

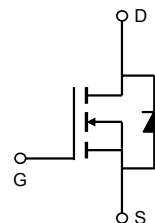
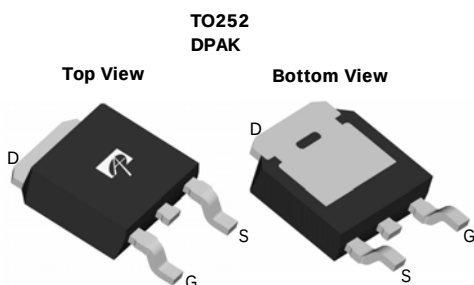
### General Description

The AOD4182 is fabricated with SDMOS™ trench technology that combines excellent  $R_{DS(ON)}$  with low gate charge and low  $Q_{rr}$ . The result is outstanding efficiency with controlled switching behavior. This universal technology is well suited for PWM, load switching and general purpose applications.

### Product Summary

|                                 |          |
|---------------------------------|----------|
| $V_{DS}$                        | 80V      |
| $I_D$ (at $V_{GS}=10V$ )        | 53A      |
| $R_{DS(ON)}$ (at $V_{GS}=10V$ ) | < 15.5mΩ |
| $R_{DS(ON)}$ (at $V_{GS}=7V$ )  | < 20mΩ   |

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                           | $V_{DS}$         | 80         | V     |
| Gate-Source Voltage                            | $V_{GS}$         | ±25        | V     |
| Continuous Drain Current                       | $I_D$            | 53         | A     |
|                                                |                  | 38         |       |
| Pulsed Drain Current <sup>C</sup>              | $I_{DM}$         | 85         |       |
| Continuous Drain Current                       | $I_{DSM}$        | 8.5        | A     |
|                                                |                  | 6.8        |       |
| Avalanche Current <sup>C</sup>                 | $I_{AS}, I_{AR}$ | 45         | A     |
| Avalanche energy $L=0.1\text{mH}$ <sup>C</sup> | $E_{AS}, E_{AR}$ | 101        | mJ    |
| Power Dissipation <sup>B</sup>                 | $P_D$            | 100        | W     |
|                                                |                  | 50         |       |
| Power Dissipation <sup>A</sup>                 | $P_{DSM}$        | 2.5        | W     |
|                                                |                  | 1.6        |       |
| Junction and Storage Temperature Range         | $T_J, T_{STG}$   | -55 to 175 | °C    |

### Thermal Characteristics

| Parameter                                  | Symbol          | Typ | Max | Units |
|--------------------------------------------|-----------------|-----|-----|-------|
| Maximum Junction-to-Ambient <sup>A</sup>   | $R_{\theta JA}$ | 16  | 20  | °C/W  |
| Maximum Junction-to-Ambient <sup>A D</sup> |                 | 40  | 50  | °C/W  |
| Maximum Junction-to-Case                   | $R_{\theta JC}$ | 1   | 1.5 | °C/W  |

