

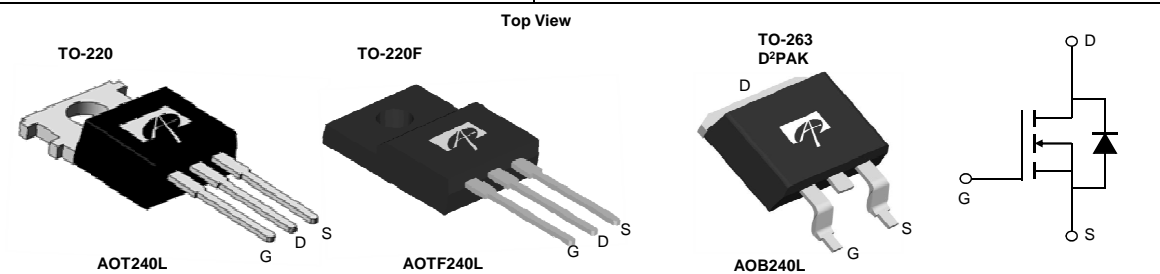
General Description

The AOT240L & AOB240L & AOTF240L uses Trench MOSFET technology that is uniquely optimized to provide the most efficient high frequency switching performance. Power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and C_{rss} .

Product Summary

| | |
|----------------------------------|--------------------------------------|
| V_{DS} | 40V |
| I_D (at $V_{GS}=10V$) | 105A/85A |
| $R_{DS(ON)}$ (at $V_{GS}=10V$) | < 2.9m Ω (< 2.6m Ω^*) |
| $R_{DS(ON)}$ (at $V_{GS}=4.5V$) | < 3.7m Ω (< 3.5m Ω^*) |

100% UIS Tested
 100% R_g Tested



| Orderable Part Number | Package Type | Form | Minimum Order Quantity |
|-----------------------|--------------|-------------|------------------------|
| AOT240L | TO-220 | Tube | 1000 |
| AOB240L | TO-263 | Tape & Reel | 800 |
| AOTF240L | TO-220F | Tube | 1000 |

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

| Parameter | Symbol | AOT240L/AOB240L | AOTF240L | Units |
|--|-------------------------|-----------------|----------|------------------|
| Drain-Source Voltage | V_{DS} | 40 | | V |
| Gate-Source Voltage | V_{GS} | ± 20 | | V |
| Continuous Drain Current ^G | $T_C=25^\circ\text{C}$ | 105 | 85 | A |
| | $T_C=100^\circ\text{C}$ | 82 | 60 | |
| Pulsed Drain Current ^C | I_{DM} | 400 | | A |
| Continuous Drain Current | $T_A=25^\circ\text{C}$ | 20 | | A |
| | $T_A=70^\circ\text{C}$ | 16 | | |
| Avalanche Current ^C | I_{AS} | 68 | | A |
| Avalanche energy $L=0.1\text{mH}$ ^C | E_{AS} | 231 | | mJ |
| Power Dissipation ^B | $T_C=25^\circ\text{C}$ | 176 | 41 | W |
| | $T_C=100^\circ\text{C}$ | 88 | 20 | |
| Power Dissipation ^A | $T_A=25^\circ\text{C}$ | 1.9 | | W |
| | $T_A=70^\circ\text{C}$ | 1.2 | | |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 175 | | $^\circ\text{C}$ |

Thermal Characteristics

| Parameter | Symbol | AOT240L/AOB240L | AOTF240L | Units |
|--|-----------------|-----------------|----------|---------------------------|
| Maximum Junction-to-Ambient ^A | $R_{\theta JA}$ | 15 | 15 | $^\circ\text{C}/\text{W}$ |
| Maximum Junction-to-Ambient ^{A,D} | | 65 | 65 | $^\circ\text{C}/\text{W}$ |
| Maximum Junction-to-Case | $R_{\theta JC}$ | 0.85 | 3.6 | $^\circ\text{C}/\text{W}$ |

