

AOL1700
N-Channel Enhancement Mode Field Effect Transistor
SRFET™
General Description

SRFET™ AOL1700 uses advanced trench technology with a monolithically integrated Schottky diode to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for use as a low side FET in SMPS, load switching and general purpose applications.

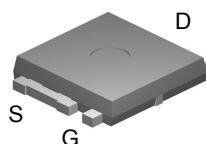
-RoHS Compliant
 -Halogen and Antimony Free Green Device*

Features

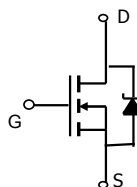
V_{DS} (V) = 30V
 I_D = 85A (V_{GS} = 10V)
 $R_{DS(ON)} < 4.2m\Omega$ (V_{GS} = 10V)
 $R_{DS(ON)} < 6.0m\Omega$ (V_{GS} = 4.5V)

UIS Tested!
 $R_g, C_{iss}, C_{oss}, C_{rss}$ Tested

Ultra SO-8™ Top View



Bottom tab
 connected to
 drain



SRFET™
 Soft Recovery MOSFET:
 Integrated Schottky Diode

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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^B	I_D	$T_C=25^\circ\text{C}^H$	A
		$T_C=100^\circ\text{C}$	
Pulsed Drain Current ^C	I_{DM}	200	
Continuous Drain Current ^A	I_{DSM}	$T_A=25^\circ\text{C}$	A
		$T_A=70^\circ\text{C}$	
Avalanche Current ^C	I_{AR}	30	A
Repetitive avalanche energy $L=0.3\text{mH}^C$	E_{AR}	135	mJ
Power Dissipation ^B	P_D	$T_C=25^\circ\text{C}$	W
		$T_C=100^\circ\text{C}$	
Power Dissipation ^A	P_{DSM}	$T_A=25^\circ\text{C}$	W
		$T_A=70^\circ\text{C}$	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	$t \leq 10\text{s}$	19.6	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A		Steady-State	50	$^\circ\text{C/W}$
Maximum Junction-to-Case ^D	$R_{\theta JC}$	1	1.5	$^\circ\text{C/W}$

Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=1\text{mA}$, $V_{GS}=0\text{V}$	30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=30\text{V}$, $V_{GS}=0\text{V}$ $T_J=125^{\circ}\text{C}$			0.1 20	mA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			0.1	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1.2	1.5	2.2	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	200			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=20\text{A}$ $T_J=125^{\circ}\text{C}$		3.4 5.2	4.2 6.5	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$, $I_D=20\text{A}$		4.8	6.0	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=20\text{A}$		90		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.36	0.5	V
I_S	Maximum Body-Diode + Schottky Diode Continuous Current ^H				85	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=15\text{V}$, $f=1\text{MHz}$		3760	4512	pF
C_{oss}	Output Capacitance			682		pF
C_{rss}	Reverse Transfer Capacitance			314		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		0.75	1.5	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $I_D=20\text{A}$		62	74	nC
$Q_g(4.5\text{V})$	Total Gate Charge			29	35	nC
Q_{gs}	Gate Source Charge			12		nC
Q_{gd}	Gate Drain Charge			12		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $R_L=0.75\Omega$, $R_{GEN}=3\Omega$		9.5		ns
t_r	Turn-On Rise Time			8.5		ns
$t_{D(off)}$	Turn-Off DelayTime			34		ns
t_f	Turn-Off Fall Time			9		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=20\text{A}$, $dI/dt=300\text{A}/\mu\text{s}$		18	27	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=20\text{A}$, $dI/dt=300\text{A}/\mu\text{s}$		22		nC

A: The value of $R_{\theta JA}$ is measured with the device in a still air environment with $T_A=25^{\circ}\text{C}$. The power dissipation P_{DSM} and current rating I_{DSM} are based on $T_{J(MAX)}=150^{\circ}\text{C}$, using steady-state junction-to-ambient thermal resistance.

B: The power dissipation P_D is based on $T_{J(MAX)}=175^{\circ}\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C: Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=175^{\circ}\text{C}$.

D: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.

E: The static characteristics in Figures 1 to 6 are obtained using <300 μs pulses, duty cycle 0.5% max.

