



AO6700

N-Channel Enhancement Mode Field Effect Transistor with Schottky Diode

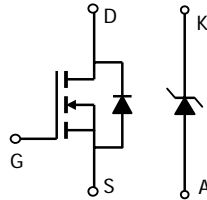
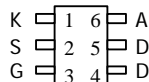
General Description

The AO6700 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 AO6700 is Pb-free (meets ROHS & Sony 259 specifications). AO6700L is a Green Product ordering option. AO6700 and AO6700L are electrically identical.

Features

V_{DS} (V) = 20V
 I_D = 4.1A (V_{GS} = 4.5V)
 $R_{DS(ON)}$ < 50m Ω (V_{GS} = 4.5V)
 $R_{DS(ON)}$ < 65m Ω (V_{GS} = 2.5V)
 $R_{DS(ON)}$ < 95m Ω (V_{GS} = 1.8V)
SCHOTTKY
 V_{DS} (V) = 20V, I_F = 1A, V_F < 0.5V@0.5A

TSOP6
Top View



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}	± 8		V
Continuous Drain Current ^A	I_D	$T_A=25^\circ\text{C}$	4.1	A
		$T_A=70^\circ\text{C}$	3.3	
Pulsed Drain Current ^B	I_{DM}	10		
Schottky reverse voltage	V_{KA}		20	V
Continuous Forward Current ^A	I_F	$T_A=25^\circ\text{C}$	1.5	A
		$T_A=70^\circ\text{C}$	1	
Pulsed Forward Current ^B	I_{FM}		10	
Power Dissipation	P_D	$T_A=25^\circ\text{C}$	1.39	W
		$T_A=70^\circ\text{C}$	0.89	
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 ^A	$t \leq 10\text{s}$	$R_{\theta JA}$	70	90	$^\circ\text{C/W}$
	Steady-State		102	130	
Maximum Junction-to-Lead ^C	Steady-State	$R_{\theta JL}$	51	80	
Thermal Characteristics Schottky					
Maximum Junction-to-Ambient ^A	$t \leq 10\text{s}$	$R_{\theta JA}$	129	160	$^\circ\text{C/W}$
	Steady-State		158	200	
Maximum Junction-to-Lead ^C	Steady-State	$R_{\theta JL}$	52	80	

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0V	20			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =16V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±8V			100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.4	0.6	1	V
I _{D(on)}	On state drain current	V _{GS} =4.5V, V _{DS} =5V	10			A
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =4.5V, I _D =4.1A T _J =125°C		41.6	50	mΩ
		V _{GS} =2.5V, I _D =3.6A		54	65	
		V _{GS} =1.8V, I _D =3A		74	95	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =4.1A		10.5		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.8	1	V
I _S	Maximum Body-Diode Continuous Current				1.8	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =10V, f=1MHz		449	550	pF
C _{oss}	Output Capacitance			74		pF
C _{rss}	Reverse Transfer Capacitance			51.6		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		4.9	6	Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =10V, I _D =4.1A		5.9	7.2	nC
Q _{gs}	Gate Source Charge			0.36		nC
Q _{gd}	Gate Drain Charge			1.3		nC
t _{D(on)}	Turn-On Delay Time	V _{GS} =5V, V _{DS} =10V, R _L =2.35Ω, R _{GEN} =0Ω		4.5		ns
t _r	Turn-On Rise Time			6		ns
t _{D(off)}	Turn-Off Delay Time			32.7		ns
t _f	Turn-Off Fall Time			7.1		ns
t _{rr}	Body Diode Reverse Recovery Time		I _F =4.1A, dI/dt=100A/μs		13	16
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =4.1A, dI/dt=100A/μs		3.3		nC
SCHOTTKY PARAMETERS						
V _F	Forward Voltage Drop	I _F =0.5A		0.39	0.5	V
I _{rm}	Maximum reverse leakage current	V _R =16V			0.02	mA
		V _R =16V, T _J =125°C			20	
C _T	Junction Capacitance	V _R =10V		34		pF
t _{rr}	Schottky Reverse Recovery Time	I _F =1A, dI/dt=100A/μs		5.2	10	ns
Q _{rr}	Schottky Reverse Recovery Charge	I _F =1A, dI/dt=100A/μs		0.8		nC

A: The value of R_{θJA} is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The value in any given application depends on the user's specific board design. The current rating is based on the t_{θJA} ≤ 10s thermal resistance rating.