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

| Symbol                      | Parameter                                          | Conditions                                                                              | Min  | Typ          | Max        | Units |
|-----------------------------|----------------------------------------------------|-----------------------------------------------------------------------------------------|------|--------------|------------|-------|
| <b>STATIC PARAMETERS</b>    |                                                    |                                                                                         |      |              |            |       |
| BV <sub>DSS</sub>           | Drain-Source Breakdown Voltage                     | I <sub>D</sub> =250μA, V <sub>GS</sub> =0V                                              | 80   |              |            | V     |
| I <sub>DSS</sub>            | Zero Gate Voltage Drain Current                    | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V<br>T <sub>J</sub> =55°C                       |      |              | 10<br>50   | μA    |
| I <sub>GSS</sub>            | Gate-Body leakage current                          | V <sub>DS</sub> =0V, V <sub>GS</sub> = ±25V                                             |      |              | 100        | nA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                             | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                | 2.8  | 3.3          | 4.2        | V     |
| I <sub>D(ON)</sub>          | On state drain current                             | V <sub>GS</sub> =10V, V <sub>DS</sub> =5V                                               | 85   |              |            | A     |
| R <sub>DS(ON)</sub>         | Static Drain-Source On-Resistance                  | V <sub>GS</sub> =10V, I <sub>D</sub> =20A<br>T <sub>J</sub> =125°C                      |      | 12.5<br>22.5 | 15.5<br>28 | mΩ    |
|                             |                                                    | V <sub>GS</sub> =7V, I <sub>D</sub> =20A                                                |      | 16           | 20         | mΩ    |
| g <sub>FS</sub>             | Forward Transconductance                           | V <sub>DS</sub> =5V, I <sub>D</sub> =20A                                                |      | 33           |            | S     |
| V <sub>SD</sub>             | Diode Forward Voltage                              | I <sub>S</sub> =1A, V <sub>GS</sub> =0V                                                 |      | 0.7          | 1          | V     |
| I <sub>S</sub>              | Maximum Body-Diode Continuous Current <sup>G</sup> |                                                                                         |      |              | 54         | A     |
| <b>DYNAMIC PARAMETERS</b>   |                                                    |                                                                                         |      |              |            |       |
| C <sub>iss</sub>            | Input Capacitance                                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =40V, f=1MHz                                       | 1335 | 1670         | 2005       | pF    |
| C <sub>oss</sub>            | Output Capacitance                                 |                                                                                         | 150  | 215          | 280        | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance                       |                                                                                         | 40   | 72           | 100        | pF    |
| R <sub>g</sub>              | Gate resistance                                    | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz                                        | 0.35 | 0.75         | 1.2        | Ω     |
| <b>SWITCHING PARAMETERS</b> |                                                    |                                                                                         |      |              |            |       |
| Q <sub>g</sub> (10V)        | Total Gate Charge                                  | V <sub>GS</sub> =10V, V <sub>DS</sub> =40V, I <sub>D</sub> =20A                         | 22   | 28           | 34         | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                                 |                                                                                         | 8.8  | 11           | 13         | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                                  |                                                                                         | 5    | 8            | 11         | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                                  | V <sub>GS</sub> =10V, V <sub>DS</sub> =40V, R <sub>L</sub> =2Ω,<br>R <sub>GEN</sub> =3Ω |      | 12           |            | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                                  |                                                                                         |      | 9            |            | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                                 |                                                                                         |      | 20           |            | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                                 |                                                                                         |      | 8            |            | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time                   | I <sub>F</sub> =20A, dI/dt=500A/μs                                                      | 14.5 | 21           | 27.5       | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge                 | I <sub>F</sub> =20A, dI/dt=500A/μs                                                      | 45.5 | 65           | 85         | nC    |

A. The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The Power dissipation P<sub>DSM</sub> is based on R<sub>θJA</sub> 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<sub>D</sub> is based on T<sub>J(MAX)</sub>=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<sub>J(MAX)</sub>=175°C. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub>=25°C.

D. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to case R<sub>θJC</sub> 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<sub>J(MAX)</sub>=175°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 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C.

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## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

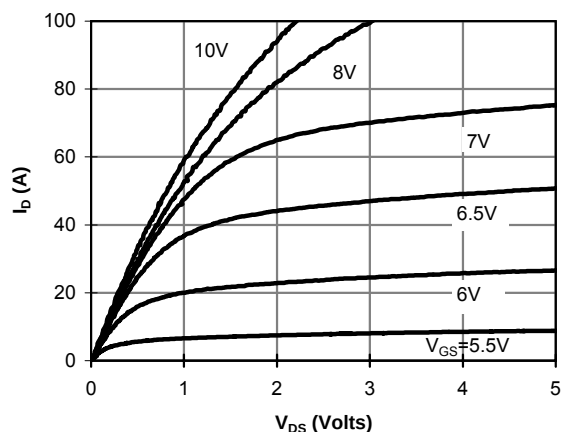


Fig 1: On-Region Characteristics (Note E)

