AO4435

Electrical Characteristics (T$_J$=25℃ 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℃			-5	
I$_{GSS}$	Gate-Body leakage current	V$_{DS}$ = 0V, V$_{GS}$ = ±25V				±100	nA
V$_{GS(th)}$	Gate Threshold Voltage	V$_{DS}$ = V$_{GS}$ I$_D$ = -250µA		-1.7	-2.3	-3	V
I$_{D(ON)}$	On state drain current	V$_{GS}$ = -10V, V$_{DS}$ = -5V		-80			A
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$ = -20V, I$_D$ = -11A			11	14	mΩ
			T$_J$=125℃		15	19	
		V$_{GS}$ = -10V, I$_D$ = -10A			15	18	
		V$_{GS}$ = -5V, I$_D$ = -5A			27	36	
g$_{FS}$	Forward Transconductance	V$_{DS}$ = -5V, I$_D$ = -10A			22		S
V$_{SD}$	Diode Forward Voltage	I$_S$ = -1A, V$_{GS}$ = 0V			-0.74	-1	V
I$_S$	Maximum Body-Diode Continuous Current					-3.5	A
DYNAMIC PARAMETERS							
C$_{iss}$	Input Capacitance	V$_{GS}$=0V, V$_{DS}$=-15V, f=1MHz			1130	1400	pF
C$_{oss}$	Output Capacitance				240		pF
C$_{rss}$	Reverse Transfer Capacitance				155		pF
R$_g$	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, f=1MHz		1	5.8	8	Ω
SWITCHING PARAMETERS							
Q$_{g(10V)}$	Total Gate Charge	V$_{GS}$=-10V, V$_{DS}$=-15V, I$_D$=-10A			18	24	nC
Q$_{g(4.5V)}$	Total Gate Charge				9.5		
Q$_{gs}$	Gate Source Charge				5.5		nC
Q$_{gd}$	Gate Drain Charge				3.3		nC
t$_{D(on)}$	Turn-On DelayTime	V$_{GS}$=-10V, V$_{DS}$=-15V, R$_L$=1.5Ω, R$_{GEN}$=3Ω			8.7		ns
t$_r$	Turn-On Rise Time				8.5		ns
t$_{D(off)}$	Turn-Off DelayTime				18		ns
t$_f$	Turn-Off Fall Time				7		ns
t$_{rr}$	Body Diode Reverse Recovery Time	I$_F$=-10A, dI/dt=100A/µs			25	30	ns
Q$_{rr}$	Body Diode Reverse Recovery Charge	I$_F$=-10A, dI/dt=100A/µs			12		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℃. The value in any given application depends on the user's specific board design. The current rating is based on the t ≤ 10s thermal resistance rating.

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 <300µs 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℃. The SOA curve provides a single pulse rating.

F. The current rating is based on the t ≤ 10s thermal resistance rating.

G. E$_{AR}$ and I$_{AR}$ ratings are based on low frequency and duty cycles to keep T$_j$=25C.

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THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

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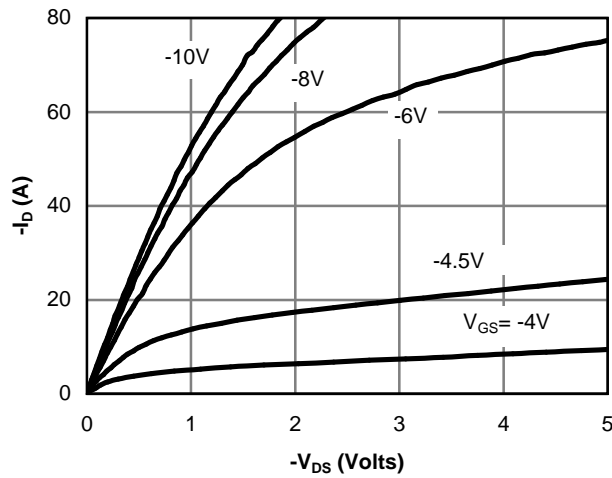## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
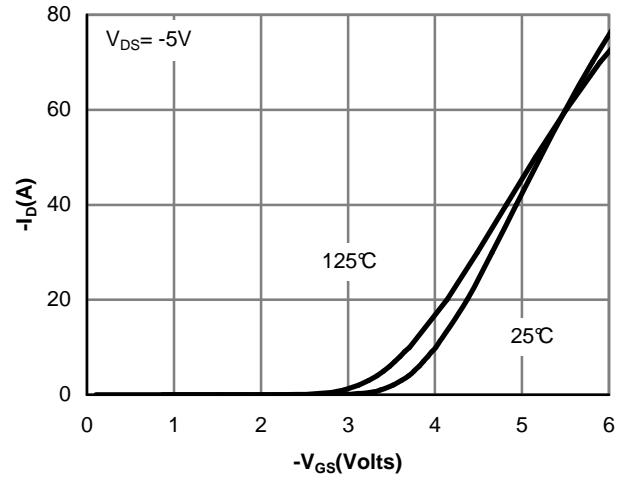
Figure 1: On-Region Characteristics