F: These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}=175^{\circ}\text{C}$. The SOA curve provides a single pulse rating.

G: These tests are performed with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}\text{C}$.

H: The maximum current rating is limited by bond-wires.

* This device is guaranteed green after date code 8P11 (June 1ST 2008)

Rev3: Dec 2008

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

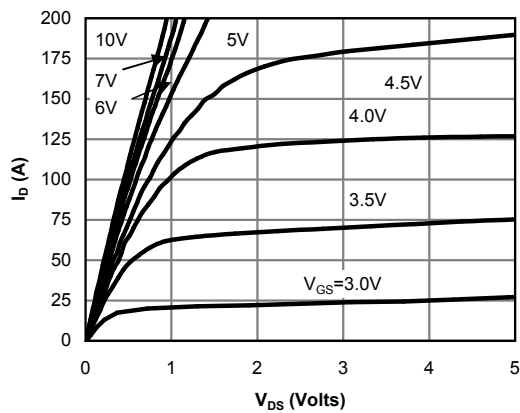


Figure 1: On-Region Characteristics

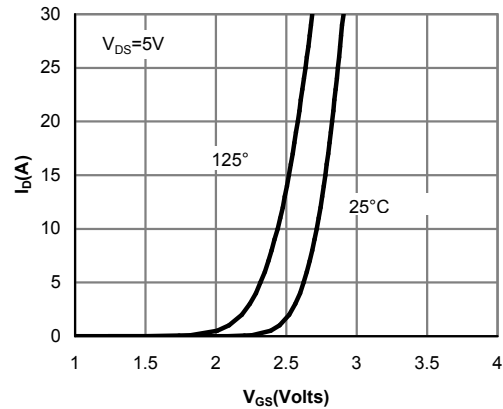


Figure 2: Transfer Characteristics