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

C: The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.

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

E: These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating.

Rev 2 : Sept 2005

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MOSFET TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

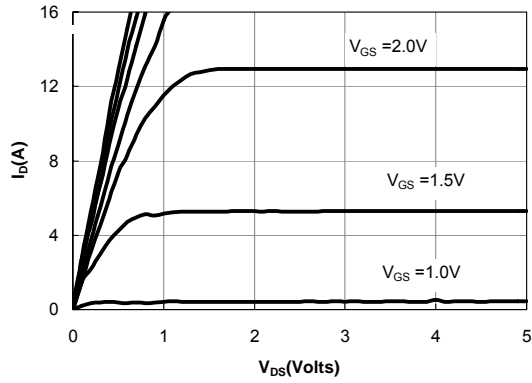


Figure 1: On-Regions Characteristic CS

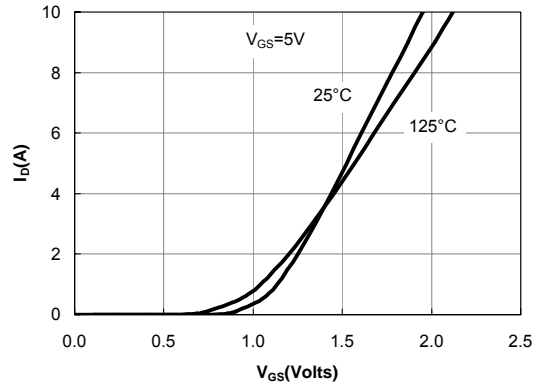


Figure 2: Transfer Characteristics

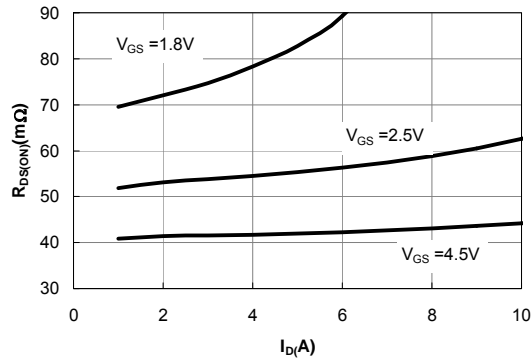


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

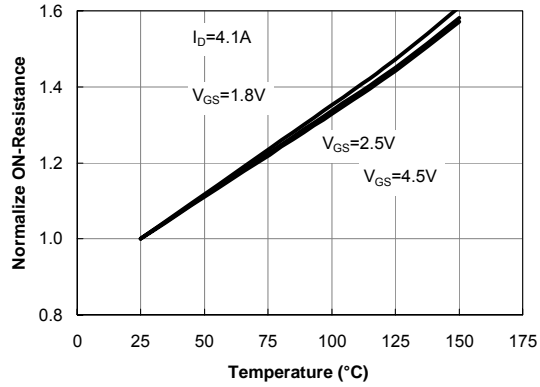


Figure 4: On-Resistance vs. Junction Temperature