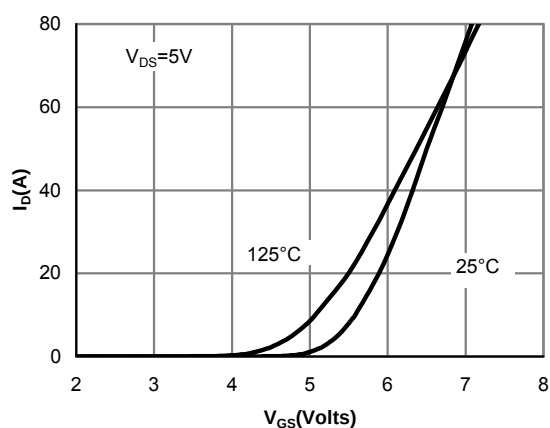


Figure 2: Transfer Characteristics (Note E)

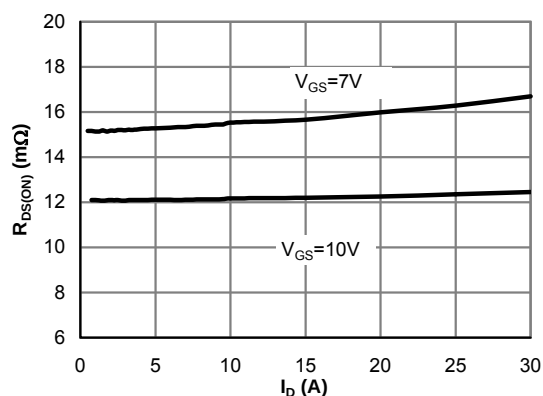


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

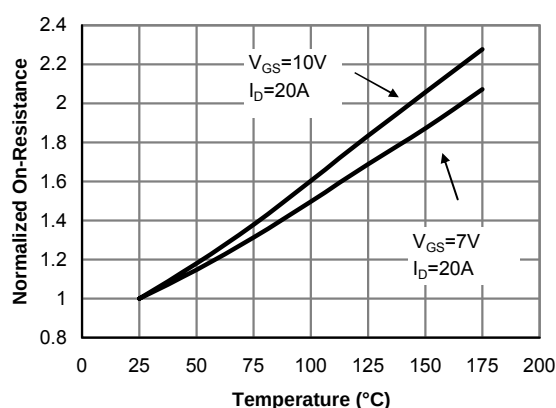


Figure 4: On-Resistance vs. Junction Temperature (Note E)

