

General Description

The AO4455 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.

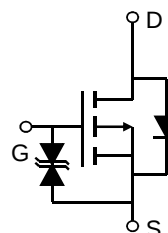
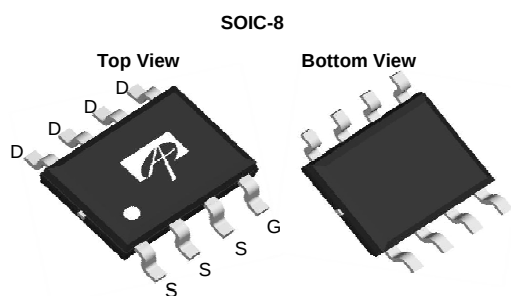
* RoHS and Halogen-Free Complaint

Product Summary

V_{DS} (V) = -30V
 I_D = -17A
 $R_{DS(ON)} < 6.2m\Omega$
 $R_{DS(ON)} < 7.2m\Omega$

$(V_{GS} = -20V)$
 $(V_{GS} = -20V)$
 $(V_{GS} = -10V)$

ESD Protected
 100% UIS tested
 100% Rg tested



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ 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}	I_D	-17	A
		-14	
Pulsed Drain Current ^B	I_{DM}	-182	
Power Dissipation ^A	P_D	3.1	W
		2	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^{AF}	$R_{\theta JA}$	26	40	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A		50	75	$^\circ\text{C/W}$
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	14	24	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
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	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			± 1	μA
		$V_{DS}=0\text{V}$, $V_{GS}=\pm 25\text{V}$			± 10	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$	-1.5	-2.1	-2.6	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=-20\text{V}$, $I_D=-15\text{A}$ $T_J=125^{\circ}\text{C}$		5 7.2	6.2 9	$\text{m}\Omega$
		$V_{GS}=-10\text{V}$, $I_D=-15\text{A}$		5.7	7.2	$\text{m}\Omega$
		$V_{GS}=-6\text{V}$, $I_D=-10\text{A}$		7.4	9.5	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}$, $I_D=-15\text{A}$		48		S
V_{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				-4.2	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=-15\text{V}$, $f=1\text{MHz}$		2823	3400	pF
C_{oss}	Output Capacitance			574		pF
C_{rss}	Reverse Transfer Capacitance			424	600	pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$	2.1	4.0	6.4	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$, $I_D=-15\text{A}$		54	76	nC
Q_{gs}	Gate Source Charge			9		nC
Q_{gd}	Gate Drain Charge			16		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$, $R_L=1.0\Omega$, $R_{GEN}=3\Omega$		12.5		ns
t_r	Turn-On Rise Time			12.5		ns
$t_{D(off)}$	Turn-Off DelayTime			49		ns
t_f	Turn-Off Fall Time			109		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=-15\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		22.3	32	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-15\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		8.8		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 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: Repetitive rating, pulse width limited by junction temperature.

C: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

D: The static characteristics in Figures 1 to 6 are obtained using $<300\mu\text{s}$ 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 $T_A=25^{\circ}\text{C}$. The SOA curve provides a single pulse rating.

F: The current rating is based on the $t \leq 10\text{s}$ junction to ambient thermal resistance rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

