

General Description

- Trench Power AlphaMOS-II technology
- Low $R_{DS(ON)}$
- Low C_{iss} and C_{rss}
- High Current Capability
- RoHS and Halogen Free Compliant

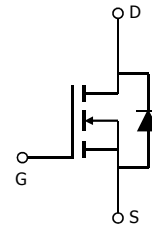
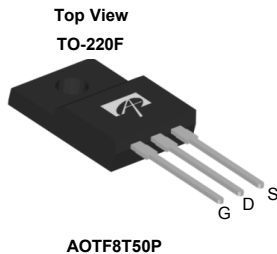
Applications

- General Lighting for LED and CCFL
- AC/DC Power supplies for Industrial, Consumer, and Telecom

Product Summary

| | |
|----------------------|-----------------|
| $V_{DS} @ T_{j,max}$ | 600V |
| I_{DM} | 32A |
| $R_{DS(ON),max}$ | < 0.81 Ω |
| $Q_{g,typ}$ | 13nC |
| $E_{oss} @ 400V$ | 2.5 μ J |

100% UIS Tested
 100% R_g Tested



| Orderable Part Number | Package Type | Form | Minimum Order Quantity |
|-----------------------|-----------------|------|------------------------|
| AOTF8T50P | TO-220F Pb Free | Tube | 1000 |
| AOTF8T50PL | TO-220F Green | Tube | 1000 |

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

| Parameter | Symbol | AOTF8T50P | AOTF8T50PL | Units |
|--|----------------|---------------------------------|------------|------------------|
| Drain-Source Voltage | V_{DS} | 500 | | V |
| Gate-Source Voltage | V_{GS} | ± 30 | | V |
| Continuous Drain Current | I_D | $T_C=25^\circ\text{C}$ | 8* | 8* |
| | | $T_C=100^\circ\text{C}$ | 5.4* | 5.4* |
| Pulsed Drain Current ^C | I_{DM} | 32 | | A |
| Avalanche Current ^C $L=1\text{mH}$ | I_{AR} | 8 | | A |
| Repetitive avalanche energy ^C | E_{AR} | 32 | | mJ |
| Single pulsed avalanche energy ^G | E_{AS} | 421 | | mJ |
| MOSFET dv/dt ruggedness | dv/dt | 50 | | V/ns |
| Peak diode recovery dv/dt ^J | | 15 | | |
| Power Dissipation ^B | P_D | $T_C=25^\circ\text{C}$ | 38 | 28 |
| | | Derate above 25°C | 0.3 | 0.2 |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 150 | | $^\circ\text{C}$ |
| Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds | T_L | 300 | | $^\circ\text{C}$ |

Thermal Characteristics

| Parameter | Symbol | AOTF8T50P | AOTF8T50PL | Units |
|--|-----------------|-----------|------------|---------------------------|
| Maximum Junction-to-Ambient ^{A,D} | $R_{\theta JA}$ | 65 | 65 | $^\circ\text{C}/\text{W}$ |
| Maximum Junction-to-Case | $R_{\theta JC}$ | 3.3 | 4.5 | $^\circ\text{C}/\text{W}$ |

* Drain current limited by maximum junction temperature.

