

## AOB440

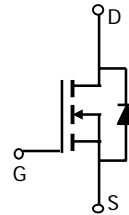
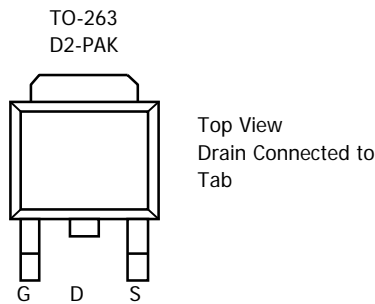
### N-Channel Enhancement Mode Field Effect Transistor

#### General Description

The AOB440 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use in UPS, high current switching applications. *Standard Product AOB440 is Pb-free (meets ROHS & Sony 259 specifications).*

#### Features

$V_{DS} (V) = 60V$   
 $I_D = 75 A \quad (V_{GS} = 10V)$   
 $R_{DS(ON)} < 7.5m\Omega \quad (V_{GS} = 10V)$



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

| Parameter  | Symbol            | Maximum    | Units      |
|--|-------------------|------------|------------|
| Drain-Source Voltage                               | $V_{DS}$          | 60         | V          |
| Gate-Source Voltage                                | $V_{GS}$          | $\pm 20$   | V          |
| Continuous Drain Current <sup>G</sup>              | $T_C=25^\circ C$  | 75         | A          |
|  | $T_C=100^\circ C$ | 75         |            |
| Pulsed Drain Current <sup>C</sup>                  | $I_{DM}$          | 150        |            |
| Avalanche Current <sup>C</sup>                     | $I_{AR}$          | 80         | A          |
| Repetitive avalanche energy $L=0.1mH$ <sup>C</sup> | $E_{AR}$          | 320        | mJ         |
| Power Dissipation <sup>B</sup>                     | $T_C=25^\circ C$  | 150        | W          |
|  | $T_C=100^\circ C$ | 75         |            |
| Junction and Storage Temperature Range             | $T_J, T_{STG}$    | -55 to 175 | $^\circ C$ |

#### Thermal Characteristics

| Parameter                                |              | Symbol          | Typ | Max | Units        |
|--|--------------|-----------------|-----|-----|--------------|
| Maximum Junction-to-Ambient <sup>A</sup> | $t \leq 10s$ | $R_{\theta JA}$ | 8   | 12  | $^\circ C/W$ |
| Maximum Junction-to-Ambient <sup>A</sup> | Steady-State | $R_{\theta JA}$ | 35  | 45  | $^\circ C/W$ |
| Maximum Junction-to-Case <sup>B</sup>    | Steady-State | $R_{\theta JC}$ | 0.7 | 1   | $^\circ C/W$ |

Electrical Characteristics ( $T_J=25^\circ\text{C}$  unless otherwise noted)

