

**SuperMOS –TO-252 30V  $V_{DSS}$  7m $\Omega$   $R_{DS(on)}$  39A  $I_D$ , N-channel MOSFET**

**1. Description**

The AOD536 is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent  $R_{DS(on)}$  with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product AOD536 is Pb-free.

**2. Features**

- 30V,  $R_{DS(on)}=7m\Omega(Typ)$ ,  $V_{GS}=10V$   
 $R_{DS(on)}=10.5m\Omega(Typ)$ ,  $V_{GS}=4.5V$
- Use trench MOSFET technology
- High density cell design for low  $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

**3. Applications**

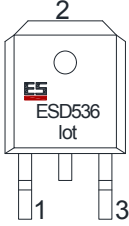
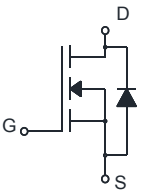
- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

**100% UIS TESTED!**

**4. Ordering Information**

| Part Number | Package | Marking   | Material     | Packing     | Quantity per reel | Flammability Rating | Reel Size |
|-------------|---------|-----------|--------------|-------------|-------------------|---------------------|-----------|
| AOD536      | TO-252  | ES536/lot | Halogen free | Tape & Reel | 2,500 PCS         | UL 94V-0            | 13 inches |

**5. Pin Configuration and Functions**

| Pin | Function | Outline                                                                             | Circuit Diagram                                                                       |
|-----|----------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1   | Gate     |  |  |
| 3   | Source   |                                                                                     |                                                                                       |
| 2   | Drain    |                                                                                     |                                                                                       |

## 6. Specification

### Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

| Parameter                                     | Symbol     | Limit             | Unit |   |
|-----------------------------------------------|------------|-------------------|------|---|
| Drain-Source Voltage                          | $BV_{DSS}$ | 30                | V    |   |
| Gate-Source Voltage                           | $V_{GS}$   | ±20               | V    |   |
| Continuous Drain Current                      | $I_D$      | $T_C=25^{\circ}C$ | 39   | A |
|                                               |            | $T_C=75^{\circ}C$ | 30   |   |
| Maximum Power Dissipation                     | $P_D$      | $T_C=25^{\circ}C$ | 31   | W |
|                                               |            | $T_C=75^{\circ}C$ | 19   |   |
| Pulsed Drain Current <sup>a</sup>             | $I_{DM}$   | 150               | A    |   |
| Avalanche Current, Single Pulsed <sup>b</sup> | $I_{AS}$   | 19                | A    |   |
| Avalanche Energy, Single Pulsed <sup>b</sup>  | $E_{AS}$   | 54.2              | mJ   |   |
| Operating Junction Temperature                | $T_J$      | 150               | °C   |   |
| Lead Temperature                              | $T_L$      | 260               | °C   |   |
| Storage Temperature Range                     | $T_{stg}$  | -55 to 150        | °C   |   |

#### Thermal resistance ratings

| Single Operation                       |               |                 |     |     |      |
|----------------------------------------|---------------|-----------------|-----|-----|------|
| Parameter                              |               | Symbol          | Typ | Max | Unit |
| Junction-to-Ambient Thermal Resistance | $t \leq 10$ s | $R_{\theta JA}$ | 15  | 20  | °C/W |
| Junction-to-Case Thermal Resistance    | Steady State  | $R_{\theta JC}$ | 3.3 | 4   |      |

Note:

a: Repetitive rating, pulse width limited by junction temperature,  $t_p=10\mu s$ , Duty Cycle=1%

