



ALPHA & OMEGA
 SEMICONDUCTOR

AO4240

40V N-Channel MOSFET

General Description

The AO4240 uses trench MOSFET technology that is uniquely optimized to provide the most efficient high frequency switching performance. Power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and C_{rss} . In addition, switching behavior is well controlled with a "Schottky style" soft recovery body diode.

Product Summary

V_{DS} 40V
 I_D (at $V_{GS}=10V$) 24A
 $R_{DS(ON)}$ (at $V_{GS}=10V$) < 3.3m Ω
 $R_{DS(ON)}$ (at $V_{GS}=4.5V$) < 4.3m Ω

100% UIS Tested
 100% R_g Tested

SOIC-8

Absolute Maximum Ratings $T_A=25^{\circ}C$ 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	24	A
		19	
Pulsed Drain Current ^c	I_{DM}	170	
Avalanche Current ^c	I_{AS}	75	A
Avalanche energy $L=0.1mH$ ^c	E_{AS}	281	mJ
Power Dissipation ^b	P_D	3.1	W
		2	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^{\circ}C$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	31	40	$^{\circ}C/W$
Maximum Junction-to-Ambient ^{A, D}		59	75	
Maximum Junction-to-Lead	$R_{\theta JL}$	16	24	$^{\circ}C/W$

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			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	1.2	1.7	2.3	V
I _{D(ON)}	On state drain current	V _{GS} =10V, V _{DS} =5V	170			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A		2.7	3.3	mΩ
		T _J =125°C		4	4.9	
		V _{GS} =4.5V, I _D =20A		3.4	4.3	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =20A		90		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.67	1	V
I _S	Maximum Body-Diode Continuous Current				4.5	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =20V, f=1MHz		4245		pF
C _{oss}	Output Capacitance			1170		pF
C _{rss}	Reverse Transfer Capacitance			69		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	0.5	1	1.5	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =10V, V _{DS} =20V, I _D =20A		62	87	nC
Q _g (4.5V)	Total Gate Charge			28	40	nC
Q _{gs}	Gate Source Charge			10.5		nC
Q _{gd}	Gate Drain Charge			8		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =20V, R _L =1.0Ω, R _{GEN} =3Ω		9		ns
t _r	Turn-On Rise Time			11.5		ns
t _{D(off)}	Turn-Off DelayTime			42		ns
t _f	Turn-Off Fall Time			21		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, dI/dt=500A/μs		23		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, dI/dt=500A/μs		74		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_{θJA} 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

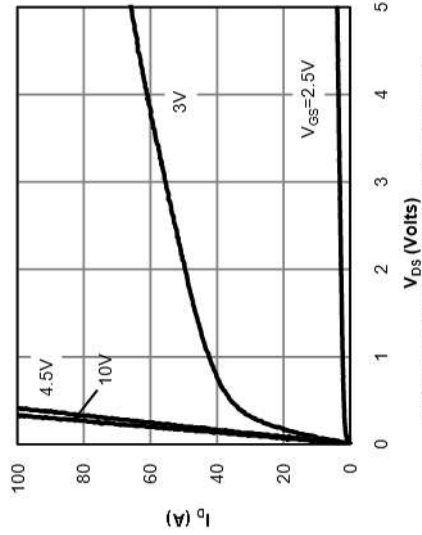


Fig 1: On-Region Characteristics (Note E)

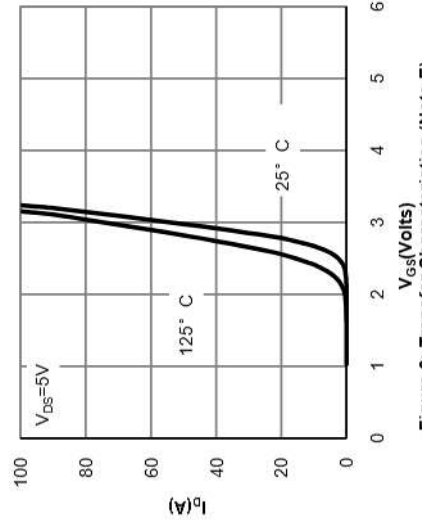


Figure 2: Transfer Characteristics (Note E)

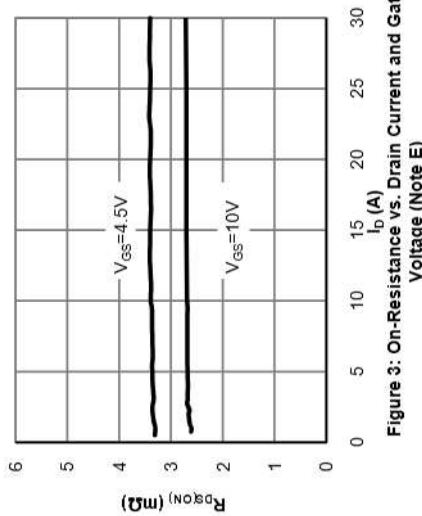


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

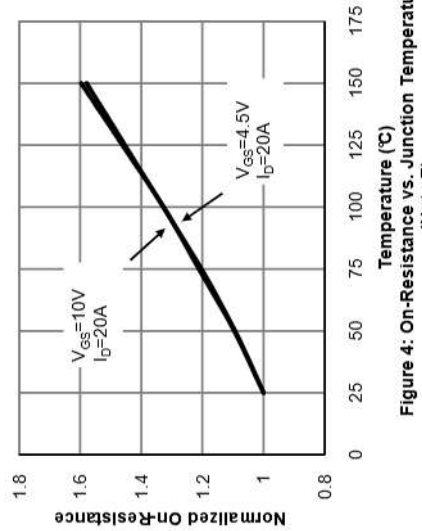


Figure 4: On-Resistance vs. Junction Temperature (Note E)

