



**General Description**

- Trench Power MOSFET Technology
- Ultra 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**

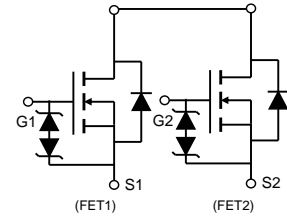
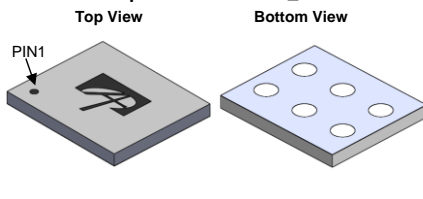
|                                  |                 |
|----------------------------------|-----------------|
| $V_{SS}$                         | 12V             |
| $R_{SS(ON)}$ (at $V_{GS}=4.5V$ ) | < 5.6m $\Omega$ |
| $R_{SS(ON)}$ (at $V_{GS}=3.8V$ ) | < 6m $\Omega$   |
| $R_{SS(ON)}$ (at $V_{GS}=3.1V$ ) | < 7m $\Omega$   |
| $R_{SS(ON)}$ (at $V_{GS}=2.5V$ ) | < 8.5m $\Omega$ |

**Typical ESD protection**

HBM Class 2



**AlphaDFN™ 1.9x1.6\_6**



| Orderable Part Number | Package Type        | Form        | Minimum Order Quantity |
|-----------------------|---------------------|-------------|------------------------|
| AOCA24106C            | AlphaDFN™ 1.9x1.6_6 | Tape & Reel | 8000                   |

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

| Parameter                               | Symbol         | Rating     | Units      |
|---|----------------|------------|------------|
| Source-Source Voltage                   | $V_{SS}$       | 12         | V          |
| Gate-Source Voltage                     | $V_{GS}$       | $\pm 8$    | V          |
| Source Current (DC) <sup>Note1</sup>    | $I_S$          | 20         | A          |
| Source Current (Pulse) <sup>Note2</sup> | $I_{SM}$       | 90         | A          |
| Power Dissipation <sup>Note1</sup>      | $P_D$          | 2.7        | W          |
| Junction and Storage Temperature Range  | $T_J, T_{STG}$ | -55 to 150 | $^\circ C$ |

**Thermal Characteristics**

| Parameter                                | Symbol          | Typical | Units        |
|--|-----------------|---------|--------------|
| Maximum Junction-to-Ambient $t \leq 10s$ | $R_{\theta JA}$ | 35      | $^\circ C/W$ |
| Maximum Junction-to-Ambient Steady-State |                 | 45      | $^\circ C/W$ |

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

**Note 2.** PW < 10  $\mu s$  pulses, duty cycle 1% max.

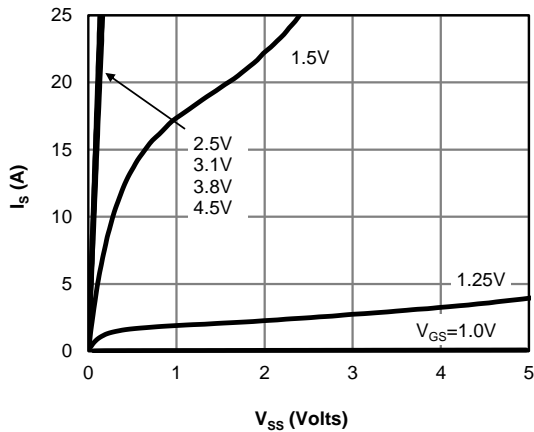
**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

