

AOL1442
N-Channel Enhancement Mode Field Effect Transistor

General Description

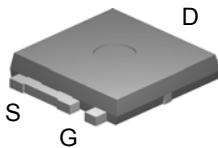
The AOL1442 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications. *Standard Product AOL1442 is Pb-free (meets ROHS & Sony 259 specifications). AOL1442L is a Green Product ordering option. AOL1442 and AOL1442L are electrically identical.*

Features

V_{DS} (V) = 30V
 $I_D = 75A$ ($V_{GS} = 10V$)
 $R_{DS(ON)} < 5m\Omega$ ($V_{GS} = 10V$)
 $R_{DS(ON)} < 9m\Omega$ ($V_{GS} = 4.5V$)

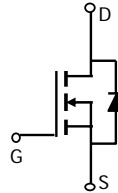
UIS Tested
Rg, Ciss, Coss, Crss Tested

Ultra SO-8™ Top View



Bottom tab
connected to
drain

**Fits SOIC8
footprint !**


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} | ± 20 | V |
| Continuous Drain Current ^G | I_D | $T_C=25^\circ\text{C}$ | A |
| | | $T_C=100^\circ\text{C}$ | |
| Pulsed Drain Current ^C | I_{DM} | 200 | A |
| Continuous Drain Current ^H | I_{DSM} | $T_A=25^\circ\text{C}$ | A |
| | | $T_A=70^\circ\text{C}$ | |
| Avalanche Current ^C | I_{AR} | 30 | A |
| Repetitive avalanche energy $L=0.3\text{mH}$ ^C | E_{AR} | 135 | mJ |
| Power Dissipation ^B | P_D | $T_C=25^\circ\text{C}$ | W |
| | | $T_C=100^\circ\text{C}$ | |
| Power Dissipation ^A | P_{DSM} | $T_A=25^\circ\text{C}$ | W |
| | | $T_A=70^\circ\text{C}$ | |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 175 | $^\circ\text{C}$ |

Thermal Characteristics

| Parameter | Symbol | Typ | Max | Units |
|--|-----------------|---------------------|------|--------------------|
| Maximum Junction-to-Ambient ^A | $R_{\theta JA}$ | $t \leq 10\text{s}$ | 16.2 | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient ^A | | Steady-State | 44 | $^\circ\text{C/W}$ |
| Maximum Junction-to-Case ^B | $R_{\theta JC}$ | 2 | 3 | $^\circ\text{C/W}$ |

Electrical Characteristics (T_J=25°C unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------------------------|---------------------------------------|--|-----|------|--------|-------|
| STATIC PARAMETERS | | | | | | |
| B _{V(DSS)} | Drain-Source Breakdown Voltage | I _D =250μA, V _{GS} =0V | 30 | 35 | | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} =24V, V _{GS} =0V T _J =55°C | | | 1 5 | μA |
| I _{GSS} | Gate-Body leakage current | V _{DS} =0V, V _{GS} =±20V | | | 100 | nA |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D =250μA | 1 | 1.5 | 2.5 | V |
| I _{D(ON)} | On state drain current | V _{GS} =10V, V _{DS} =5V | 100 | | | A |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =10V, I _D =20A | | 4 | 5 | mΩ |
| | | T _J =125°C | | 5 | 6 | |
| | | V _{GS} =4.5V, I _D =10A | | 7 | 9 | mΩ |
| g _{FS} | Forward Transconductance | V _{DS} =5V, I _D =20A | | 40 | | S |
| V _{SD} | Diode Forward Voltage | I _S =1A, V _{GS} =0V | | | 1 | V |
| I _S | Maximum Body-Diode Continuous Current | | | | 55 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =15V, f=1MHz | | 2662 | 3194 | pF |
| C _{oss} | Output Capacitance | | | 502 | | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 375 | | pF |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, f=1MHz | | 1.1 | 1.7 | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _{g(10V)} | Total Gate Charge | V _{GS} =10V, V _{DS} =15V, I _D =20A | | 70 | 84 | nC |
| Q _{g(4.5V)} | Total Gate Charge | | | 34.8 | 42 | nC |
| Q _{gs} | Gate Source Charge | | | 13.1 | | nC |
| Q _{gd} | Gate Drain Charge | | | 18.5 | | nC |
| t _{D(on)} | Turn-On Delay Time | V _{GS} =10V, V _{DS} =15V, R _L =0.75Ω, R _{GEN} =3Ω | | 9 | | ns |
| t _r | Turn-On Rise Time | | | 11 | | ns |
| t _{D(off)} | Turn-Off Delay Time | | | 30.7 | | ns |
| t _f | Turn-Off Fall Time | | | 9.2 | | ns |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =20A, dI/dt=100A/μs | | 34.5 | 42 | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =20A, dI/dt=100A/μs | | 28.3 | 34 | nC |

A: The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The Power dissipation P_{D(SM)} is based on R_{θJA} and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 175°C may be used if the PCB allows it.

