
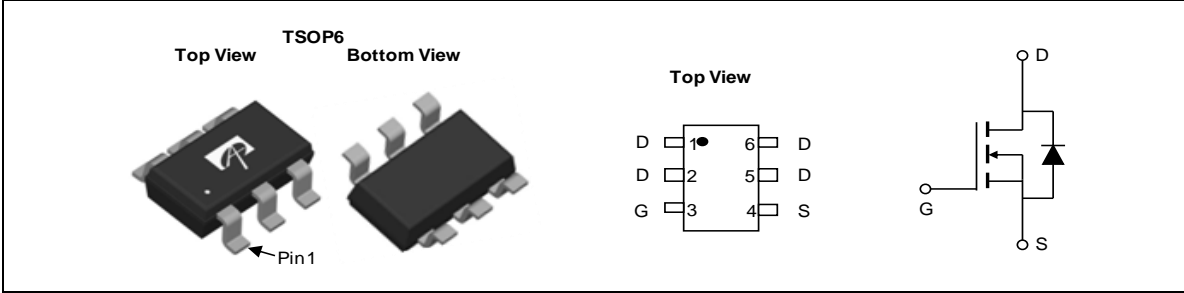


|   |   |          |     |                          |      |                                 |                |                                  |                |
|---|---|----------|-----|--------------------------|------|---------------------------------|----------------|----------------------------------|----------------|
| <p><b>General Description</b></p> <ul style="list-style-type: none"> <li>Latest Trench Power MOSFET technology</li> <li>Very Low <math>R_{DS(ON)}</math> at 4.5V <math>V_{GS}</math></li> <li>Low Gate Charge</li> <li>High Current Capability</li> <li>RoHS and Halogen-Free Compliant</li> </ul> <p><b>Application</b></p> <ul style="list-style-type: none"> <li>System/Load Switch</li> </ul> | <p><b>Product Summary</b></p> <table style="width: 100%; border: none;"> <tr> <td style="padding: 2px 10px;"><math>V_{DS}</math></td> <td style="padding: 2px 10px;">30V</td> </tr> <tr> <td style="padding: 2px 10px;"><math>I_D</math> (at <math>V_{GS}=10V</math>)</td> <td style="padding: 2px 10px;">6.5A</td> </tr> <tr> <td style="padding: 2px 10px;"><math>R_{DS(ON)}</math> (at <math>V_{GS}=10V</math>)</td> <td style="padding: 2px 10px;">&lt; 35m<math>\Omega</math></td> </tr> <tr> <td style="padding: 2px 10px;"><math>R_{DS(ON)}</math> (at <math>V_{GS}=4.5V</math>)</td> <td style="padding: 2px 10px;">&lt; 48m<math>\Omega</math></td> </tr> </table> <div style="text-align: right; margin-top: 20px;">  </div> | $V_{DS}$ | 30V | $I_D$ (at $V_{GS}=10V$ ) | 6.5A | $R_{DS(ON)}$ (at $V_{GS}=10V$ ) | < 35m $\Omega$ | $R_{DS(ON)}$ (at $V_{GS}=4.5V$ ) | < 48m $\Omega$ |
| $V_{DS}$  | 30V   |          |     |                          |      |                                 |                |                                  |                |
| $I_D$ (at $V_{GS}=10V$ )  | 6.5A  |          |     |                          |      |                                 |                |                                  |                |
| $R_{DS(ON)}$ (at $V_{GS}=10V$ )   | < 35m $\Omega$  |          |     |                          |      |                                 |                |                                  |                |
| $R_{DS(ON)}$ (at $V_{GS}=4.5V$ )  | < 48m $\Omega$  |          |     |                          |      |                                 |                |                                  |                |



| Orderable Part Number | Package Type | Form        | Minimum Order Quantity |
|-----------------------|--------------|-------------|------------------------|
| AO6424A               | TSOP-6       | Tape & Reel | 3000                   |

| Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted |                |                        |                  |
|--|----------------|------------------------|------------------|
| Parameter  | Symbol         | Maximum                | Units            |
| Drain-Source Voltage   | $V_{DS}$       | 30                     | V                |
| Gate-Source Voltage  | $V_{GS}$       | $\pm 20$               | V                |
| Continuous Drain Current   | $I_D$          | $T_A=25^\circ\text{C}$ | 6.5              |
|  |                | $T_A=70^\circ\text{C}$ | 5                |
| Pulsed Drain Current <sup>C</sup>                                      | $I_{DM}$       | 27                     | A                |
| Power Dissipation <sup>B</sup>   | $P_D$          | $T_A=25^\circ\text{C}$ | 2.5              |
|  |                | $T_A=70^\circ\text{C}$ | 1.5              |
| Junction and Storage Temperature Range                                 | $T_J, T_{STG}$ | -55 to 150             | $^\circ\text{C}$ |

