

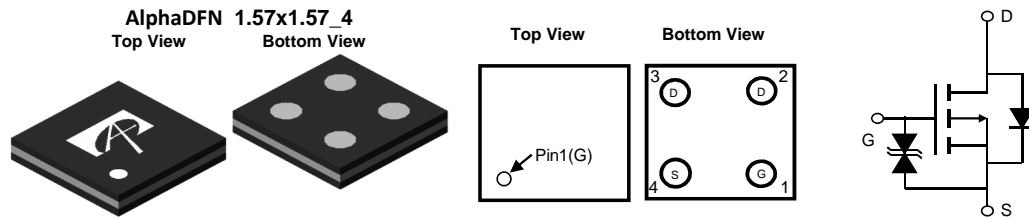
General Description

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 $V_{GS}=-10V$) | < 41m Ω |
| $R_{DS(ON)}$ (at $V_{GS}=-4.5V$) | < 47m Ω |
| $R_{DS(ON)}$ (at $V_{GS}=-2.5V$) | < 58m Ω |

Typical ESD protection **HBM Class 2**



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ 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} | I_D | -3 | A |
| $T_A=25^\circ\text{C}$ | | | |
| Source Current (Pulse) ^{Note2} | I_{DM} | -45 | A |
| Power Dissipation ^{Note1} | P_D | 0.55 | W |
| $T_A=25^\circ\text{C}$ | | | |
| 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 | $R_{\theta JA}$ | 140 | 170 | $^\circ\text{C/W}$ |
| $t \leq 10\text{s}$ | | | | |
| Maximum Junction-to-Ambient ^{A,D} | | 190 | 230 | $^\circ\text{C/W}$ |
| Steady-State | | | | |

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 T _J =55°C | | | -1 -5 | μA |
| 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 T _J =125°C | | 34 | 41 | mΩ |
| | | V _{GS} =-4.5V, I _D =-1A | | 37 | 47 | |
| | | 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 |

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

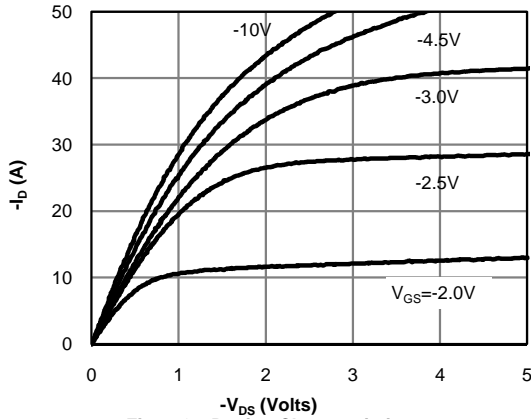


Fig 1: On-Region Characteristics

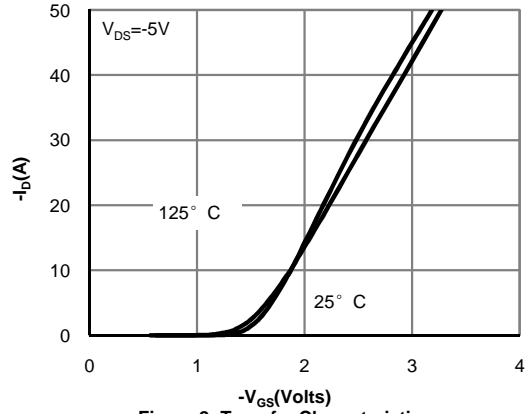


Figure 2: Transfer Characteristics

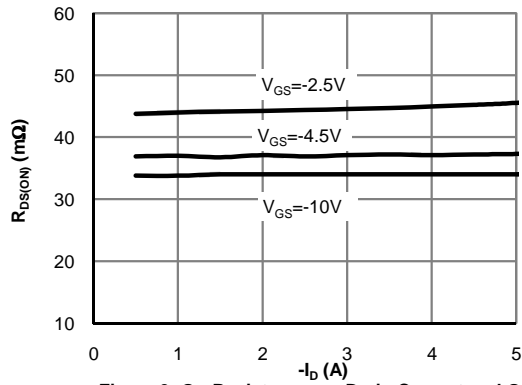


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

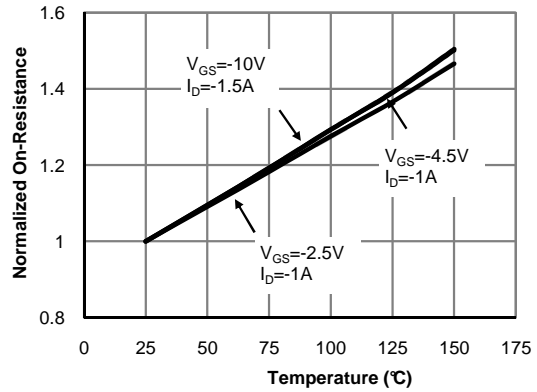


Figure 4: On-Resistance vs. Junction Temperature (Note E)

