AO4433

30V P-Channel MOSFET

General Description

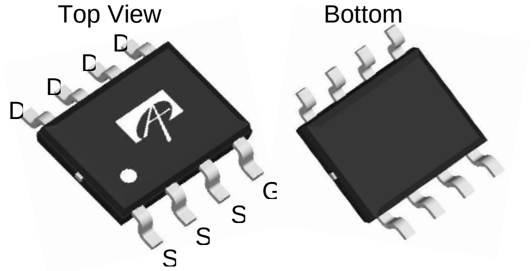
The AO4433 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and ultra-low low gate charge with a 25V gate rating. This device is suitable for use as a load switch or in PWM applications.

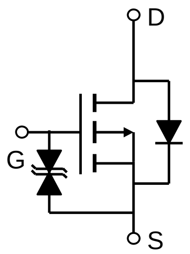
Product Summary

V_{DS} (V) = -30V
I_D = -11 A (V$_{GS}$ = -20V)
$R_{DS(ON)}$ < 14mΩ (V_{GS} = -20V)
$R_{DS(ON)}$ < 18mΩ (V_{GS} = -10V)
$R_{DS(ON)}$ < 36mΩ (V_{GS}= -5V)

ESD Protected
100% UIS Tested
100% Rg Tested

SOIC-8





Absolute Maximum Ratings T_A=25℃ unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	±25	V
Continuous Drain Current [AF]	T_A=25℃	I_D	-11	A
	T_A=70℃		-9.7	
Pulsed Drain Current [B]		I_{DM}	-50	
Power Dissipation [A]	T_A=25℃	P_D	3	W
	T_A=70℃		2.1	
Avalanche Current [B]		I_{AR}	-36	A
Repetitive avalanche energy 0.1mH [B]		E_{AR}	65	mJ
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	℃

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [AF]	t ≤ 10s	$R_{\theta JA}$	28	40	℃/W
Maximum Junction-to-Ambient [A]	Steady-State		54	75	℃/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	21	30	℃/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				-1	µA
			T_J=55°C			-5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±25V				±10	µA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=-250µA		-1.5	-2.45	-3.5	V
$I_{D(ON)}$	On state drain current	V_{GS}=-10V, V_{DS}=-5V		-50			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-20V, I_D=-11A			11	14	mΩ
			T_J=125°C		15	19	
		V_{GS}=-10V, I_D=-10A			13.8	18	mΩ
		V_{GS}=-5V, I_D=-5A			25.8	36	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-11A			20		S
V_{SD}	Diode Forward Voltage	I_S=-1A,V_{GS}=0V			-0.72	-1	V
I_S	Maximum Body-Diode Continuous Current					-4.2	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, f=1MHz			1760	2200	pF
C_{oss}	Output Capacitance				360		pF
C_{rss}	Reverse Transfer Capacitance				255	357	pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		3.2	6.4	8	Ω
SWITCHING PARAMETERS							
Q_g	Total Gate Charge	V_{GS}=-10V, V_{DS}=-15V, I_D=-11A			30	38	nC
Q_{gs}	Gate Source Charge				7		nC
Q_{gd}	Gate Drain Charge				8		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-10V, V_{DS}=-15V, R_L=1.5Ω, R_{GEN}=3Ω			11.5		ns
t_r	Turn-On Rise Time				8		ns
$t_{D(off)}$	Turn-Off DelayTime				35		ns
t_f	Turn-Off Fall Time				18.5		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-11A, dI/dt=100A/µs			24	30	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-11A, dI/dt=100A/µs			16		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: Repetitive rating, pulse width limited by junction temperature.
C. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ and lead to ambient.
D. The static characteristics in Figures 1 to 6 are obtained using <300 µs pulses, duty cycle 0.5% max.
E. These tests are performed with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating.
F. The current rating is based on the t≤ 10s junction to ambient thermal resistance rating.
Rev9: Nov. 2010

