

## DESCRIPTION

The AO3407L is the P-Channel logic enhancement mode power field effect transistor is produced using high cell density advanced trench technology to provide excellent  $R_{DS(ON)}$ . This device is suitable for use as a load switch or in PWM and gate charge for most of the synchronous buck converter applications

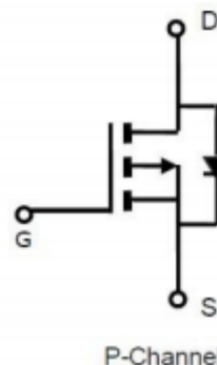
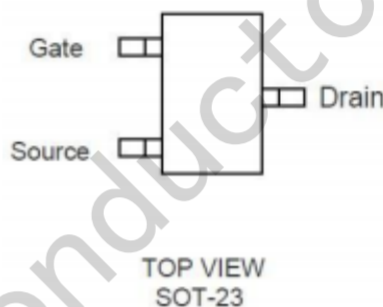
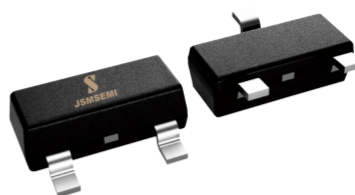
## FEATURE

- ◆ -30V/-4.3A,  $R_{DS(ON)}=37m\Omega$  (typ.)@ $V_{GS}=-10V$
- ◆ -30V/-3.0A,  $R_{DS(ON)}=52m\Omega$  (typ.)@ $V_{GS}=-4.5V$
- ◆ Super high design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and Maximum DC current capability
- ◆ Full RoHS compliance
- ◆ SOT23-3L package design

## APPLICATIONS

- ◆ High Frequency Point-of-load Synchronous
- ◆ Buck Converter for MB/NB/UMPC/VGA
- ◆ DC/DC Converter
- ◆ Load Switch

## PIN CONFIGURATION



## ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ Unless otherwise noted )

| Symbol           | Parameter                                       |                       | Typical  | Unit |
|------------------|-------------------------------------------------|-----------------------|----------|------|
| V <sub>DSS</sub> | Drain-Source Voltage                            |                       | -30      | V    |
| V <sub>GSS</sub> | Gate-Source Voltage                             |                       | ±20      | V    |
| I <sub>D</sub>   | Continuous Drain Current (T <sub>C</sub> =25°C) | V <sub>GS</sub> =-10V | -4.3     | A    |
|                  | Continuous Drain Current (T <sub>C</sub> =70°C) |                       | -3.6     |      |
| I <sub>DM</sub>  | Pulsed Drain Current                            |                       | -20      | A    |
| I <sub>S</sub>   | Continuous Source Current (Diode Conduction)    |                       | -1.4     | A    |
| P <sub>D</sub>   | Power Dissipation                               | T <sub>A</sub> =25°C  | 1.4      | W    |
|                  |                                                 | T <sub>A</sub> =70°C  | 0.9      |      |
| T <sub>J</sub>   | Operation Junction Temperature                  |                       | 150      | °C   |
| T <sub>STG</sub> | Storage Temperature Range                       |                       | -55~+150 | °C   |
| R <sub>θJA</sub> | Thermal Resistance Junction to Ambient          |                       | 120      | °C/W |

**Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.**

**Absolute maximum ratings are stress rating only and functional device operation is not implied**

■ **ELECTRICAL CHARACTERISTICS** ( $T_A=25^\circ\text{C}$  Unless otherwise noted)

