ALPHA & OMEGA SEMICONDUCTOR

AOSX32128

20V N-Channel MOSFET

General Description

- Trench Power MOSFET technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- RoHS 2.0 and Halogen-Free Compliant

Applications

- This device is ideal for Load Switch

Product Summary

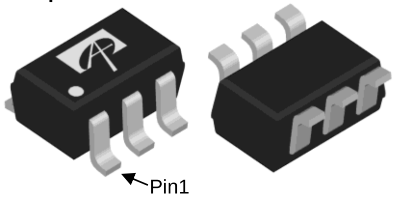
V_{DS}	20V
I_D (at V_{GS}=10V)	3.2A
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 75mΩ
$R_{DS(ON)}$ (at V_{GS}=2.5V)	< 90mΩ
$R_{DS(ON)}$ (at V_{GS}=1.8V)	< 120mΩ

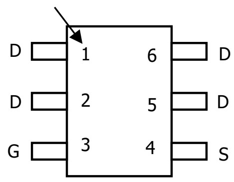
Typical ESD protection **HBM Class 2**

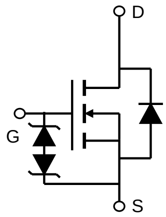
100% Rg Tested

SC70-6L (SOT-363)

Top View **Bottom View**







Orderable Part Number	Package Type	Form	Minimum Order Quantity
AOSX32128	SC70-3	Tape & Reel	3000

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±8	V
Continuous Drain Current	T_A=25°C	I_D	3.2	A
	T_A=70°C		2.5	
Pulsed Drain Current [C]		I_{DM}	13	
Power Dissipation [B]	T_A=25°C	P_D	1.1	W
	T_A=70°C		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 [A]	t ≤ 10s	$R_{\theta JA}$	90	110	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		110	135	°C/W
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	60	72	°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	20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V, V_{GS}=0V			1	µA
		T_J=55°C			5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±8V			±10	µA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=$V_{GS,}$ I_D=250µA	0.4	0.85	1.3	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=4.5V, I_D=3.2A		55	75	mΩ
		T_J=125°C		75	102	
		V_{GS}=2.5V, I_D=3A		66	90	mΩ
		V_{GS}=1.8V, I_D=1A		86	120	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=3.2A		13		S
V_{SD}	Diode Forward Voltage	I_S=1A, V_{GS}=0V		0.75	1	V
I_S	Maximum Body-Diode Continuous Current				1.5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=10V, f=1MHz		190		pF
C_{oss}	Output Capacitance			30		pF
C_{rss}	Reverse Transfer Capacitance			23		pF
R_g	Gate resistance	f=1MHz	4	8	12	Ω
SWITCHING PARAMETERS						
Q_g(4.5V)	Total Gate Charge	V_{GS}=4.5V, V_{DS}=10V, I_D=3.2A		2.2	6	nC
Q_{gs}	Gate Source Charge			0.2		nC
Q_{gd}	Gate Drain Charge			0.6		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=4.5V, V_{DS}=10V, R_L=3.12Ω, R_{GEN}=3Ω		5.5		ns
t_r	Turn-On Rise Time			6		ns
$t_{D(off)}$	Turn-Off DelayTime			21.5		ns
t_f	Turn-Off Fall Time			5		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=3.2A, di/dt=300A/µs		3.7		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=3.2A, di/dt=300A/µs		1.7		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 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 $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ 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 1in^2 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

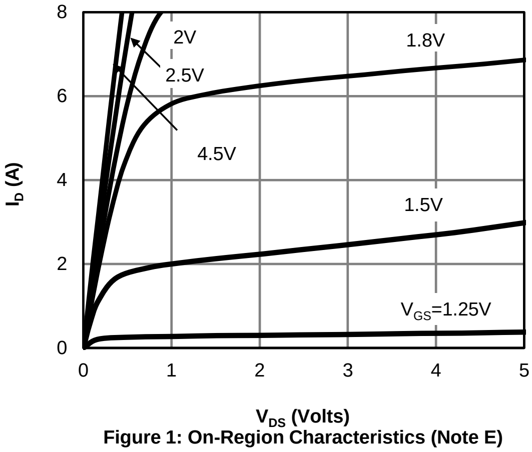


Figure 1: On-Region Characteristics (Note E)