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

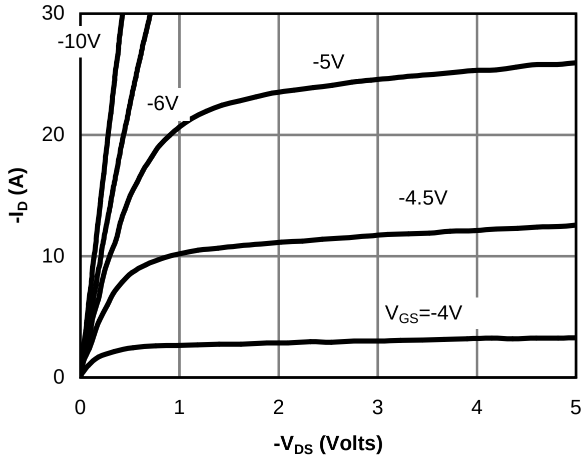


Fig 1: On-Region Characteristics

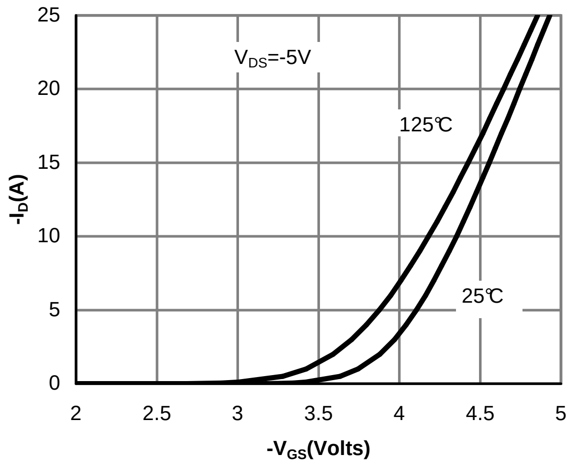


Figure 2: Transfer Characteristics

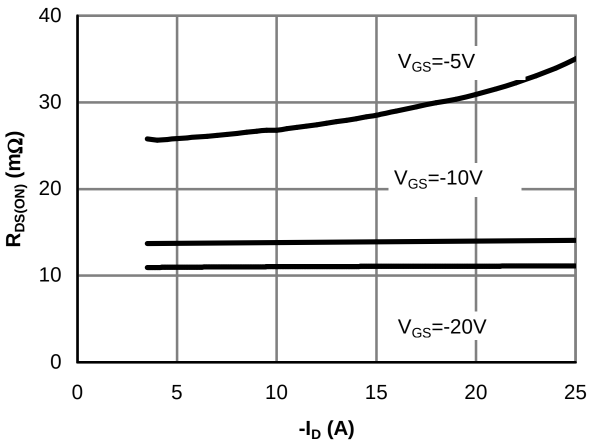


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

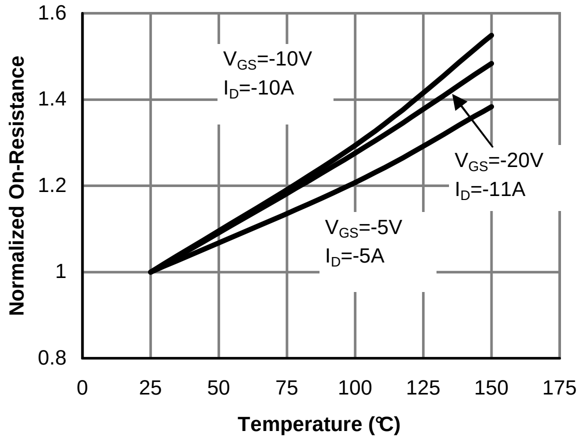


