

Description

The AO3415 is the high cell density trenched P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

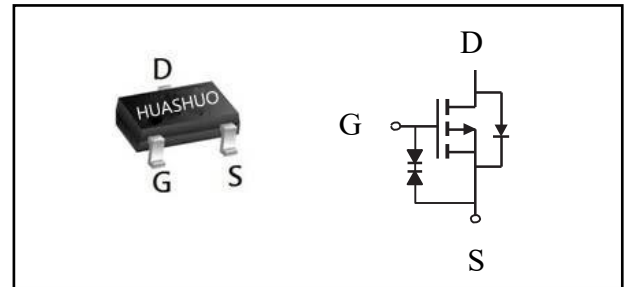
The AO3415 meet the RoHS and Green Product requirement with full function reliability approved.

- Super Low Gate Charge
- Green Device Available
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology
- ESD Protect 2KV

Product Summary

| | | |
|------------------|------|------------|
| V_{DS} | -20 | V |
| $R_{DS(ON),max}$ | 45 | m Ω |
| I_D | -4.3 | A |

SOT 23 Pin Configurations



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|----------------------|--|------------|------------|
| V_{DS} | Drain-Source Voltage | -20 | V |
| V_{GS} | Gate-Source Voltage | ± 8 | V |
| $I_D@T_A=25^\circ C$ | Continuous Drain Current, $V_{GS} @ -4.5V_1$ | -4.3 | A |
| $I_D@T_A=70^\circ C$ | Continuous Drain Current, $V_{GS} @ -4.5V_1$ | -3.5 | A |
| I_{DM} | Pulsed Drain Current ₂ | -14 | A |
| $P_D@T_A=25^\circ C$ | Total Power Dissipation ₃ | 1.25 | W |
| $P_D@T_A=70^\circ C$ | Total Power Dissipation ₃ | 0.84 | W |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ C$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ C$ |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|---|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ₁ | --- | 100 | $^\circ C/W$ |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient ₁ ($t \leq 10s$) | --- | 95 | $^\circ C/W$ |



Electrical Characteristics (T_J=25 °C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------------|--|--|-------|--------|------|-------|
| B _{VDS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =-250uA | -20 | --- | --- | V |
| ΔB _{VDS} /ΔT _J | B _{VDS} Temperature Coefficient | Reference to 25°C, I _D =-1mA | --- | -0.014 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =-4.5V, I _D =-3.5A | --- | 35 | 45 | mΩ |
| | | V _{GS} =-2.5V, I _D =-3A | --- | 47 | 55 | |
| | | V _{GS} =-1.8V, I _D =-2A | --- | 67 | 80 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =-250uA | -0.45 | --- | -0.9 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | 3.95 | --- | mV/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =-16V, V _{GS} =0V, T _J =25°C | --- | --- | -1 | uA |
| | | V _{DS} =-16V, V _{GS} =0V, T _J =55°C | --- | --- | -5 | |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±12V, V _{DS} =0V | --- | --- | ±100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =-5V, I _D =-3A | --- | 12.8 | --- | S |
| Q _g | Total Gate Charge (-4.5V) | V _{DS} =-15V, V _{GS} =-4.5V, I _D =-3A | --- | 8.4 | 11 | nC |
| Q _{gs} | Gate-Source Charge | | --- | 2.4 | | |
| Q _{gd} | Gate-Drain Charge | | --- | 1.5 | | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =-10V, V _{GS} =-4.5V, R _G =3.3Ω, I _D =-3A | --- | 9 | 20 | ns |
| T _r | Rise Time | | --- | 4 | 10 | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 42 | 85 | |
| T _f | Fall Time | | --- | 5 | 10 | |
| C _{iss} | Input Capacitance | V _{DS} =-15V, V _{GS} =0V, f=1MHz | --- | 900 | | pF |
| C _{oss} | Output Capacitance | | --- | 155 | | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 205 | | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|--|------|------|------|------|
| I _S | Continuous Source Current ^{1,4} | V _G =V _D =0V, Force Current | --- | --- | -4.3 | A |
| I _{SM} | Pulsed Source Current ^{2,4} | | --- | --- | -14 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =-1A, T _J =25°C | --- | --- | -1 | V |
| t _{rr} | Reverse Recovery Time | I _F =-3A, di/dt=100A/μs, T _J =25°C | --- | 21.8 | --- | nS |
| Q _{rr} | Reverse Recovery Charge | | --- | 6.9 | --- | nC |

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
- 2.The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- 3.The power dissipation is limited by 150°C junction temperature
- 4.The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

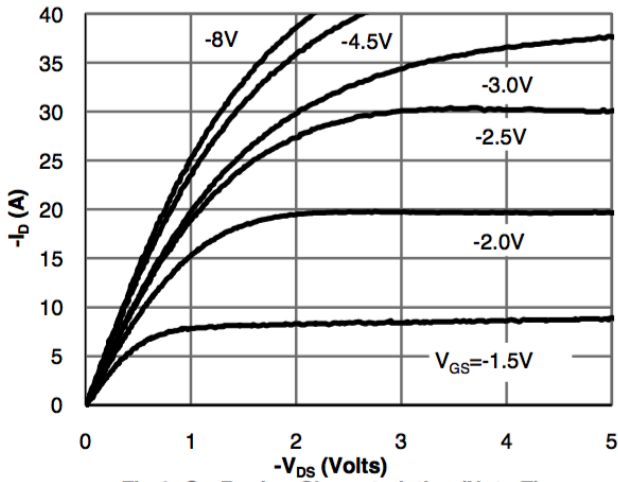


Fig 1: On-Region Characteristics (Note E)

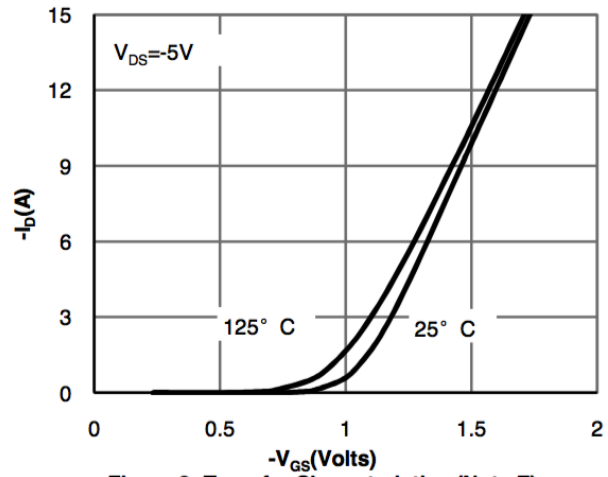


Figure 2: Transfer Characteristics (Note E)

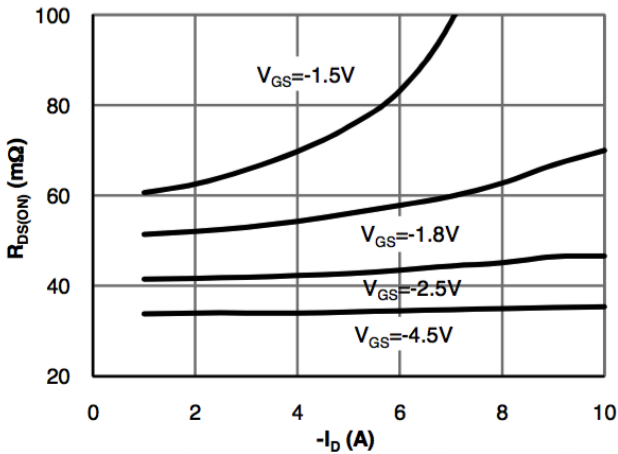


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

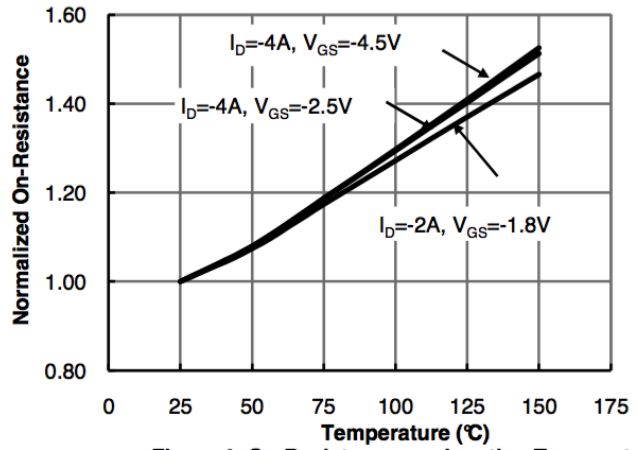


Figure 4: On-Resistance vs. Junction Temperature (Note E)

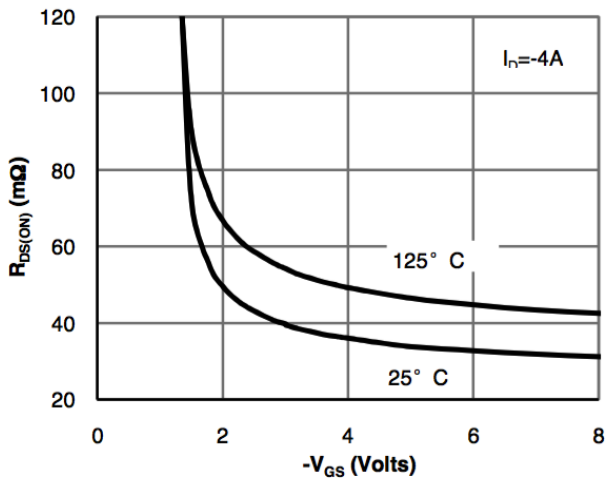


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

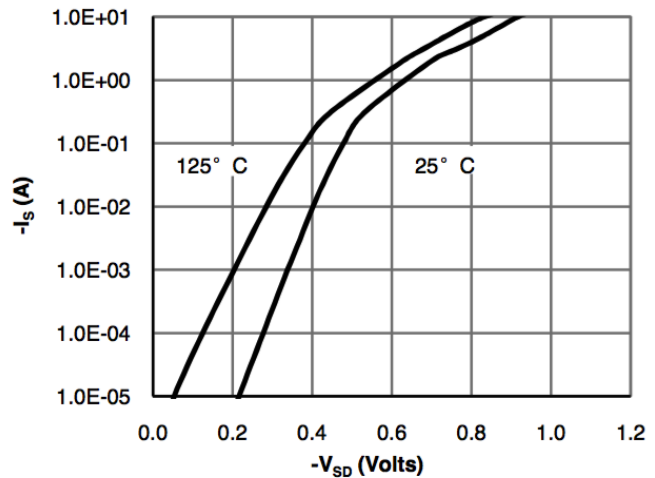


Figure 6: Body-Diode Characteristics (Note E)

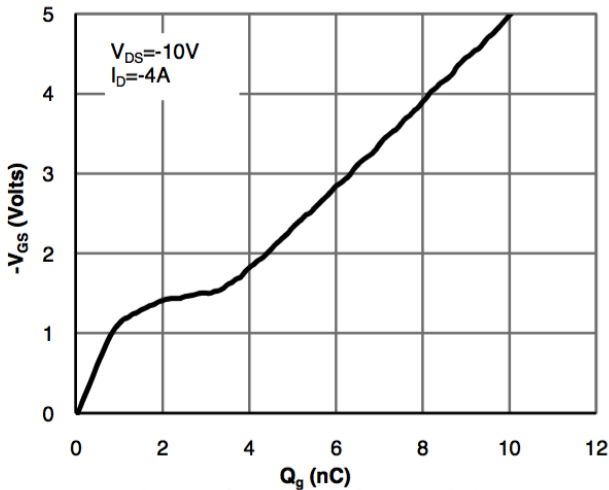


Figure 7: Gate-Charge Characteristics

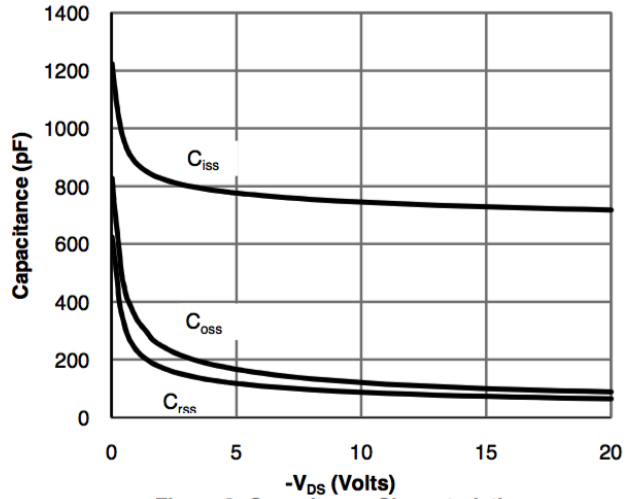


Figure 8: Capacitance Characteristics

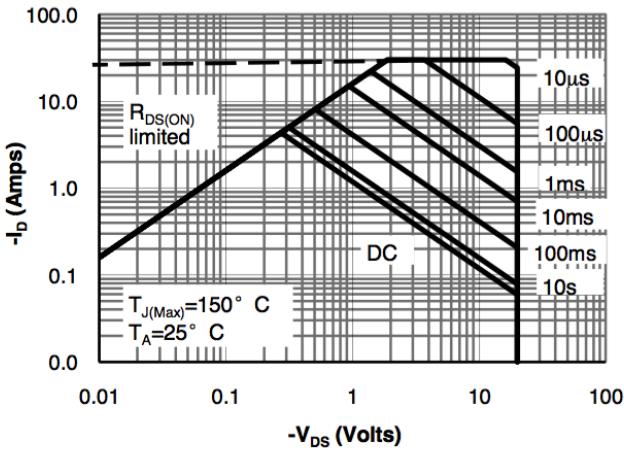


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

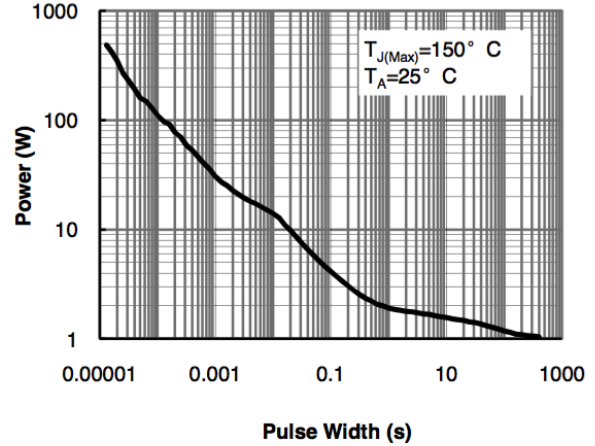


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

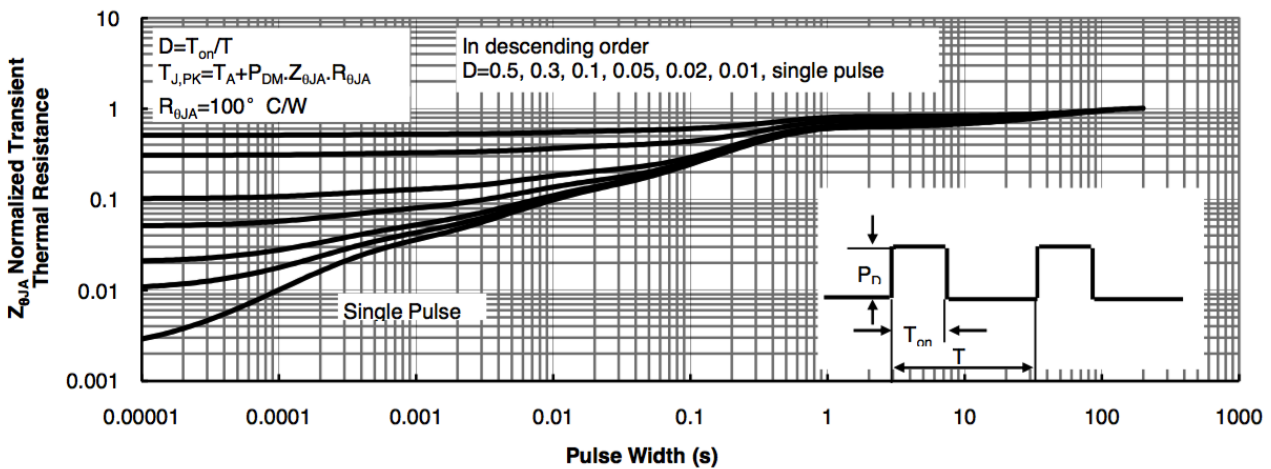
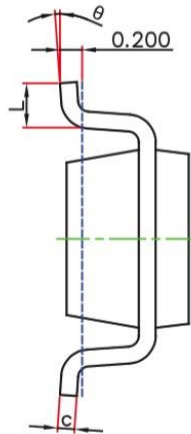
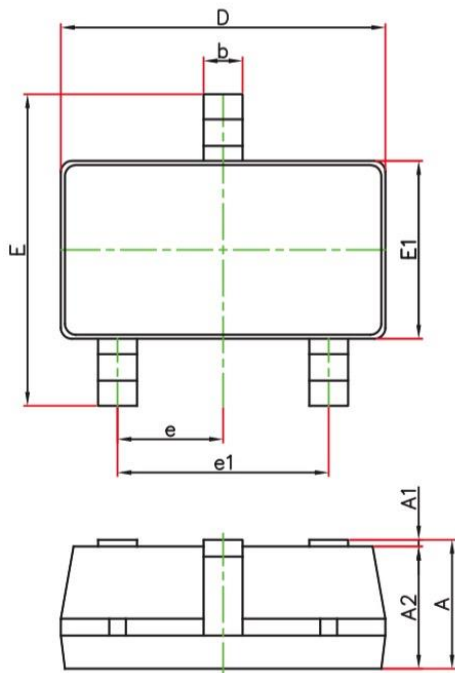


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)



Ordering Information

| Part Number | Package code | Packaging |
|-------------|--------------|----------------|
| AO3415 | SOT-23L | 3000/Tape&Reel |



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| D | 2.820 | 3.020 | 0.111 | 0.119 |
| E1 | 1.500 | 1.700 | 0.059 | 0.067 |
| E | 2.650 | 2.950 | 0.104 | 0.116 |
| e | 0.950(BSC) | | 0.037(BSC) | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.300 | 0.600 | 0.012 | 0.024 |
| theta | 0° | 8° | 0° | 8° |