



AO8701, AO8701L (Green Product) P-Channel Enhancement Mode Field Effect Transistor with Schottky Diode

General Description

The AO8701 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. AO8701L (Green Product) is offered in a lead-free package.

Features

V_{DS} (V) = -30V

I_D = -4.2A

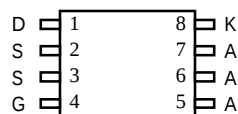
$R_{DS(ON)} < 50m\Omega$ ($V_{GS} = 10V$)

$R_{DS(ON)} < 65m\Omega$ ($V_{GS} = 4.5V$)

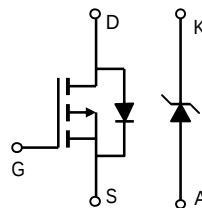
$R_{DS(ON)} < 120m\Omega$ ($V_{GS} = 2.5V$)

SCHOTTKY

V_{DS} (V) = 30V, $I_F = 3A$, $V_F = 0.5V@1A$



TSSOP-8



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

Parameter	Symbol	MOSFET	Schottky	Units
Drain-Source Voltage	V_{DS}	-30		V
Gate-Source Voltage	V_{GS}	± 12		V
Continuous Drain Current ^A	$T_A=25^\circ\text{C}$	-4.2		A
	$T_A=70^\circ\text{C}$	-3.5		
Pulsed Drain Current ^B	I_{DM}	-30		
Schottky reverse voltage	V_{KA}		30	V
Continuous Forward Current ^A	$T_A=25^\circ\text{C}$		3	A
	$T_A=70^\circ\text{C}$		2	
Pulsed Forward Current ^B	I_{FM}		40	
Power Dissipation	$T_A=25^\circ\text{C}$	1.4	1.4	W
	$T_A=70^\circ\text{C}$	1	1	
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 ≤ 10s	R _{θJA}	73	90	°C/W
Maximum Junction-to-Ambient ^A	Steady-State		96	125	
Maximum Junction-to-Lead ^C	Steady-State	R _{θJL}	63	75	
Thermal Characteristics Schottky					
Maximum Junction-to-Ambient ^A	t ≤ 10s	R _{θJA}	75	90	°C/W
Maximum Junction-to-Ambient ^A	Steady-State		97	125	
Maximum Junction-to-Lead ^C	Steady-State	R _{θJL}	63	75	

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	-30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-24V, V _{GS} =0V T _J =55°C			-1 -5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±12V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-0.7	-1	-1.3	V
I _{D(ON)}	On state drain current	V _{GS} =-4.5V, V _{DS} =-5V	-25			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-4.2A T _J =125°C		43	50	mΩ
					75	
		V _{GS} =-4.5V, I _D =-4A		54	65	mΩ
		V _{GS} =-2.5V, I _D =-1A		82	120	mΩ
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-5A	7	11		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.75	-1	V
I _S	Maximum Body-Diode Continuous Current				-2.2	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-15V, f=1MHz		954		pF
C _{oss}	Output Capacitance			115		pF
C _{rss}	Reverse Transfer Capacitance			77		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		6.1		Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =-4.5V, V _{DS} =-15V, I _D =-4A		9.4		nC
Q _{gs}	Gate Source Charge			2		nC
Q _{gd}	Gate Drain Charge			3		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =-10V, V _{DS} =-15V, R _L =3.6Ω, R _{GEN} =6Ω		6.3		ns
t _r	Turn-On Rise Time			3.2		ns
t _{D(off)}	Turn-Off DelayTime			38.2		ns
t _f	Turn-Off Fall Time			12		ns
t _{rr}	Body Diode Reverse Recovery Time			20.2		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-4A, dI/dt=100A/μs		11.2		nC
SCHOTTKY PARAMETERS						
V _F	Forward Voltage Drop	I _F =1.0A		0.45	0.5	V
I _{rm}	Maximum reverse leakage current	V _R =30V		0.007	0.05	mA
		V _R =30V, T _J =125°C		3.2	10	
		V _R =30V, T _J =150°C		12	20	
C _T	Junction Capacitance	V _R =15V		37		pF

A: The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=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_{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 6,12,14 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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

