ALPHA & OMEGA SEMICONDUCTOR

AOSP66919
100V N-Channel AlphaSGT^{TM}

General Description

- Trench Power AlphaSGT^{TM} technology
- Low R$_{DS(ON)}$
- Logic Level Driving
- Excellent Q$_g$ x R$_{DS(ON)}$ Product (FOM)
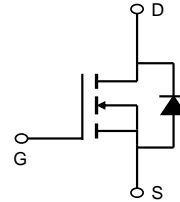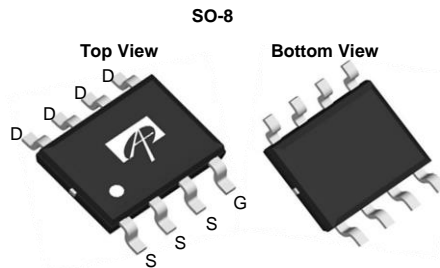- RoHS 2.0 and Halogen-Free Compliant

Applications

- High Frequency Switching and Synchronous Rectification

Product Summary

V$_{DS}$	100V
I$_D$ (at V$_{GS}$=10V)	16A
R$_{DS(ON)}$ (at V$_{GS}$=10V)	< 6.5mΩ
R$_{DS(ON)}$ (at V$_{GS}$=4.5V)	< 8.5mΩ

100% UIS Tested
100% Rg Tested

Green Product

SO-8

Top View **Bottom View**

Orderable Part Number	Package Type	Form	Minimum Order Quantity
AOSP66919	SO-8	Tape & Reel	3000

Absolute Maximum Ratings T$_A$=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V$_{DS}$	100	V
Gate-Source Voltage		V$_{GS}$	±20	V
Continuous Drain Current	T$_A$=25°C	I$_D$	16	A
	T$_A$=70°C		12	
Pulsed Drain Current ^{C}		I$_{DM}$	64	
Avalanche Current ^{C}		I$_{AS}$	48	A
Avalanche energy L=0.1mH ^{C}		E$_{AS}$	115	mJ
Power Dissipation ^{B}	T$_A$=25°C	P$_D$	3.1	W
	T$_A$=70°C		2.0	
Junction and Storage Temperature Range		T$_J$, T$_{STG}$	-55 to 150	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^{A}	t ≤ 10s	R$_{θJA}$	31	40	°C/W
Maximum Junction-to-Ambient $^{A D}$	Steady-State		59	75	°C/W
Maximum Junction-to-Lead	Steady-State	R$_{θJL}$	16	24	°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		100			V
I$_{DSS}$	Zero Gate Voltage Drain Current	V$_{DS}$=100V, V$_{GS}$=0V				1	μA
			T$_J$=55°C			5	
I$_{GSS}$	Gate-Body leakage current	V$_{DS}$=0V, V$_{GS}$=±20V				±100	nA
V$_{GS(th)}$	Gate Threshold Voltage	V$_{DS}$=V$_{GS,}$ I$_D$=250μA		1.5	2	2.6	V
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$=10V, I$_D$=16A			5.4	6.5	mΩ
			T$_J$=125°C		9.5	11.5	
		V$_{GS}$=4.5V, I$_D$=16A			6.8	8.5	mΩ
g$_{FS}$	Forward Transconductance	V$_{DS}$=5V, I$_D$=16A			80		S
V$_{SD}$	Diode Forward Voltage	I$_S$=1A, V$_{GS}$=0V			0.7	1	V
I$_S$	Maximum Body-Diode Continuous Current					4	A
DYNAMIC PARAMETERS							
C$_{iss}$	Input Capacitance	V$_{GS}$=0V, V$_{DS}$=50V, f=1MHz			3420		pF
C$_{oss}$	Output Capacitance				790		pF
C$_{rss}$	Reverse Transfer Capacitance				14		pF
R$_g$	Gate resistance	f=1MHz		0.8	1.7	2.7	Ω
SWITCHING PARAMETERS							
Q$_g$(10V)	Total Gate Charge	V$_{GS}$=10V, V$_{DS}$=50V, I$_D$=16A			47	66	nC
Q$_g$(4.5V)	Total Gate Charge				22	31	nC
Q$_{gs}$	Gate Source Charge				10		nC
Q$_{gd}$	Gate Drain Charge				5		nC
Q$_{oss}$	Output Charge	V$_{GS}$=0V, V$_{DS}$=50V			70		nC
t$_{D(on)}$	Turn-On DelayTime	V$_{GS}$=10V, V$_{DS}$=50V, R$_L$=3.1Ω, R$_{GEN}$=3Ω			11		ns
t$_r$	Turn-On Rise Time				5.5		ns
t$_{D(off)}$	Turn-Off DelayTime				43		ns
t$_f$	Turn-Off Fall Time				9.5		ns
t$_{rr}$	Body Diode Reverse Recovery Time	I$_F$=16A, di/dt=500A/μs			36		ns
Q$_{rr}$	Body Diode Reverse Recovery Charge	I$_F$=16A, di/dt=500A/μs			214		nC

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 given application depends on the user's specific board design.