Figure 4: On-Resistance vs. Junction Temperature

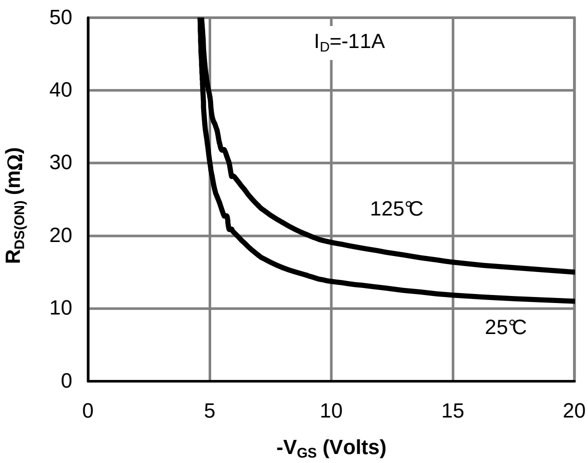


Figure 5: On-Resistance vs. Gate-Source Voltage

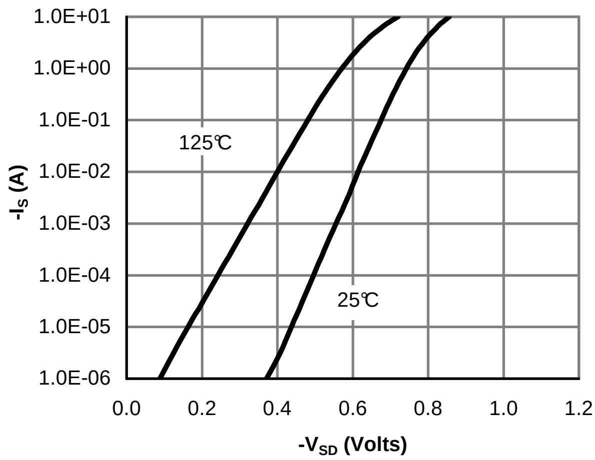


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

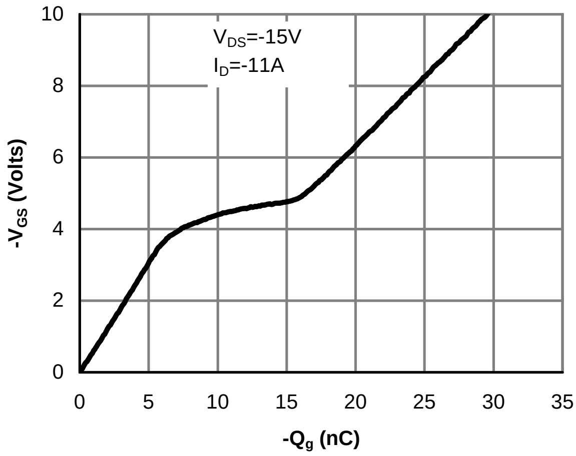


Figure 7: Gate-Charge Characteristics

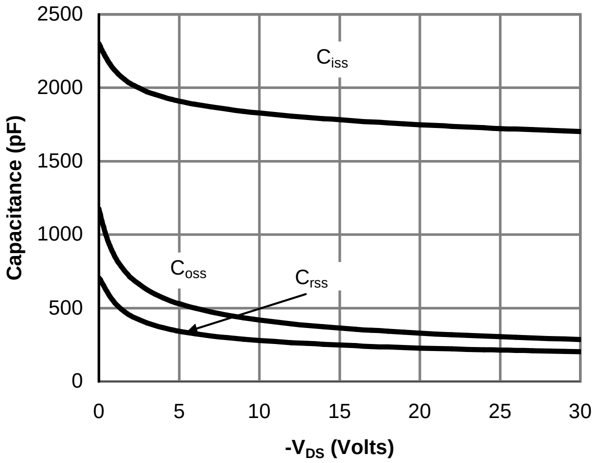