| Thermal Characteristics                    |                 |              |     |       |                    |
|--|-----------------|--------------|-----|-------|--------------------|
| Parameter                                  | Symbol          | Typ          | Max | Units |                    |
| Maximum Junction-to-Ambient <sup>A</sup>   | $R_{\theta JA}$ | $t \leq 10s$ | 42  | 50    | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient <sup>A D</sup> |                 | Steady-State | 68  | 85    | $^\circ\text{C/W}$ |
| Maximum Junction-to-Lead                   | $R_{\theta JL}$ | Steady-State | 23  | 30    | $^\circ\text{C/W}$ |

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

| Symbol                      | Parameter                             | Conditions  | Min | Typ      | Max      | Units |
|-----------------------------|---------------------------------------|---|-----|----------|----------|-------|
| <b>STATIC PARAMETERS</b>    |                                       |   |     |          |          |       |
| BV <sub>DSS</sub>           | Drain-Source Breakdown Voltage        | ID=250μA, VGS=0V  | 30  |          |          | V     |
| I <sub>DSS</sub>            | Zero Gate Voltage Drain Current       | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V<br>T <sub>J</sub> =55°C                       |     |          | 1<br>5   | μA    |
| I <sub>GSS</sub>            | Gate-Body leakage current             | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V  |     |          | ±100     | nA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                | 1.2 | 1.8      | 2.4      | V     |
| R <sub>DS(ON)</sub>         | Static Drain-Source On-Resistance     | V <sub>GS</sub> =10V, I <sub>D</sub> =5A<br>T <sub>J</sub> =125°C                       |     | 29<br>44 | 35<br>53 | mΩ    |
|                             |                                       | V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A   |     | 38       | 48       |       |
| g <sub>FS</sub>             | Forward Transconductance              | V <sub>DS</sub> =5V, I <sub>D</sub> =5A   |     | 8        |          | S     |
| V <sub>SD</sub>             | Diode Forward Voltage                 | I <sub>S</sub> =1A, V <sub>GS</sub> =0V   |     | 0.76     | 1        | V     |
| I <sub>S</sub>              | Maximum Body-Diode Continuous Current |   |     |          | 3        | A     |
| <b>DYNAMIC PARAMETERS</b>   |                                       |   |     |          |          |       |
| C <sub>iss</sub>            | Input Capacitance                     | V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz                                       |     | 270      |          | pF    |
| C <sub>oss</sub>            | Output Capacitance                    |   |     | 50       |          | pF    |
| C <sub>riss</sub>           | Reverse Transfer Capacitance          |   |     | 35       |          | pF    |
| R <sub>g</sub>              | Gate resistance                       | f=1MHz  | 1.4 | 2.8      | 4.2      | Ω     |
| <b>SWITCHING PARAMETERS</b> |                                       |   |     |          |          |       |
| Q <sub>g</sub> (10V)        | Total Gate Charge                     | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =5A                          |     | 6.3      | 12       | nC    |
| Q <sub>g</sub> (4.5V)       | Total Gate Charge                     |   |     | 3.2      | 8        | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                    |   |     | 0.65     |          | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                     |   |     | 1.75     |          | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                     | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =3Ω,<br>R <sub>GEN</sub> =3Ω |     | 3        |          | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                     |   |     | 2.5      |          | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                    |   |     | 17.5     |          | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                    |   |     | 2.5      |          | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time      | I <sub>F</sub> =5A, dI/dt=100A/μs   |     | 10       |          | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge    | I <sub>F</sub> =5A, dI/dt=100A/μs   |     | 2.3      |          | nC    |

A. The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25° C. The value in any given application depends on the user's specific board design.

B. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150° C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150° C. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub>=25° C.

D. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> and lead to ambient.

