



**ALPHA & OMEGA**  
SEMICONDUCTOR

**AOSN32338C**  
**30V N-Channel MOSFET**

### General Description

- Trench Power MOSFET technology
- Low  $R_{DS(ON)}$
- Low Gate Charge
- RoHS and Halogen-Free Compliant

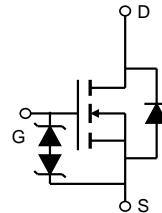
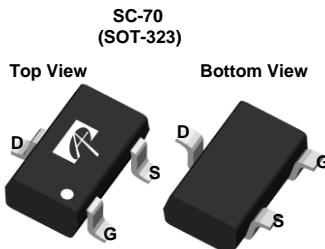
### Applications

- Ideal for Load Switching

### Product Summary

$V_{DS}$	30V
$I_D$ (at $V_{GS}=10V$ )	3.7A
$R_{DS(ON)}$ (at $V_{GS}=10V$ )	< 51mΩ
$R_{DS(ON)}$ (at $V_{GS}=4.5V$ )	< 56mΩ
$R_{DS(ON)}$ (at $V_{GS}=2.5V$ )	< 72mΩ

ESD protection



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AOSN32338C	SC70-3	Tape & Reel	3000

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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current <sup>A</sup>	$I_D$	3.7	A
Current <sup>B</sup>		2.9	
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	20	
Power Dissipation <sup>B</sup>	$P_D$	1.1	W
Temperature Range <sup>D</sup>		0.7	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	°C

### Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	90	110	°C/W
Maximum Junction-to-Ambient <sup>A,D</sup>		110	135	°C/W
Maximum Junction-to-Lead	$R_{\theta JL}$	60	72	°C/W

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=30\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$		1	5	$\mu\text{A}$
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 12\text{V}$			$\pm 10$	$\mu\text{A}$
$V_{GS(\text{th})}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	0.5	1	1.5	V
$R_{DS(\text{ON})}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=3.7\text{A}$		42	51	$\text{m}\Omega$
		$T_J=125^\circ\text{C}$		58	70	
		$V_{GS}=4.5\text{V}, I_D=3.5\text{A}$		42	56	
		$V_{GS}=2.5\text{V}, I_D=3.1\text{A}$		54	72	$\text{m}\Omega$
		$V_{DS}=5\text{V}, I_D=3.7\text{A}$		20		
		$I_S=1\text{A}, V_{GS}=0\text{V}$		0.7	1	V
$I_S$	Maximum Body-Diode Continuous Current				1	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=15\text{V}, f=1\text{MHz}$		340		pF
$C_{oss}$	Output Capacitance			30		pF
$C_{rss}$	Reverse Transfer Capacitance			25		pF
$R_g$	Gate resistance	$f=1\text{MHz}$	4	8	12	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=15\text{V}, I_D=3.7\text{A}$		8	16	nC
$Q_g(4.5\text{V})$	Total Gate Charge			4	8	nC
$Q_{gs}$	Gate Source Charge			1		nC
$Q_{gd}$	Gate Drain Charge			1.2		nC
$t_{D(\text{on})}$	Turn-On DelayTime	$V_{GS}=10\text{V}, V_{DS}=15\text{V}, R_L=4.05\Omega, R_{\text{GEN}}=3\Omega$		2.5		ns
$t_r$	Turn-On Rise Time			3		ns
$t_{D(\text{off})}$	Turn-Off DelayTime			30		ns
$t_f$	Turn-Off Fall Time			5		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=3.7\text{A}, di/dt=500\text{A}/\mu\text{s}$		5.5		ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=3.7\text{A}, di/dt=500\text{A}/\mu\text{s}$		4		nC

A. The value of  $R_{\text{QJA}}$  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 value in any given application depends on the user's specific board design.

B. The power dissipation  $P_D$  is based on  $T_{J(\text{MAX})}=150^\circ\text{ C}$ , using  $\leq 10\text{s}$  junction-to-ambient thermal resistance.