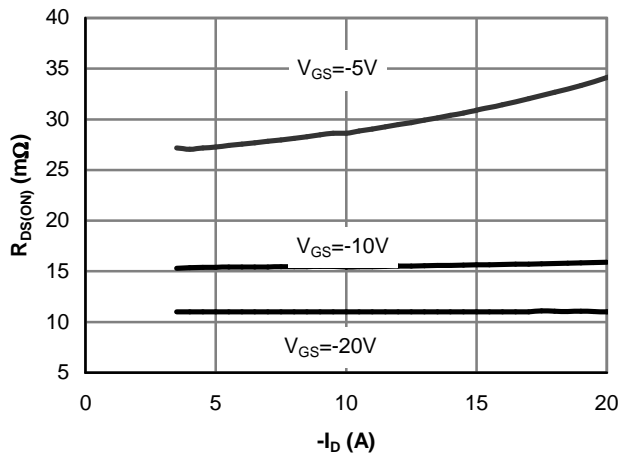**Figure 2: Transfer Characteristics**

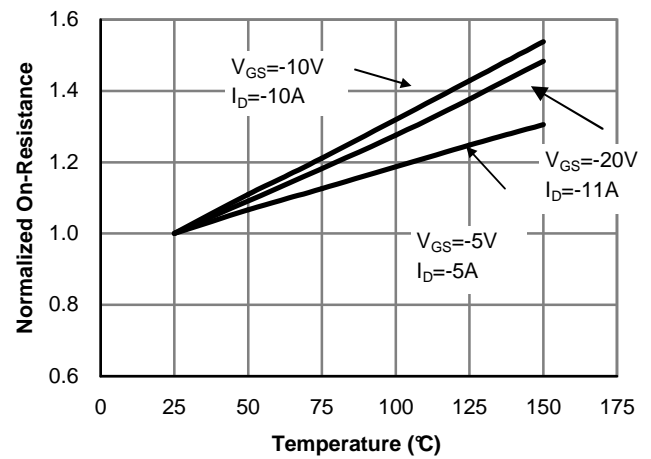**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**
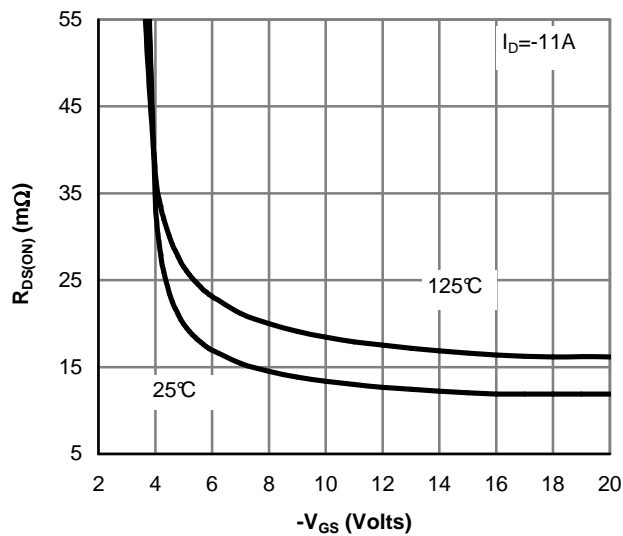
Figure 4: On-Resistance vs. Junction Temperature

