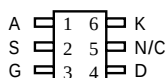
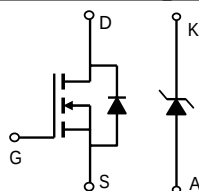


**AO6702**
**N-Channel Enhancement Mode Field Effect Transistor  
with Schottky Diode**
**General Description**

The AO6702 uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. A Schottky diode is provided to facilitate the implementation of a bidirectional blocking switch, or for DC-DC conversion applications. *Standard Product AO6702 is Pb-free (meets ROHS & Sony 259 specifications). AO6702L is a Green Product ordering option. AO6702 and AO6702L are electrically identical.*

**Features**

$V_{DS}$  (V) = 20V  
 $I_D$  = 3.8A ( $V_{GS}$  = 4.5V)  
 $R_{DS(ON)}$  < 50m $\Omega$  ( $V_{GS}$  = 4.5V)  
 $R_{DS(ON)}$  < 65m $\Omega$  ( $V_{GS}$  = 2.5V)  
 $R_{DS(ON)}$  < 95m $\Omega$  ( $V_{GS}$  = 1.8V)  
**SCHOTTKY**  
 $V_{DS}$  (V) = 20V,  $I_F$  = 1A,  $V_F$  < 0.5V@0.5A


**TSOP6**

**Absolute Maximum Ratings  $T_A=25^\circ\text{C}$  unless otherwise noted**

| Parameter                               | Symbol                 | MOSFET     | Schottky   | Units            |
|-----------------------------------------|------------------------|------------|------------|------------------|
| Drain-Source Voltage                    | $V_{DS}$               | 20         |            | V                |
| Gate-Source Voltage                     | $V_{GS}$               | $\pm 8$    |            | V                |
| Continuous Drain Current <sup>A</sup>   | $T_A=25^\circ\text{C}$ | $I_D$      | 3.8        | A                |
|                                         | $T_A=70^\circ\text{C}$ |            | 3          |                  |
| Pulsed Drain Current <sup>B</sup>       | $I_{DM}$               | 10         |            |                  |
| Schottky reverse voltage                | $V_{KA}$               |            | 20         | V                |
| Continuous Forward Current <sup>A</sup> | $T_A=25^\circ\text{C}$ | $I_F$      | 2          | A                |
|                                         | $T_A=70^\circ\text{C}$ |            | 1          |                  |
| Pulsed Forward Current <sup>B</sup>     | $I_{FM}$               |            | 10         |                  |
| Power Dissipation                       | $T_A=25^\circ\text{C}$ | $P_D$      | 1.15       | W                |
|                                         | $T_A=70^\circ\text{C}$ |            | 0.7        |                  |
| Junction and Storage Temperature Range  | $T_J, T_{STG}$         | -55 to 150 | -55 to 150 | $^\circ\text{C}$ |

| Parameter: Thermal Characteristics MOSFET |              | Symbol           | Typ   | Max | Units |
|-------------------------------------------|--------------|------------------|-------|-----|-------|
| Maximum Junction-to-Ambient <sup>A</sup>  | t ≤ 10s      | R <sub>θJA</sub> | 80.3  | 110 | °C/W  |
| Maximum Junction-to-Ambient <sup>A</sup>  | Steady-State |                  | 117   | 150 |       |
| Maximum Junction-to-Lead <sup>C</sup>     | Steady-State | R <sub>θJL</sub> | 43    | 80  |       |
| Thermal Characteristics Schottky          |              |                  |       |     |       |
| Maximum Junction-to-Ambient <sup>A</sup>  | t ≤ 10s      | R <sub>θJA</sub> | 109.4 | 135 | °C/W  |
| Maximum Junction-to-Ambient <sup>A</sup>  | Steady-State |                  | 136.5 | 175 |       |
| Maximum Junction-to-Lead <sup>C</sup>     | Steady-State | R <sub>θJL</sub> | 58.5  | 80  |       |

Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

| Symbol                      | Parameter                             | Conditions                                                                               | Min | Typ        | Max      | Units |
|-----------------------------|---------------------------------------|------------------------------------------------------------------------------------------|-----|------------|----------|-------|
| <b>STATIC PARAMETERS</b>    |                                       |                                                                                          |     |            |          |       |
| BV <sub>DSS</sub>           | Drain-Source Breakdown Voltage        | I <sub>D</sub> =250μA, V <sub>GS</sub> =0V                                               | 20  |            |          | V     |
| I <sub>DSS</sub>            | Zero Gate Voltage Drain Current       | V <sub>DS</sub> =16V, V <sub>GS</sub> =0V<br>T <sub>J</sub> =55°C                        |     |            | 1<br>5   | μA    |
| I <sub>GSS</sub>            | Gate-Body leakage current             | V <sub>DS</sub> =0V, V <sub>GS</sub> =±8V                                                |     |            | 100      | nA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                 | 0.4 | 0.6        | 1        | V     |
| I <sub>D(ON)</sub>          | On state drain current                | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =5V                                               | 10  |            |          | A     |
| R <sub>DS(ON)</sub>         | Static Drain-Source On-Resistance     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =3.8A<br>T <sub>J</sub> =125°C                     |     | 41.6<br>63 | 50<br>80 | mΩ    |
|                             |                                       | V <sub>GS</sub> =2.5V, I <sub>D</sub> =3.3A                                              |     | 54         | 65       | mΩ    |
|                             |                                       | V <sub>GS</sub> =1.8V, I <sub>D</sub> =2.8A                                              |     | 74         | 95       | mΩ    |
|                             |                                       |                                                                                          |     |            |          |       |
| g <sub>FS</sub>             | Forward Transconductance              | V <sub>DS</sub> =5V, I <sub>D</sub> =3.8A                                                |     | 10.5       |          | S     |
| V <sub>SD</sub>             | Diode Forward Voltage                 | I <sub>S</sub> =1A, V <sub>GS</sub> =0V                                                  |     | 0.8        | 1        | V     |
| I <sub>S</sub>              | Maximum Body-Diode Continuous Current |                                                                                          |     |            | 1.8      | A     |
| <b>DYNAMIC PARAMETERS</b>   |                                       |                                                                                          |     |            |          |       |
| C <sub>iss</sub>            | Input Capacitance                     | V <sub>GS</sub> =0V, V <sub>DS</sub> =10V, f=1MHz                                        |     | 449        |          | pF    |
| C <sub>oss</sub>            | Output Capacitance                    |                                                                                          |     | 74         |          | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance          |                                                                                          |     | 51.6       |          | pF    |
| R <sub>g</sub>              | Gate resistance                       | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz                                         |     | 4.9        |          | Ω     |
| <b>SWITCHING PARAMETERS</b> |                                       |                                                                                          |     |            |          |       |
| Q <sub>g</sub>              | Total Gate Charge                     | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =3.8A                        |     | 5.9        |          | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                    |                                                                                          |     | 0.36       |          | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                     |                                                                                          |     | 1.3        |          | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                     | V <sub>GS</sub> =5V, V <sub>DS</sub> =10V, R <sub>L</sub> =2.6Ω,<br>R <sub>GEN</sub> =0Ω |     | 4.5        |          | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                     |                                                                                          |     | 6          |          | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                    |                                                                                          |     | 32.7       |          | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                    |                                                                                          |     | 7.1        |          | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time      |                                                                                          |     | 13         |          | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge    | I <sub>F</sub> =3.8A, dI/dt=100A/μs                                                      |     | 3.3        |          | nC    |
| <b>SCHOTTKY PARAMETERS</b>  |                                       |                                                                                          |     |            |          |       |
| V <sub>F</sub>              | Forward Voltage Drop                  | I <sub>F</sub> =0.5A                                                                     |     | 0.39       | 0.5      | V     |
| I <sub>rm</sub>             | Maximum reverse leakage current       | V <sub>R</sub> =16V                                                                      |     |            | 0.02     | mA    |
|                             |                                       | V <sub>R</sub> =16V, T <sub>J</sub> =125°C                                               |     |            | 20       |       |
| C <sub>T</sub>              | Junction Capacitance                  | V <sub>R</sub> =10V                                                                      |     | 34         |          | pF    |
| t <sub>rr</sub>             | SchottkyReverse Recovery Time         | I <sub>F</sub> =1A, dI/dt=100A/μs                                                        |     | 5.2        | 10       | ns    |
| Q <sub>rr</sub>             | Schottky Reverse Recovery Charge      | I <sub>F</sub> =1A, dI/dt=100A/μs                                                        |     | 0.8        |          | nC    |

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The value in any given application depends on the user's specific board design. The current rating is based on the t ≤ 10s thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C: The R<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> and lead to ambient.