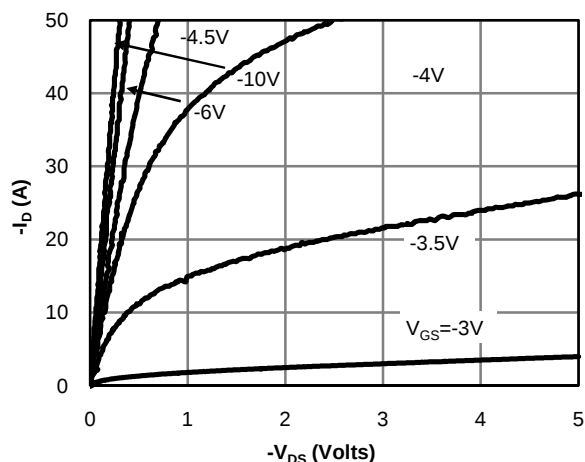


Fig 1: On-Region Characteristics

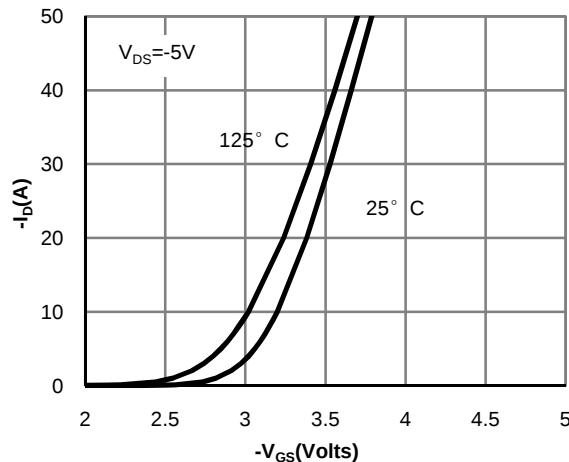


Figure 2: Transfer Characteristics

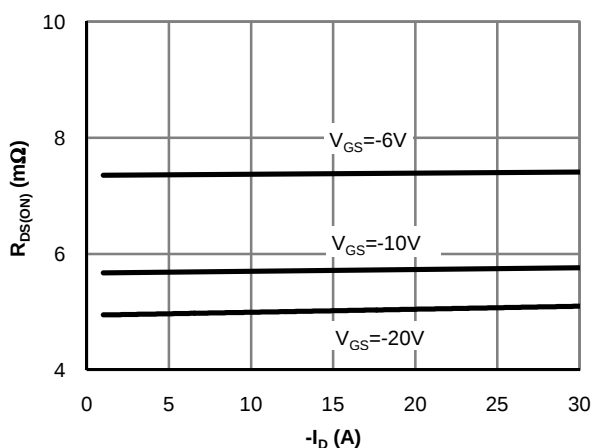


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

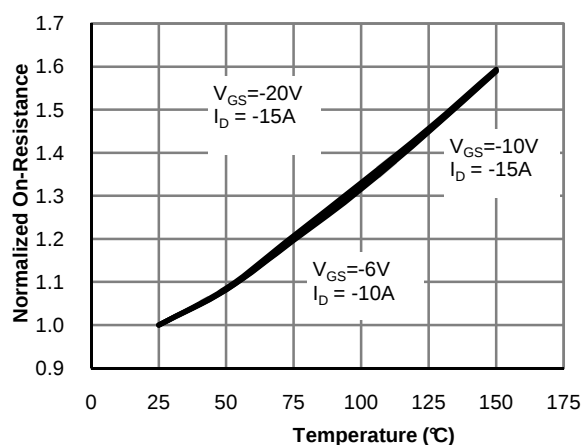


Figure 4: On-Resistance vs. Junction Temperature

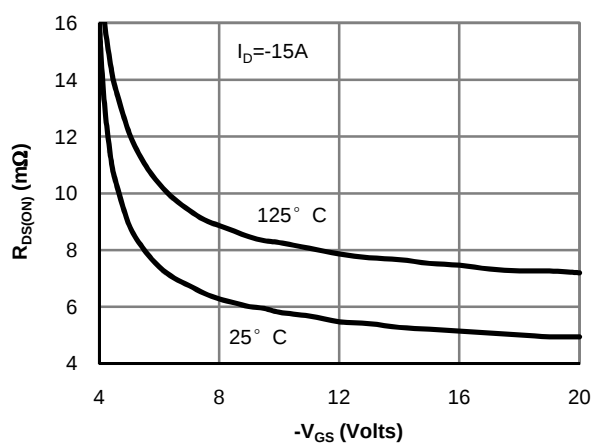


Figure 5: On-Resistance vs. Gate-Source Voltage

