

- ★ Super Low Gate Charge
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

Product Summary



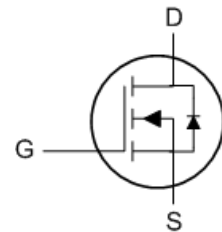
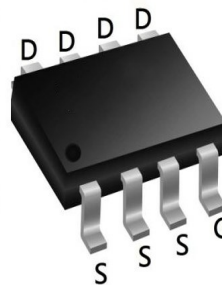
| BVDSS | RDSON | ID |
|-------|-------|-------|
| 30V | 9mΩ | 15.0A |

Description

The AO4410 is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The AO4410 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

SOP8 Pin Configuration



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|----------------------------|--|------------|------------------|
| V_{DS} | Drain-Source Voltage | 30 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| $I_D@T_A=25^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 15.0 | A |
| $I_D@T_A=70^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 8.2 | A |
| I_{DM} | Pulsed Drain Current ² | 42 | A |
| EAS | Single Pulse Avalanche Energy ³ | 61 | mJ |
| I_{AS} | Avalanche Current | 35 | A |
| $P_D@T_A=25^\circ\text{C}$ | Total Power Dissipation ⁴ | 1.5 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ\text{C}$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ\text{C}$ |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient ¹ | --- | 85 | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | --- | 36 | $^\circ\text{C/W}$ |

Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------|--|--|------|-------|-----------|---------------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 30 | --- | --- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | BV_{DSS} Temperature Coefficient | Reference to 25°C , $I_D=1mA$ | --- | 0.027 | --- | $V/^\circ\text{C}$ |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance ² | $V_{GS}=10V, I_D=10A$ | --- | 7.5 | 9 | $m\Omega$ |
| | | $V_{GS}=4.5V, I_D=8A$ | --- | 11 | 14 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=250\mu A$ | 1.2 | 1.5 | 2.5 | V |
| $\Delta V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | -5.8 | --- | $mV/^\circ\text{C}$ |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=24V, V_{GS}=0V, T_J=25^\circ\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=24V, V_{GS}=0V, T_J=55^\circ\text{C}$ | --- | --- | 5 | |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | --- | --- | ± 100 | nA |
| g_{fs} | Forward Transconductance | $V_{DS}=5V, I_D=10A$ | --- | 5.8 | --- | S |
| R_g | Gate Resistance | $V_{DS}=0V, V_{GS}=0V, f=1MHz$ | --- | 2.2 | 3.8 | Ω |
| Q_g | Total Gate Charge (4.5V) | $V_{DS}=15V, V_{GS}=4.5V, I_D=10A$ | --- | 12.6 | 17.6 | nC |
| Q_{gs} | Gate-Source Charge | | --- | 4.2 | 5.9 | |
| Q_{gd} | Gate-Drain Charge | | --- | 5.1 | 7.1 | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega, I_D=10A$ | --- | 6.2 | 12.4 | ns |
| T_r | Rise Time | | --- | 59 | 106 | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 27.6 | 55 | |
| T_f | Fall Time | | --- | 8.4 | 16.8 | |
| C_{iss} | Input Capacitance | $V_{DS}=15V, V_{GS}=0V, f=1MHz$ | --- | 1317 | 1845 | pF |
| C_{oss} | Output Capacitance | | --- | 163 | 228.2 | |
| C_{riss} | Reverse Transfer Capacitance | | --- | 131 | 183.4 | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------|--|---|------|------|------|------|
| I_S | Continuous Source Current ^{1,5} | $V_G=V_D=0V$, Force Current | --- | --- | 10.3 | A |
| I_{SM} | Pulsed Source Current ^{2,5} | | --- | --- | 42 | A |
| V_{SD} | Diode Forward Voltage ² | $V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$ | --- | --- | 1.2 | V |
| t_{rr} | Reverse Recovery Time | $I_F=10A, di/dt=100A/\mu s, T_J=25^\circ\text{C}$ | --- | 12.5 | --- | nS |
| Q_{rr} | Reverse Recovery Charge | | --- | 5 | --- | nC |

Note :

- The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
- The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- The EAS data shows Max. rating. The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=35A$
- The power dissipation is limited by 150°C junction temperature
- The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.

