

General Description

- Trench Power MOSFET technology
- Low $R_{SS(ON)}$
- With ESD protection to improve battery performance and safety
- Common drain configuration for design simplicity
- RoHS and Halogen-Free Compliant

Applications

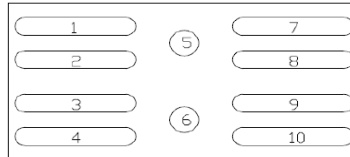
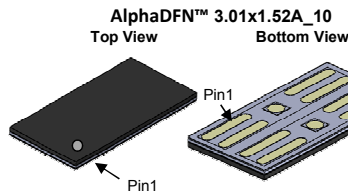
- Battery protection switch
- Mobile device battery charging and discharging

Product Summary

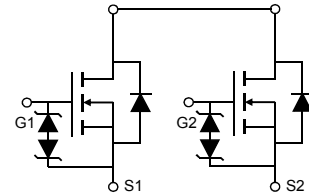
| | |
|----------------------------------|-----------------|
| V_{SS} | 12V |
| $R_{SS(ON)}$ (at $V_{GS}=4.5V$) | < 3.7m Ω |
| $R_{SS(ON)}$ (at $V_{GS}=4.0V$) | < 3.8m Ω |
| $R_{SS(ON)}$ (at $V_{GS}=3.8V$) | < 4m Ω |
| $R_{SS(ON)}$ (at $V_{GS}=3.1V$) | < 4.6m Ω |
| $R_{SS(ON)}$ (at $V_{GS}=2.5V$) | < 5.6m Ω |

Typical ESD protection

HBM Class 2



1, 2, 7, 8: Source(FET1) 5: Gate(FET1)
 3, 4, 9, 10: Source(FET2) 6: Gate(FET2)



| Orderable Part Number | Package Type | Form | Minimum Order Quantity |
|-----------------------|------------------------|-------------|------------------------|
| AOC3870A | AlphaDFN 3.01x1.52A_10 | Tape & Reel | 8000 |

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

| Parameter | Symbol | Rating | Units |
|--|----------------|------------|------------------|
| Source-Source Voltage | V_{SS} | 12 | V |
| Gate-Source Voltage | V_{GS} | ± 8 | V |
| Source Current(DC) ^{Note1} | I_S | 22 | A |
| Source Current(Pulse) ^{Note2} | I_{SM} | 130 | |
| Power Dissipation ^{Note1} | P_D | 2.3 | W |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 150 | $^\circ\text{C}$ |

Thermal Characteristics

| Parameter | Symbol | Typical | Units |
|--|-----------------|---------|--------------------|
| Maximum Junction-to-Ambient $t \leq 10s$ | $R_{\theta JA}$ | 45 | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient Steady-State | | 55 | $^\circ\text{C/W}$ |

Note 1. I_S rated value is based on bare silicon. Mounted on 70mmx70mm FR-4 board.

Note 2. PW < 10 μs pulses, duty cycle 1% max.

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------------------------|---------------------------------------|---|-----|------|--------|-------|
| STATIC PARAMETERS | | | | | | |
| BV _{SSS} | Source-Source Breakdown Voltage | I _S =250μA, V _{GS} =0V Test Circuit 6 | 12 | | | V |
| I _{SSS} | Zero Gate Voltage Source Current | V _{SS} =12V, V _{GS} =0V Test Circuit 1 T _J =55°C | | | 1 5 | μA |
| I _{GSS} | Gate leakage current | V _{SS} =0V, V _{GS} =±8V Test Circuit 2 | | | ±10 | μA |
| V _{GS(th)} | Gate Threshold Voltage | V _{SS} =V _{GS} , I _S =250μA Test Circuit 3 | 0.4 | 0.7 | 1.1 | V |
| R _{SS(ON)} | Static Source to Source On-Resistance | V _{GS} =4.5V, I _S =5A Test Circuit 4 T _J =125°C | 2.1 | 2.95 | 3.7 | mΩ |
| | | V _{GS} =4.0V, I _S =5A Test Circuit 4 | 2.2 | 3.05 | 3.8 | mΩ |
| | | V _{GS} =3.8V, I _S =5A Test Circuit 4 | 2.3 | 3.1 | 4.0 | mΩ |
| | | V _{GS} =3.1V, I _S =5A Test Circuit 4 | 2.4 | 3.4 | 4.6 | mΩ |
| | | V _{GS} =2.5V, I _S =5A Test Circuit 4 | 2.8 | 3.9 | 5.6 | mΩ |
| g _{FS} | Forward Transconductance | V _{SS} =5V, I _S =5A Test Circuit 3 | | 50 | | S |
| V _{FSS} | Forward Source to Source Voltage | I _S =1A, V _{GS} =0V Test Circuit 5 | | 0.57 | 1 | V |
| DYNAMIC PARAMETERS | | | | | | |
| R _g | Gate resistance | f=1MHz | | 1.2 | | KΩ |
| SWITCHING PARAMETERS | | | | | | |
| Q _g | Total Gate Charge | V _{G1S1} =4.5V, V _{SS} =6V, I _S =5A | | 32 | | nC |
| t _{D(on)} | Turn-On DelayTime | V _{G1S1} =4.5V, V _{SS} =6V, R _L =1.2Ω, R _{GEN} =3Ω Test Circuit8 | | 1.2 | | μs |
| t _r | Turn-On Rise Time | | | 3.0 | | μs |
| t _{D(off)} | Turn-Off DelayTime | | | 3.1 | | μs |
| t _f | Turn-Off Fall Time | | | 8.2 | | μs |

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

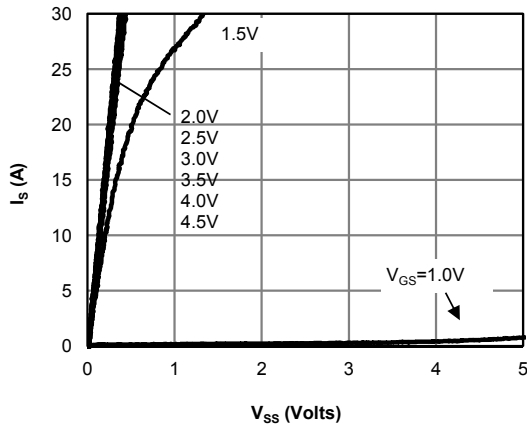


Figure 1: On-Region Characteristics

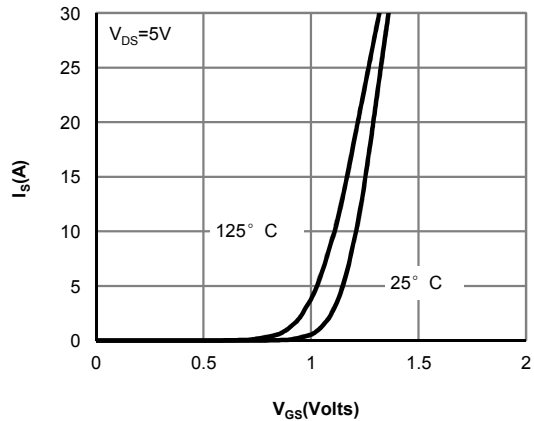


Figure 2: Transfer Characteristics

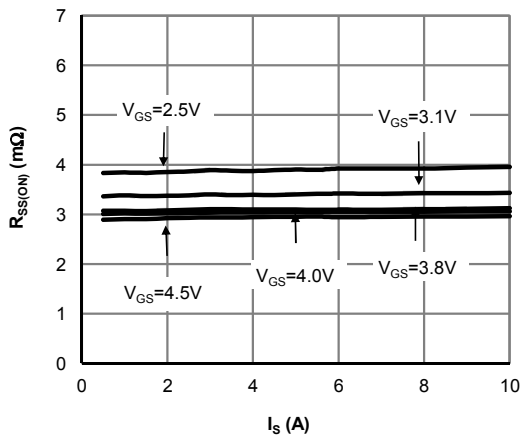


Figure 3: On-Resistance vs. Source Current and Gate Voltage

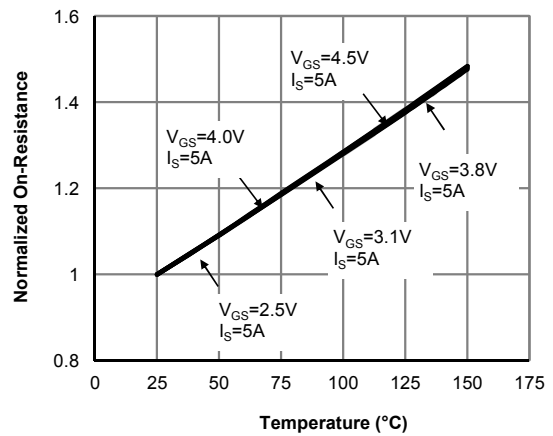


Figure 4: On-Resistance vs. Junction Temperature

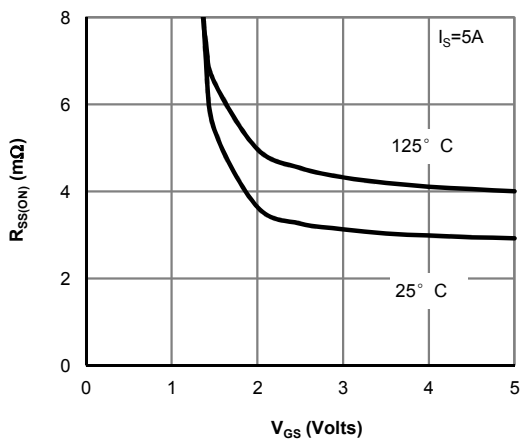


Figure 5: On-Resistance vs. Gate-Source Voltage

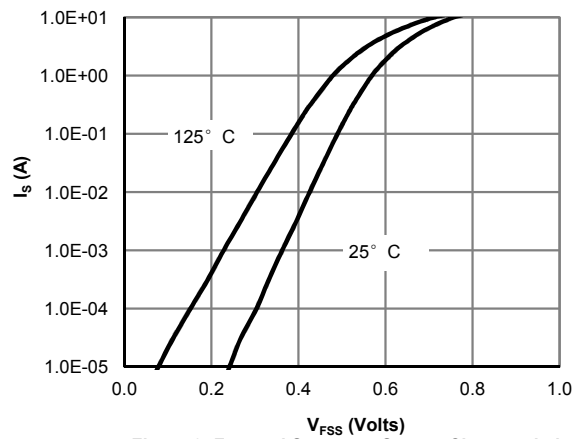


Figure 6: Forward Source to Source Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

