ALPHA & OMEGA SEMICONDUCTOR

AOC2401

30V P-Channel MOSFET

General Description

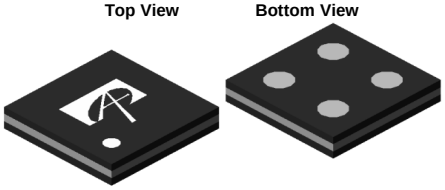
The AOC2401 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V while retaining a 12V $V_{GS(MAX)}$ rating.

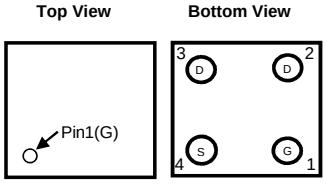
Product Summary

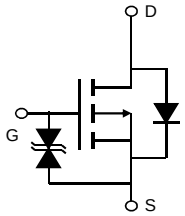
V_{DS}	-30V
I_D (at V_{GS}=-10V)	-3A
$R_{DS(ON)}$ (at V_{GS}=-10V)	< 41mΩ
$R_{DS(ON)}$ (at V_{GS}=-4.5V)	< 47mΩ
$R_{DS(ON)}$ (at V_{GS}=-2.5V)	< 58mΩ
Typical ESD protection	**HBM Class 2**

Green Product

MCSP 1.57x1.57_4







Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	±12	V
Source Current (DC) Note1	T_A=25°C	I_D	-3	A
Source Current (Pulse) Note2		I_{DM}	-45	
Power Dissipation Note1	T_A=25°C	P_D	0.55	W
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	$R_{\theta JA}$	140	170	°C/W
Maximum Junction-to-Ambient A D	Steady-State		190	230	°C/W

Note 1. Mounted on minimum pad PCB

Note 2. PW <300 µs pulses, duty cycle 0.5% max

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	-30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-30V, V_{GS}=0V			-1	µA
		T_J=55°C			-5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±12V			±10	µA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=-250µA	-0.6	-0.93	-1.3	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-10V, I_D=-1.5A		34	41	mΩ
		T_J=125°C		47.5	58	
		V_{GS}=-4.5V, I_D=-1A		37	47	mΩ
		V_{GS}=-2.5V, I_D=-1A		44	58	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-1.5A		12		S
V_{SD}	Diode Forward Voltage	I_S=-1A,V_{GS}=0V		-0.68	-1	V
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, f=1MHz		1327		pF
C_{oss}	Output Capacitance			158		pF
C_{rss}	Reverse Transfer Capacitance			102		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		15.5		Ω
SWITCHING PARAMETERS						
$Q_{g(10V)}$	Total Gate Charge	V_{GS}=-10V, V_{DS}=-15V, I_D=-1.5A		28	40	nC
$Q_{g(4.5V)}$	Total Gate Charge			13.5	19	nC
Q_{gs}	Gate Source Charge			2		nC
Q_{gd}	Gate Drain Charge			4		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-10V, V_{DS}=-15V, R_L=10Ω, R_{GEN}=3Ω		7		ns
t_r	Turn-On Rise Time			5		ns
$t_{D(off)}$	Turn-Off DelayTime			190		ns
t_f	Turn-Off Fall Time			62		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-1.5A, dI/dt=100A/µs		15		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-1.5A, dI/dt=100A/µs		5		nC