* Surface mount package TO263

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 | 40 | | | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} =40V, 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 | 1.7 | 2.2 | V |
| I _{D(ON)} | On state drain current | V _{GS} =10V, V _{DS} =5V | 400 | | | A |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =10V, I _D =20A TO220/TO220F T _J =125°C | | 2.4 | 2.9 | mΩ |
| | | V _{GS} =4.5V, I _D =20A TO220/TO220F | | 3 | 3.7 | |
| | | V _{GS} =10V, I _D =20A TO263 | | 2.1 | 2.6 | mΩ |
| | | V _{GS} =4.5V, I _D =20A TO263 | | 2.7 | 3.5 | mΩ |
| | | | | | | |
| g _{FS} | Forward Transconductance | V _{DS} =5V, I _D =20A | | 78 | | S |
| V _{SD} | Diode Forward Voltage | I _S =1A, V _{GS} =0V | | 0.65 | 1 | V |
| I _S | Maximum Body-Diode Continuous Current ^G | | | | 105 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =20V, f=1MHz | | 3510 | | pF |
| C _{oss} | Output Capacitance | | | 1070 | | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 68 | | pF |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, f=1MHz | 0.5 | 1 | 1.5 | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _g (10V) | Total Gate Charge | V _{GS} =10V, V _{DS} =20V, I _D =20A | | 49 | 72 | nC |
| Q _g (4.5V) | Total Gate Charge | | | 22 | 32 | nC |
| Q _{gs} | Gate Source Charge | | | 9 | | nC |
| Q _{gd} | Gate Drain Charge | | | 7 | | nC |
| t _{D(on)} | Turn-On DelayTime | V _{GS} =10V, V _{DS} =20V, R _L =1Ω, R _{GEN} =3Ω | | 11 | | ns |
| t _r | Turn-On Rise Time | | | 10 | | ns |
| t _{D(off)} | Turn-Off DelayTime | | | 38 | | ns |
| t _f | Turn-Off Fall Time | | | 11 | | ns |
| t _{rr} | Body Diode Reverse Recovery Time | | I _F =20A, di/dt=500A/μs | | 21 | |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =20A, di/dt=500A/μs | | 58 | | 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_{DSM} 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. 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 <300μs 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. The SOA curve provides a single pulse rating.

G. The maximum current limited by package.

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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

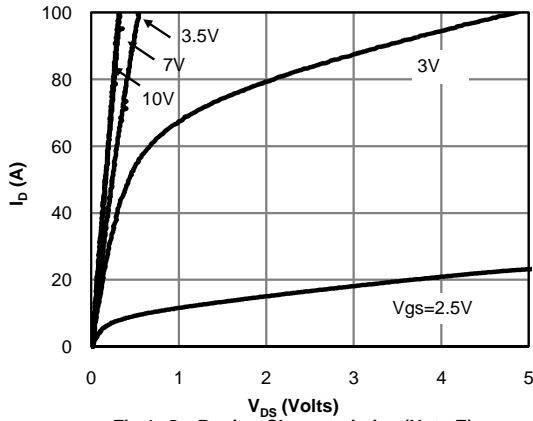


Fig 1: On-Region Characteristics (Note E)

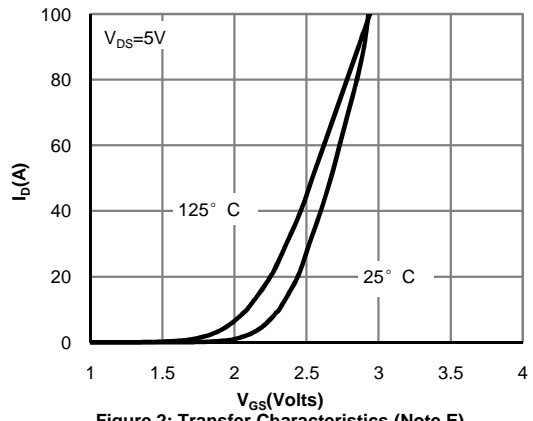


Figure 2: Transfer Characteristics (Note E)