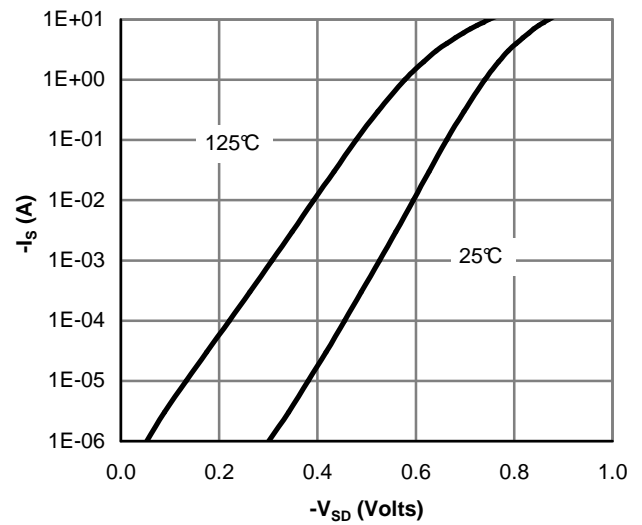**Figure 5: On-Resistance vs. Gate-Source Voltage**

Figure 6: Body-Diode Characteristics

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

$V_{DS}=-15V$
$I_D=-10A$
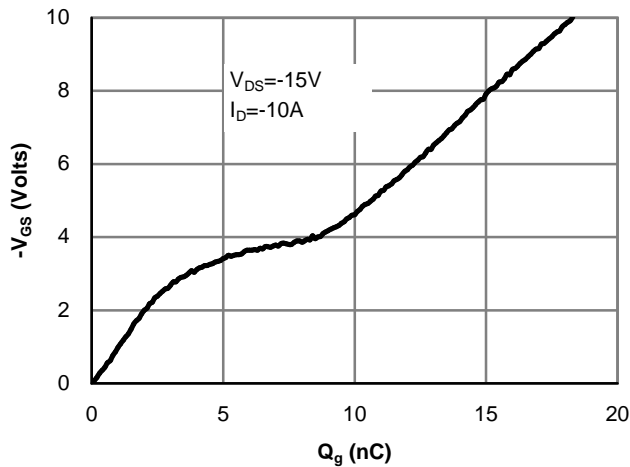
Figure 7: Gate-Charge Characteristics

C_{iss}

C_{oss}

C_{rss}
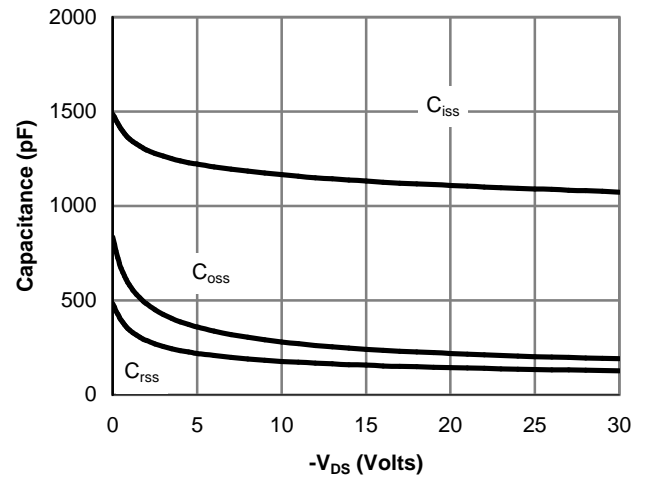
Figure 8: Capacitance Characteristics

