
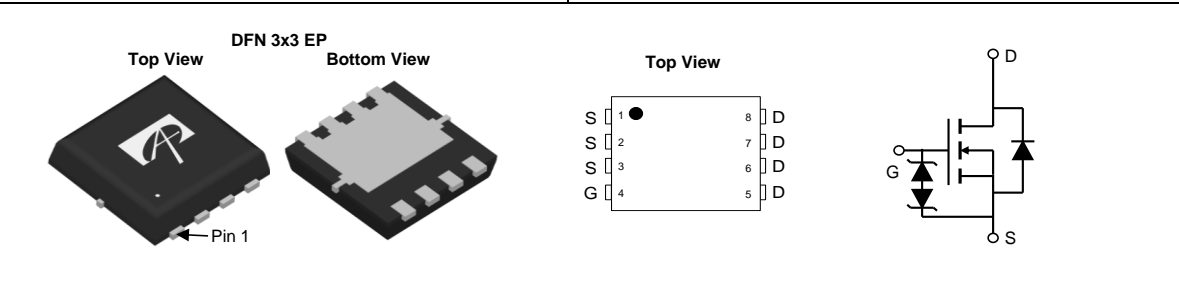


| | | | | | | | | | | | |
|--|---|----------|-----|--------------------------|-----|---------------------------------|---------|----------------------------------|-------|----------------------------------|---------|
| <h3>General Description</h3> <ul style="list-style-type: none"> • Latest Trench Power AlphaMOS (αMOS LV) technology • Very Low $R_{DS(ON)}$ at 2.5V V_{GS} • Low Gate Charge • ESD protection • RoHS and Halogen-Free Compliant <h3>Application</h3> <ul style="list-style-type: none"> • DC/DC Converters | <h3>Product Summary</h3> <table border="0"> <tr> <td>V_{DS}</td> <td>30V</td> </tr> <tr> <td>I_D (at $V_{GS}=10V$)</td> <td>28A</td> </tr> <tr> <td>$R_{DS(ON)}$ (at $V_{GS}=10V$)</td> <td>< 3.3mΩ</td> </tr> <tr> <td>$R_{DS(ON)}$ (at $V_{GS}=4.5V$)</td> <td>< 4mΩ</td> </tr> <tr> <td>$R_{DS(ON)}$ (at $V_{GS}=2.5V$)</td> <td>< 5.8mΩ</td> </tr> </table> <p>Typical ESD protection HBM Class 3B</p> <p>100% UIS Tested 100% R_g Tested</p>  | V_{DS} | 30V | I_D (at $V_{GS}=10V$) | 28A | $R_{DS(ON)}$ (at $V_{GS}=10V$) | < 3.3mΩ | $R_{DS(ON)}$ (at $V_{GS}=4.5V$) | < 4mΩ | $R_{DS(ON)}$ (at $V_{GS}=2.5V$) | < 5.8mΩ |
| V_{DS} | 30V | | | | | | | | | | |
| I_D (at $V_{GS}=10V$) | 28A | | | | | | | | | | |
| $R_{DS(ON)}$ (at $V_{GS}=10V$) | < 3.3mΩ | | | | | | | | | | |
| $R_{DS(ON)}$ (at $V_{GS}=4.5V$) | < 4mΩ | | | | | | | | | | |
| $R_{DS(ON)}$ (at $V_{GS}=2.5V$) | < 5.8mΩ | | | | | | | | | | |



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} | ± 12 | V |
| Continuous Drain Current ^G | I_D | $T_C=25^\circ\text{C}$ | 28 |
| | | $T_C=100^\circ\text{C}$ | 22 |
| Pulsed Drain Current ^C | I_{DM} | 112 | A |
| Continuous Drain Current | I_{DSM} | $T_A=25^\circ\text{C}$ | 25 |
| | | $T_A=70^\circ\text{C}$ | 20 |
| Avalanche Current ^C | I_{AS} | 28 | A |
| Avalanche energy $L=0.05\text{mH}$ ^C | E_{AS} | 20 | mJ |
| V_{DS} Spike | V_{SPIKE} | 36 | V |
| Power Dissipation ^B | P_D | $T_C=25^\circ\text{C}$ | 32 |
| | | $T_C=100^\circ\text{C}$ | 12.8 |
| Power Dissipation ^A | P_{DSM} | $T_A=25^\circ\text{C}$ | 3.1 |
| | | $T_A=70^\circ\text{C}$ | 2 |
| 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 ^A | $R_{\theta JA}$ | 30 | 40 | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient ^{A D} | | 60 | 75 | $^\circ\text{C/W}$ |
| Maximum Junction-to-Case | $R_{\theta JC}$ | 3.1 | 3.9 | $^\circ\text{C/W}$ |