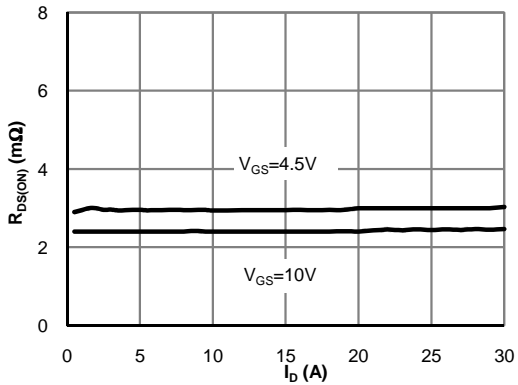


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

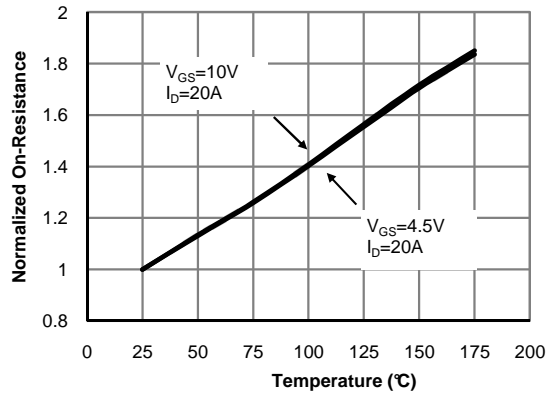


Figure 4: On-Resistance vs. Junction Temperature (Note E)

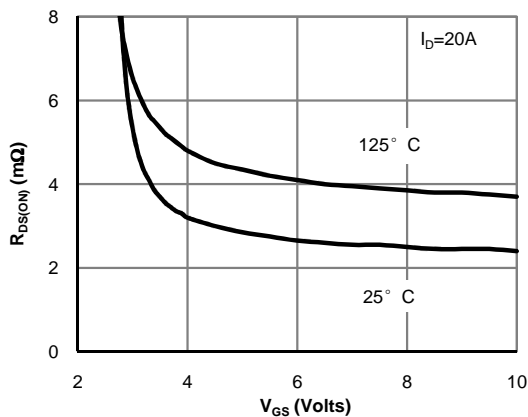


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

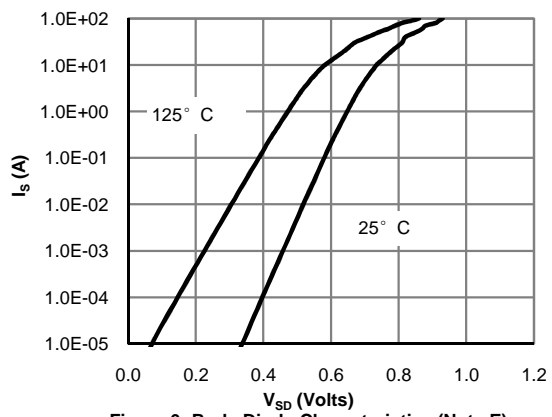


Figure 6: Body-Diode Characteristics (Note E)

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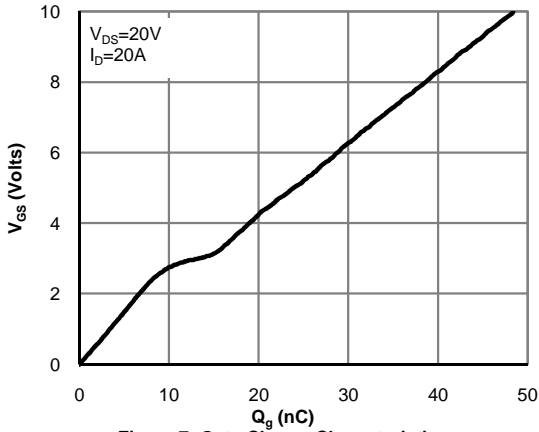


