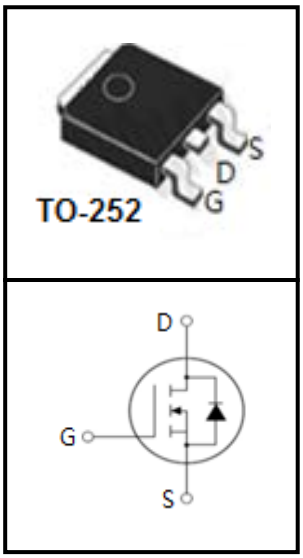
# 100V N-Channel Trench MOSFET

## FEATURES

- Super Low Gate Charge
- 100% EAS Guaranteed
- RoHS compliant
- Green Device Available
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology




## APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Hard switched and high frequency circuits

RoHS

## Device Marking and Package Information

| Device | Package | Marking |
|---|---|---|
| CTD10N033 | TO-252 | CTD10N033 |

## Absolute Maximum Ratings at $T_j$= 25ºC unless otherwise noted

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain-Source Voltage ($V_{GS}$ = 0V) | | $V_{DSS}$ | 100 | V |
| Continuous Drain Current $T_C$ = 25ºC | (note1) | $I_D$ | 30 | A |
| Continuous Drain Current $T_C$ = 100ºC | (note1) | | 23 | A |
| Pulsed Drain Current | (note2) | $I_{DM}$ | 120 | A |
| Gate Source Voltage | | $V_{GSS}$ | ±20 | V |
| Single Pulse Avalanche Energy | (note3) | $E_{AS}$ | 46 | mJ |
| Power Dissipation $T_C$ = 25ºC | (note4) | $P_D$ | 52 | W |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{stg}$ | -55~150 | ºC |

## Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 2.4 | ºC/W |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 62 | |

| **Electrical Characteristics** $T_j$= 25ºC unless otherwise specified | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Test Conditions** | **Value** | | | **Unit** |
| | | | **Min.** | **Typ.** | **Max.** | |
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 100 | -- | -- | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 80V, $V_{GS}$ = 0V, $T_J$ = 25ºC | -- | -- | 1 | uA |
| | | $V_{DS}$ = 80V, $V_{GS}$ = 0V, $T_J$ = 100ºC | -- | -- | 5 | uA |
| Gate-Source Leakage | $I_{GSS}$ | $V_{GS}$ = ±20V | -- | -- | ±100 | nA |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 1.0 | -- | 2.5 | V |
| Drain-Source On-Resistance (note2) | $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 15A | -- | 27.5 | 33 | mΩ |
| | | $V_{GS}$ = 4.5V, $I_D$ = 10A | -- | 29 | 37 | mΩ |
| **Dynamic** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 25V, f = 1.0MHz | -- | 3000 | -- | pF |
| Output Capacitance | $C_{oss}$ | | -- | 120 | -- | |
| Reverse Transfer Capacitance | $C_{rss}$ | | -- | 110 | -- | |
| Gate Resistance | Rg | f = 1.0MHz | -- | 1.7 | -- | Ω |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 80V, $I_D$ = 15A, $V_{GS}$ = 10V | -- | 65 | -- | nC |
| Gate-Source Charge | $Q_{gs}$ | | -- | 7 | -- | |
| Gate-Drain Charge | $Q_{gd}$ | | -- | 16 | -- | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$ = 50V, $I_D$ = 15A ,$R_G$ = 3Ω | -- | 12 | -- | ns |
| Turn-on Rise Time | $t_r$ | | -- | 42 | -- | |
| Turn-off Delay Time | $t_{d(off)}$ | | -- | 54 | -- | |
| Turn-off Fall Time | $t_f$ | | -- | 13 | -- | |
| **Body Diode Characteristics** | | | | | | |
| Continuous Body Diode Current | $I_S$ | $T_C$ = 25ºC | -- | -- | 30 | A |
| Pulsed Diode Forward Current | $I_{SM}$ | | -- | -- | 120 | |
| Body Diode Voltage | $V_{SD}$ | $T_J$ = 25ºC, $I_{SD}$ = 15A, $V_{GS}$ = 0V | -- | -- | 1.2 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_S$ = 15A $di_F/dt$ = 100A/μs | -- | 60 | -- | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | -- | 140 | -- | nC |

