



**ALPHA & OMEGA**  
SEMICONDUCTOR

**AONS66814**  
**80V N-Channel AlphaSGT2™**

### General Description

- AlphaSGT2™ N-Channel Power MOSFET
- Low  $R_{DS(ON)}$
- Low Gate Charge
- Enhanced body diode performance
- RoHS 2.0 and Halogen-Free Compliant

### Applications

- DC Motor Drive and BMS industrial application.
- Synchronous Rectification in DC/DC and AC/DC Converters

### Product Summary

$V_{DS}$	80V
$I_D$ (at $V_{GS}=10V$ )	310A
$R_{DS(ON)}$ (at $V_{GS}=10V$ )	< 2.4mΩ
$R_{DS(ON)}$ (at $V_{GS}=8V$ )	< 2.8mΩ

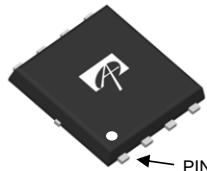
100% UIS Tested  
100%  $R_g$  Tested

Max  $T_j=175^\circ C$

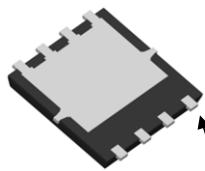


**DFN5x6**

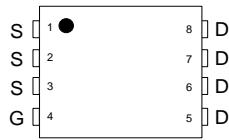
Top View



Bottom View



Top View



PIN1



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AONS66814	DFN 5x6	Tape & Reel	3000

### Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	80	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	310	A
$T_C=100^\circ C$		220	
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	540	
Continuous Drain Current	$I_{DSM}$	41	A
$T_A=70^\circ C$		34	
Avalanche Current <sup>C</sup>	$I_{AS}$	67	A
Avalanche energy $L=0.1mH$ <sup>C</sup>	$E_{AS}$	224	mJ
Power Dissipation <sup>B</sup>	$P_D$	500	W
$T_C=100^\circ C$		250	
Power Dissipation <sup>A</sup>	$P_{DSM}$	8.8	W
$T_A=70^\circ C$		6	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 175	°C

### Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup> $t \leq 10s$	$R_{\theta JA}$	14	17	°C/W
Maximum Junction-to-Ambient <sup>A,D</sup> Steady-State		40	50	°C/W
Maximum Junction-to-Case	$R_{\theta JC}$	0.2	0.3	°C/W

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$\text{BV}_{\text{DSS}}$	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	80			V
$I_{\text{DSS}}$	Zero Gate Voltage Drain Current	$V_{DS}=80\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$		1	5	$\mu\text{A}$
$I_{\text{GSS}}$	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm20\text{V}$			$\pm100$	nA
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	2.6	3.2	3.8	V
$R_{\text{DS(ON)}}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=20\text{A}$ $T_J=125^\circ\text{C}$	2	2.4	4.1	$\text{m}\Omega$
		$V_{GS}=8\text{V}, I_D=20\text{A}$		3.4	2.2	$\text{m}\Omega$
$g_{\text{FS}}$	Forward Transconductance	$V_{DS}=5\text{V}, I_D=20\text{A}$		60		S
$V_{\text{SD}}$	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.7	1	V
$I_S$	Maximum Body-Diode Continuous Current				200	A
<b>DYNAMIC PARAMETERS</b>						
$C_{\text{iss}}$	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=40\text{V}, f=1\text{MHz}$		5000		pF
$C_{\text{oss}}$	Output Capacitance			1290		pF
$C_{\text{rss}}$	Reverse Transfer Capacitance			25		pF
$R_g$	Gate resistance	$f=1\text{MHz}$	0.3	0.75	1.2	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=40\text{V}, I_D=20\text{A}$		66	95	nC
$Q_{\text{gs}}$	Gate Source Charge			19.5		nC
$Q_{\text{gd}}$	Gate Drain Charge			12.5		nC
$Q_{\text{oss}}$	Output Charge	$V_{GS}=0\text{V}, V_{DS}=40\text{V}$		97		nC
$t_{\text{D(on)}}$	Turn-On DelayTime	$V_{GS}=10\text{V}, V_{DS}=40\text{V}, R_L=2\Omega, R_{\text{GEN}}=3\Omega$		17.5		ns
$t_r$	Turn-On Rise Time			6		ns
$t_{\text{D(off)}}$	Turn-Off DelayTime			43		ns
$t_f$	Turn-Off Fall Time			9		ns
$t_{\text{rr}}$	Body Diode Reverse Recovery Time	$I_F=20\text{A}, \text{di}/\text{dt}=500\text{A}/\mu\text{s}$		35		ns
$Q_{\text{rr}}$	Body Diode Reverse Recovery Charge	$I_F=20\text{A}, \text{di}/\text{dt}=500\text{A}/\mu\text{s}$		192		nC

