

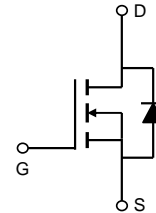
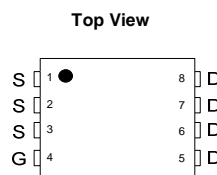
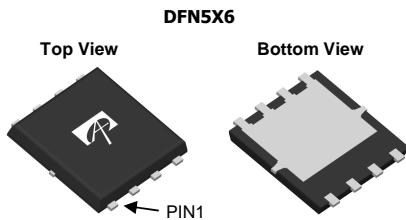
General Description

The AON6414 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

Product Summary

| | |
|------------------------------------|------------------|
| V_{DS} | 30V |
| I_D (at $V_{GS}=10V$) | 30A |
| $R_{DS(ON)}$ (at $V_{GS}=10V$) | < 10.5m Ω |
| $R_{DS(ON)}$ (at $V_{GS} = 4.5V$) | < 17m Ω |

100% UIS Tested
 100% R_g Tested



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 | $T_C=25^\circ\text{C}$ | 30 |
| | | $T_C=100^\circ\text{C}$ | 28 |
| Pulsed Drain Current ^C | I_{DM} | 120 | A |
| Continuous Drain Current | I_{DSM} | $T_A=25^\circ\text{C}$ | 11 |
| | | $T_A=70^\circ\text{C}$ | 9 |
| Avalanche Current ^C | I_{AS}, I_{AR} | 30 | A |
| Avalanche energy $L=0.1\text{mH}$ ^C | E_{AS}, E_{AR} | 135 | mJ |
| Power Dissipation ^B | P_D | $T_C=25^\circ\text{C}$ | 36 |
| | | $T_C=100^\circ\text{C}$ | 14 |
| Power Dissipation ^A | P_{DSM} | $T_A=25^\circ\text{C}$ | 2 |
| | | $T_A=70^\circ\text{C}$ | 1.3 |
| 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 | $R_{\theta JA}$ | 24 | 30 | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient ^{A D} | | | | |
| Maximum Junction-to-Case | $R_{\theta JC}$ | 2.6 | 3.5 | $^\circ\text{C/W}$ |

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------------------------|---------------------------------------|---|-----|------|-----------|------------------|
| STATIC PARAMETERS | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$ | 30 | | | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=30\text{V}$, $V_{GS}=0\text{V}$ $T_J=125^\circ\text{C}$ | | | 1 5 | μA |
| 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 | $V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$ | 1.3 | 1.9 | 2.5 | V |
| $I_{D(ON)}$ | On state drain current | $V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$ | 120 | | | A |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=10\text{V}$, $I_D=20\text{A}$ $T_J=125^\circ\text{C}$ | | 8.7 | 10.5 | $\text{m}\Omega$ |
| | | $V_{GS}=4.5\text{V}$, $I_D=20\text{A}$ | | 13 | 16 | |
| g_{FS} | Forward Transconductance | $V_{DS}=5\text{V}$, $I_D=20\text{A}$ | | 40 | | S |
| V_{SD} | Diode Forward Voltage | $I_S=1\text{A}$, $V_{GS}=0\text{V}$ | | 0.72 | 1 | V |
| I_S | Maximum Body-Diode Continuous Current | | | | 40 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C_{iss} | Input Capacitance | $V_{GS}=0\text{V}$, $V_{DS}=15\text{V}$, $f=1\text{MHz}$ | | 1000 | 1300 | pF |
| C_{oss} | Output Capacitance | | | 340 | | pF |
| C_{rss} | Reverse Transfer Capacitance | | | 100 | | pF |
| R_g | Gate resistance | $V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$ | | 1.3 | 2.0 | Ω |
| SWITCHING PARAMETERS | | | | | | |
| $Q_g(10\text{V})$ | Total Gate Charge | $V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $I_D=20\text{A}$ | | 18 | 23 | nC |
| $Q_g(4.5\text{V})$ | Total Gate Charge | | | 8.5 | | nC |
| Q_{gs} | Gate Source Charge | | | 3.1 | | nC |
| Q_{gd} | Gate Drain Charge | | | 4.8 | | nC |
| $t_{D(on)}$ | Turn-On Delay Time | $V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $R_L=0.75\Omega$, $R_{GEN}=3\Omega$ | | 5.6 | | ns |
| t_r | Turn-On Rise Time | | | 5.5 | | ns |
| $t_{D(off)}$ | Turn-Off Delay Time | | | 18.5 | | ns |
| t_f | Turn-Off Fall Time | | | 5 | | ns |
| t_{rr} | Body Diode Reverse Recovery Time | $I_F=20\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$ | | 29 | 38 | ns |
| Q_{rr} | Body Diode Reverse Recovery Charge | $I_F=20\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$ | | 24 | | 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 $T_{J(MAX)}=150^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsink is used.