Figure 7: Gate-Charge Characteristics

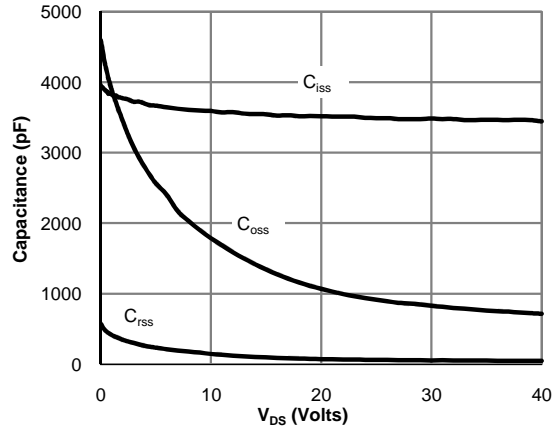


Figure 8: Capacitance Characteristics

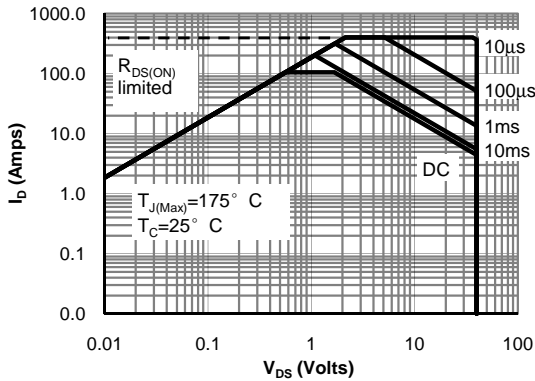


Figure 9: Maximum Forward Biased Safe Operating Area for AOT240L and AOB240L (Note F)

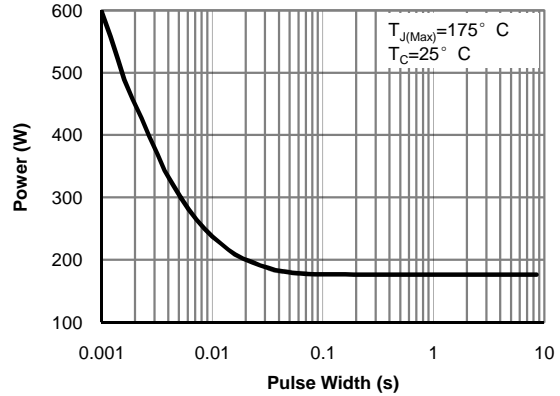


Figure 10: Single Pulse Power Rating Junction-to-Case for AOT240L and AOB240L (Note F)

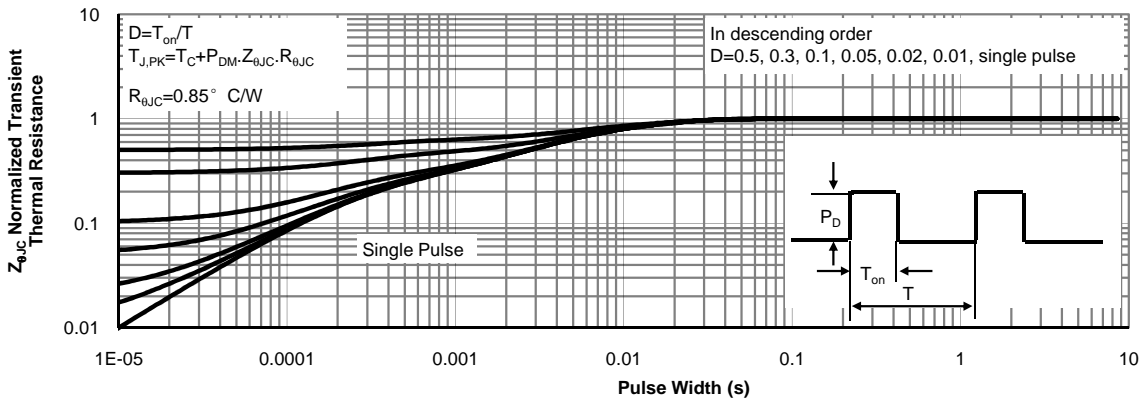


Figure 11: Normalized Maximum Transient Thermal Impedance for AOT240L and AOB240L (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