A. The value of  $R_{\text{BJA}}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The Power dissipation  $P_{\text{DSM}}$  is based on  $R_{\text{BJA}} \leq 10\text{s}$  and the maximum allowed junction temperature of  $175^\circ\text{C}$ . The value in any given application depends on the user's specific board design.

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

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

D. The  $R_{\text{BJA}}$  is the sum of the thermal impedance from junction to case  $R_{\text{JJC}}$  and case to ambient.

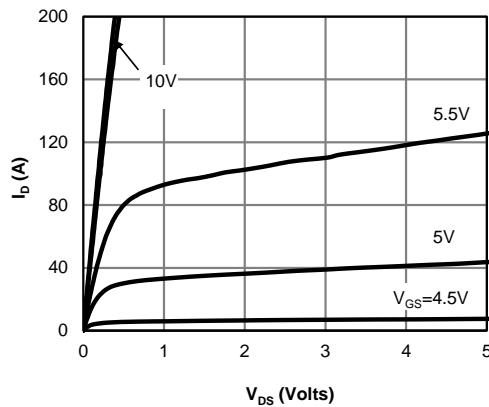
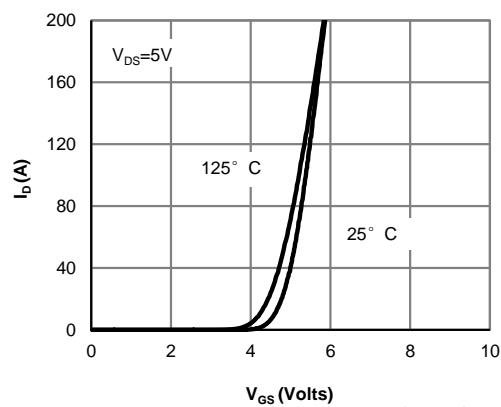
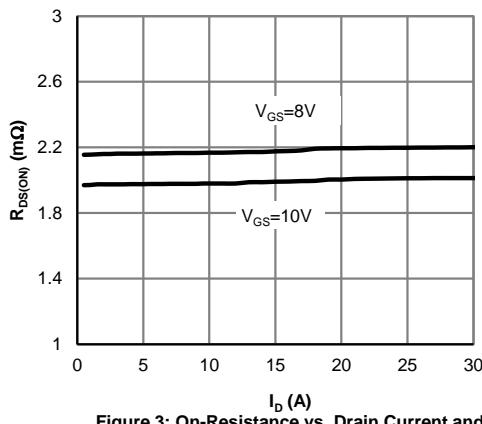
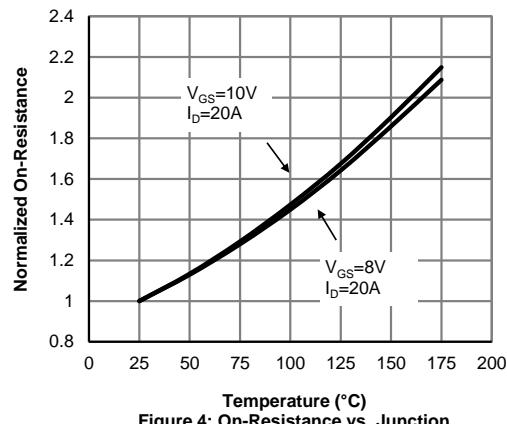
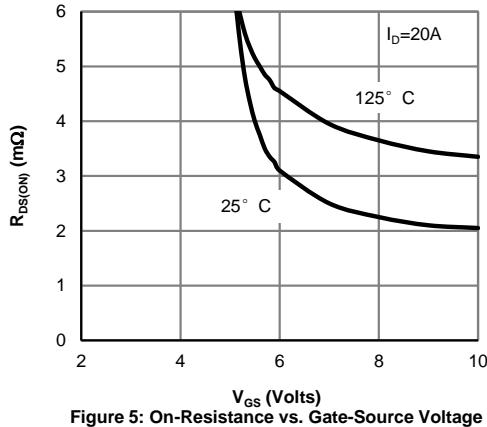
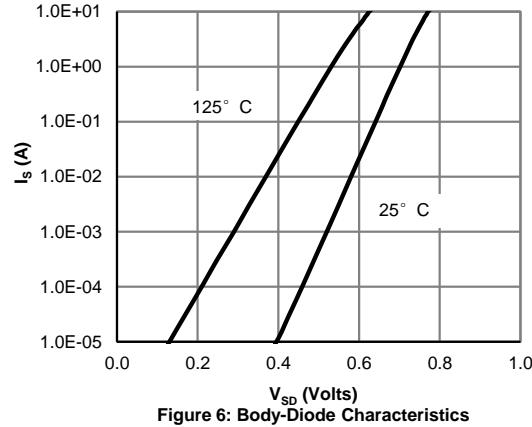
E. The static characteristics in Figures 1 to 6 are obtained using  $<300\mu\text{s}$  pulses, duty cycle 0.5% max.