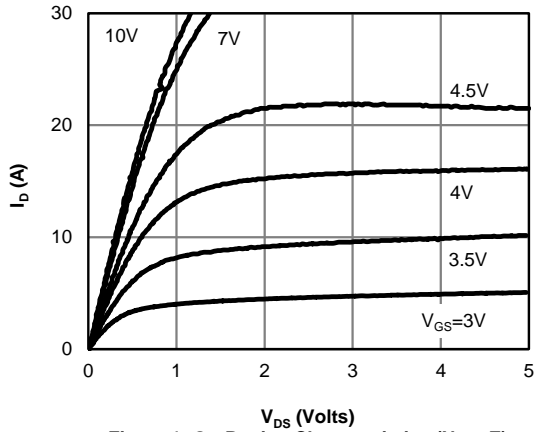
E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150° C. The SOA curve provides a single pulse rating.

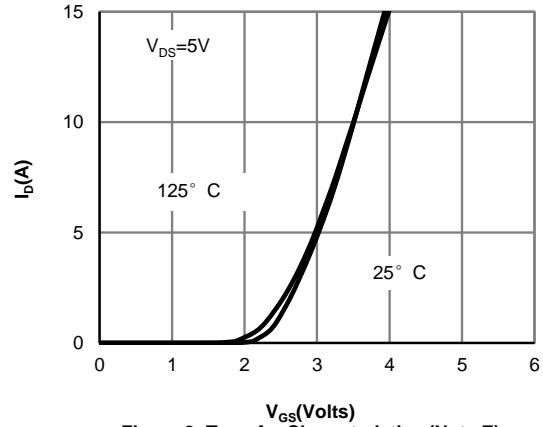
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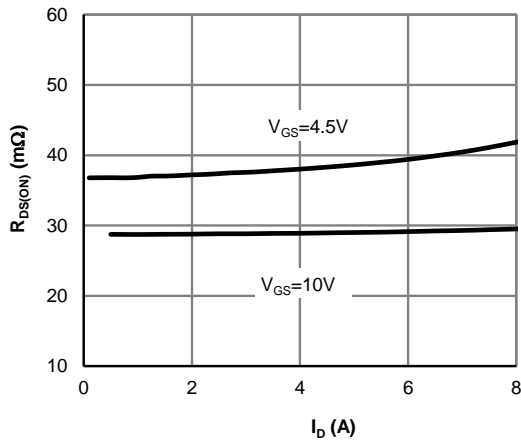
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



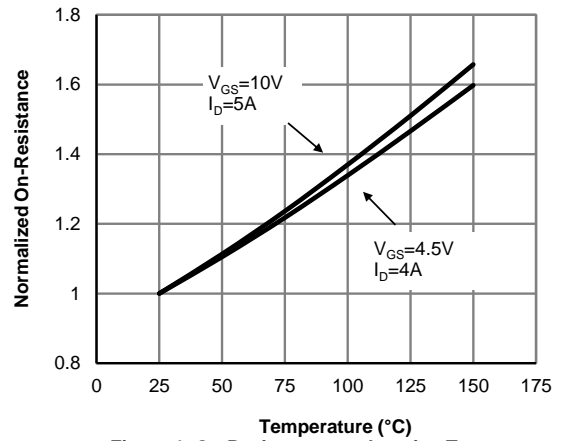
**Figure 1: On-Region Characteristics (Note E)**



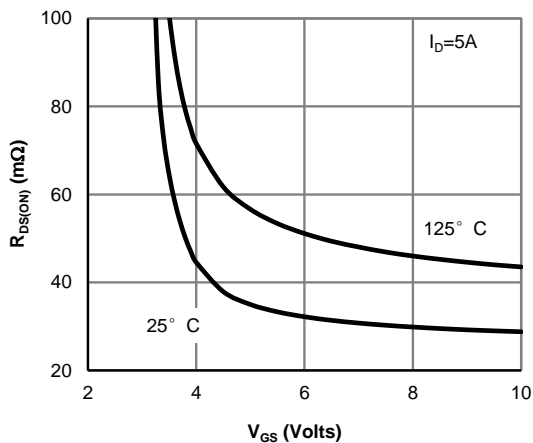
**Figure 2: Transfer Characteristics (Note E)**



