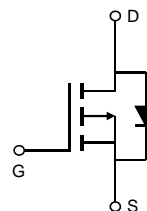


General Description

The A04443 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

Features

V_{DS}	-40V
I_D (at $V_{GS}=-10V$)	-6A
$R_{DS(ON)}$ (at $V_{GS}=-10V$)	< 42m Ω
$R_{DS(ON)}$ (at $V_{GS}=-4.5V$)	< 63m Ω



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	$T_A=25^\circ\text{C}$	-6
		$T_A=70^\circ\text{C}$	-5
Pulsed Drain Current ^C	I_{DM}	-40	A
Avalanche Current ^C	I_{AS}, I_{AR}	20	A
Avalanche energy $L=0.1\text{mH}$ ^C	E_{AS}, E_{AR}	20	mJ
Power Dissipation ^B	P_D	$T_A=25^\circ\text{C}$	3.1
		$T_A=70^\circ\text{C}$	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 ^A	$R_{\theta JA}$	31	40	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient ^{A, D}		Steady-State	59	75
Maximum Junction-to-Lead	$R_{\theta JL}$	16	24	$^\circ\text{C}/\text{W}$

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	-40			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-40V, V _{GS} =0V T _J =55°C			-1 -5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±20V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-1.5	-2	-2.6	V
I _{D(ON)}	On state drain current	V _{GS} =-10V, V _{DS} =-5V	40			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-6A T _J =125°C		35 53	42 65	mΩ
		V _{GS} =-4.5V, I _D =-5A		46.5	63	mΩ
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-6A		17		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.76	-1	V
I _S	Maximum Body-Diode Continuous Current				-3.5	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-20V, f=1MHz	750	940	1175	pF
C _{oss}	Output Capacitance		97			pF
C _{riss}	Reverse Transfer Capacitance		72			pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	7	14	21	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =-10V, V _{DS} =-20V, I _D =-6A		17.3	22	nC
Q _{g(4.5V)}			8.4	11		
Q _{gs}	Gate Source Charge		3.2			
Q _{gd}	Gate Drain Charge		4.3			
t _{D(on)}	Turn-On DelayTime		10.3			
t _r	Turn-On Rise Time	V _{GS} =-10V, V _{DS} =-20V, R _L =3.35Ω, R _{GEN} =3Ω	4.3		ns	
t _{D(off)}	Turn-Off DelayTime		39		ns	
t _f	Turn-Off Fall Time		46.5		ns	
t _{rr}	Body Diode Reverse Recovery Time	I _F =-6A, di/dt=100A/μs		17	24	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-6A, di/dt=100A/μs		11.5		nC

A. The value of R_{θJA} is measured with the device mounted on 1in² 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 initial T_J=25° C.

D. The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} 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 1in² 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

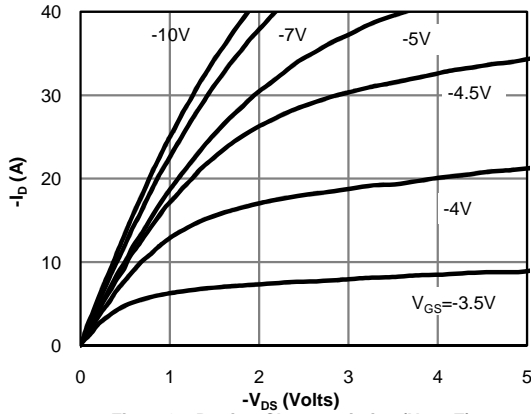


Figure 1: On-Region Characteristics (Note E)

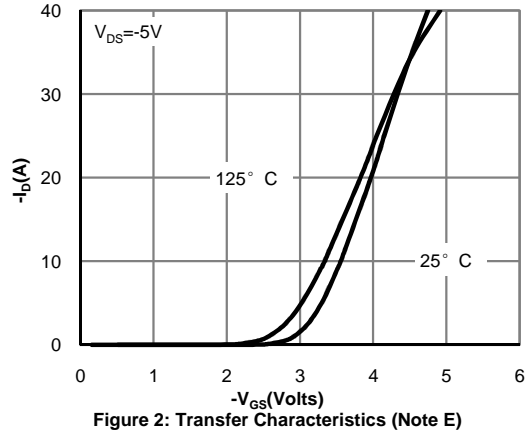


Figure 2: Transfer Characteristics (Note E)

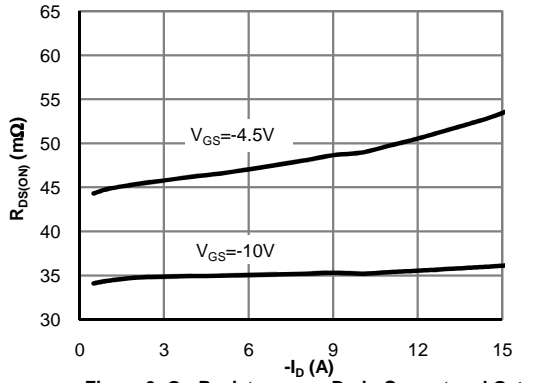


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

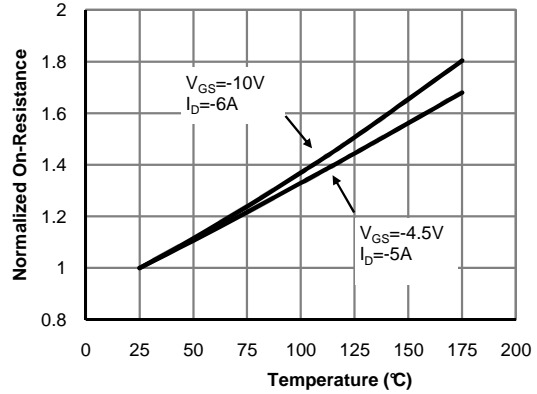


Figure 4: On-Resistance vs. Junction Temperature (Note E)

