

General Description

The AO4410 uses advanced trench technology to provide excellent $R_{DS(ON)}$, shoot-through immunity, body diode characteristics and ultra-low gate resistance. This device is ideally suited for use as a low side switch in Notebook CPU core power conversion. *Standard product AO4410 is Pb-free (meets ROHS & Sony 259 specifications). AO4410L is a Green Product ordering option. AO4410 and AO4410L are electrically identical.*

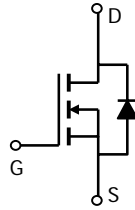
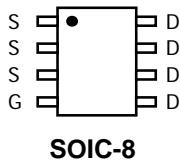
Features

$$V_{DS} (V) = 30V$$

$$I_D = 18A \quad (V_{GS} = 10V)$$

$$R_{DS(ON)} < 5.5m\Omega \quad (V_{GS} = 10V)$$

$$R_{DS(ON)} < 6.2m\Omega \quad (V_{GS} = 4.5V)$$



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

| Parameter | Symbol | Maximum | Units |
|--|------------------|------------|------------|
| Drain-Source Voltage | V_{DS} | 30 | V |
| Gate-Source Voltage | V_{GS} | ± 12 | V |
| Continuous Drain Current ^A | $T_A=25^\circ C$ | 18 | A |
| | $T_A=70^\circ C$ | 15 | |
| Pulsed Drain Current ^B | I_{DM} | 80 | |
| Power Dissipation | $T_A=25^\circ C$ | 3 | W |
| | $T_A=70^\circ C$ | 2.1 | |
| 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 | | Steady-State | 59 | 75 |
| Maximum Junction-to-Lead ^C | $R_{\theta JL}$ | 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 | 30 | | | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} =24V, V _{GS} =0V T _J =55°C | | 0.005 | 1 5 | μA |
| I _{GSS} | Gate-Body leakage current | V _{DS} =0V, V _{GS} = ±12V | | | 100 | nA |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D =250μA | 0.8 | 1.1 | 1.5 | V |
| I _{D(ON)} | On state drain current | V _{GS} =4.5V, V _{DS} =5V | 80 | | | A |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =10V, I _D =18A T _J =125°C | | 4.7 6.4 | 5.5 7.4 | mΩ |
| | | V _{GS} =4.5V, I _D =15A | | 5.2 | 6.2 | mΩ |
| g _{FS} | Forward Transconductance | V _{DS} =5V, I _D =18A | | 102 | | S |
| V _{SD} | Diode Forward Voltage | I _S =1A, V _{GS} =0V | | 0.64 | 1 | V |
| I _S | Maximum Body-Diode Continuous Current | | | | 4.5 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | | | 9130 | 10500 | pF |
| C _{oss} | Output Capacitance | V _{GS} =0V, V _{DS} =15V, f=1MHz | | 625 | | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 387 | | pF |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, f=1MHz | | 0.4 | 0.5 | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _{g(4.5V)} | Total Gate Charge | | | 72.4 | 85 | nC |
| Q _{gs} | Gate Source Charge | V _{GS} =10V, V _{DS} =15V, I _D =18A | | 13.4 | | nC |
| Q _{gd} | Gate Drain Charge | | | 16.8 | | nC |
| t _{D(on)} | Turn-On Delay Time | | | 11 | 15 | ns |
| t _r | Turn-On Rise Time | V _{GS} =10V, V _{DS} =15V, R _L =0.83Ω, | | 7 | 11 | ns |
| t _{D(off)} | Turn-Off Delay Time | R _{GEN} =3Ω | | 99 | 135 | ns |
| t _f | Turn-Off Fall Time | | | 13 | 19.5 | ns |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =18A, dI/dt=100A/μs | | 33 | 40 | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =18A, dI/dt=100A/μs | | 22.2 | 30 | 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. The current rating is based on the ≤ 10s thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C: The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.

D: The static characteristics in Figures 1 to 6 are obtained using 80μs pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