| Symbol                      | Parameter                             | Conditions  | Min | Typ  | Max | Units |
|-----------------------------|---------------------------------------|---|-----|------|-----|-------|
| <b>STATIC PARAMETERS</b>    |                                       |   |     |      |     |       |
| BV <sub>SSS</sub>           | Source-Source Breakdown Voltage       | I <sub>S</sub> =250μA, V <sub>GS</sub> =0V Test Circuit 6   | 12  |      |     | V     |
| I <sub>SSS</sub>            | Zero Gate Voltage Source Current      | V <sub>SS</sub> =12V, V <sub>GS</sub> =0V Test Circuit 1  |     |      | 1   | μA    |
|                             |                                       | T <sub>J</sub> =55°C  |     |      | 5   |       |
| I <sub>GSS</sub>            | Gate leakage current                  | V <sub>SS</sub> =0V, V <sub>GS</sub> =±8V Test Circuit 2  |     |      | ±10 | μA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                | V <sub>SS</sub> =V <sub>GS</sub> , I <sub>S</sub> =250μA Test Circuit 3                                   | 0.4 | 0.75 | 1.1 | V     |
| R <sub>SS(ON)</sub>         | Static Source to Source On-Resistance | V <sub>GS</sub> =4.5V, I <sub>S</sub> =4A Test Circuit 4  | 3.1 | 4.5  | 5.6 | mΩ    |
|                             |                                       | T <sub>J</sub> =125°C   | 4.0 | 5.7  | 7.0 |       |
|                             |                                       | V <sub>GS</sub> =3.8V, I <sub>S</sub> =4A Test Circuit 4  | 3.2 | 4.7  | 6.0 | mΩ    |
|                             |                                       | V <sub>GS</sub> =3.1V, I <sub>S</sub> =4A Test Circuit 4  | 3.6 | 5.1  | 7.0 | mΩ    |
|                             |                                       | V <sub>GS</sub> =2.5V, I <sub>S</sub> =4A Test Circuit 4  | 4.2 | 5.8  | 8.5 | mΩ    |
| g <sub>FS</sub>             | Forward Transconductance              | V <sub>SS</sub> =5V, I <sub>S</sub> =4A Test Circuit 3  |     | 30   |     | S     |
| V <sub>FSS</sub>            | Forward Source to Source Voltage      | I <sub>S</sub> =1A, V <sub>GS</sub> =0V Test Circuit 5  |     | 0.6  | 1   | V     |
| <b>DYNAMIC PARAMETERS</b>   |                                       |   |     |      |     |       |
| R <sub>g</sub>              | Gate resistance                       | f=1MHz  |     | 1.6  |     | KΩ    |
| <b>SWITCHING PARAMETERS</b> |                                       |   |     |      |     |       |
| Q <sub>g</sub>              | Total Gate Charge                     | V <sub>G1S1</sub> =4.5V, V <sub>SS</sub> =6V, I <sub>S</sub> =4A  |     | 16   |     | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                     | V <sub>G1S1</sub> =4.5V, V <sub>SS</sub> =6V, R <sub>L</sub> =1.5Ω,<br>R <sub>GEN</sub> =3Ω Test Circuit8 |     | 1.2  |     | μs    |
| t <sub>r</sub>              | Turn-On Rise Time                     |   |     | 1.7  |     | μs    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                    |   |     | 3.8  |     | μs    |
| t <sub>f</sub>              | Turn-Off Fall Time                    |   |     | 4.1  |     | μs    |

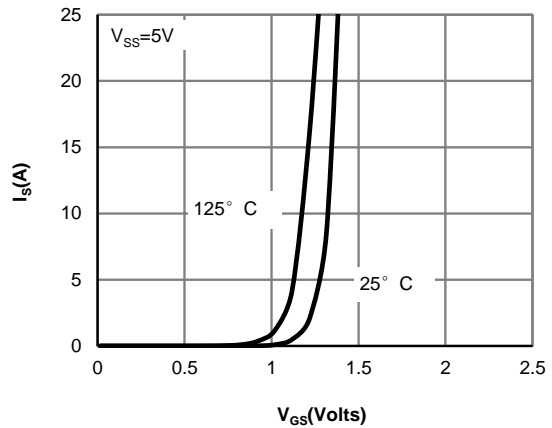
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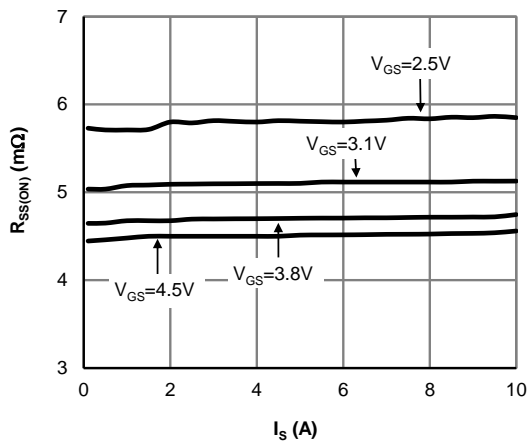
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