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

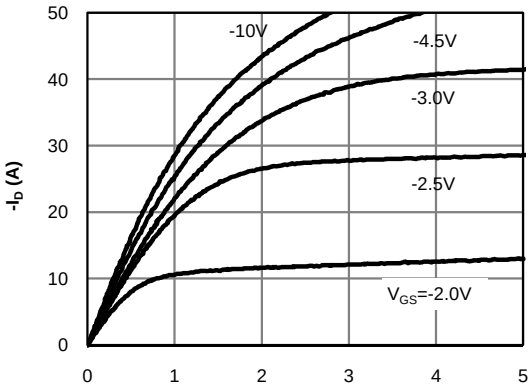


Fig 1: On-Region Characteristics

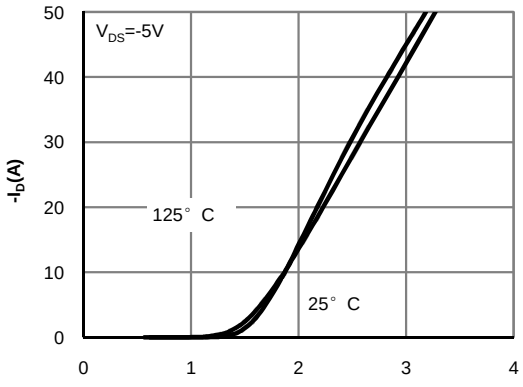


Figure 2: Transfer Characteristics

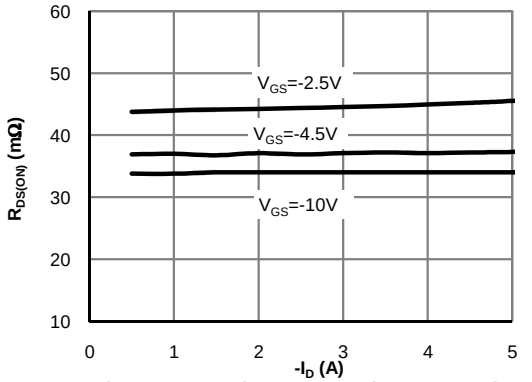


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

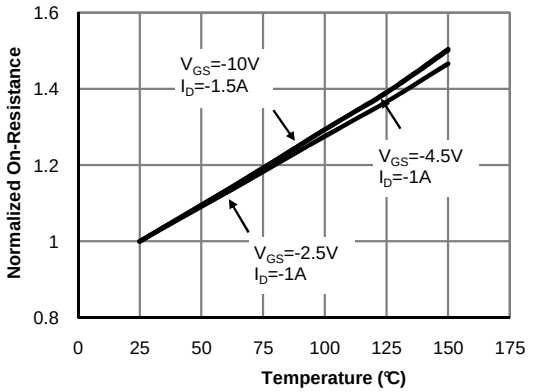


Figure 4: On-Resistance vs. Junction Temperature (Note E)

