# PDFN5060 Plastic-Encapsulate MOSFETS

## Features

- $V_{DS}$=40V
- $I_D$=65A
- $R_{DS(on)}$@$V_{GS}$=10V ＜ 6mΩ
- $R_{DS(on)}$@$V_{GS}$=4.5V ＜ 8mΩ
- High density cell design for ultra low Rdson
- Voltage controlled small signal switch
- Fast Switching Speedze

**Drain-source Voltage**
40 V
**Drain Current**
65 Ampere

## Applications

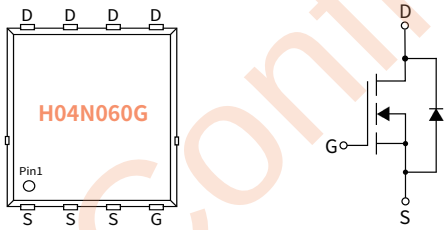
- DC-DC Converters
- Motor Control
- Portable equipment application

**PDFN5060**


## Mechanical Data

- Case: PDFN5060
  Molding compound meets UL 94V-0 flammability rating, RoHS-compliant,halogen-free
- Terminals: Solder plated, solderable per MIL-STD-750,Method 2026

## Function Diagram




## Ordering Information

| PACKAGE | PACKAGE CODE | UNIT WEIGHT(g) | REEL(pcs) | BOX(pcs) | CARTON(pcs) | DELIVERY MODE |
|---|---|---|---|---|---|---|
| PDFN5060 | R3 | 0.09 | 5000 | 10000 | 80000 | 13'' |

## Maximum Ratings (Ta=25°C Unless otherwise specified)

| PARAMETER | SYMBOL | UNIT | VALUE |
|---|---|---|---|
| Drain-source Voltage | $V_{DS}$ | V | 40 |
| Gate-source Voltage | $V_{GS}$ | V | ±20 |
| Drain Current | $I_D$ | A | 65 |
| Pulsed Drain Current [1] | $I_{DM}$ | A | 260 |
| Total Power Dissipation | $P_D$ | W | 65 |
| Single pulse avalanche energy[2] | EAS | mJ | 110 |
| Junction temperature | $T_J$ | °C | -55 ~+150 |
| Storage temperature | $T_{stg}$ | °C | -55 ~+150 |
| Thermal Resistance Junction-to-Case | $R_{\theta JC}$ | °C / W | 1.92 |

## Static Parameter Characteristics (Tj=25°C Unless otherwise specified)

| PARAMETER | SYMBOL | Condition | UNIT | Min | Typ | Max |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$= 0V, $I_D$=250μA | V | 40 | — | — |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=40V, $V_{GS}$=0V | μA | — | — | 1.0 |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$= ±20V, $V_{DS}$=0V | nA | — | — | ±100 |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$= $V_{GS}$, $I_D$=250μA | V | 1.0 | 1.5 | 2.5 |
| Static Drain-Source On-Resistance (3) | $R_{DS(ON)}$ | $V_{GS}$= 10V, $I_D$=20A | mΩ | — | 4.5 | 6 |
| | $R_{DS(ON)}$ | $V_{GS}$= 4.5V, $I_D$=10A | | — | 6.2 | 8 |

## Dynamic Parameters

| PARAMETER | SYMBOL | Condition | UNIT | Min | Typ | Max |
|---|---|---|---|---|---|---|
| Input Capacitance | $C_{iss}$ | $V_{DS}$=20V, $V_{GS}$=0V, f=1MHZ | pF | — | 910 | — |
| Output Capacitance | $C_{oss}$ | | | — | 485 | — |
| Reverse Transfer Capacitance | $C_{rss}$ | | | — | 11 | — |

## Switching Parameters

| PARAMETER | SYMBOL | Condition | UNIT | Min | Typ | Max |
|---|---|---|---|---|---|---|
| Turn-on Delay Time | $t_{D(on)}$ | $V_{GS}$=10V, $V_{DD}$=20V, $I_D$=30A ,$R_{GEN}$=3Ω | nS | — | 8 | — |
| Turn-on Rise Time | $t_r$ | | nS | — | 5 | — |
| Turn-off Delay Time | $t_{D(off)}$ | | nS | — | 24 | — |
| Turn-off fall Time | $t_f$ | | nS | — | 3.5 | — |
| Total Gate Charge | $Q_g$ | $V_{DS}$=20V, $I_D$=30A $V_{GS}$=10V | nC | — | 35 | — |
| Gate-Source Charge | $Q_{gs}$ | | nC | — | 6.4 | — |
| Gate-Drain Charge | $Q_{gd}$ | | nC | — | 3.5 | — |