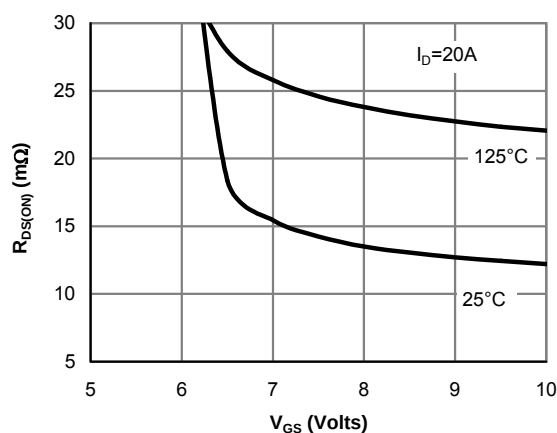


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

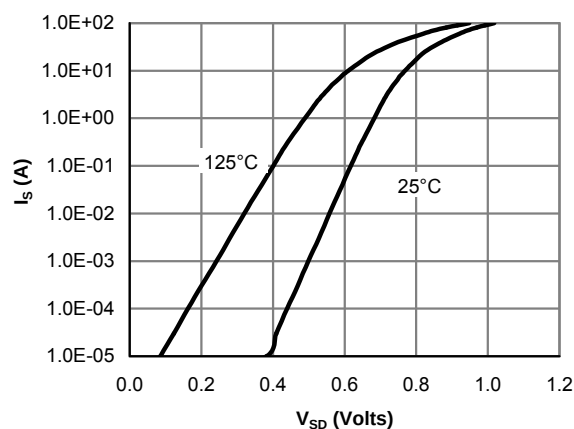
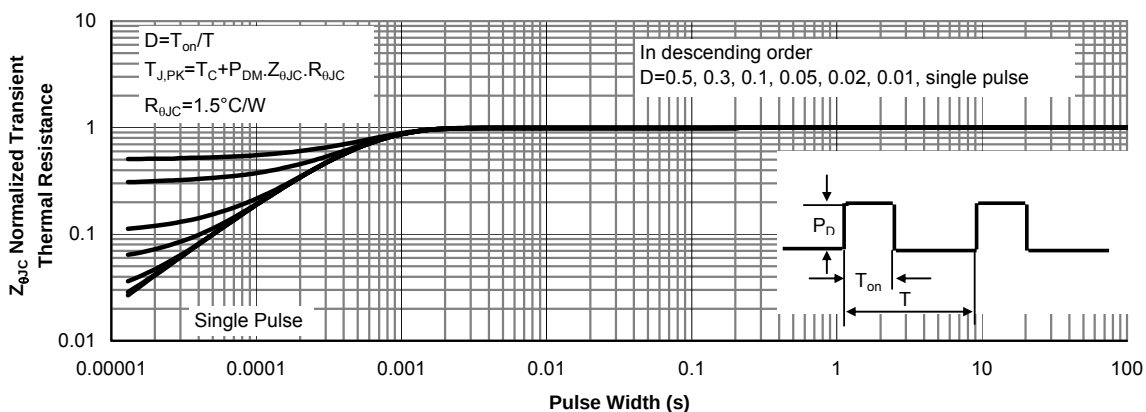
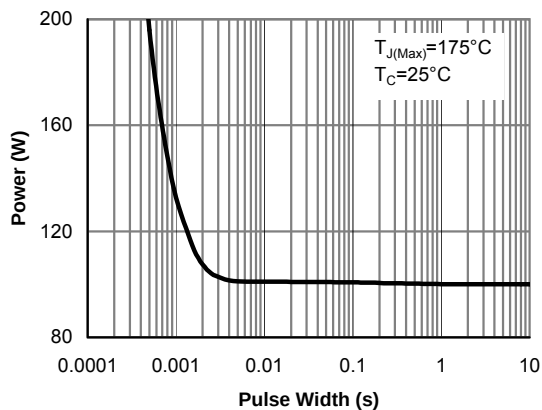
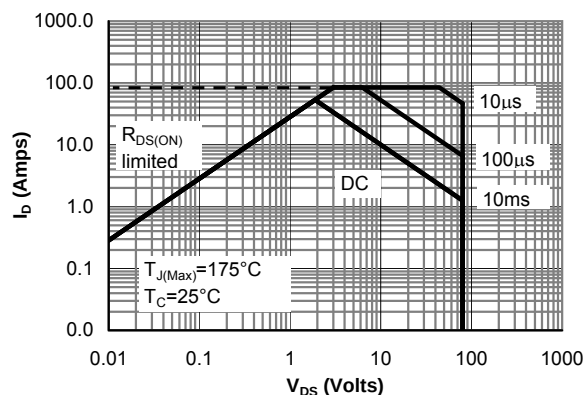
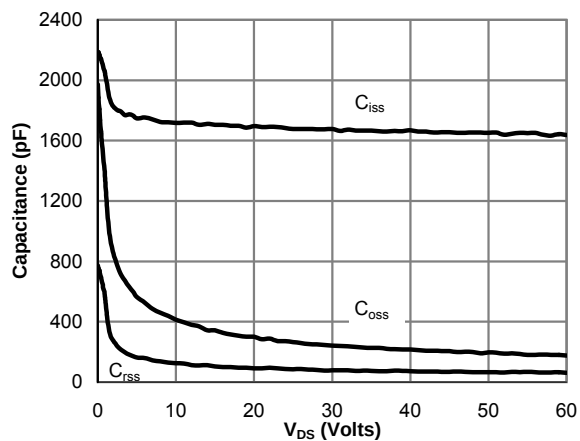
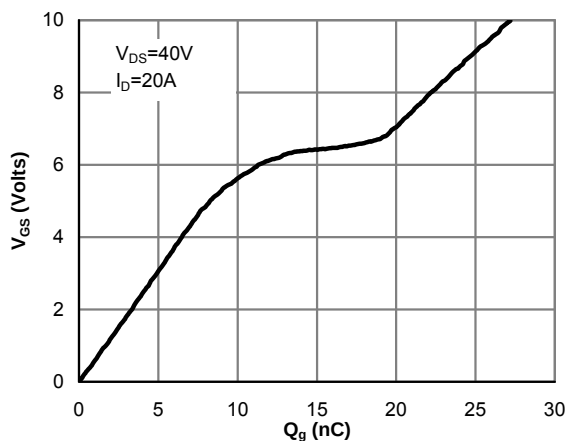