| Symbol                      | Parameter  | Conditions   | Min | Typ         | Max       | Units            |
|-----------------------------|--|--|-----|-------------|-----------|------------------|
| <b>STATIC PARAMETERS</b>    |  |  |     |             |           |                  |
| $BV_{DSS}$                  | Drain-Source Breakdown Voltage                     | $I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$  | 60  |             |           | V                |
| $I_{DSS}$                   | Zero Gate Voltage Drain Current                    | $V_{DS}=60\text{V}$ , $V_{GS}=0\text{V}$<br>$T_J=55^\circ\text{C}$               |     |             | 10<br>50  | $\mu\text{A}$    |
| $I_{GSS}$                   | Gate-Body leakage current                          | $V_{DS}=0\text{V}$ , $V_{GS}=\pm 20\text{V}$                                     |     |             | 100       | nA               |
| $V_{GS(th)}$                | Gate Threshold Voltage                             | $V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$   | 2   | 3           | 4         | V                |
| $I_{D(ON)}$                 | On state drain current                             | $V_{GS}=10\text{V}$ , $V_{DS}=5\text{V}$   | 150 |             |           | A                |
| $R_{DS(ON)}$                | Static Drain-Source On-Resistance                  | $V_{GS}=10\text{V}$ , $I_D=30\text{A}$<br>$T_J=125^\circ\text{C}$                |     | 6.3<br>10.5 | 7.5<br>13 | $\text{m}\Omega$ |
| $g_{FS}$                    | Transconductance                                   | $V_{DS}=5\text{V}$ , $I_D=30\text{A}$  |     | 90          |           | S                |
| $V_{SD}$                    | Diode Forward Voltage                              | $I_S=1\text{A}$ , $V_{GS}=0\text{V}$   |     | 0.7         | 1         | V                |
| $I_S$                       | Maximum Body-Diode Continuous Current <sup>G</sup> |  |     |             | 55        | A                |
| <b>DYNAMIC PARAMETERS</b>   |  |  |     |             |           |                  |
| $C_{iss}$                   | Input Capacitance                                  | $V_{GS}=0\text{V}$ , $V_{DS}=30\text{V}$ , $f=1\text{MHz}$                       |     | 3800        | 4560      | pF               |
| $C_{oss}$                   | Output Capacitance                                 |  |     | 430         |           | pF               |
| $C_{rss}$                   | Reverse Transfer Capacitance                       |  |     | 190         |           | pF               |
| $R_g$                       | Gate resistance                                    | $V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$                        |     | 1.5         | 2.3       | $\Omega$         |
| <b>SWITCHING PARAMETERS</b> |  |  |     |             |           |                  |
| $Q_g(10\text{V})$           | Total Gate Charge                                  | $V_{GS}=10\text{V}$ , $V_{DS}=30\text{V}$ , $I_D=30\text{A}$                     |     | 68          | 88        | nC               |
| $Q_g(4.5\text{V})$          | Total Gate Charge                                  |  |     | 33          |           | nC               |
| $Q_{gs}$                    | Gate Source Charge                                 |  |     | 15          |           | nC               |
| $Q_{gd}$                    | Gate Drain Charge                                  |  |     | 19          |           | nC               |
| $t_{D(on)}$                 | Turn-On Delay Time                                 | $V_{GS}=10\text{V}$ , $V_{DS}=30\text{V}$ , $R_L=1\Omega$ ,<br>$R_{GEN}=3\Omega$ |     | 18          |           | ns               |
| $t_r$                       | Turn-On Rise Time                                  |  |     | 35          |           | ns               |
| $t_{D(off)}$                | Turn-Off Delay Time                                |  |     | 44          |           | ns               |
| $t_f$                       | Turn-Off Fall Time                                 |  |     | 23          |           | ns               |
| $t_{rr}$                    | Body Diode Reverse Recovery Time                   | $I_F=30\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$                               |     | 53          | 64        | ns               |
| $Q_{rr}$                    | Body Diode Reverse Recovery Charge                 | $I_F=30\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$                               |     | 98          |           | nC               |

A: The value of  $R_{\theta JA}$  is measured with the device in a still air environment with  $T_A=25^\circ\text{C}$ .

B: The power dissipation  $P_D$  is based on  $T_{J(MAX)}=175^\circ\text{C}$ , using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C: Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)}=175^\circ\text{C}$ .

D: The  $R_{\theta JA}$  is the sum of the thermal impedance from junction to case  $R_{\theta JC}$  and case to ambient.

E: The static characteristics in Figures 1 to 6 are obtained using  $<300 \mu\text{s}$  pulses, duty cycle 0.5% max.

F: These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of  $T_{J(MAX)}=175^\circ\text{C}$ .

G: The maximum current rating is limited by bond-wires.