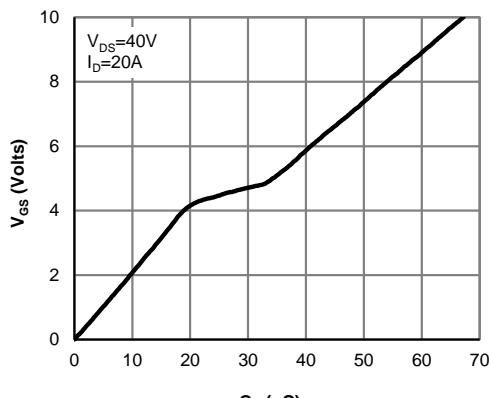
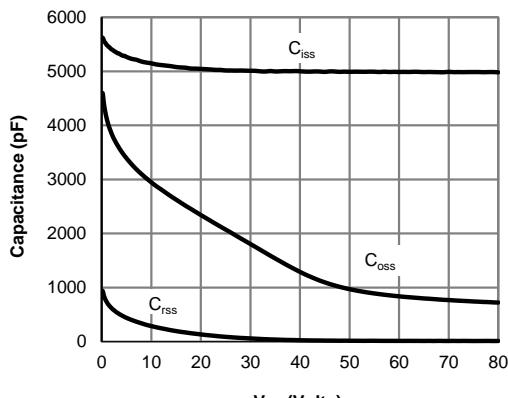
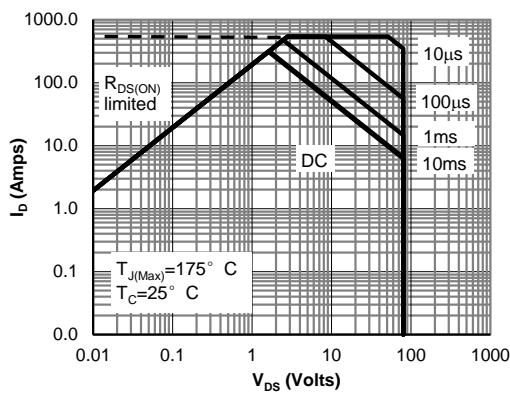
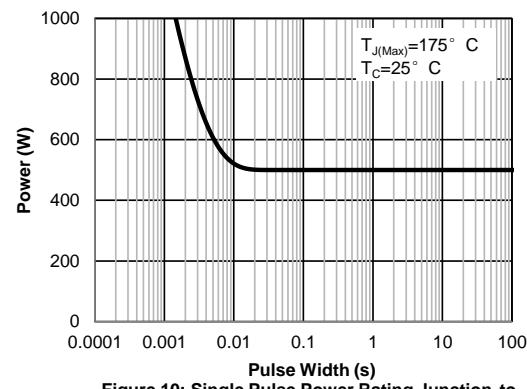
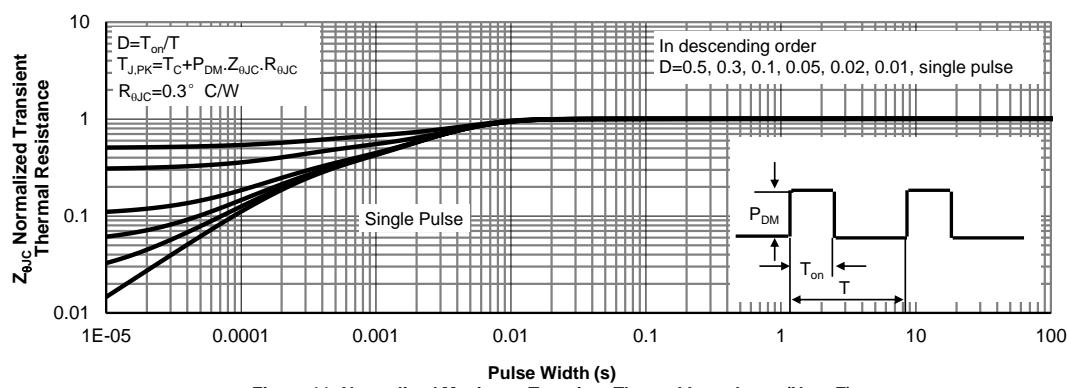
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of  $T_{J(\text{MAX})}=175^\circ\text{C}$ . The SOA curve provides a single pulse rating.

