# HAOLIN ELECTRONICS

# HP100N03/HD100N03

## Features

- Lead free and Green Device Available
- Low Rds-on to Minimize Conductive Loss
- High avalanche Current

## Application

- Load Switch
- SPMS
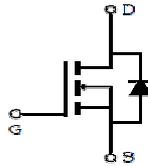
| $V_{DSS}$ | 30V |
|---|---|
| $R_{DS(on)}$ Vgs=10V typ. | 3.1mΩ |
| | 4.1mΩ |
| $R_{DS(on)}$ Vgs=4.5V typ. | 4.3mΩ |
| max. | 7mΩ |
| $I_D$ @ Vgs=10V (Silicon limited) | 100A |
| $I_D$ @ Vgs=10V (Package limited) | 80A |

TO-220

TO252
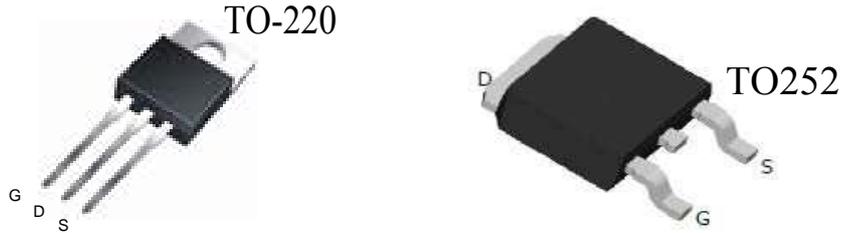
1.Gate  2. Drain  3. Source

## Absolute Maximum Ratings (T$_A$=25°C unless otherwise noted)

| Symbol | Param | | Maximum | Unit |
|---|---|---|---|---|
| $V_{DSS}$ | Drain-to-Source Voltage | | 30 | V |
| $V_{GSS}$ | Gate-to-Source Voltage | | ±20 | V |
| $I_D$ Vgs=10V | Continuous Drain Current | $T_C$=25°C (Silicon limited) | 100 | A |
| | | $T_C$=100°C (Silicon limited) | 80 | |
| | | $T_C$=25°C (Package limited) | 70 | |
| $I_D$ Vgs=4.5V | | $T_C$=25°C (Silicon limited) | 100 | |
| | | $T_C$=100°C (Silicon limited) | 65 | |
| | | $T_C$=25°C (Package limited) | 70 | |
| $I_{DP}$ | Pulsed Drain Current | $T_C$=25°C | - | A |
| $I_{AS}$ | Avalanche  Current (L=0.1mH) | | 23 | A |
| $E_{AS}$ | Avalanche  Energy (L=0.1mH) | | 26 | mJ |
| $P_D$ | Maximum Power Dissipation | $T_C$=25°C | 71 | W |
| | | $T_C$=100°C | 35 | |
| $T_J$, $T_{STG}$ | Junction & Storage Temperature Range | | -55~175 | °C |

## Thermal Characteristics

| Symbol | Parameter | Max. | Unit |
|---|---|---|---|
| $R_{thJC}$ | Thermal resistance, junction to case | 2.1 | °C/W |
| $R_{thJA}$ | Thermal resistance, junction to ambient | 106 | °C/W |