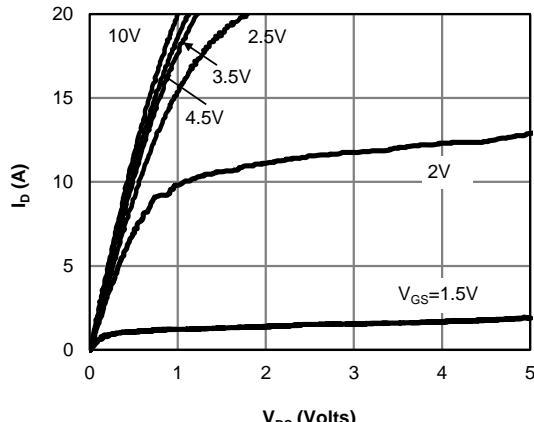
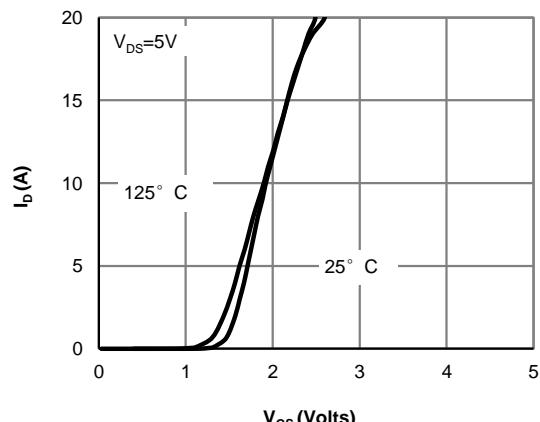
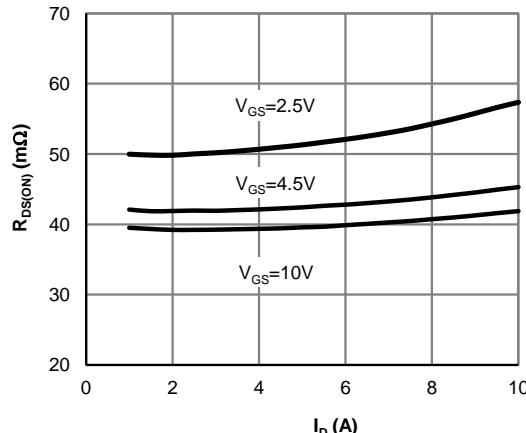
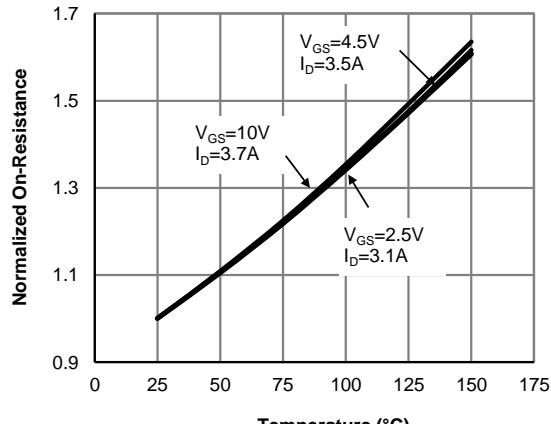
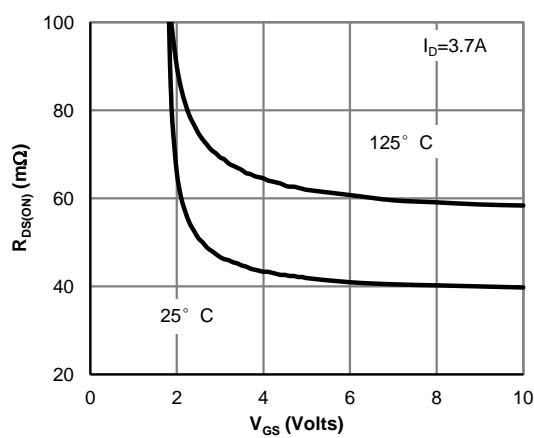
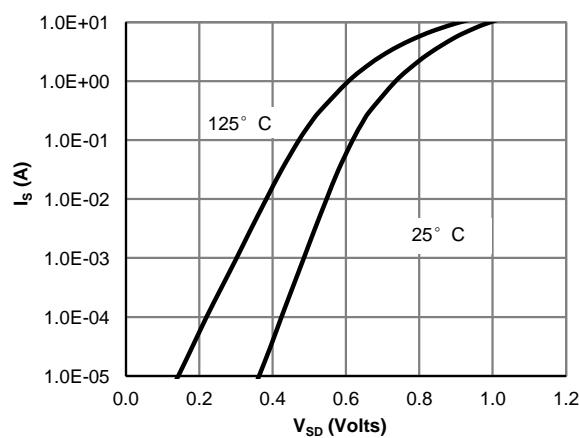
C. Repetitive rating, pulse width limited by junction temperature  $T_{J(\text{MAX})}=150^\circ\text{ C}$ . Ratings are based on low frequency and duty cycles to keep initial  $T_J=25^\circ\text{ C}$ .