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

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**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**

**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)**

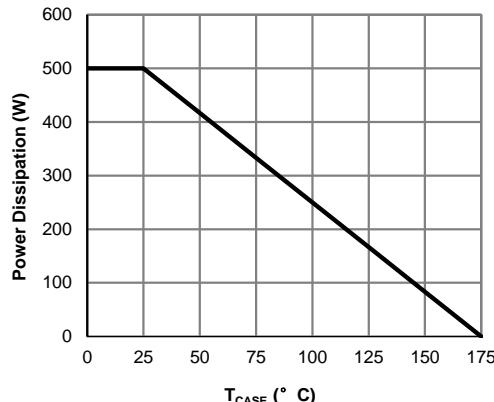
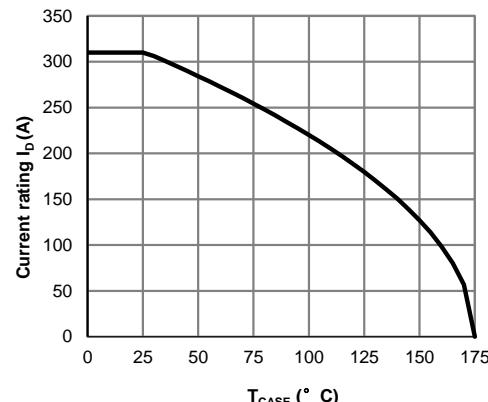
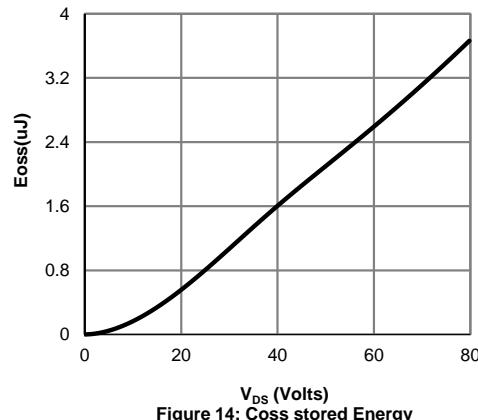
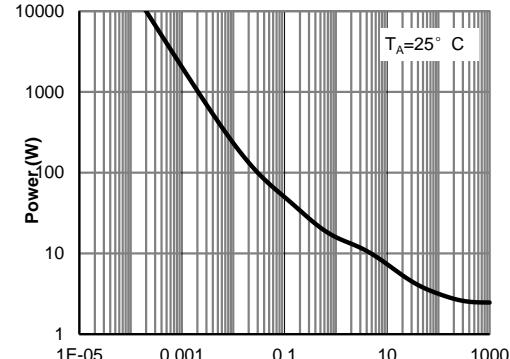
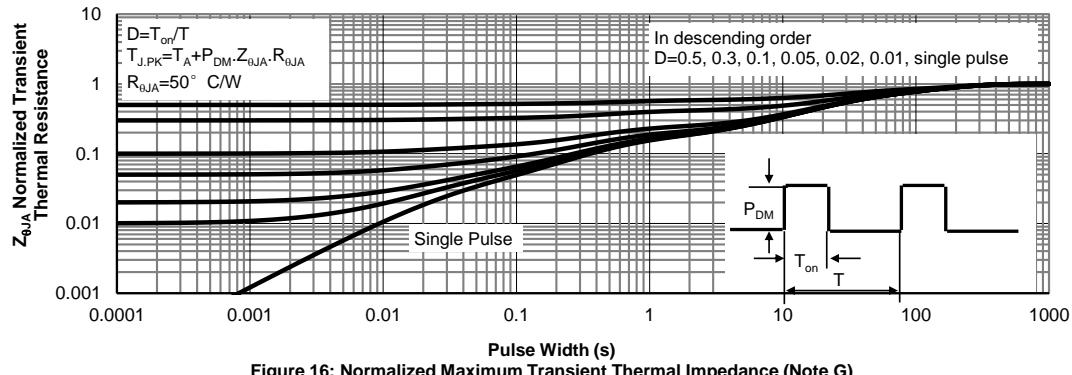
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

