
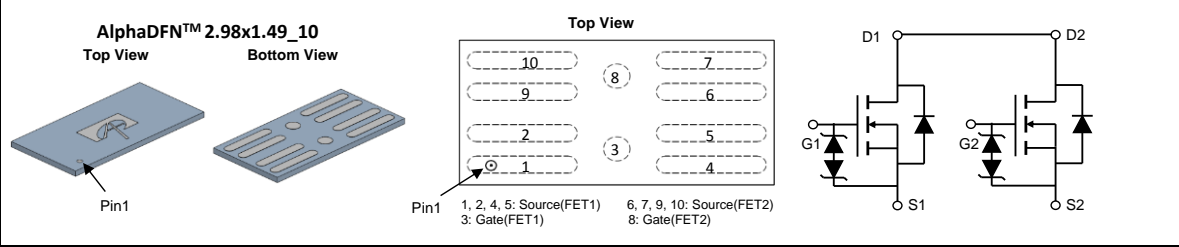


|  |   |          |     |                                  |                 |                                  |               |                                  |                 |                                  |                 |
|--|---|----------|-----|----------------------------------|-----------------|----------------------------------|---------------|----------------------------------|-----------------|----------------------------------|-----------------|
| <b>General Description</b> <ul style="list-style-type: none"> <li>Trench Power MOSFET technology</li> <li>Ultra low <math>R_{SS(ON)}</math></li> <li>Common drain configuration for design simplicity</li> <li>RoHS and Halogen-Free Compliant</li> </ul><br><b>Applications</b> <ul style="list-style-type: none"> <li>Battery protection switch</li> <li>Mobile device battery charging and discharging</li> </ul> | <b>Product Summary</b> <table border="0"> <tr> <td><math>V_{SS}</math></td> <td>12V</td> </tr> <tr> <td><math>R_{SS(ON)}</math> (at <math>V_{GS}=4.5V</math>)</td> <td>&lt; 2.8m<math>\Omega</math></td> </tr> <tr> <td><math>R_{SS(ON)}</math> (at <math>V_{GS}=3.8V</math>)</td> <td>&lt; 3m<math>\Omega</math></td> </tr> <tr> <td><math>R_{SS(ON)}</math> (at <math>V_{GS}=3.1V</math>)</td> <td>&lt; 3.5m<math>\Omega</math></td> </tr> <tr> <td><math>R_{SS(ON)}</math> (at <math>V_{GS}=2.5V</math>)</td> <td>&lt; 4.2m<math>\Omega</math></td> </tr> </table><br><b>Typical ESD protection</b> <p style="text-align: right;"><b>HBM Class 2</b></p>  | $V_{SS}$ | 12V | $R_{SS(ON)}$ (at $V_{GS}=4.5V$ ) | < 2.8m $\Omega$ | $R_{SS(ON)}$ (at $V_{GS}=3.8V$ ) | < 3m $\Omega$ | $R_{SS(ON)}$ (at $V_{GS}=3.1V$ ) | < 3.5m $\Omega$ | $R_{SS(ON)}$ (at $V_{GS}=2.5V$ ) | < 4.2m $\Omega$ |
| $V_{SS}$   | 12V   |          |     |                                  |                 |                                  |               |                                  |                 |                                  |                 |
| $R_{SS(ON)}$ (at $V_{GS}=4.5V$ )   | < 2.8m $\Omega$   |          |     |                                  |                 |                                  |               |                                  |                 |                                  |                 |
| $R_{SS(ON)}$ (at $V_{GS}=3.8V$ )   | < 3m $\Omega$   |          |     |                                  |                 |                                  |               |                                  |                 |                                  |                 |
| $R_{SS(ON)}$ (at $V_{GS}=3.1V$ )   | < 3.5m $\Omega$   |          |     |                                  |                 |                                  |               |                                  |                 |                                  |                 |
| $R_{SS(ON)}$ (at $V_{GS}=2.5V$ )   | < 4.2m $\Omega$   |          |     |                                  |                 |                                  |               |                                  |                 |                                  |                 |