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|------------------------------------|---|--|-----|------|------|-------|
| STATIC PARAMETERS | | | | | | |
| BV _{DSS} | Drain-Source Breakdown Voltage | I _D =250μA, V _{GS} =0V, T _J =25°C | 500 | | | V |
| | | I _D =250μA, V _{GS} =0V, T _J =150°C | | 600 | | |
| BV _{DSS} /ΔT _J | Breakdown Voltage Temperature Coefficient | I _D =250μA, V _{GS} =0V | | 0.47 | | V/°C |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} =500V, V _{GS} =0V | | | 1 | μA |
| | | V _{DS} =400V, T _J =125°C | | | 10 | |
| I _{GSS} | Gate-Body leakage current | V _{DS} =0V, V _{GS} =±30V | | | ±100 | nA |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =5V, I _D =250μA | 3 | 3.9 | 5 | V |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =10V, I _D =4A | | 0.6 | 0.81 | Ω |
| g _{FS} | Forward Transconductance | V _{DS} =40V, I _D =4A | | 6.5 | | S |
| V _{SD} | Diode Forward Voltage | I _S =1A, V _{GS} =0V | | 0.76 | 1 | V |
| I _S | Maximum Body-Diode Continuous Current | | | | 8 | A |
| I _{SM} | Maximum Body-Diode Pulsed Current ^C | | | | 32 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =100V, f=1MHz | | 905 | | pF |
| C _{oss} | Output Capacitance | | | | 42 | |
| C _{o(er)} | Effective output capacitance, energy related ^H | V _{GS} =0V, V _{DS} =0 to 400V, f=1MHz | | 31 | | pF |
| C _{o(tr)} | Effective output capacitance, time related ^I | | | | 56 | |
| C _{rss} | Reverse Transfer Capacitance | V _{GS} =0V, V _{DS} =100V, f=1MHz | | 3.5 | | pF |
| R _g | Gate resistance | f=1MHz | | 2 | | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _g | Total Gate Charge | V _{GS} =10V, V _{DS} =400V, I _D =8A | | 13 | 19 | nC |
| Q _{gs} | Gate Source Charge | | | 4.4 | | nC |
| Q _{gd} | Gate Drain Charge | | | 3.4 | | nC |
| t _{D(on)} | Turn-On DelayTime | V _{GS} =10V, V _{DS} =250V, I _D =8A, R _G =25Ω | | 23 | | ns |
| t _r | Turn-On Rise Time | | | 33 | | ns |
| t _{D(off)} | Turn-Off DelayTime | | | 34 | | ns |
| t _f | Turn-Off Fall Time | | | 21 | | ns |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =8A, di/dt=100A/μs, V _{DS} =100V | | 340 | | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =8A, di/dt=100A/μs, V _{DS} =100V | | 3.5 | | μC |

A. The value of R_{θJA} is measured with the device in a still air environment with T_A=25°C.

B. The power dissipation P_D is based on T_{J(MAX)}=150°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)}=150°C. Ratings are based on low frequency and duty cycles to keep initial T_J=25°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 ms 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)}=150°C. The SOA curve provides a single pulse rating.