B. The power dissipation P$_D$ is based on T$_{J(MAX)}$=150° C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature T$_{J(MAX)}$=150° C. Ratings are based on low frequency and duty cycles to keep initialT$_J$=25° C.

D. The R$_{θJA}$ is the sum of the thermal impedance from junction to lead R$_{θJL}$ and lead to ambient.

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

F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T$_{J(MAX)}$=150° C. The SOA curve provides a single pulse rating.

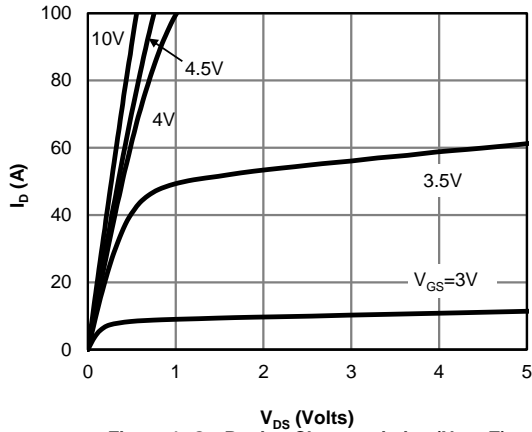## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

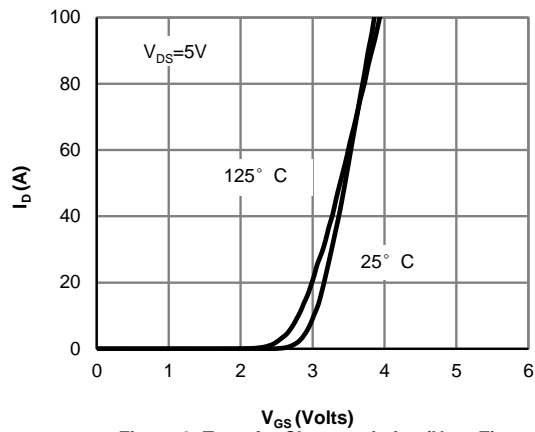**Figure 1: On-Region Characteristics (Note E)**
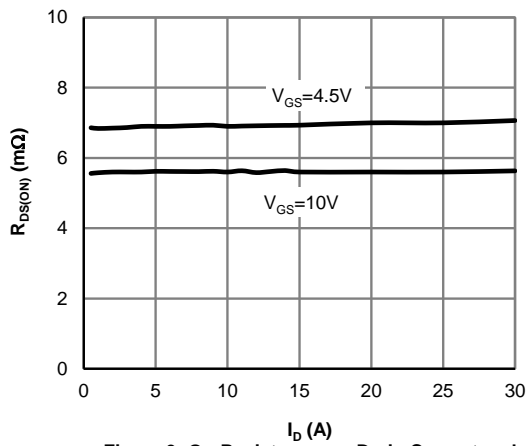
Figure 2: Transfer Characteristics (Note E)

Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)
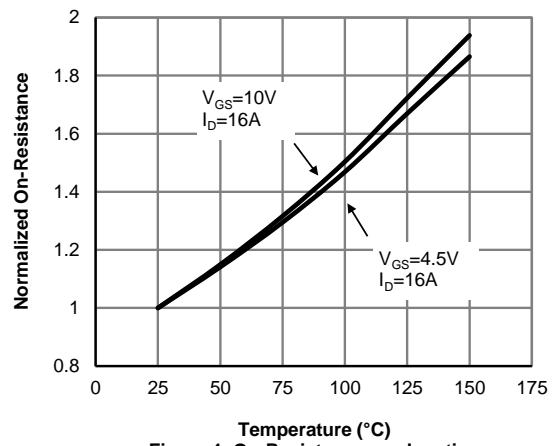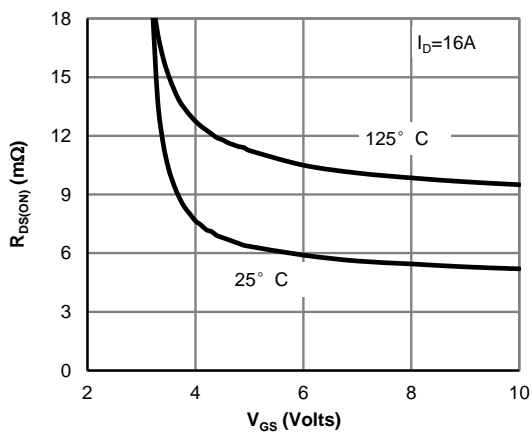
Figure 4: On-Resistance vs. Junction Temperature (Note E)
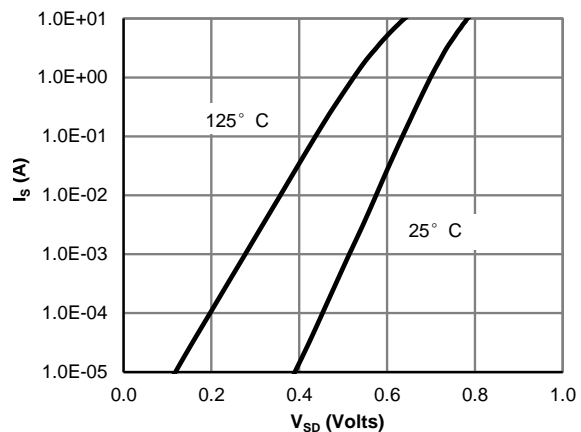
Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