## Drian-Source Diode Characteristics

| PARAMETER | SYMBOL | Condition | UNIT | Min | Typ | Max |
|---|---|---|---|---|---|---|
| Diode Forward Voltage | $V_{SD}$ | $I_S$=65, $V_{GS}$=0V | V | — | — | 1.2 |
| Maximum Body-Diode Continuous Current | $I_S$ | — | A | — | — | 65 |
| Reverse Recovery Time | $V_{rr}$ | $I_S$=65A, di/dt=100A/us, TJ=25°C | nS | — | 14 | — |
| Reverse Recovery Charge | $Q_{rr}$ | | nC | — | 16 | — |

Note :
(1)Repetitive Rating: Pulse width limited by maximum junction temperature.
(2)EAS condition : Tj=25°C ,VDD=20V,VG=10V,L=0.5mH,IAS=21A,Rg=25Ω.
(3)Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

## Ratings And Characteristics Curves (Ta=25°C Unless otherwise specified)

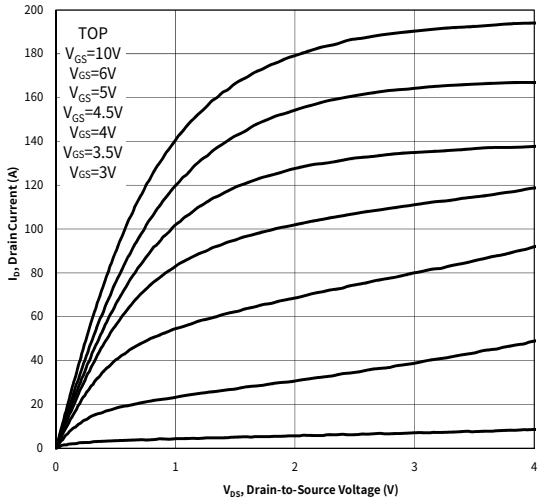



Fig.1 Output Characteristics

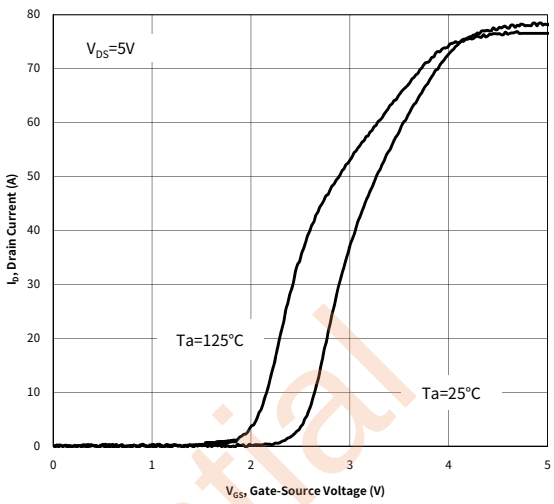



Fig.2 Transfer Characteristics

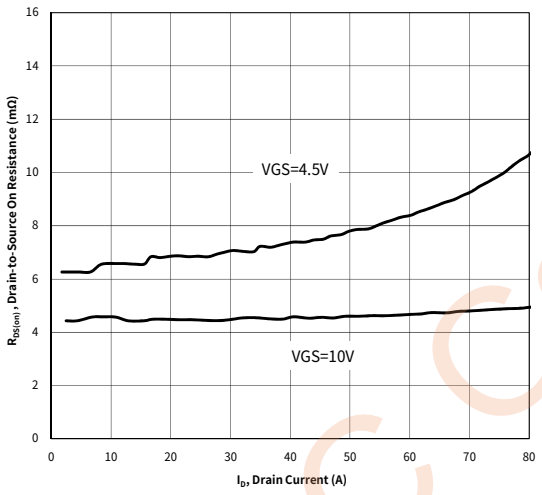



Fig.3 On-Resistance vs. Drain Current and Gate Voltage

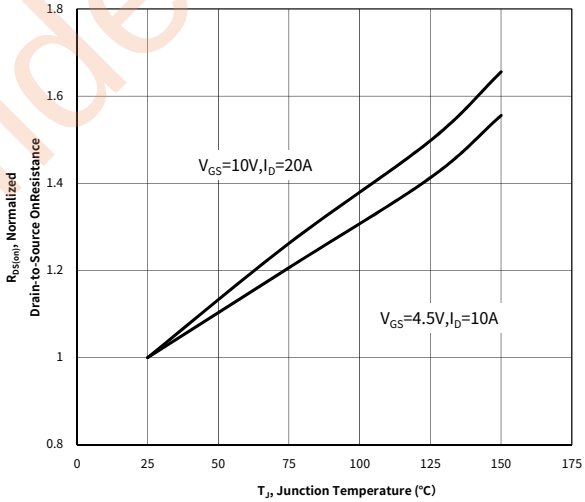



Fig.4 On-Resistance vs. Junction Temperature

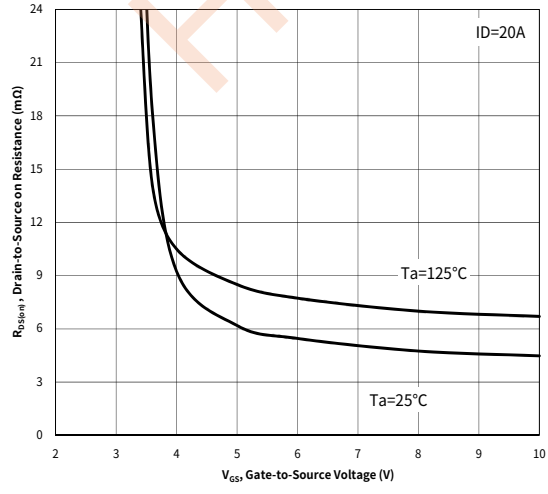



Fig.5 On-Resistance vs. Gate to Source Voltage

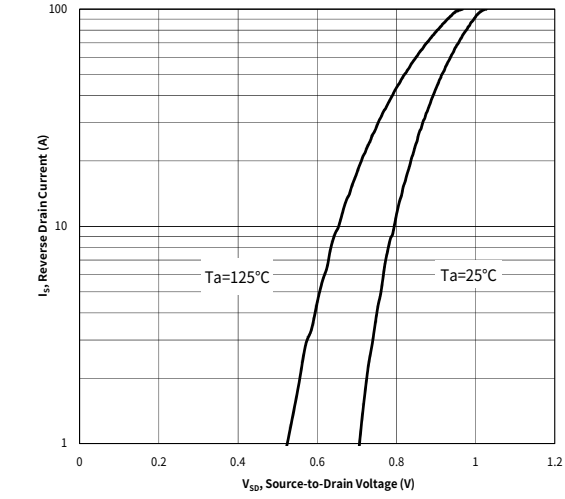



Fig.6 Typical Body-Diode Forward Characteristics

## Ratings And Characteristics Curves (Ta=25°C Unless otherwise specified)

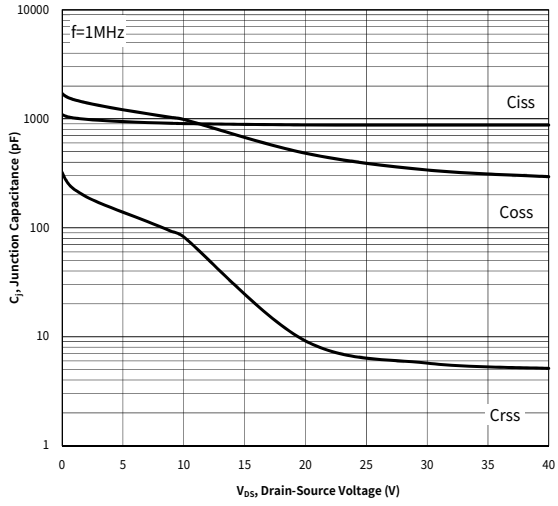



