# MS18N50

## 500V N-channel MOSFET

### Description

The MS18N50 is a N-channel enhancement-mode MOSFET, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The TO-220AB package is universally preferred for all commercial-industrial applications

### Features

- Originative New Design
- Very Low Intrinsic Capacitances
- Excellent Switching Characteristics
- 100% EAS Test
- Extended Safe Operating Area
- RoHS compliant package

### Application

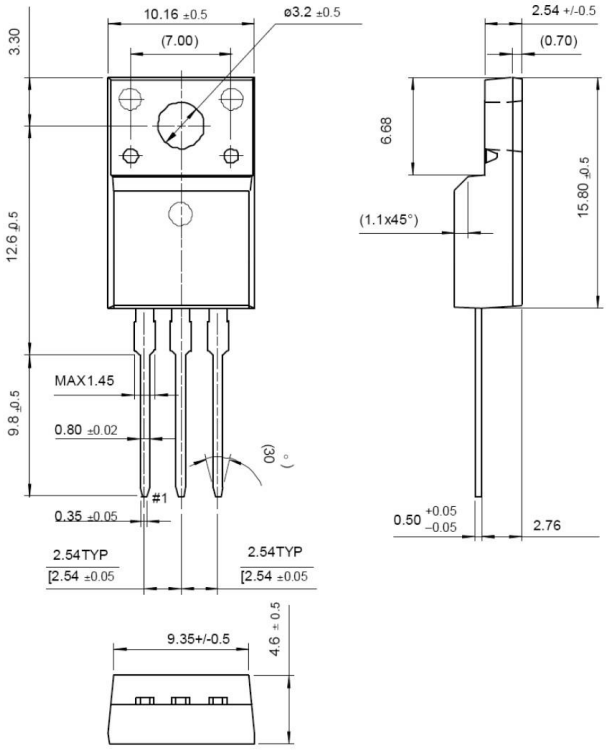
- High current, High speed switching
- PFC (Power Factor Correction)
- SMPS (Switched Mode Power Supplies)

**Package type**：TO-220AB

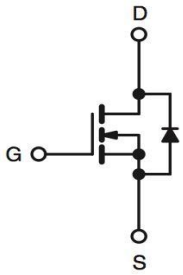
### Packing & Order Information

50/Tube ; 1,000/Box


RoHS COMPLIANT




### Graphic symbol




## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

**Absolute Maximum Ratings**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 500 | V |
| $V_{GS}$ | Gate-Source Voltage | ±30 | V |
| $I_D$ | Drain Current -Continuous (TC=25°C) | 18 | A |
| | Drain Current -Continuous (TC=100°C) | 10.8 | A |
| $I_{DM}$ | Drain Current -Pulsed | 72 | A |
| $E_{AS}$ | Single Pulsed Avalanche Energy | 990 | mJ |
| $E_{AR}$ | Repetitive Avalanche Energy | 23.5 | mJ |
| dV/dt | Peak Diode Recovery dV/dt | 4.5 | V/ns |
| $T_J$, Tstg | Operating Junction and Storage Temperature | -55~+150 | °C |
| $P_D$ | Power Dissipation (TC=25°C) | 238 | W |
| | Power Dissipation (TC=100°C) | 1.8 | W |

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• Drain current limited by maximum junction temperature

### Thermal Characteristics

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| Rthjc | Thermal Resistance resistance | 0.53 | °C/W |
| RθJA | Thermal Resistance resistance | 62.5 | |

### Static Characteristics

| Symbol | Test Conditions | Min | Typ. | Max. | Units |
|---|---|---|---|---|---|
| $V_{GS}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 3.0 | | 5.0 | V |
| $BV_{DSS}$ | $V_{GS}$ = 0 V , $I_D$ = 250μA | 500 | -- | -- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | $I_D$ = 250μA, Referenced to 25°C | -- | 0.6 | -- | V/°C |
| $I_{DSS}$ | $V_{DS}$ = 500 V , $V_{GS}$ = 0 V<br>$V_{DS}$ = 400 V , $V_{GS}$ = 0 V , $T_C$ = 125°C | -- | -- | 1<br>10 | uA |
| $I_{GSSF}$ | $V_{GS}$ =-30 V, $V_{DS}$ = 0 V | -- | -- | 100 | nA |
| $I_{GSSR}$ | $V_{GS}$ = -30 V, $V_{DS}$ = 0 V | | | -100 | nA |
| *$R_{DS(ON)}$ | $V_{GS}$ = 10 V , $I_D$ = 9 A | -- | 0.25 | 0.32 | Ω |