G. L=60mH, I_{AS}=3.75A, V_{DD}=150V, R_G=25Ω, Starting T_J=25°C.

H. C_{o(er)} is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 80% V_{(BR)DSS}.

I. C_{o(tr)} is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{(BR)DSS}.

J. I_{SD}≤I_D, di/dt≤200A/μs, V_{DD}=400V, T_J≤T_{J(MAX)}.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

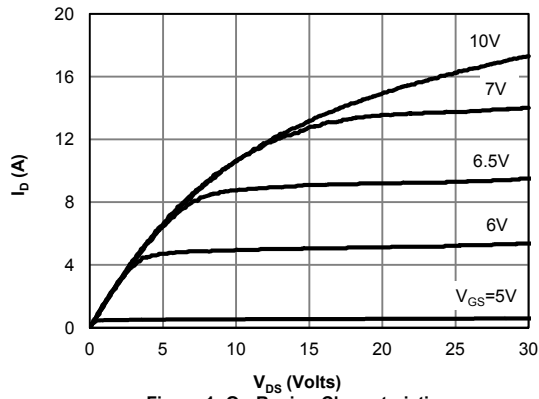


Figure 1: On-Region Characteristics

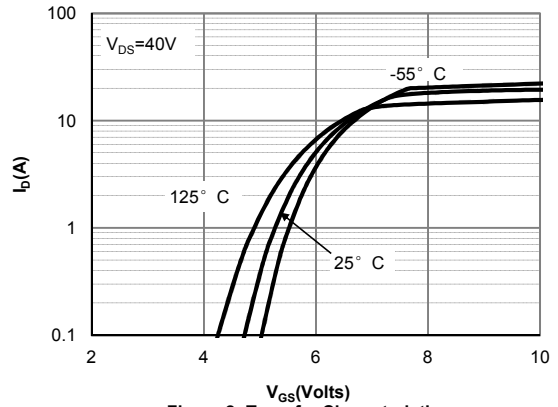


Figure 2: Transfer Characteristics

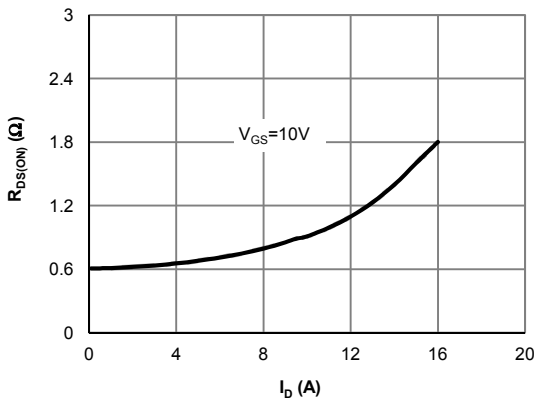


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

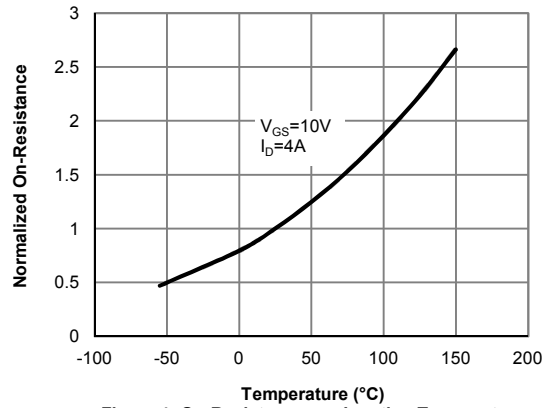


Figure 4: On-Resistance vs. Junction Temperature

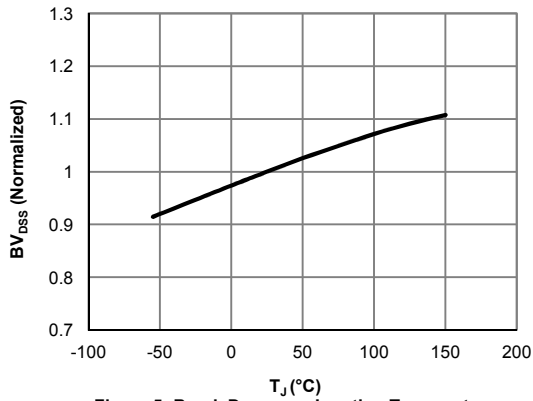


Figure 5: Break Down vs. Junction Temperature

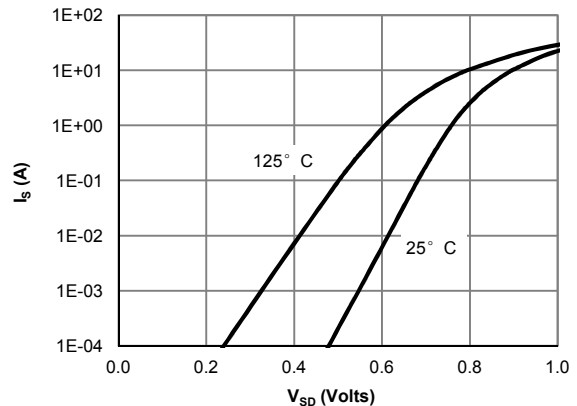