C: Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^\circ\text{C}$.

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 $T_{J(MAX)}=150^\circ\text{C}$.

G: These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The SOA curve provides a single pulse rating.

H: Surface mounted on a 1 in² FR-4 board with 2oz. Copper.

J: Maximum current is limited by bonding wire.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

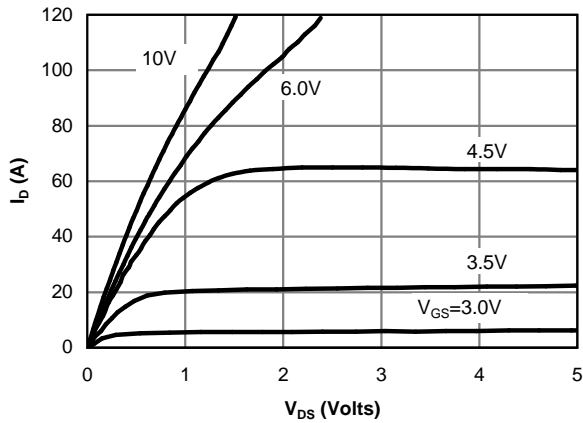


Figure 1: On-Region Characteristics

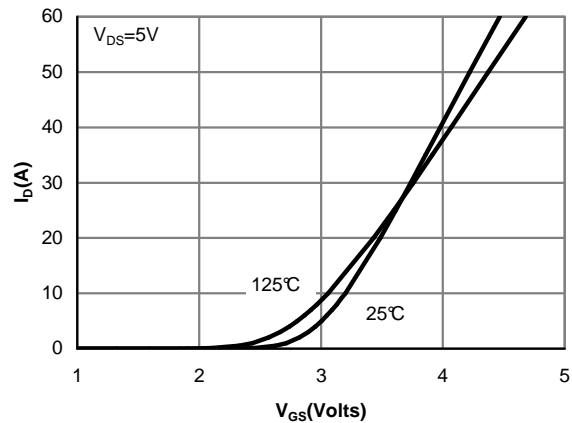