D. The  $R_{\text{QJA}}$  is the sum of the thermal impedance from junction to lead  $R_{\text{QJL}}$  and lead 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-ambient thermal impedance which is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, assuming a maximum junction temperature of  $T_{J(\text{MAX})}=150^\circ\text{ C}$ . The SOA curve provides a single pulse rating.

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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)**

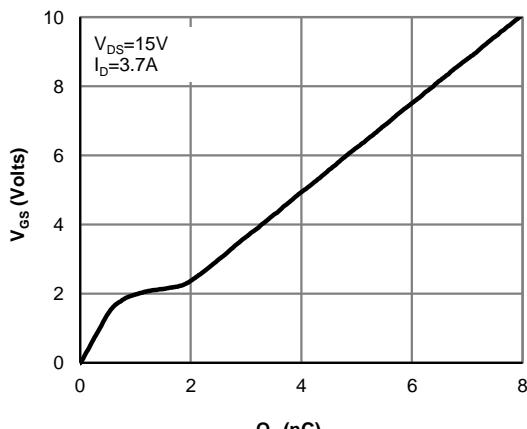
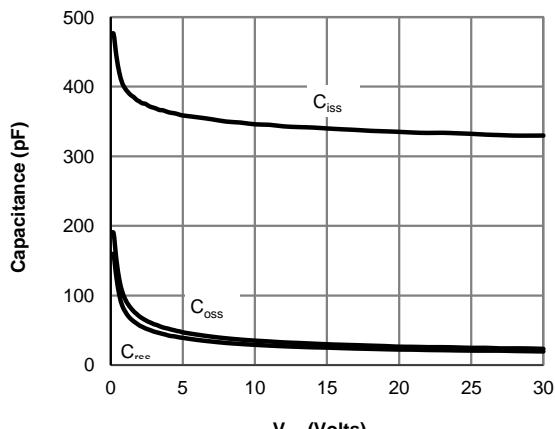
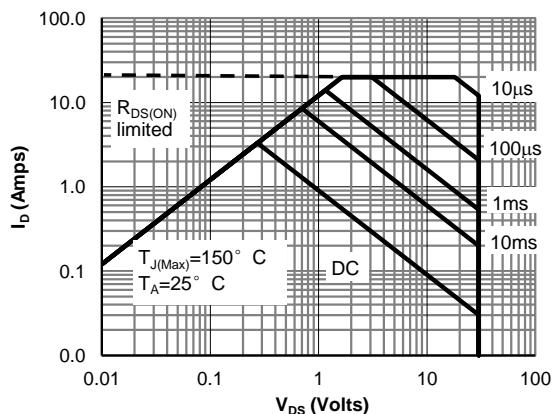
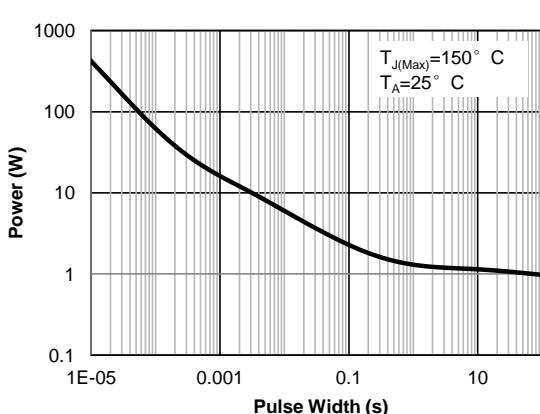
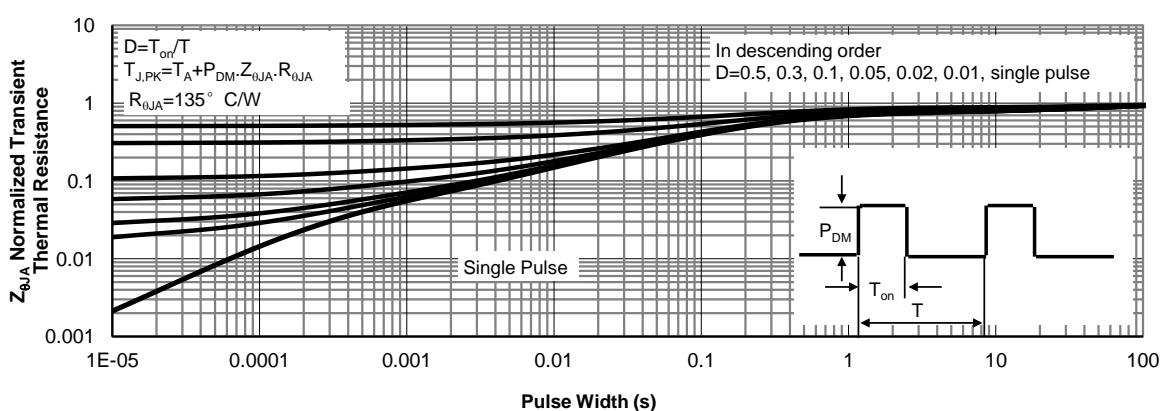
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