### Dynamic Characteristics

| Symbol | Test Conditions | Min | Typ. | Max. | Units |
|---|---|---|---|---|---|
| $C_{ISS}$ | $V_{DS}$ = 25 V, $V_{GS}$ = 0 V , f=1.0MHz | -- | 2500 | -- | pF |
| $C_{OSS}$ | | -- | 400 | -- | pF |
| $C_{RSS}$ | | -- | 40 | -- | pF |
| $t_{d(on)}$ | $V_{DD}$ = 250 V, $I_D$ = 18 A , $R_G$ = 25 Ω | -- | 70 | -- | ns |
| $t_r$ | | -- | 190 | -- | ns |
| $t_{d(off)}$ | | -- | 100 | -- | ns |
| tf | | -- | 100 | -- | ns |
| $Q_g$ | $V_{DD}$ = 400 V, $I_D$ =18 A , $V_{GS}$ =10 V | -- | 48.5 | -- | nC |
| $Q_{gs}$ | | -- | 14 | -- | nC |
| $Q_{gd}$ | | -- | 22 | -- | nC |

### Source-Drain Diode Characteristics

| Symbol | Test Conditions | Min | Typ. | Max. | Units |
|---|---|---|---|---|---|
| $I_S$ | | -- | -- | 18 | A |
| $I_{SM}$ | | -- | -- | 72 | |
| $V_{SD}$ | $I_S$ = 18 A , $V_{GS}$ = 0 V | -- | -- | 1.5 | V |
| $t_{rr}$ | $I_F$ = 18 A , $V_{GS}$ = 0 V<br>diF/dt=100A/us | -- | 550 | -- | ns |
| $Q_{rr}$ | | -- | 5.5 | -- | nC |

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Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L= 5.5mH, $I_{AS}$= 18.0A, $V_{DD}$=50V, $R_G$=25Ω, Starting TJ=25°°C
3. $I_{SD}$ ≤ 16.0 A, di/dt ≤ 200A/μs, VDD ≤ BVDSS, Starting TJ = 25°C
4. Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature

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■Characteristic Curves

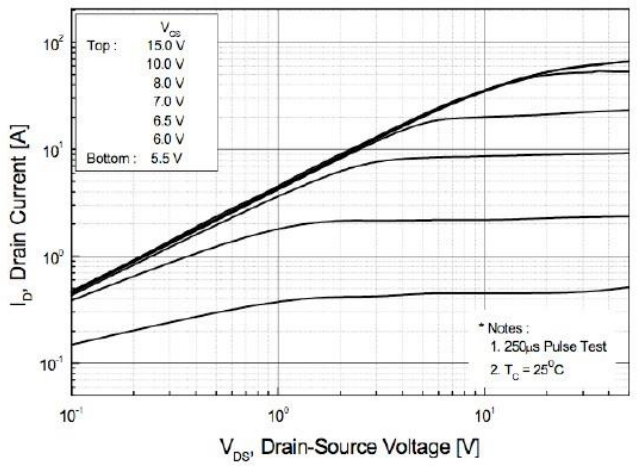


FIG.1-ON REGION CHARACTERISTICS

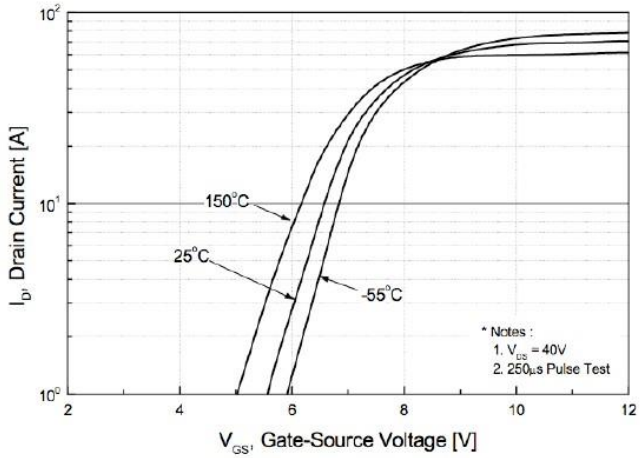


FIG.2-TRANSFER CHARACTERISTICS

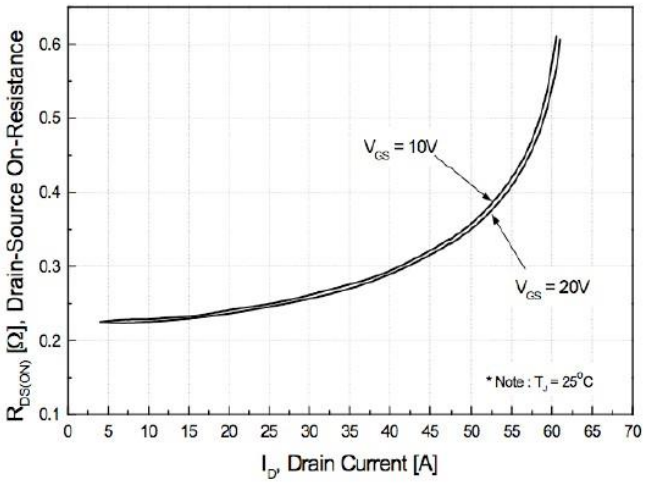


FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

