

### General Description

The AO6701 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.

### Product Summary

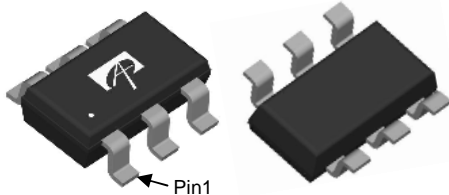
$V_{DS} (V) = -30V$   
 $I_D = -2.3A (V_{GS} = -10V)$   
 $R_{DS(ON)} < 135m\Omega (V_{GS} = -10V)$   
 $R_{DS(ON)} < 185m\Omega (V_{GS} = -4.5V)$   
 $R_{DS(ON)} < 265m\Omega (V_{GS} = -2.5V)$

### SCHOTTKY

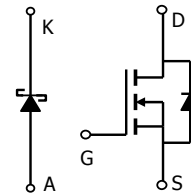
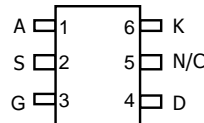
$V_{DS} (V) = 20V$   
 $I_F = 1A$   
 $V_F < 0.5V @ 0.5A$



TSOP6  
 Top View      Bottom View



Top View



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

Parameter	Symbol	MOSFET	Schottky	Units
Drain-Source Voltage	$V_{DS}$	-30		V
Gate-Source Voltage	$V_{GS}$	$\pm 12$		V
Continuous Drain Current <sup>A</sup>	$T_A=25^\circ C$	-2.3		A
	$T_A=70^\circ C$	-1.8		
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	-15		
Schottky reverse voltage	$V_{KA}$		20	V
Continuous Forward Current <sup>A</sup>	$T_A=25^\circ C$		2	A
	$T_A=70^\circ C$		1	
Pulsed Forward Current <sup>B</sup>	$I_{FM}$		10	
Power Dissipation	$T_A=25^\circ C$	$P_D$	1.15	W
	$T_A=70^\circ C$		0.7	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	-55 to 150	$^\circ C$

Parameter: Thermal Characteristics MOSFET		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$t \leq 10s$	$R_{\theta JA}$	78	110	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>	Steady-State		106	150	
Maximum Junction-to-Lead <sup>C</sup>	Steady-State	$R_{\theta JL}$	64	80	
Thermal Characteristics Schottky					
Maximum Junction-to-Ambient <sup>A</sup>	$t \leq 10s$	$R_{\theta JA}$	109.4	135	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>	Steady-State		136.5	175	
Maximum Junction-to-Lead <sup>C</sup>	Steady-State	$R_{\theta JL}$	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	-30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			-1 -5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±12V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =-250μA	-0.6	-1	-1.4	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-5V	-15			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-2.3A T <sub>J</sub> =125°C		107 154	135 190	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-2A		135	185	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-1A		195	265	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-2.3A		8		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V		-0.85	-1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				-1.35	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V, f=1MHz		409		pF
C <sub>oss</sub>	Output Capacitance			55		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			42		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		12		Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-2.0A		4.9		nC
Q <sub>gs</sub>	Gate Source Charge			0.6		nC
Q <sub>gd</sub>	Gate Drain Charge			1.6		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, R <sub>L</sub> =7.5Ω, R <sub>GEN</sub> =3Ω		6.9		ns
t <sub>r</sub>	Turn-On Rise Time			3.3		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			38.5		ns
t <sub>f</sub>	Turn-Off Fall Time			13.2		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =-2.0A, di/dt=100A/μs		15		ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =-2.0A, di/dt=100A/μs		8		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			0.1	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 a 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 6,12,14 are obtained using 80 μs 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: Nov. 2010

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MOSFET TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

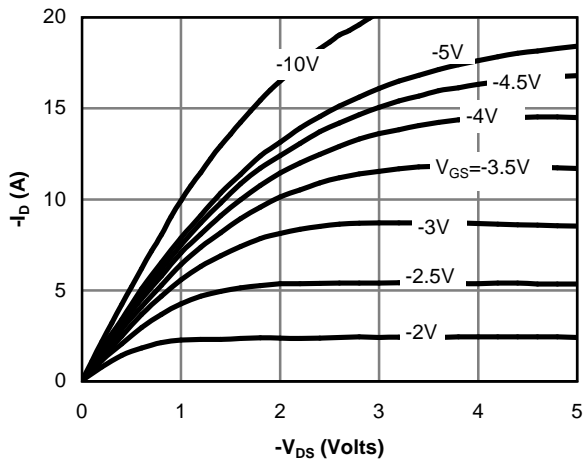


Fig 1: On-Region Characteristics

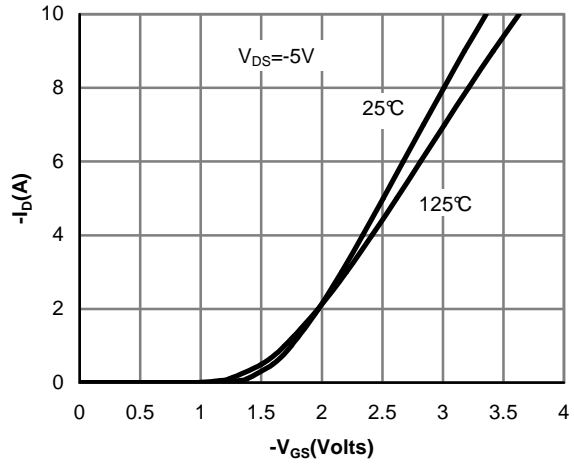


Figure 2: Transfer Characteristics

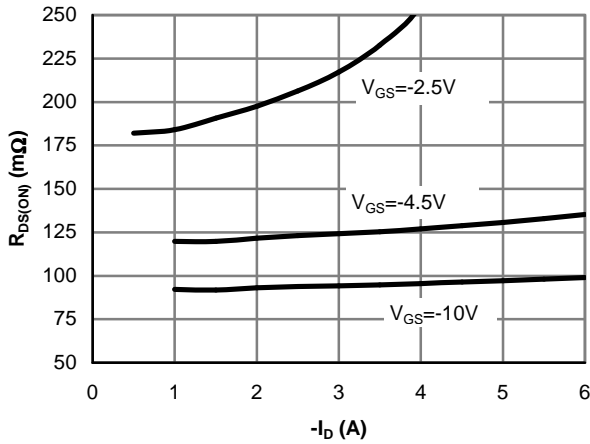


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

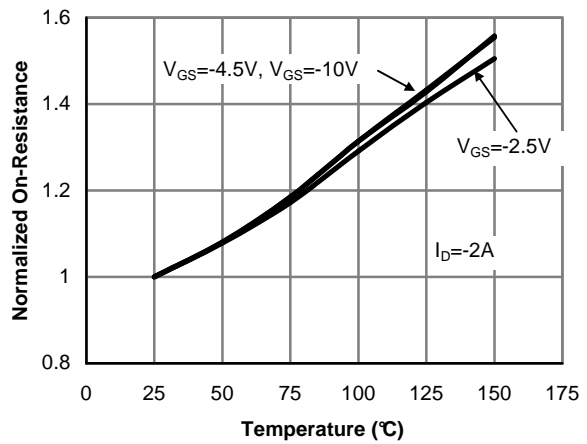


Figure 4: On-Resistance vs. Junction Temperature

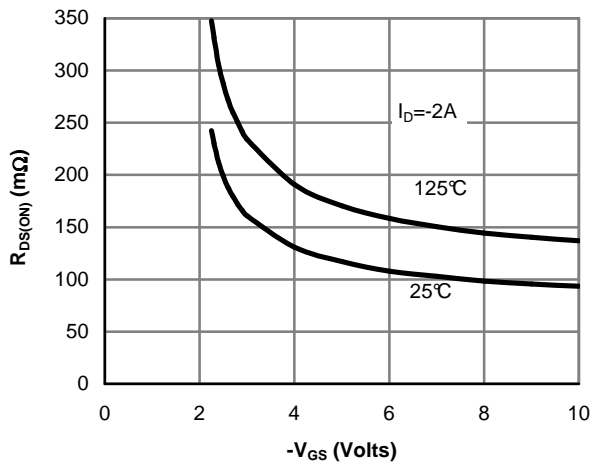


Figure 5: On-Resistance vs. Gate-Source Voltage

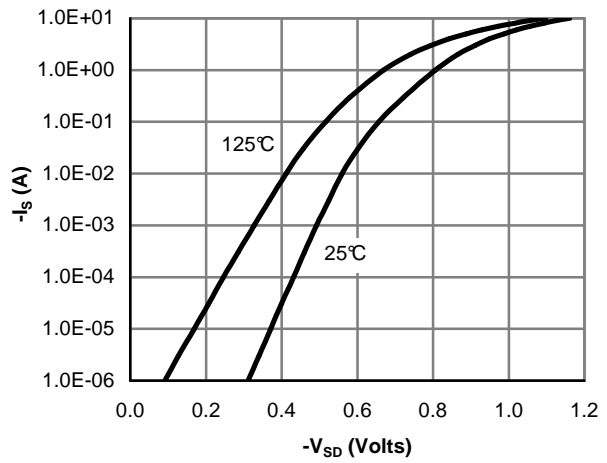


Figure 6: Body-Diode Characteristics