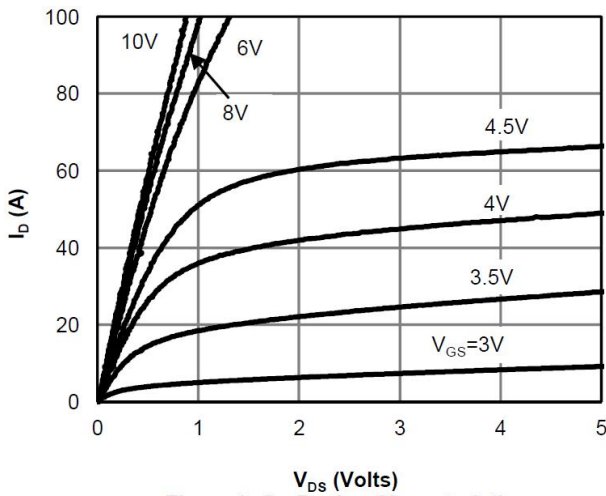
b: EAS condition:  $T_j=25^{\circ}C, V_{DD}=30V, V_G=10V, L=0.3mH, R_g=25\Omega$

## Electrical Characteristics

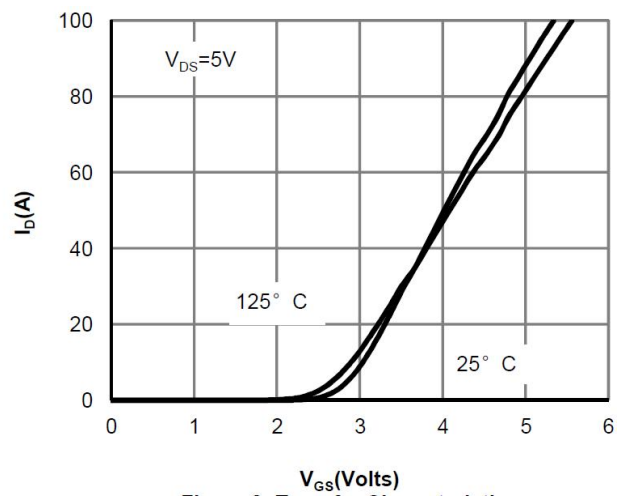
At TA = 25°C unless otherwise specified

| Parameter                                        | Symbol       | Test Conditions                                       | Min. | Typ. | Max.      | Unit       |
|--------------------------------------------------|--------------|-------------------------------------------------------|------|------|-----------|------------|
| <b>OFF CHARACTERISTICS</b>                       |              |                                                       |      |      |           |            |
| Drain-to-Source Breakdown Voltage                | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                             | 30   |      |           | V          |
| Zero Gate Voltage Drain Current                  | $I_{DSS}$    | $V_{DS}=30V, V_{GS}=0V$                               |      |      | 1.0       | $\mu A$    |
| Gate-to-source Leakage Current                   | $I_{GSS}$    | $V_{DS}=0V, V_{GS}=\pm 20V$                           |      |      | $\pm 100$ | nA         |
| <b>ON CHARACTERISTICS</b>                        |              |                                                       |      |      |           |            |
| Gate Threshold Voltage                           | $V_{GS(TH)}$ | $V_{GS}=V_{DS}, I_D=250\mu A$                         | 1.0  | 1.4  | 1.8       | V          |
| Drain-to-source On-resistance                    | $R_{DS(on)}$ | $V_{GS}=10V, I_D=20A$                                 |      | 7    | 12        | m $\Omega$ |
|                                                  |              | $V_{GS}=4.5V, I_D=20A$                                |      | 10.5 | 18        |            |
| Forward Trans conductance                        | $g_{FS}$     | $V_{DS}=5.0V, I_D=20A$                                |      |      | 100       | S          |
| <b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b> |              |                                                       |      |      |           |            |
| Input Capacitance                                | $C_{ISS}$    | $V_{GS}=0V, f=1MHz, V_{DS}=15V$                       |      | 1150 |           | pF         |
| Output Capacitance                               | $C_{OSS}$    |                                                       |      | 400  |           |            |
| Reverse Transfer Capacitance                     | $C_{RSS}$    |                                                       |      | 45   |           |            |
| Total Gate Charge                                | $Q_{G(TOT)}$ | $V_{GS}=4.5V, V_{DS}=15V, I_D=20A$                    |      | 15   |           | nC         |
| Gate-to-Source Charge                            | $Q_{GS}$     |                                                       |      | 3    |           |            |
| Gate-to-Drain Charge                             | $Q_{GD}$     |                                                       |      | 2.5  |           |            |
| <b>SWITCHING CHARACTERISTICS</b>                 |              |                                                       |      |      |           |            |
| Turn-On Delay Time                               | $t_{d(ON)}$  | $V_{GS}=10V, V_{DS}=20V, R_L=0.75\Omega, R_G=6\Omega$ |      | 7.6  |           | ns         |
| Rise Time                                        | $t_r$        |                                                       |      | 13.5 |           |            |
| Turn-Off Delay Time                              | $t_{d(OFF)}$ |                                                       |      | 18   |           |            |
| Fall Time                                        | $t_f$        |                                                       |      | 4.6  |           |            |
| <b>BODY DIODE CHARACTERISTICS</b>                |              |                                                       |      |      |           |            |
| Forward Voltage                                  | $V_{SD}$     | $V_{GS}=0V, I_S=1.9A$                                 |      | 0.7  | 1.5       | V          |