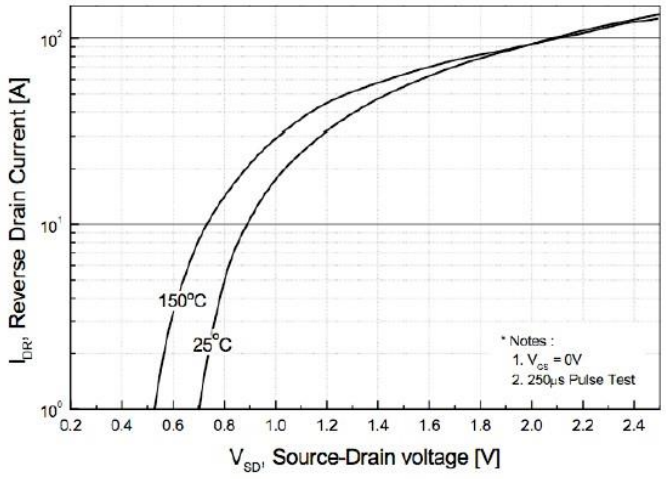


FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

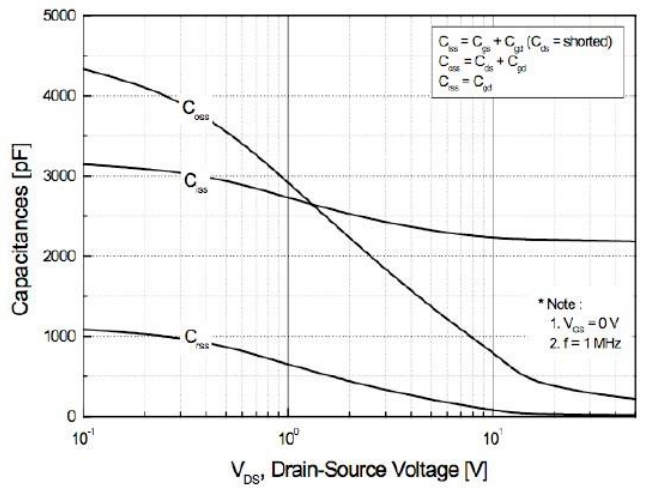


FIG.5-CAPACITANCE CHARACTERISTICS

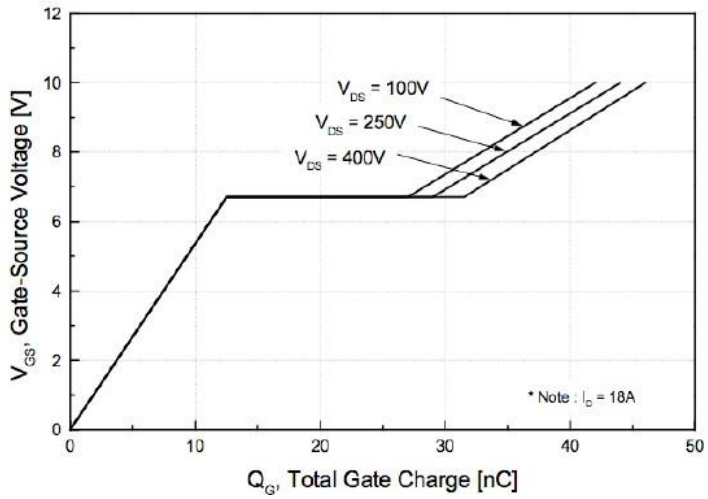


FIG.6-GATE CHARGE CHARACTERISTICS

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■Typical Electrical Characteristics