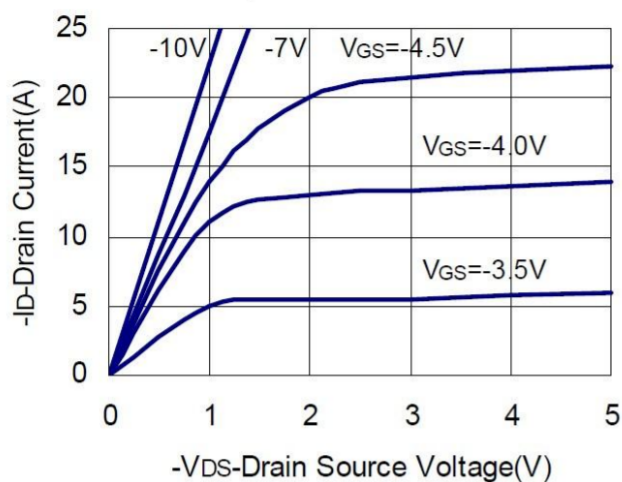
| Symbol               | Parameter                       | Condition                                                                | Min  | Typ  | Max  | Unit |
|----------------------|---------------------------------|--------------------------------------------------------------------------|------|------|------|------|
| Static Parameters    |                                 |                                                                          |      |      |      |      |
| V <sub>(BR)DSS</sub> | Drain-Source Breakdown Voltage  | V <sub>GS</sub> =0V, I <sub>D</sub> =-250Ua                              | -30  |      |      | V    |
| V <sub>GS(th)</sub>  | Gate Threshold Voltage          | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA                | -1.0 |      | -2.0 | V    |
| I <sub>GSS</sub>     | Gate Leakage Current            | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                               |      |      | ±100 | nA   |
| I <sub>DSS</sub>     | Zero Gate Voltage Drain Current | V <sub>DS</sub> =-24V, V <sub>GS</sub> =0                                |      |      | -1   | uA   |
|                      |                                 | V <sub>DS</sub> =-24V, V <sub>GS</sub> =0<br>T <sub>J</sub> =55℃         |      |      | -5   |      |
| R <sub>DS(ON)</sub>  | Drain-Source On-Resistance      | V <sub>GS</sub> =-10V, I <sub>D</sub> =-4.3A                             |      | 37   | 50   | mΩ   |
|                      |                                 | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3.0A                            |      | 52   | 75   |      |
| Source-Drain Diode   |                                 |                                                                          |      |      |      |      |
| V <sub>SD</sub>      | Diode Forward Voltage           | I <sub>S</sub> =-1.0A, V <sub>GS</sub> =0V                               |      | -0.7 | -1.0 | V    |
| Dynamic Parameters   |                                 |                                                                          |      |      |      |      |
| Q <sub>g</sub>       | Total Gate Charge               | V <sub>DS</sub> =-20V<br>V <sub>GS</sub> =-4.5V<br>I <sub>D</sub> =-4.0A |      | 6    |      | nC   |
| Q <sub>gs</sub>      | Gate-Source Charge              |                                                                          |      | 2.7  |      |      |
| Q <sub>gd</sub>      | Gate-Drain Charge               |                                                                          |      | 3.1  |      |      |
| C <sub>iss</sub>     | Input Capacitance               | V <sub>DS</sub> =-25V<br>V <sub>GS</sub> =0V<br>f=1MHz                   |      | 645  |      | pF   |
| C <sub>oss</sub>     | Output Capacitance              |                                                                          |      | 272  |      |      |
| C <sub>rss</sub>     | Reverse Transfer Capacitance    |                                                                          |      | 105  |      |      |
| T <sub>d(on)</sub>   | Turn-On Time                    | V <sub>DS</sub> =-12V<br>I <sub>D</sub> =-4A                             |      | 9    |      | nS   |
| T <sub>r</sub>       |                                 |                                                                          |      | 16.5 |      |      |
| T <sub>d(off)</sub>  | Turn-Off Time                   | V <sub>GEN</sub> =-10V<br>R <sub>G</sub> =3.3Ω                           |      | 22   |      |      |
| T <sub>f</sub>       |                                 |                                                                          |      | 21   |      |      |

Note: 1. Pulse test: pulse width $\leq 300\mu\text{s}$ , duty cycle $\leq 2\%$

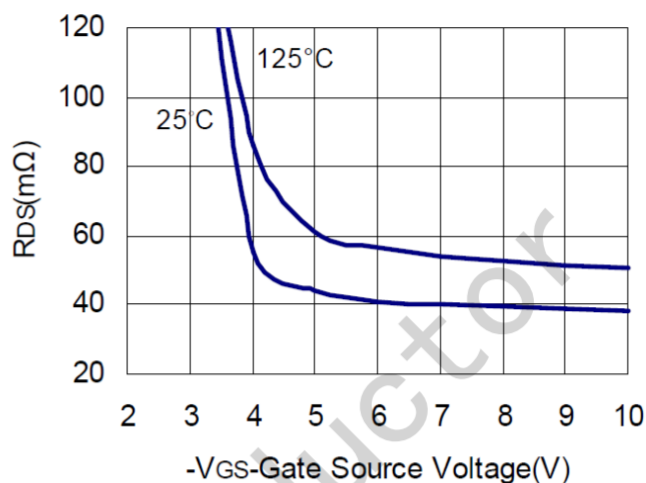
2. Static parameters are based on package level with recommended wire bonding

