



### General Description

- Trench Power MOSFET technology
- Low  $R_{DS(ON)}$
- Low Gate Charge
- High Current Capability
- RoHS 2.0 and Halogen-Free Compliant

### Applications

- DC/DC Converters in Computing, Servers and POL
- Isolated DC/DC Converters in Telecom and Industrial
- See Note H

### Product Summary

|                                  |                 |
|----------------------------------|-----------------|
| $V_{DS}$                         | 30V             |
| $I_D$ (at $V_{GS}=10V$ )         | 88A             |
| $R_{DS(ON)}$ (at $V_{GS}=10V$ )  | < 4.4m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=4.5V$ ) | < 7.7m $\Omega$ |

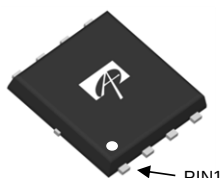
Typical ESD protection HBM Class H2

100% UIS Tested  
100% Rg Tested

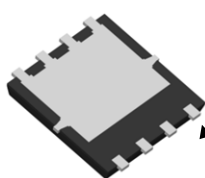


DFN5X6

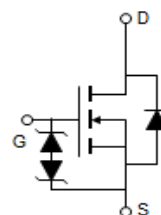
Top View



Bottom View



Top View



| Orderable Part Number | Package Type | Form        | Minimum Order Quantity |
|-----------------------|--------------|-------------|------------------------|
| AONS36321             | DFN 5x6      | Tape & Reel | 3000                   |

### 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                             | $V_{GS}$       | $\pm 20$   | V                |
| Continuous Drain Current                        | $I_D$          | 88         | A                |
|                                                 |                | 55         |                  |
| Pulsed Drain Current <sup>C</sup>               | $I_{DM}$       | 167        |                  |
| Continuous Drain Current                        | $I_{DSM}$      | 30         | A                |
|                                                 |                | 24         |                  |
| Avalanche Current <sup>C</sup>                  | $I_{AS}$       | 50         | A                |
| Avalanche energy $L=0.01\text{mH}$ <sup>C</sup> | $E_{AS}$       | 13         | mJ               |
| Power Dissipation <sup>B</sup>                  | $P_D$          | 54         | W                |
|                                                 |                | 22         |                  |
| Power Dissipation <sup>A</sup>                  | $P_{DSM}$      | 6.2        | W                |
|                                                 |                | 4          |                  |
| 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 <sup>A</sup>    | $R_{\theta JA}$ | 15  | 20  | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient <sup>A, D</sup> |                 | 40  | 50  | $^\circ\text{C/W}$ |
| Maximum Junction-to-Case                    | $R_{\theta JC}$ | 1.8 | 2.3 | $^\circ\text{C/W}$ |