Figure 2: Transfer Characteristics

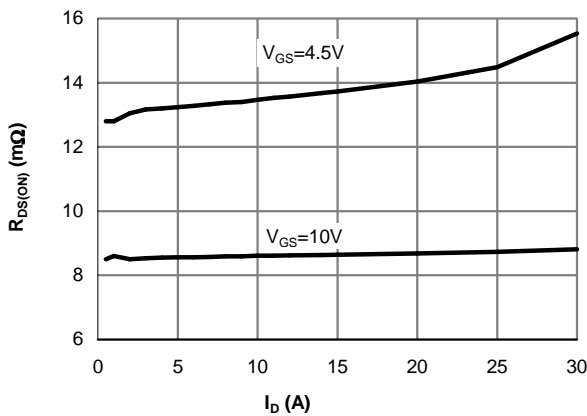


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

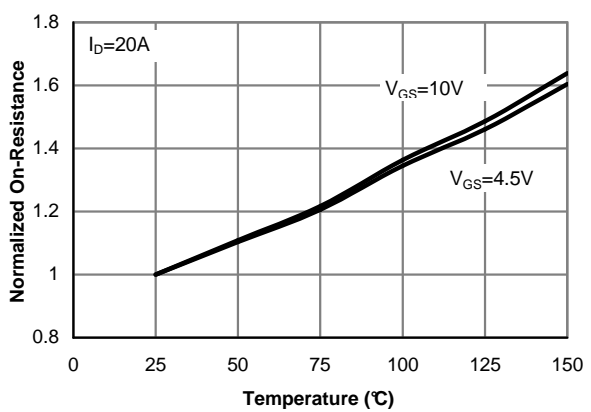


Figure 4: On-Resistance vs. Junction Temperature

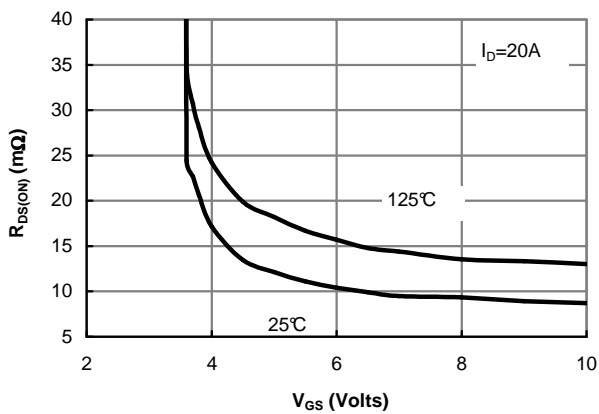


Figure 5: On-Resistance vs. Gate-Source Voltage

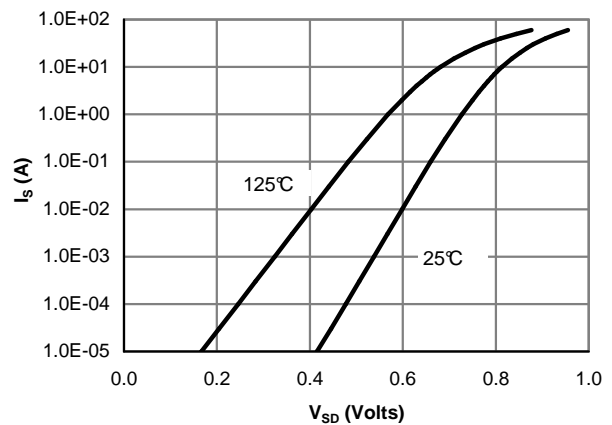


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

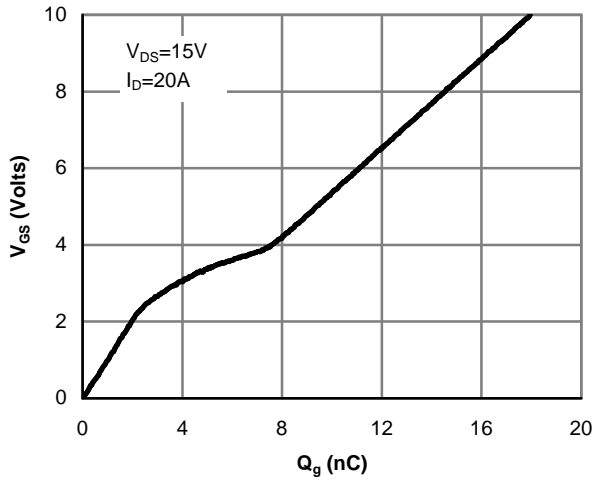


Figure 7: Gate-Charge Characteristics

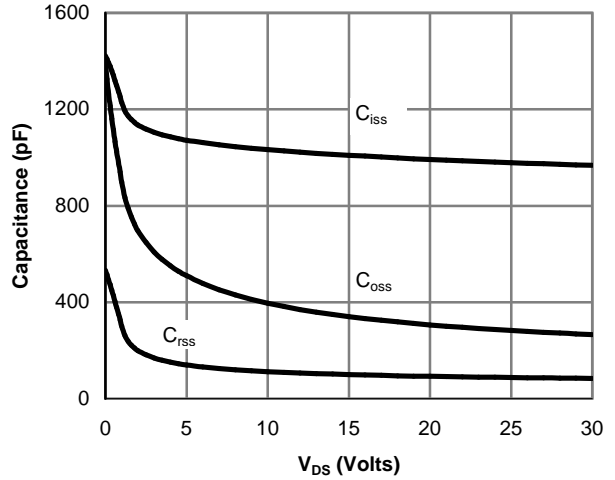


Figure 8: Capacitance Characteristics