Figure 6: Body-Diode Characteristics (Note E)

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



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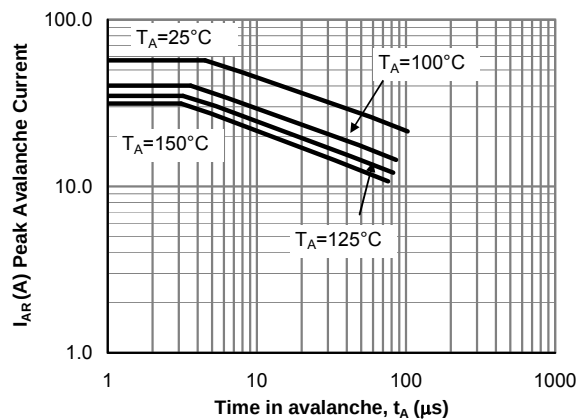


Figure 12: Single Pulse Avalanche capability (Note C)

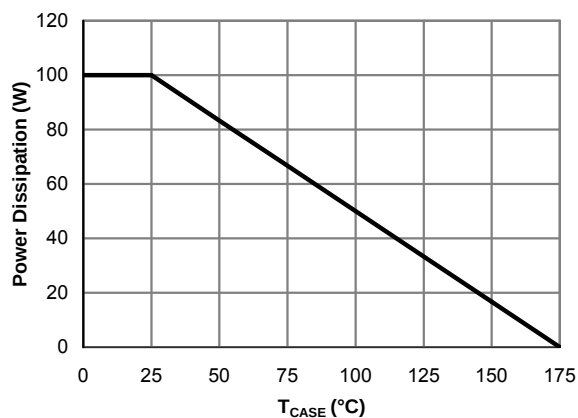


Figure 13: Power De-rating (Note F)

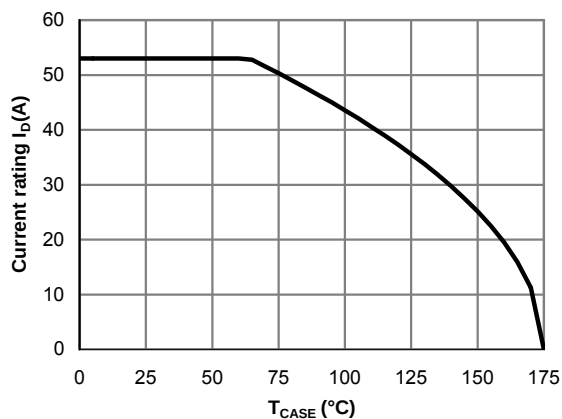


Figure 14: Current De-rating (Note F)