Typical Characteristics

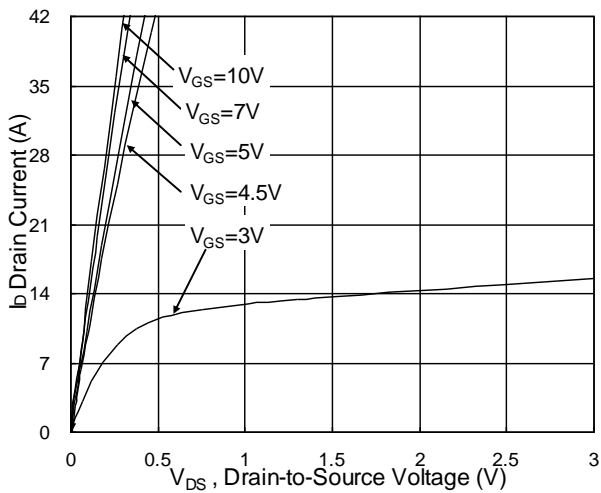


Fig.1 Typical Output Characteristics

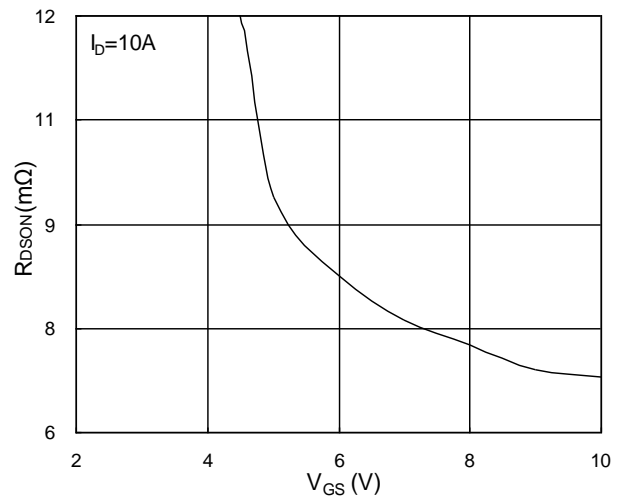


Fig.2 On-Resistance vs. Gate-Source

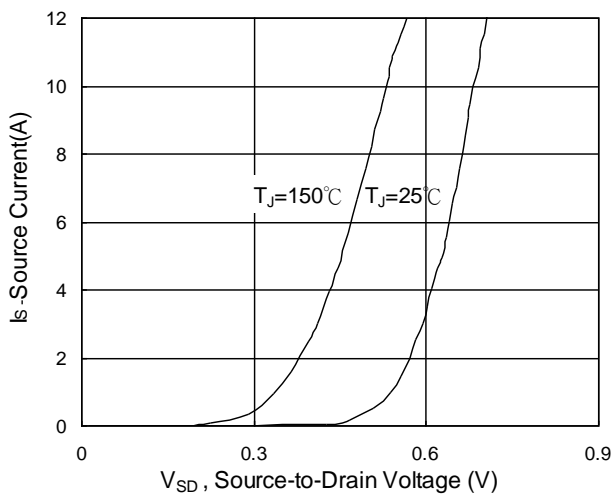


Fig.3 Forward Characteristics of reverse

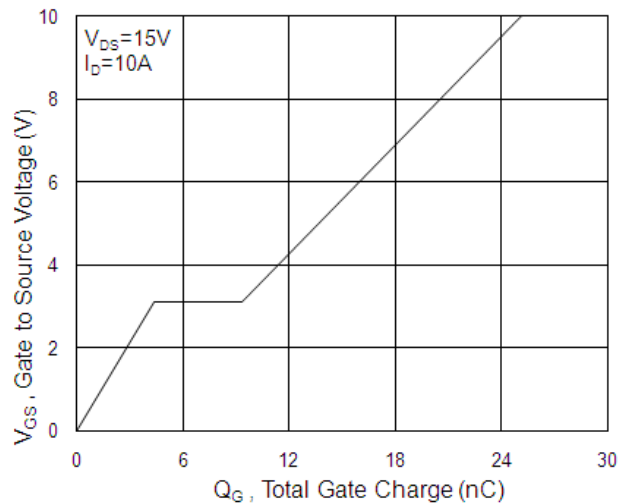