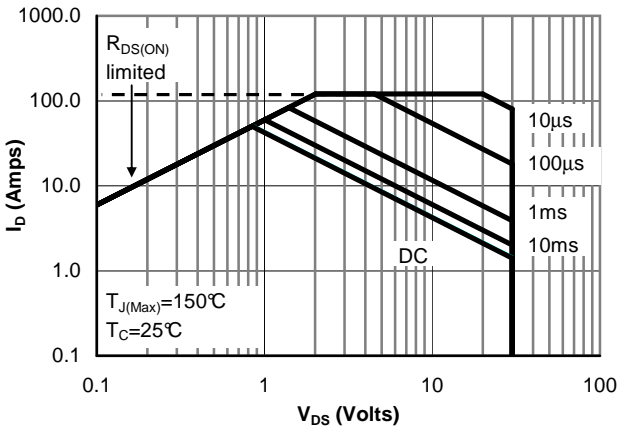


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

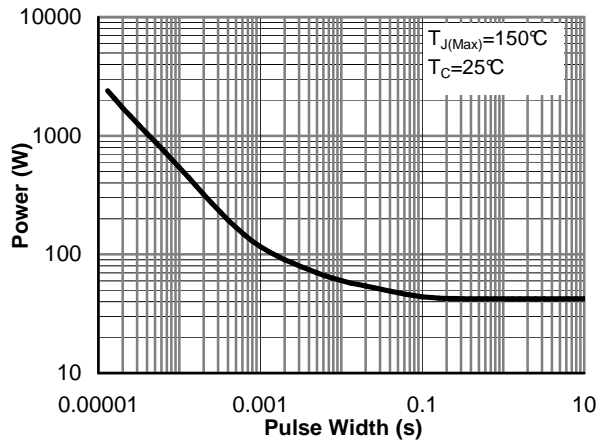


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

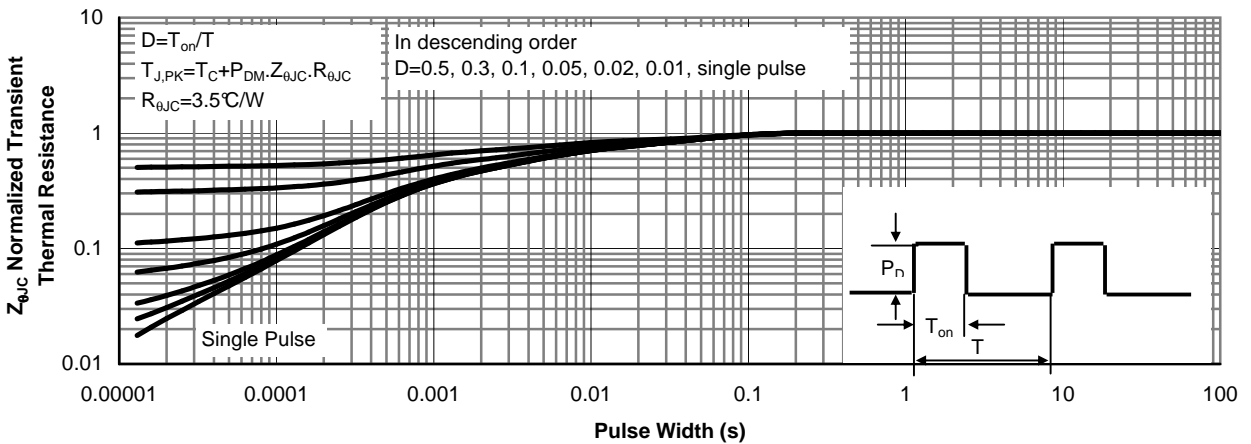


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

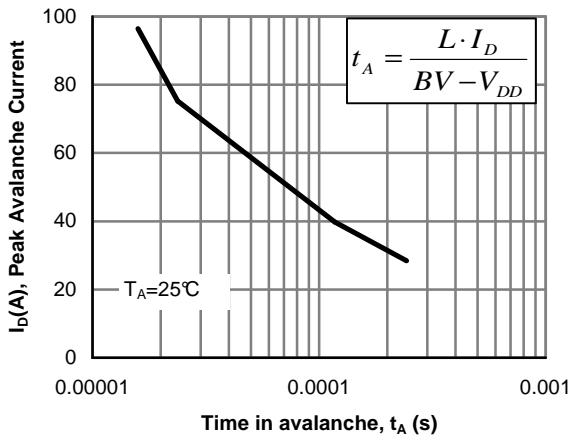


Figure 12: Single Pulse Avalanche capability

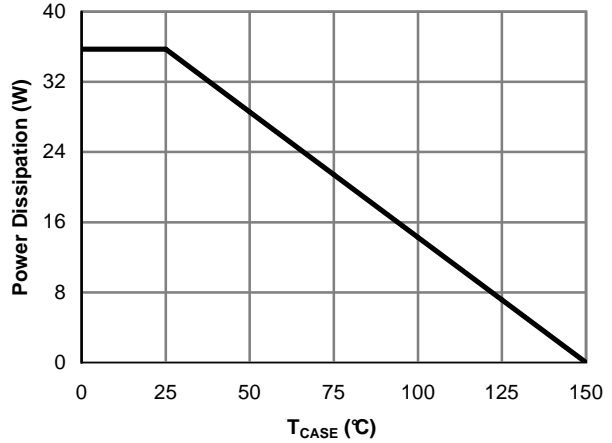


Figure 13: Power De-rating (Note B)

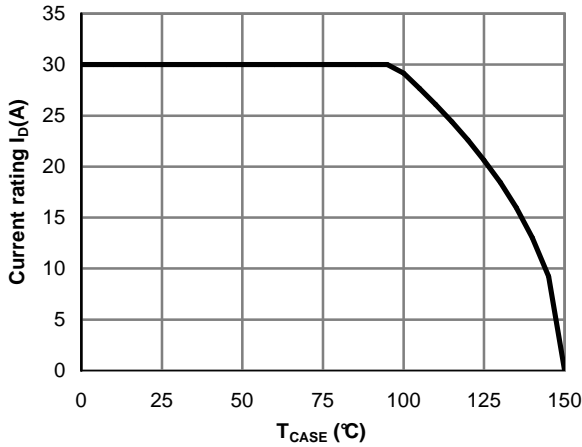


Figure 14: Current De-rating (Note B)

