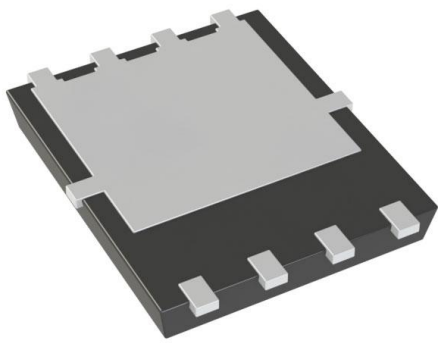


# AONS36302 Datasheet

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|                              |  |
|------------------------------|--|
| DiGi Electronics Part Number | AONS36302-DG   |
| Manufacturer                 | <a href="#">Alpha &amp; Omega Semiconductor Inc.</a>   |
| Manufacturer Product Number  | AONS36302  |
| Description                  | MOSFET N-CH 30V 146A 8DFN                              |
| Detailed Description         | N-Channel 30 V 146A 57W (Tc) Surface Mount 8-DFN (5x6) |



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## Purchase and inquiry

**Manufacturer Product Number:**

AONS36302

**Series:**

-

**FET Type:**

N-Channel

**Drain to Source Voltage (Vdss):**

30 V

**Drive Voltage (Max Rds On, Min Rds On):**

10V

**Vgs(th) (Max) @ Id:**

1.8V @ 250µA

**Vgs (Max):**

±20V

**FET Feature:**

Schottky Diode (Body)

**Operating Temperature:**

-55°C ~ 150°C (Tj)

**Supplier Device Package:**

8-DFN (5x6)

**Base Product Number:**

AONS363

**Manufacturer:**

Alpha &amp; Omega Semiconductor Inc.

**Product Status:**

Active

**Technology:**

MOSFET (Metal Oxide)

**Current - Continuous Drain (Id) @ 25°C:**

146A

**Rds On (Max) @ Id, Vgs:**

1.8mOhm @ 20A, 10V

**Gate Charge (Qg) (Max) @ Vgs:**

60 nC @ 10 V

**Input Capacitance (Ciss) (Max) @ Vds:**

3860 pF @ 15 V

**Power Dissipation (Max):**

57W (Tc)

**Mounting Type:**

Surface Mount

**Package / Case:**

8-PowerSMD, Flat Leads

## Environmental & Export classification

**RoHS Status:**

ROHS3 Compliant

**REACH Status:**

REACH Unaffected

**HTSUS:**

8541.29.0095

**Moisture Sensitivity Level (MSL):**

1 (Unlimited)

**ECCN:**

EAR99



# AONS36302

## 30V N-Channel MOSFET

### General Description

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

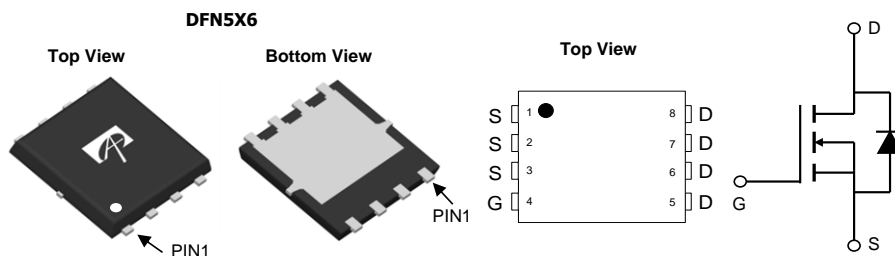
### Applications

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

### Product Summary

|                                  |                 |
|----------------------------------|-----------------|
| $V_{DS}$                         | 30V             |
| $I_D$ (at $V_{GS}=10V$ )         | 146A            |
| $R_{DS(ON)}$ (at $V_{GS}=10V$ )  | < 1.8m $\Omega$ |
| $R_{DS(ON)}$ (at $V_{GS}=4.5V$ ) | < 2.6m $\Omega$ |