**Notes**

1. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.
2. The data tested by pulsed , pulse width≦300us , duty cycle≦2%
3. The EAS data shows Max. rating . The test condition is VGS =50V,Rg=25Ω,L=1mH
4. The power dissipation is limited by 175℃ junction temperature
5. The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

**Typical Characteristics** $T_J$ = 25ºC, unless otherwise noted

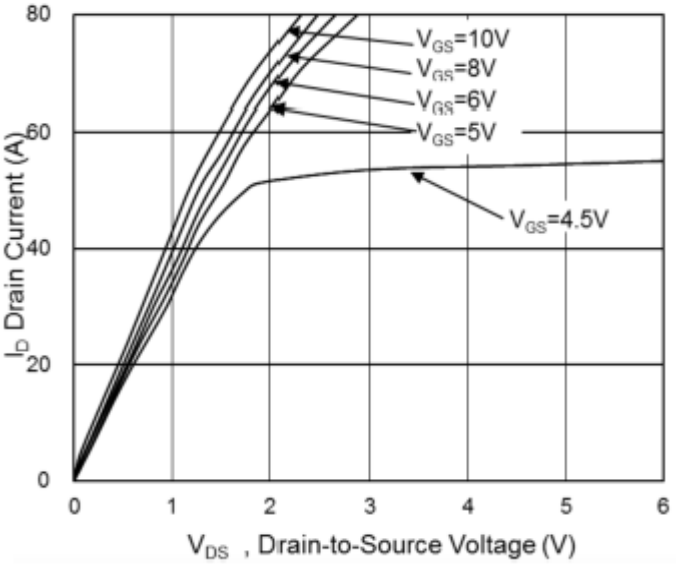



Fig.1 Typical Output Characteristics

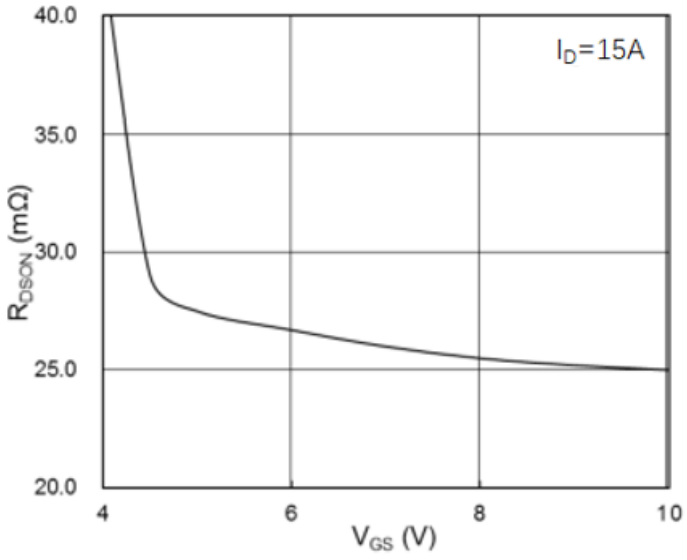



Fig.2 On-Resistance vs. G-S Voltage

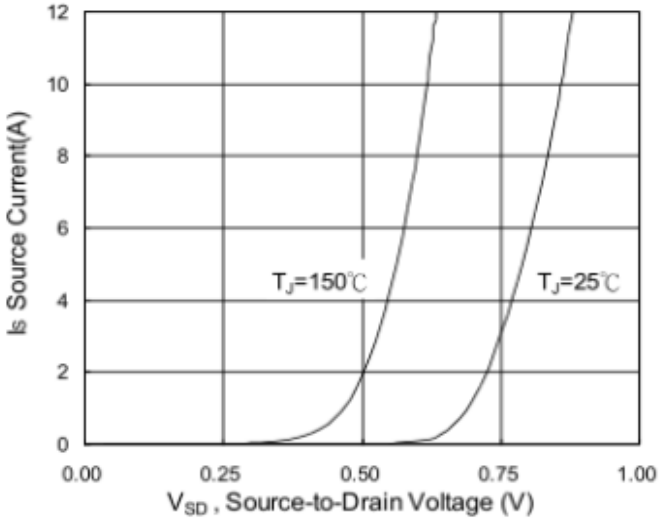



Fig.3 Forward Characteristics of Reverse Diode

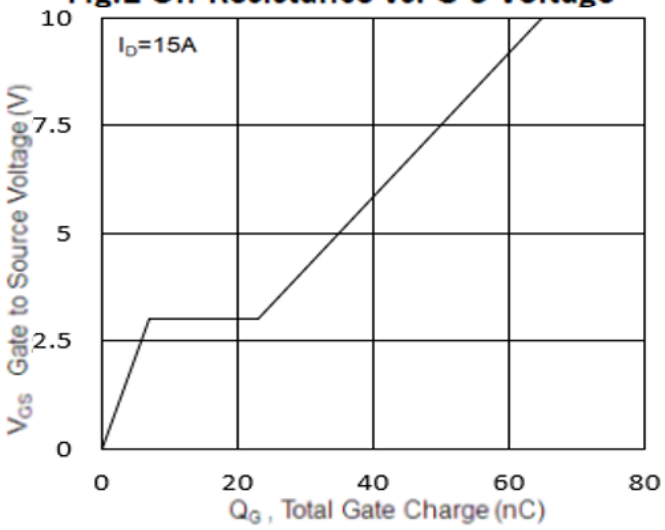