Figure 8: Capacitance Characteristics

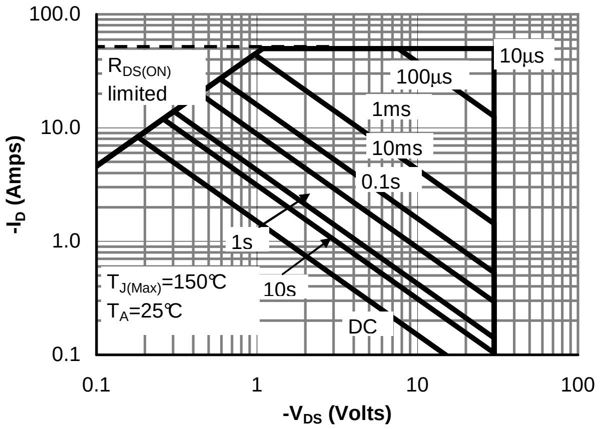


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

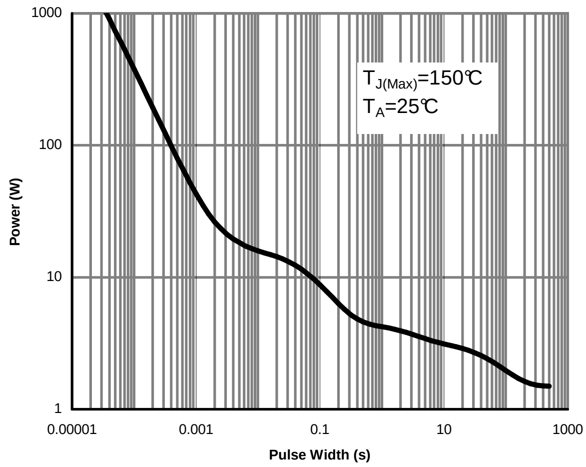


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

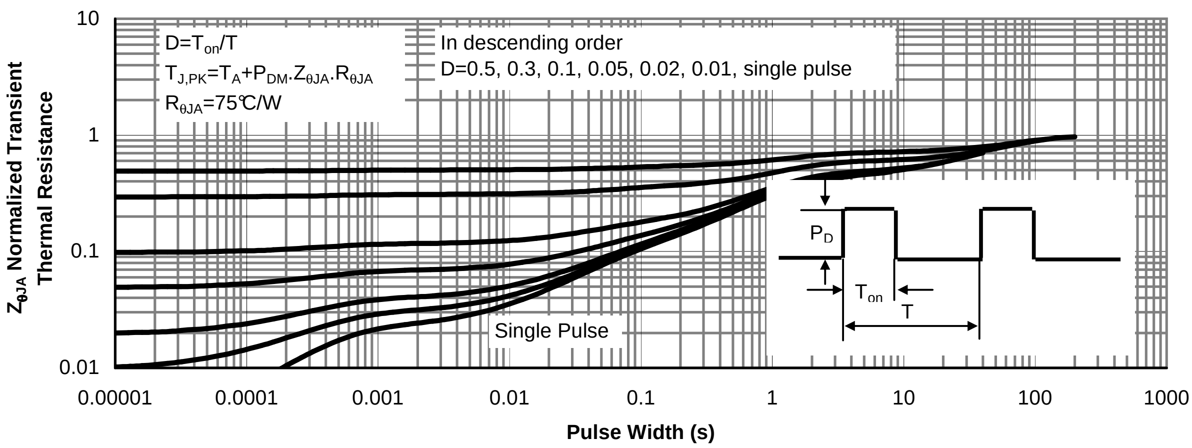
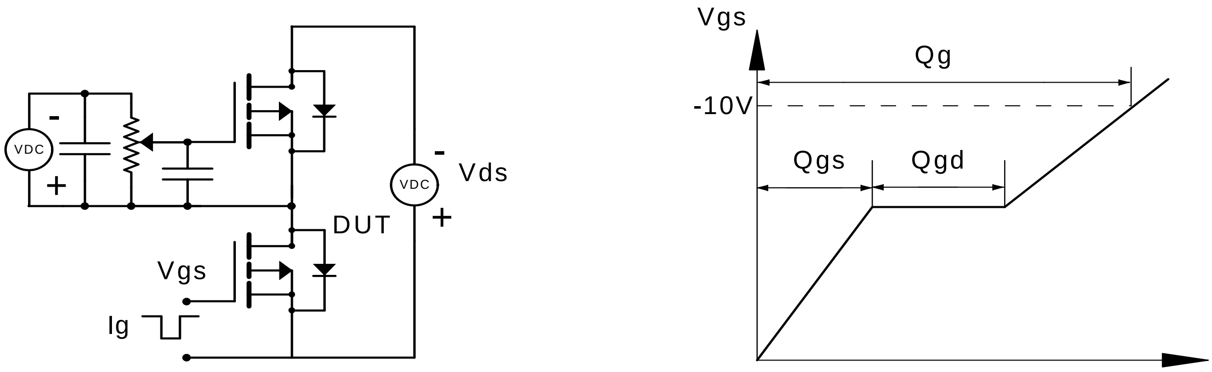
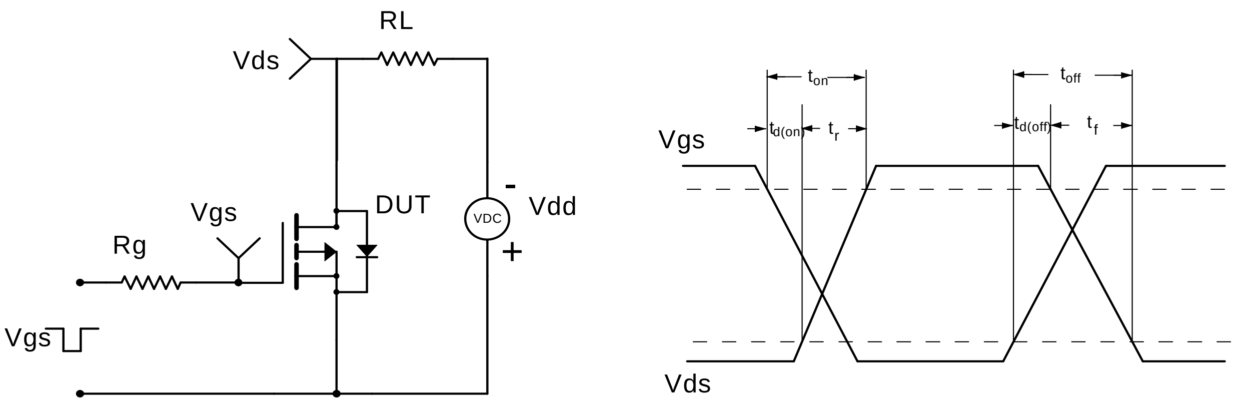