Fig.4 Gate-Charge Characteristics

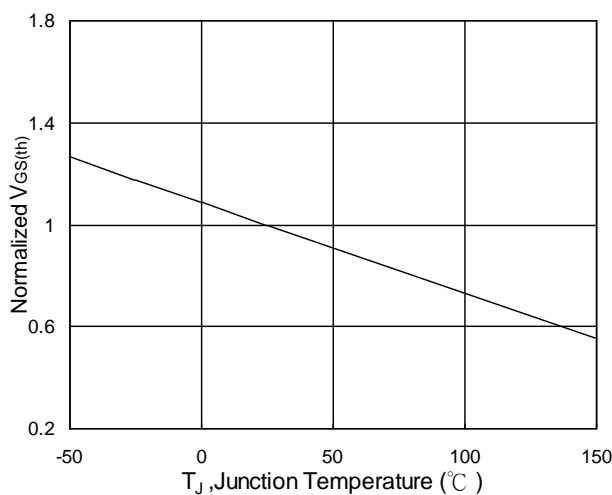


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

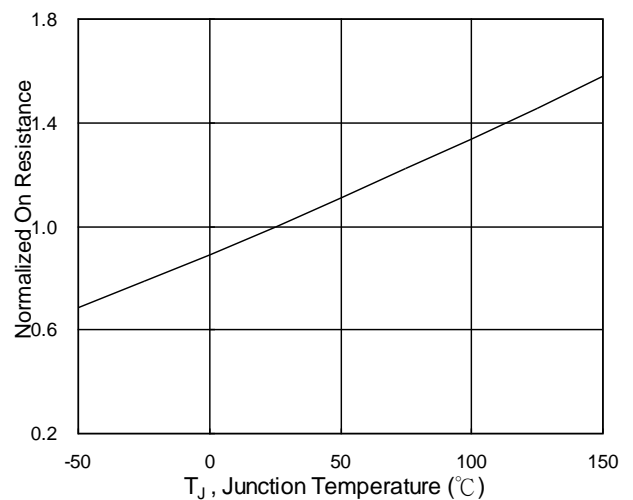


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

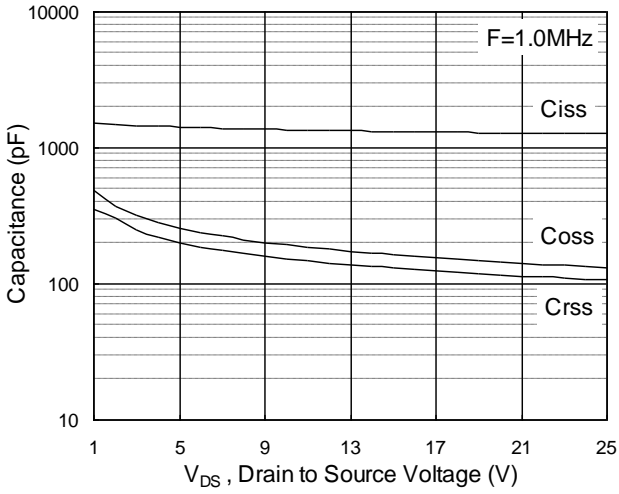


Fig.7 Capacitance