Fig.4 Gate-Charge Characteristics

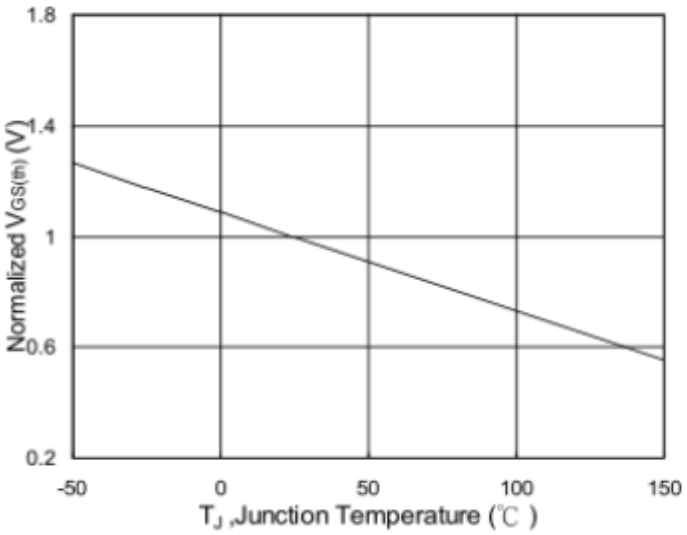



Fig.5 Normalized $V_{GS(th)}$ vs. $T_J$

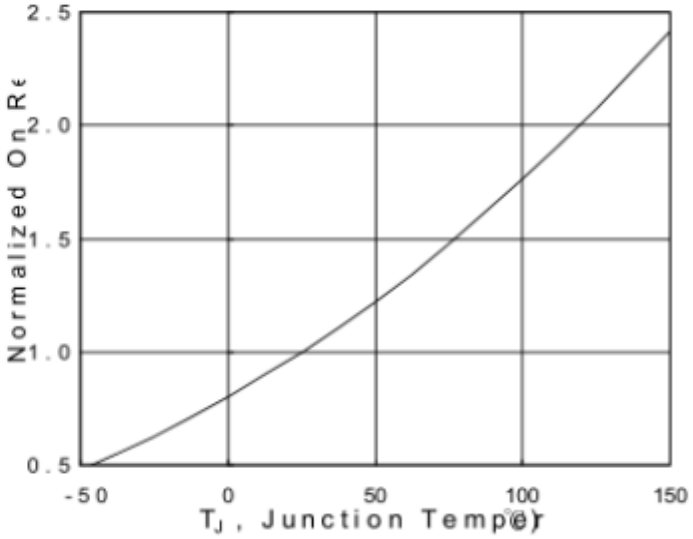



Fig.6 Normalized $R_{DSON}$ vs. $T_J$

**Typical Characteristics** $T_J$ = 25ºC, unless otherwise noted

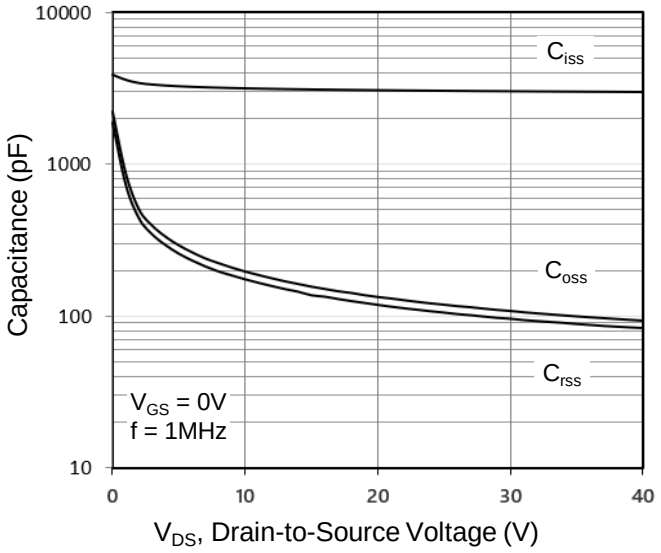



**Fig.7 Capacitance**

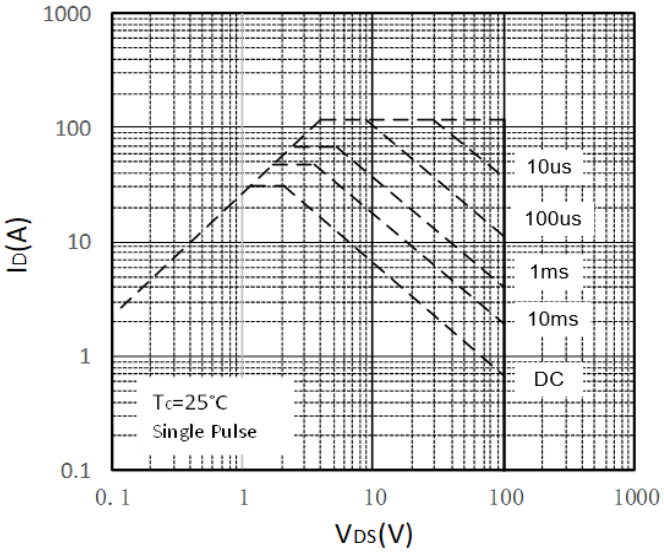