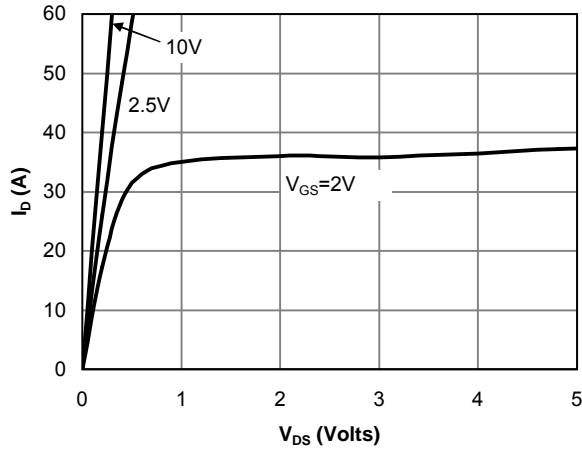


Fig 1: On-Region Characteristics

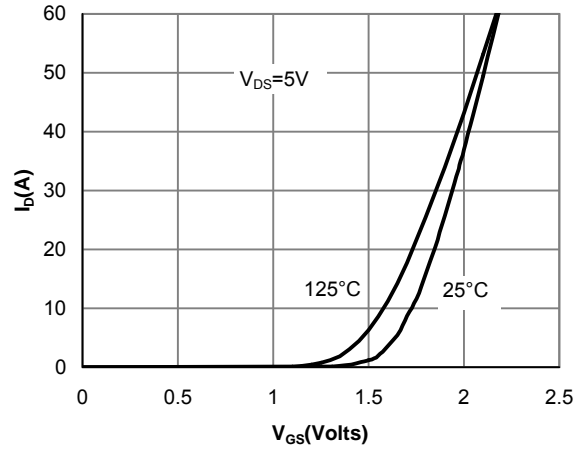


Figure 2: Transfer Characteristics

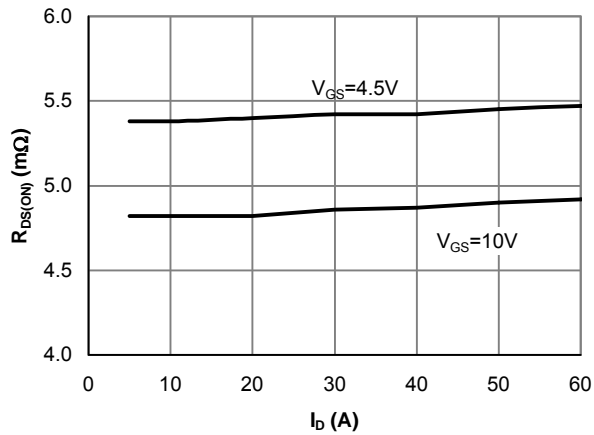


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

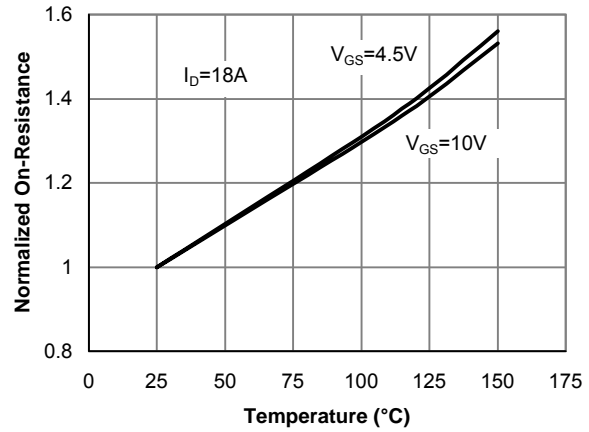


Figure 4: On-Resistance vs. Junction Temperature

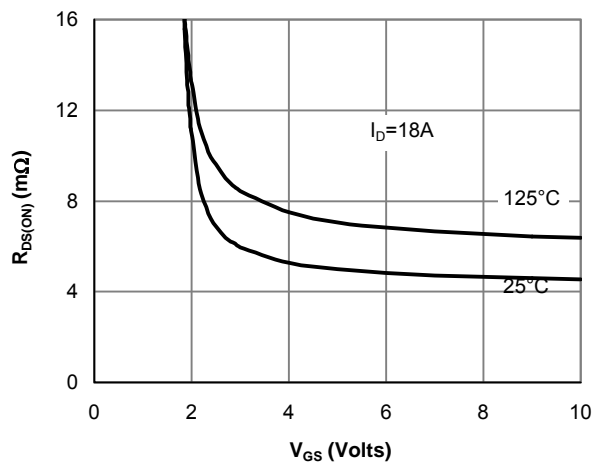


Figure 5: On-Resistance vs. Gate-Source Voltage

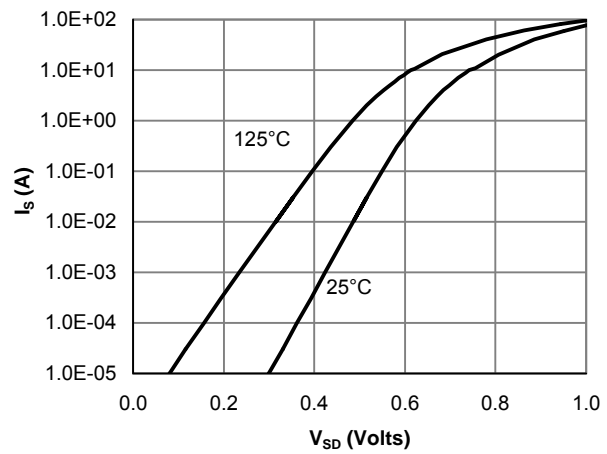