100% UIS Tested  
100% Rg Tested



| Orderable Part Number | Package Type | Form        | Minimum Order Quantity |
|-----------------------|--------------|-------------|------------------------|
| AONS36302             | 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 <sup>G</sup>           | $I_D$                | $T_C=25^\circ\text{C}$  | 146              |
|   |                      | $T_C=100^\circ\text{C}$ | 92               |
| Pulsed Drain Current <sup>C</sup>               | $I_{DM}$             | 300                     | A                |
| Continuous Drain Current                        | $I_{DSM}$            | $T_A=25^\circ\text{C}$  | 48               |
|   |                      | $T_A=70^\circ\text{C}$  | 39               |
| Avalanche Current <sup>C</sup>                  | $I_{AS}$             | 80                      | A                |
| Avalanche energy $L=0.01\text{mH}$ <sup>C</sup> | $E_{AS}$             | 32                      | mJ               |
| $V_{DS}$ Spike                                  | 150ns<br>$V_{SPIKE}$ | 36                      | V                |
| Power Dissipation <sup>B</sup>                  | $P_D$                | $T_C=25^\circ\text{C}$  | 57               |
|   |                      | $T_C=100^\circ\text{C}$ | 23               |
| Power Dissipation <sup>A</sup>                  | $P_{DSM}$            | $T_A=25^\circ\text{C}$  | 6.2              |
|   |                      | $T_A=70^\circ\text{C}$  | 4.0              |
| 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> |                 |     |     |                    |
| Maximum Junction-to-Case                   | $R_{\theta JC}$ | 1.8 | 2.2 | $^\circ\text{C/W}$ |

**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   |      |      | ±100   | nA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                             | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                   | 1.4  | 1.8  | 2.2    | 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                         |      | 1.5  | 1.8    | mΩ    |
|                             |  | V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A   |      | 2.1  | 2.5    |       |
| g <sub>FS</sub>             | Forward Transconductance                           | V <sub>DS</sub> =5V, I <sub>D</sub> =20A   |      | 100  |        | 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> |  |      |      | 70     | A     |
| <b>DYNAMIC PARAMETERS</b>   |  |  |      |      |        |       |
| C <sub>iss</sub>            | Input Capacitance                                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz  |      | 3860 |        | pF    |
| C <sub>oss</sub>            | Output Capacitance                                 |  |      | 1020 |        | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance                       |  |      | 130  |        | pF    |
| R <sub>g</sub>              | Gate resistance                                    | f=1MHz   | 0.65 | 1.35 | 2      | Ω     |
| <b>SWITCHING PARAMETERS</b> |  |  |      |      |        |       |
| Q <sub>g</sub> (10V)        | Total Gate Charge                                  | V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =20A                            |      | 60   | 84     | nC    |
| Q <sub>g</sub> (4.5V)       | Total Gate Charge                                  |  |      | 28   | 40     | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                                 |  |      | 12   |        | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                                  |  |      | 9.5  |        | 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 |      | 12.5 |        | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                                  |  |      | 6.0  |        | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                                 |  |      | 47   |        | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                                 |  |      | 10.5 |        | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time                   | I <sub>F</sub> =20A, di/dt=500A/μs   |      | 18   |        | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge                 | I <sub>F</sub> =20A, di/dt=500A/μs   |      | 58   |        | 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. 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.

I. 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

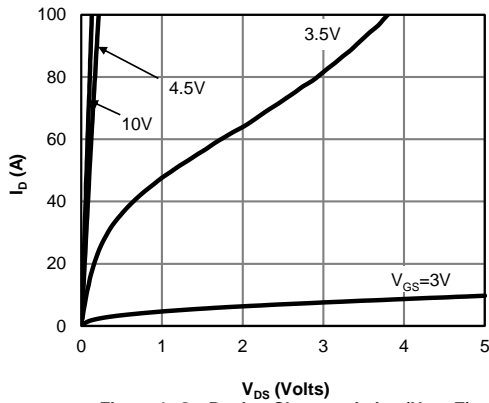


Figure 1: On-Region Characteristics (Note E)