**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-Ambient (Note F)**

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

Figure A: Gate Charge Test Circuit &amp; Waveforms

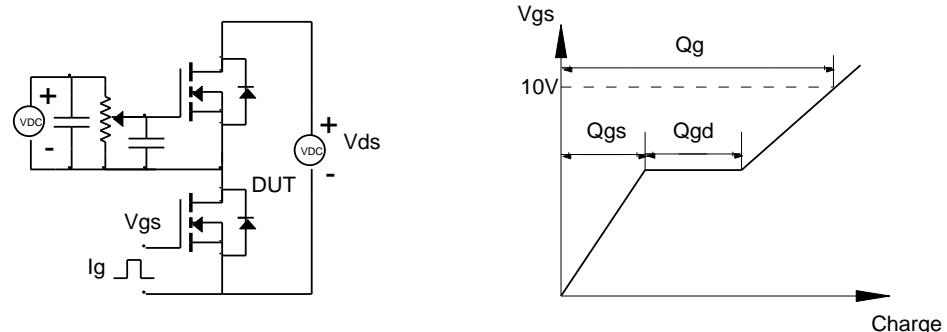


Figure B: Resistive Switching Test Circuit &amp; Waveforms

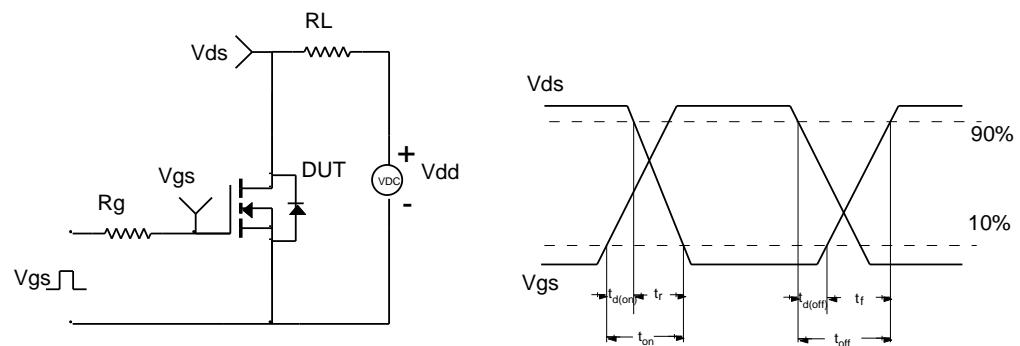


Figure C: Unclamped Inductive Switching (UIS) Test Circuit &amp; Waveforms

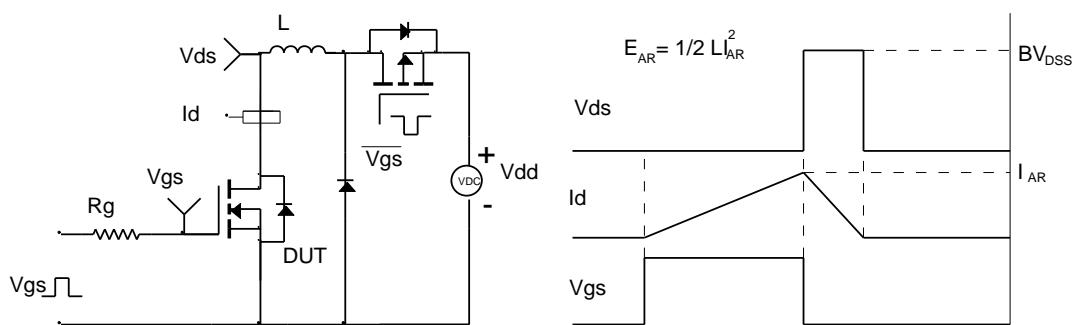


Figure D: Diode Recovery Test Circuit &amp; Waveforms