B: The power dissipation P_D is based on T_{J(MAX)}=175°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°C.

D: The R_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} and case to ambient.

E: The static characteristics in Figures 1 to 6 are obtained using <300 μs 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°C.

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

H: These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating.

I: Revision 0: Mar 2006

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

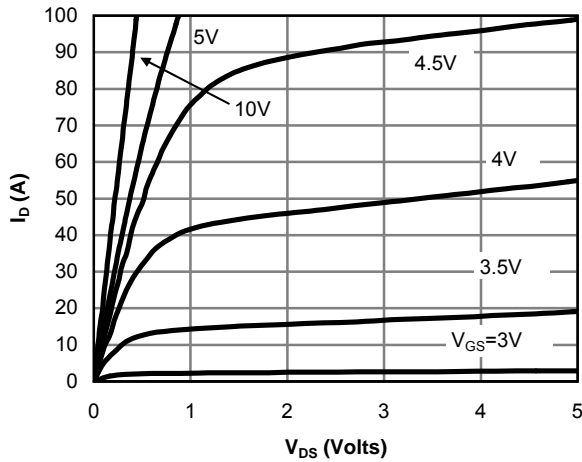


Fig 1: On-Region Characteristics

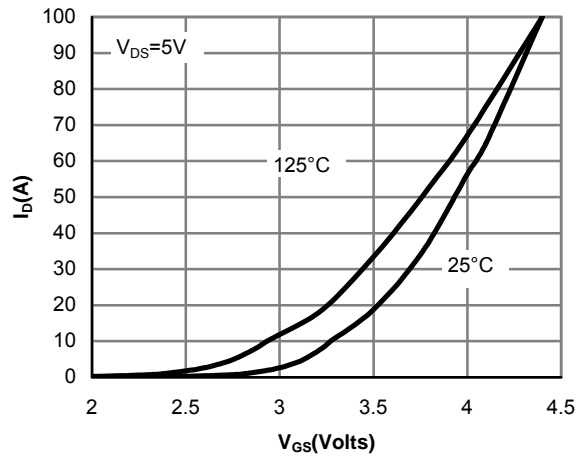


Figure 2: Transfer Characteristics

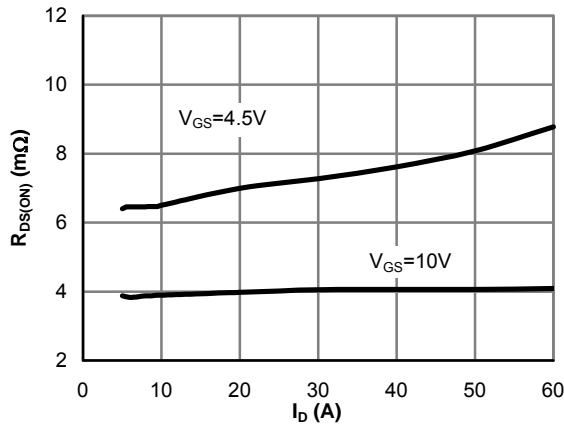


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

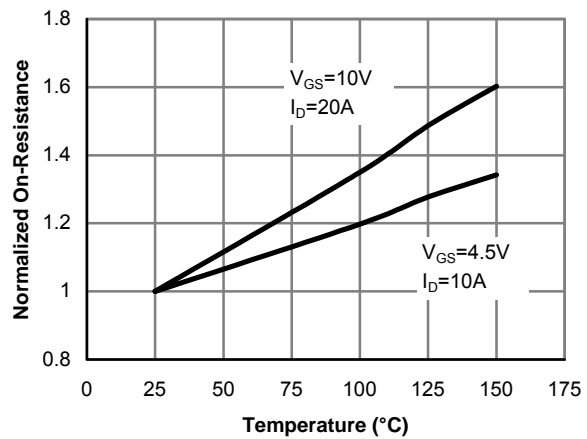


Figure 4: On-Resistance vs. Junction Temperature

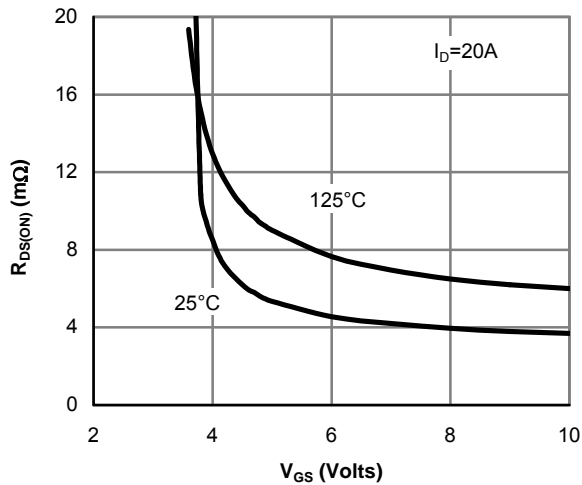


Figure 5: On-Resistance vs. Gate-Source Voltage