**Figure 12: Power De-rating (Note F)**

**Figure 13: Current De-rating (Note F)**

**Figure 14: Coss stored Energy**

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

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

Figure A: Gate Charge Test Circuit &amp; Waveforms

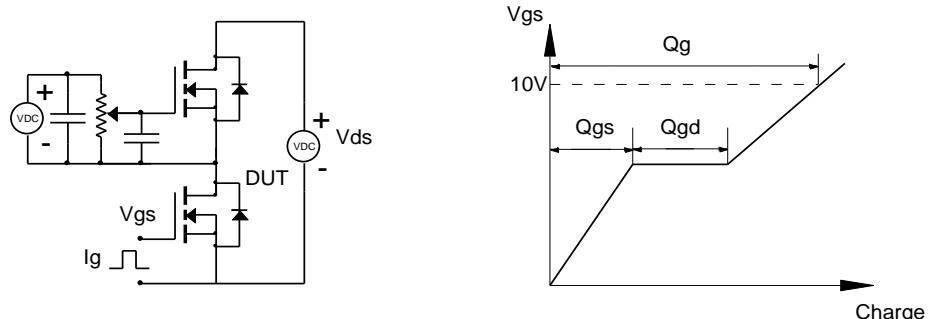


Figure B: Resistive Switching Test Circuit &amp; Waveforms

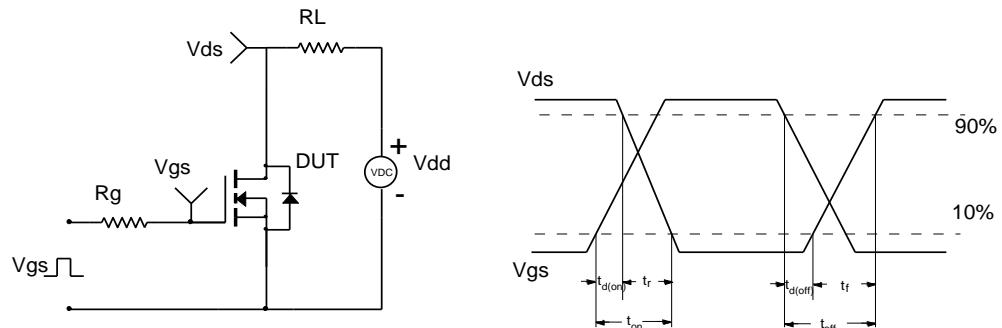


Figure C: Unclamped Inductive Switching (UIS) Test Circuit &amp; Waveforms

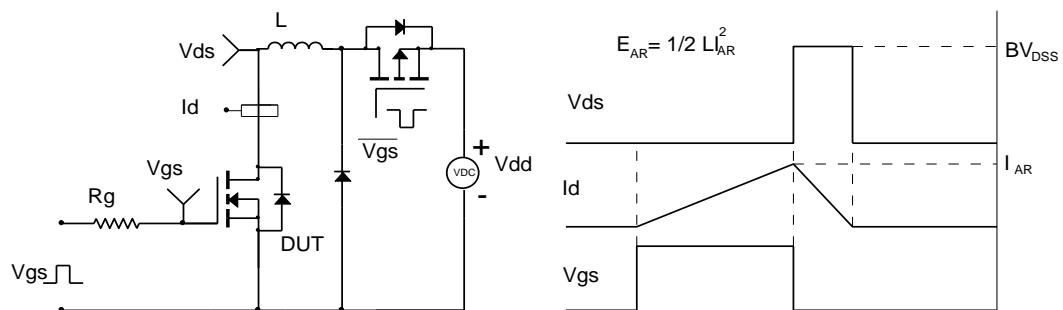


Figure D: Diode Recovery Test Circuit &amp; Waveforms