**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                                                 | 30  |            |            | V     |
| I <sub>DSS</sub>            | Zero Gate Voltage Drain Current       | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V<br>T <sub>J</sub> =55°C                          |     |            | 1<br>5     | μA    |
| I <sub>GSS</sub>            | Gate-Body leakage current             | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                                 |     |            | ±10        | μA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                   | 1.3 | 2          | 2.5        | V     |
| 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                         |     | 3.6<br>5.3 | 4.4<br>6.4 | mΩ    |
|                             |                                       | V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A                                                 |     | 6.1        | 7.7        | mΩ    |
|                             |                                       |                                                                                            |     |            |            |       |
| g <sub>FS</sub>             | Forward Transconductance              | V <sub>DS</sub> =5V, I <sub>D</sub> =20A                                                   |     | 94         |            | 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 |                                                                                            |     |            | 60         | A     |
| <b>DYNAMIC PARAMETERS</b>   |                                       |                                                                                            |     |            |            |       |
| C <sub>iss</sub>            | Input Capacitance                     | V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz                                          |     | 1025       |            | pF    |
| C <sub>oss</sub>            | Output Capacitance                    |                                                                                            |     | 275        |            | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance          |                                                                                            |     | 35         |            | pF    |
| R <sub>g</sub>              | Gate resistance                       | f=1MHz                                                                                     | 0.8 | 1.6        | 2.4        | Ω     |
| <b>SWITCHING PARAMETERS</b> |                                       |                                                                                            |     |            |            |       |
| Q <sub>g(10V)</sub>         | Total Gate Charge                     | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =20A                            |     | 14.2       | 20         | nC    |
| Q <sub>g(4.5V)</sub>        | Total Gate Charge                     |                                                                                            |     | 6.7        | 10         | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                    |                                                                                            |     | 3.1        |            | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                     |                                                                                            |     | 2.6        |            | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                     | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =0.75Ω,<br>R <sub>GEN</sub> =3Ω |     | 6.1        |            | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                     |                                                                                            |     | 1.8        |            | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                    |                                                                                            |     | 17.2       |            | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                    |                                                                                            |     | 2.5        |            | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time      | I <sub>F</sub> =20A, di/dt=500A/μs                                                         |     | 9.4        |            | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge    | I <sub>F</sub> =20A, di/dt=500A/μs                                                         |     | 13.3       |            | 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> ≤ 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<sub>D</sub> is based on T<sub>J(MAX)</sub>=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<sub>J(MAX)</sub>=150° 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>=150° C. The SOA curve provides a single pulse rating.
- G. 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.
- H. For application requiring slow >1ms turn-on/turn-off, please consult AOS FAE for proper product selection.

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## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

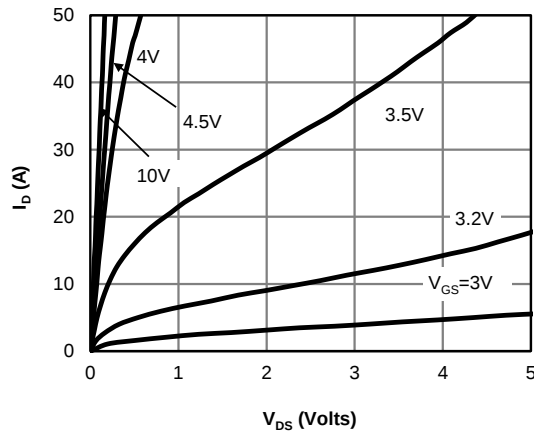


Figure 1: On-Region Characteristics (Note E)

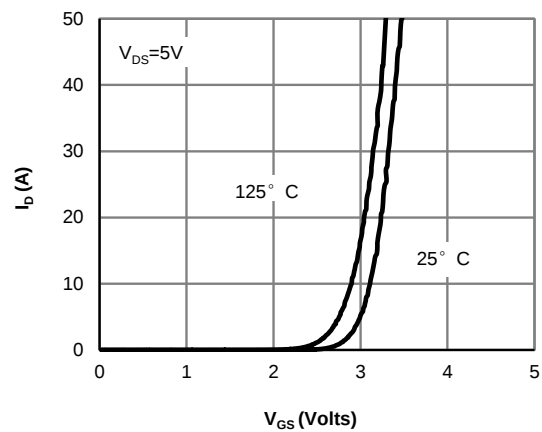


Figure 2: Transfer Characteristics (Note E)