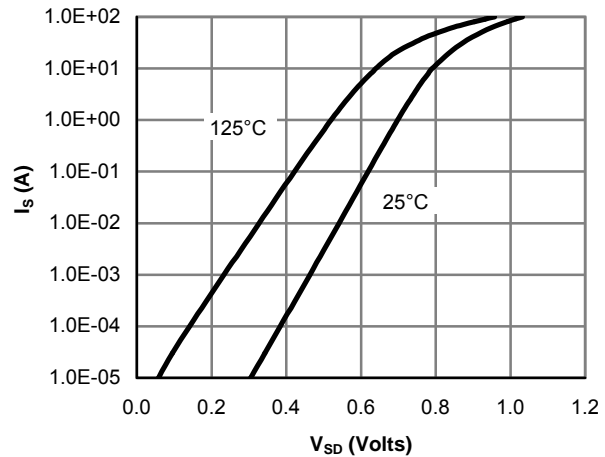


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

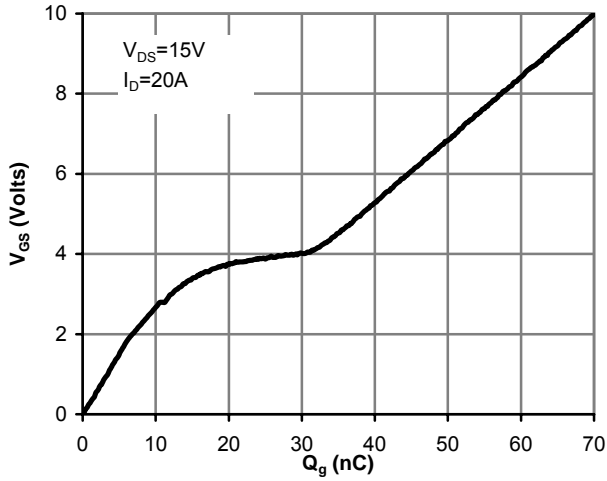


Figure 7: Gate-Charge Characteristics

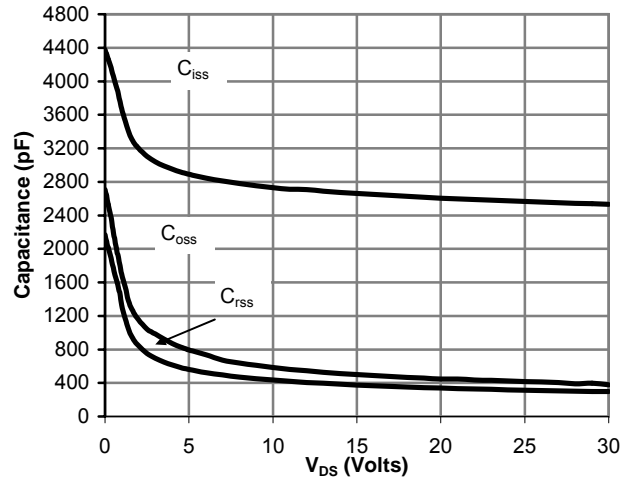


Figure 8: Capacitance Characteristics

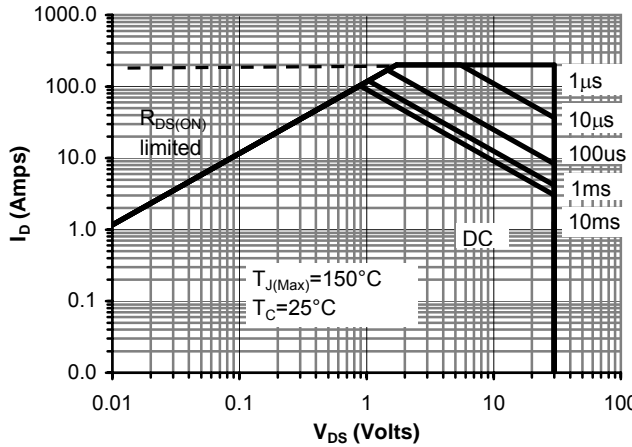


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

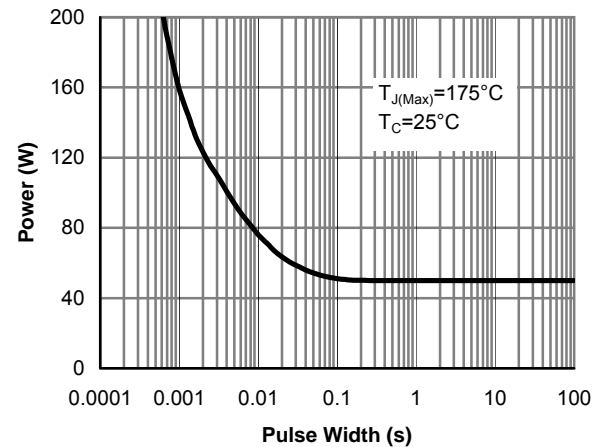


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

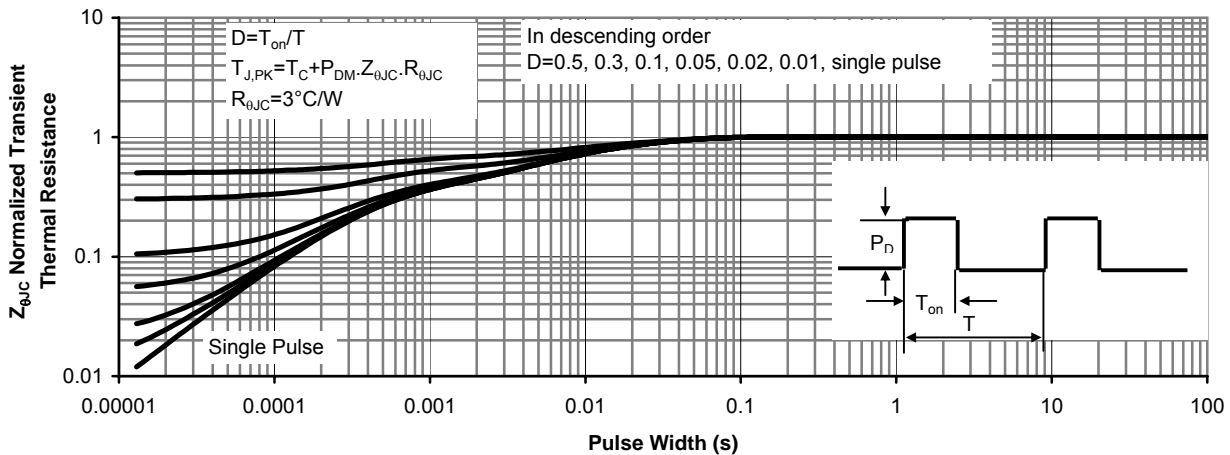