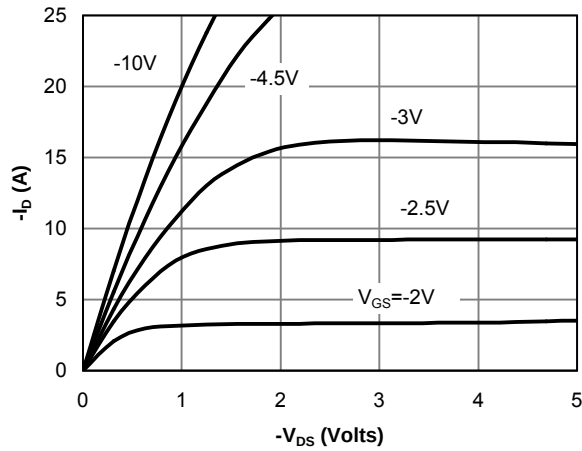


Fig 1: On-Region Characteristics

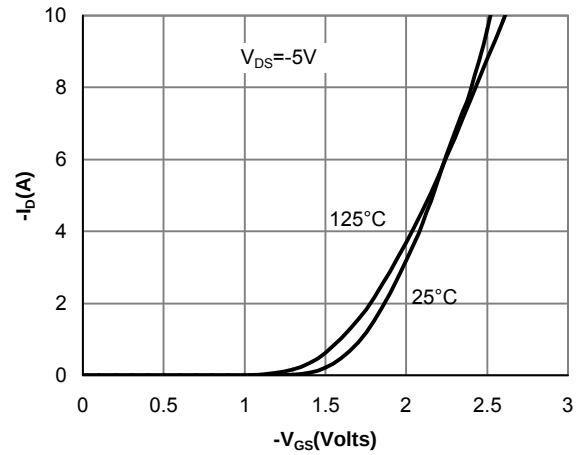


Figure 2: Transfer Characteristics

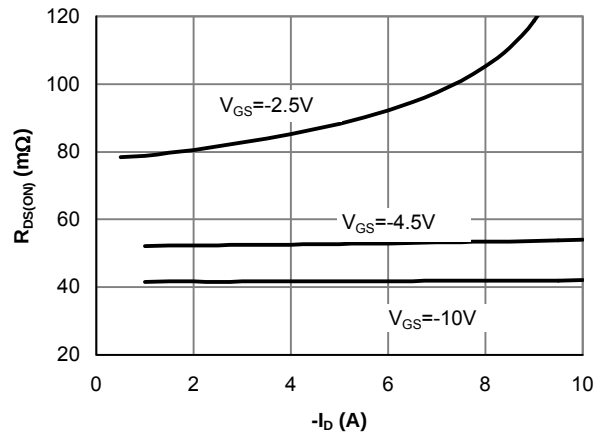


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

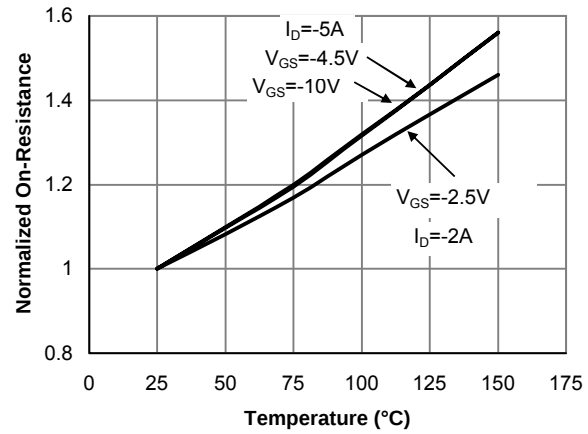


Figure 4: On-Resistance vs. Junction Temperature

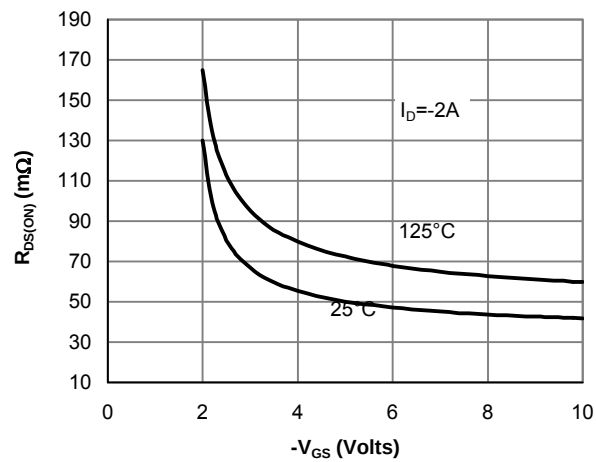