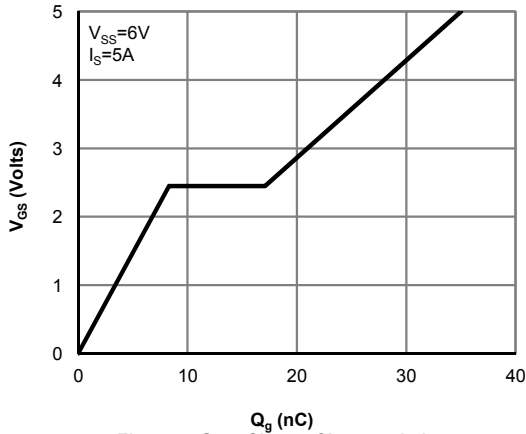


Figure 7: Gate-Charge Characteristics

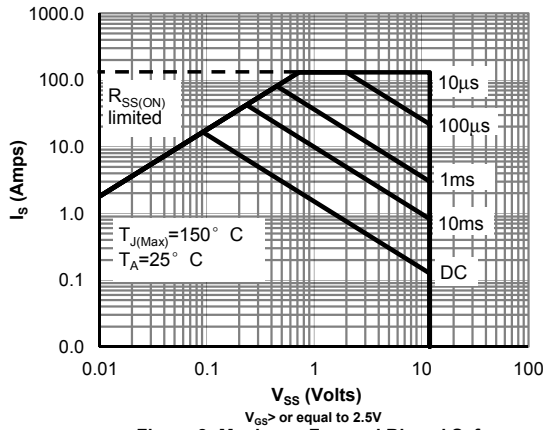


Figure 8: Maximum Forward Biased Safe Operating Area (Note1)

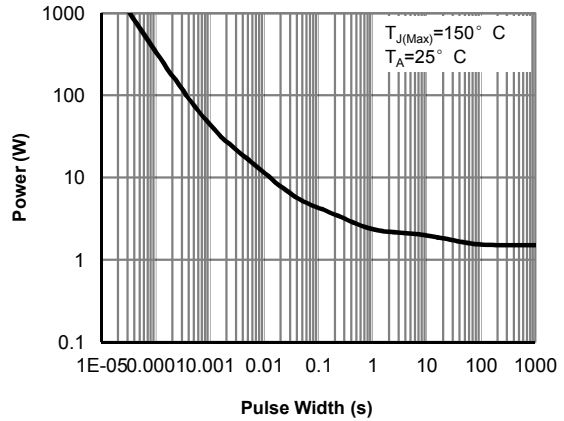


Figure 9: Single Pulse Power Rating Junction-to-Ambient (Note1)

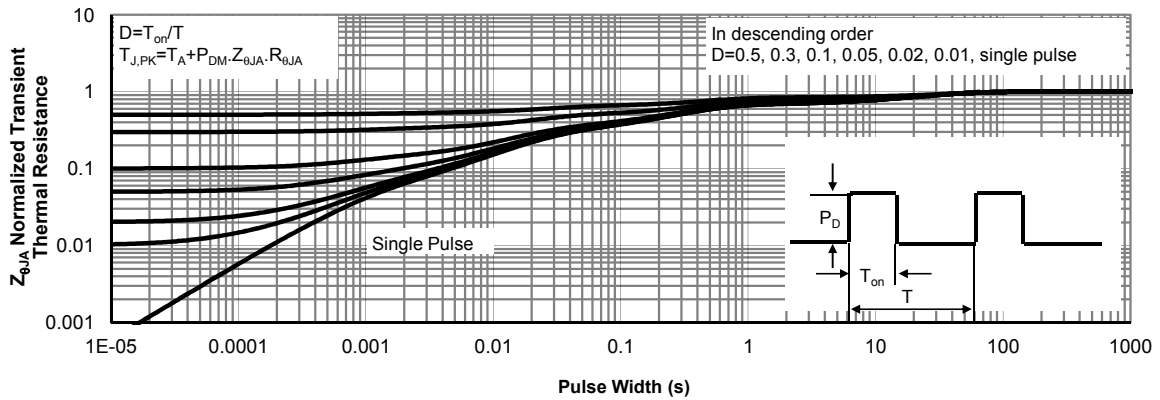


Figure 10: Normalized Maximum Transient Thermal Impedance (Note1)