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------------------------|--|--|-----|------------|------------|-------|
| STATIC PARAMETERS | | | | | | |
| BV _{DSS} | Drain-Source Breakdown Voltage | ID=250μA, V _{GS} =0V | 30 | | | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} =30V, V _{GS} =0V T _J =125°C | | | 1 5 | μA |
| I _{GSS} | Gate-Body leakage current | V _{DS} =0V, V _{GS} =±10V | | | ±10 | μA |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D =250μA | 0.4 | 0.8 | 1.2 | V |
| R _{DS(on)} | Static Drain-Source On-Resistance | V _{GS} =10V, I _D =20A T _J =125°C | | 2.6 3.6 | 3.3 4.5 | mΩ |
| | | V _{GS} =4.5V, I _D =18A | | 3 | 4 | mΩ |
| | | V _{GS} =2.5V, I _D =16A | | 4.4 | 5.8 | mΩ |
| g _{FS} | Forward Transconductance | V _{DS} =5V, I _D =20A | | 103 | | S |
| V _{SD} | Diode Forward Voltage | I _S =1A, V _{GS} =0V | | 0.62 | 1 | V |
| I _S | Maximum Body-Diode Continuous Current ^G | | | | 28 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =15V, f=1MHz | | 2250 | | pF |
| C _{oss} | Output Capacitance | | | 800 | | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 65 | | pF |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, f=1MHz | 1.5 | 3.0 | 4.5 | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _{g(10V)} | Total Gate Charge | V _{GS} =10V, V _{DS} =15V, I _D =20A | | 37 | 50 | nC |
| Q _{g(4.5V)} | Total Gate Charge | | | 16 | 22 | nC |
| Q _{gs} | Gate Source Charge | | | 3.2 | | nC |
| Q _{gd} | Gate Drain Charge | | | 5.2 | | nC |
| t _{D(on)} | Turn-On DelayTime | V _{GS} =10V, V _{DS} =15V, R _L =0.75Ω, R _{GEN} =3Ω | | 5 | | ns |
| t _r | Turn-On Rise Time | | | 3 | | ns |
| t _{D(off)} | Turn-Off DelayTime | | | 47.5 | | ns |
| t _f | Turn-Off Fall Time | | | 11.3 | | ns |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =20A, dI/dt=500A/μs | | 16 | | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =20A, dI/dt=500A/μs | | 23 | | 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} ≤ 10s and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design.

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. Single pulse width limited by junction temperature T_{J(MAX)}=150° 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)}=150° C. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

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

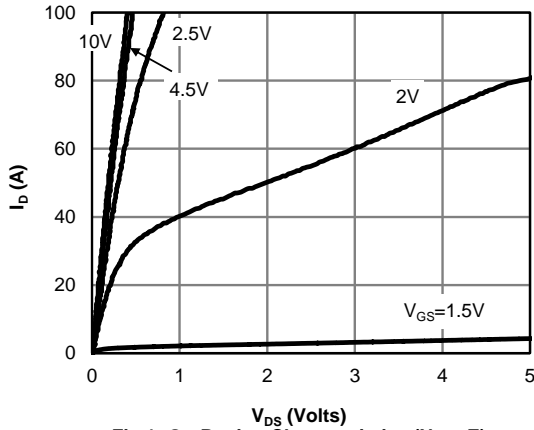


Figure 1: On-Region Characteristics (Note E)