MOSFET TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

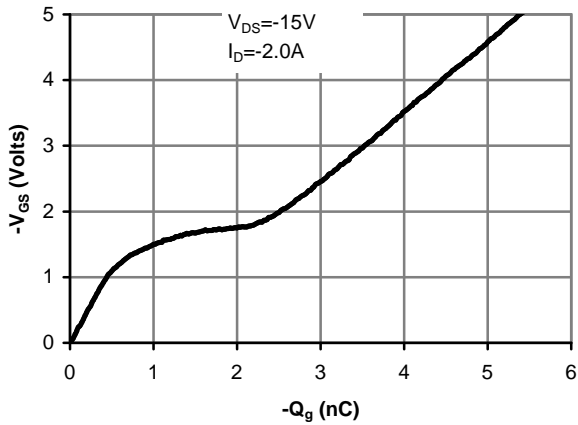


Figure 7: Gate-Charge Characteristics

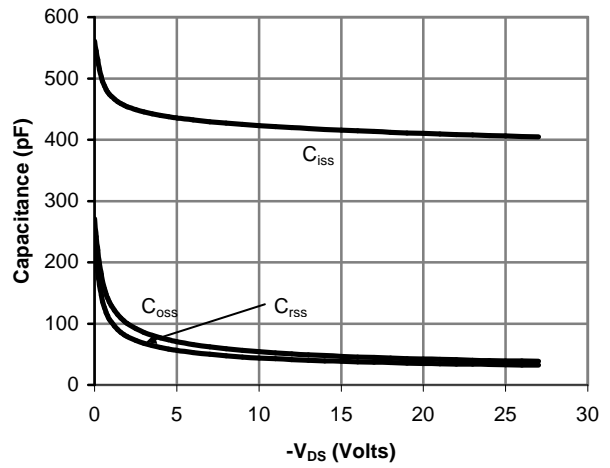


Figure 8: Capacitance Characteristics

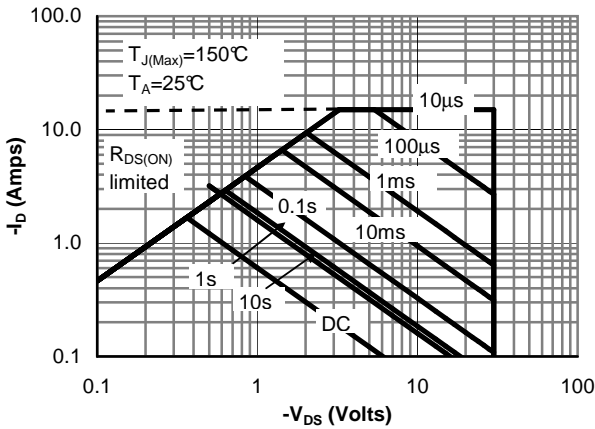


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

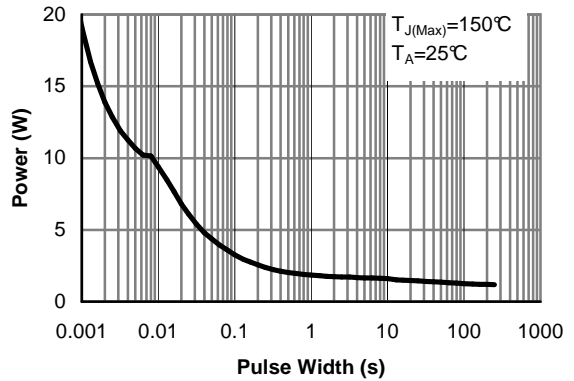


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

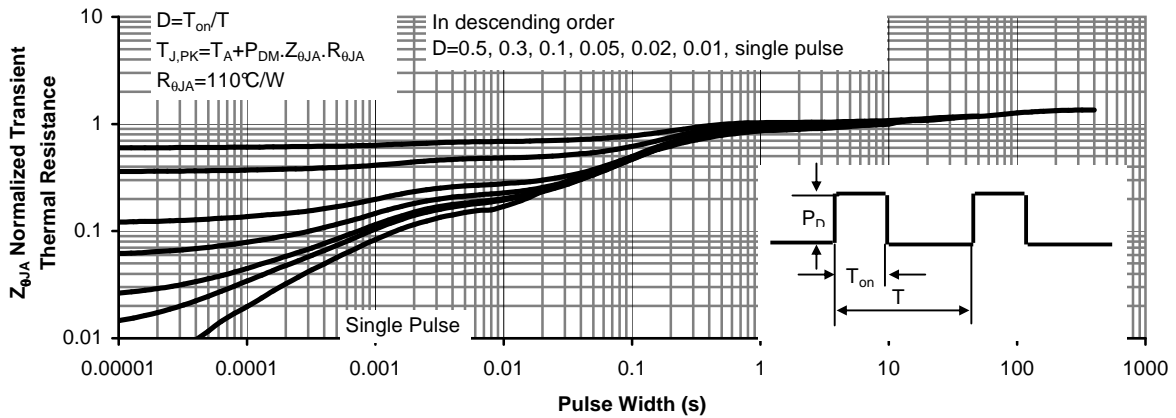


Figure 11: Normalized Maximum Transient Thermal Impedance