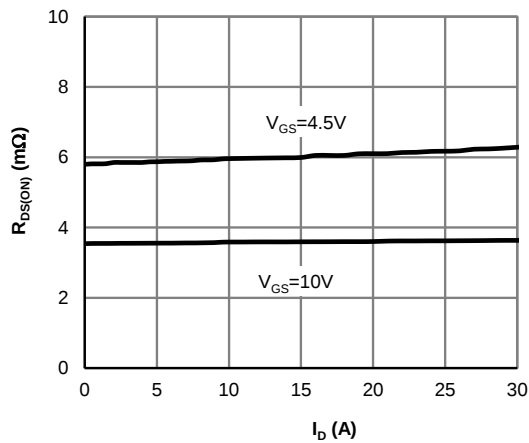


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

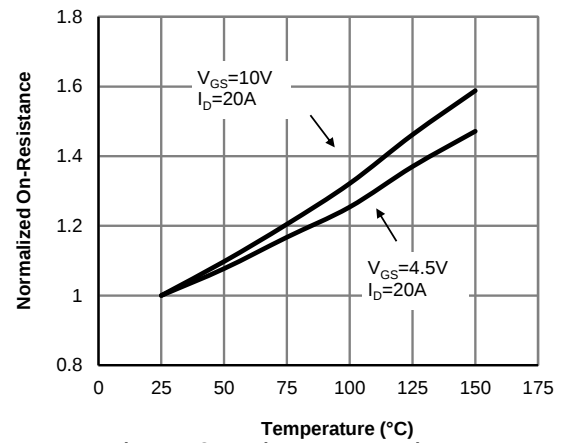


Figure 4: On-Resistance vs. Junction Temperature (Note E)