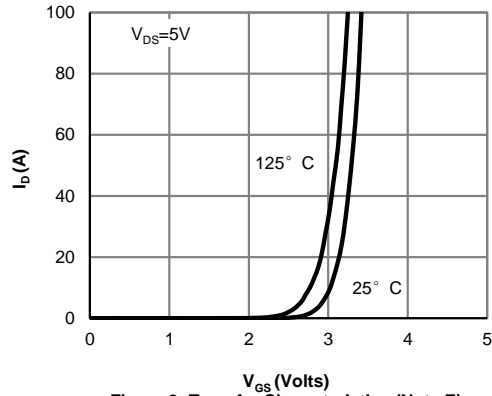


Figure 2: Transfer Characteristics (Note E)

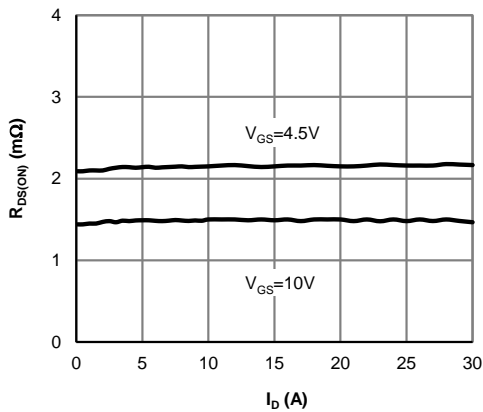


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

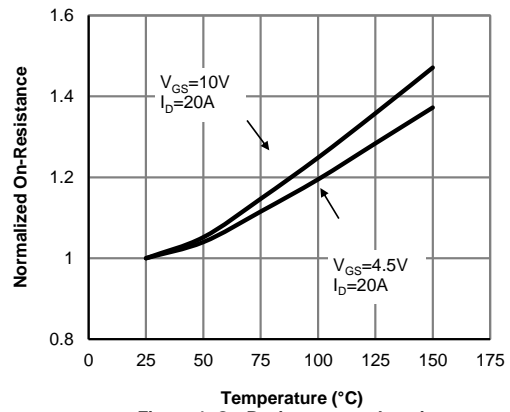


Figure 4: On-Resistance vs. Junction Temperature (Note E)