Figure 6: Body-Diode Characteristics (Note E)

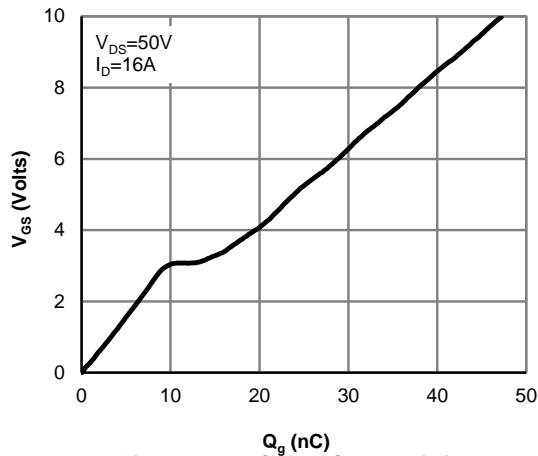## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
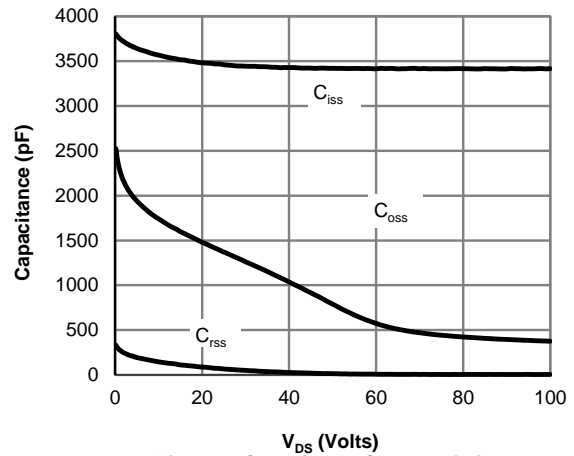

Figure 7: Gate-Charge Characteristics

$V_{DS}=50V$
$I_D=16A$

Figure 8: Capacitance Characteristics

C_{iss}
C_{oss}
C_{rss}

$R_{DS(ON)}$ limited

10μs
100μs
1ms
10ms

DC

$T_{J(Max)}=150°C$
$T_A=25°C$

$V_{GS}>$ or equal to 4.5V
Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

$T_{J(Max)}=150°C$
$T_A=25°C$

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

$D=T_{on}/T$
$T_{J,PK}=T_A+P_{DM}.Z_{\theta JA}.R_{\theta JA}$
$R_{\theta JA}=75°C/W$

In descending order
D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pulse
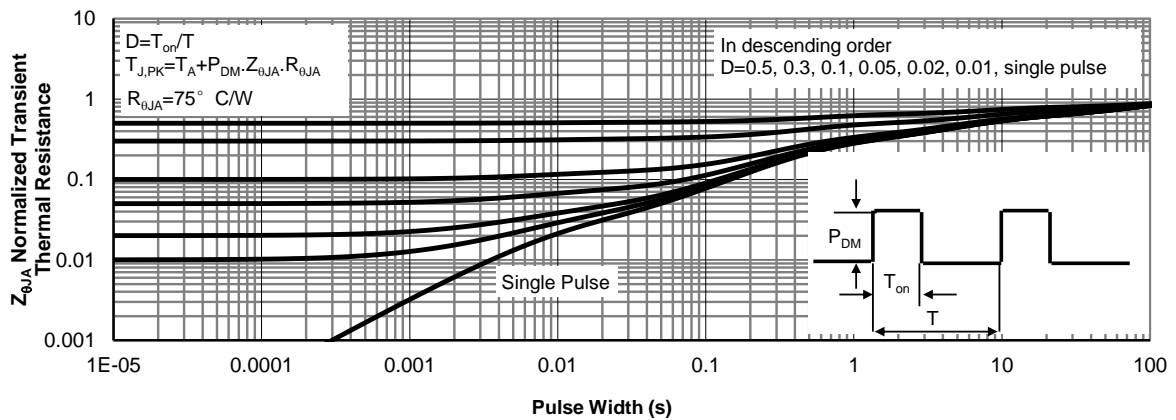
Single Pulse