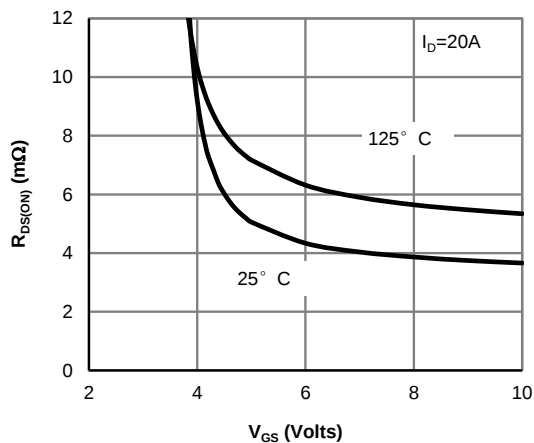


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

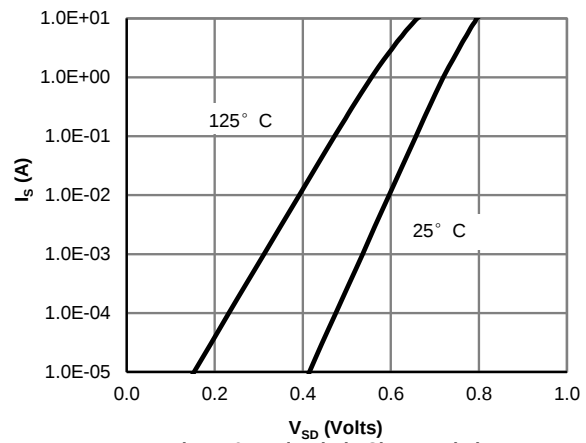
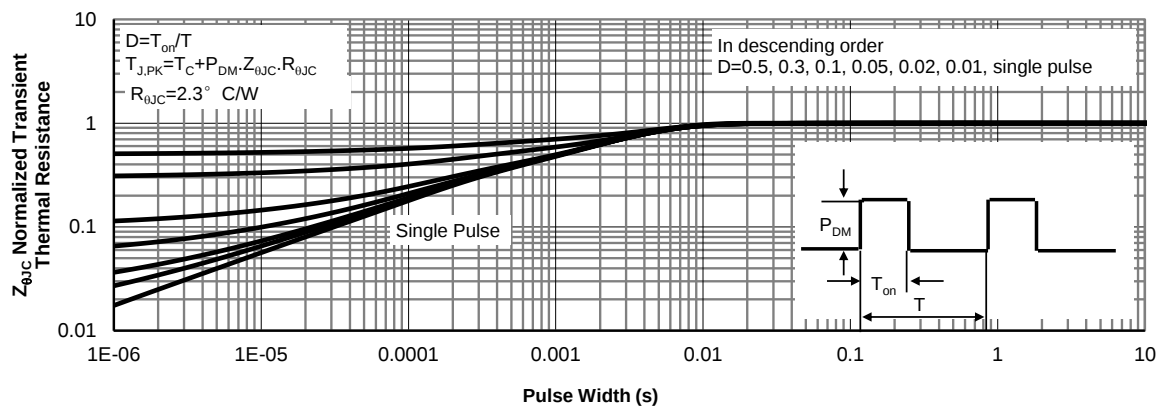
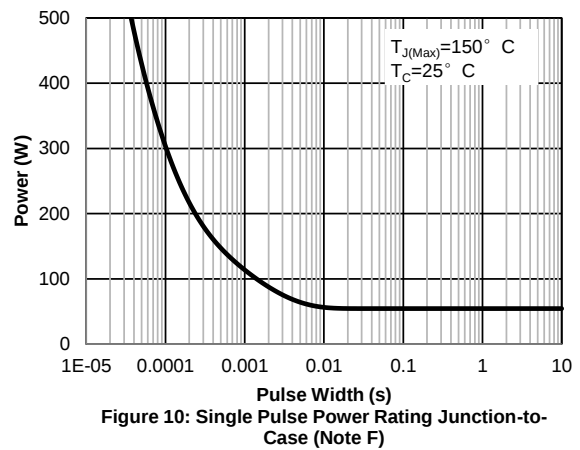
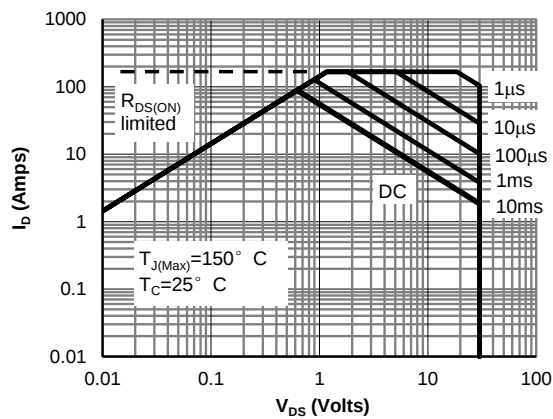
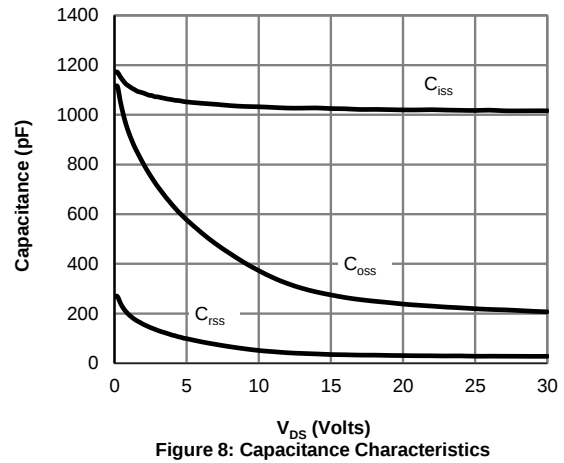
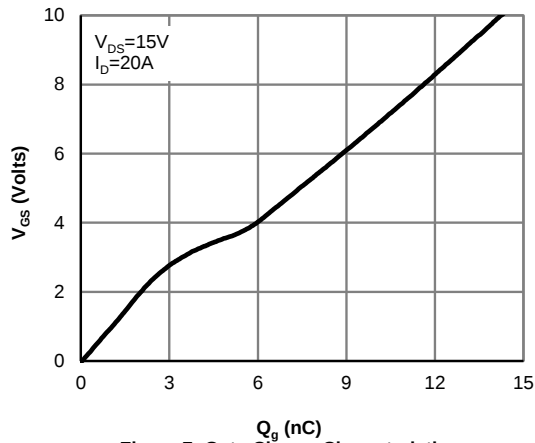


Figure 6: Body-Diode Characteristics (Note E)

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



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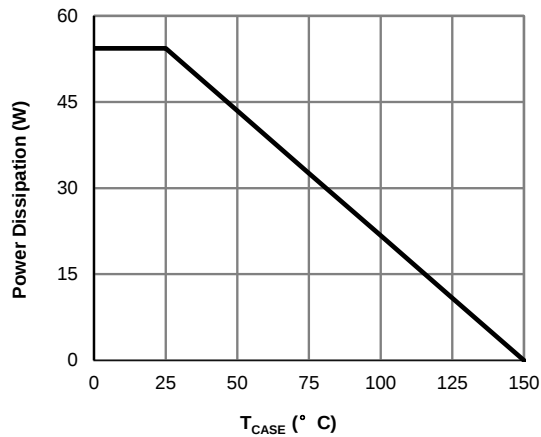