■ **TYPICAL CHARACTERISTICS** (25 °C Unless Note)

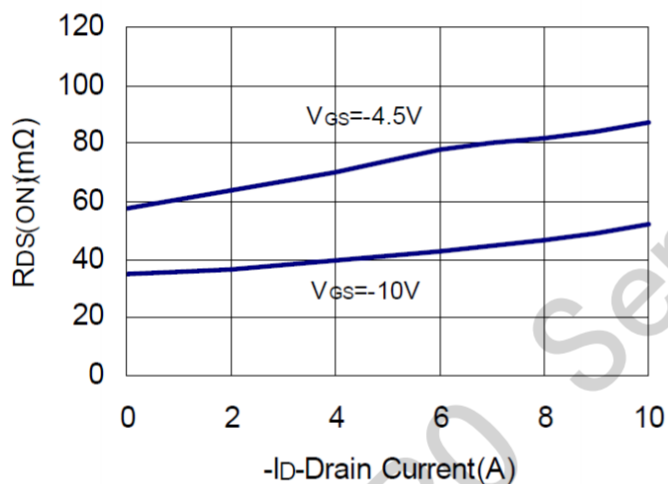
**Output Characteristics**



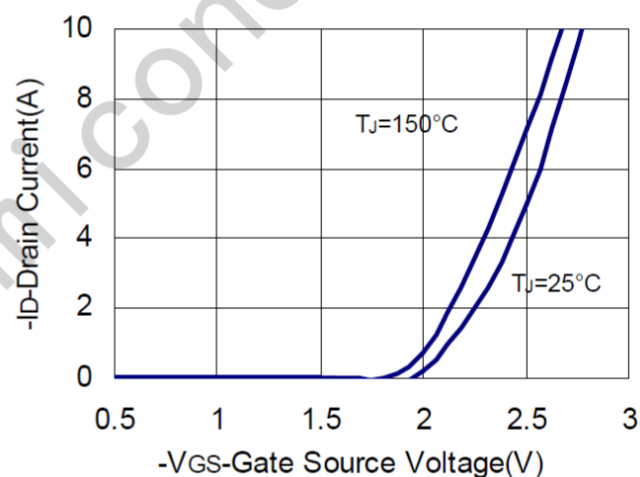
**Drain-Source On Resistance**



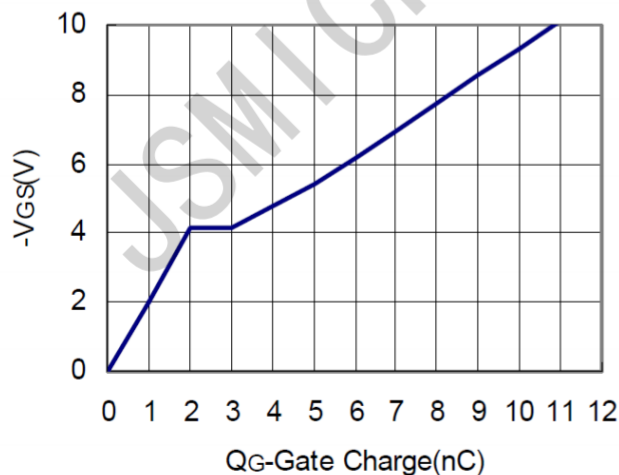
**Drain Source On Resistance**



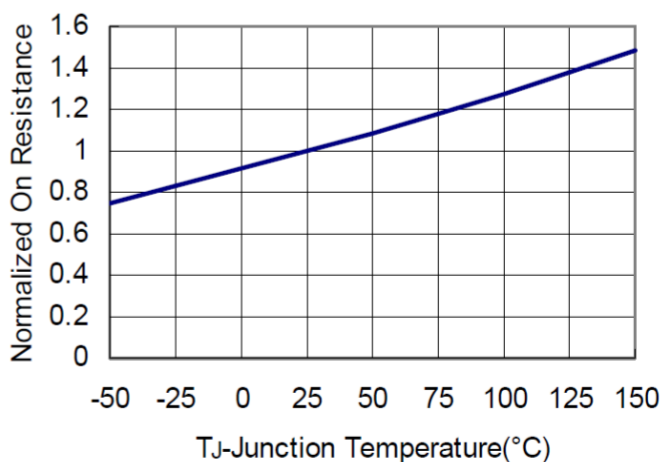
**Transfer Characteristics**



**Gate Charge**

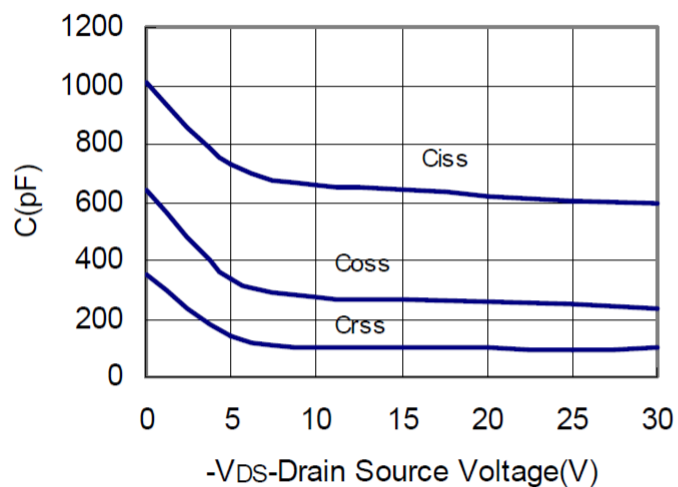


**Drain Source On Resistance**

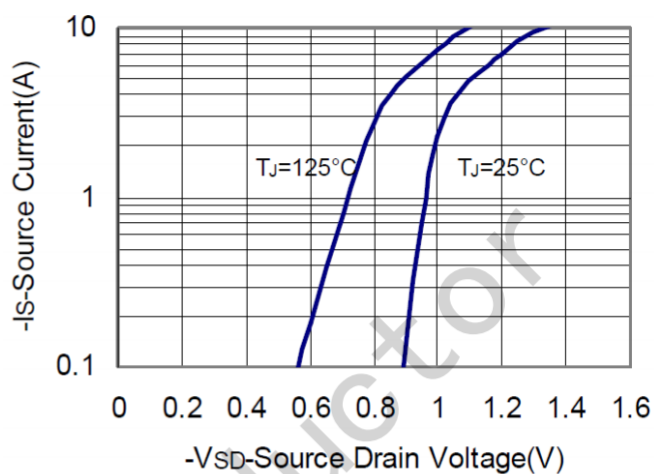


# ■ **TYPICAL CHARACTERISTICS** (continuous)

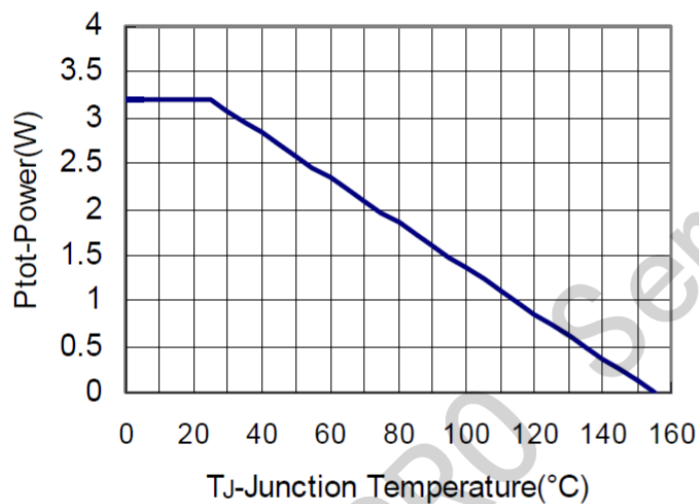
**Capacitance**



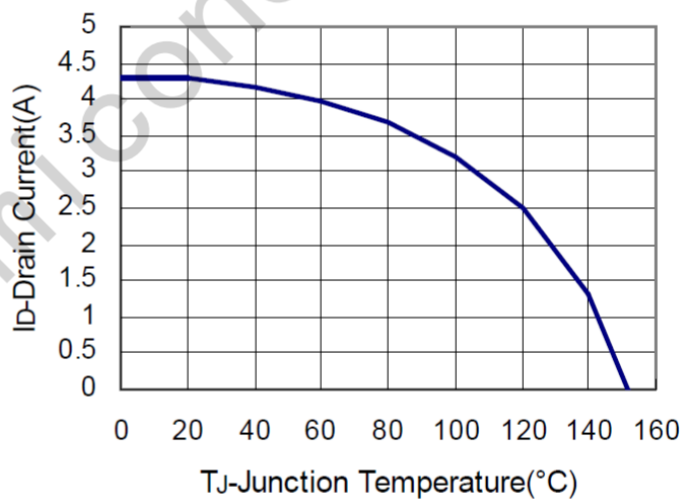
**Source Drain Diode Forward**



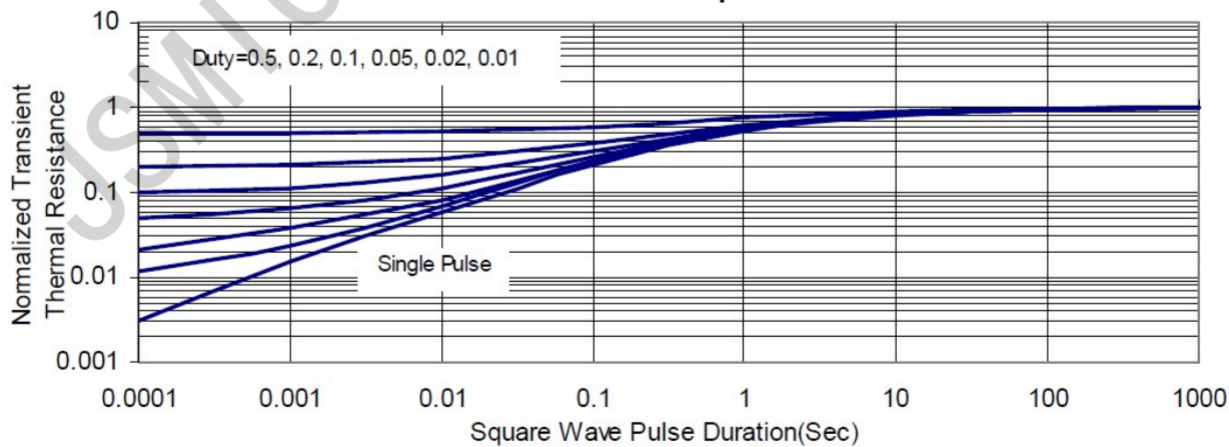
**Power Dissipation**



**Drain Current**

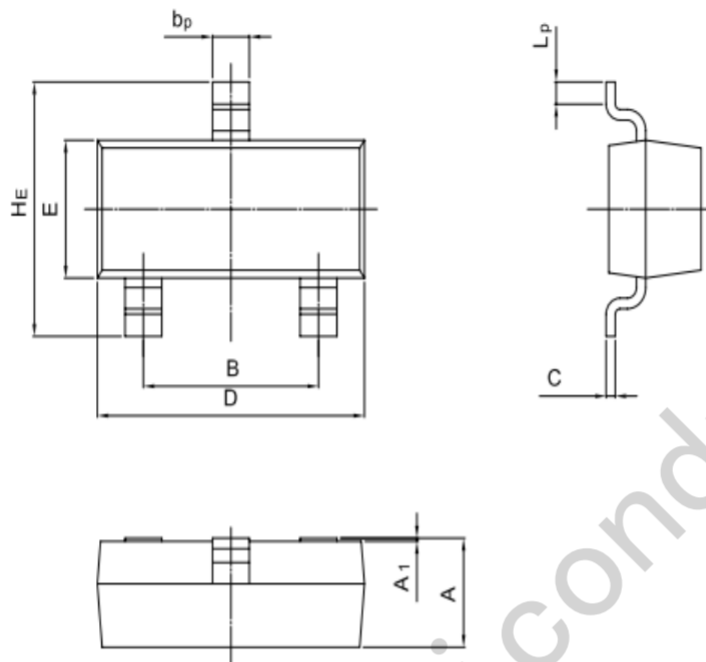


**Thermal Transient Impedance**



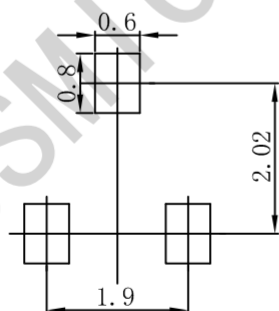
## Package Information

### SOT-23



| UNIT | A            | B            | $b_p$        | C            | D            | E            | $H_E$        | $A_1$          | $L_p$        |
|------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|----------------|--------------|
| mm   | 1.40<br>0.95 | 2.04<br>1.78 | 0.50<br>0.35 | 0.19<br>0.08 | 3.10<br>2.70 | 1.65<br>1.20 | 3.00<br>2.20 | 0.100<br>0.013 | 0.50<br>0.20 |

### SOT-23 Suggested Pad Layout



**Note:**

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