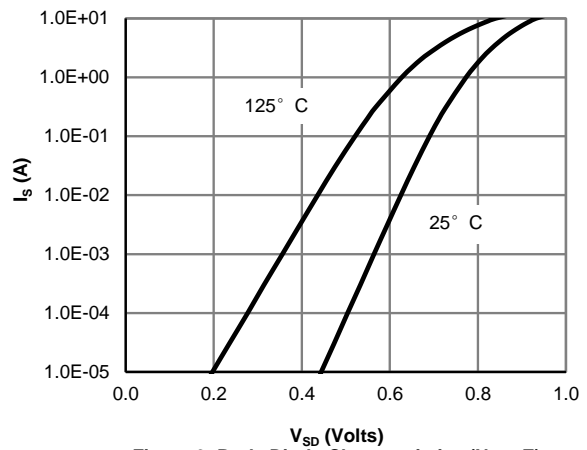
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)**



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

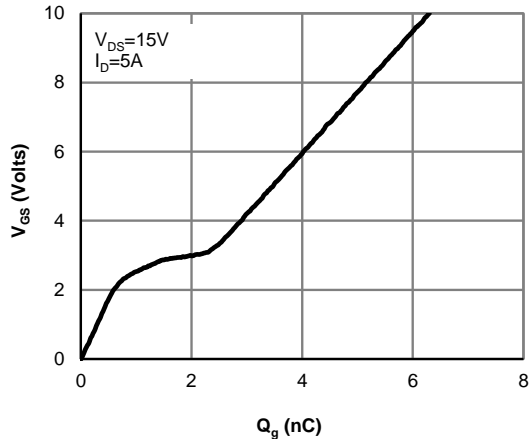


**Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)**

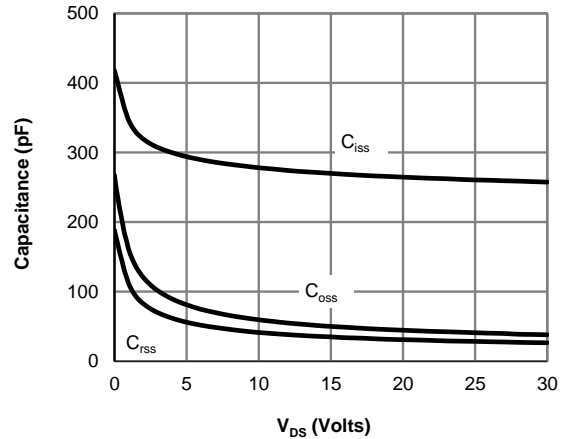


**Figure 6: Body-Diode Characteristics (Note E)**

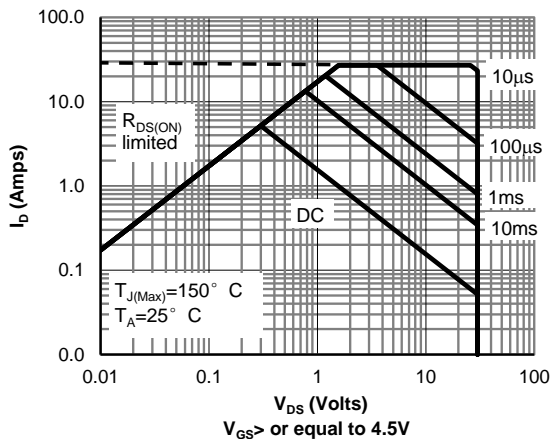
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



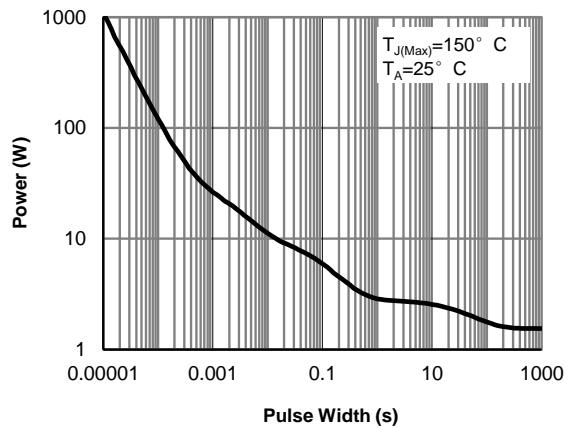
**Figure 7: Gate-Charge Characteristics**