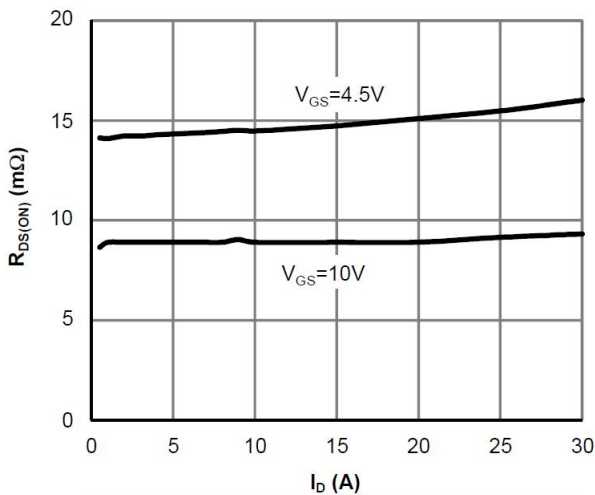
**7. Typical Characteristic**



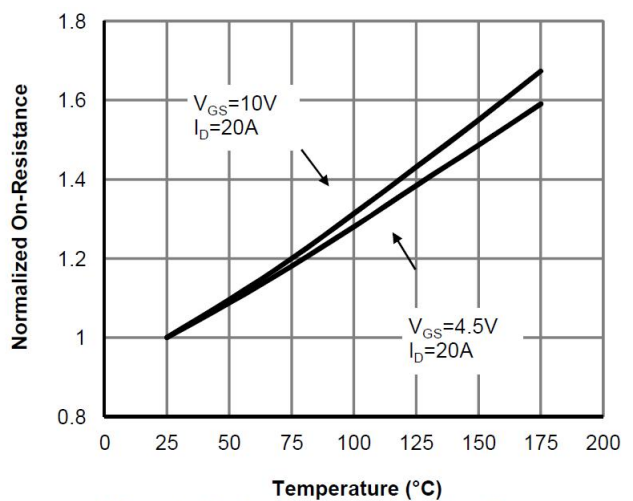
**Figure 1: On-Region Characteristics**



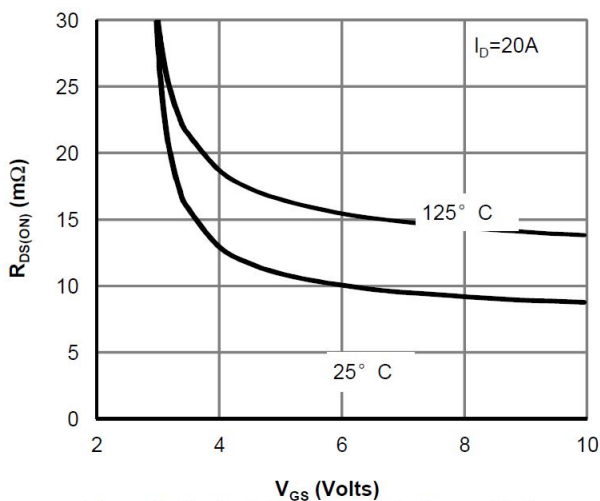
**Figure 2: Transfer Characteristics**



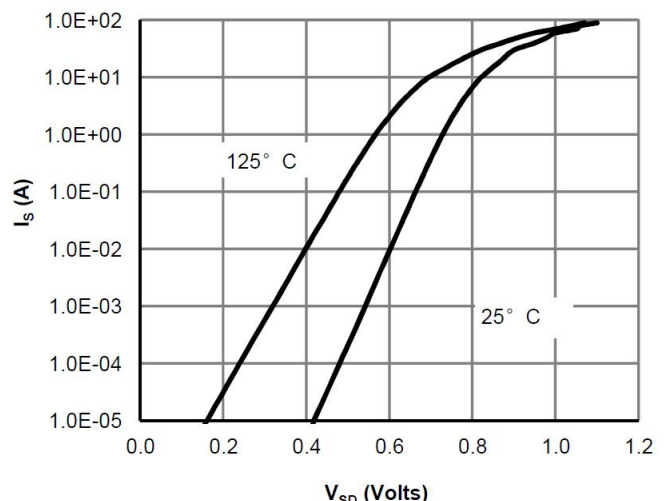