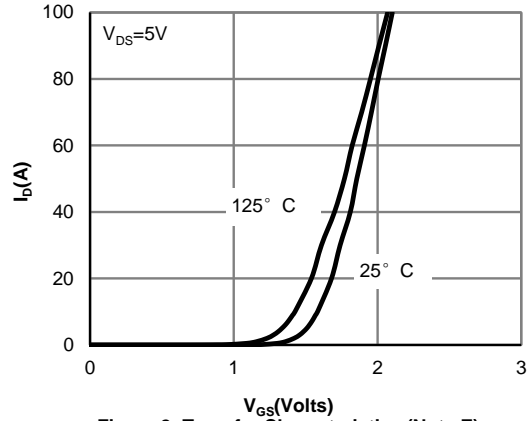


Figure 2: Transfer Characteristics (Note E)

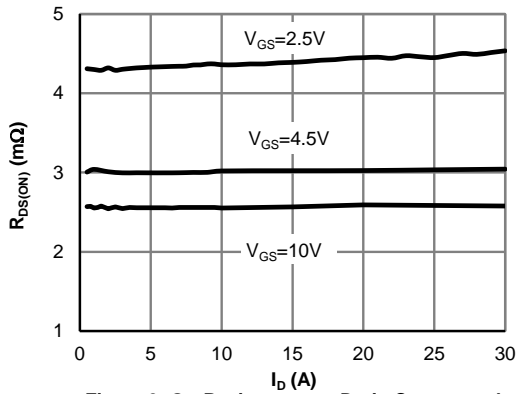


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

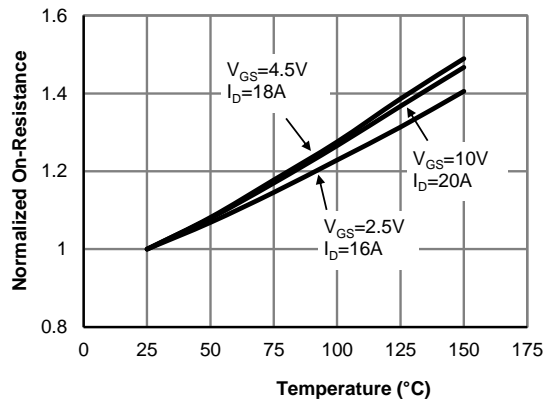


Figure 4: On-Resistance vs. Junction Temperature (Note E)