## Electrical Characteristics (TA=25°C unless otherwise noted)

| Symbol | Parameter | Test Conditions | Min. | Typ | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V,$I_D$=250uA | 30 | — | — | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=30V,$V_{GS}$=0V | — | — | 1 | uA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=250uA | 0.8 | — | 1.8 | V |
| $I_{GSS}$ | Gate Leakage Current | $V_{GS}$=±20V, $V_{DS}$=0V | — | — | ±100 | nA |
| $R_{DS(on)}$ | Drain-Source On-Resistance | $V_{GS}$=10V, $I_D$=20A | — | 3.1 | 4.1 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=20A | — | 4.3 | 7 | |
| $G_{fs}$ | Forward Transconductance | VDS=5V, ID=100A | — | 72 | — | S |
| **Diode Characteristics** | | | | | | |
| $V_{SD}$ | Diode Forward Voltage | $I_{SD}$=25A,$V_{GS}$=0V | — | 0.8 | 1.3 | V |
| $I_S$ | Diode Continuous Forward Current | | — | — | 50 | A |
| $t_{rr}$ | Reverse Recovery Time | IS=20A, di/dt=100A/us | — | 14 | — | nS |
| $Q_{rr}$ | Reverse Recovery Charge | | — | 2.8 | — | nC |
| **Dynamic Characteristics** | | | | | | |
| $R_G$ | Gate Resistance | $V_{GS}$=0V, $V_{DS}$=0V, Frequency=1MHz | — | 1.9 | — | Ω |
| $C_{iss}$ | Input Capacitance | VGS=0V, VDS=15V, F=1MHz | — | 2999 | — | pF |
| $C_{oss}$ | Output Capacitance | | — | 335 | — | |
| $C_{rss}$ | Reverse Transfer Capacitance | | — | 290 | — | |
| $t_{d(on)}$ | Turn-On Delay Time | VDS=15V, ID=1A, Rg=3 Ω, VGS=4.5V | — | 21 | — | nS |
| $t_r$ | Rise Time | | — | 32 | — | |
| $t_{d(off)}$ | Turn-Off Delay Time | | — | 59 | — | |
| $t_f$ | Fall Time | | — | 34 | — | |
| **Gate Charge Characteristics** | | | | | | |
| $Q_g$ | Total Gate Charge | VDS=25V, VGS=4.5V, ID=14A | — | 26 | — | nC |
| $Q_{gs}$ | Gate-to-Source Charge | | — | 3.5 | — | |
| $Q_{gd}$ | Gate-to-Drain Charge | | — | 14 | — | |

