

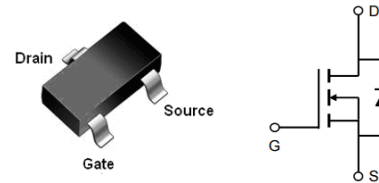
Features

- Low $R_{DS(on)}$ @ $V_{GS}=4.5V$
- 3.3V Logic Level Control
- N Channel SOT23 Package
- Pb-Free, RoHS Compliant

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ Typ | I_D Max |
|---------------|-----------------------|-----------|
| 20V | 16.2m Ω @ 4.5V | 6.5A |
| | 17.3m Ω @ 3.3V | |

Applications

- DC-to-DC converters
- Power management in battery-driven portables
- Low-side load switch and charging switch for portable devices
- Switching circuits
- High-speed line driver


SOT23
Order Information

| Product | Package | Marking | Packing | Min Unit Quantity |
|---------|---------|---------|--------------|-------------------|
| AO3416 | SOT23 | ** | 3000PCS/Reel | 3000PCS |

Absolute Maximum Ratings

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

| Symbol | Parameter | Rating | Unit |
|--|-------------------------------------|------------------------|--------------------|
| Common Ratings ($T_A=25^\circ\text{C}$ Unless Otherwise Noted) | | | |
| V_{GS} | Gate-Source Voltage | ± 10 | V |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | 20 | V |
| T_J | Maximum Junction Temperature | 150 | $^\circ\text{C}$ |
| T_{STG} | Storage Temperature Range | -50 to 150 | $^\circ\text{C}$ |
| Mounted on Large Heat Sink | | | |
| I_{DM} | Pulse Drain Current Tested① | $T_A=25^\circ\text{C}$ | 26 |
| I_D | Continuous Drain Current | $T_A=25^\circ\text{C}$ | 6.5 |
| | | $T_A=70^\circ\text{C}$ | 4.8 |
| P_D | Maximum Power Dissipation | $T_A=25^\circ\text{C}$ | 1.56 |
| | | $T_A=70^\circ\text{C}$ | 1 |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient | 80 | $^\circ\text{C/W}$ |

| Symbol | Parameter | Condition | Min | Typ | Max | Unit |
|--|--|--|-----|------|-----|------|
| Static Electrical Characteristics @ T_J = 25°C (unless otherwise stated) | | | | | | |
| V _{(BR)DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V I _D =250μA | 20 | -- | -- | V |
| I _{DSS} | Zero Gate Voltage Drain Current(T _A =25°C) | V _{DS} =20V, V _{GS} =0V | -- | -- | 1 | μA |
| | Zero Gate Voltage Drain Current(T _A =125°C) | V _{DS} =16V, V _{GS} =0V | -- | -- | 100 | uA |
| I _{GSS} | Gate-Body Leakage Current | V _{GS} =±10V, V _{DS} =0V | -- | -- | ±10 | uA |
| V _{GS(TH)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D =250μA | 0.4 | 0.7 | 1.0 | V |
| R _{DS(ON)} | Drain-Source On-State Resistance② | V _{GS} =4.5V, I _D =5A | -- | 16.2 | 20 | mΩ |
| R _{DS(ON)} | Drain-Source On-State Resistance② | V _{GS} =3.3V, I _D =3A | -- | 17.3 | 22 | mΩ |
| R _{DS(ON)} | Drain-Source On-State Resistance② | V _{GS} =2.5V, I _D =2A | -- | 20 | 25 | mΩ |
| Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated) | | | | | | |
| C _{iss} | Input Capacitance | V _{DS} =10V, V _{GS} =0V, f=1MHz | -- | 450 | -- | pF |
| C _{oss} | Output Capacitance | | -- | 108 | -- | pF |
| C _{rss} | Reverse Transfer Capacitance | | -- | 80 | -- | pF |
| Q _g | Total Gate Charge | V _{DS} =10V I _D =5A, V _{GS} =4.5V | -- | 8.3 | -- | nC |
| Q _{gs} | Gate Source Charge | | -- | 1.4 | -- | nC |
| Q _{gd} | Gate Drain Charge | | -- | 4.7 | -- | nC |
| Switching Characteristics @ T_J = 25°C (unless otherwise stated) | | | | | | |
| t _{d(on)} | Turn on Delay Time | V _{DD} =10V, I _D =1A, R _G =3.3Ω, V _{GS} =4.5V | -- | 285 | -- | ns |
| t _r | Turn on Rise Time | | -- | 345 | -- | ns |
| t _{d(off)} | Turn Off Delay Time | | - | 5.8 | -- | ns |
| t _f | Turn Off Fall Time | | -- | 4.2 | -- | ns |
| Source Drain Diode Characteristics @ T_J = 25°C (unless otherwise stated) | | | | | | |
| I _{SD} | Source drain current(Body Diode) | T _A =25°C | -- | -- | 2 | A |
| V _{SD} | Forward on voltage② | T _J =25°C, I _{SD} =5A, V _{GS} =0V | -- | 0.78 | 1.2 | V |