Figure 5: On-Resistance vs. Gate-Source Voltage

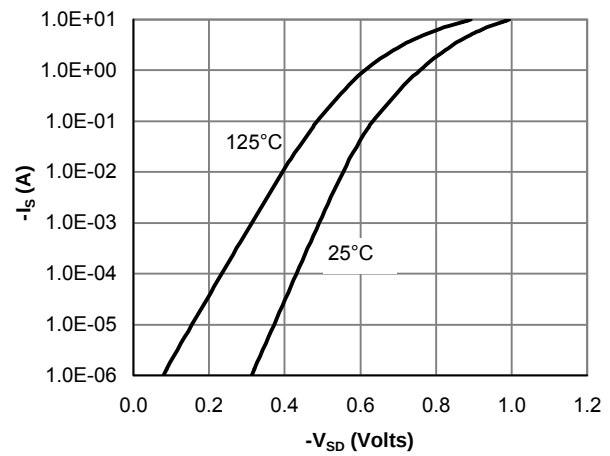


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

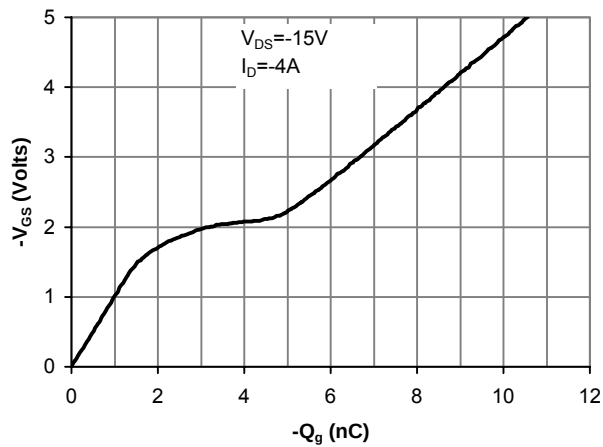


Figure 7: Gate-Charge Characteristics

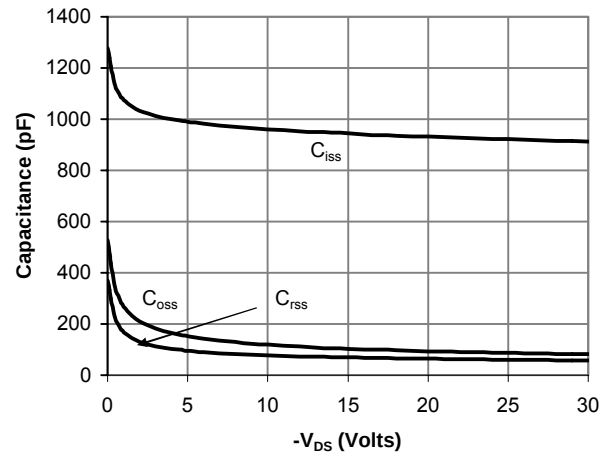


Figure 8: Capacitance Characteristics

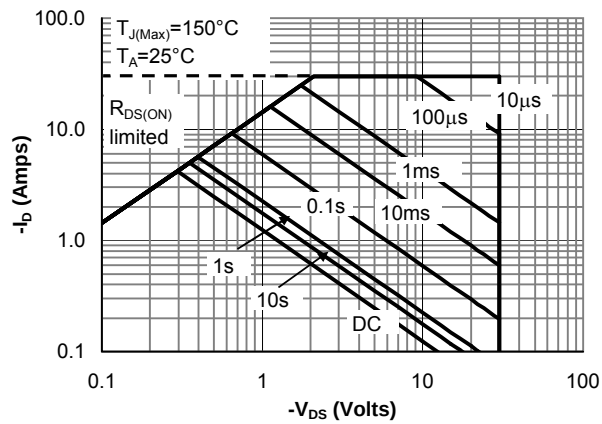


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

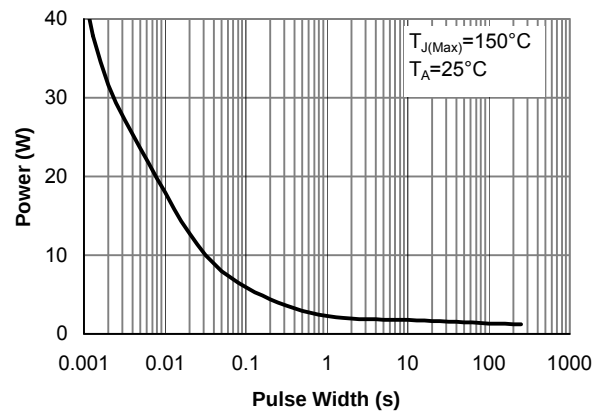


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

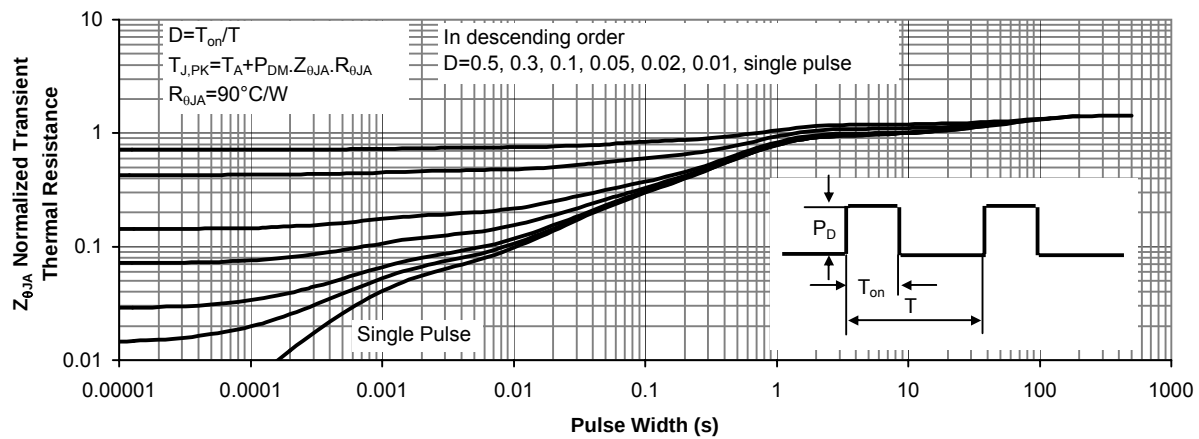


Figure 11: Normalized Maximum Transient Thermal Impedance

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: SCHOTTKY

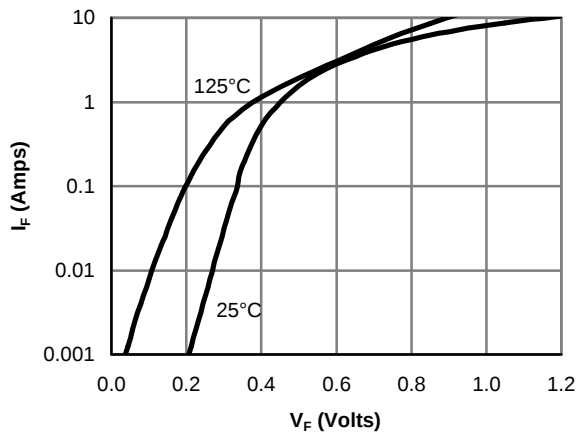


Figure 12: Schottky Forward Characteristics