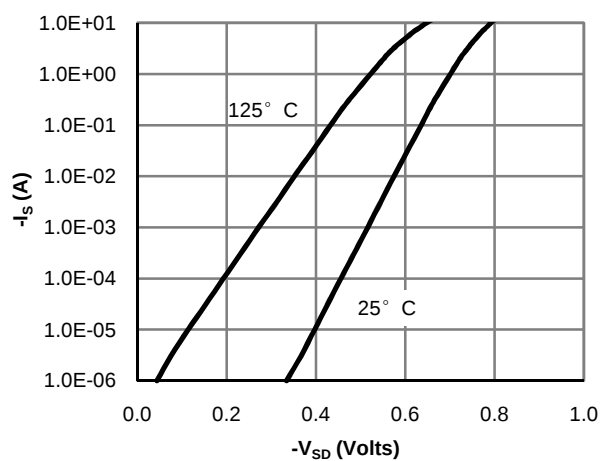


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

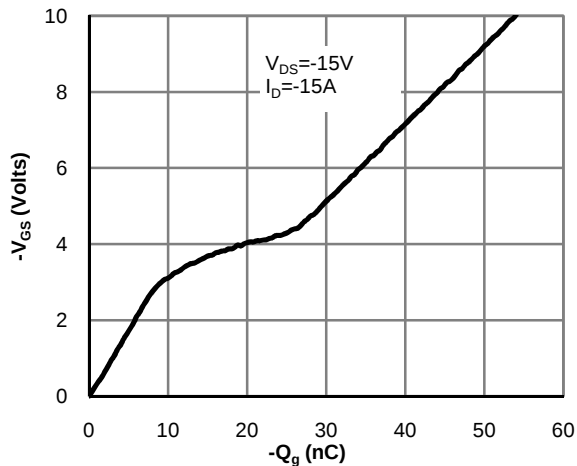


Figure 7: Gate-Charge Characteristics

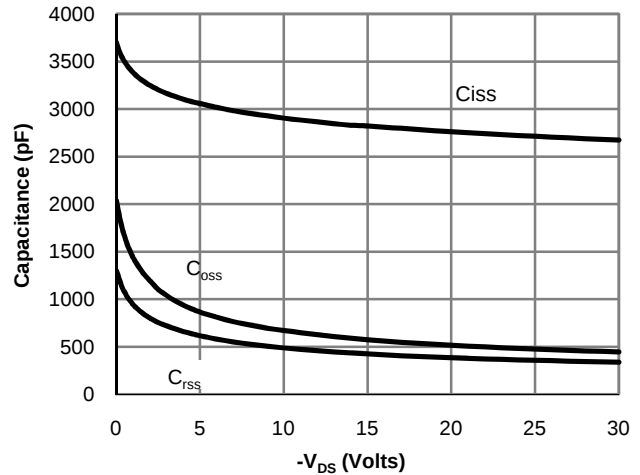


Figure 8: Capacitance Characteristics

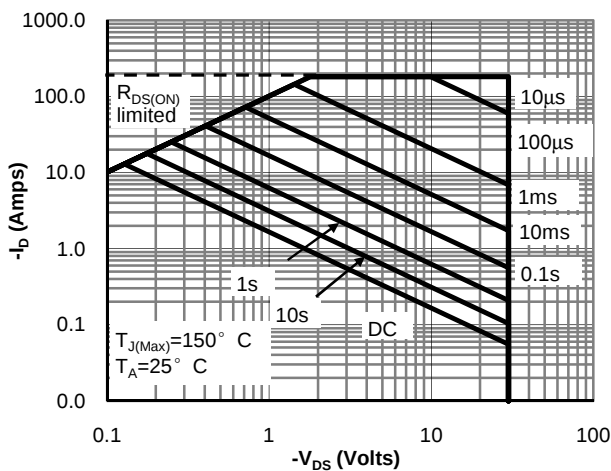


Figure 9: Maximum Forward Biased Safe

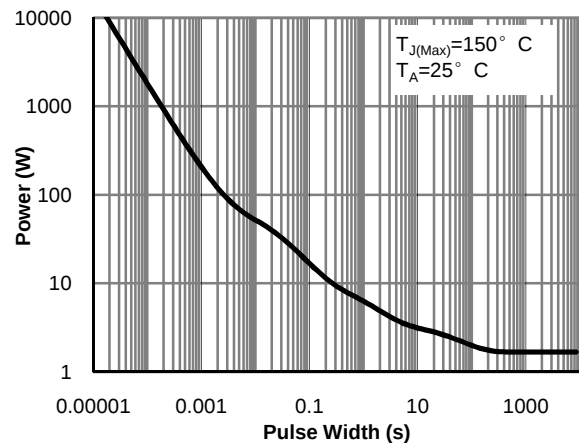


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