**Figure 3: On-Resistance vs Drain Current and Gate Voltage**



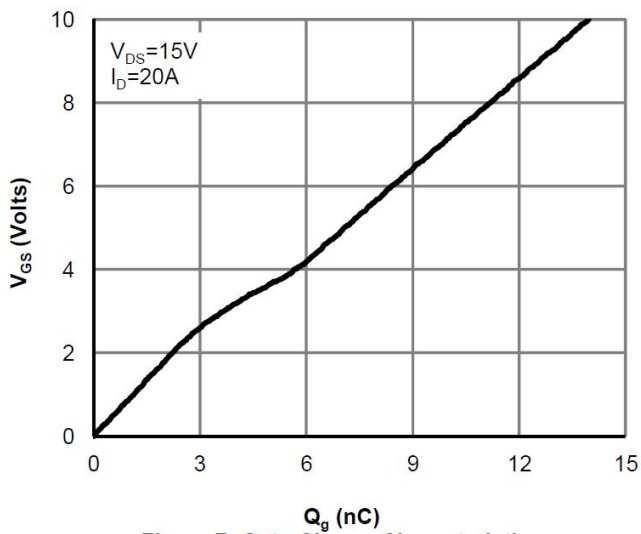
**Figure 4: On-Resistance vs. Junction Temperature**



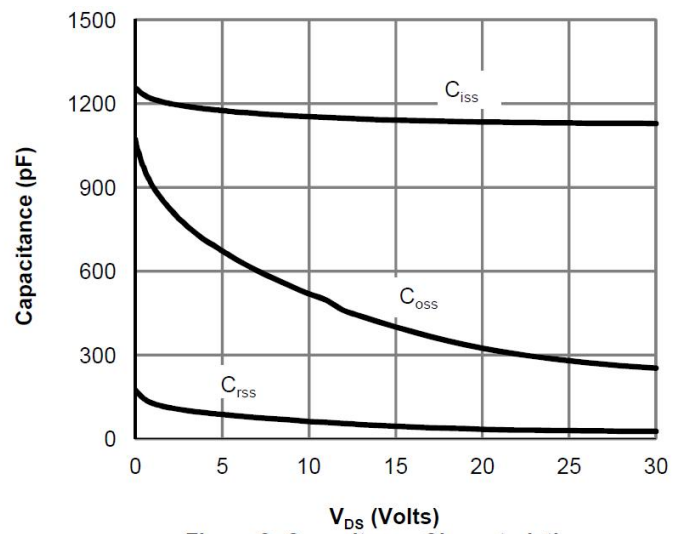
**Figure 5: On-Resistance vs. Gate-Source Voltage**