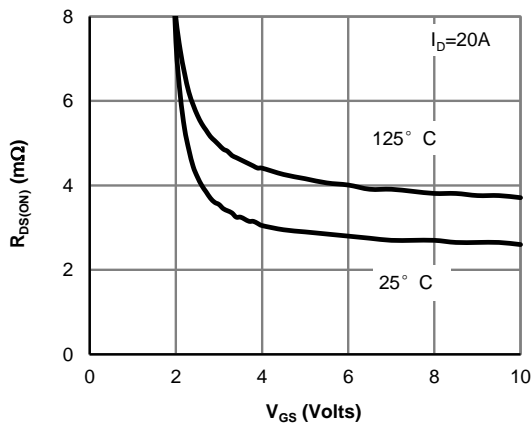


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

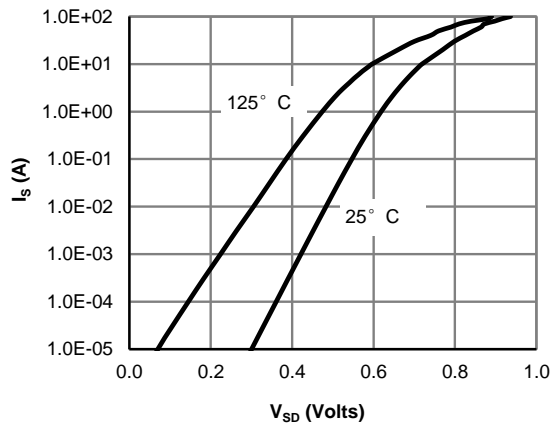


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

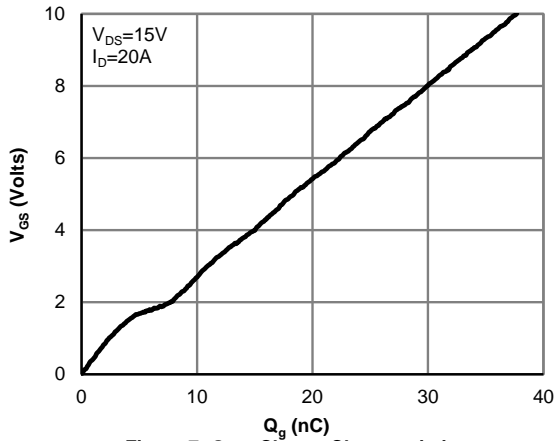


Figure 7: Gate-Charge Characteristics

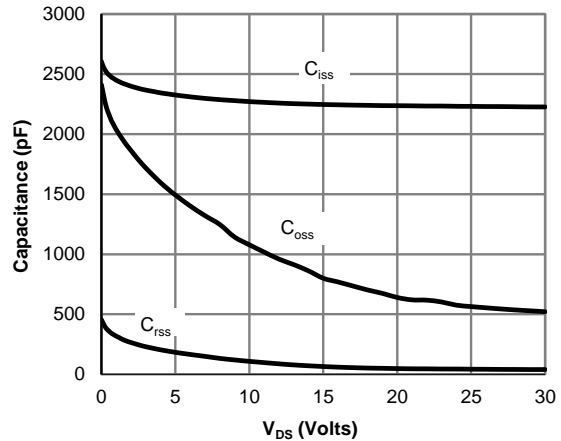


Figure 8: Capacitance Characteristics

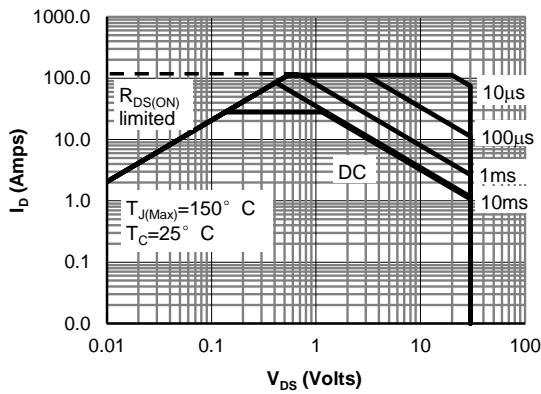


Figure 9: Maximum Forward Biased

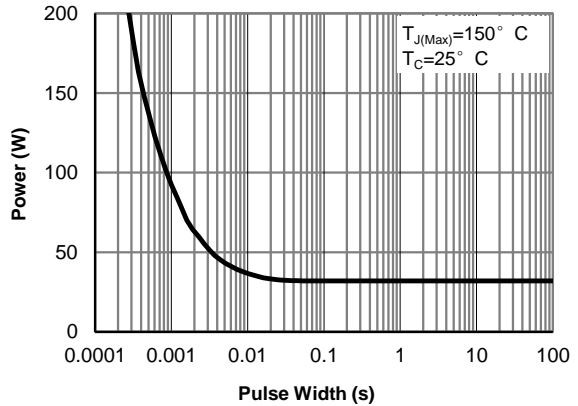


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

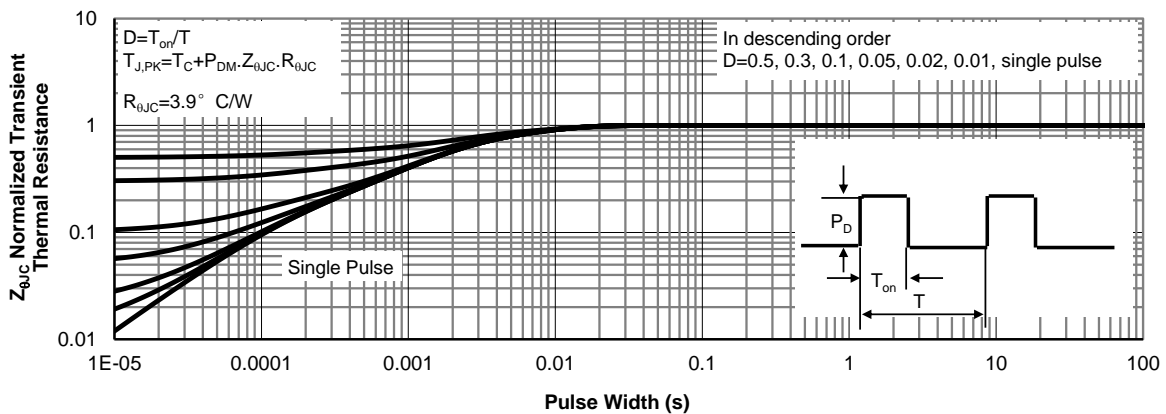


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

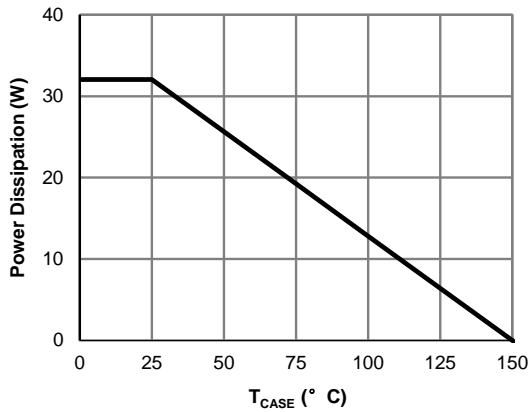


Figure 12: Power De-rating (Note F)

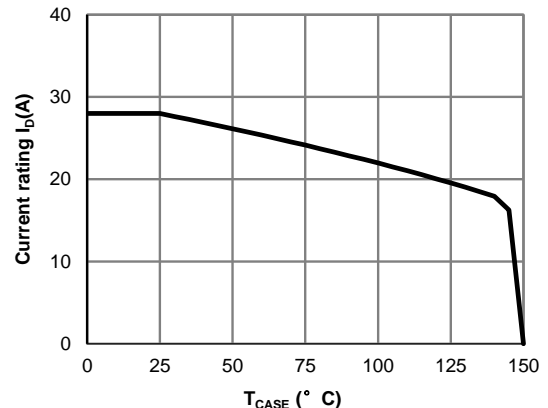


Figure 13: Current De-rating (Note F)