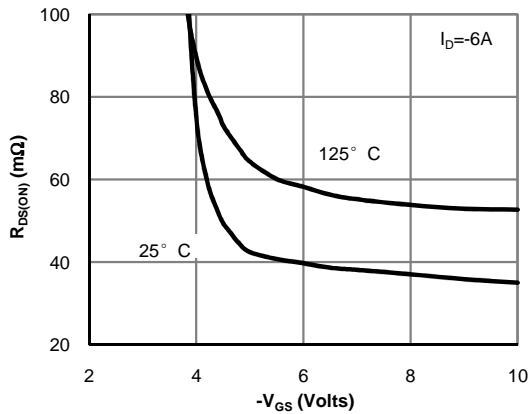


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

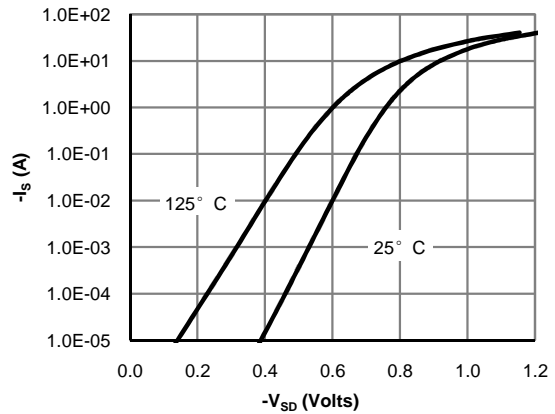


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

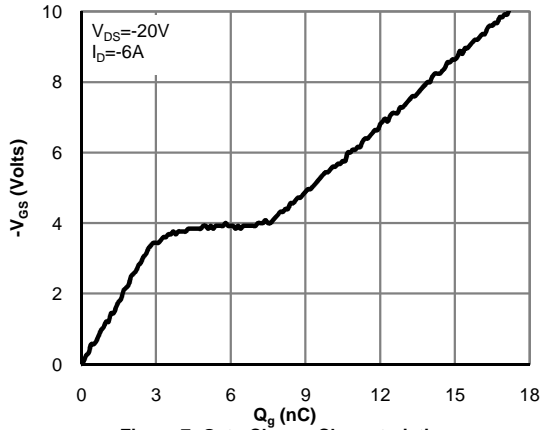


Figure 7: Gate-Charge Characteristics

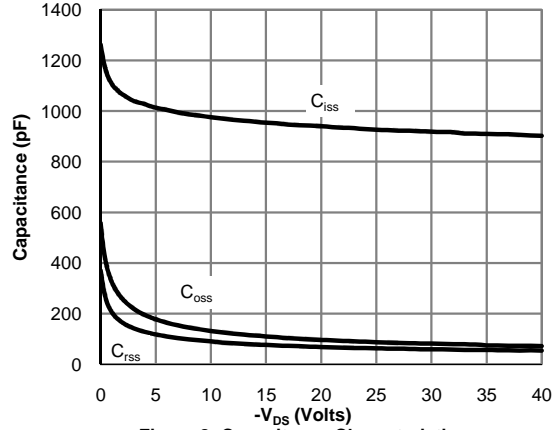


Figure 8: Capacitance Characteristics

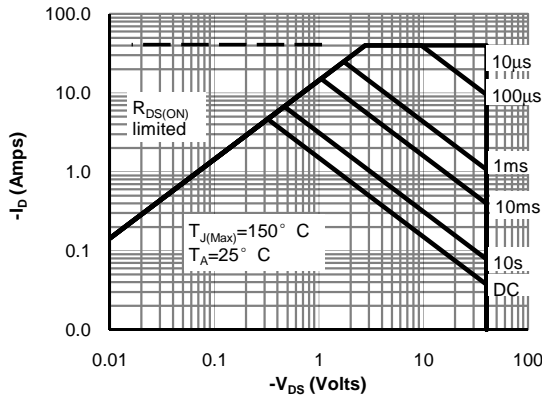


Figure 10: Maximum Forward Biased Safe Operating Area (Note F)

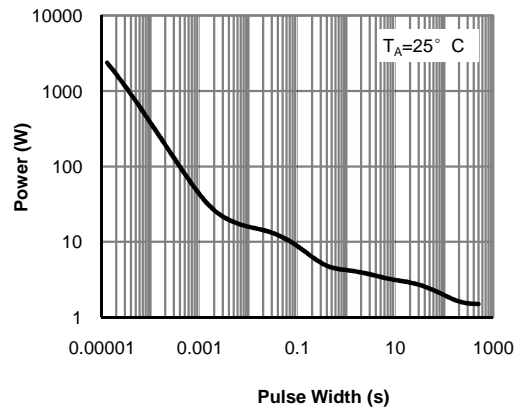


Figure 11: Single Pulse Power Rating Junction-to-Ambient (Note F)

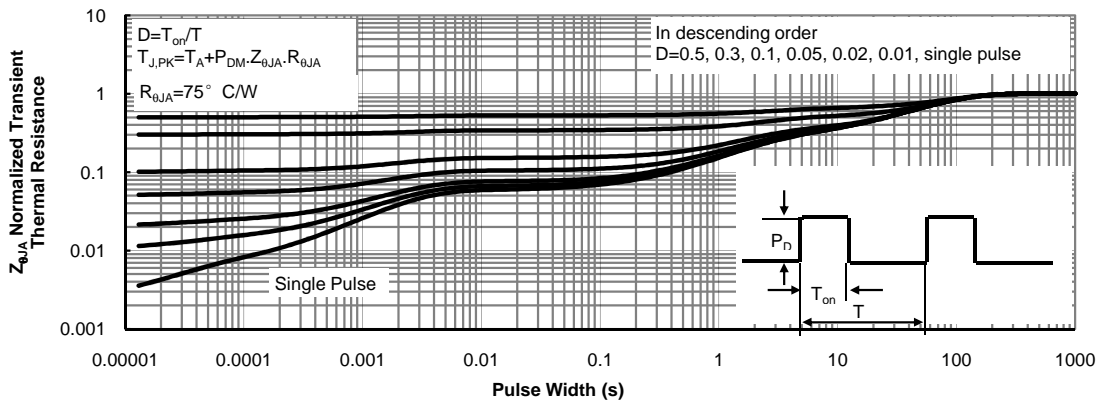
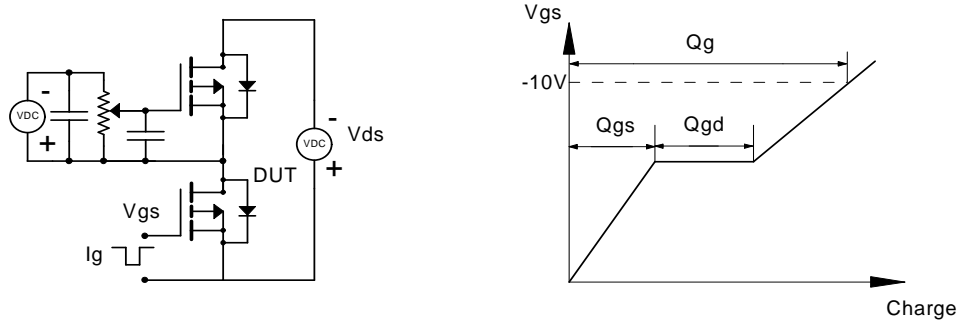
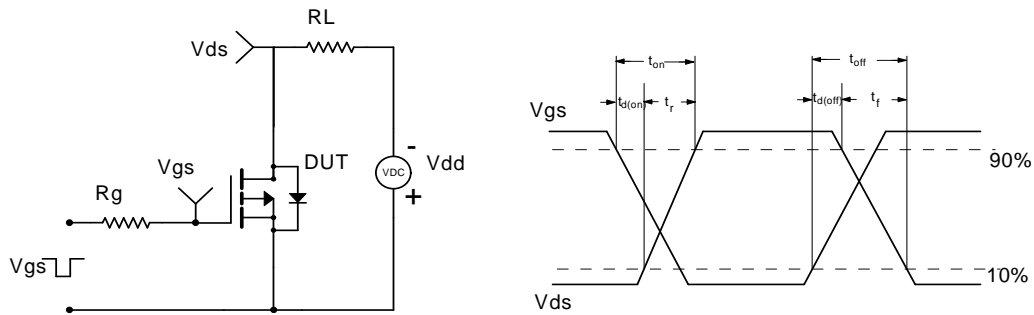


Figure 12: Normalized Maximum Transient Thermal Impedance (Note F)

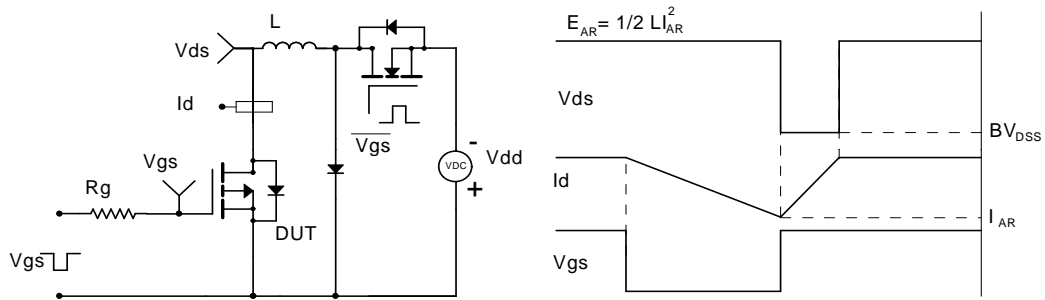
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