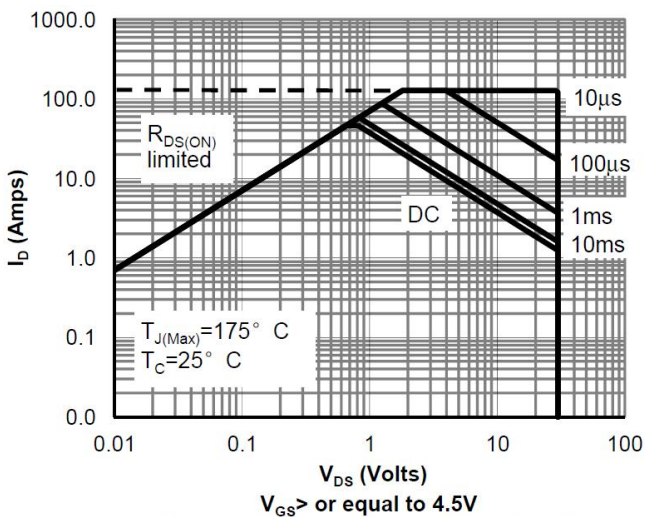
**Figure 6: Body-Diode Characteristics**



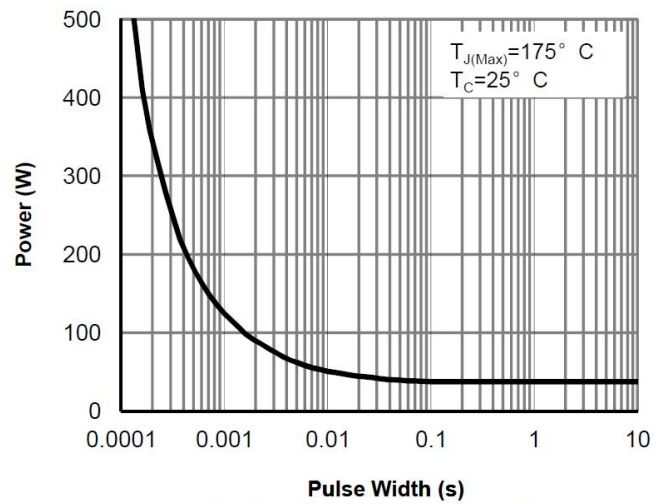
**Figure 7: Gate-Charge Characteristics**



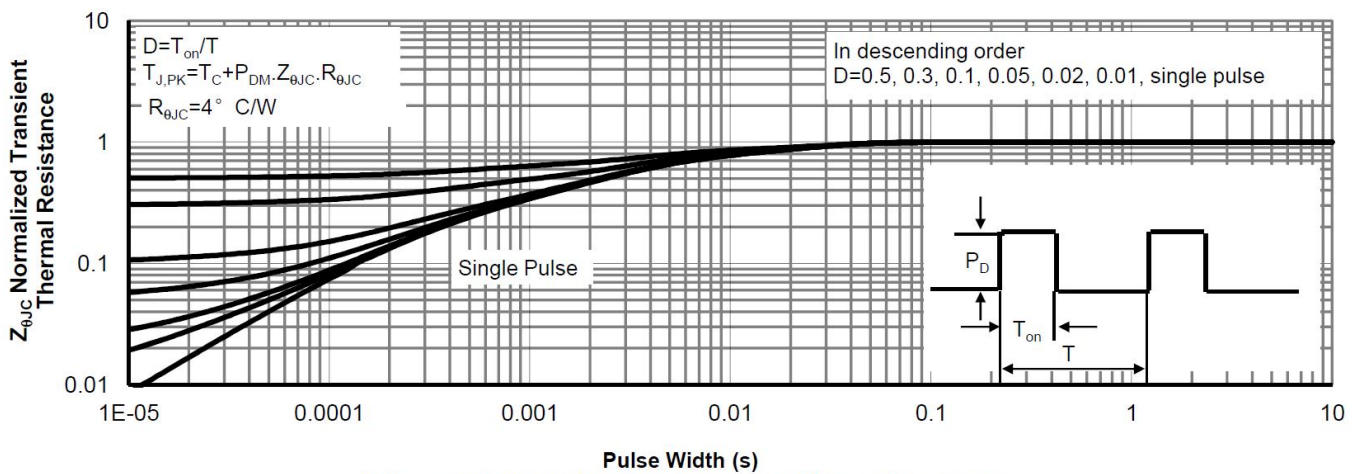
**Figure 8: Capacitance Characteristics**