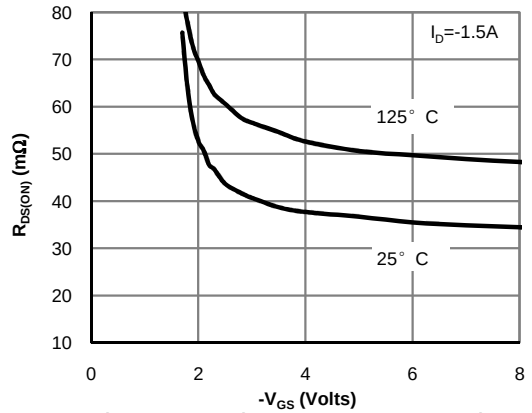


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

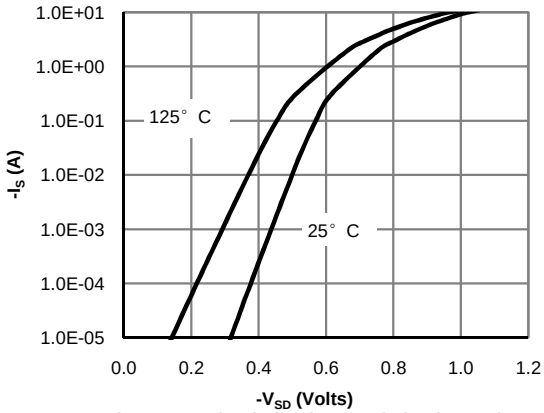


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

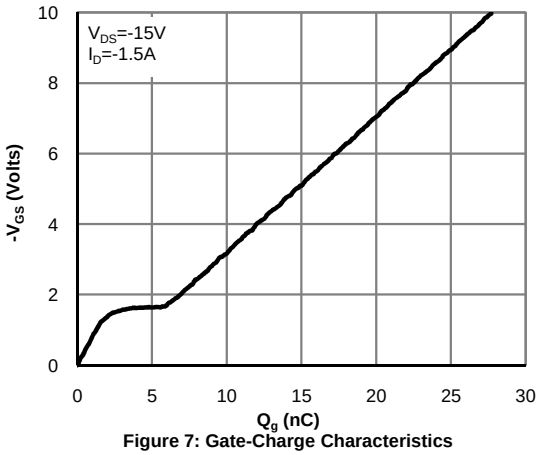


Figure 7: Gate-Charge Characteristics

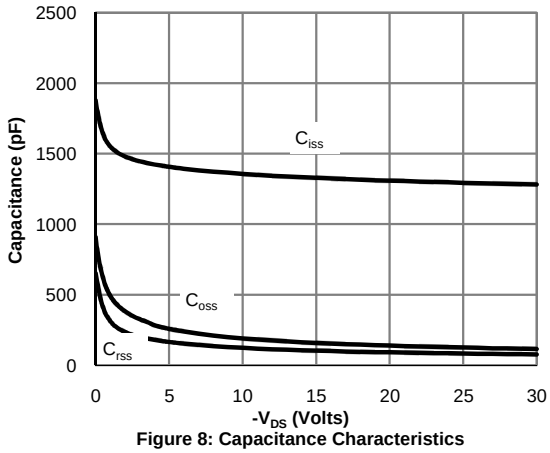


Figure 8: Capacitance Characteristics

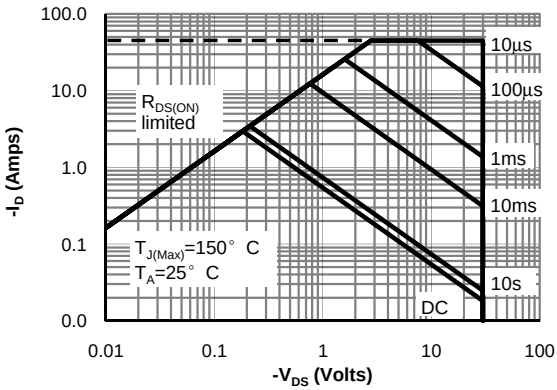


Figure 9: Maximum Forward Biased Safe Operating Area

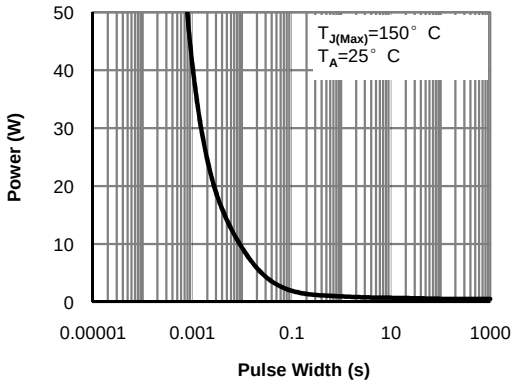


Figure 10: Single Pulse Power Rating Junction-to-Ambient

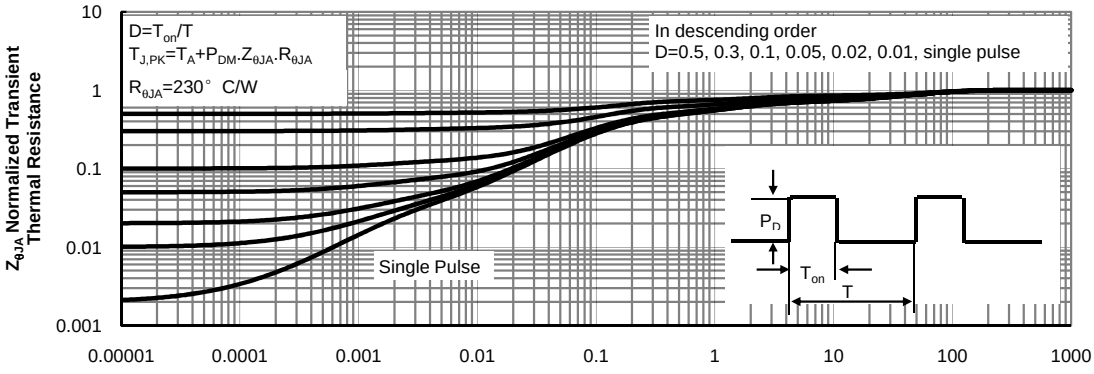
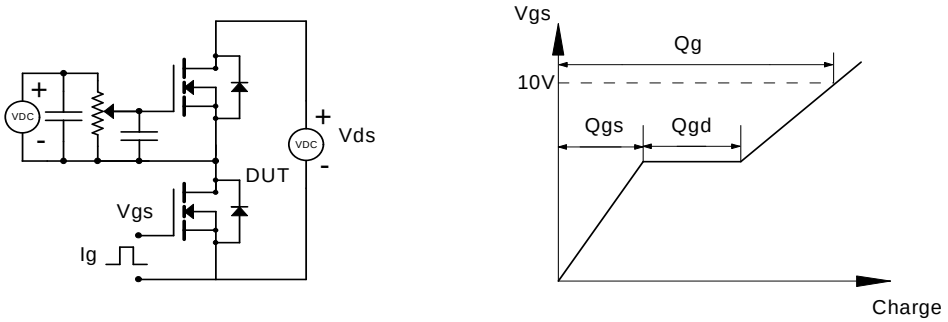
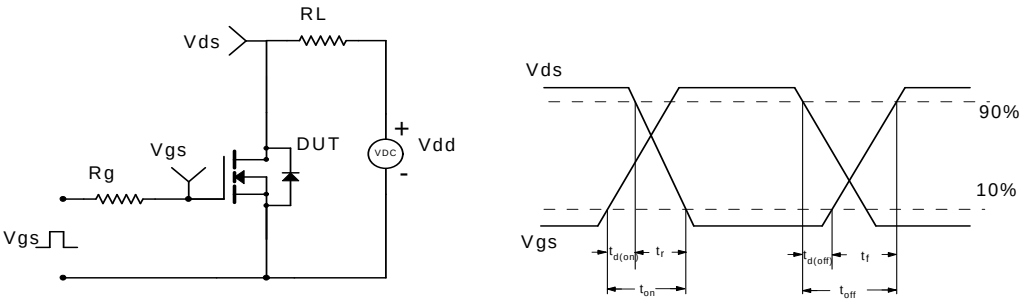


Figure 11: Normalized Maximum Transient Thermal Impedance

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms