
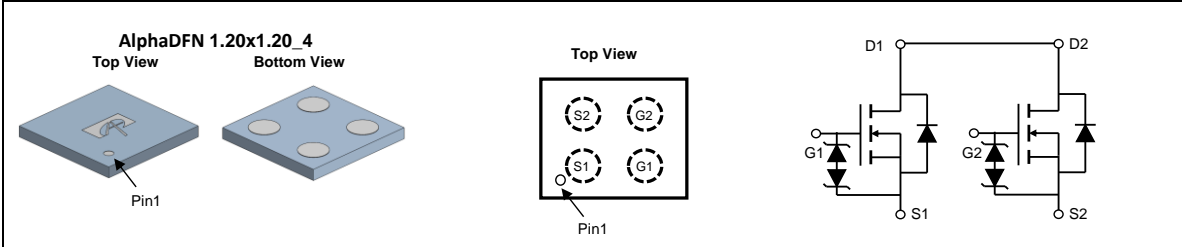


# AOCA32116E

## 20V Common-Drain Dual N-Channel MOSFET

|   |  |          |     |                                  |                |                                  |                |                                  |                |                                  |                |
|---|--|----------|-----|----------------------------------|----------------|----------------------------------|----------------|----------------------------------|----------------|----------------------------------|----------------|
| <p><b>General Description</b></p> <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> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Battery protection switch</li> <li>• Mobile device battery charging and discharging</li> </ul> | <p><b>Product Summary</b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 60%;"><math>V_{SS}</math></td> <td style="text-align: right;">20V</td> </tr> <tr> <td><math>R_{SS(ON)}</math> (at <math>V_{GS}=4.5V</math>)</td> <td style="text-align: right;">&lt; 36m<math>\Omega</math></td> </tr> <tr> <td><math>R_{SS(ON)}</math> (at <math>V_{GS}=3.8V</math>)</td> <td style="text-align: right;">&lt; 39m<math>\Omega</math></td> </tr> <tr> <td><math>R_{SS(ON)}</math> (at <math>V_{GS}=3.1V</math>)</td> <td style="text-align: right;">&lt; 44m<math>\Omega</math></td> </tr> <tr> <td><math>R_{SS(ON)}</math> (at <math>V_{GS}=2.5V</math>)</td> <td style="text-align: right;">&lt; 55m<math>\Omega</math></td> </tr> </table> <p><b>Typical ESD protection</b> <span style="float: right;"><b>HBM Class 2</b></span></p> <div style="text-align: right;">  </div> | $V_{SS}$ | 20V | $R_{SS(ON)}$ (at $V_{GS}=4.5V$ ) | < 36m $\Omega$ | $R_{SS(ON)}$ (at $V_{GS}=3.8V$ ) | < 39m $\Omega$ | $R_{SS(ON)}$ (at $V_{GS}=3.1V$ ) | < 44m $\Omega$ | $R_{SS(ON)}$ (at $V_{GS}=2.5V$ ) | < 55m $\Omega$ |
| $V_{SS}$  | 20V  |          |     |                                  |                |                                  |                |                                  |                |                                  |                |
| $R_{SS(ON)}$ (at $V_{GS}=4.5V$ )  | < 36m $\Omega$   |          |     |                                  |                |                                  |                |                                  |                |                                  |                |
| $R_{SS(ON)}$ (at $V_{GS}=3.8V$ )  | < 39m $\Omega$   |          |     |                                  |                |                                  |                |                                  |                |                                  |                |
| $R_{SS(ON)}$ (at $V_{GS}=3.1V$ )  | < 44m $\Omega$   |          |     |                                  |                |                                  |                |                                  |                |                                  |                |
| $R_{SS(ON)}$ (at $V_{GS}=2.5V$ )  | < 55m $\Omega$   |          |     |                                  |                |                                  |                |                                  |                |                                  |                |



| Orderable Part Number | Package Type         | Form        | Minimum Order Quantity |
|-----------------------|----------------------|-------------|------------------------|
| AOCA32116E            | AlphaDFN 1.20x1.20_4 | Tape & Reel | 8000                   |

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

| Parameter                                  | Symbol         | Rating     | Units            |
|--|----------------|------------|------------------|
| Source-Source Voltage                      | $V_{SS}$       | 20         | V                |
| Gate-Source Voltage                        | $V_{GS}$       | $\pm 12$   | V                |
| Source Current(DC) <small>Note1</small>    | $I_S$          | 6          | A                |
| Source Current(Pulse) <small>Note2</small> |                | 25         |                  |
| Power Dissipation <small>Note1</small>     | $P_D$          | 1.7        | 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 | $R_{\theta JA}$ | 65      | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient |                 | 75      | $^\circ\text{C/W}$ |

**Note 1.**  $I_S$  rated value is based on bare silicon. Mounted on 70mmx70mm FR-4 board.  
**Note 2.** PW <10  $\mu\text{s}$  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  | 20   |      |        | V     |
| I <sub>SSS</sub>            | Zero Gate Voltage Source Current                         | V <sub>SS</sub> =20V, 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> =±12V 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                                    | 0.5  | 0.85 | 1.3    | V     |
| R <sub>SS(ON)</sub>         | Static Source to Source On-Resistance                    | V <sub>GS</sub> =4.5V, I <sub>S</sub> =3A Test Circuit 4<br>T <sub>J</sub> =125°C                          | 20   | 29.5 | 36     | mΩ    |
|                             |  |  | 28   | 40.5 | 50     |       |
|                             |  | V <sub>GS</sub> =3.8V, I <sub>S</sub> =3A Test Circuit 4   | 21   | 31   | 39     | mΩ    |
|                             |  | V <sub>GS</sub> =3.1V, I <sub>S</sub> =3A Test Circuit 4   | 23   | 33.6 | 44     | mΩ    |
|                             | V <sub>GS</sub> =2.5V, I <sub>S</sub> =3A Test Circuit 4 | 26   | 38.6 | 55   | mΩ     |       |
| g <sub>FS</sub>             | Forward Transconductance                                 | V <sub>SS</sub> =5V, I <sub>S</sub> =3A Test Circuit 3   |      | 20   |        | S     |
| V <sub>FSS</sub>            | Forward Source to Source Voltage                         | I <sub>S</sub> =1A, V <sub>GS</sub> =0V Test Circuit 5   |      | 0.68 | 1      | V     |
| <b>DYNAMIC PARAMETERS</b>   |  |  |      |      |        |       |
| C <sub>iss</sub>            | Input Capacitance  | V <sub>GS</sub> =0V, V <sub>SS</sub> =10V, f=1MHz  | 410  | 520  | 630    | pF    |
| C <sub>oss</sub>            | Output Capacitance                                       |  | 50   | 72   | 95     | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance                             |  | 14   | 48   | 82     | pF    |
| R <sub>g</sub>              | Gate resistance  | f=1MHz   |      | 2    |        | KΩ    |
| <b>SWITCHING PARAMETERS</b> |  |  |      |      |        |       |
| Q <sub>g</sub>              | Total Gate Charge  | V <sub>G1S1</sub> =4.5V, V <sub>SS</sub> =10V, I <sub>S</sub> =3A  |      | 5.5  |        | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime  | V <sub>G1S1</sub> =4.5V, V <sub>SS</sub> =10V, R <sub>L</sub> =3.3Ω,<br>R <sub>GEN</sub> =3Ω Test Circuit8 |      | 0.5  |        | μs    |
| t <sub>r</sub>              | Turn-On Rise Time  |  |      | 1.4  |        | μs    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                                       |  |      | 1.9  |        | μs    |
| t <sub>f</sub>              | Turn-Off Fall Time                                       |  |      | 2.7  |        | μs    |

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

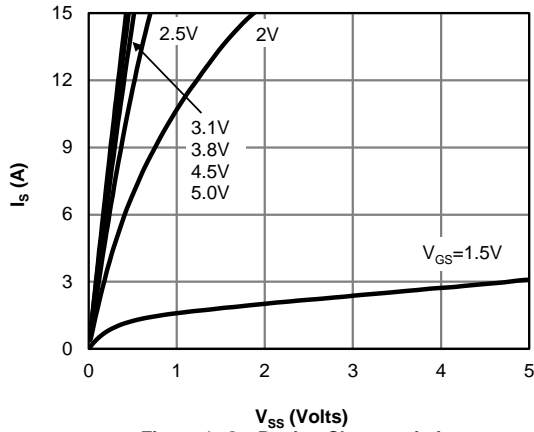


Figure 1: On-Region Characteristics

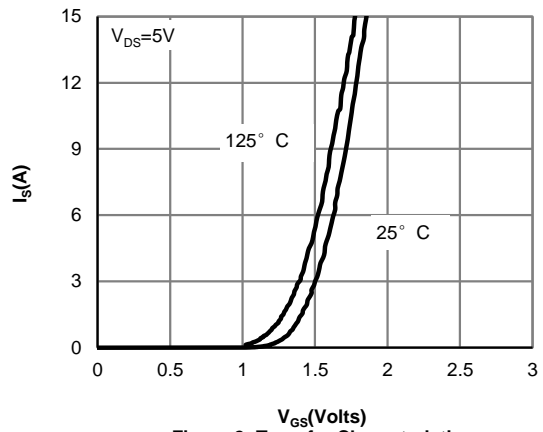


Figure 2: Transfer Characteristics

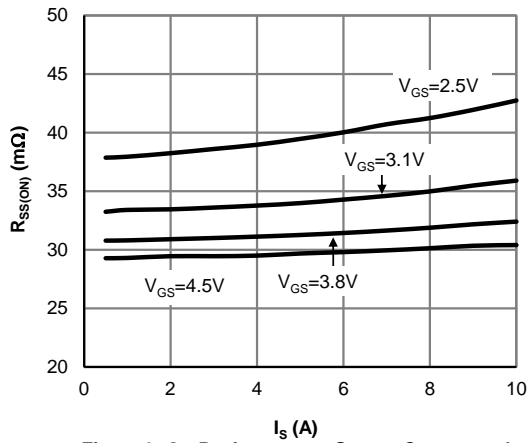


Figure 3: On-Resistance vs. Source Current and Gate Voltage

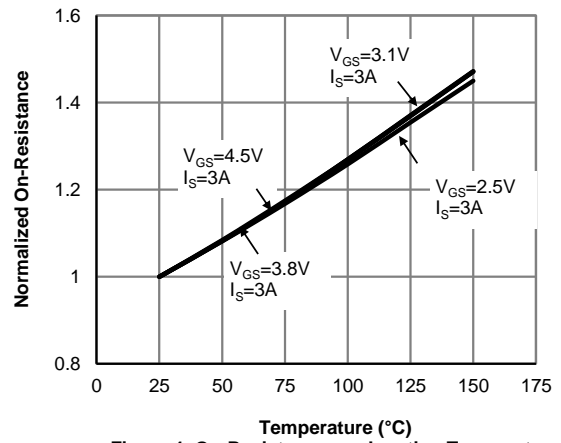


Figure 4: On-Resistance vs. Junction Temperature

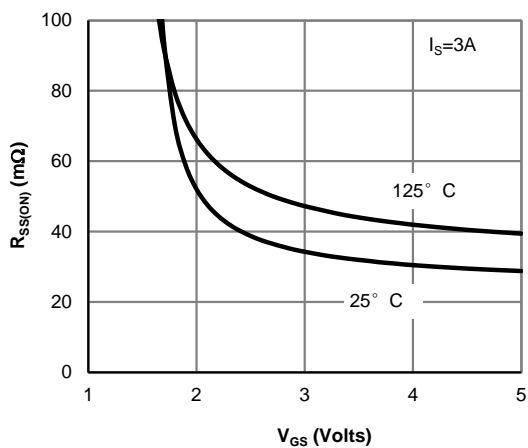


Figure 5: On-Resistance vs. Gate-Source Voltage

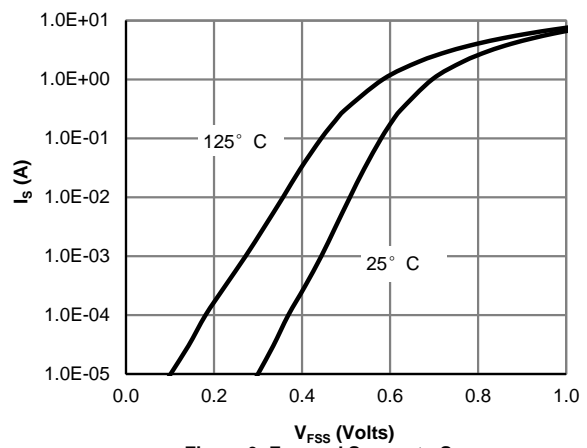


Figure 6: Forward Source to Source Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