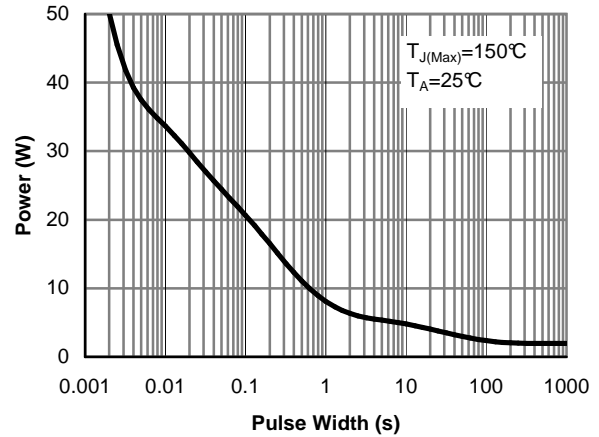


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

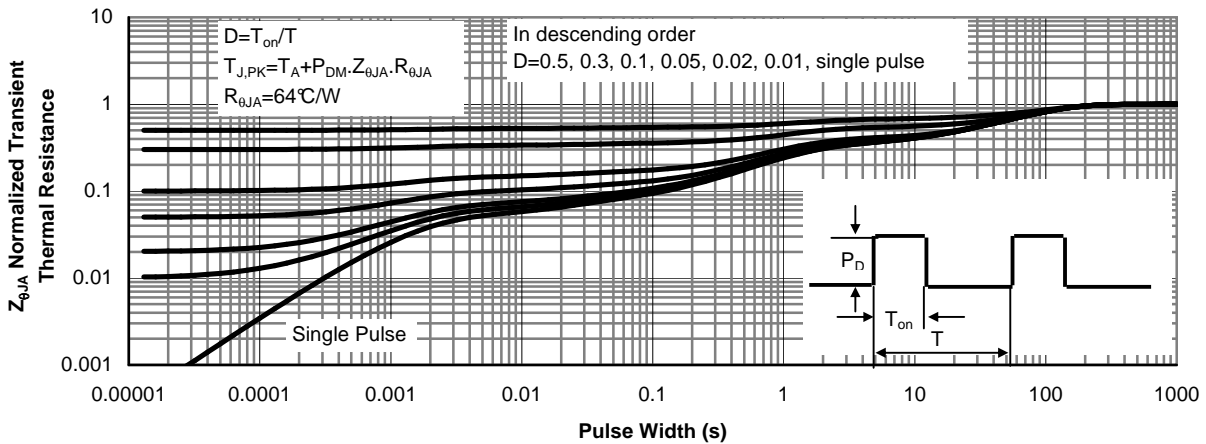
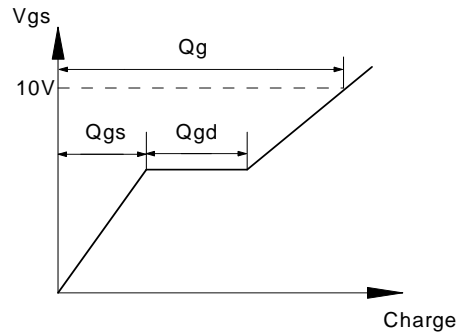
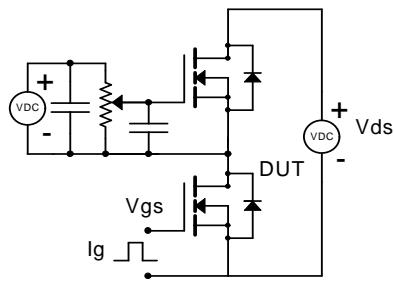
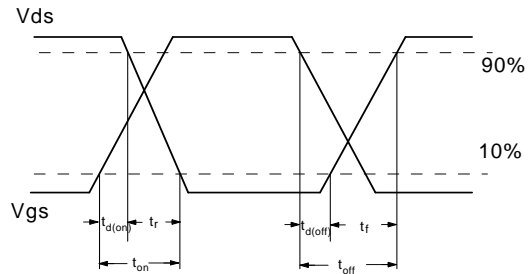