Rev1: May. 2008

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

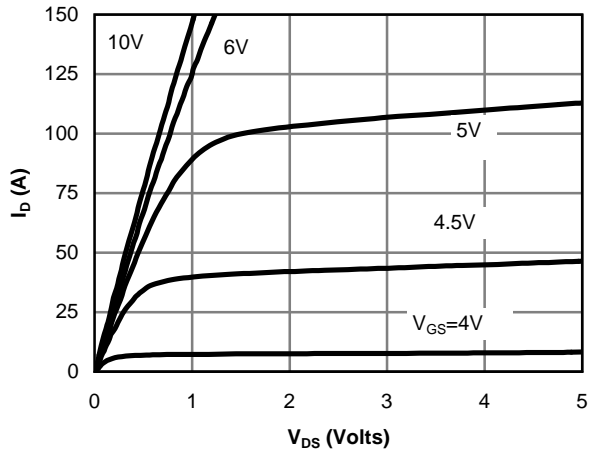


Figure 1: On-Region Characteristics

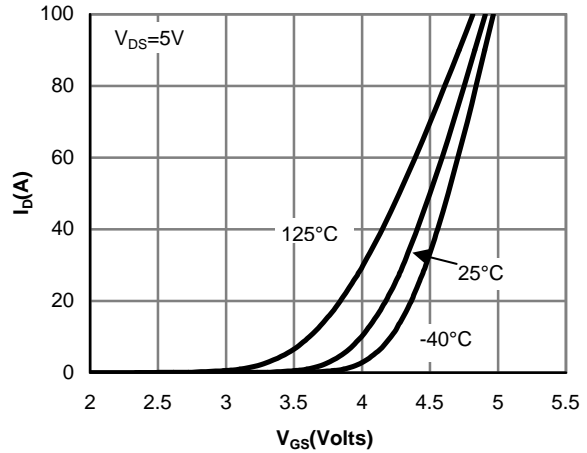


Figure 2: Transfer Characteristics

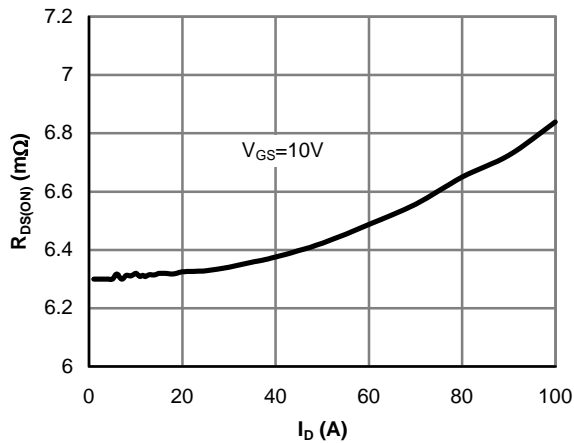


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

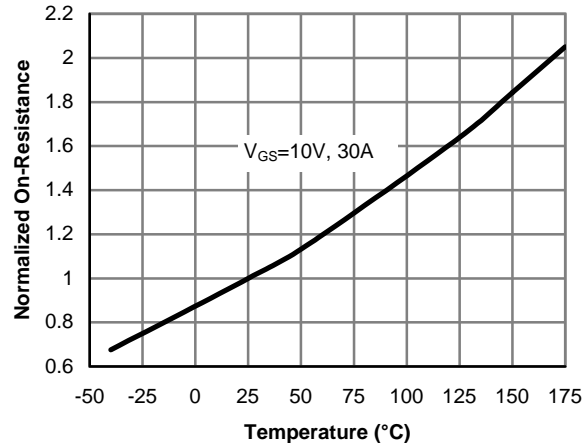


Figure 4: On-Resistance vs. Junction Temperature

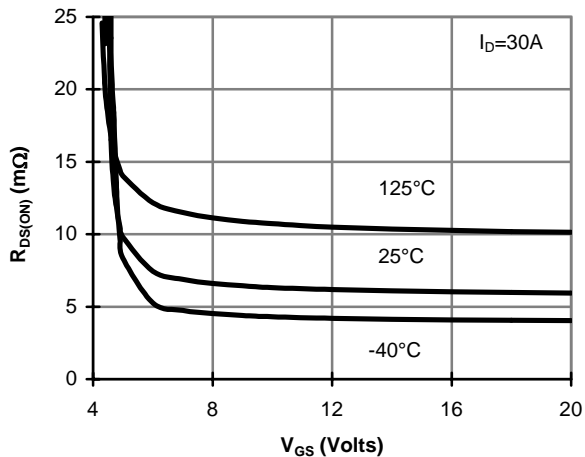


Figure 5: On-Resistance vs. Gate-Source Voltage

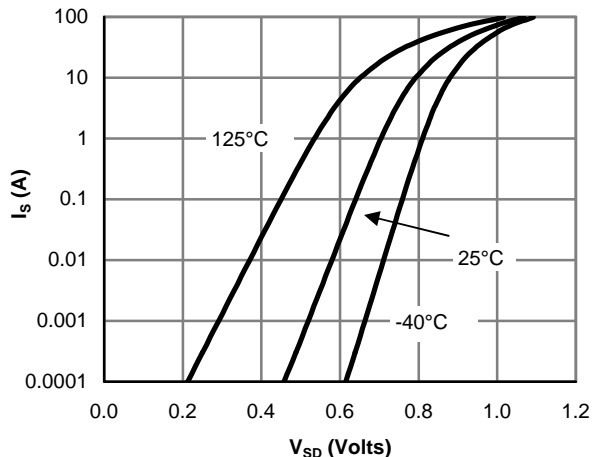


Figure 6: Body-Diode Characteristics

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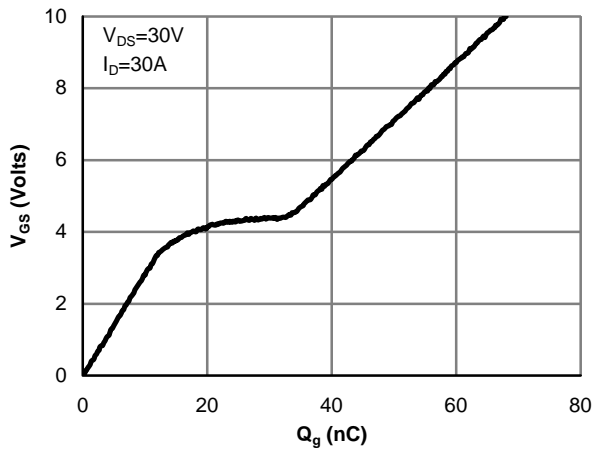