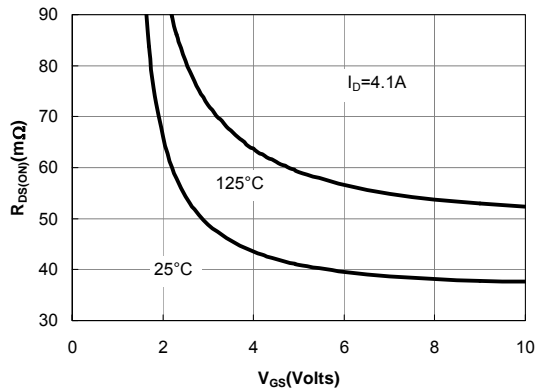


Figure 5: On-Resistance vs. Gate-Source Voltage

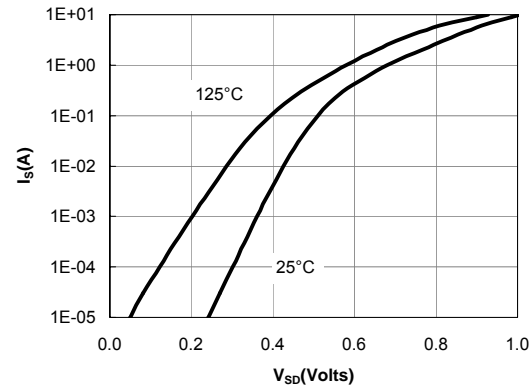


Figure 6: Body-Diode Characteristics

MOSFET TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

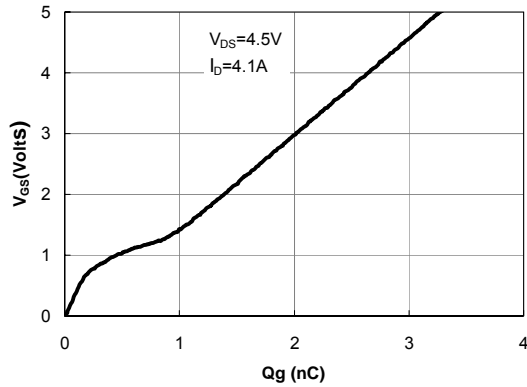


Figure 7: Gate-Charge Characteristics

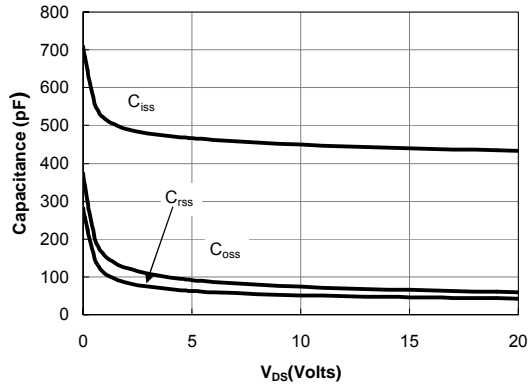


Figure 8: Capacitance Characteristics

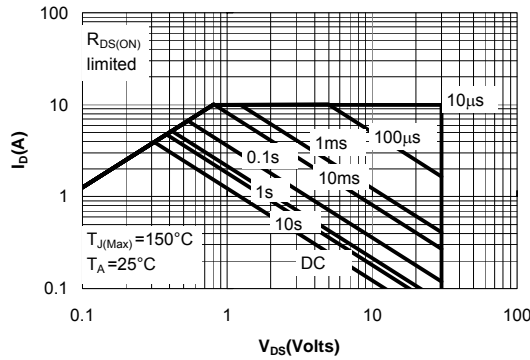


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

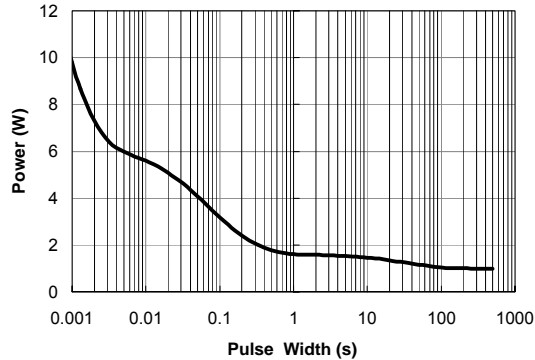


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

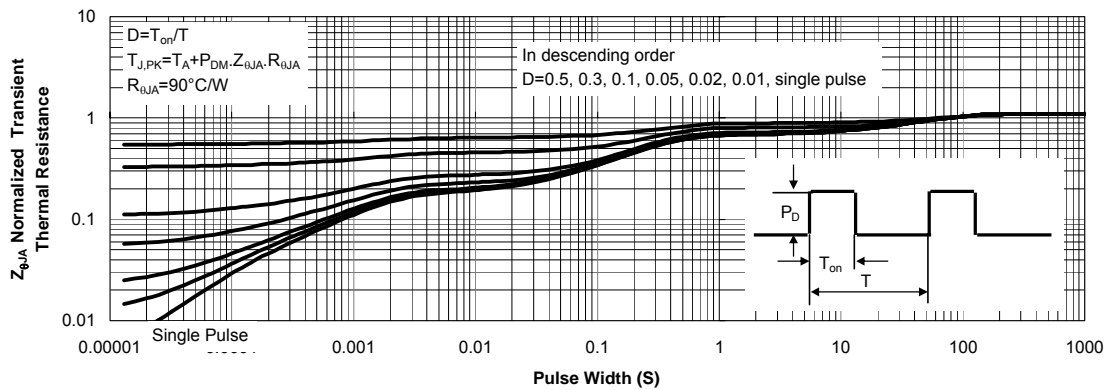


Figure 11: Normalized Maximum Transient Thermal Impedance