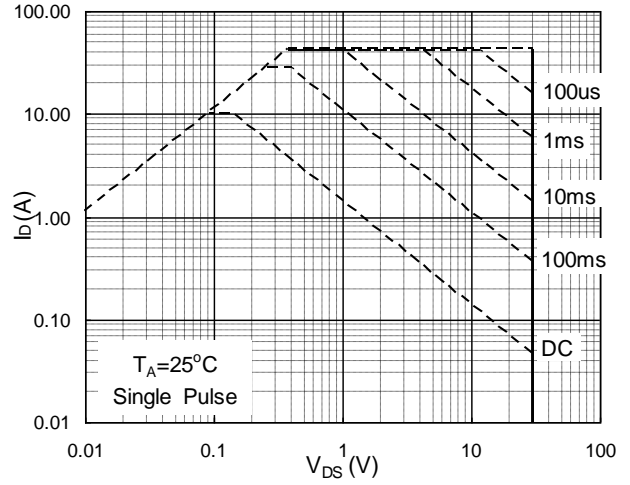


Fig.8 Safe Operating Area

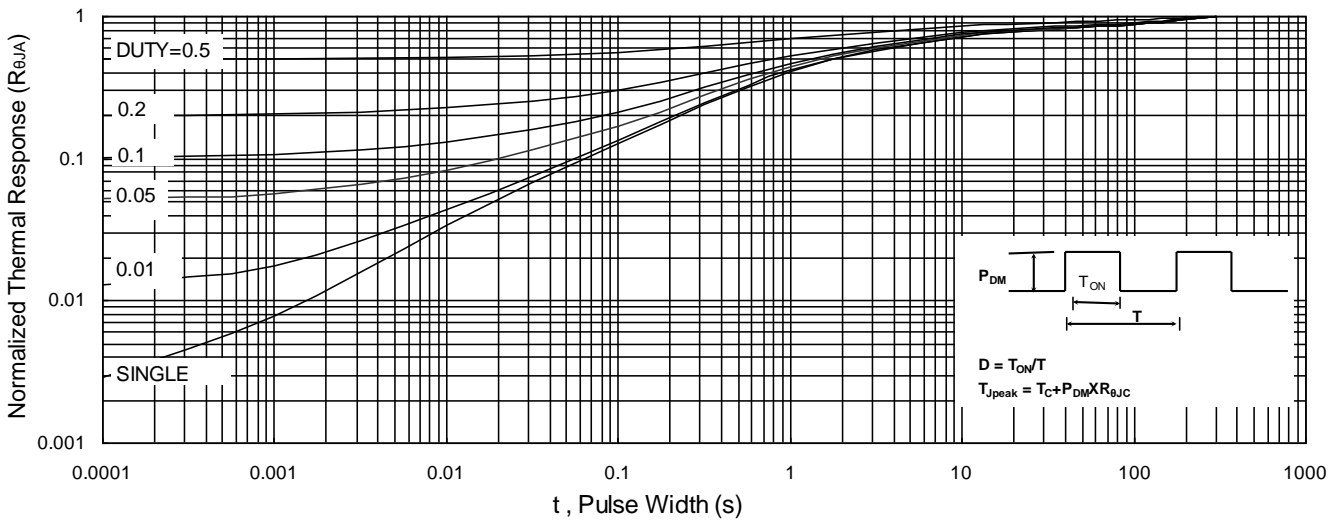


Fig.9 Normalized Maximum Transient Thermal Impedance

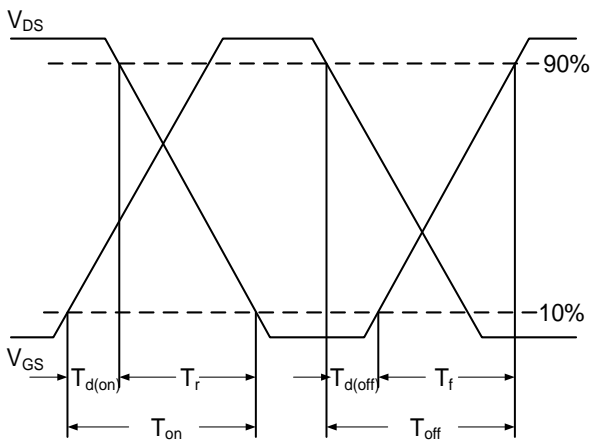


Fig.10 Switching Time Waveform

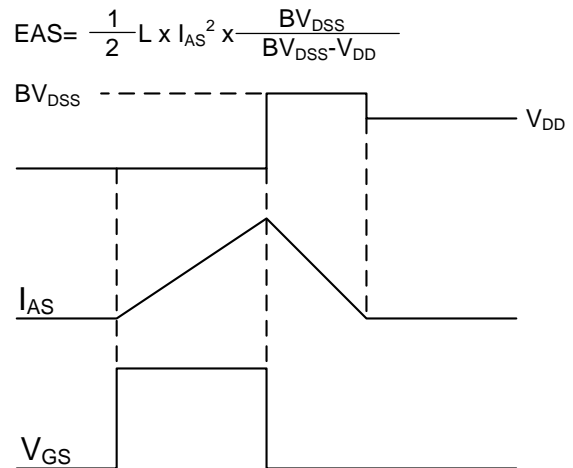


Fig.11 Unclamped Inductive Switching Waveform