April 26, 2016

# Typical Operating Characteristics

### Figure 1. Typ. Output Characteristics
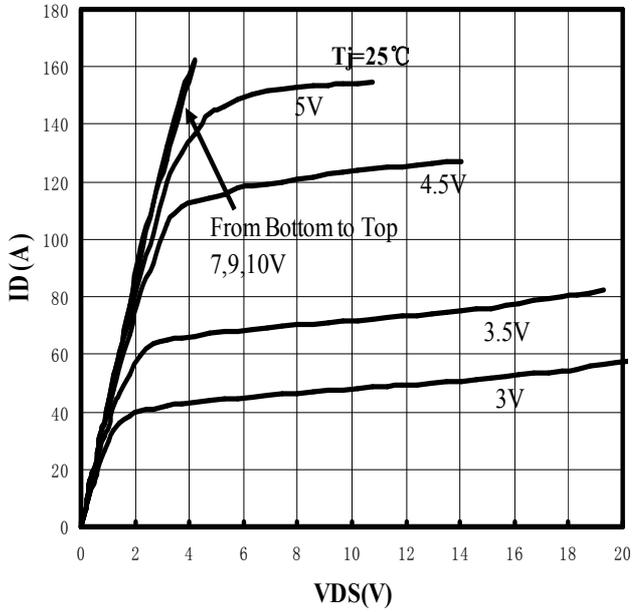


### Figure 2. Typ. Output Characteristics
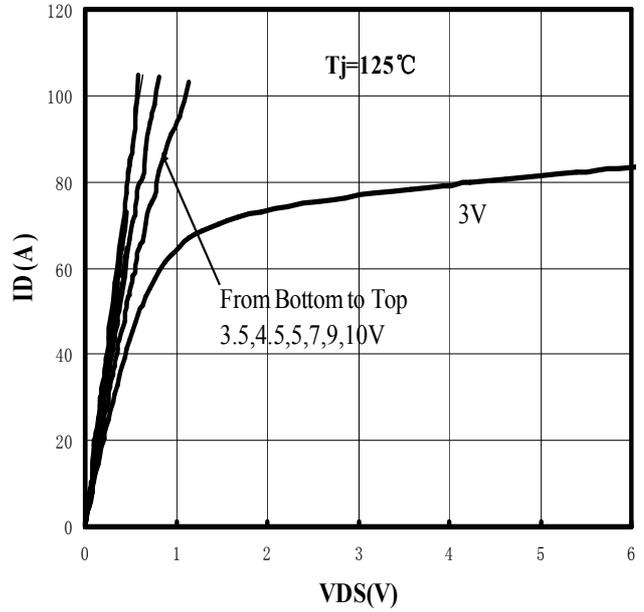


### Figure 3. Transfer Characteristics
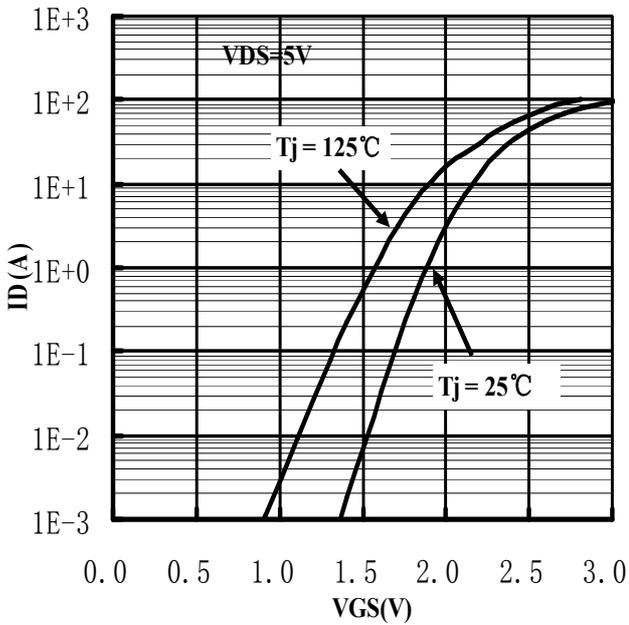


### Figure 4. Gate Threshold Voltage Characteristics



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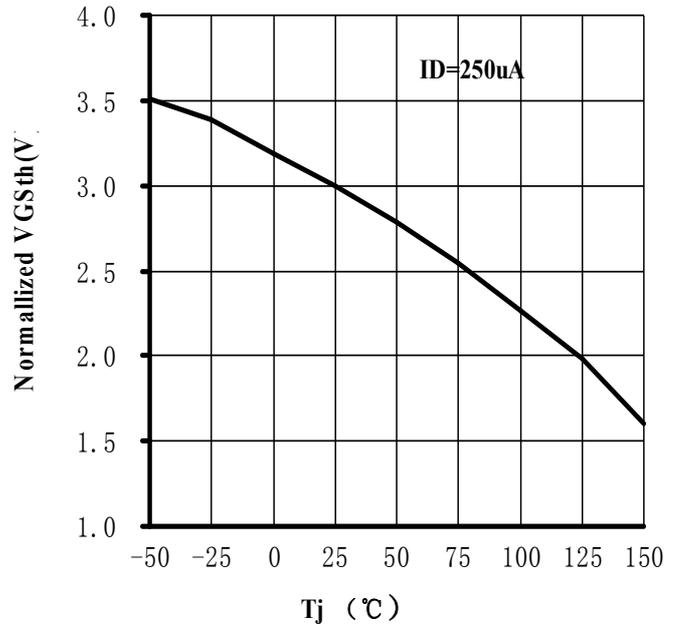
# Typical Operating Characteristics

