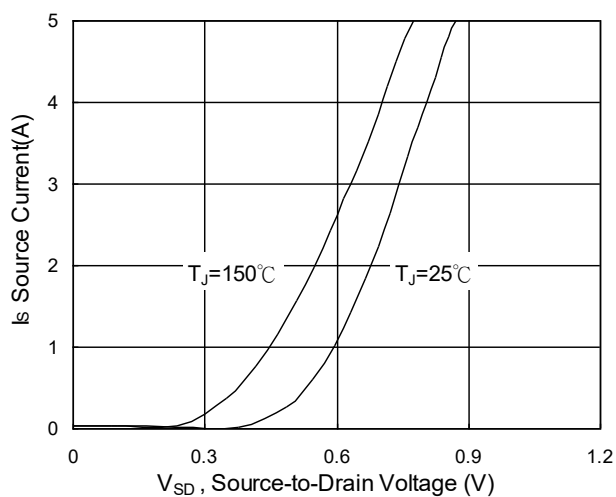
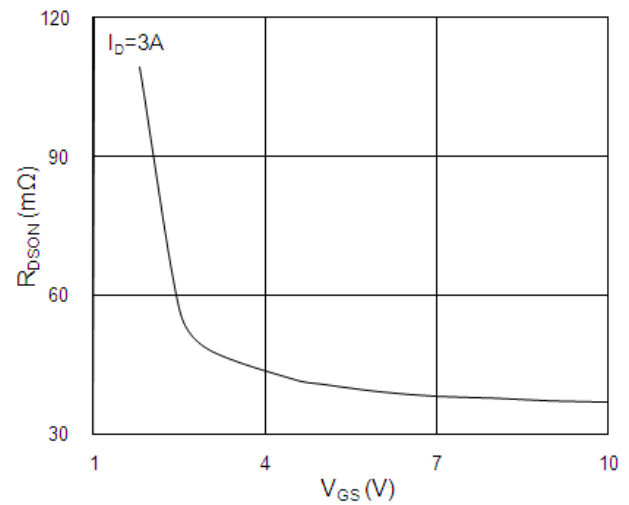
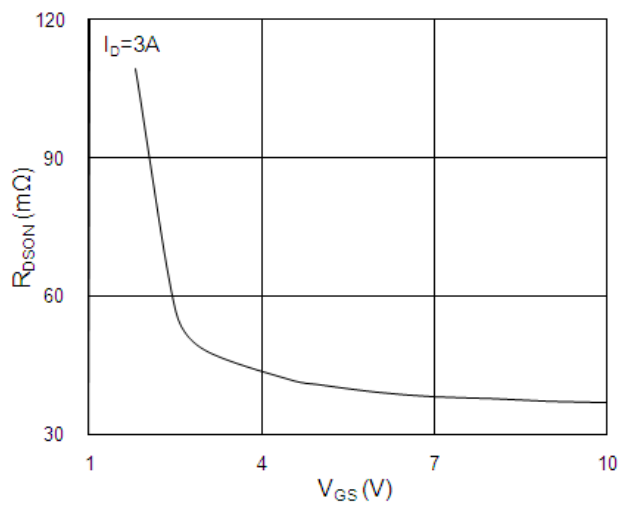
2.The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$

3.The power dissipation is limited by  $150^\circ\text{C}$  junction temperature

4.The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications , should be limited by total power dissipation.