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

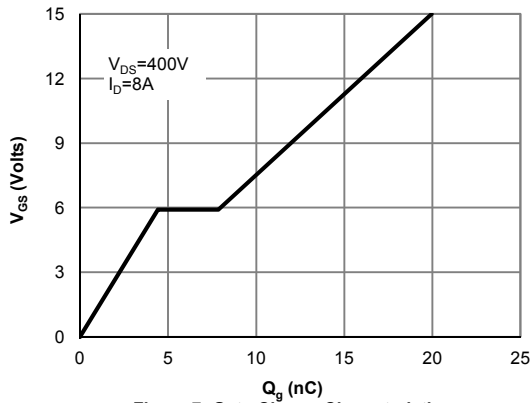


Figure 7: Gate-Charge Characteristics

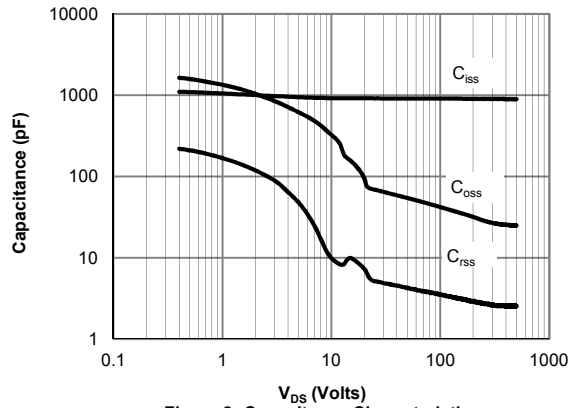


Figure 8: Capacitance Characteristics

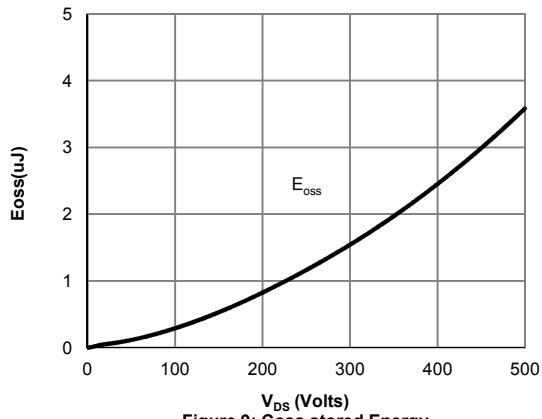


Figure 9: Coss stored Energy

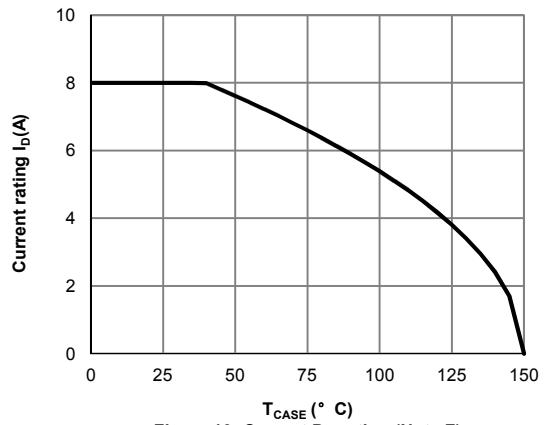


Figure 10: Current De-rating (Note F)

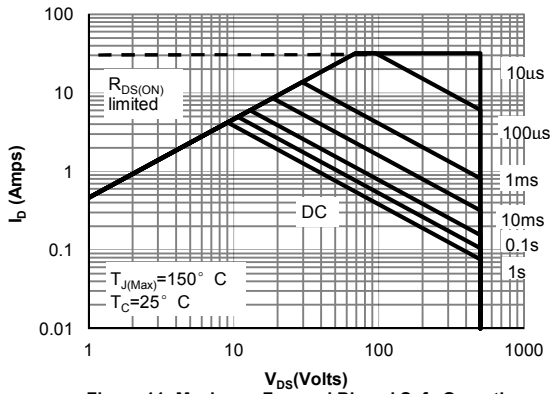


Figure 11: Maximum Forward Biased Safe Operating Area for TO-220F Pb Free (Note F)

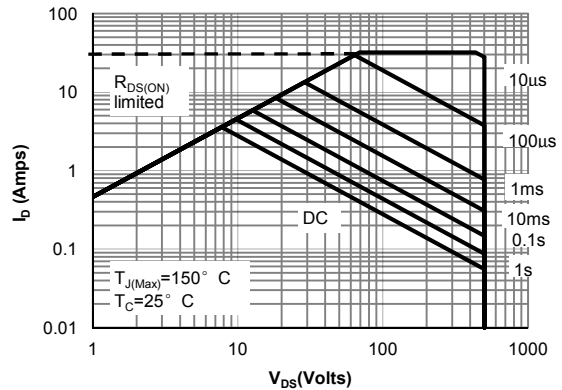


Figure 12: Maximum Forward Biased Safe Operating Area for TO-220F Green (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

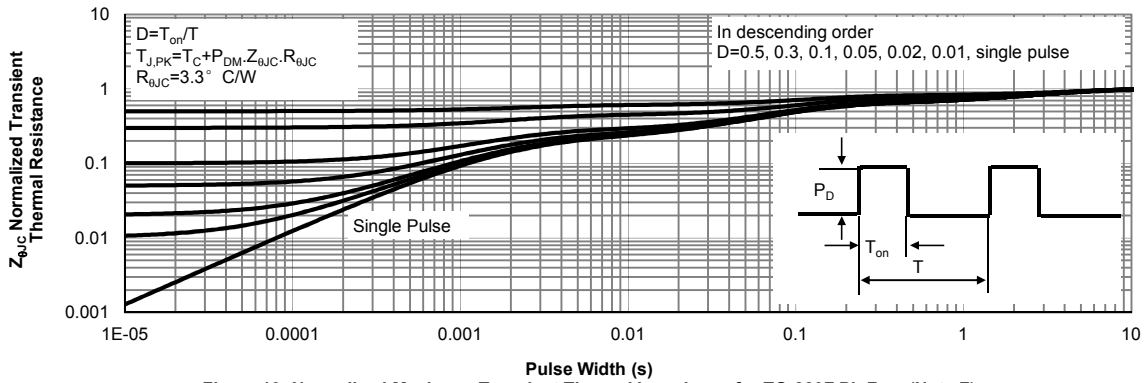


Figure 13: Normalized Maximum Transient Thermal Impedance for TO-220F Pb Free (Note F)

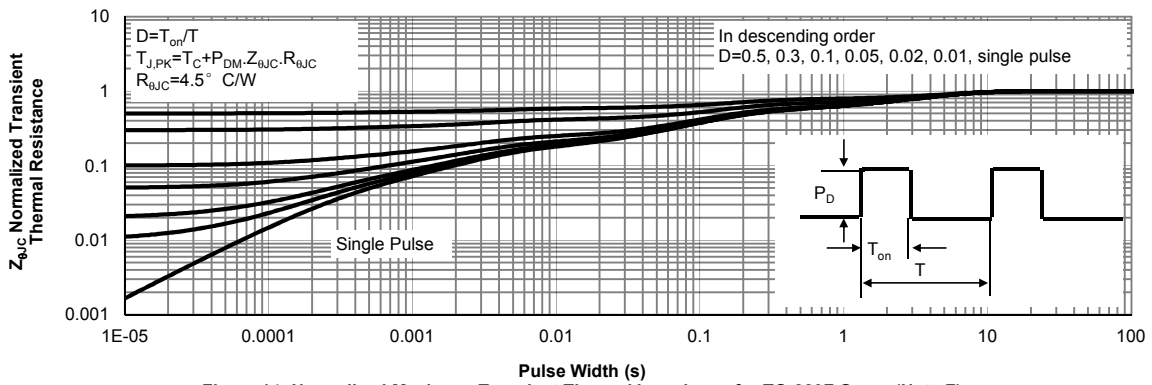
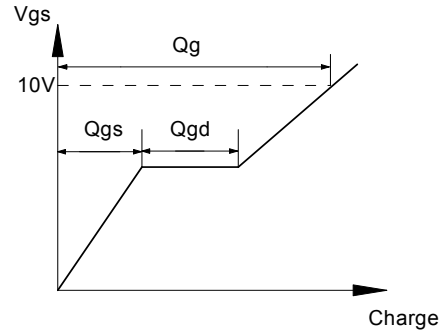
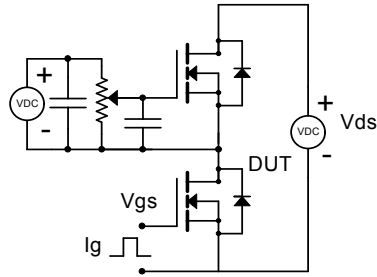
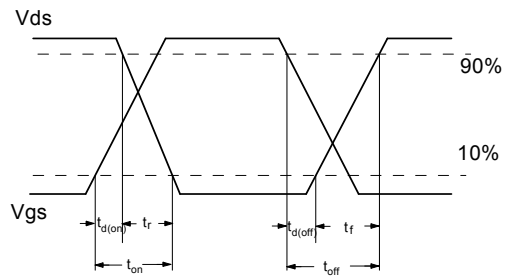
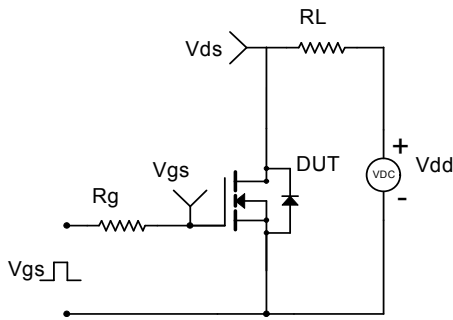


Figure 14: Normalized Maximum Transient Thermal Impedance for TO-220F Green (Note F)

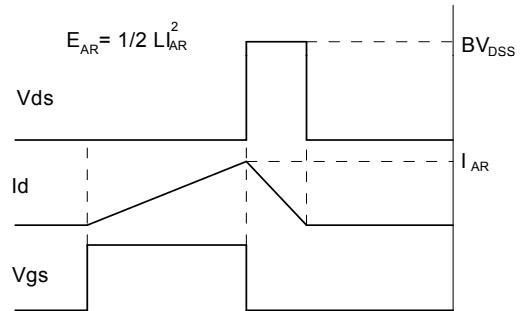
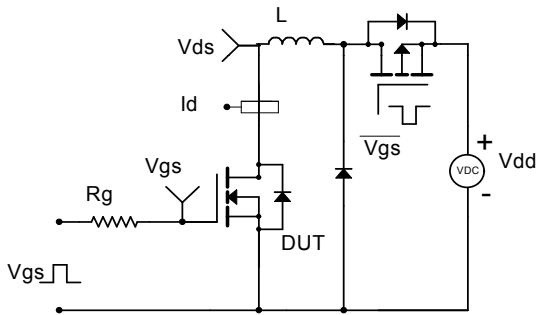
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