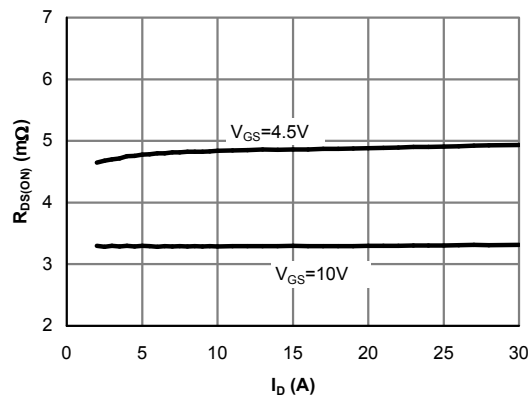


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

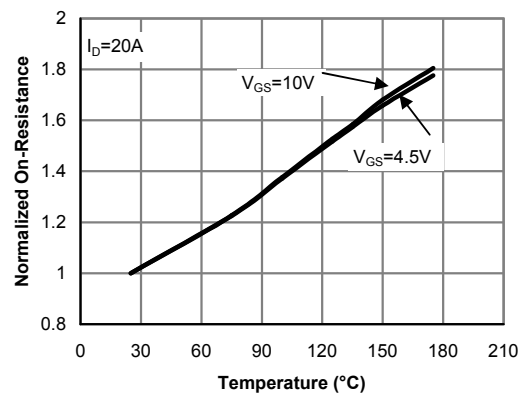


Figure 4: On-Resistance vs. Junction Temperature

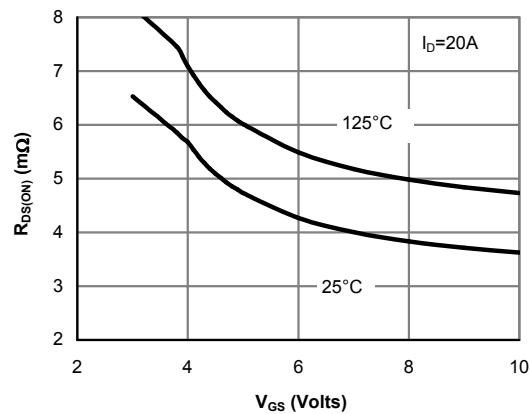


Figure 5: On-Resistance vs. Gate-Source Voltage

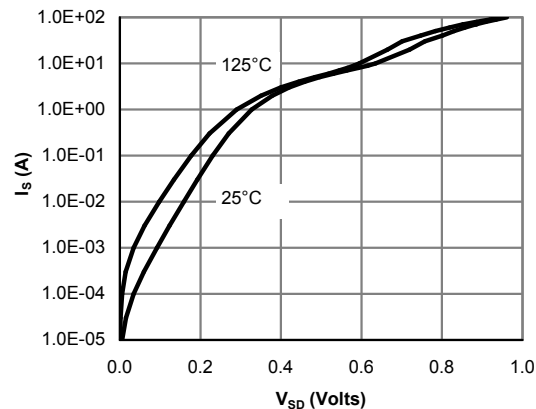


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

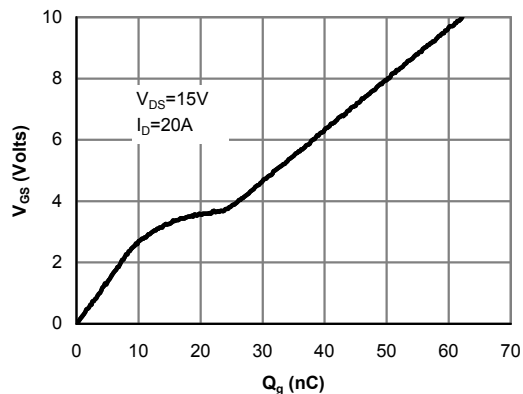


Figure 7: Gate-Charge Characteristics

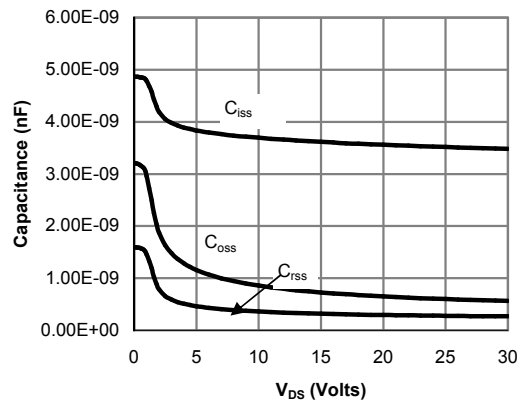


Figure 8: Capacitance Characteristics

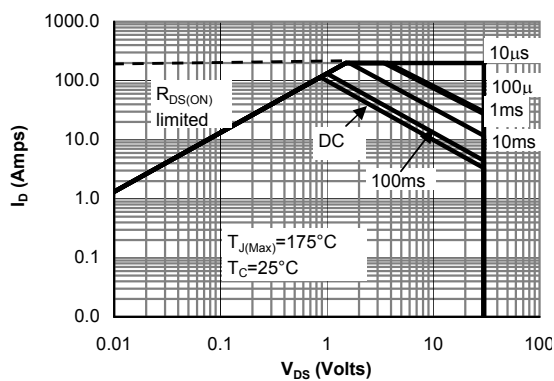