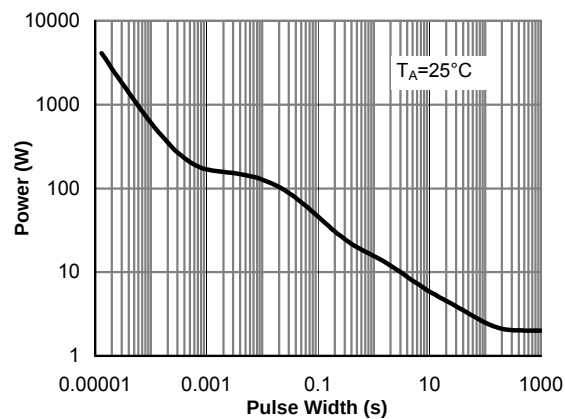


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

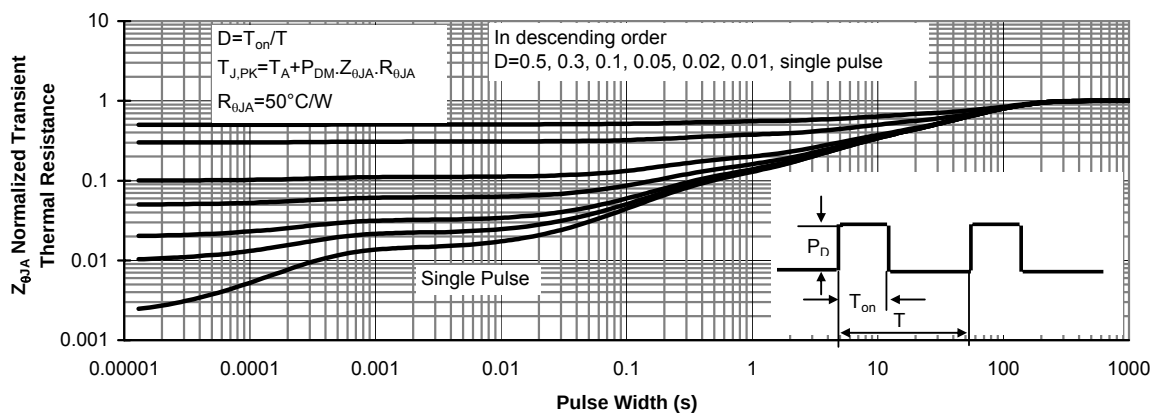


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

# TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

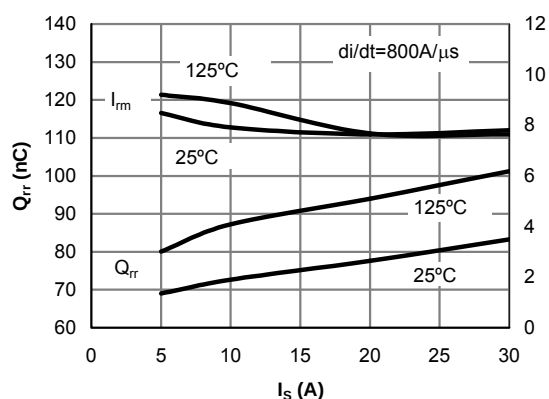


Figure 17: Diode Reverse Recovery Charge and Peak Current vs. Conduction Current

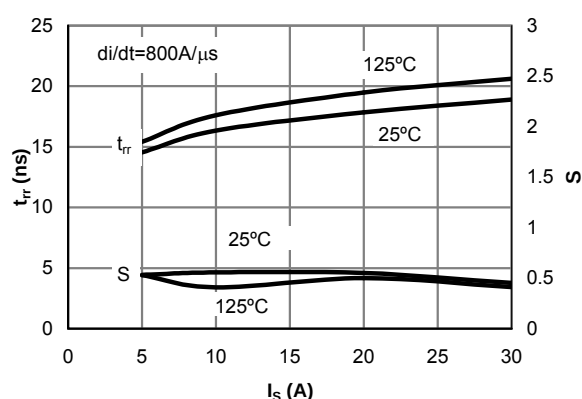


Figure 18: Diode Reverse Recovery Time and Softness Factor vs. Conduction Current

