



ALPHA & OMEGA
SEMICONDUCTOR

AON7700

N-Channel Enhancement Mode Field Effect Transistor

SRFET™



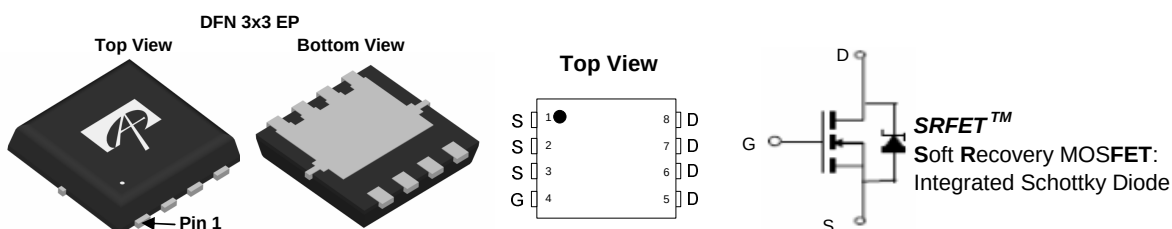
General Description

SRFET™ AON7700 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.

Features

V_{DS} (V) = 30V
 I_D = 20A (V_{GS} = 10V)
 $R_{DS(ON)} < 8.5m\Omega$ (V_{GS} = 10V)
 $R_{DS(ON)} < 10m\Omega$ (V_{GS} = 4.5V)

100% UIS Tested
100% Rg Tested



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}	± 12	V
Continuous Drain Current ^B	I_D	40	A
$T_C=25^\circ\text{C}$		30	
$T_C=100^\circ\text{C}$		30	
Pulsed Drain Current ^C	I_{DM}	80	A
Continuous Drain Current ^G	I_{DSM}	12	
$T_A=25^\circ\text{C}$		11	
$T_A=70^\circ\text{C}$	P_D	33	W
Power Dissipation ^B		13	
$T_C=25^\circ\text{C}$	P_{DSM}	3.1	
$T_C=100^\circ\text{C}$		2	
Power Dissipation ^A	P_{DSM}	3.1	W
$T_A=25^\circ\text{C}$		2	
$T_A=70^\circ\text{C}$		2	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	30	40	$^\circ\text{C/W}$
$t \leq 10s$		60	75	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	3.1	3.7	$^\circ\text{C/W}$
Steady-State		3.1	3.7	$^\circ\text{C/W}$
Maximum Junction-to-Case ^D	$R_{\theta JC}$	3.1	3.7	$^\circ\text{C/W}$

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} =30V, V _{GS} =0V T _J =55°C			100 500	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	1	1.7	3	V
I _{D(ON)}	On state drain current	V _{GS} =10V, V _{DS} =5V	80			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =12A T _J =125°C		6.7 9	8.5 12	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =12A		27		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.39	0.5	V
I _S	Maximum Body-Diode Continuous Current				6	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		3395	4250	pF
C _{oss}	Output Capacitance			490		pF
C _{rss}	Reverse Transfer Capacitance			185		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		1	1.5	Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =15V, I _D =10A		25	33	nC
Q _{gs}	Gate Source Charge			9.5		nC
Q _{gd}	Gate Drain Charge			8.4		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =1.25Ω, R _{GEN} =3Ω		11		ns
t _r	Turn-On Rise Time			16		ns
t _{D(off)}	Turn-Off DelayTime			38		ns
t _f	Turn-Off Fall Time			21		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =12A, dI/dt=100A/μs		28	36	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =12A, dI/dt=100A/μs		15		nC

A: The value of R_{θJA} is measured with the device in a still air environment with T_A=25°C. The power dissipation P_{DSM} and current rating I_{DSM} are based on T_{J(MAX)}=150°C, using t ≤ 10s junction-to-ambient thermal resistance.

B: The power dissipation P_D is based on T_{J(MAX)}=150°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)}=150°C.

D: The R_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} 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)}=150°C. The SOA curve provides a single pulse rating.

G: 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.