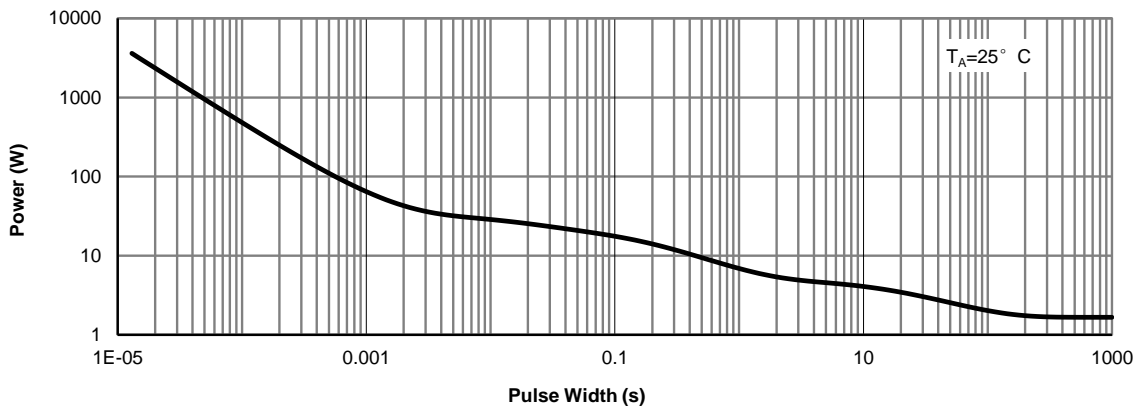


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

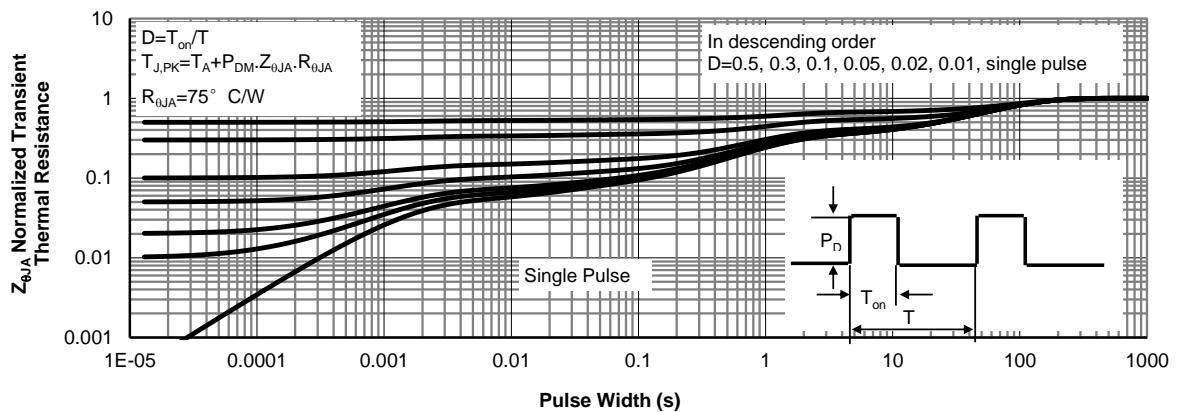
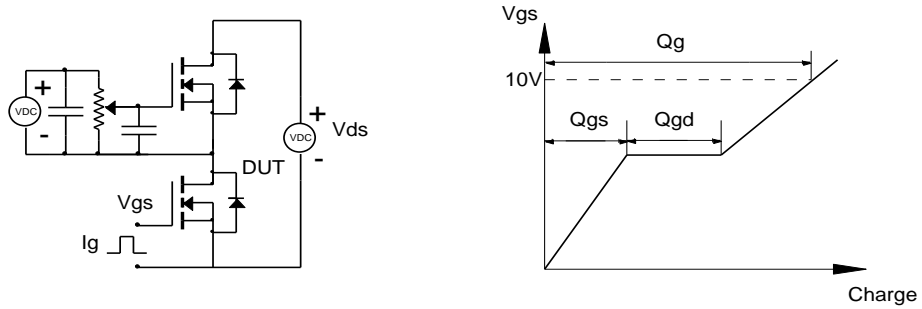
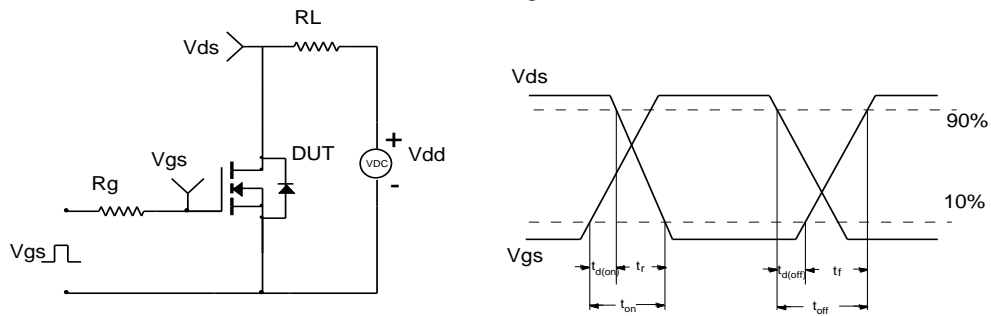


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

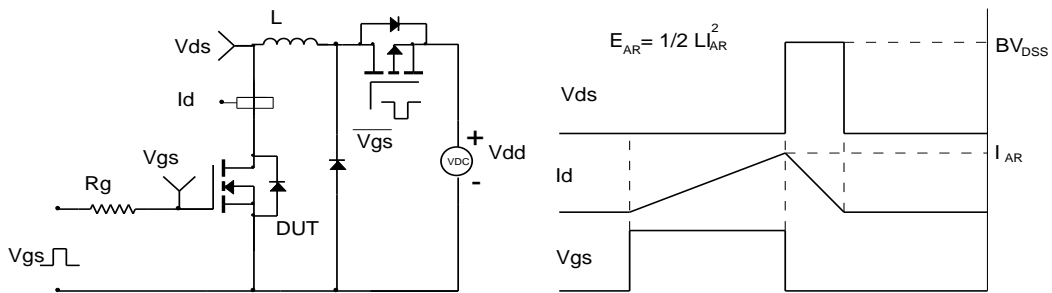
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