Figure 7: Gate-Charge Characteristics

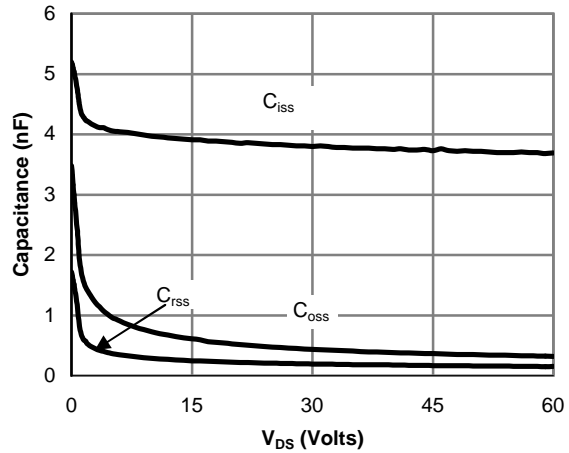


Figure 8: Capacitance Characteristics

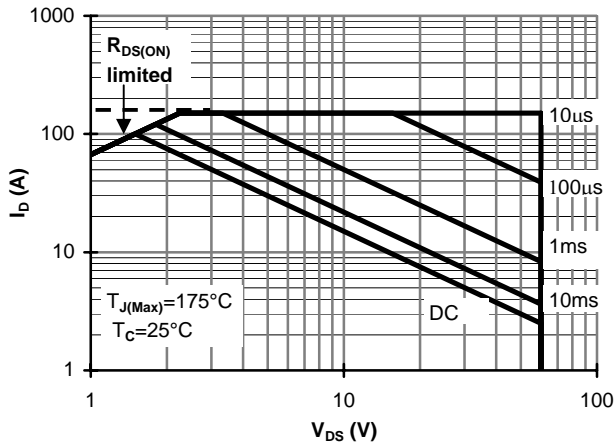


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

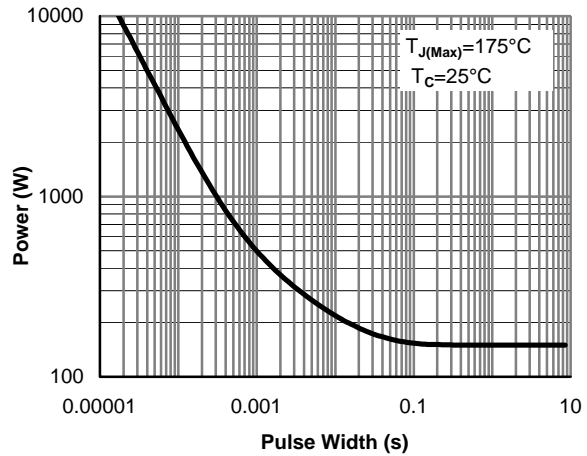


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

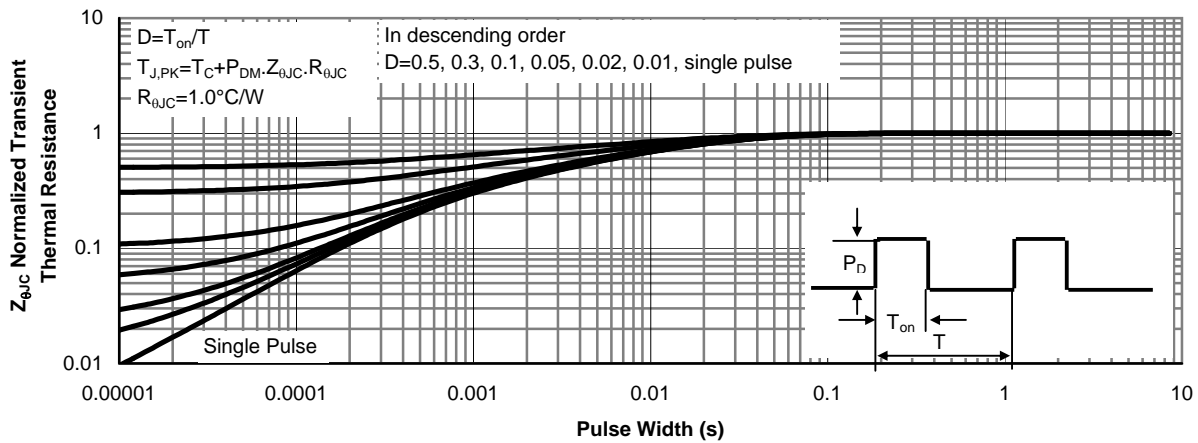