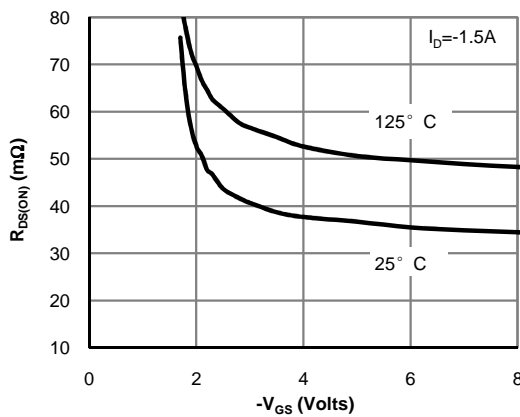


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

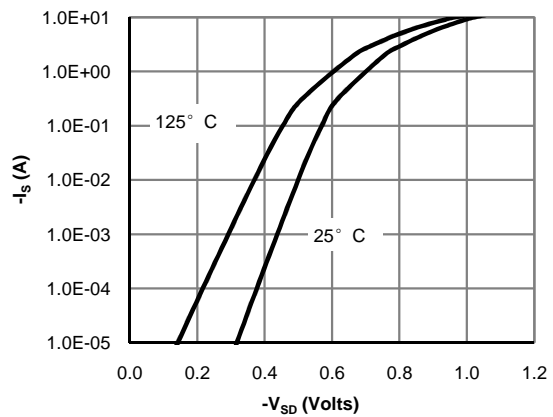


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

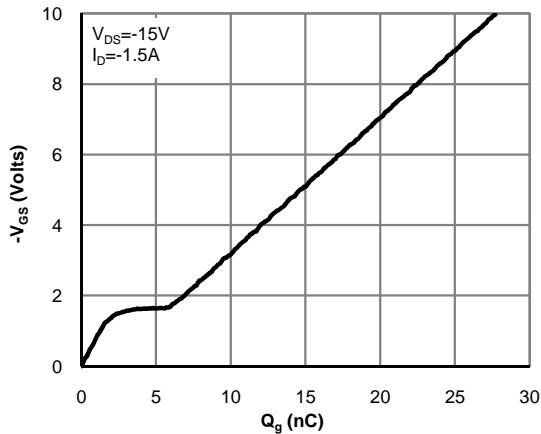


Figure 7: Gate-Charge Characteristics

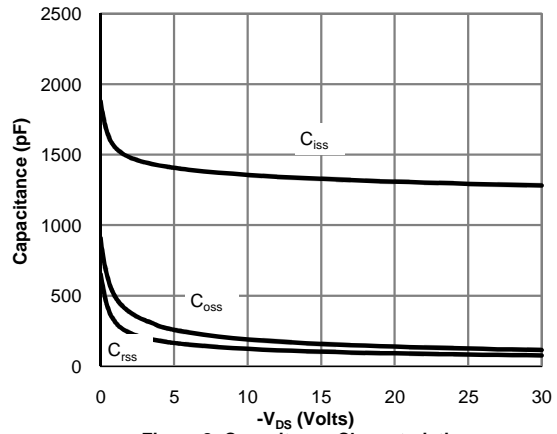


Figure 8: Capacitance Characteristics

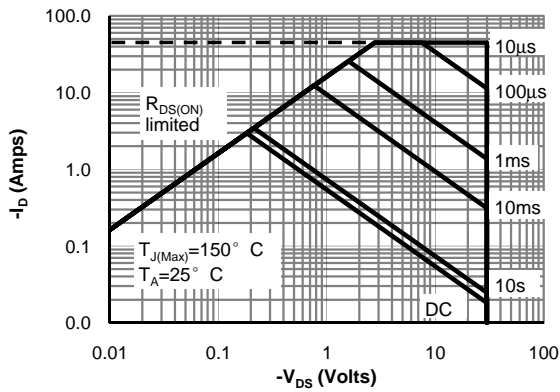


Figure 9: Maximum Forward Biased Safe Operating Area

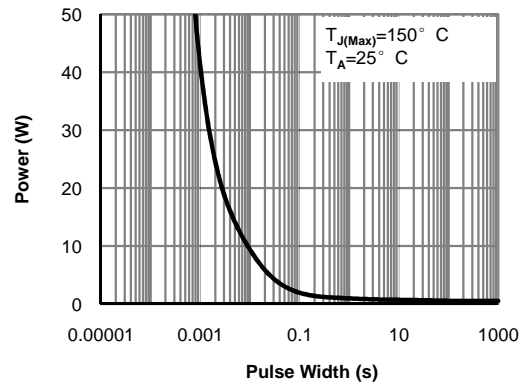