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

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

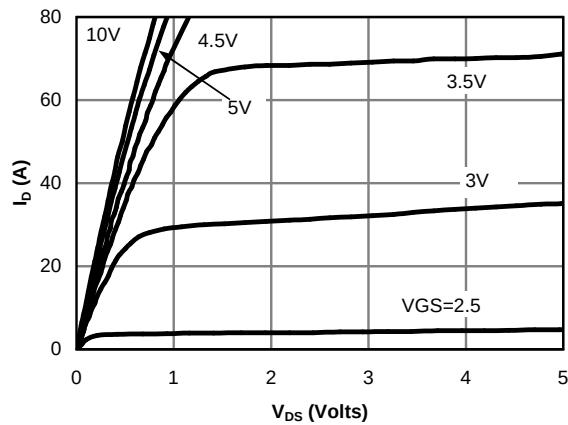


Figure 1: On-Region Characteristics

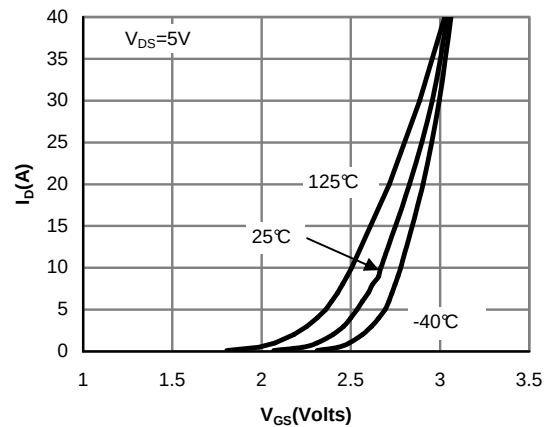


Figure 2: Transfer Characteristics

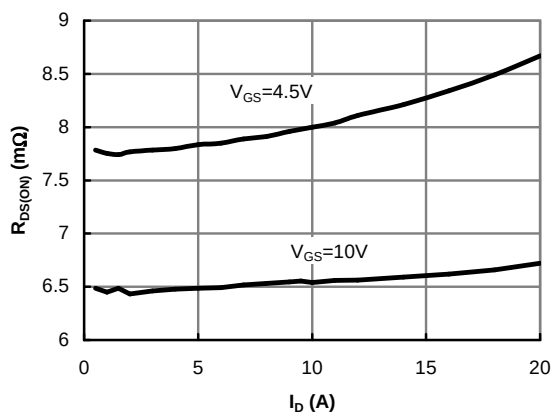


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

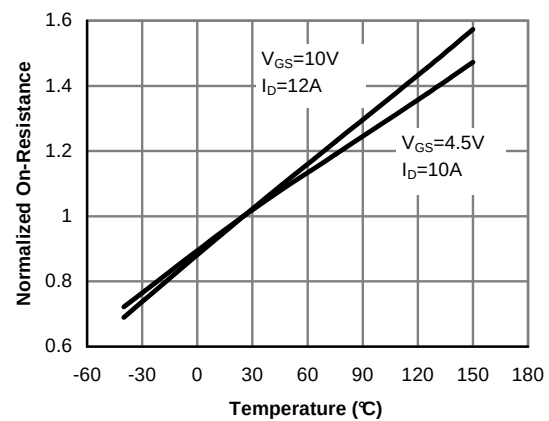


Figure 4: On-Resistance vs. Junction Temperature

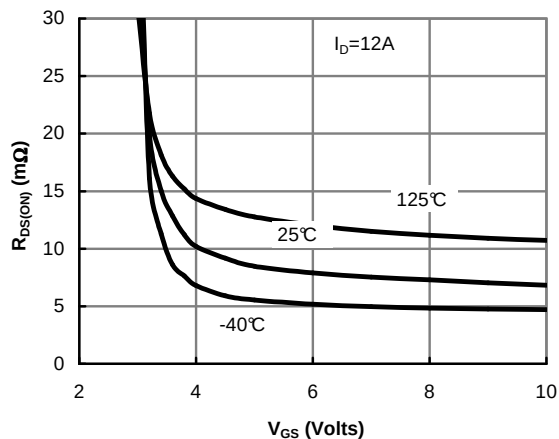