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

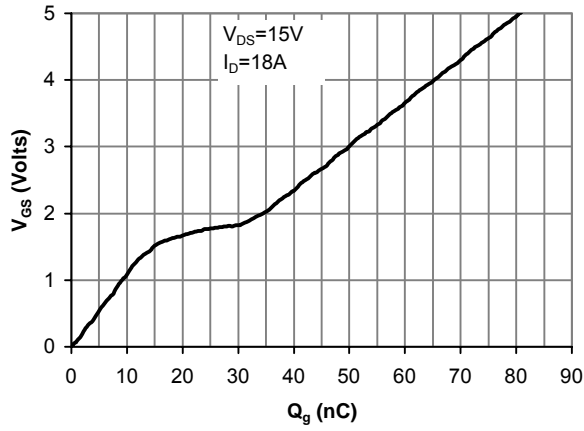


Figure 7: Gate-Charge Characteristics

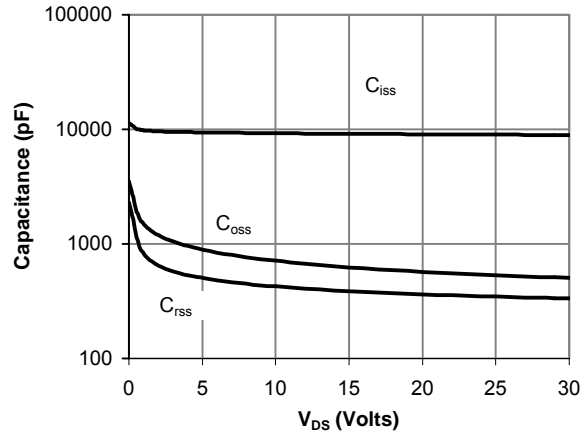


Figure 8: Capacitance Characteristics

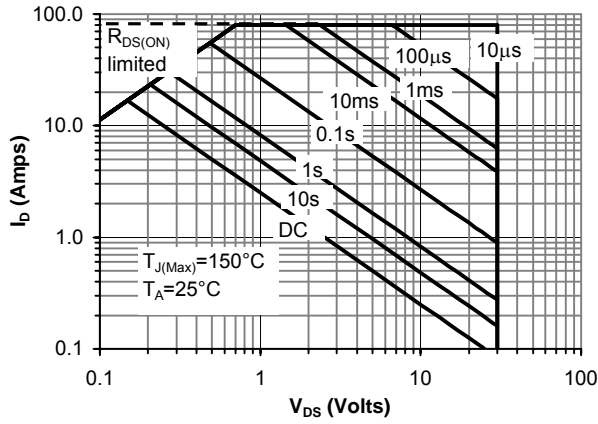


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

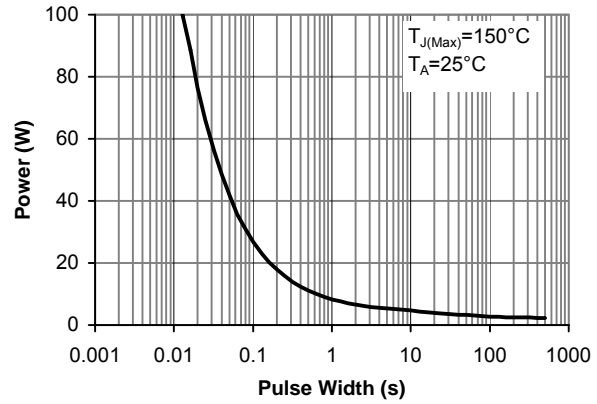


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

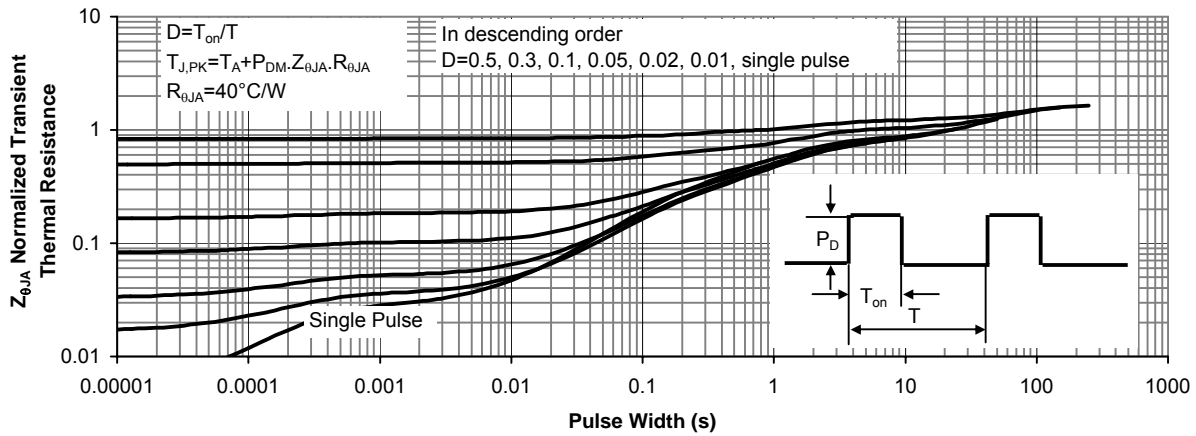


Figure 11: Normalized Maximum Transient Thermal Impedance