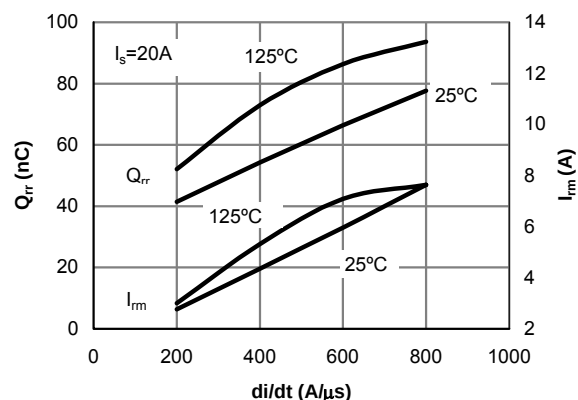


Figure 19: Diode Reverse Recovery Charge and Peak Current vs. di/dt

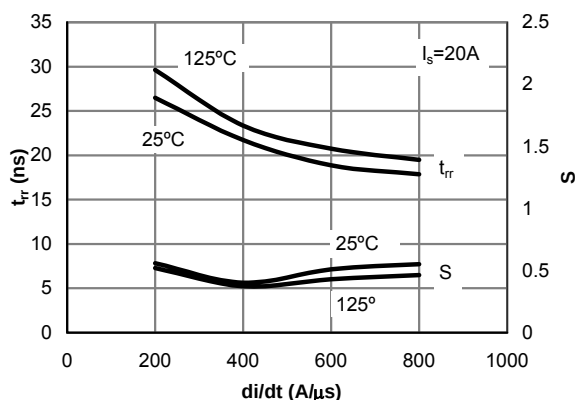
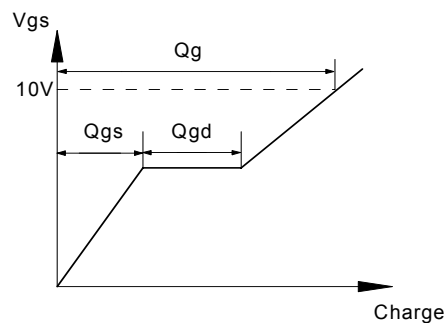
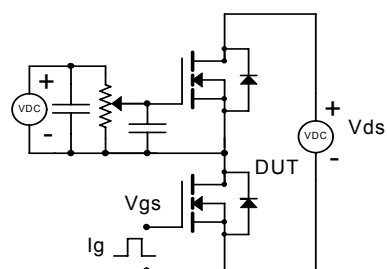
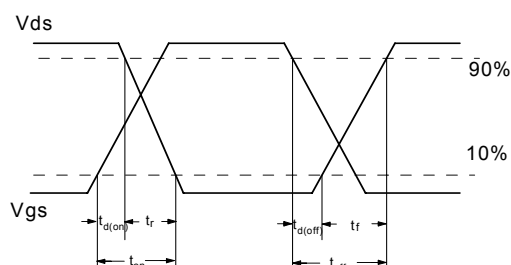
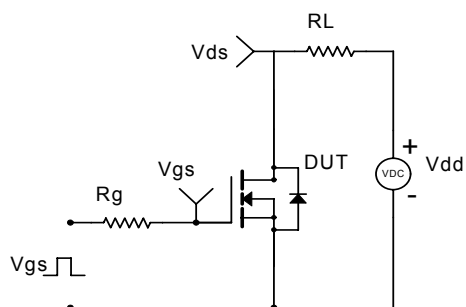


Figure 20: Diode Reverse Recovery Time and Softness Factor vs. di/dt

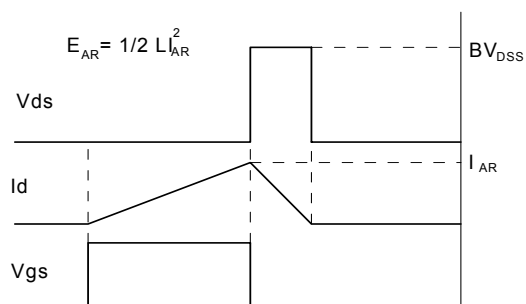
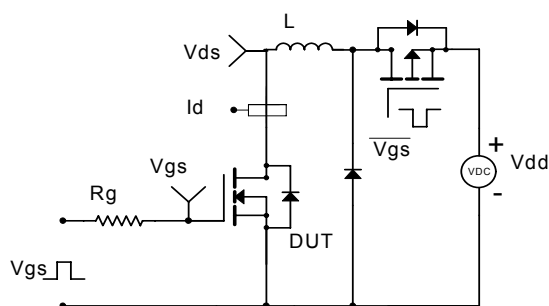
### Gate Charge Test Circuit & Waveform



### Resistive Switching Test Circuit & Waveforms



### Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



### Diode Recovery Test Circuit & Waveforms