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

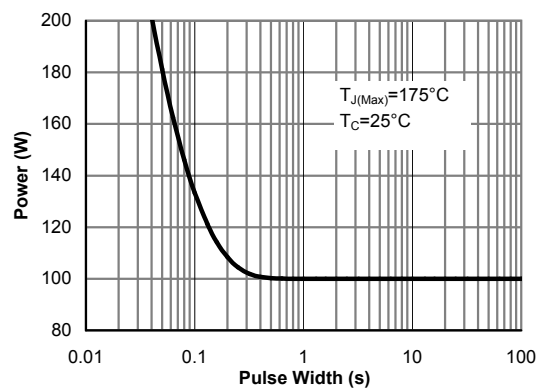


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

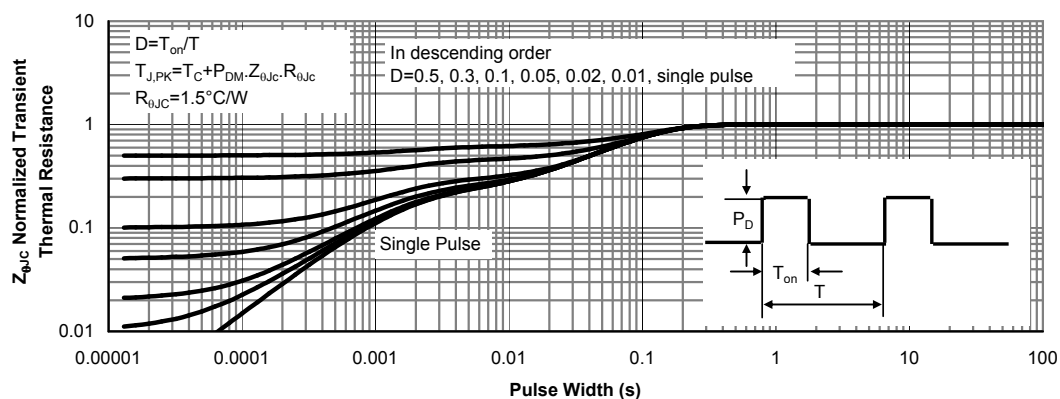


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

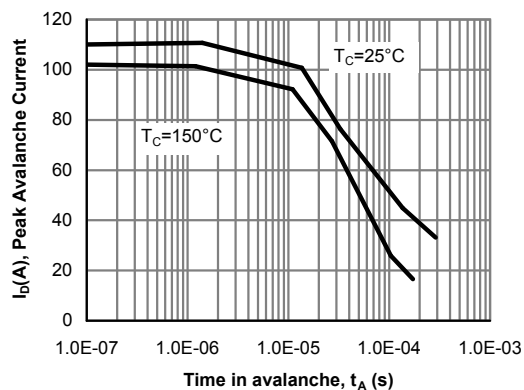


Figure 12: Single Pulse Avalanche capability

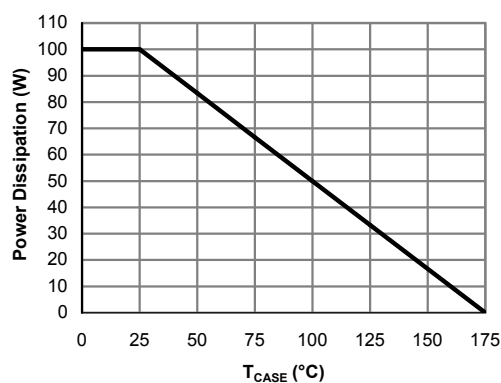


Figure 13: Power De-rating (Note B)

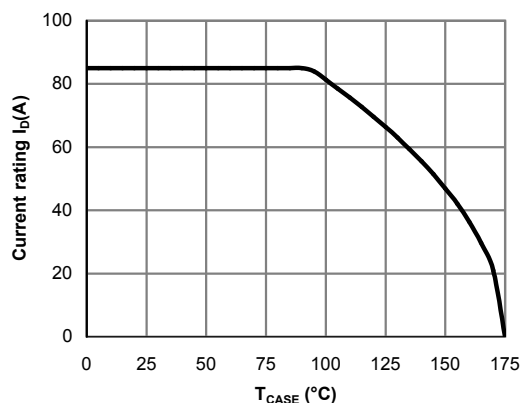


Figure 14: Current De-rating (Note B)

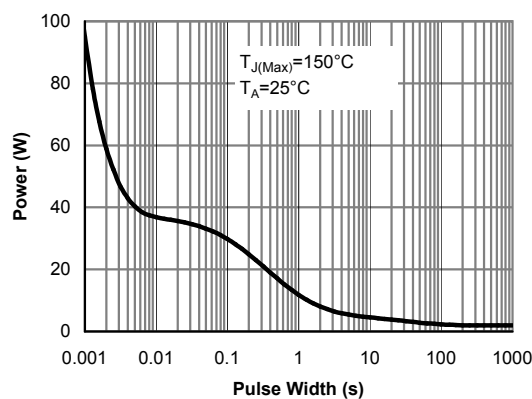


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note G)