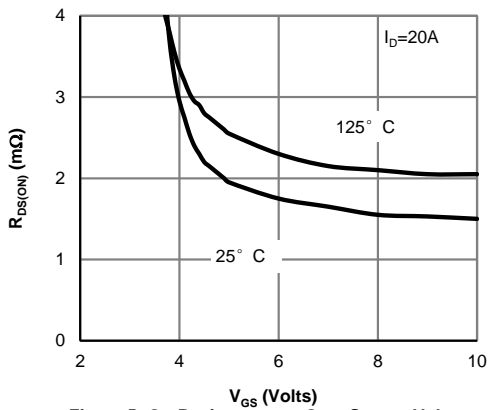


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

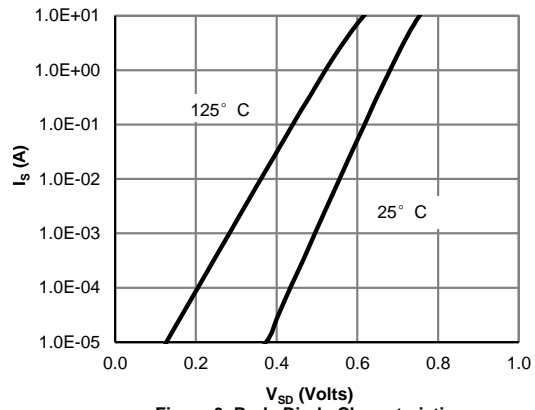


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

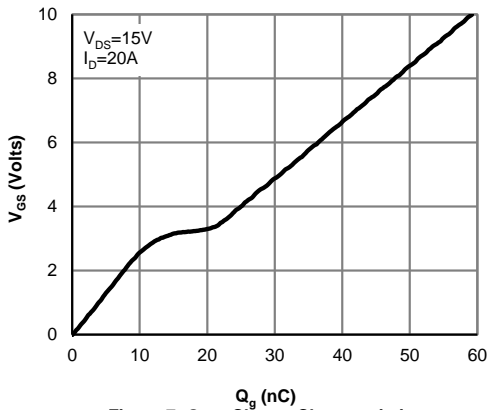


Figure 7: Gate-Charge Characteristics

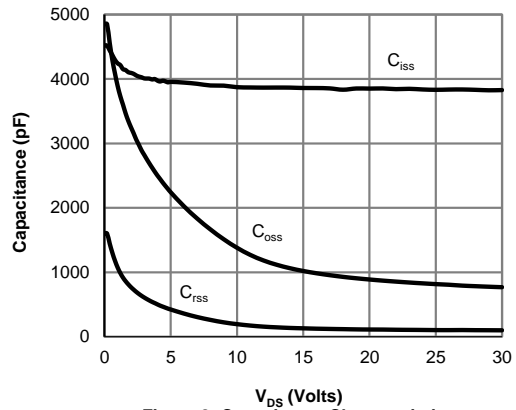


Figure 8: Capacitance Characteristics

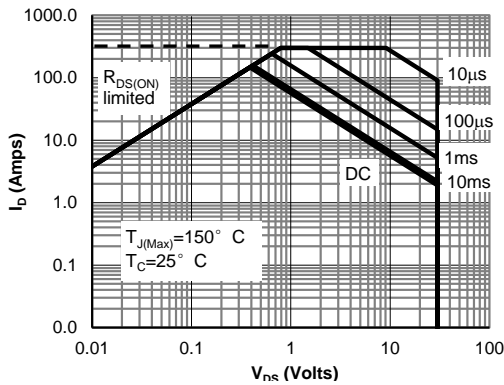


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

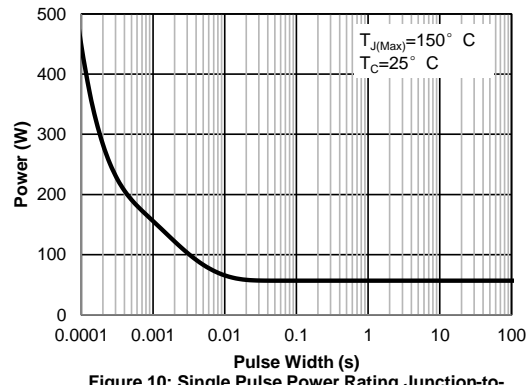


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

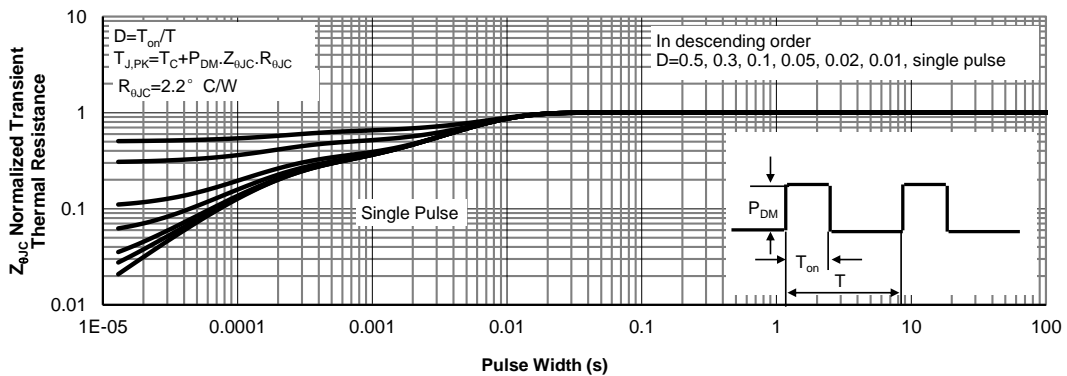


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

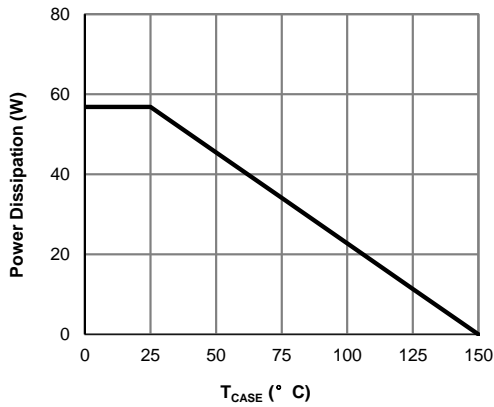


Figure 12: Power De-rating (Note F)