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

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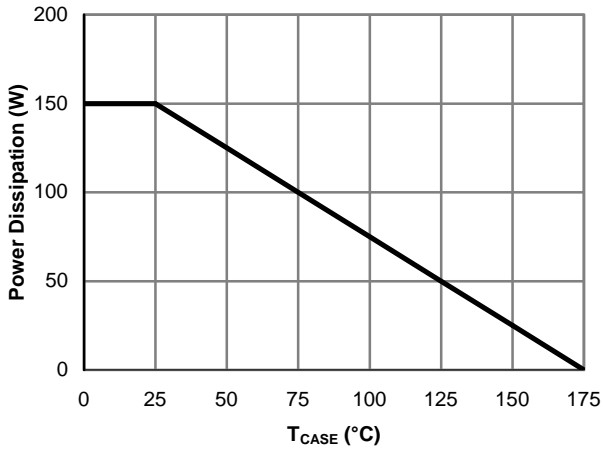


Figure 13: Power De-rating (Note B)

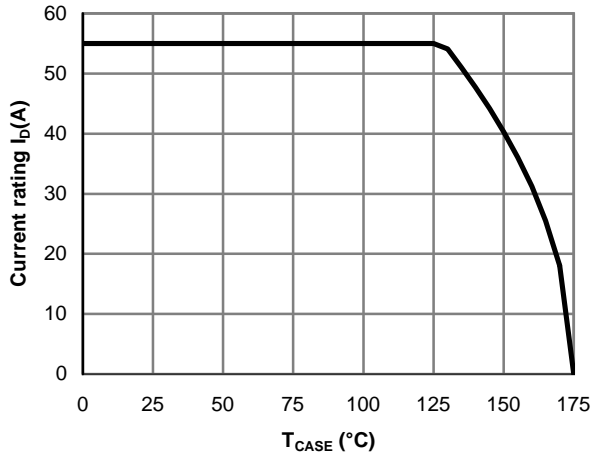


Figure 12: Current De-rating (Note B)

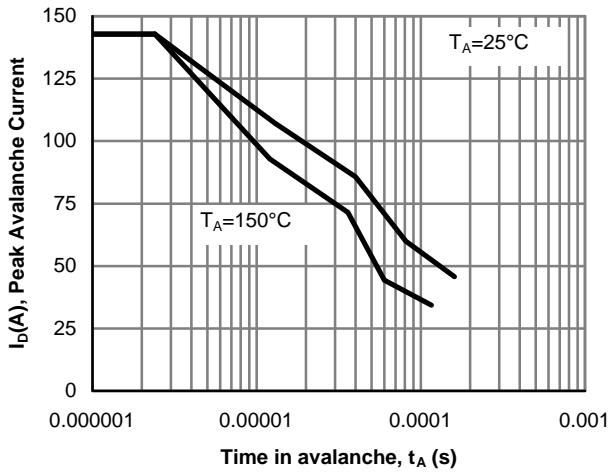


Figure 10: Single Pulse Avalanche capability