Notes:

① Pulse width limited by maximum allowable junction temperature

② Pulse test ; Pulse width≤300μs, duty cycle≤2%.

Typical Characteristics

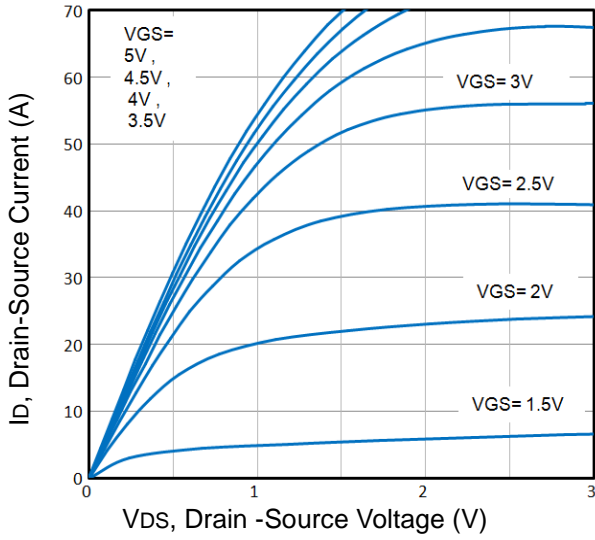


Fig1. Typical Output Characteristics

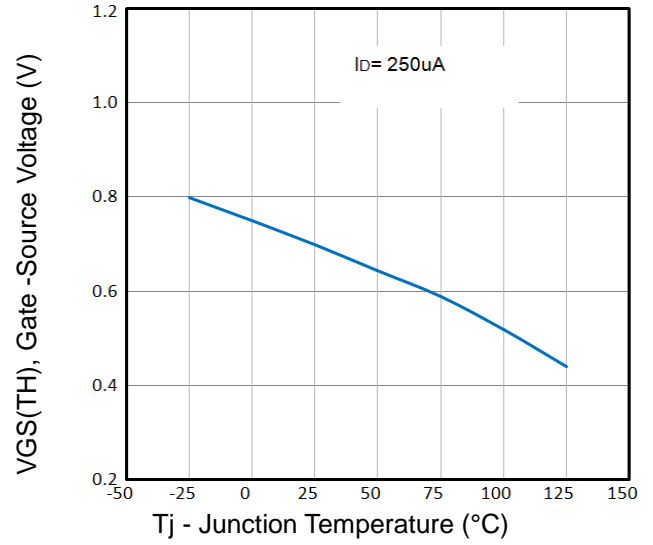


Fig2. VGS(TH) Voltage Vs. Temperature

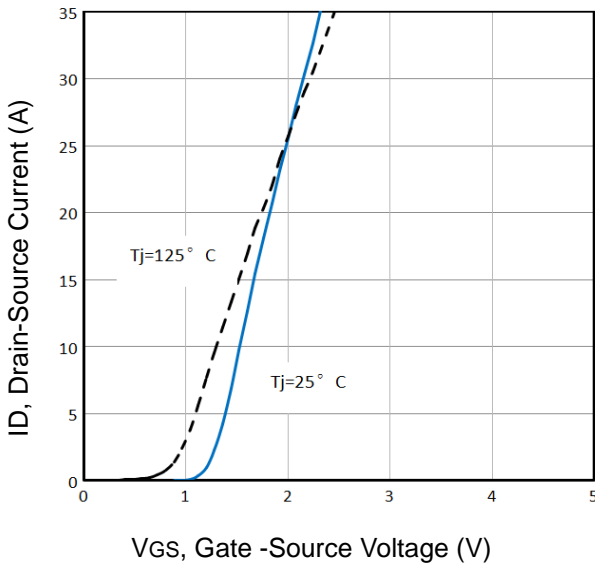


Fig3. Typical Transfer Characteristics

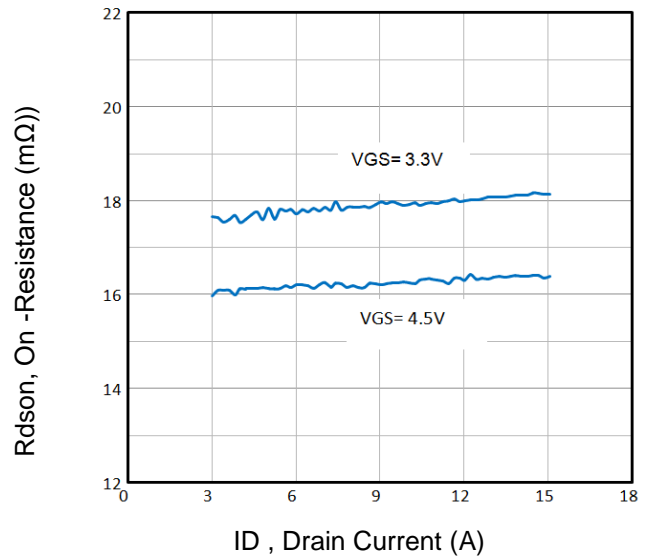


Fig4. On-Resistance vs. Drain Current and Gate

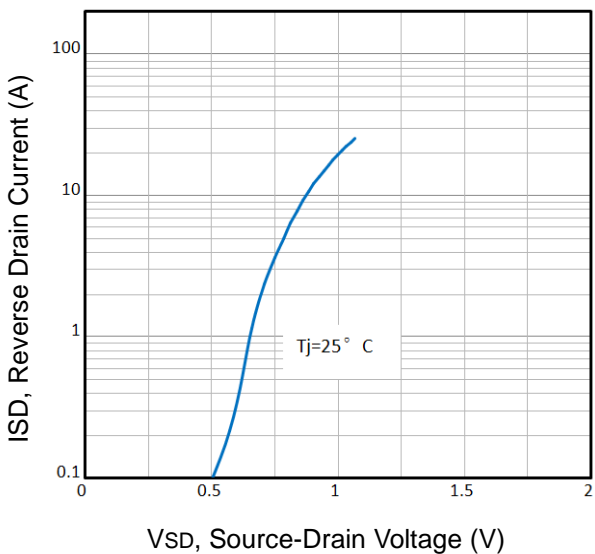


Fig5. Typical Source-Drain Diode Forward Voltage

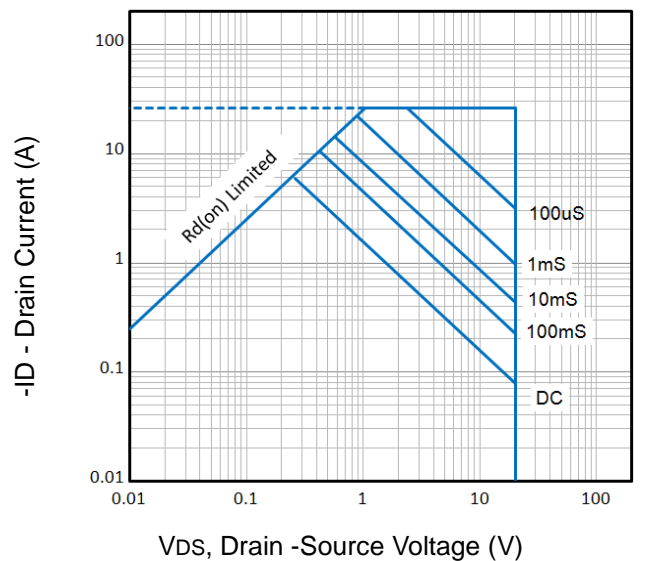


Fig6. Maximum Safe Operating Area

Typical Characteristics

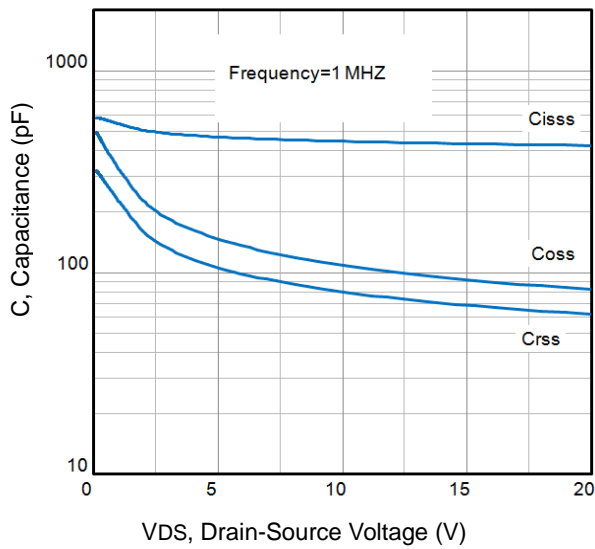


Fig7. Typical Capacitance Vs. Drain-Source Voltage

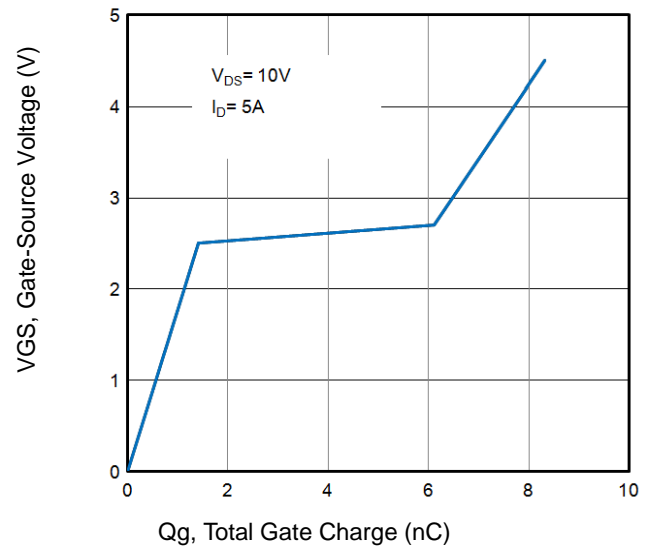


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

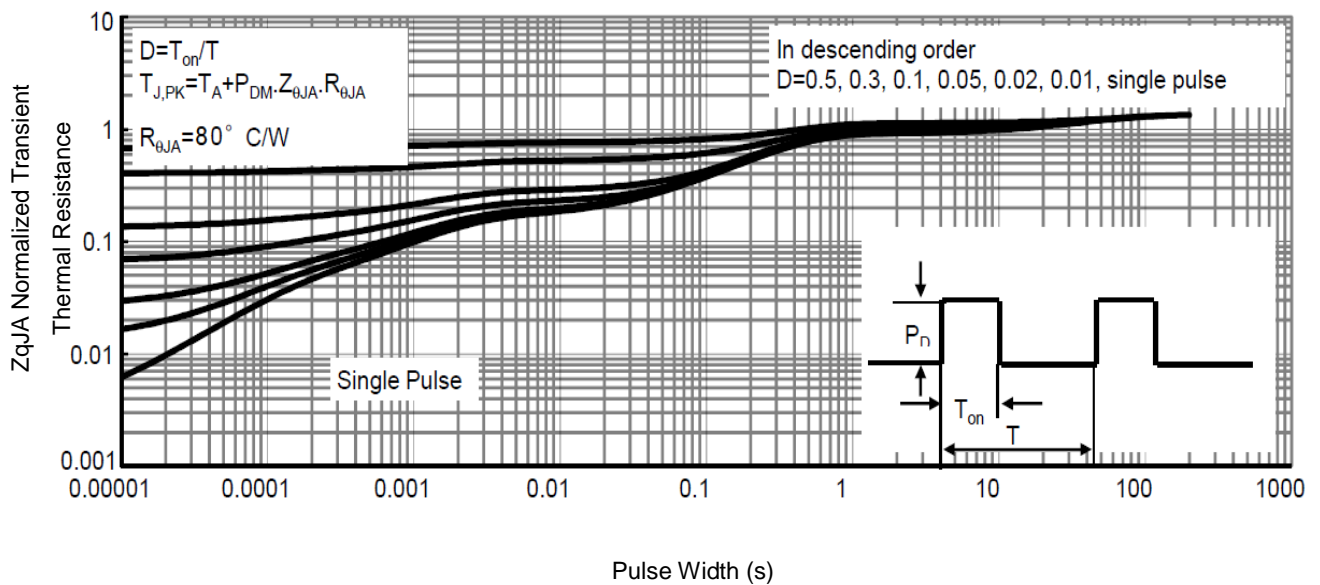


Fig9. Normalized Maximum Transient Thermal Impedance

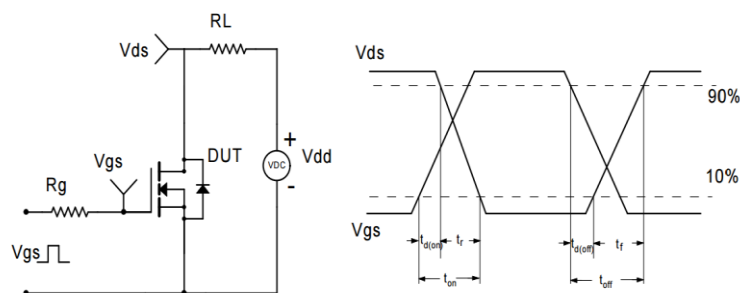
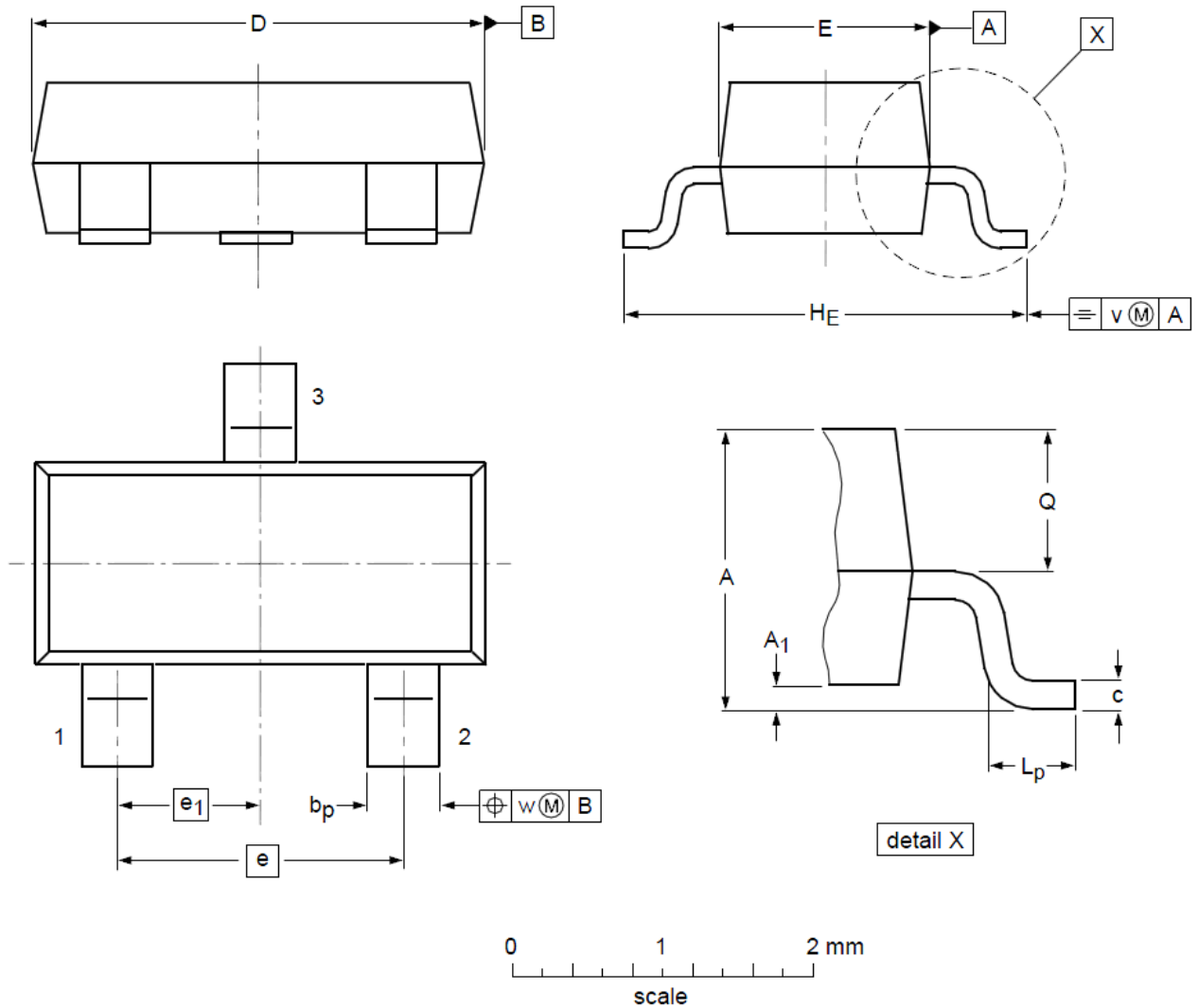


Fig10. Switching Time Test Circuit and waveforms

SOT23 Mechanical Data



DIMENSIONS (unit : mm)

| Symbol | Min | Typ | Max | Symbol | Min | Typ | Max |
|----------------|------|------|------|----------------|------|------|------|
| A | 0.90 | 1.01 | 1.15 | A ₁ | 0.01 | 0.05 | 0.10 |
| b _p | 0.30 | 0.42 | 0.50 | c | 0.08 | 0.13 | 0.15 |
| D | 2.80 | 2.92 | 3.00 | E | 1.20 | 1.33 | 1.40 |
| e | -- | 1.90 | -- | e ₁ | -- | 0.95 | -- |
| H _E | 2.25 | 2.40 | 2.55 | L _p | 0.30 | 0.42 | 0.50 |
| Q | 0.45 | 0.49 | 0.55 | v | -- | 0.20 | -- |
| w | -- | 0.10 | -- | | | | |