Figure 12: Power De-rating (Note F)

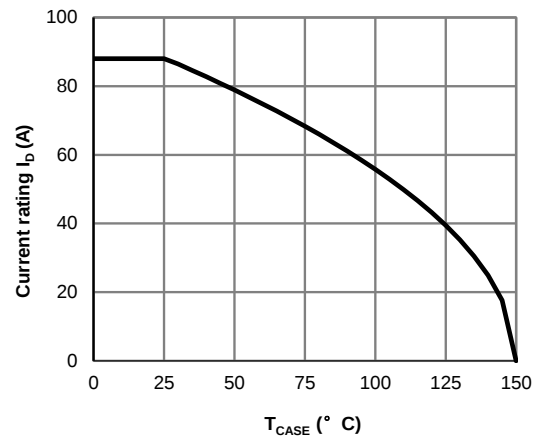


Figure 13: Current De-rating (Note F)

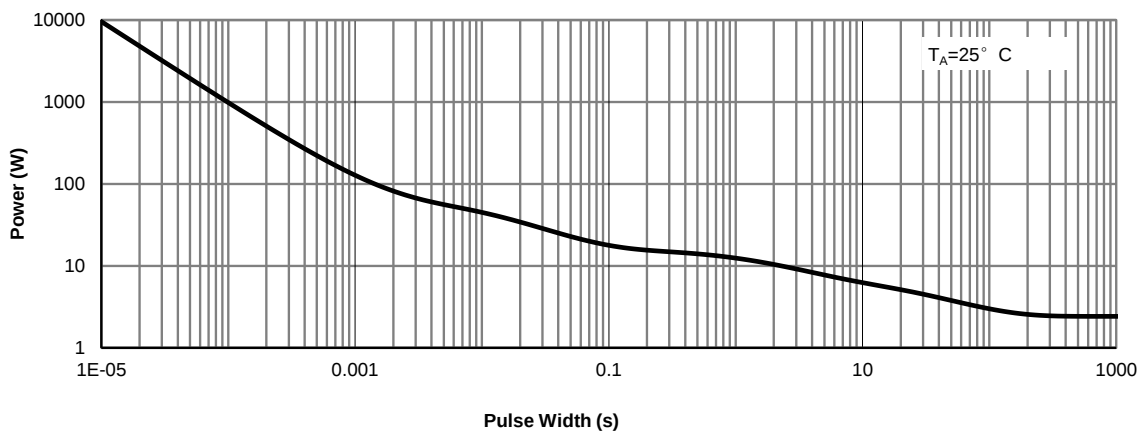


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note G)

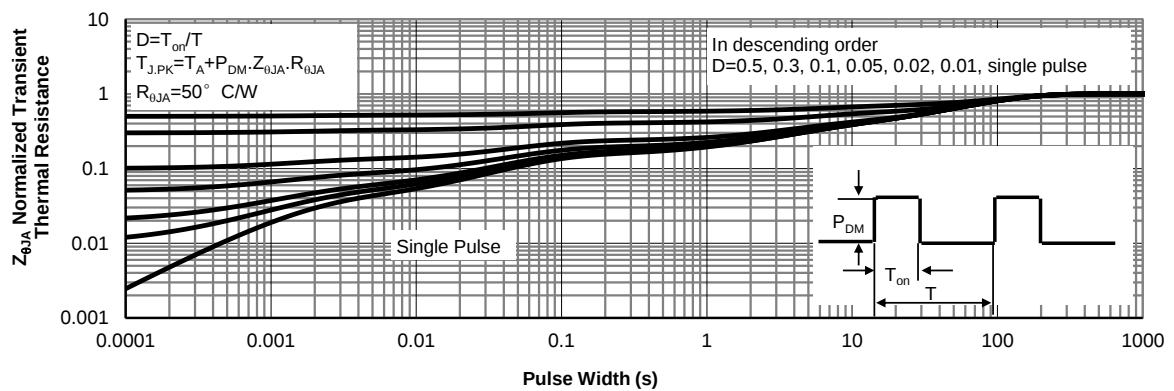


Figure 15: Normalized Maximum Transient Thermal Impedance (Note G)