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

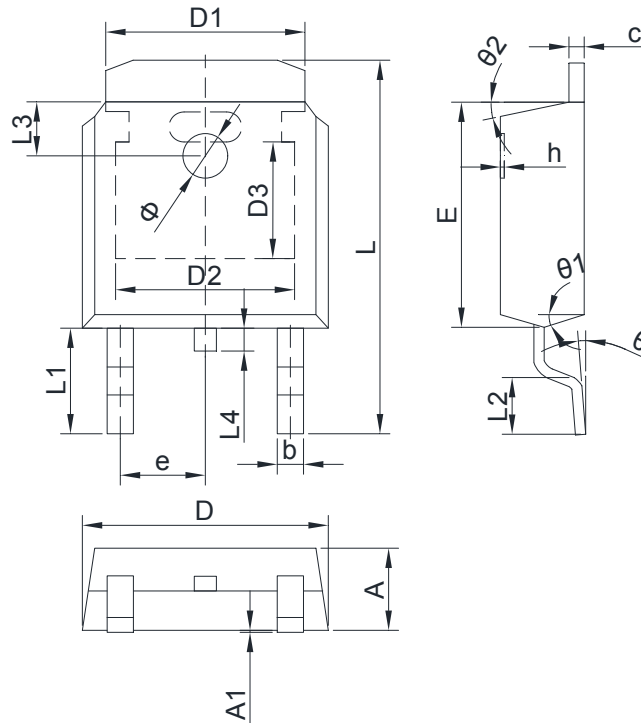


**Figure 10: Single Pulse Power Rating Junction-to-Case**



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

8. Dimension (TO-252)



| SYMBOL | MILLIMETER |       |       | SYMBOL | MILLIMETER |        |        |
|--------|------------|-------|-------|--------|------------|--------|--------|
|        | MIN        | Typ.  | MAX   |        | MIN        | Typ.   | MAX    |
| A      | 2.200      | 2.300 | 2.400 | h      | 0.000      | 0.100  | 0.200  |
| A1     | 0.000      |       | 0.127 | L      | 9.900      | 10.100 | 10.300 |
| b      | 0.640      | 0.690 | 0.740 | L1     | 2.888 REF  |        |        |
| C(电镀后) | 0.460      | 0.520 | 0.580 | L2     | 1.400      | 1.550  | 1.700  |
| D      | 6.500      | 6.600 | 6.700 | L3     | 1.600 REF  |        |        |
| D1     | 5.334 REF  |       |       | L4     | 0.600      | 0.800  | 1.000  |
| D2     | 4.826 REF  |       |       | Φ      | 1.100      | 1.200  | 1.300  |
| D3     | 3.166 REF  |       |       | θ      | 0°         |        | 8°     |
| E      | 6.000      | 6.100 | 6.200 | θ1     | 9° TYP     |        |        |
| e      | 2.286 TYP  |       |       | θ2     | 9° TYP     |        |        |

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