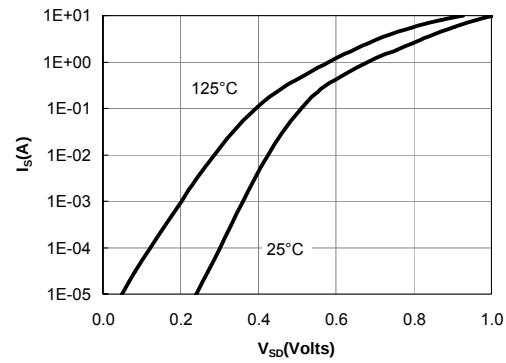
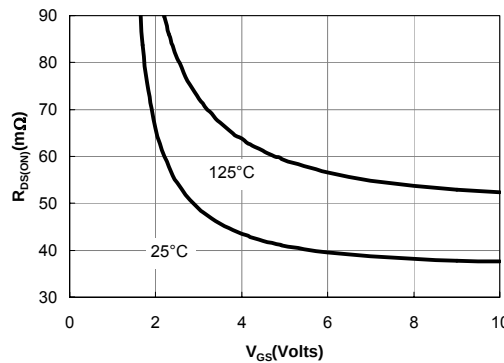
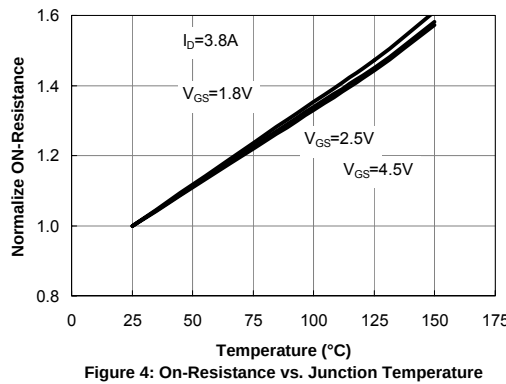
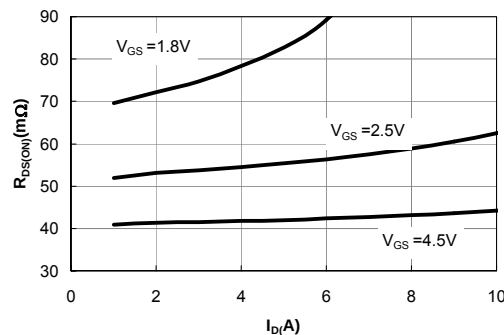
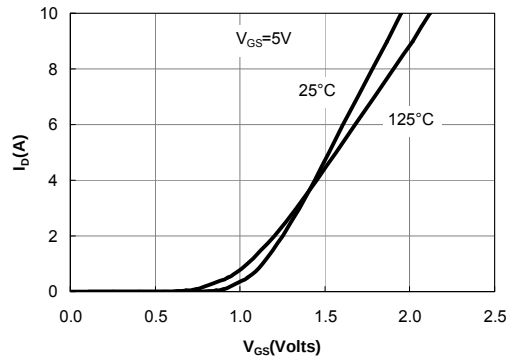
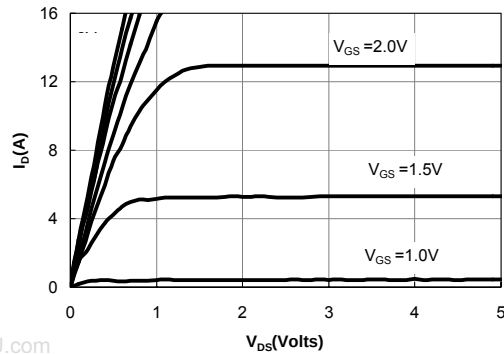
D: The static characteristics in Figures 1 to 6 are obtained using 80μs pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The SOA curve provides a single pulse rating.

Rev3: August 2005

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

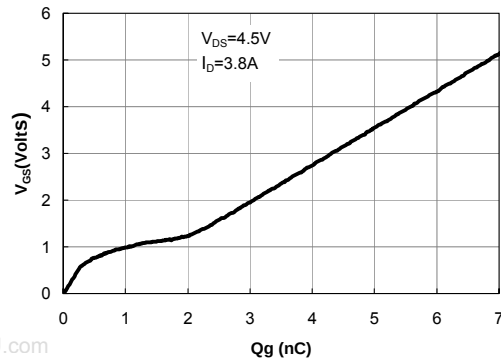


Figure 7: Gate-Charge Characteristics

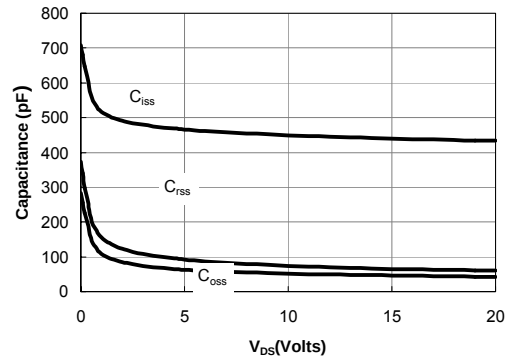


Figure 8: Capacitance Characteristics

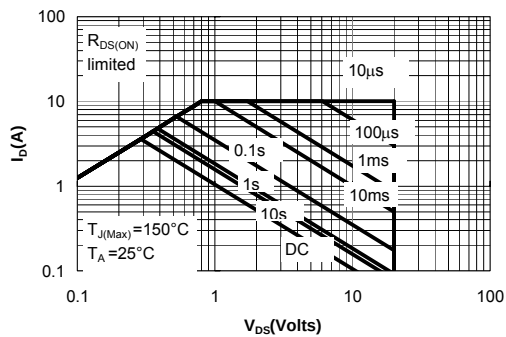


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

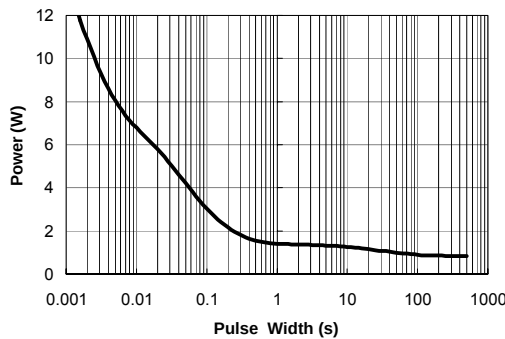


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

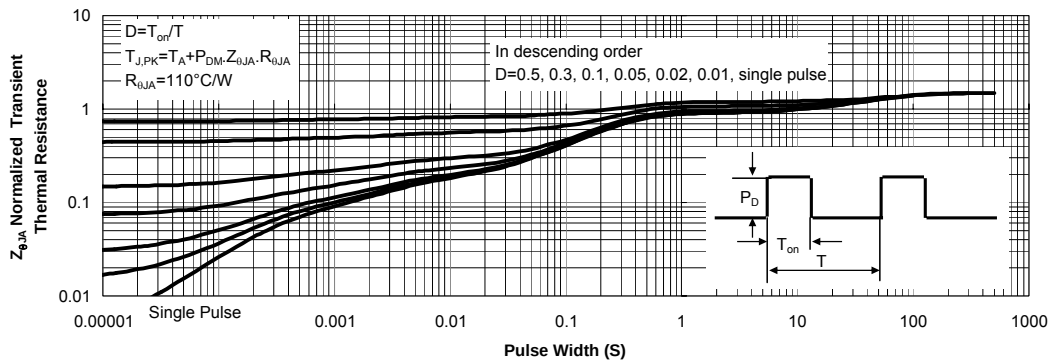


Figure 11: Normalized Maximum Transient Thermal Impedance

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: SCHOTTKY