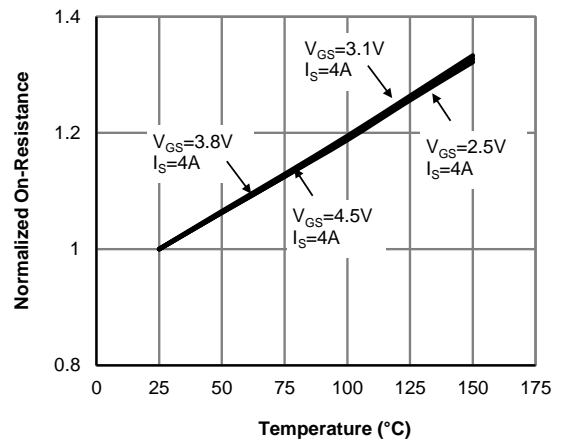
**Figure 1: On-Region Characteristics**



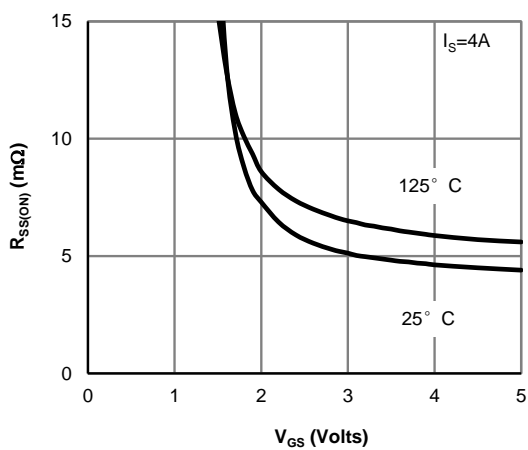
**Figure 2: Transfer Characteristics**



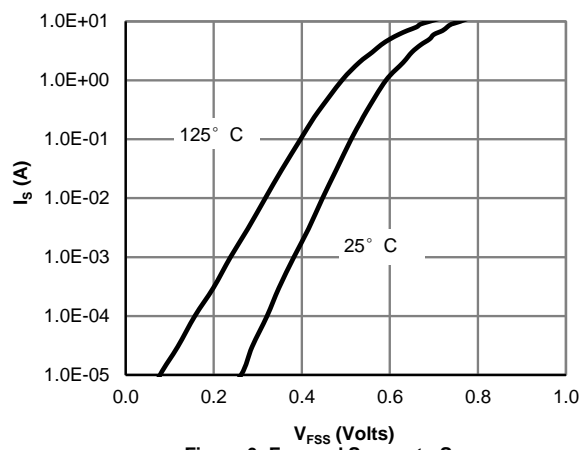
**Figure 3: On-Resistance vs. Source Current and Gate Voltage**



**Figure 4: On-Resistance vs. Junction Temperature**

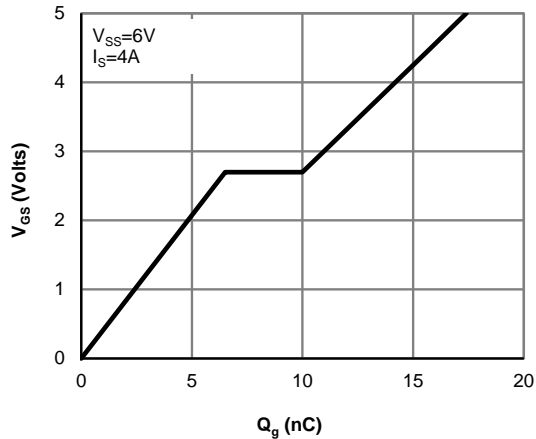


**Figure 5: On-Resistance vs. Gate-Source Voltage**

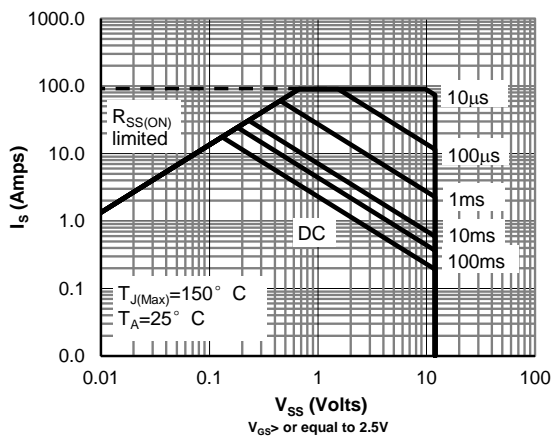


**Figure 6: Forward Source to Source Characteristics**

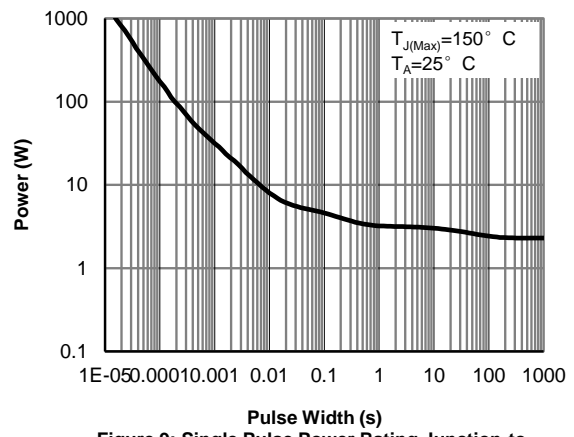
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