Figure 11: Normalized Maximum Transient Thermal Impedance

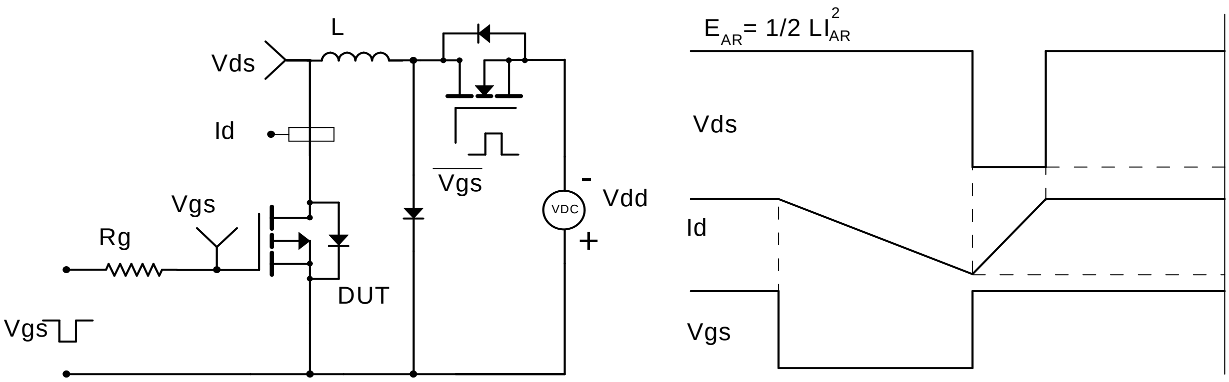
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms