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AO4840E

40V Dual N-Channel AlphaMOS

General Description

- Advanced trench technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- ESD protected
- RoHS and Halogen-Free Compliant

Applications

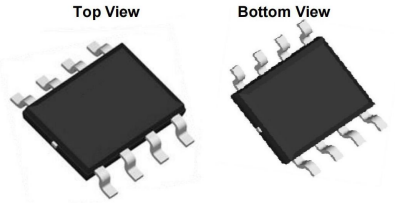
- Buck Converter
- DC motor drive
- Load switch

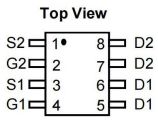
Product Summary

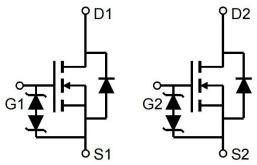
V_{DS}	40V
I_D (at V_{GS}=10V)	6A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 28mΩ
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 35mΩ
Typical ESD protection	**HBM Class 2**

100% UIS Tested
100% Rg Tested

SOIC-8







Orderable Part Number	Package Type	Form	Minimum Order Quantity
AO4840E	SO-8	Tape & Reel	3000

Absolute Maximum Ratings T_A=25°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	T_A=25°C	I_D	6	A
	T_A=70°C		5	
Pulsed Drain Current [C]		I_{DM}	30	
Avalanche Current [C]		I_{AS}	14	A
Avalanche energy	L=0.1mH [C]	E_{AS}	10	mJ
V_{DS} Spike	10µs	V_{SPIKE}	48	V
Power Dissipation [B]	T_A=25°C	P_D	2	W
	T_A=70°C		1.2	
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	$R_{\theta JA}$	48	62.5	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		74	90	°C/W
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	32	40	°C/W

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Electrical Characteristics (T_J=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	ID=250μA, VGS=0V	40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V, V_{GS}=0V			1	μA
		T_J=55℃			5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±20V			±10	μA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	1.7	2.1	2.6	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=6A		23	28	mΩ
		T_J=125℃		39	47	
		V_{GS}=4.5V, I_D=5A		28	35	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=6A		29		S
V_{SD}	Diode Forward Voltage	I_S=1A, V_{GS}=0V		0.75	1	V
I_S	Maximum Body-Diode Continuous Current				3	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=20V, f=1MHz		520		pF
C_{oss}	Output Capacitance			65		pF
C_{rss}	Reverse Transfer Capacitance			32		pF
R_g	Gate resistance	f=1MHz	2	4.2	6.5	Ω
SWITCHING PARAMETERS						
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=20V, I_D=6A		9	15	nC
Q_g(4.5V)	Total Gate Charge			4.5	10	nC
Q_{gs}	Gate Source Charge			2		nC
Q_{gd}	Gate Drain Charge			1.5		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=20V, R_L=3.3Ω, R_{GEN}=3Ω		5.5		ns
t_r	Turn-On Rise Time			2.5		ns
$t_{D(off)}$	Turn-Off DelayTime			20.5		ns
t_f	Turn-Off Fall Time			7		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=6A, di/dt=500A/μs		8		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=6A, di/dt=500A/μs		13		nC

A. The value of $R_{\theta JA}$ 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 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 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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

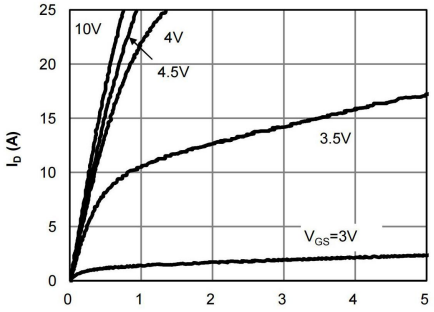


Figure 1: On-Region Characteristics (Note E)

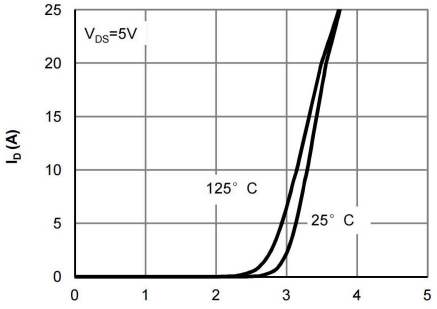


Figure 2: Transfer Characteristics (Note E)