**Fig.8 Safe Operating Area**

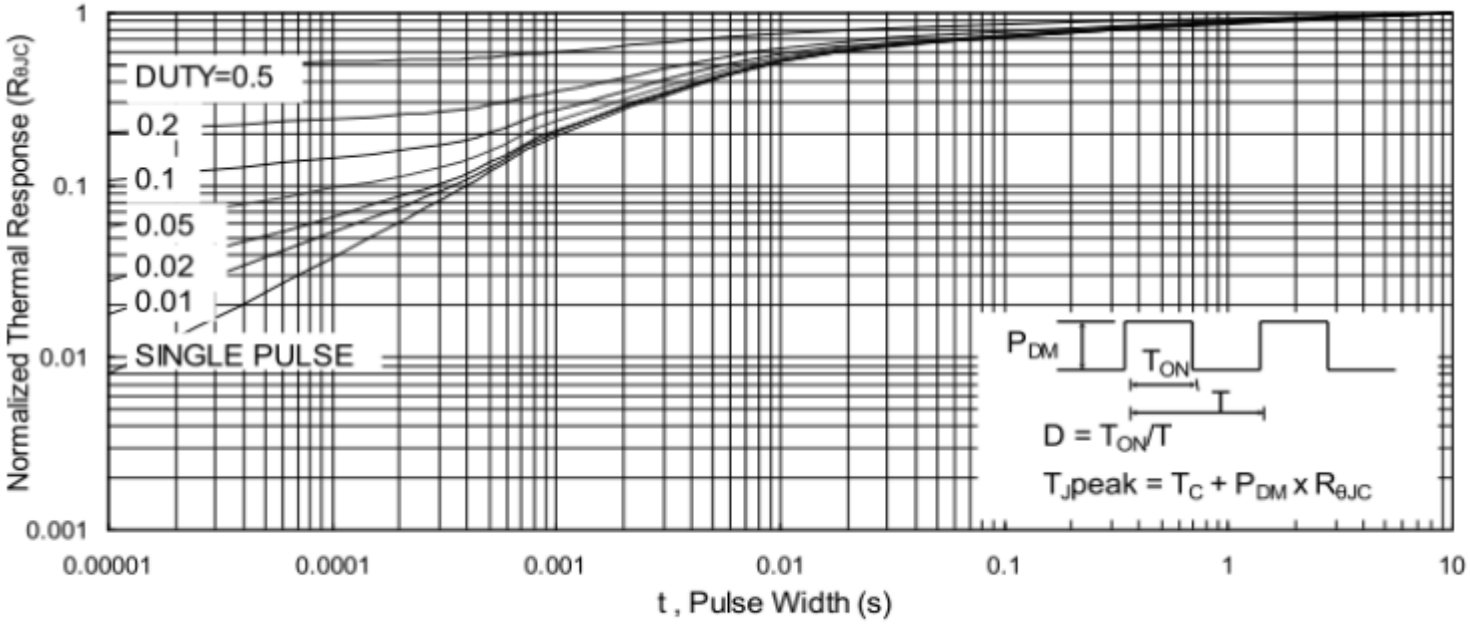



**Fig.9 Normalized Maximum Transient Thermal Impedance**

**Figure A：Gate Charge Test Circuit and Waveform**

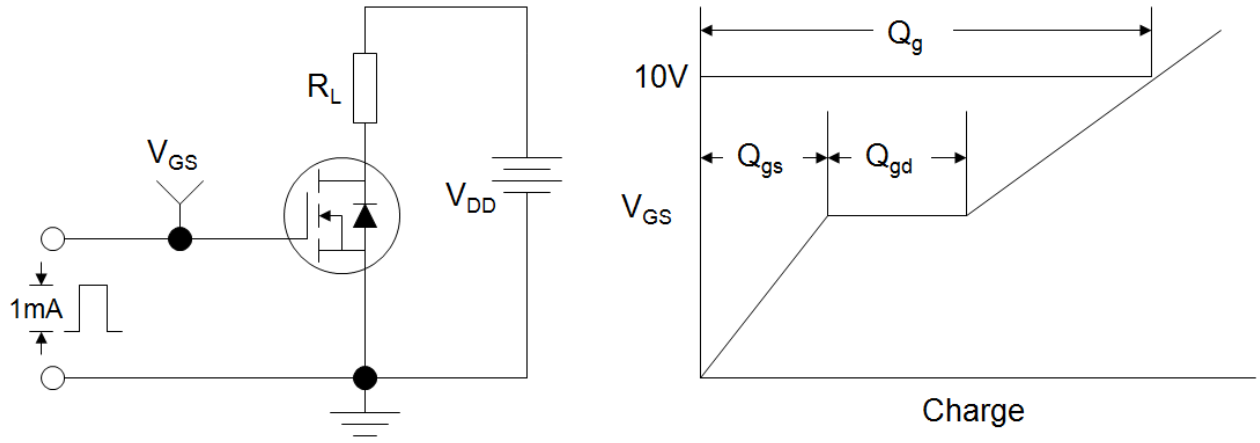



**Figure B：Resistive Switching Test Circuit and Waveform**

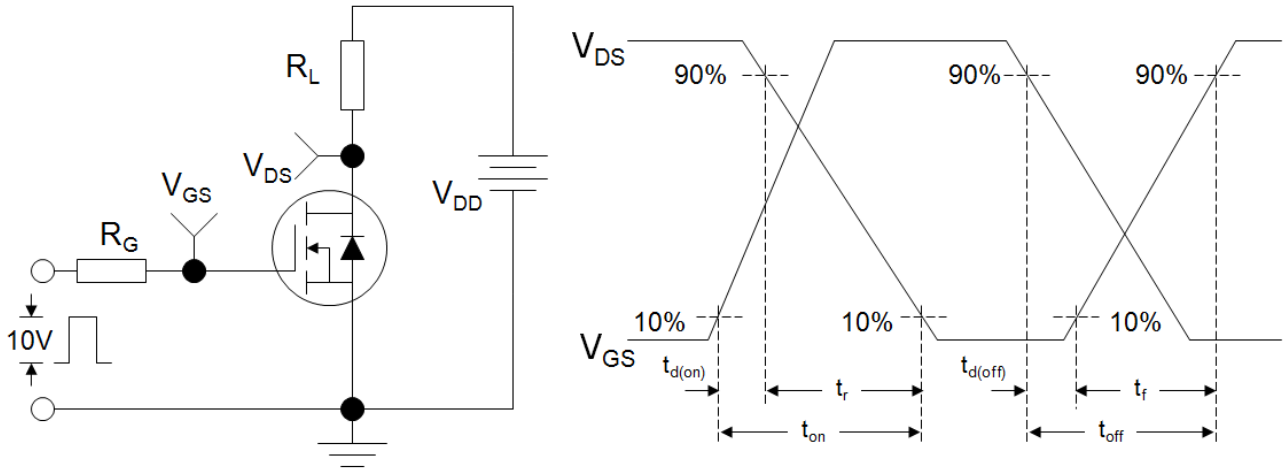