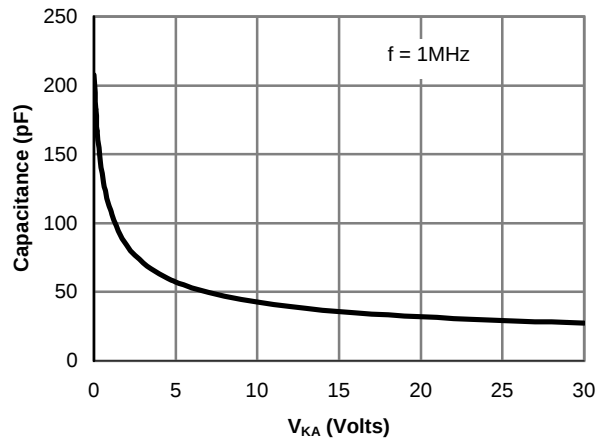


Figure 13: Schottky Capacitance Characteristics

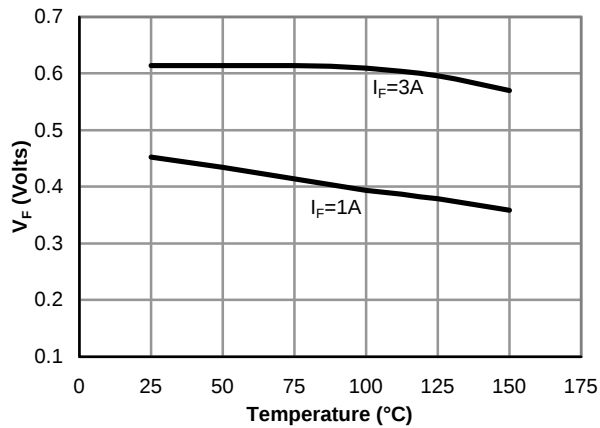


Figure 14: Schottky Forward Drop vs. Junction Temperature

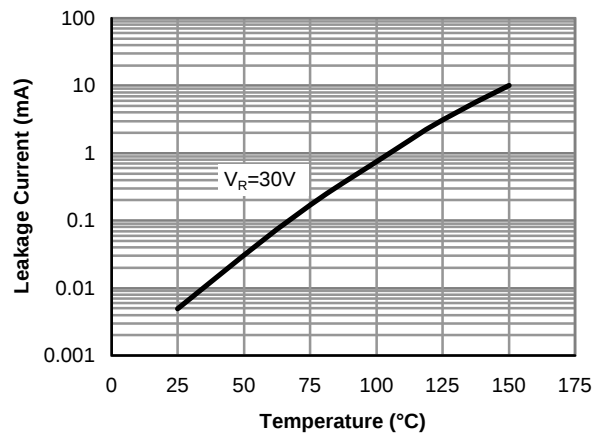


Figure 15: Schottky Leakage current vs. Junction Temperature

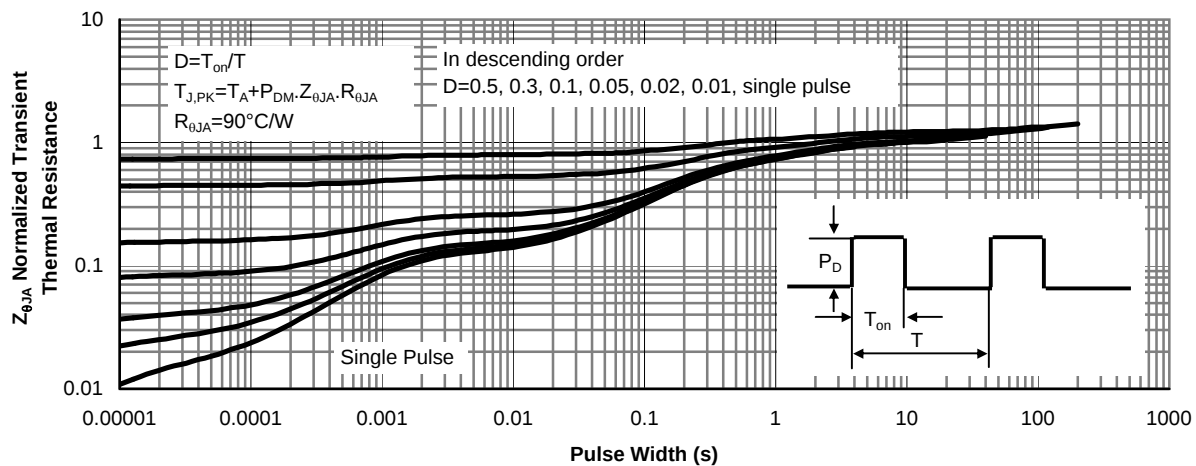


Figure 15: Schottky Normalized Maximum Transient Thermal Impedance