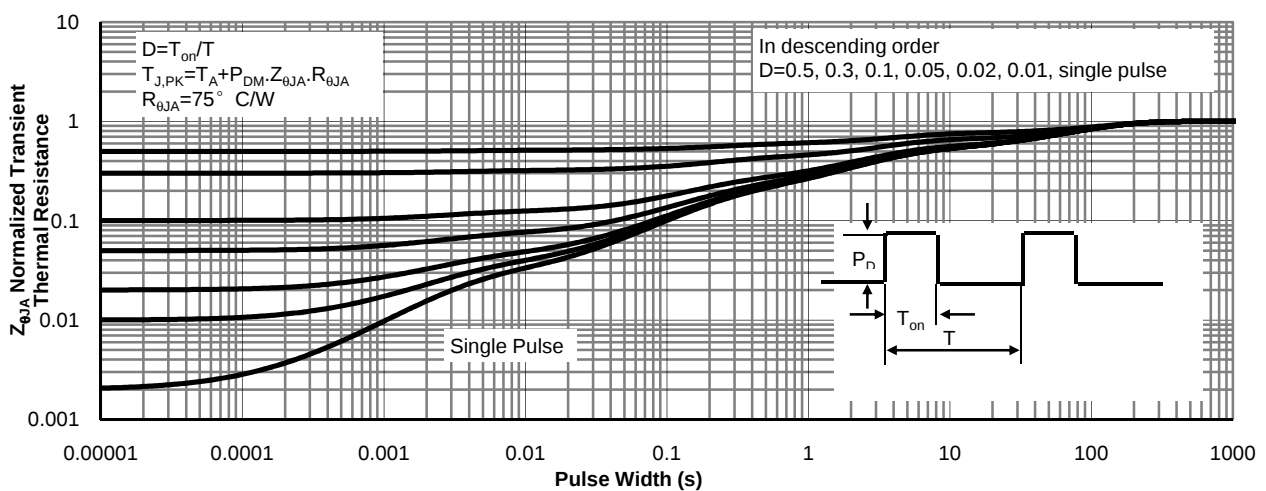
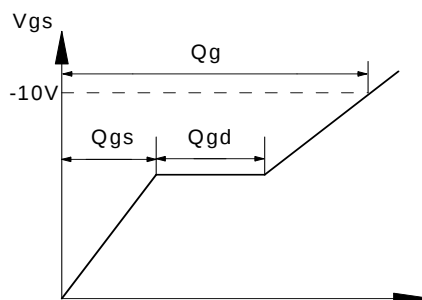
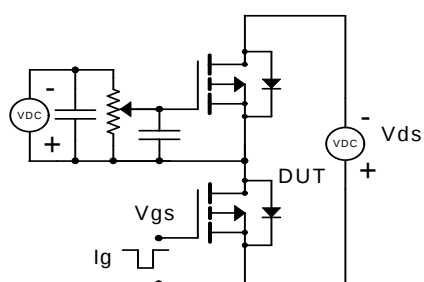
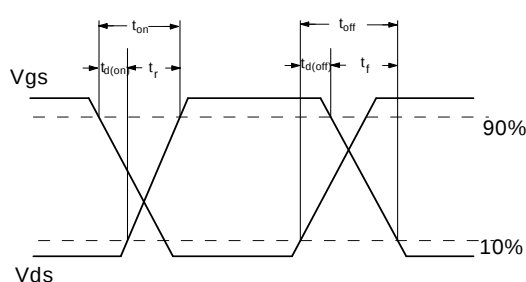
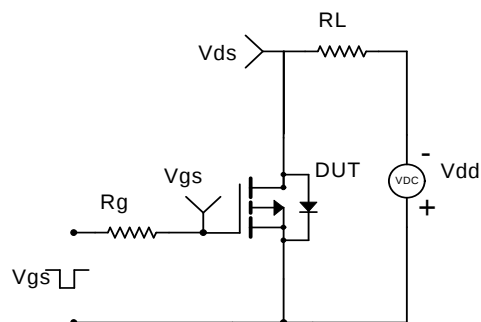


Figure 11: Normalized Maximum Transient Thermal Impedance

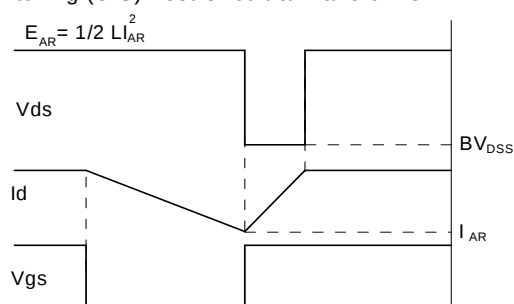
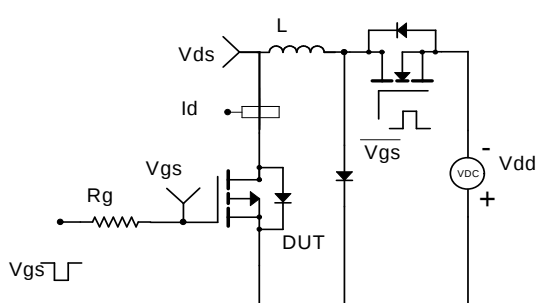
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