| Orderable Part Number | Package Type           | Form        | Minimum Order Quantity |
|-----------------------|------------------------|-------------|------------------------|
| AOCA33104E            | AlphaDFN™ 2.98x1.49_10 | 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>    | $I_S$          | 30         | A          |
| Source Current(Pulse) <sup>Note2</sup> | $I_{SM}$       | 130        |            |
| Power Dissipation <sup>Note1</sup>     | $P_D$          | 3.1        | 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 $t \leq 10s$ | $R_{\theta JA}$ | 30      | $^\circ C/W$ |
| Maximum Junction-to-Ambient Steady-State |                 | 40      | $^\circ C/W$ |

**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.

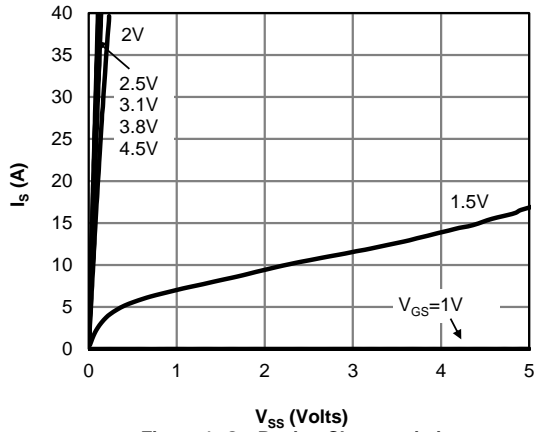
**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

| 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<br>T <sub>J</sub> =55°C                          |     |      | 1<br>5 | μA    |
| 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 | 1.2    | V     |
| R <sub>SS(ON)</sub>         | Static Source to Source On-Resistance | V <sub>GS</sub> =4.5V, I <sub>S</sub> =5A Test Circuit 4<br>T <sub>J</sub> =125°C                         | 1.6 | 2.25 | 2.8    | mΩ    |
|                             |                                       | V <sub>GS</sub> =3.8V, I <sub>S</sub> =5A Test Circuit 4  | 1.7 | 2.35 | 3      |       |
|                             |                                       | V <sub>GS</sub> =3.1V, I <sub>S</sub> =5A Test Circuit 4  | 1.8 | 2.55 | 3.5    | mΩ    |
|                             |                                       | V <sub>GS</sub> =2.5V, I <sub>S</sub> =5A Test Circuit 4  | 2   | 3    | 4.2    | mΩ    |
| g <sub>FS</sub>             | Forward Transconductance              | V <sub>SS</sub> =5V, I <sub>S</sub> =5A Test Circuit 3  |     | 40   |        | 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  |     | 1.5  |        | 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> =5A  |     | 36   |        | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                     | V <sub>G1S1</sub> =4.5V, V <sub>SS</sub> =6V, R <sub>L</sub> =1.2Ω,<br>R <sub>GEN</sub> =3Ω Test Circuit8 |     | 2.2  |        | μs    |
| t <sub>r</sub>              | Turn-On Rise Time                     |   |     | 5    |        | μs    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                    |   |     | 2.6  |        | μs    |
| t <sub>f</sub>              | Turn-Off Fall Time                    |   |     | 10.4 |        | μs    |