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

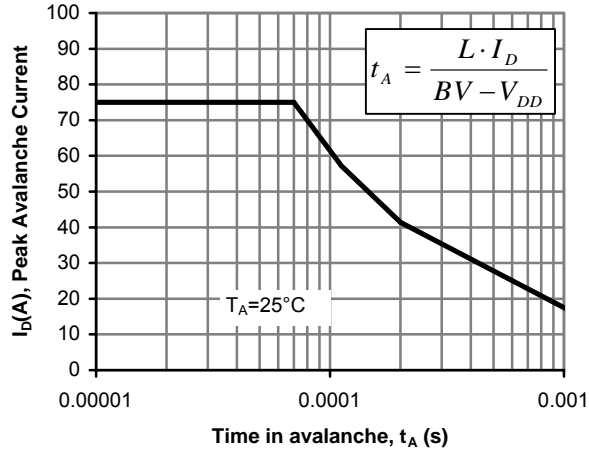


Figure 12: Single Pulse Avalanche capability

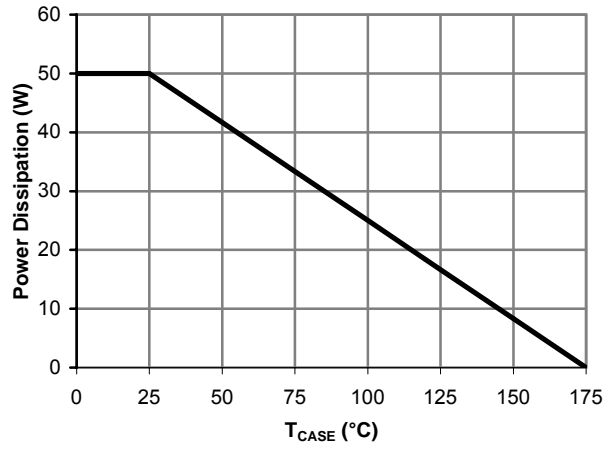


Figure 13: Power De-rating (Note B)

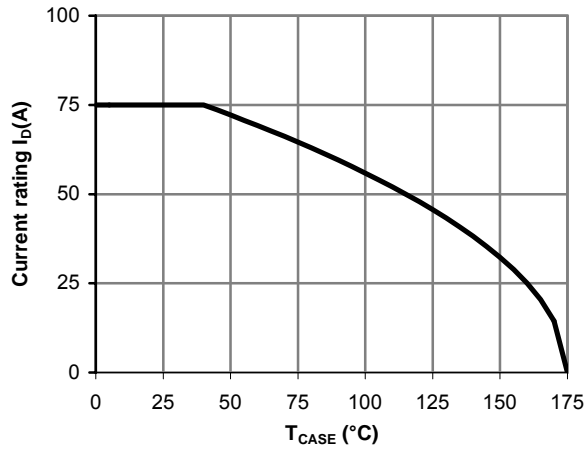


Figure 14: Current De-rating (Note B)

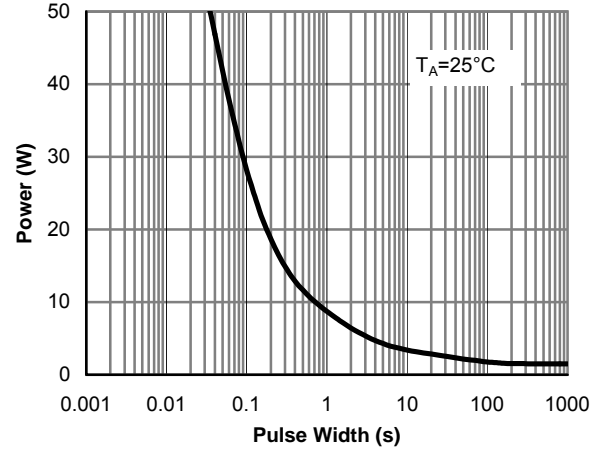


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

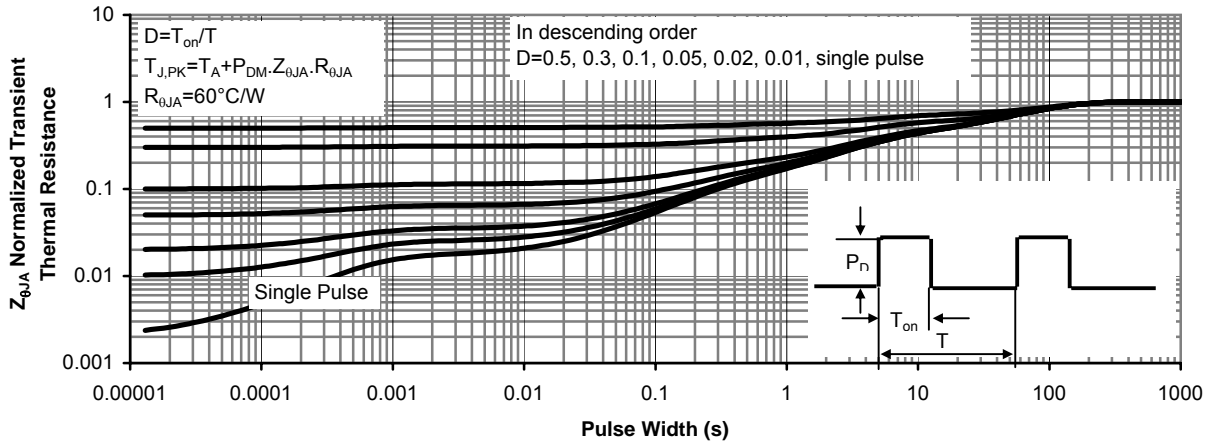


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)