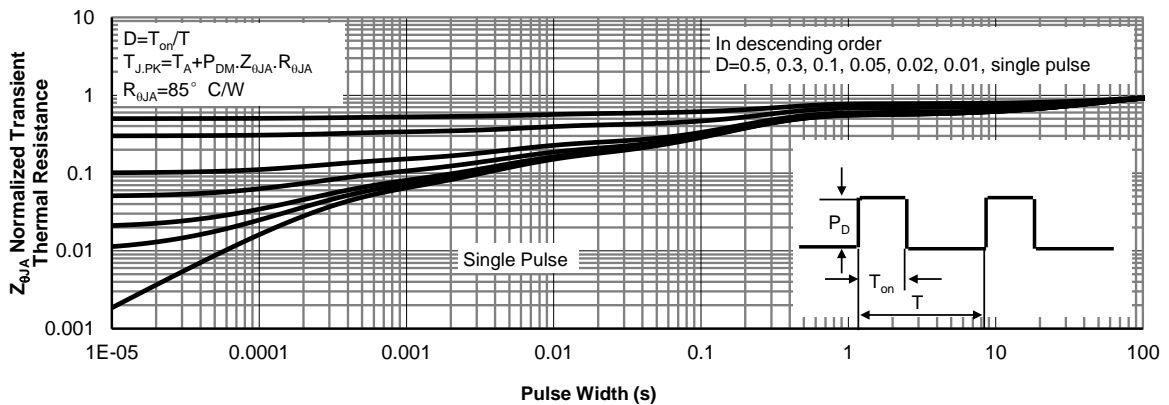
**Figure 8: Capacitance Characteristics**



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

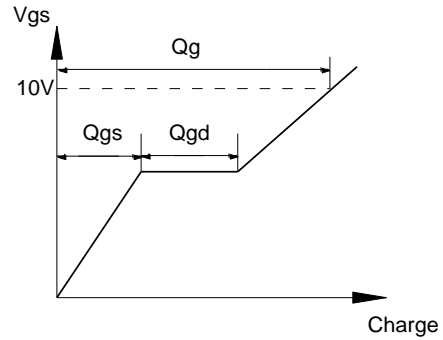
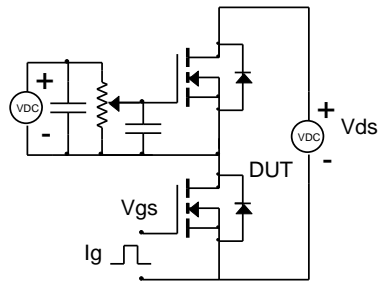


**Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)**

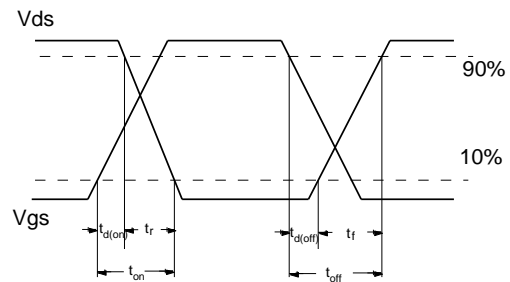
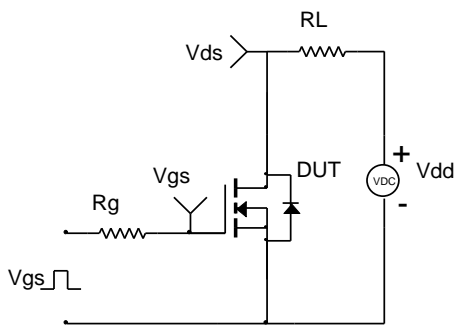


**Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)**

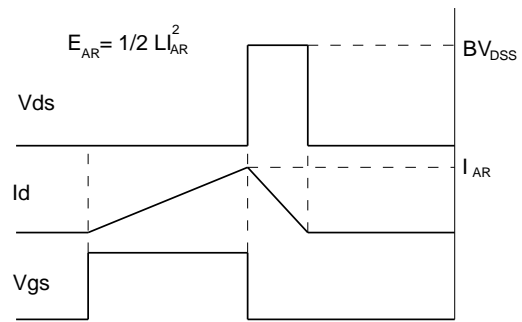
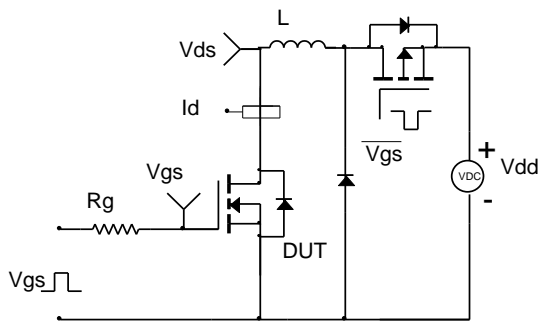
**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**



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



**Diode Recovery Test Circuit & Waveforms**