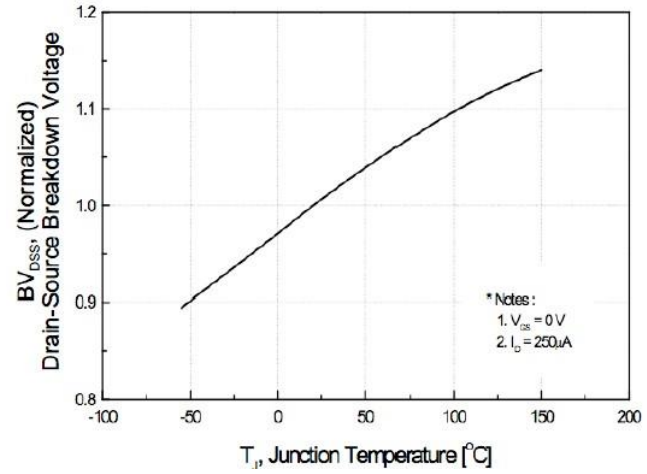


FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

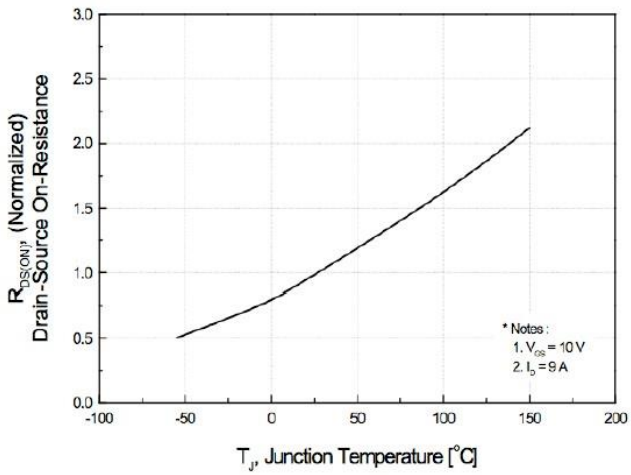


FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE

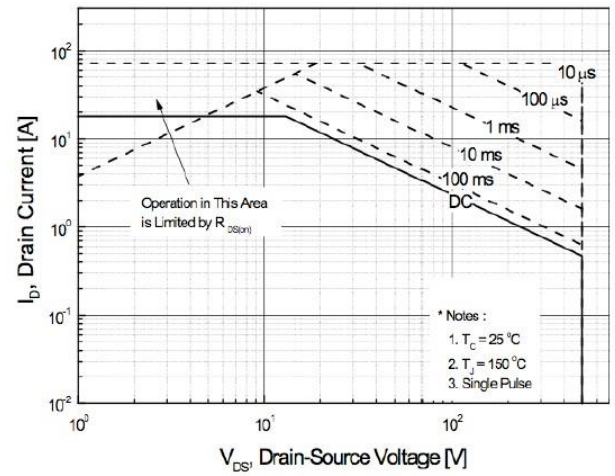


FIG.9-MAXIMUM SAFE OPERATING AREA

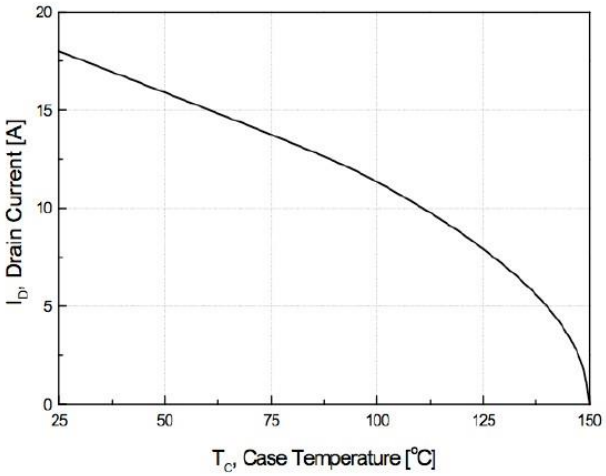


FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

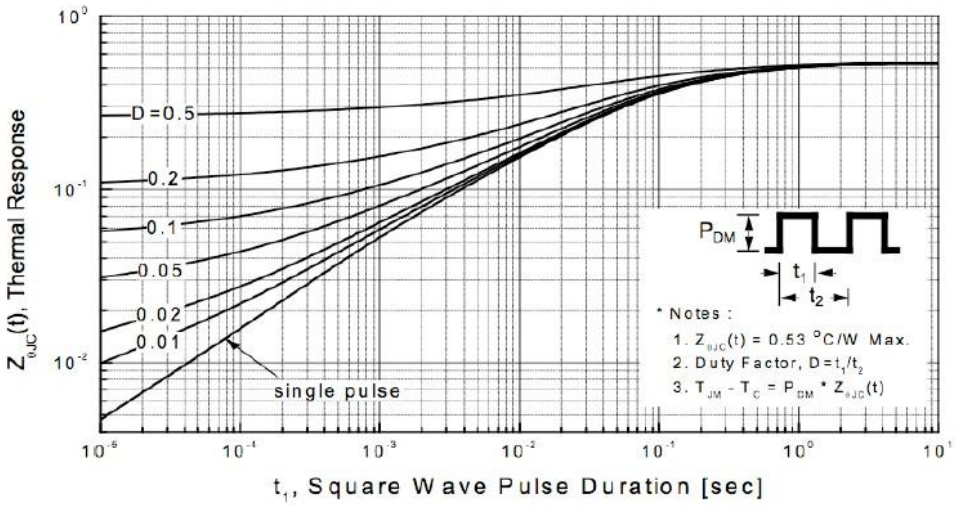


FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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■Characteristics Test Circuit & Waveform