Figure A: Gate Charge Test Circuit & Waveforms

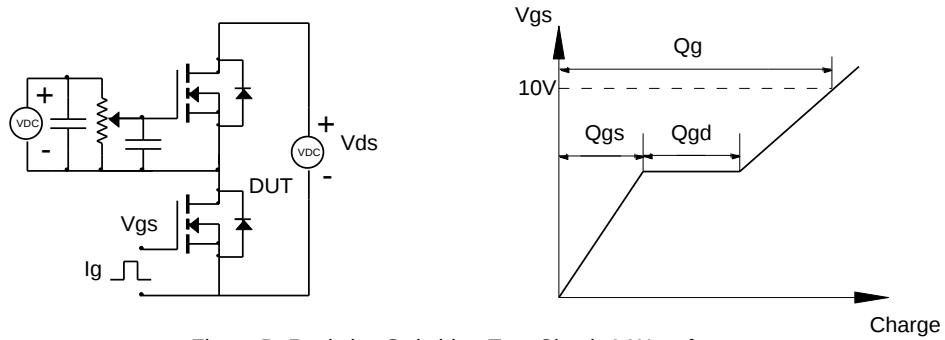


Figure B: Resistive Switching Test Circuit & Waveforms

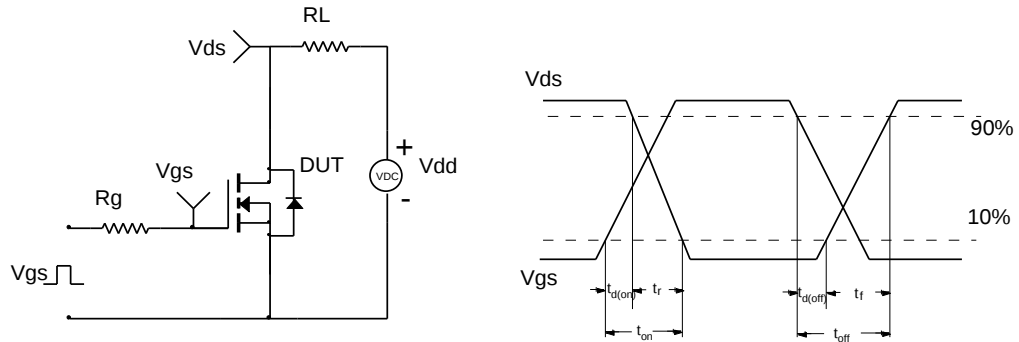


Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

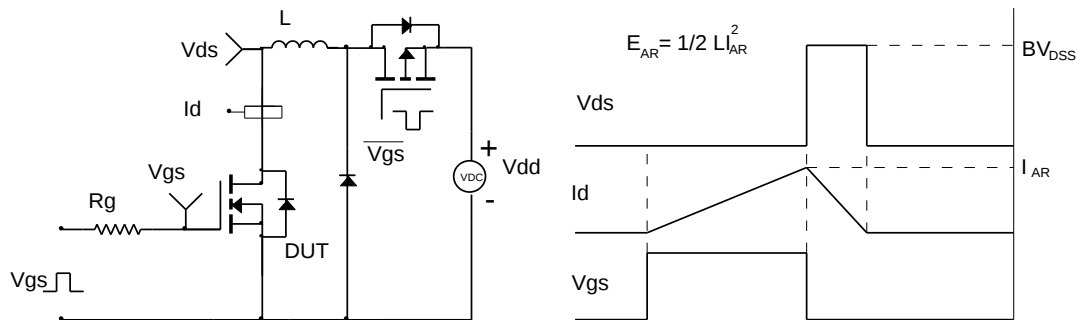


Figure D: Diode Recovery Test Circuit & Waveforms