**Figure 5. Rdson vs. Drain Current Characteristics**

VGS=4.5V,Tj=25℃
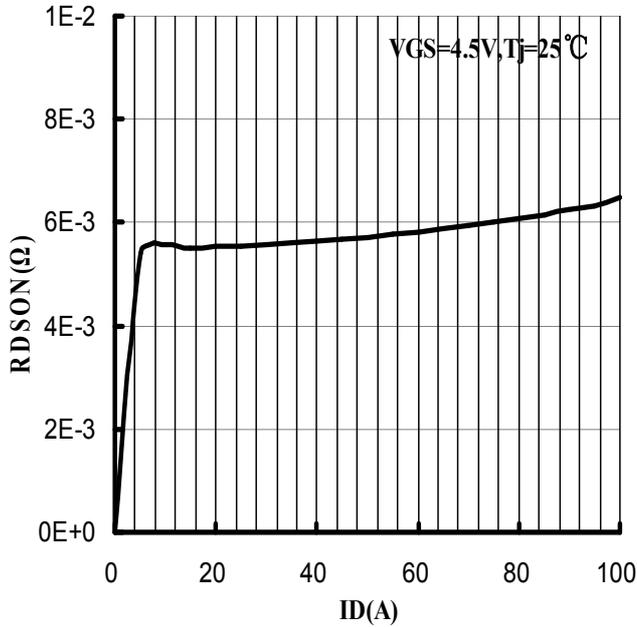
**Figure 6. Rdson vs. Junction Tem Characteristics**

VGS=4.5V,ID=20A
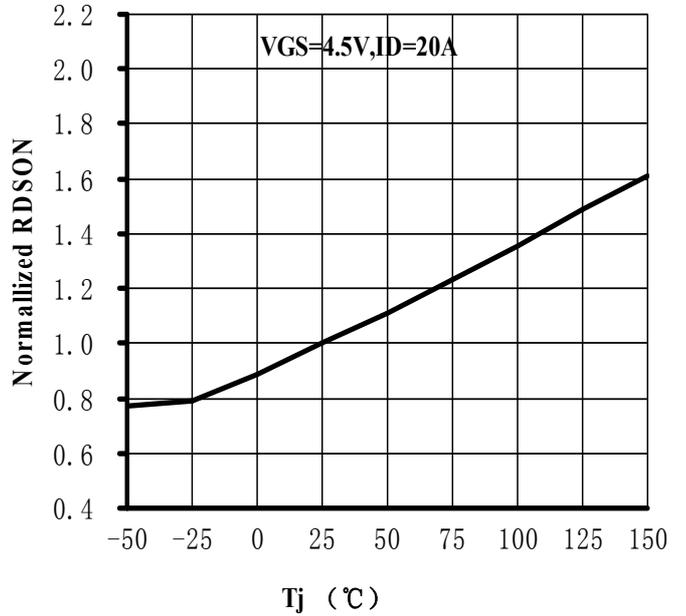
**Figure 7. Rdson vs. VGS Characteristics**

ID=20A
Tj=25℃
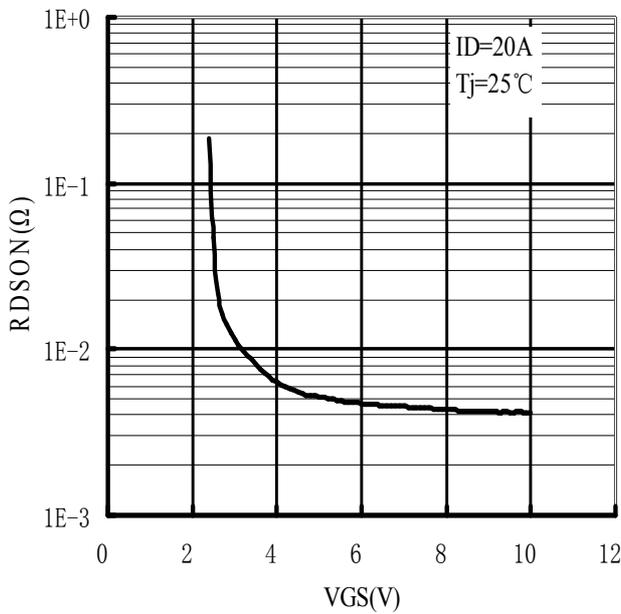
**Figure 8. IS vs. VSD Characteristics**