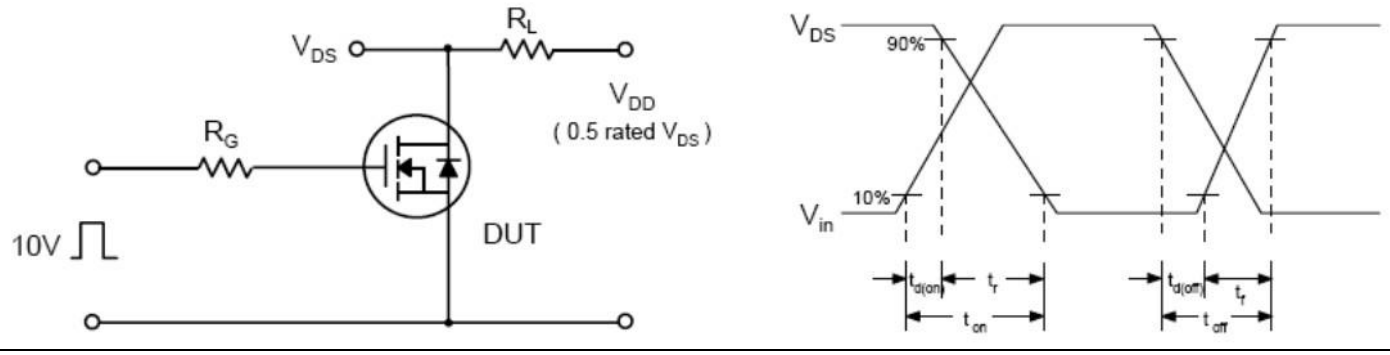


FIG.12-RESISTIVE SWITCHING TEST CIRCUIT & WAVEFORMS

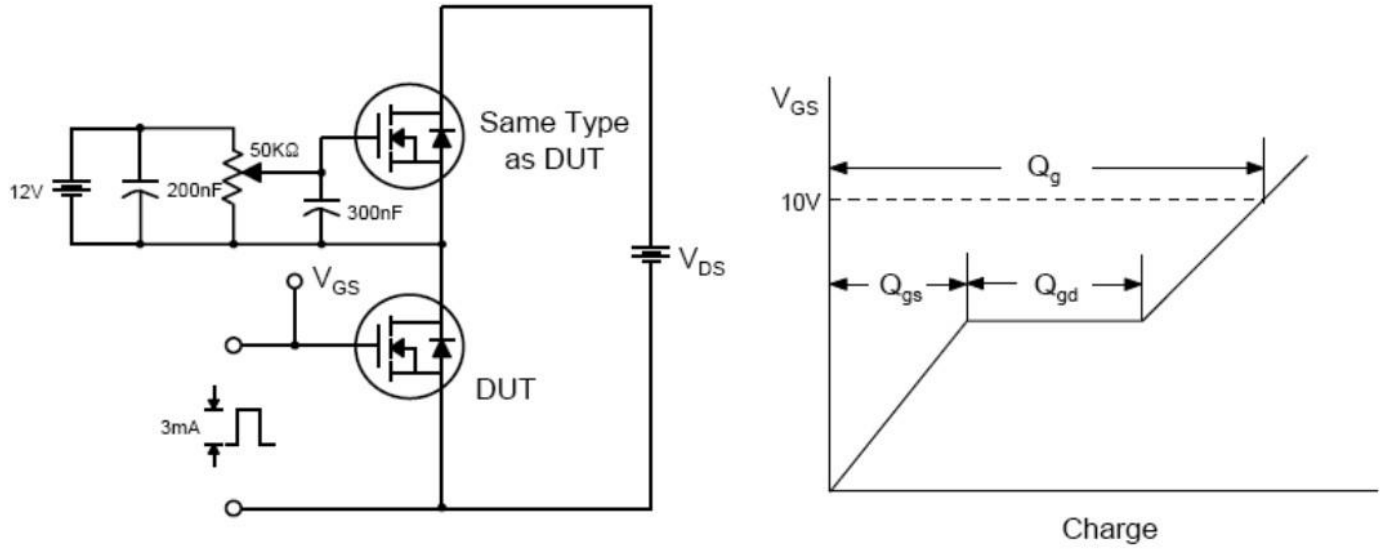


FIG.13-GATE CHARGE TEST CIRCUIT & WAVEFORM

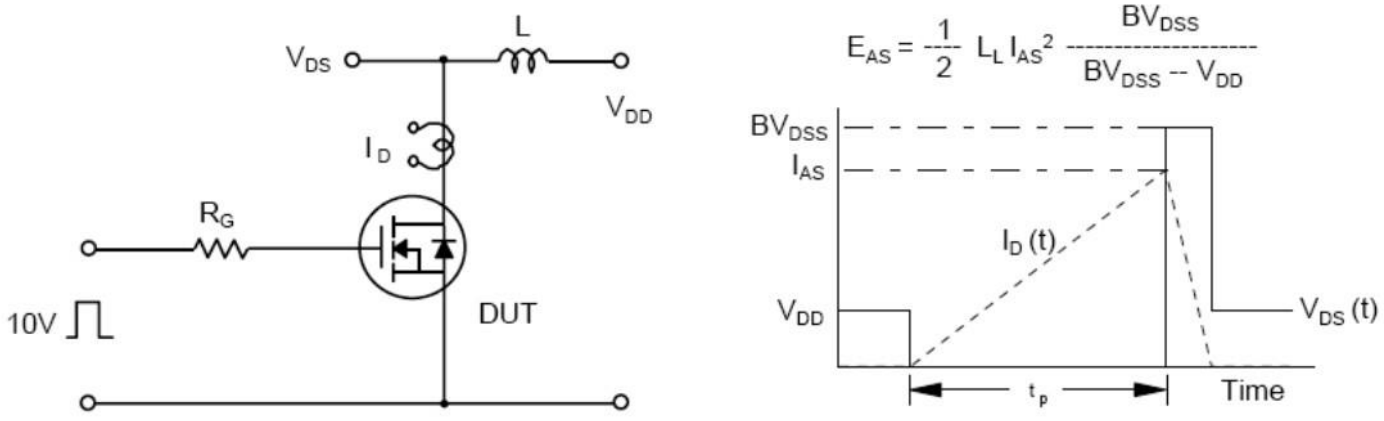