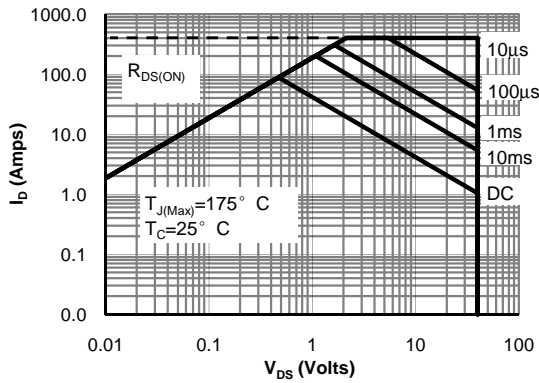


Figure 12: Maximum Forward Biased Safe Operating Area for AOTF240L

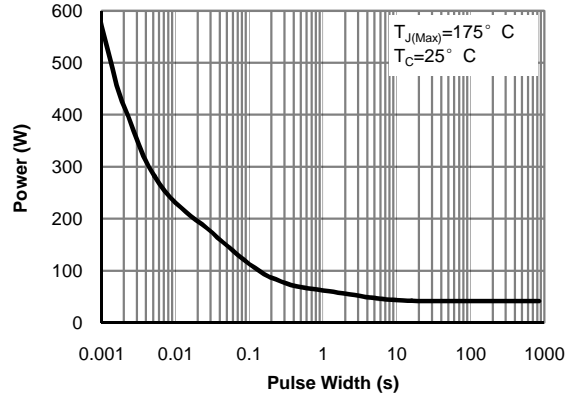


Figure 13: Single Pulse Power Rating Junction-to-Case for AOTF240L (Note F)

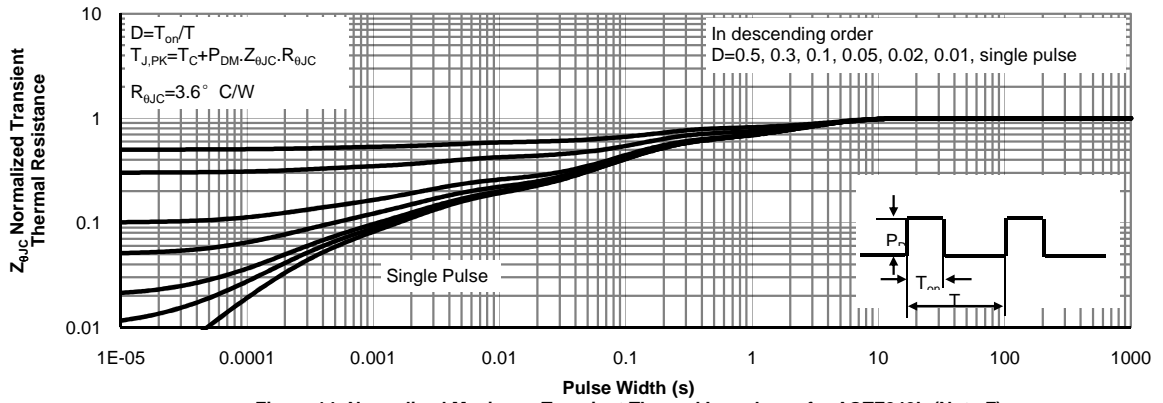


Figure 14: Normalized Maximum Transient Thermal Impedance for AOTF240L (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

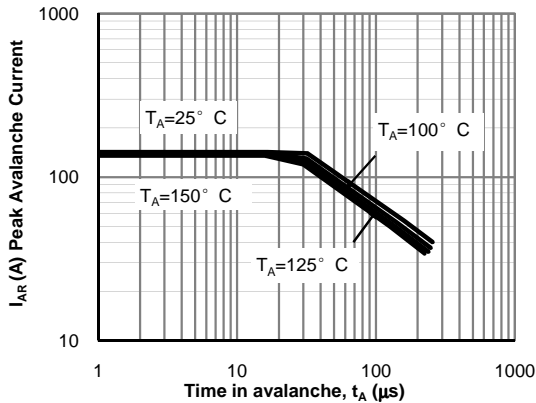


Figure 15: Single Pulse Avalanche capability (Note C)

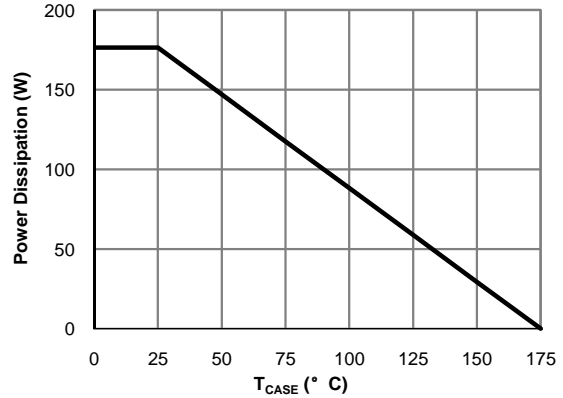


Figure 16: Power De-rating (Note F)