Tj=125℃

Tj=25℃

* Note:
1. VGS=0V
2. 250uS Pusle test
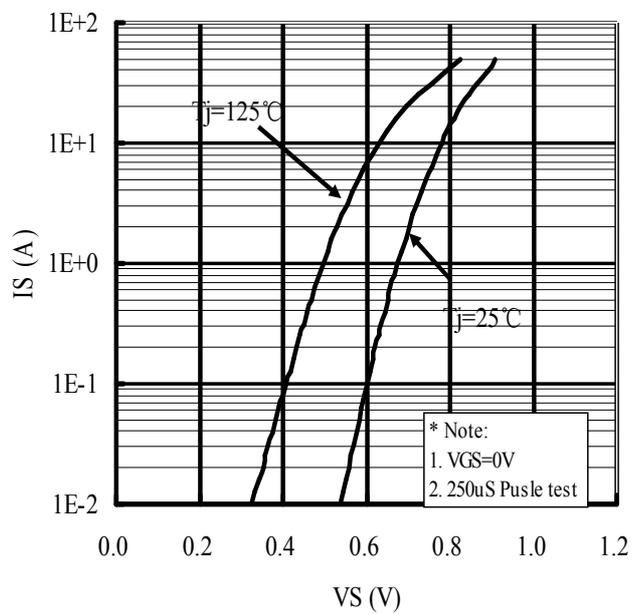
# Typical Operating Characteristics

**Figure 9. Gate Charge Characteristics**

VGS(V) vs Qg (nC)

VDS=25V,ID=14A
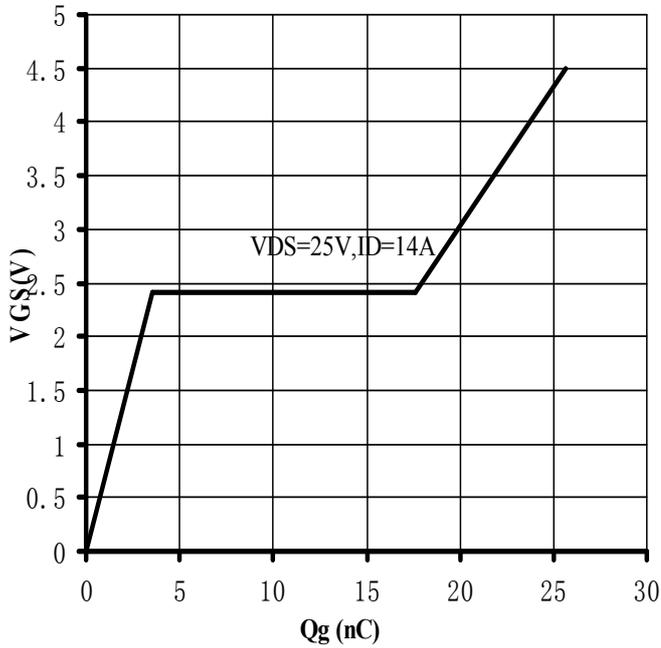
**Figure 10. Capacitance Characteristics**

C(pF) vs VDS(V)

Ciss

Coss

Crss
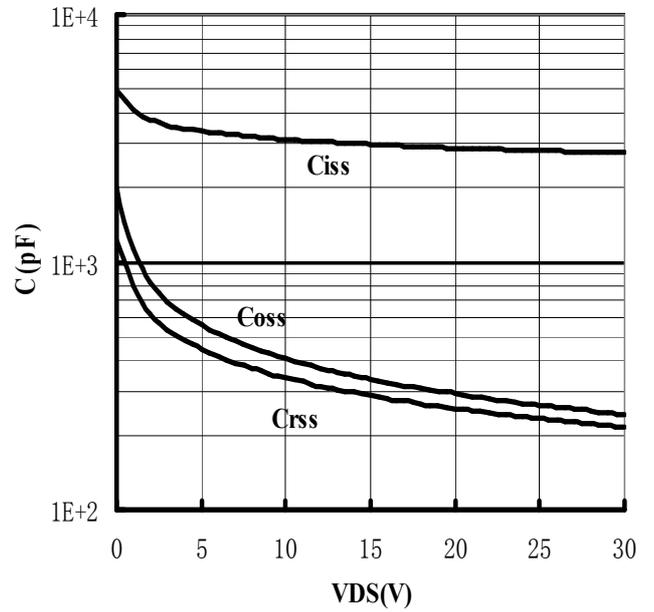
**Figure 11. Thermal Resistance Characteristics**