Fig.7 Capacitance Characteristics

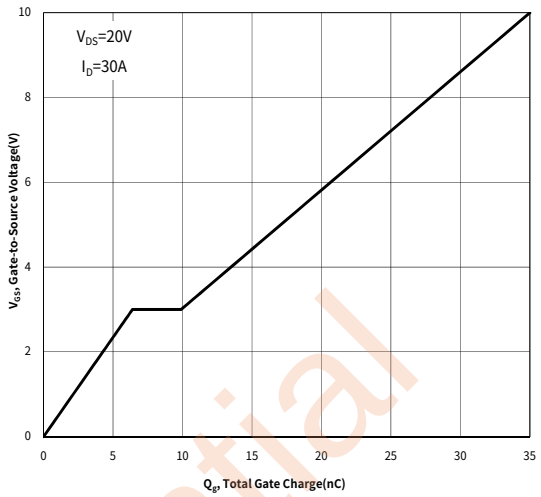



Fig.8 Gate Charge

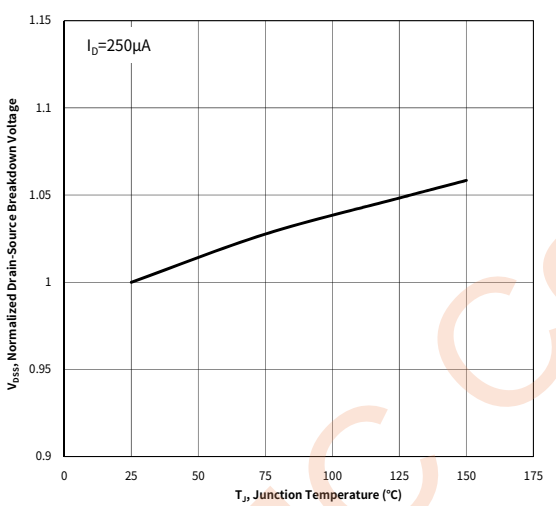



Fig.9 V(BR)DSS vs.Junction Temperature

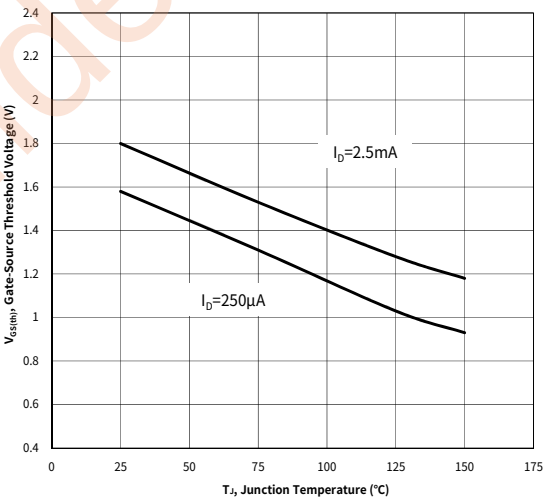



Fig.10 Gate Thresold Variation vs. Tj

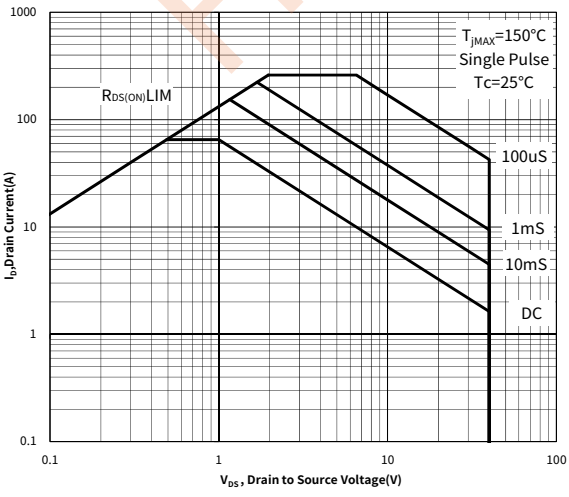



Fig.11 Safe Operation Area

## Ratings And Characteristics Curves (Ta=25°C Unless otherwise specified)

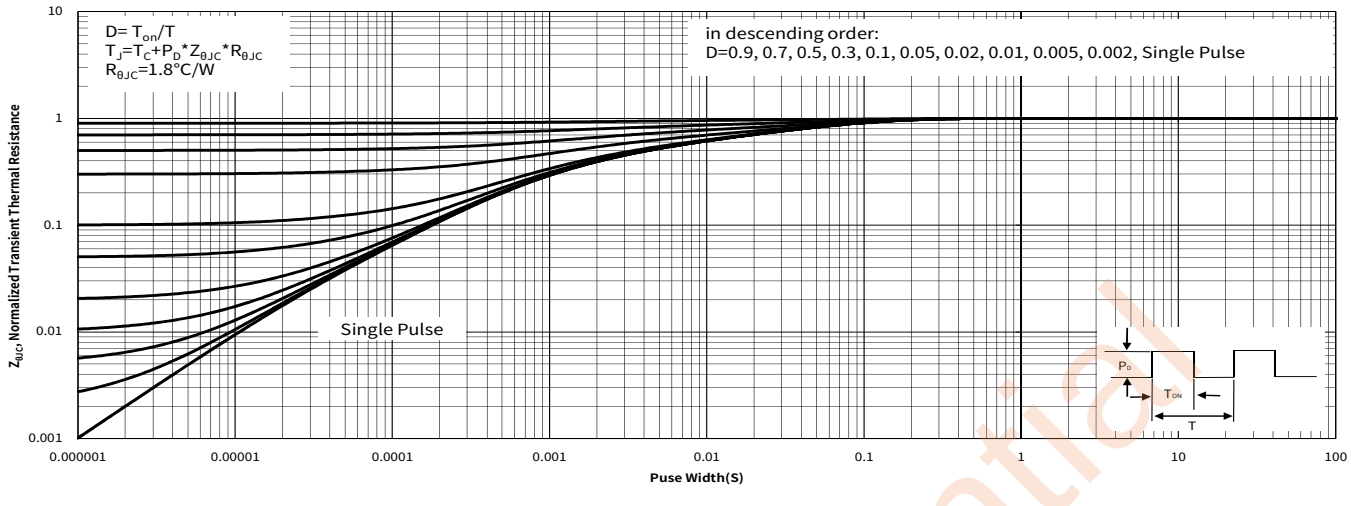
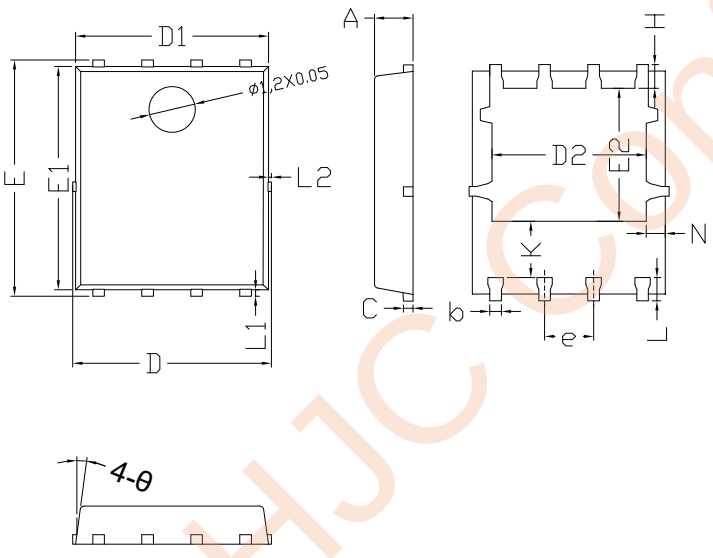


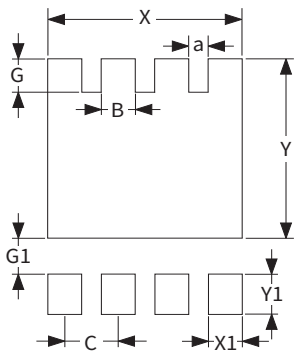

Fig.12 Normalized Maximum Transient Thermal Impedance

## Package Outline Dimensions (PDFN5060)



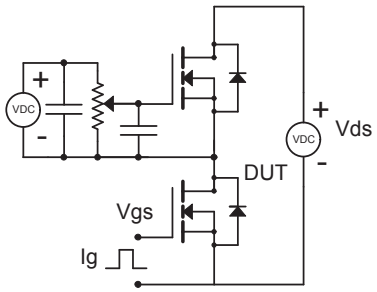

| Symbol | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 0.95 | 1.05 | 0.037 | 0.041 |
| b | 0.25 | 0.35 | 0.010 | 0.014 |
| C | 0.20 | 0.30 | 0.008 | 0.012 |
| D | 5.15 BSC | | 0.203 BSC | |
| D1 | 4.90 | 5.10 | 0.193 | 0.201 |
| D2 | 3.90 | 4.20 | 0.154 | 0.165 |
| e | 1.17 | 1.37 | 0.046 | 0.054 |
| E | 6.15 BSC | | 0.242 BSC | |
| E1 | 5.75 | 5.95 | 0.226 | 0.234 |
| E2 | 3.35 | 3.65 | 0.132 | 0.144 |
| H | 0.51 | 0.71 | 0.020 | 0.028 |
| K | 1.10 | 1.50 | 0.043 | 0.059 |
| L | 0.51 | 0.71 | 0.020 | 0.028 |
| L1 | 0.06 | 0.20 | 0.002 | 0.008 |
| L2 | - | 0.12 | - | 0.005 |
| N | 0.40 | 0.60 | 0.016 | 0.024 |
| θ | 9° | 13° | 9° | 13° |