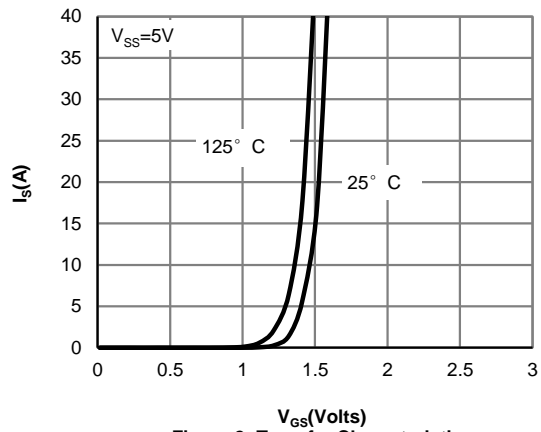
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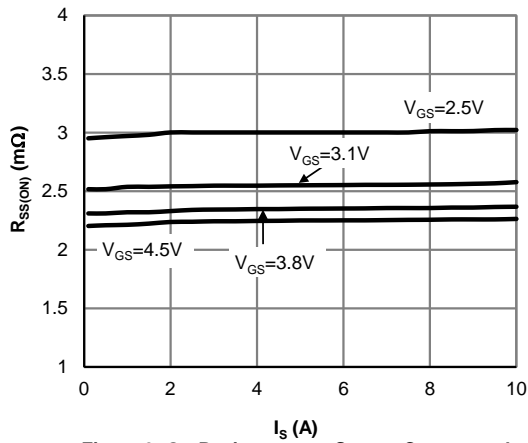
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



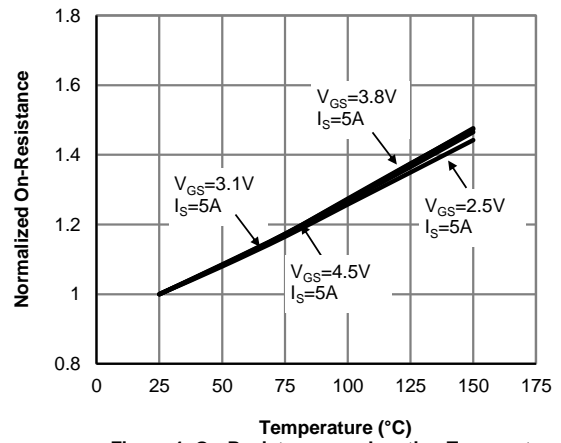
**Figure 1: On-Region Characteristics**



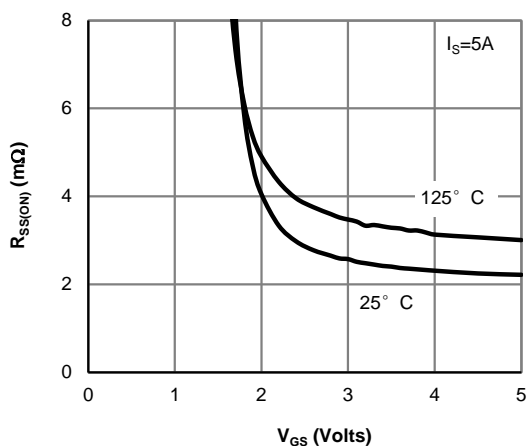
**Figure 2: Transfer Characteristics**



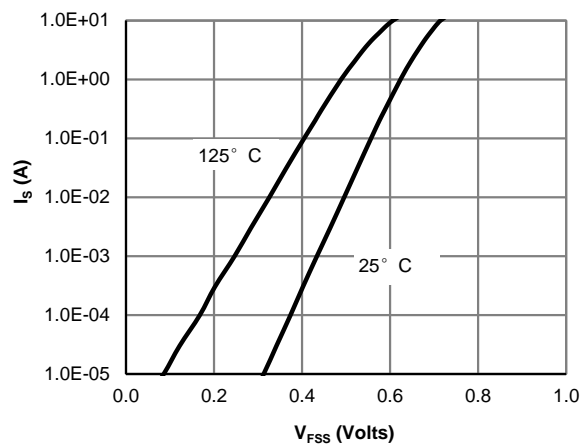
**Figure 3: On-Resistance vs. Source Current and Gate Voltage**