$Z\theta jc(t)$, Thermal Impedance ($°C/W$)

D=0.9
0.7
0.5
0.3
0.1
0.05
0.02
Singe Pusle

*Notes:
1. $Tj-Tc=P_{DM}*Z\theta jc(t)$
2. Duty Factor $D=T1/T2$

$P_{DM}$

T1
T2

T1, Square Wave Pusle Duration(Sec)
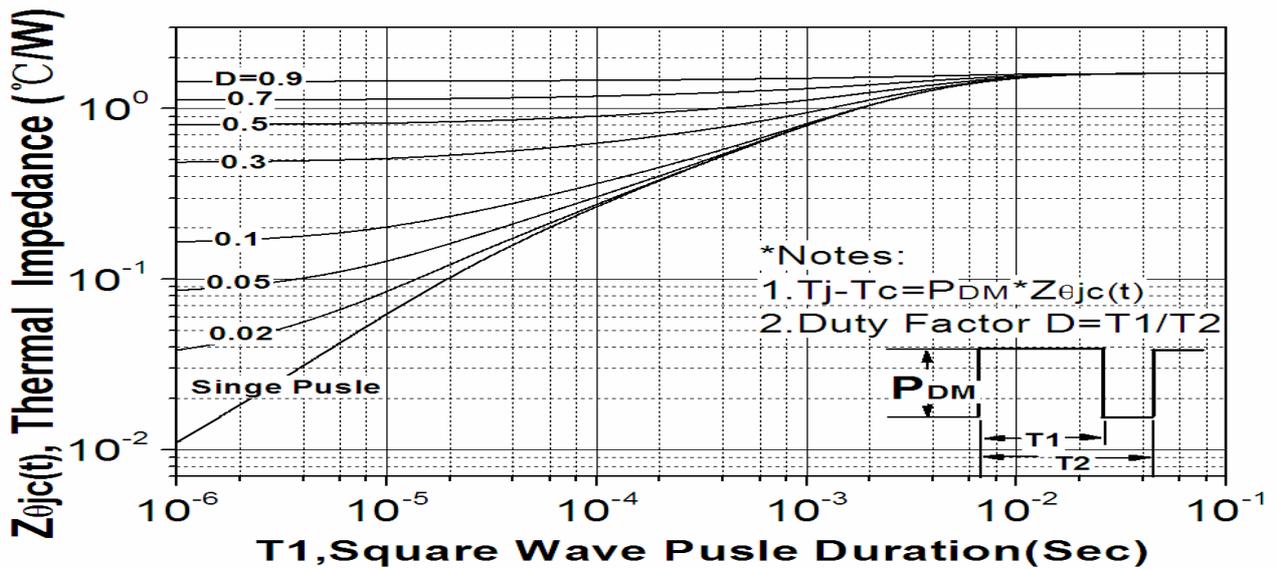
## Test Circuit & Waveform