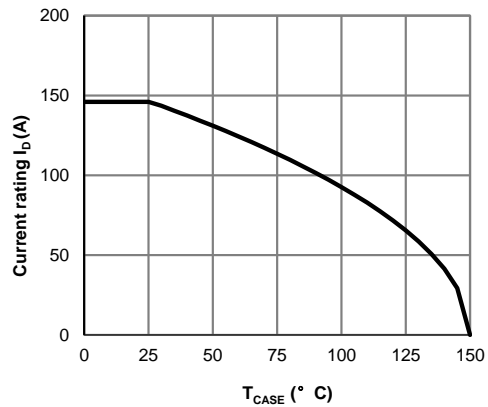


Figure 13: Current De-rating (Note F)

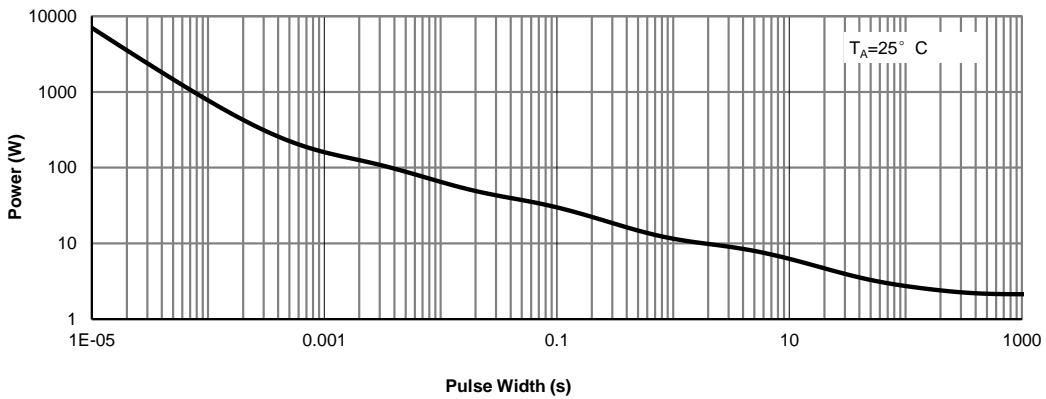


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

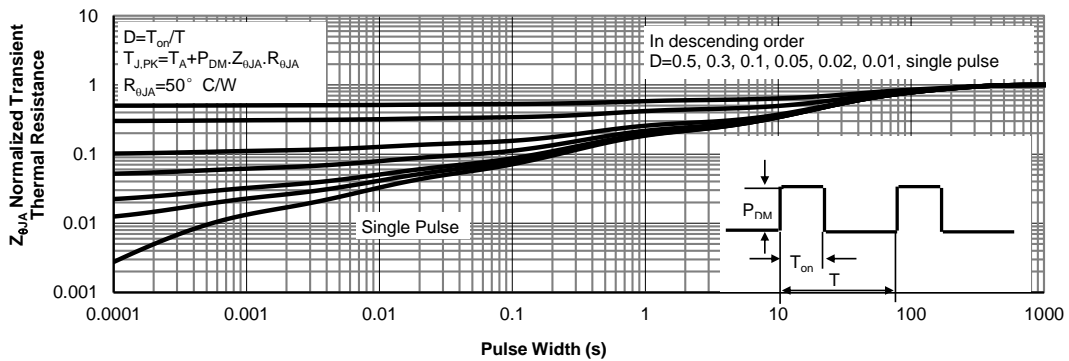


Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

Figure A: Gate Charge Test Circuit & Waveforms

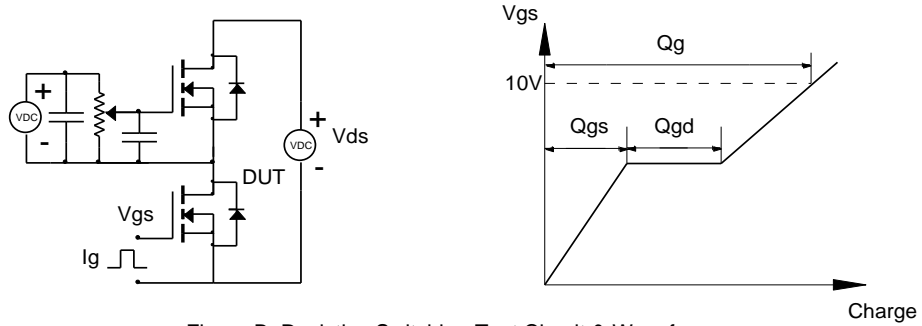