## Typical Characteristics



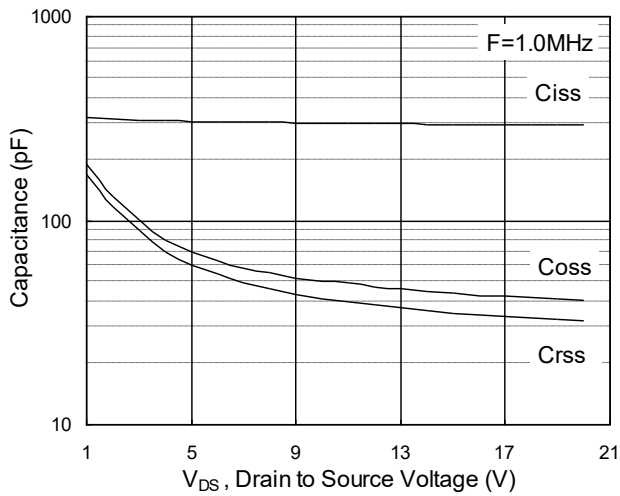


Fig.7 Capacitance

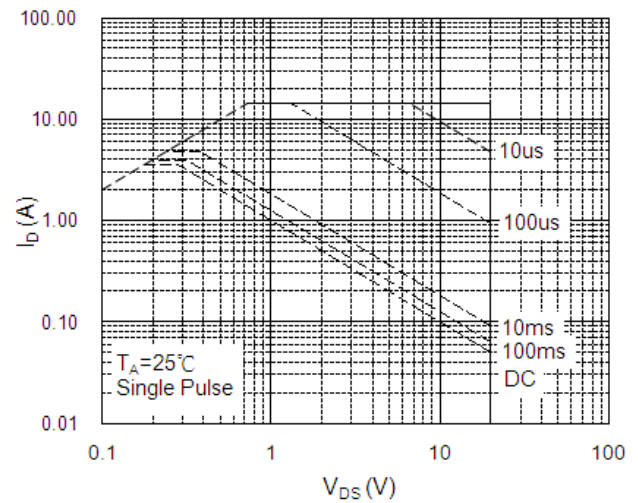


Fig.8 Safe Operating Area

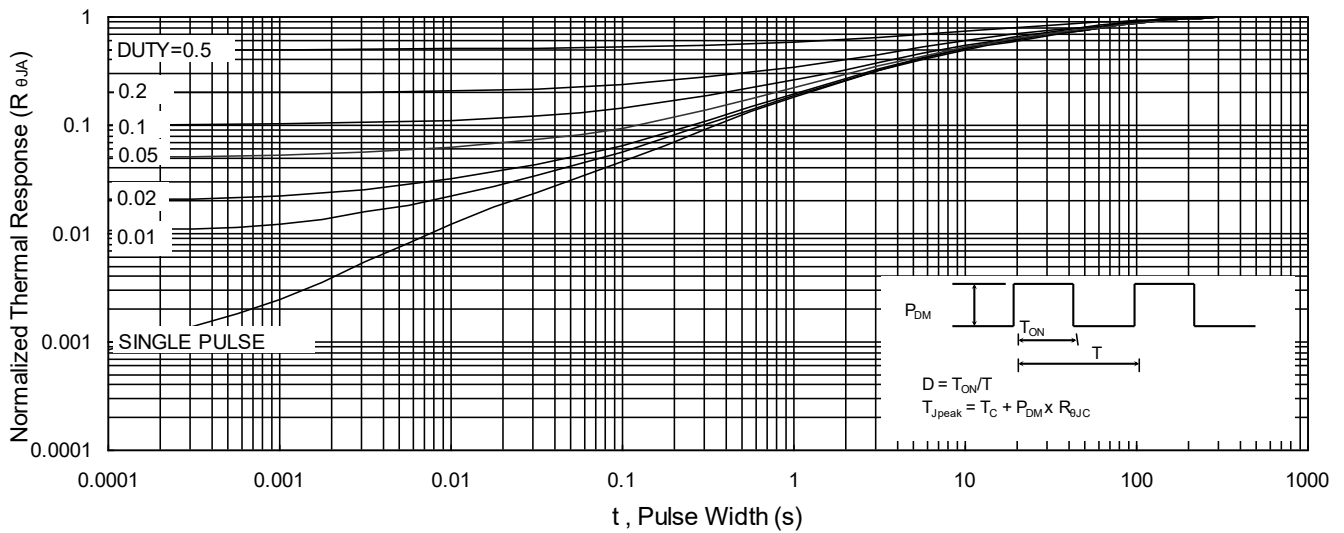


Fig.9 Normalized Maximum Transient Thermal Impedance

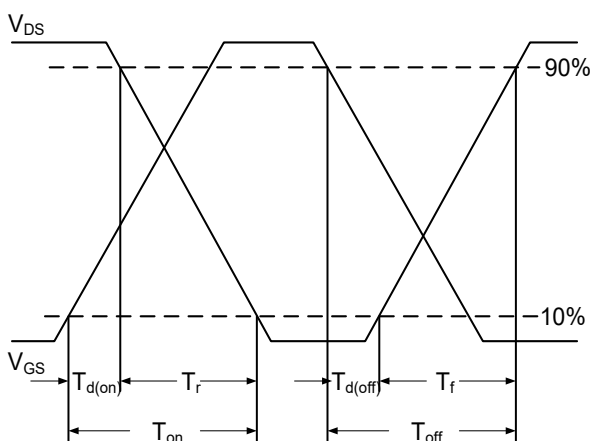


Fig.10 Switching Time Waveform

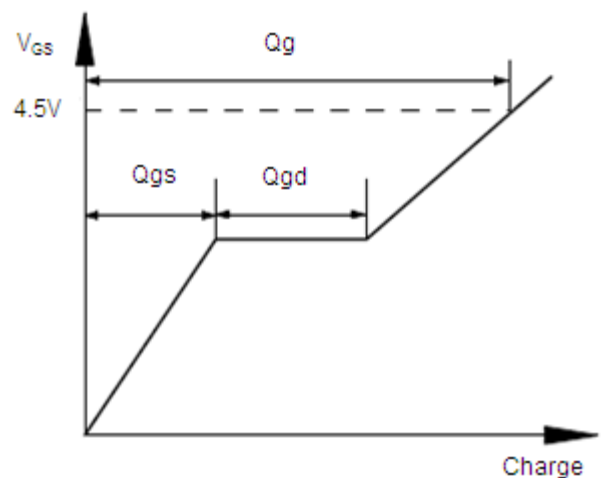
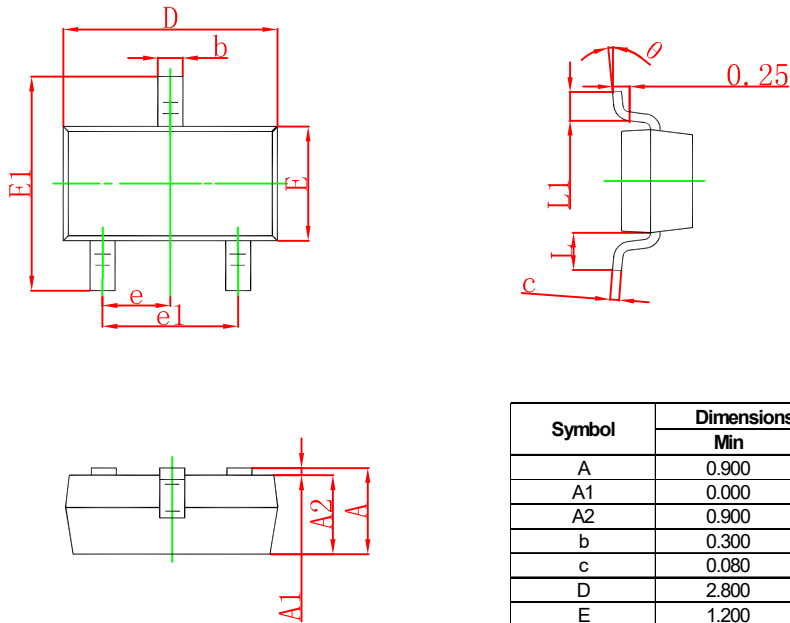


Fig.11 Gate Charge Waveform

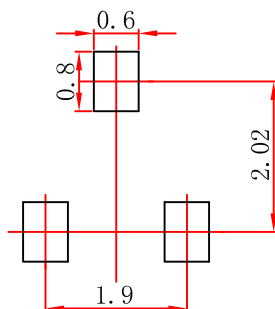


## SOT-23 Package Outline Dimensions



| 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 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |

## SOT-23 Suggested Pad Layout



Note:  
1. Controlling dimension: in millimeters.  
2. General tolerance:  $\pm 0.05\text{mm}$ .  
3. The pad layout is for reference purposes only.



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