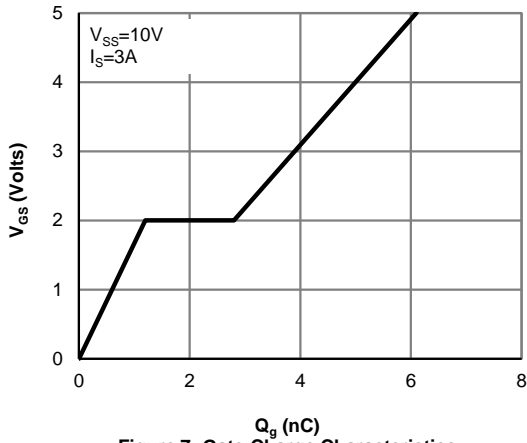


Figure 7: Gate-Charge Characteristics

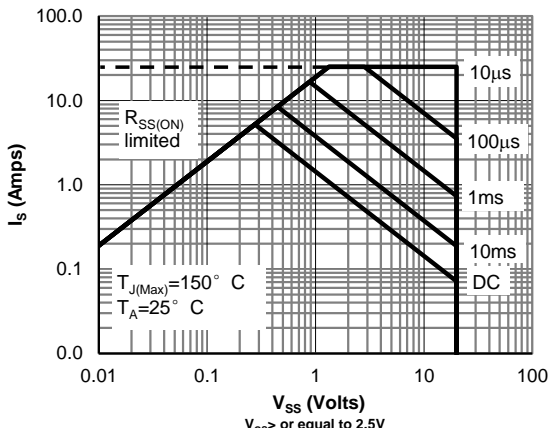


Figure 8: Maximum Forward Biased Safe Operating Area (Note1)

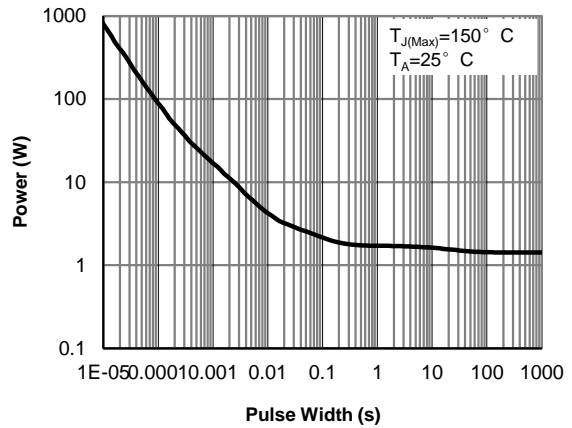


Figure 9: Single Pulse Power Rating Junction-to-Ambient (Note1)

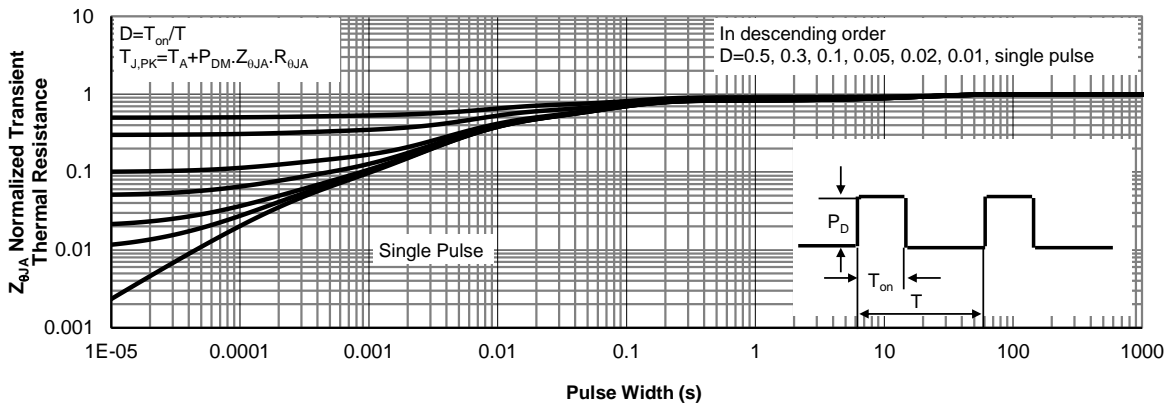


Figure 10: Normalized Maximum Transient Thermal Impedance (Note1)