Figure 5: On-Resistance vs. Gate-Source Voltage

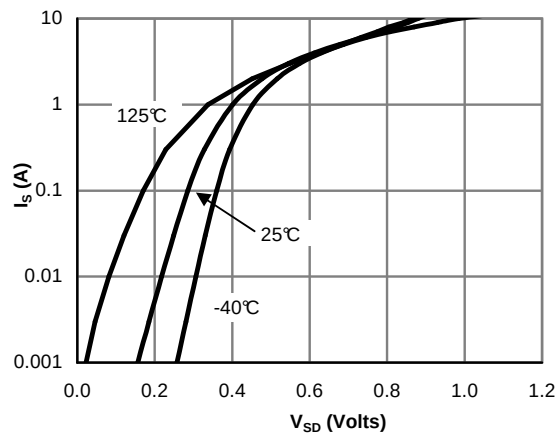


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

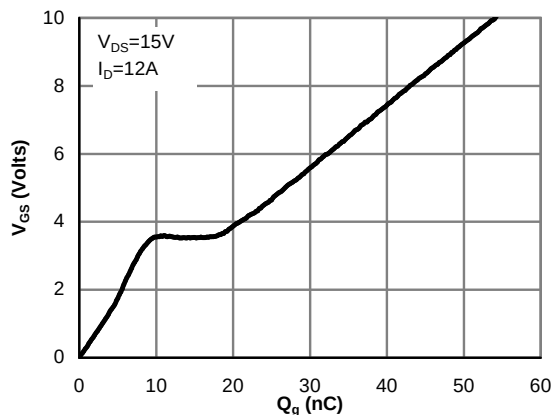


Figure 7: Gate-Charge Characteristics

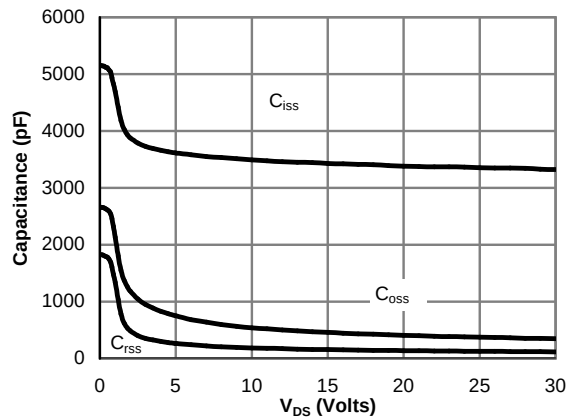


Figure 8: Capacitance Characteristics

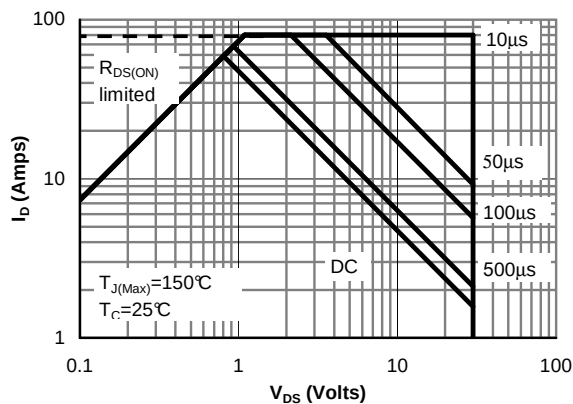


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

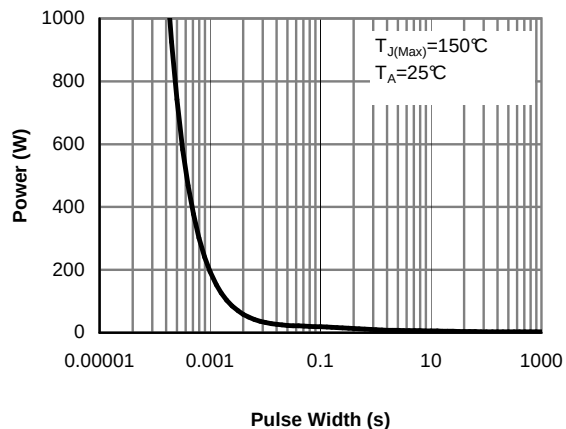


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note G)