FIG.14-UNCLAMPED LINDUCTIVE SWITCHING TEST CIRCUIT & WAVEFORMS

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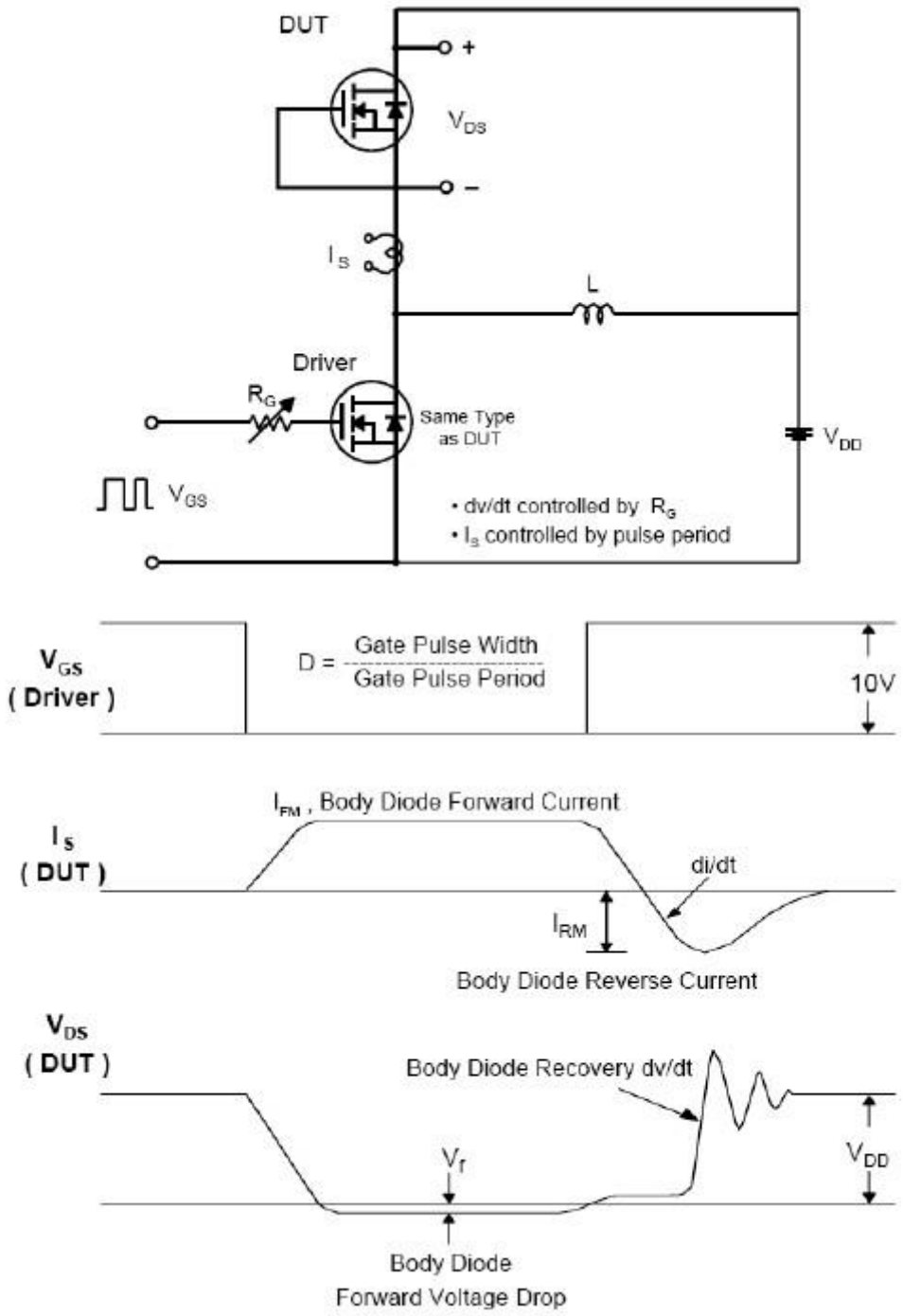


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

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