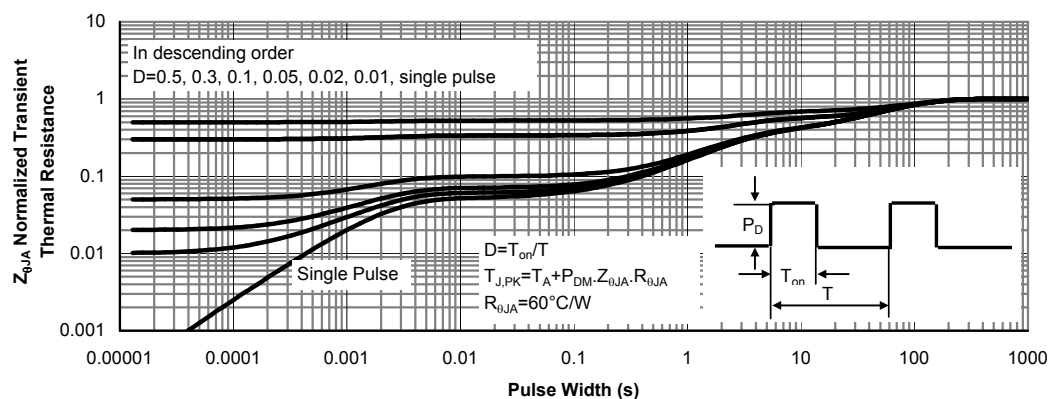
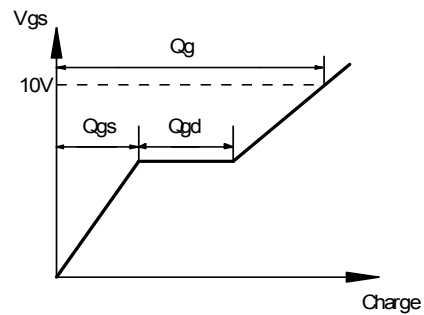
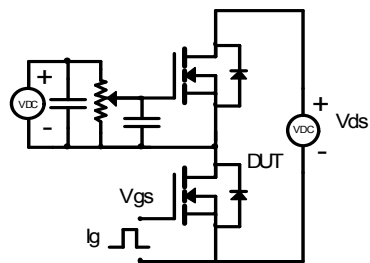
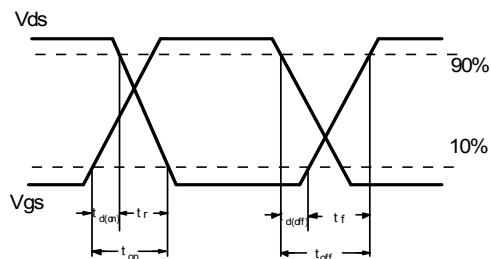
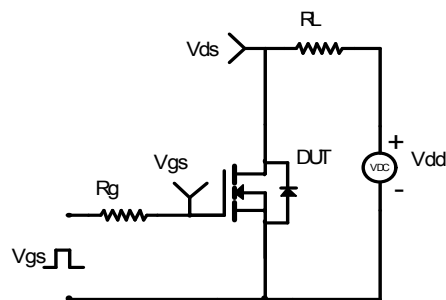


Figure 16: Normalized Maximum Transient Thermal Impedance (Note G)

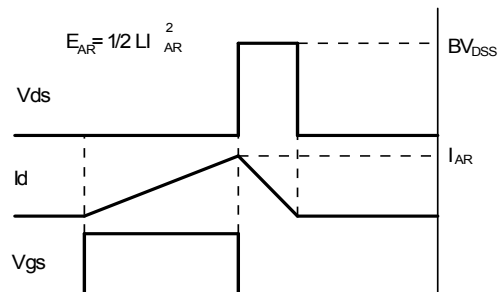
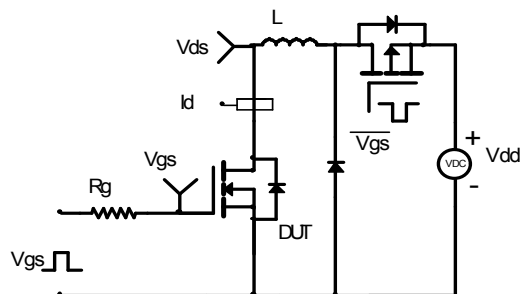
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