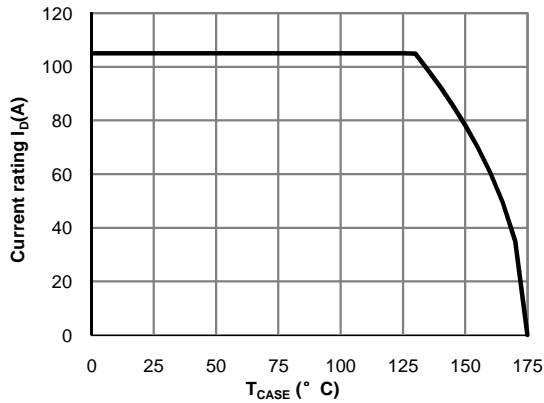


Figure 17: Current De-rating (Note F)

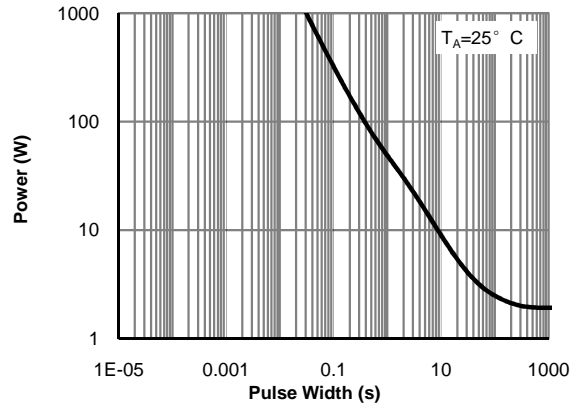


Figure 18: Single Pulse Power Rating Junction-to-Ambient (Note H)

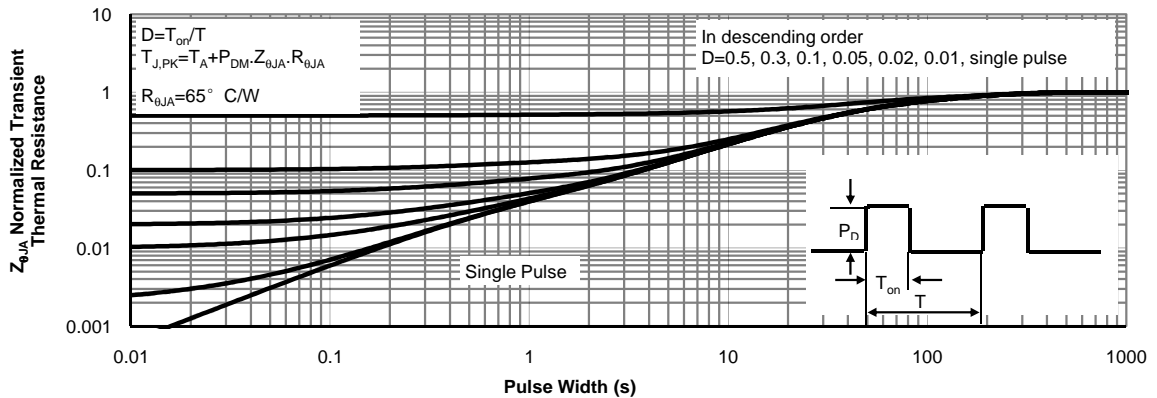
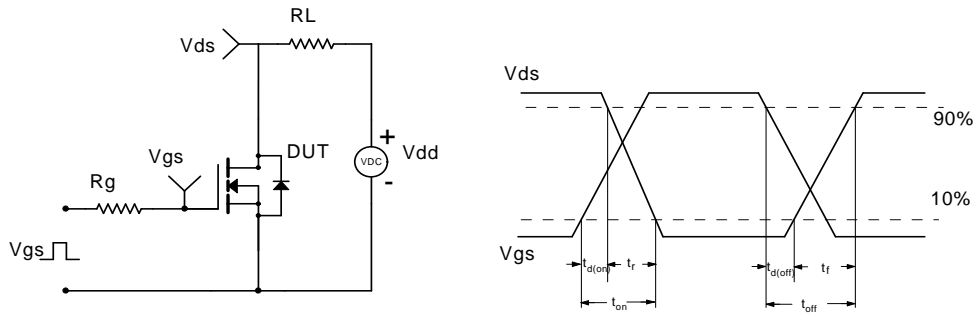


Figure 19: Normalized Maximum Transient Thermal Impedance (Note H)

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