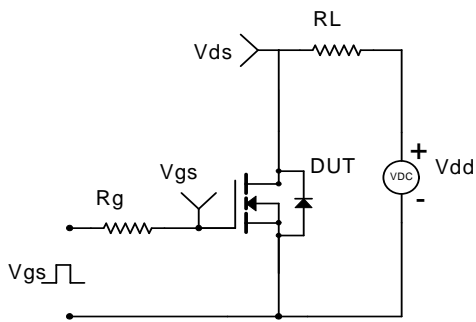


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

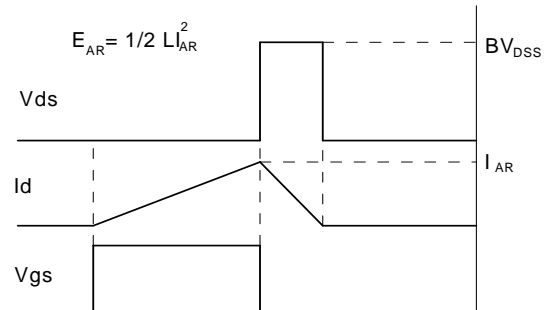
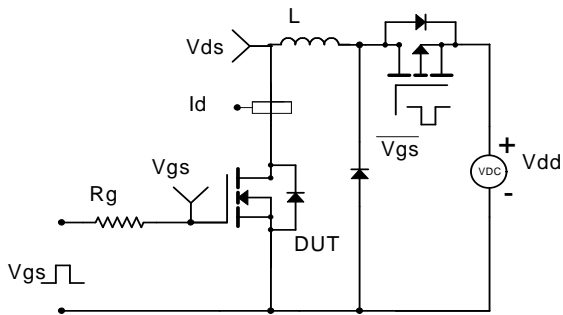
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