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

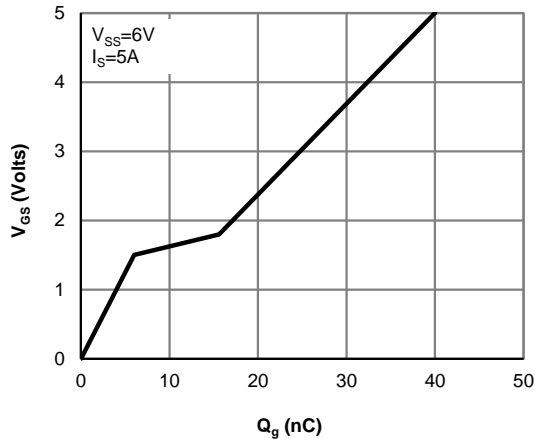


**Figure 5: On-Resistance vs. Gate-Source Voltage**

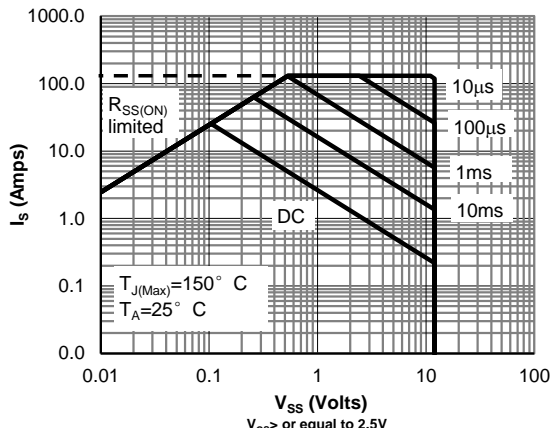


**Figure 6: Forward Source to Source Characteristics**

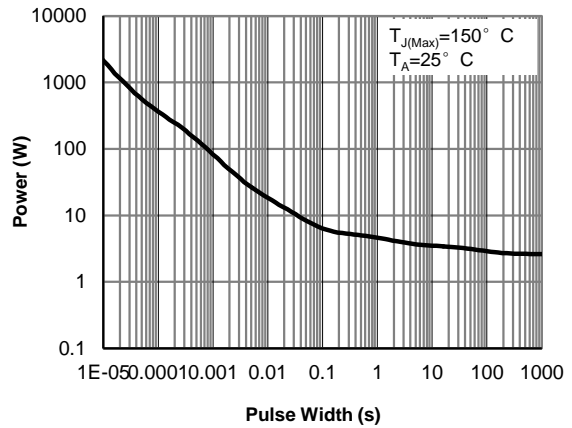
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



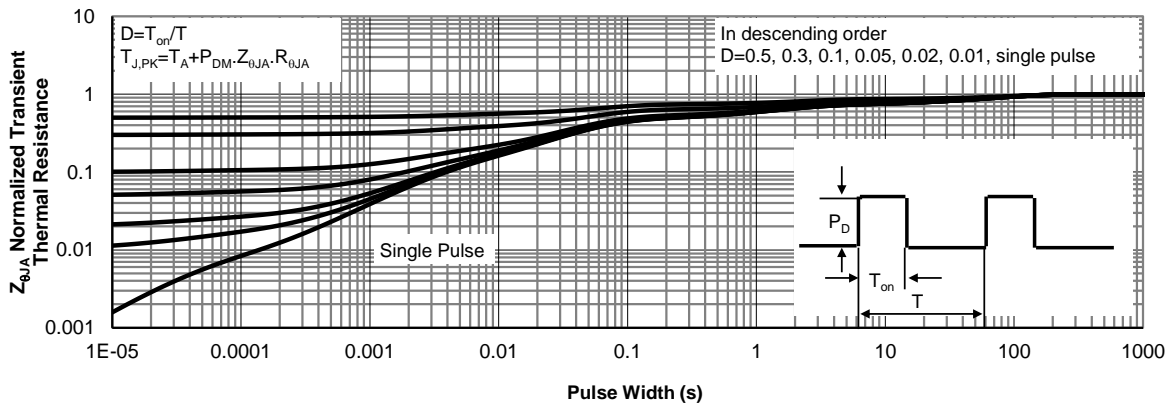
**Figure 7: Gate-Charge Characteristics**