Figure B: Resistive Switching Test Circuit & Waveforms

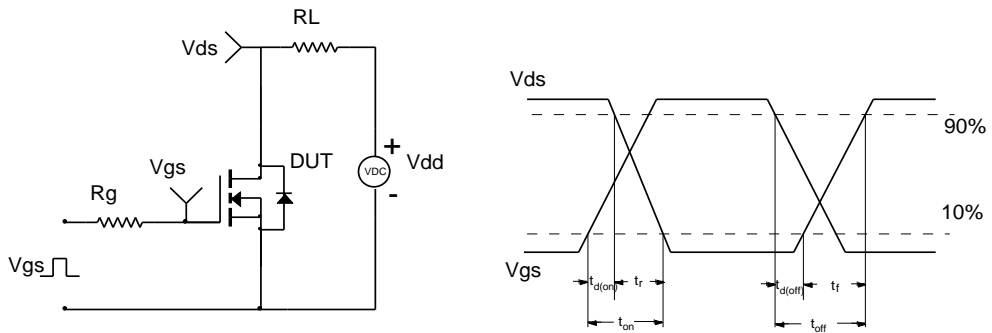


Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

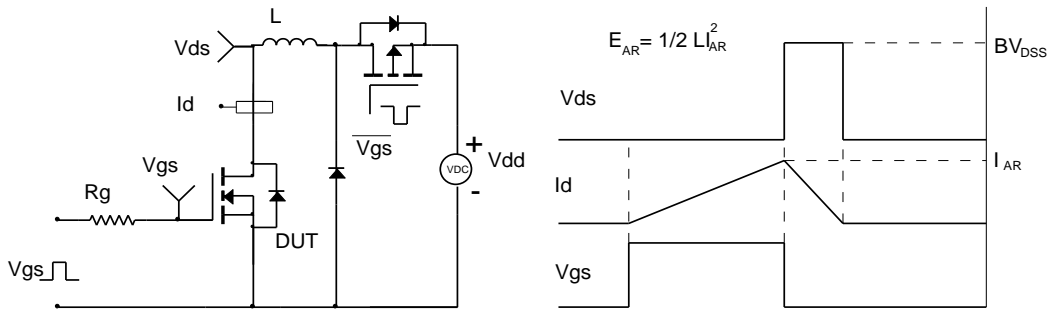
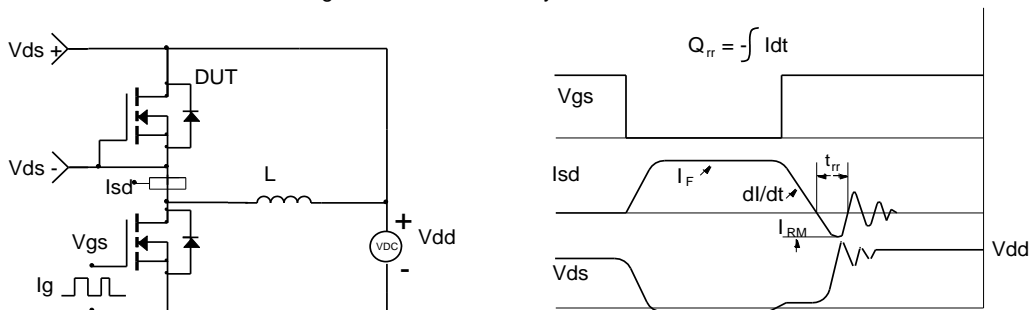


Figure D: Diode Recovery Test Circuit & Waveforms





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