### Gate Charge Test Circuit & Waveform
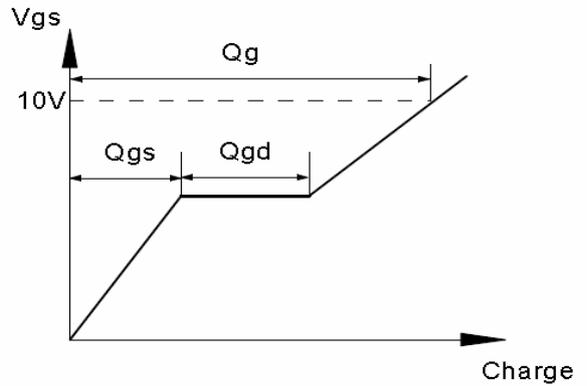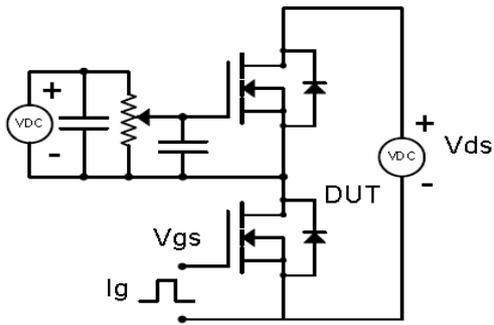


### Resistive Switching Test Circuit & Waveforms
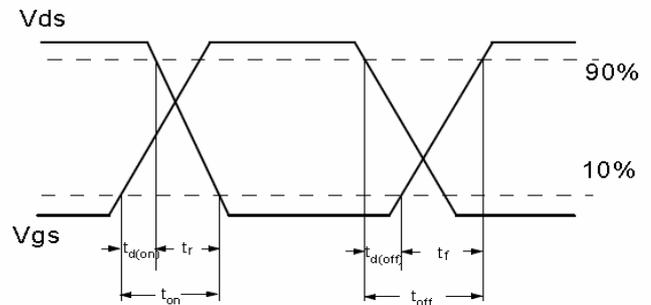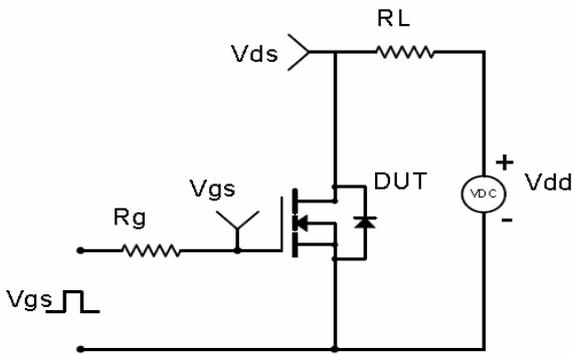


### Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

$$E_{AR} = 1/2 \, LI_{AR}^2$$
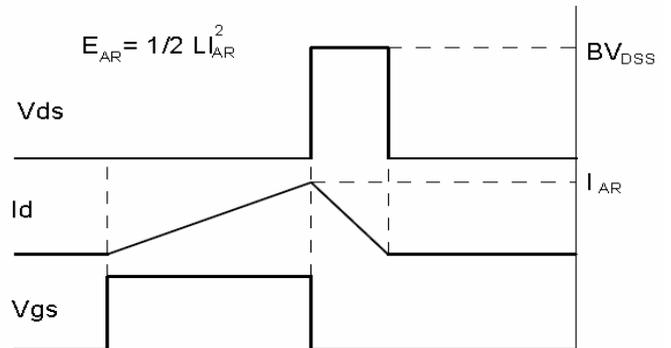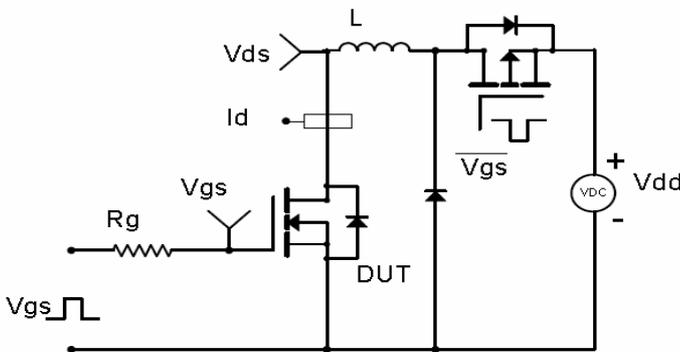


### Diode Recovery Test Circuit & Waveforms

$$Q_{rr} = -\int Idt$$

## Package Information

TO-252



A-A

# Package Information

## TO-220 (B)