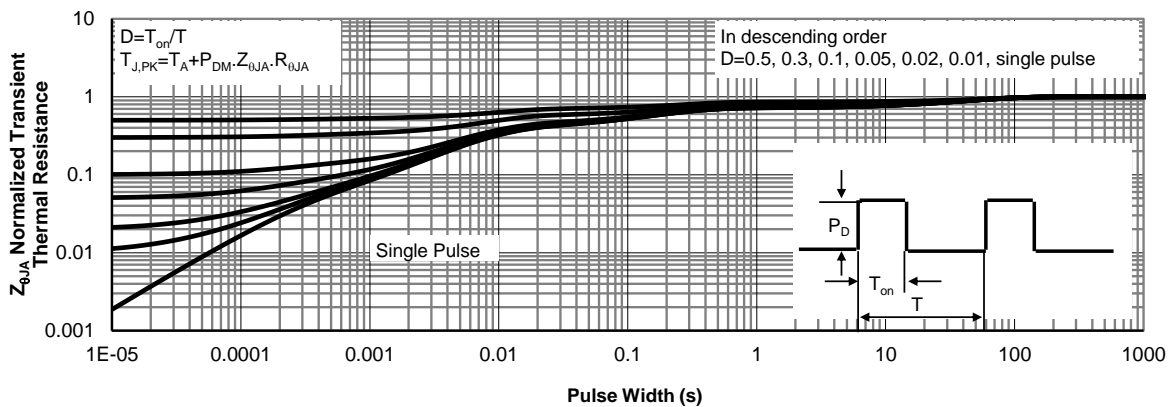
**Figure 7: Gate-Charge Characteristics**



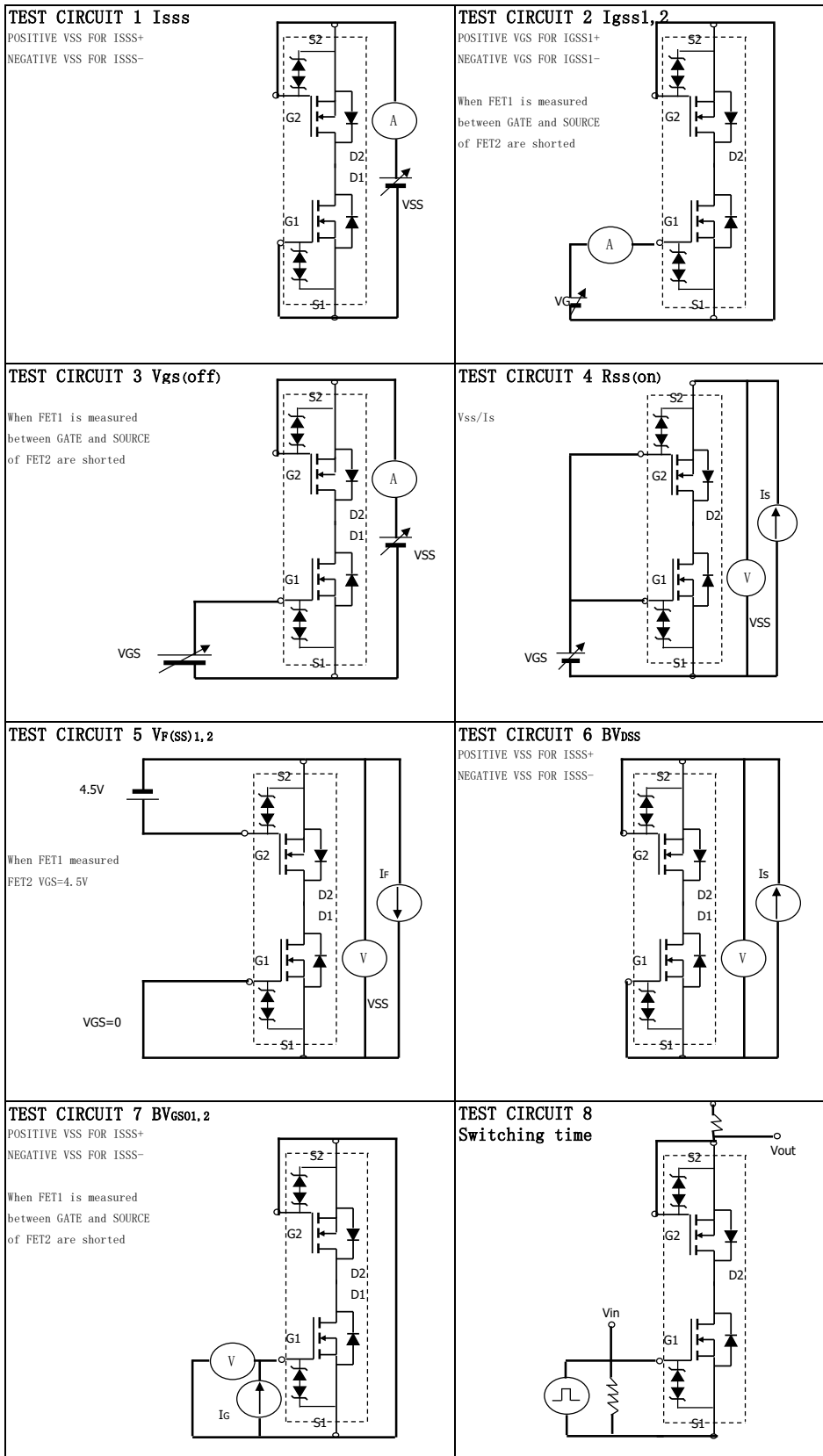
**Figure 8: Maximum Forward Biased Safe Operating Area (Note1)**