$R_{DS(ON)}$ limited

10μs
100μs
1ms
10ms
100ms
10s
DC

$T_{J(Max)}=150°C$
$T_A=25°C$
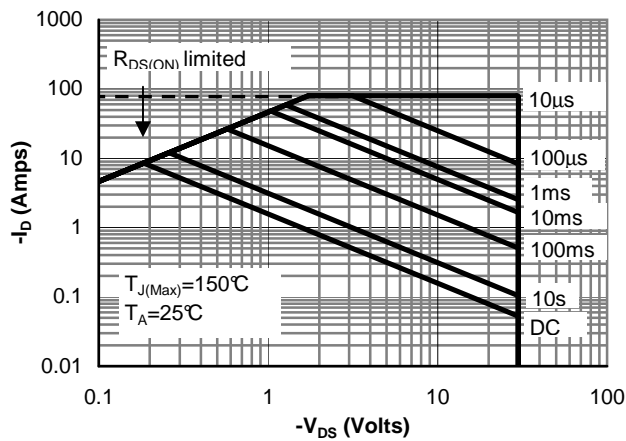
**Figure 9: Maximum Forward Biased Safe
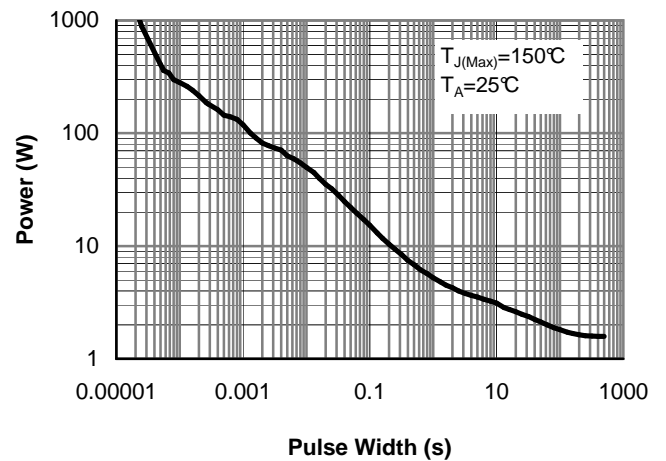Operating Area (Note E)**

$T_{J(Max)}=150°C$
$T_A=25°C$

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

$D=T_{on}/T$
$T_{J,PK}=T_A+P_{DM}.Z_{\theta JA}.R_{\theta JA}$
$R_{\theta JA}=75°C/W$

In descending order
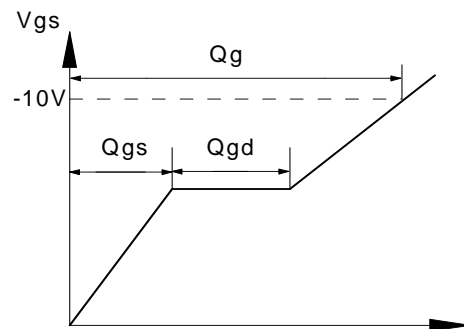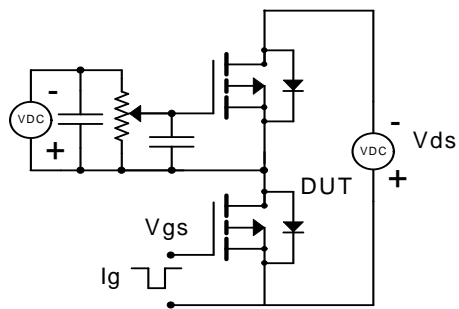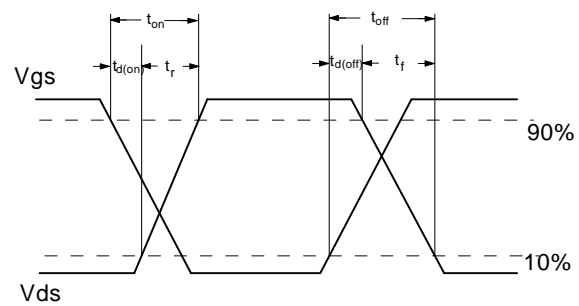D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pulse

Single Pulse

P_D

T_{on}
T
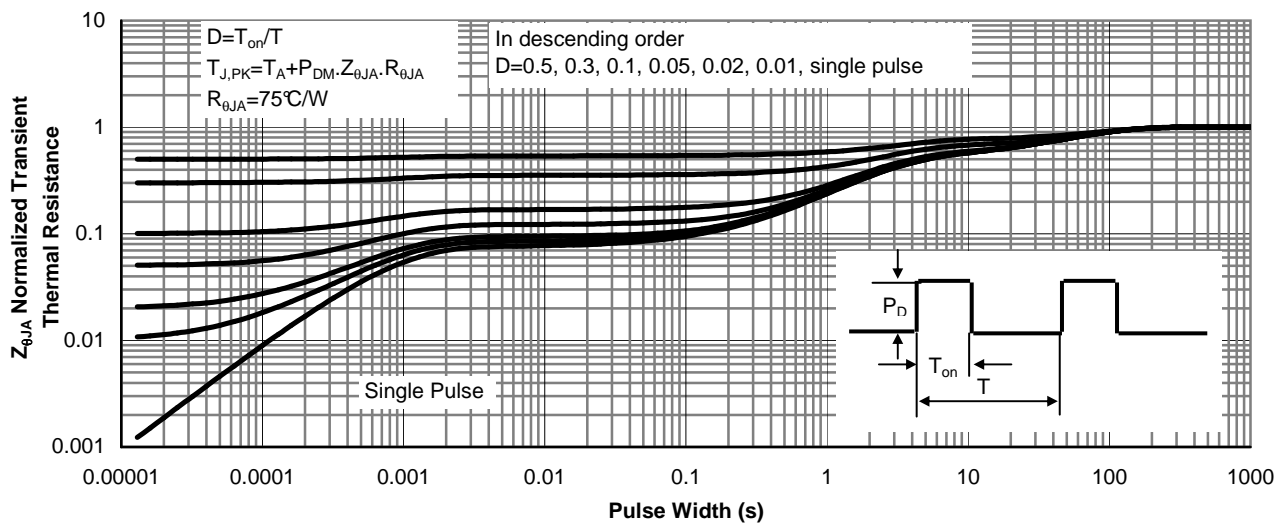
Figure 11: Normalized Maximum Transient Thermal Impedance(Note E)
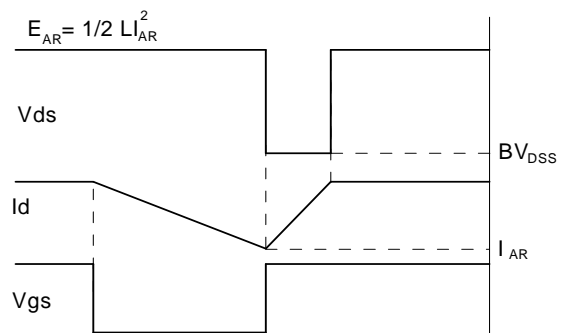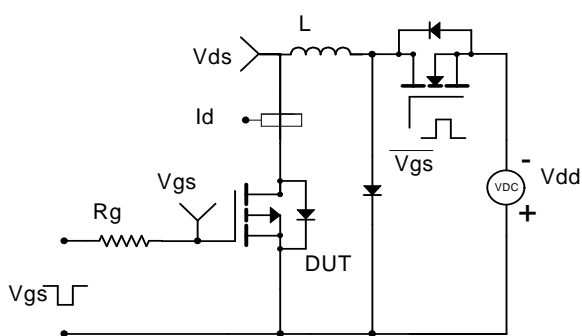
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Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms
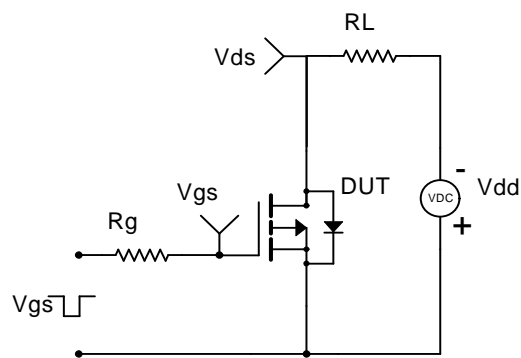
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

$$E_{AR} = 1/2 \, LI_{AR}^2$$

Diode Recovery Test Circuit & Waveforms

$$Q_{rr} = -\int I dt$$