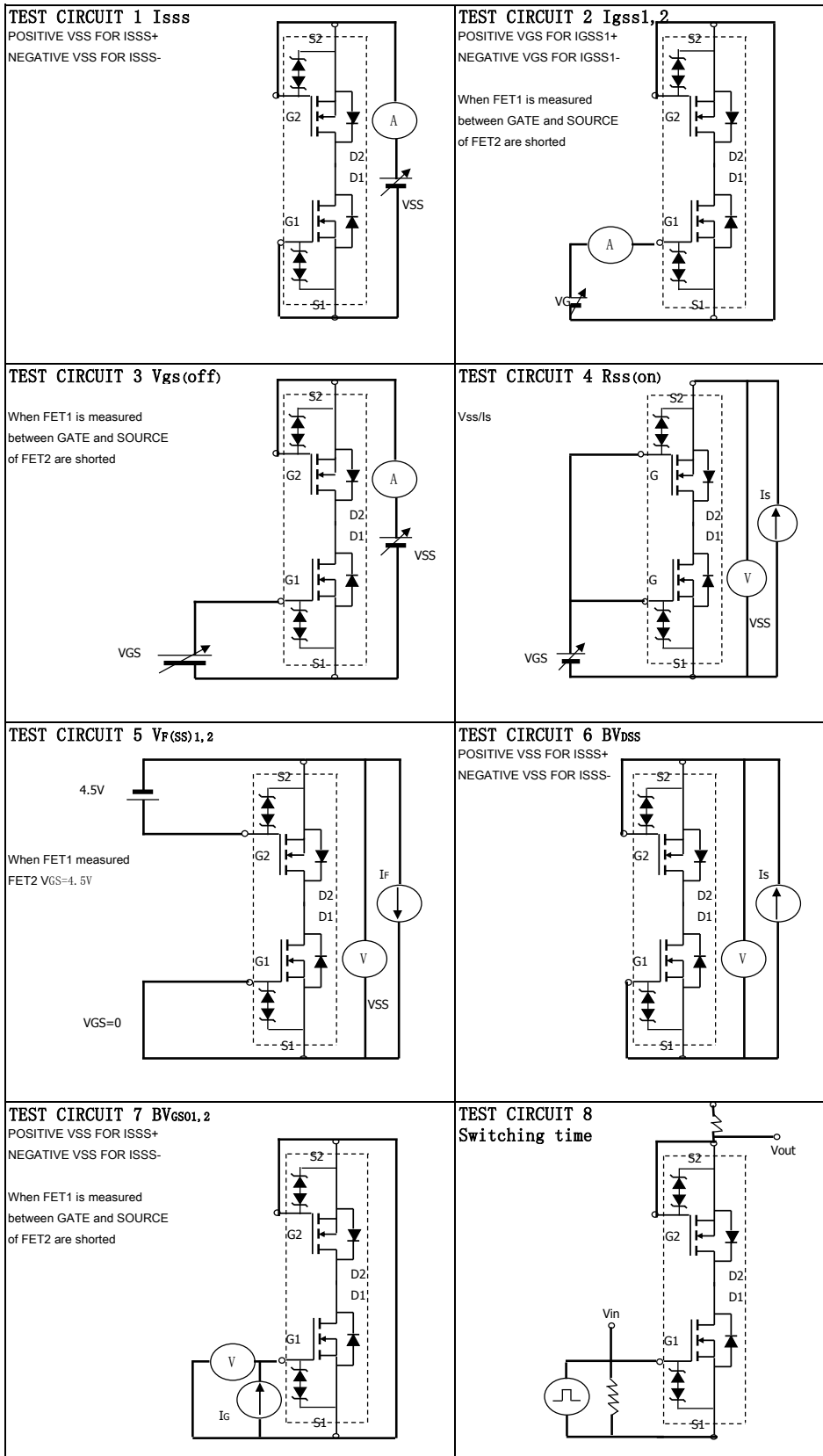
**Figure 8: Maximum Forward Biased Safe Operating Area (Note1)**



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



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



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