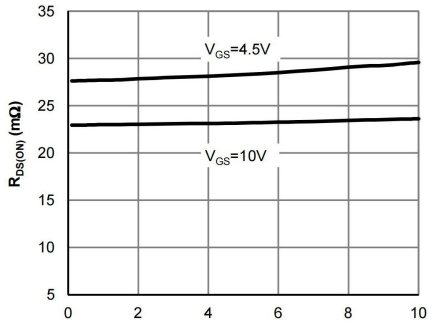


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

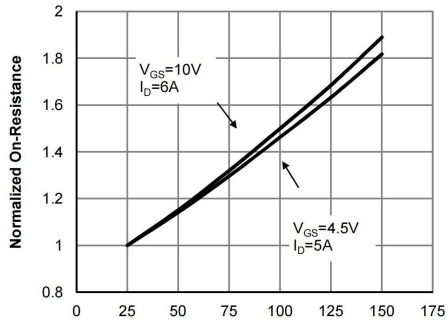


Figure 4: On-Resistance vs. Junction Temperature (Note E)

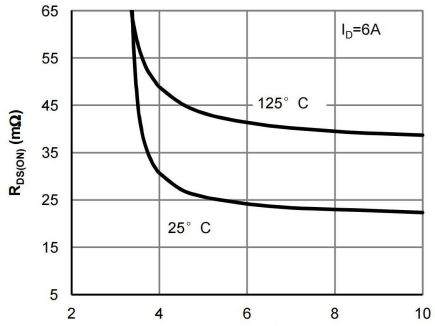


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

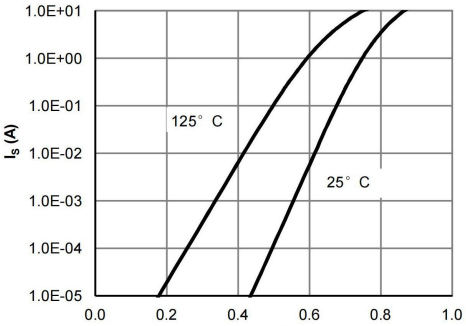


Figure 6: Body-Diode Characteristics (Note E)