P_{DM}
T_{on}
T

Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)
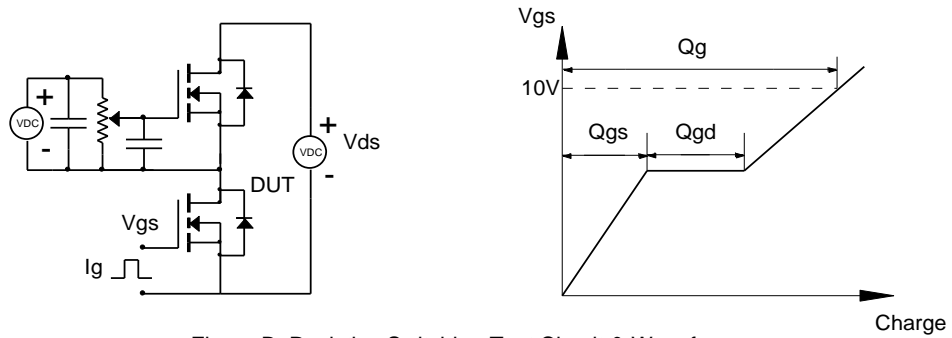
Figure A: Gate Charge Test Circuit & Waveforms

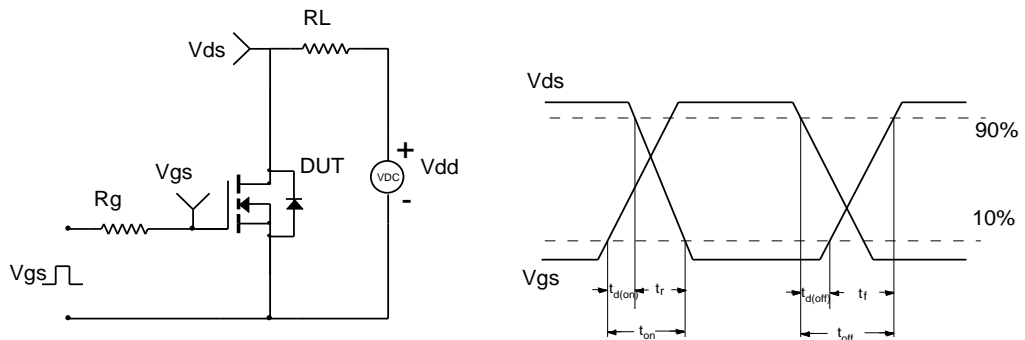Figure B: Resistive Switching Test Circuit & Waveforms

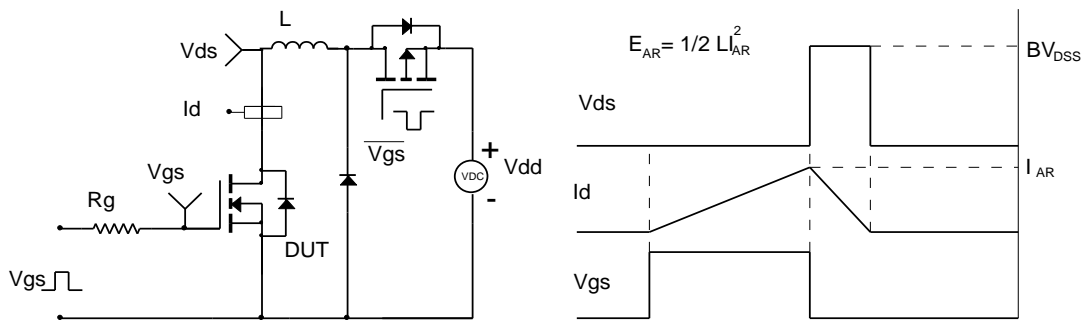Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

$$E_{AR} = 1/2 \, LI_{AR}^2$$

Figure D: Diode Recovery Test Circuit & Waveforms

$$Q_{rr} = \int Idt$$