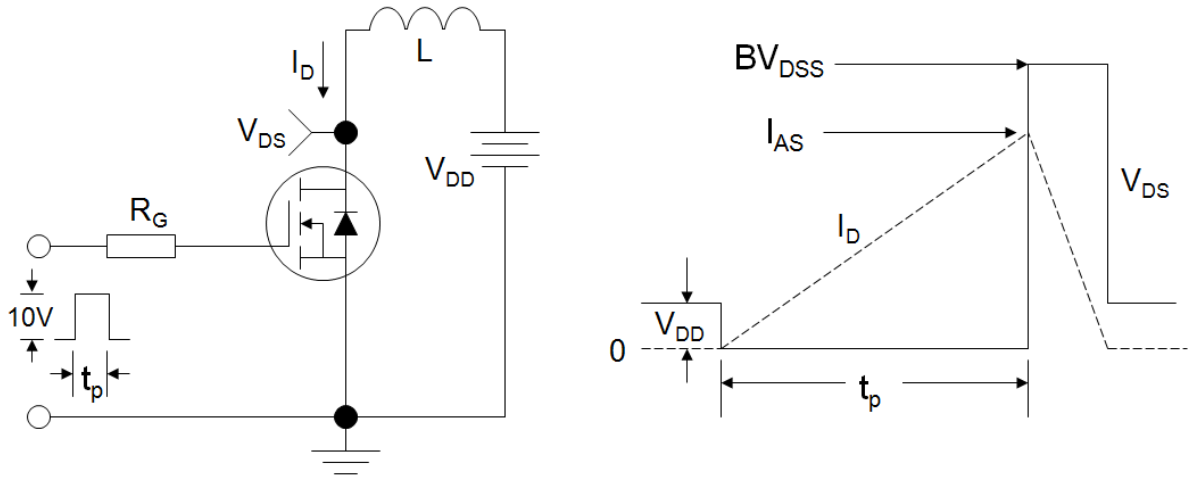
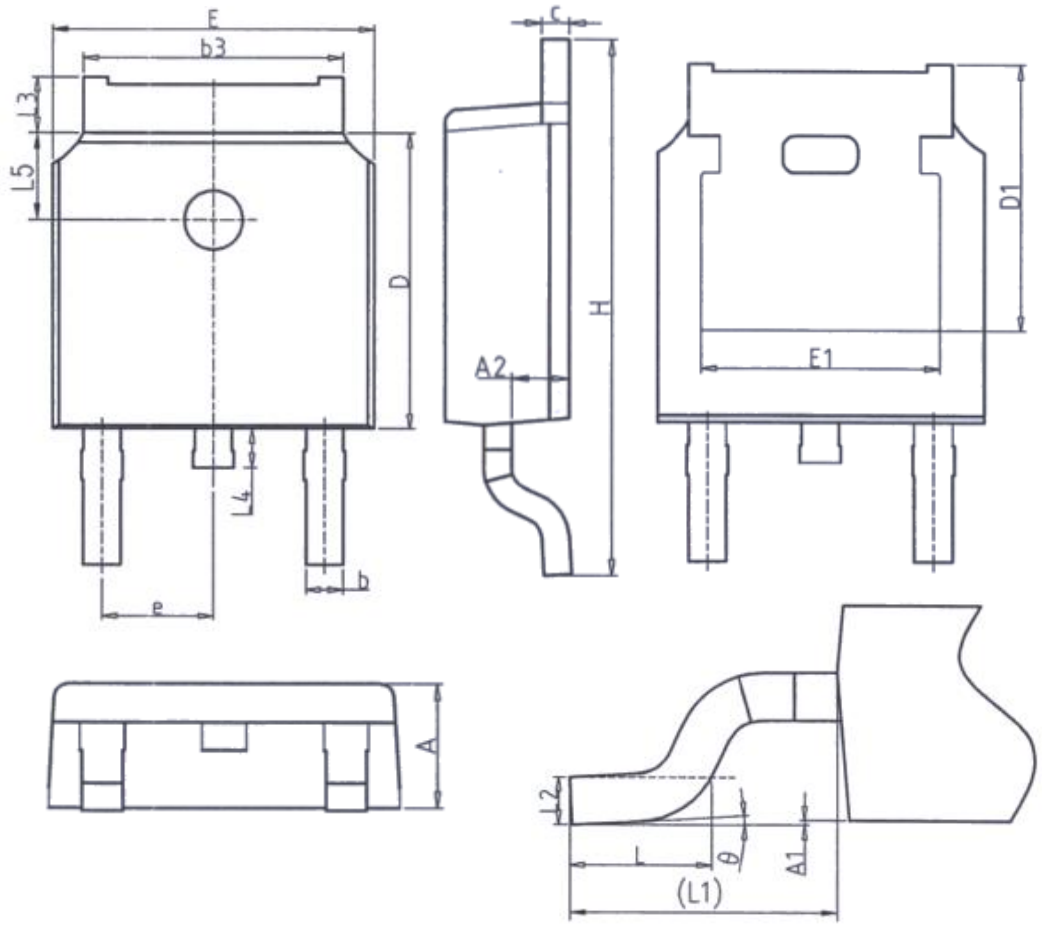



**Figure C：Unclamped Inductive Switching Test Circuit and Waveform**



# TO-252




| Unit: mm | | |
|---|---|---|
| Symbol | Min. | Max. |
| A | 2.20 | 2.40 |
| A1 | 0.00 | 0.20 |
| A2 | 0.97 | 1.17 |
| b | 0.68 | 0.90 |
| b3 | 5.20 | 5.50 |
| c | 0.43 | 0.63 |
| D | 5.98 | 6.22 |
| D1 | 5.30REF | |
| E | 6.40 | 6.80 |
| E1 | 4.63 | – |

| Unit: mm | | |
|---|---|---|
| Symbol | Min. | Max. |
| e | 2.286BSC | |
| H | 9.40 | 10.50 |
| L | 1.38 | 1.75 |
| L1 | 2.90REF | |
| L2 | 0.51BSC | |
| L3 | 0.88 | 1.28 |
| L4 | – | 1.00 |
| L5 | 1.65 | 1.95 |
| θ | 0° | 8° |

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