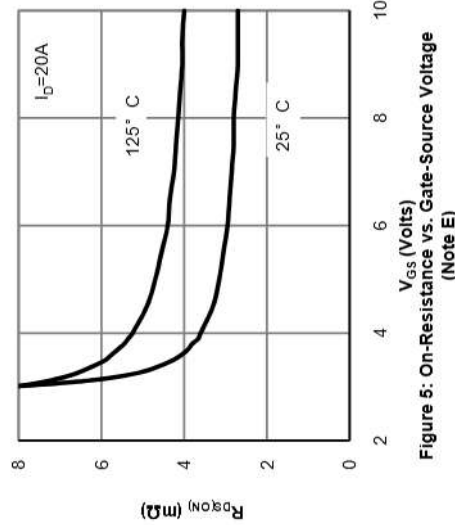


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

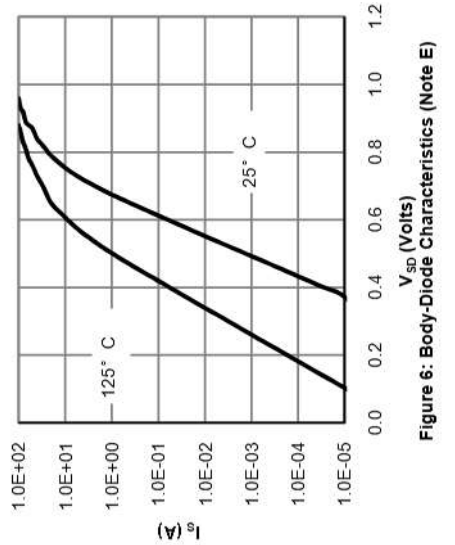
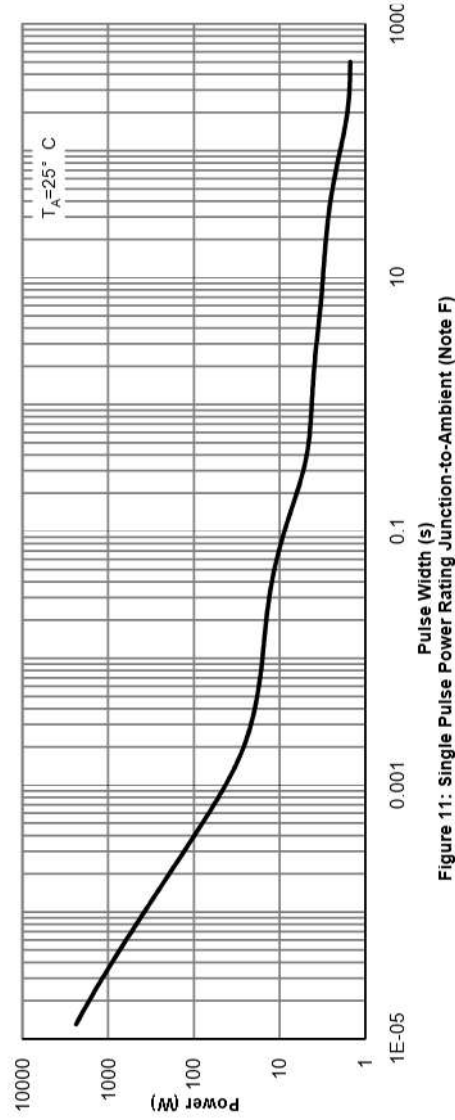
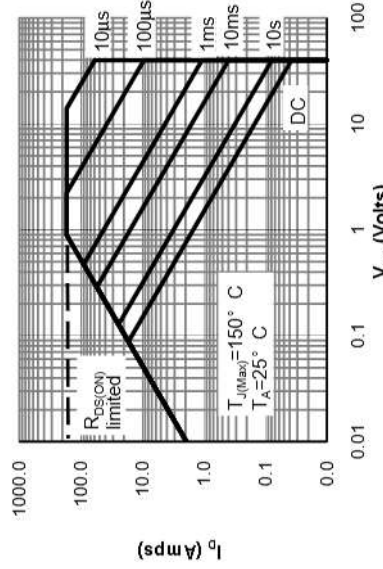
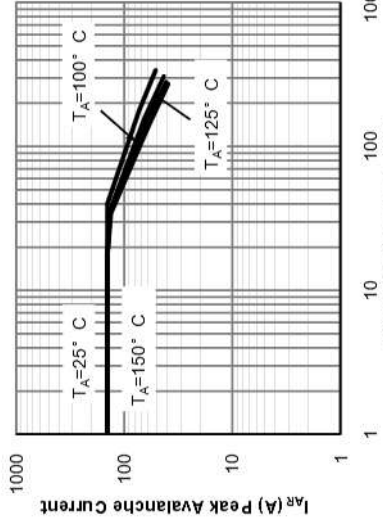
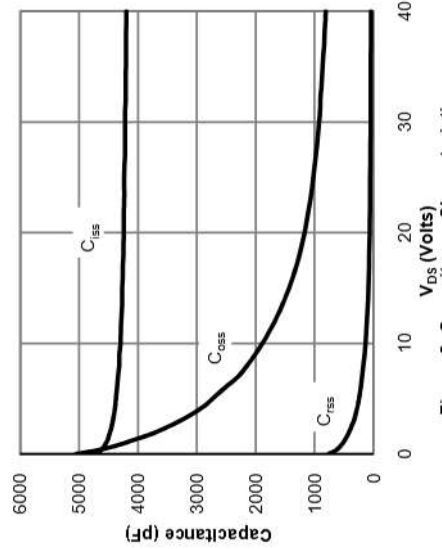
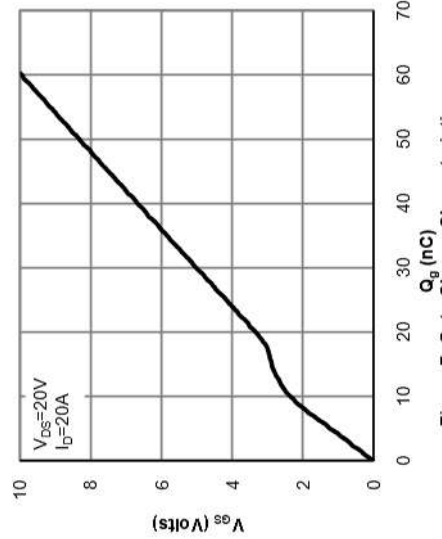


Figure 6: Body-Diode Characteristics (Note E)

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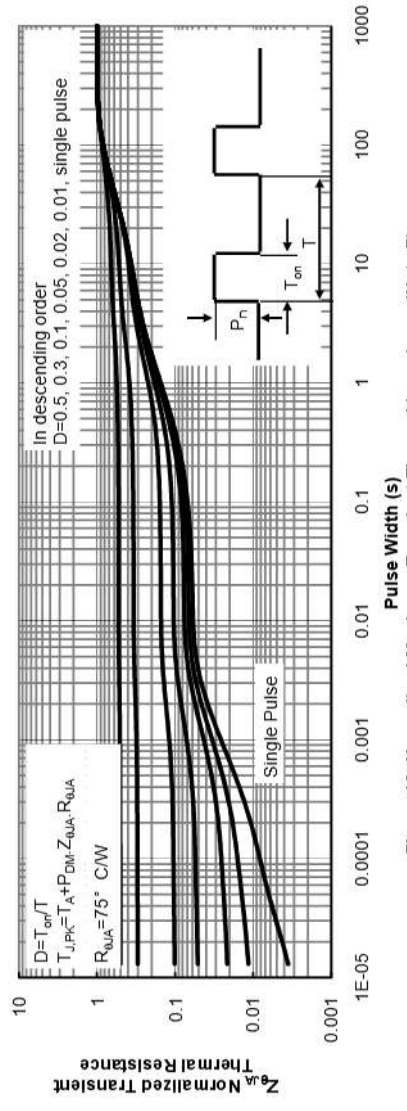


Figure 12: Normalized Maximum Transient Thermal Impedance (Note F)