Figure 10: Single Pulse Power Rating Junction-to-Ambient

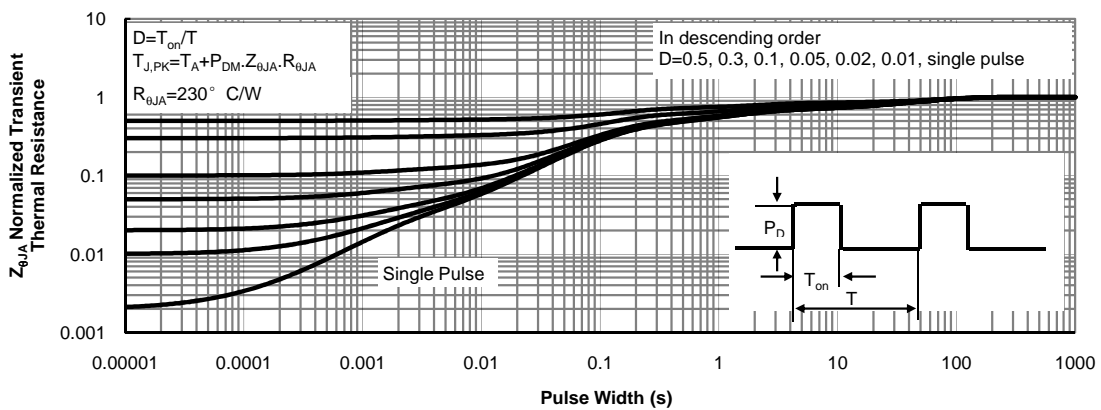
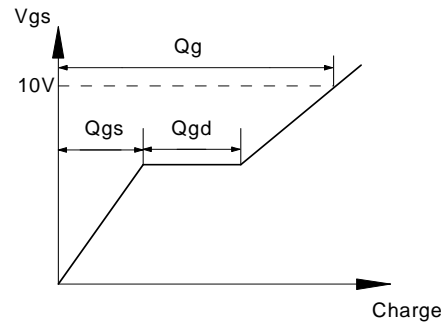
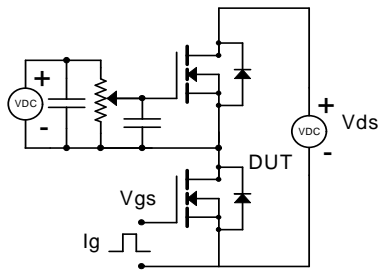
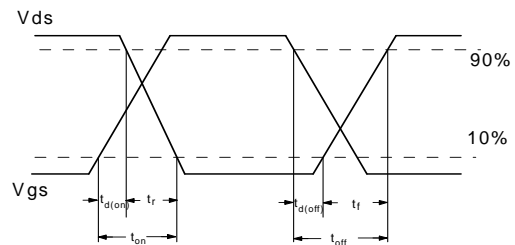
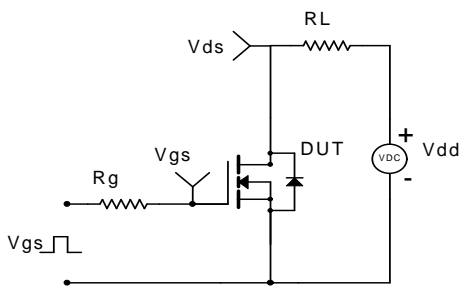


Figure 11: Normalized Maximum Transient Thermal Impedance

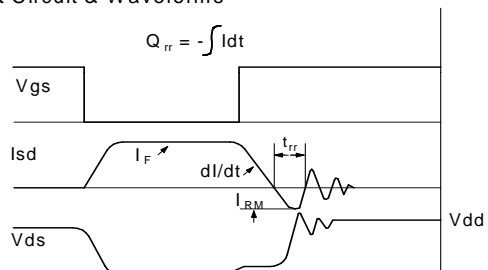
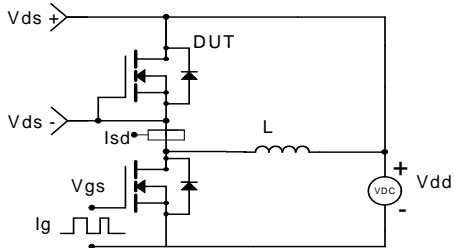
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



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