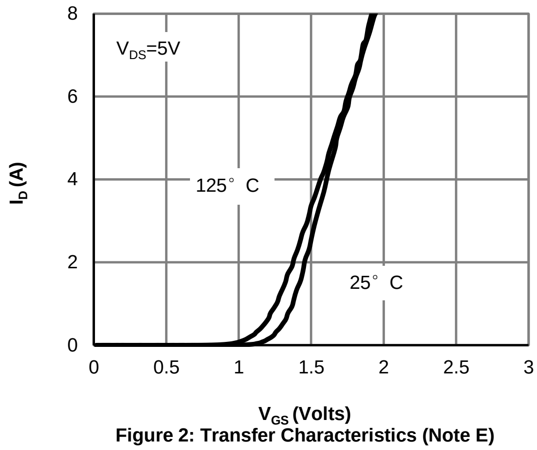


Figure 2: Transfer Characteristics (Note E)

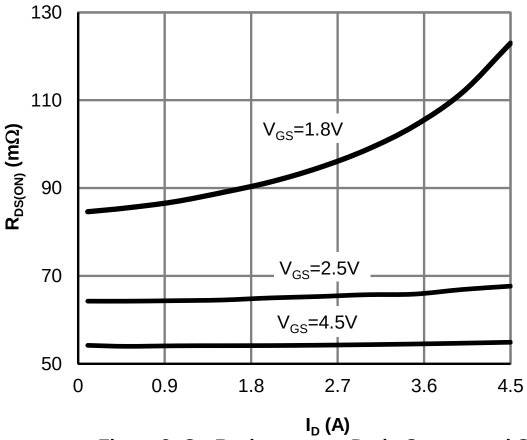


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

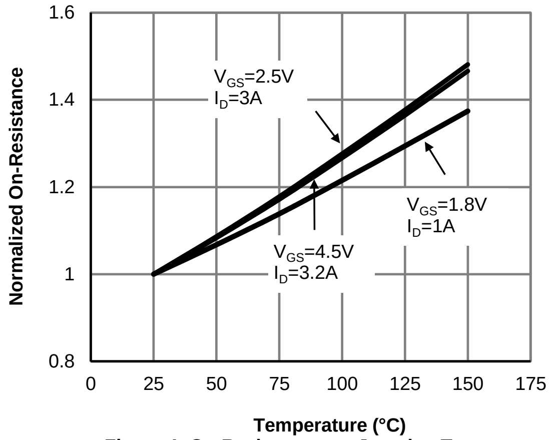


Figure 4: On-Resistance vs. Junction Temperature (Note E)

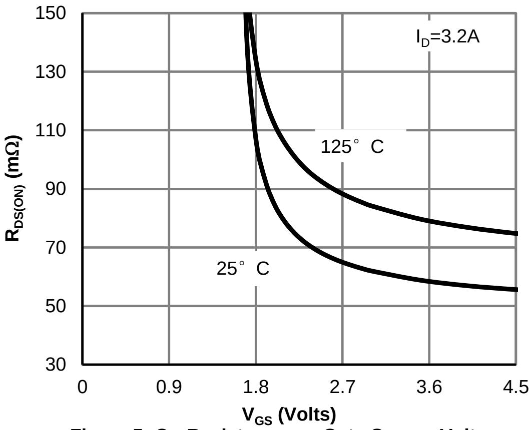


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

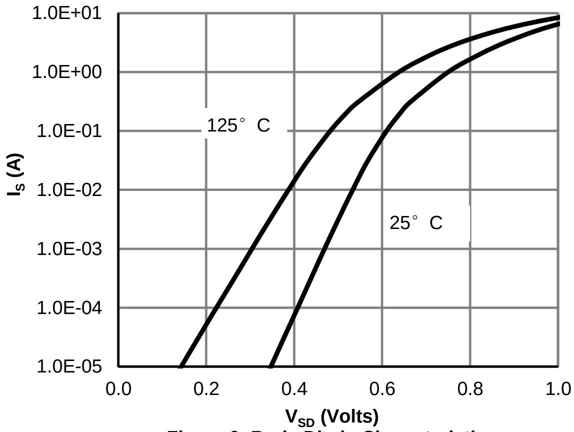


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

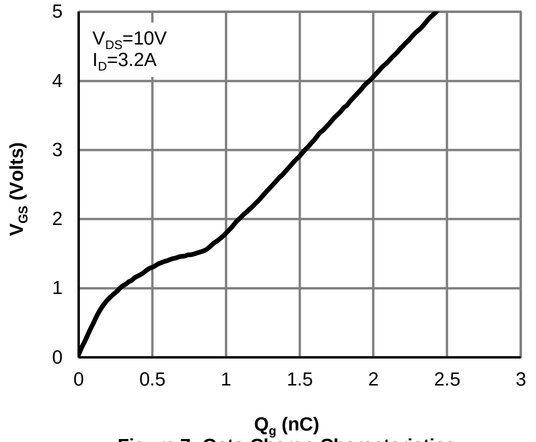


Figure 7: Gate-Charge Characteristics

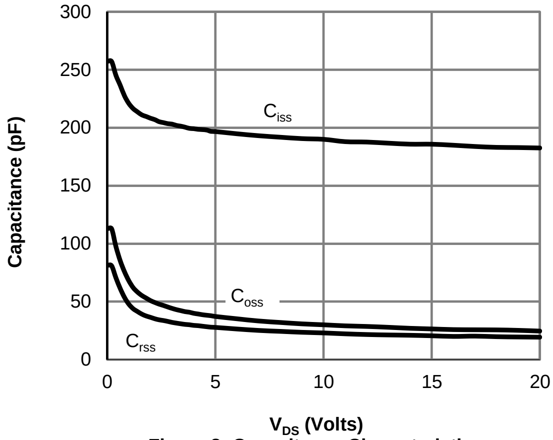


Figure 8: Capacitance Characteristics

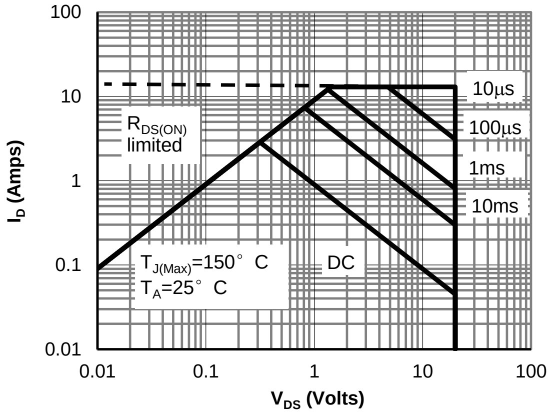


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

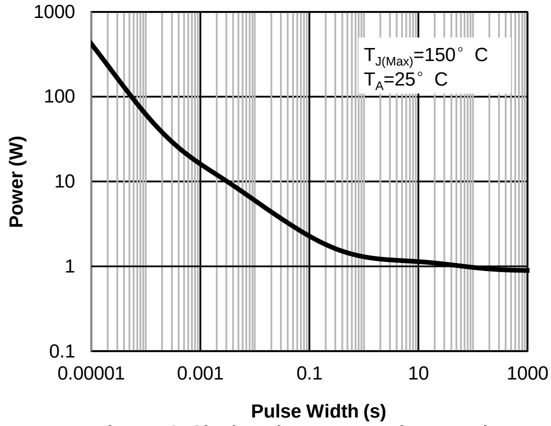


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

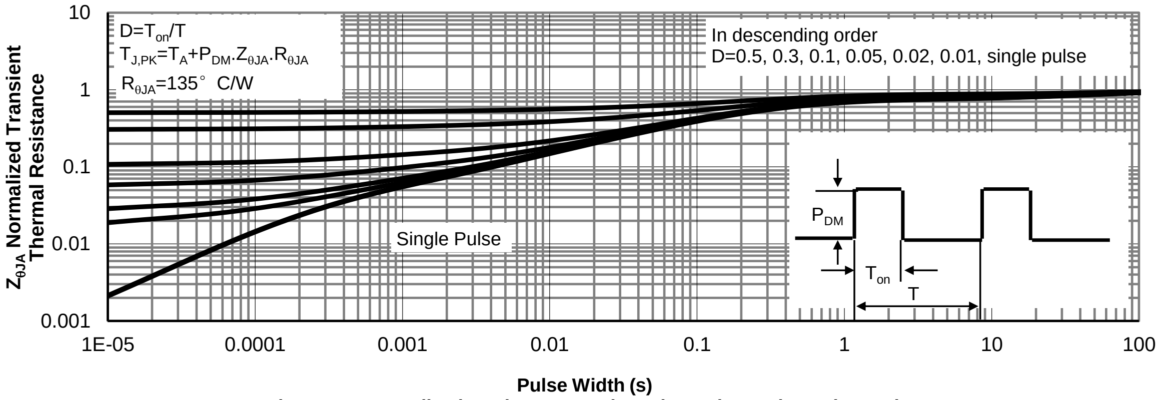


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

Figure A: Gate Charge Test Circuit & Waveforms

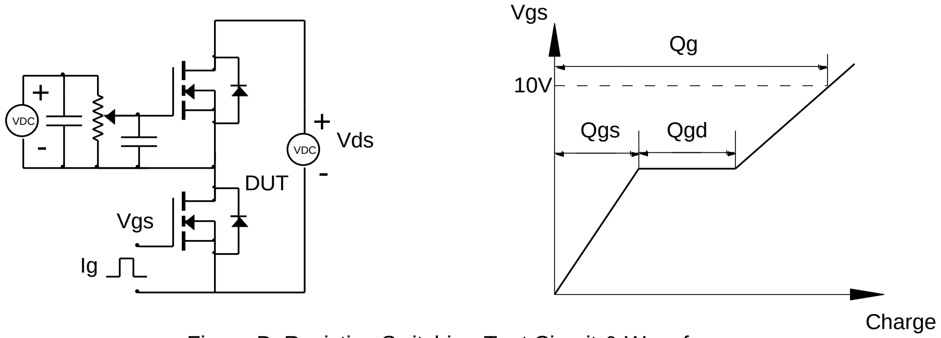


Figure B: Resistive Switching Test Circuit & Waveforms

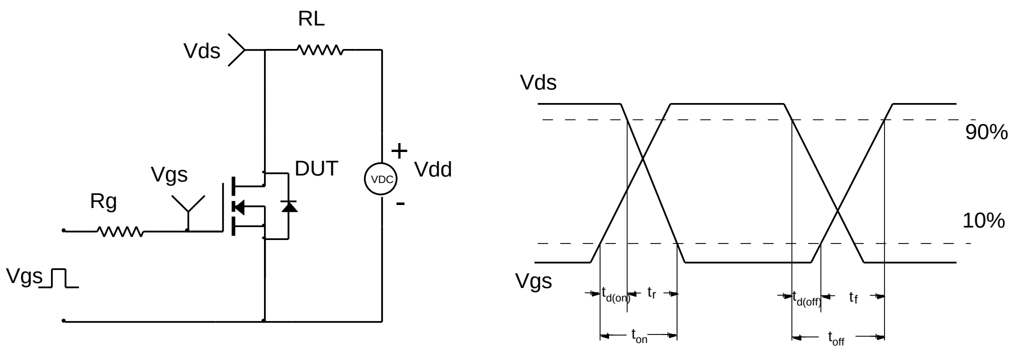


Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

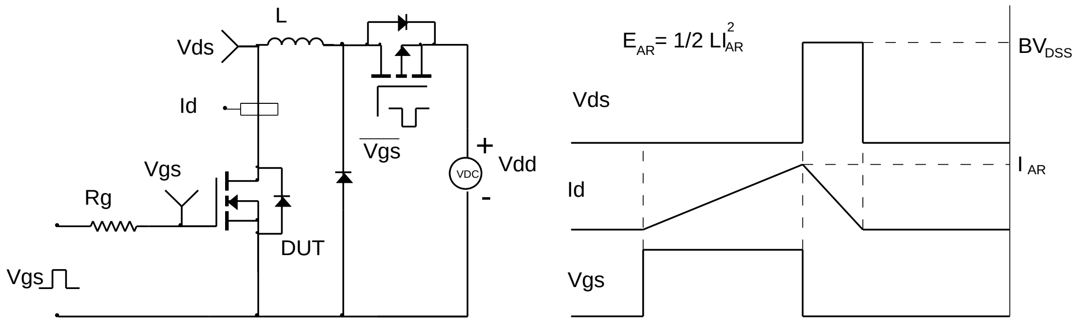


Figure D: Diode Recovery Test Circuit & Waveforms