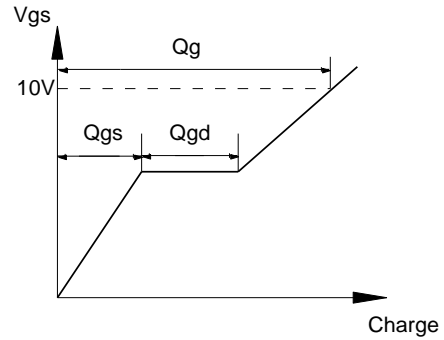
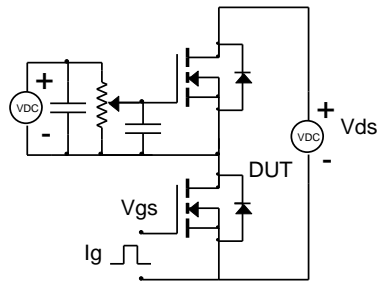
**Figure 9: Single Pulse Power Rating Junction-to-Ambient (Note1)**



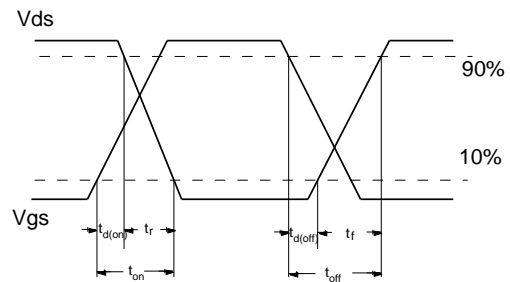
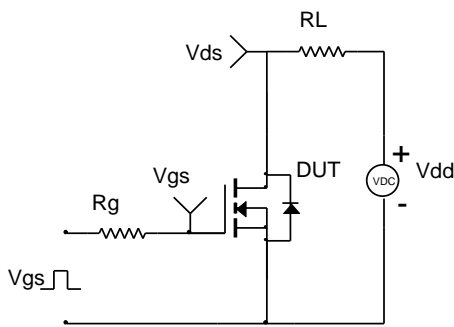
**Figure 10: Normalized Maximum Transient Thermal Impedance (Note1)**



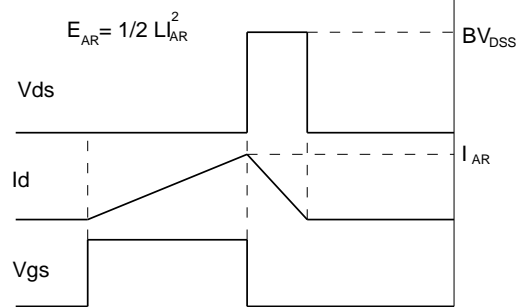
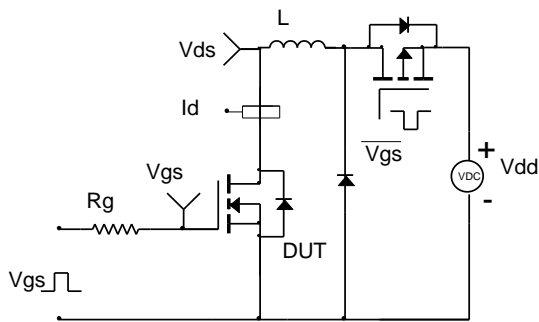
**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**



**Unclamped Inductive Switching (UIS) Test Circuit & Waveforms**



**Diode Recovery Test Circuit & Waveforms**