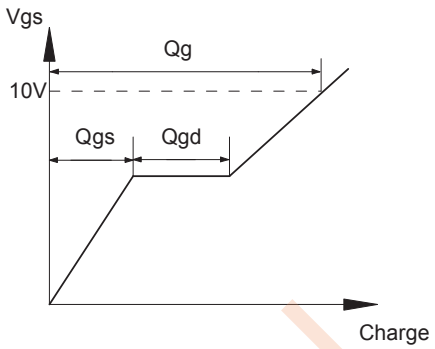
## Suggested Pad Layout



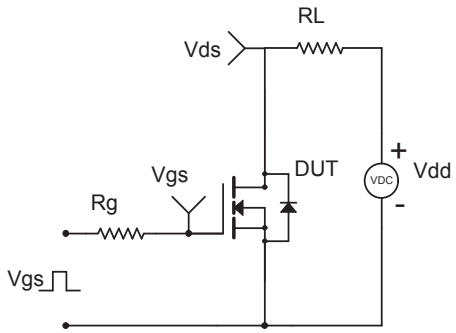

| Symbol | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| a | 0.46 | 0.48 | 0.0184 | 0.0192 |
| B | 0.70 | 0.90 | 0.028 | 0.036 |
| C | 1.17 | 1.37 | 0.0468 | 0.0548 |
| G | 0.75 | 0.95 | 0.03 | 0.038 |
| G1 | 0.80 | 1.00 | 0.032 | 0.04 |
| X | 4.50 | 4.70 | 0.180 | 0.188 |
| X1 | 0.70 | 0.90 | 0.028 | 0.036 |
| Y | 4.40 | 4.60 | 0.176 | 0.184 |
| Y1 | 0.90 | 1.10 | 0.036 | 0.044 |

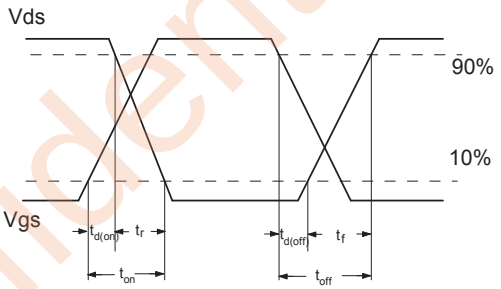
1.Gate Charge Test Circuit & Waveforms



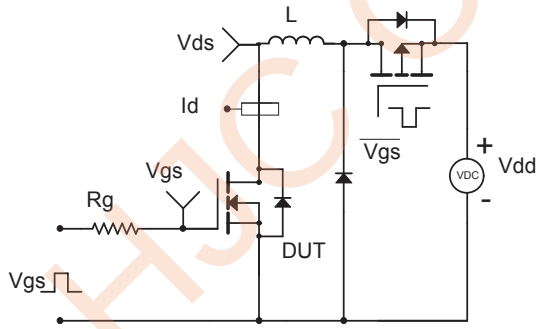



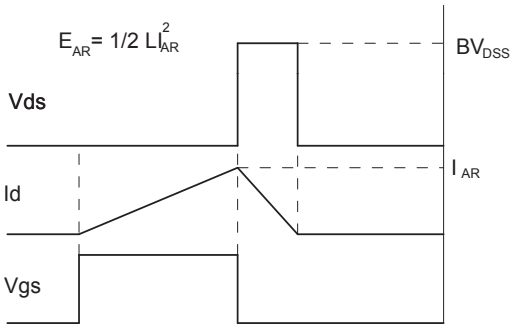

2. Resistive Switching Test Circuit & Waveforms




3.Unclamped Inductive Switching (UIS) Test Circuit & Waveforms




4.Diode Recovery Test Circuit & Waveforms