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

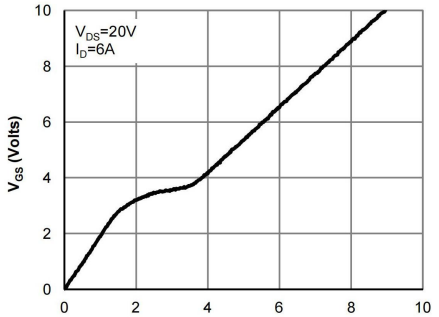


Figure 7: Gate-Charge Characteristics

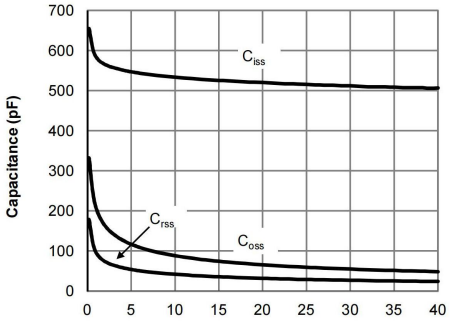


Figure 8: Capacitance Characteristics

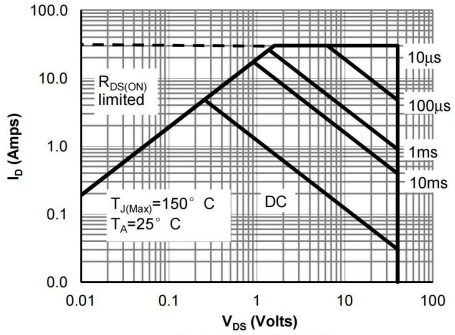


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

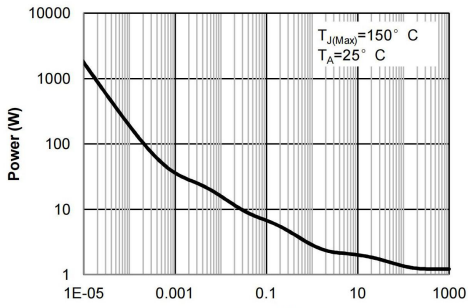


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

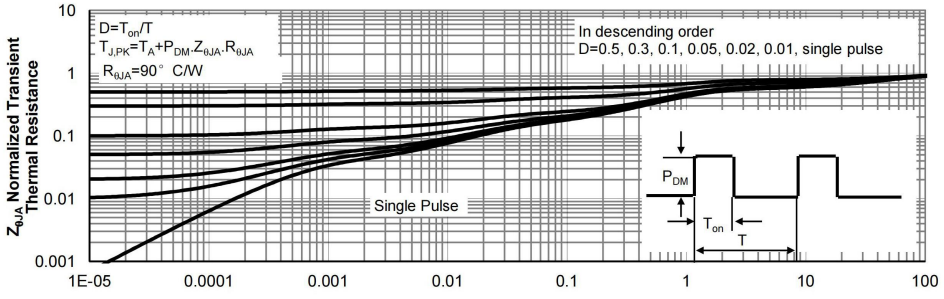
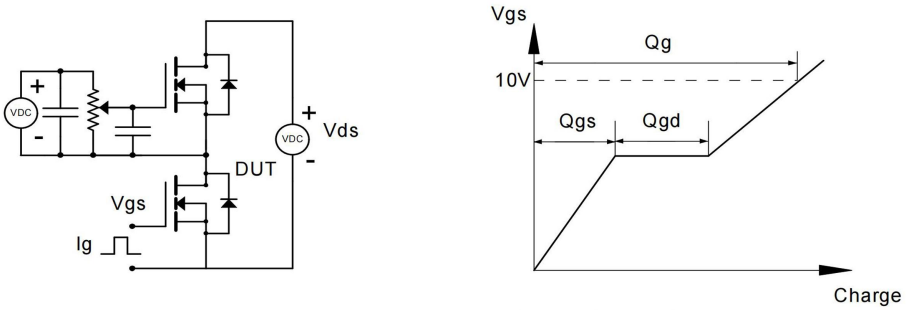


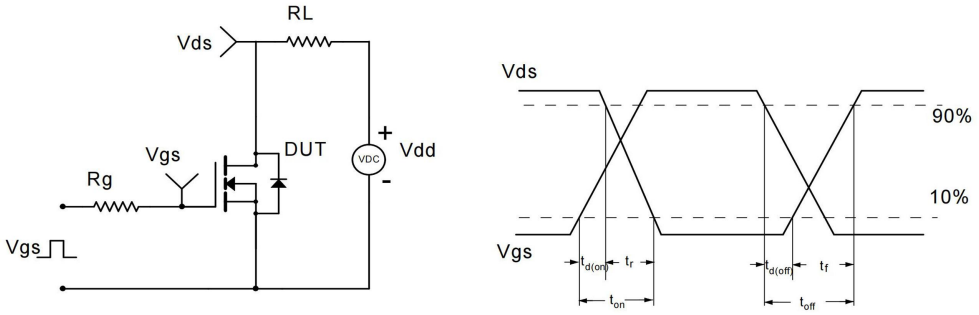
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

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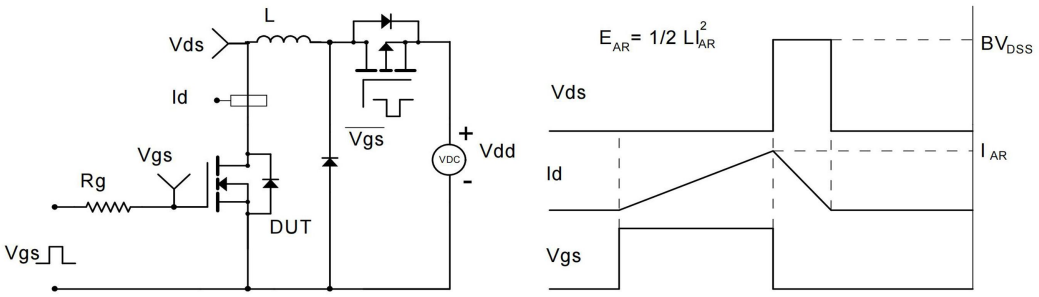
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