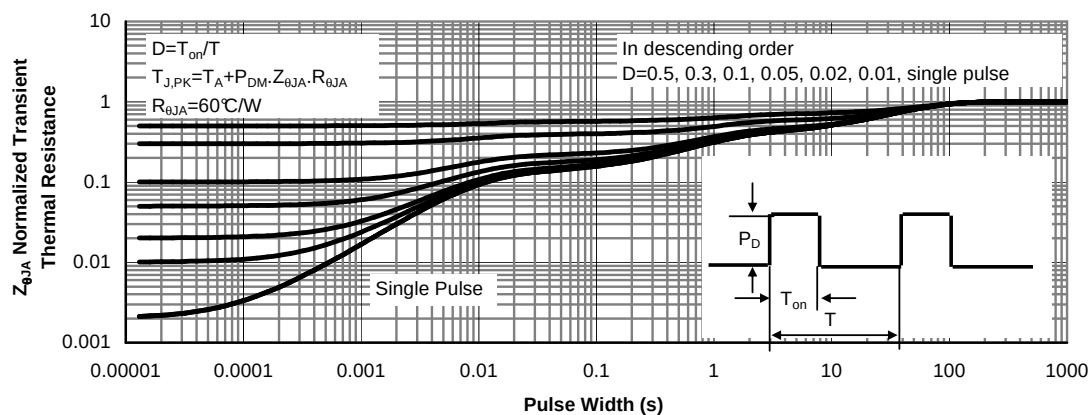
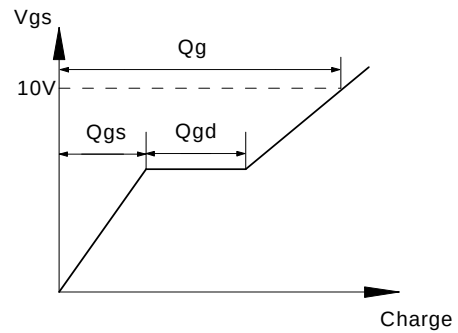
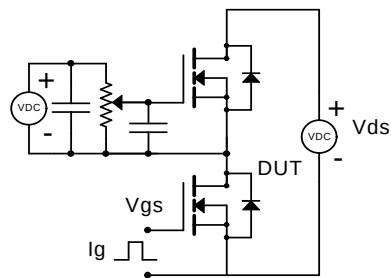
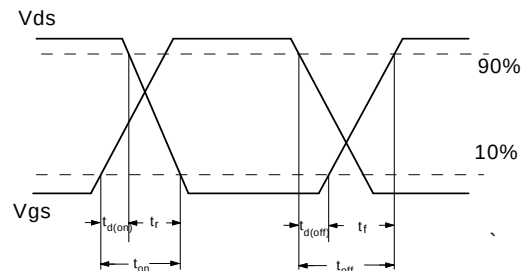
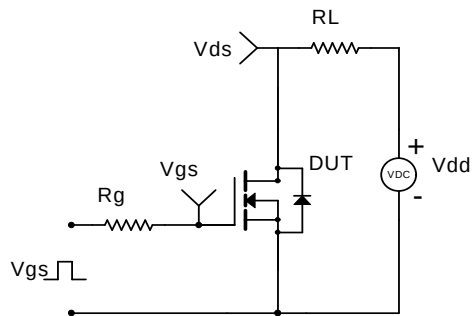


Figure 11: Normalized Maximum Transient Thermal Impedance (Note G)

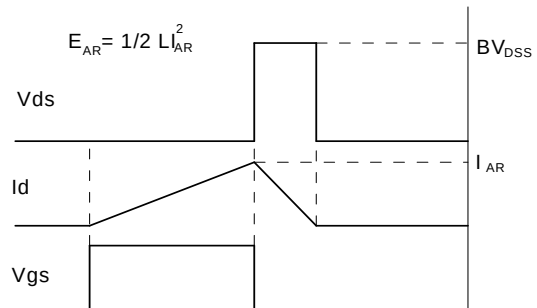
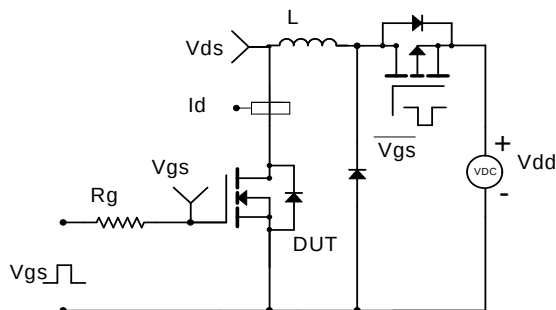
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

