Wuxi Unigroup Microelectronics CO.,LTD.

# 30V N-Channel Trench MOSFET(Preliminary)

## General Description

- Trench Power technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- Optimized for fast-switching applications

## Applications

- Synchronous Rectification in DC/DC and AC/DC Converters
- Isolated DC/DC Converters in Telecom and Industrial

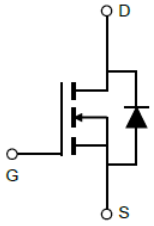
## Product Summary

| | |
|---|---|
| $V_{DS}$ | 30V |
| $I_D$ (at $V_{GS}$=10V) | 160A |
| $R_{DS(ON)}$ (at $V_{GS}$=10V) | < 2.2mΩ |
| $R_{DS(ON)}$ (at $V_{GS}$=4.5V) | < 3mΩ |

100% UIS Tested

RoHS

**TO-252**


| Part Number | Package Type | Form | Marking |
|---|---|---|---|
| TTD160N03GT | TO-252 | Tape&Reel | 160N03GT |

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

| Parameter | | Symbol | Maximum | Units |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current [B] | $T_C$ =25°C | $I_D$ | 46 | A |
| | $T_C$ =100°C | | 46 | |
| Pulsed Drain Current [A] | | $I_{DM}$ | 480 | A |
| Avalanche Current [A] | | $I_{AS}$ | 43 | A |
| Single Pulse Avalanche Energy L =0.3mH [A] | | $E_{AS}$ | 277 | mJ |
| Power Dissipation [C] | $T_C$ =25°C | $P_D$ | 143 | W |
| | $T_C$ =100°C | | 71 | W |
| Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to 175 | °C |

**Thermal Characteristics**

| Parameter | | Symbol | Maximum | Units |
|---|---|---|---|---|
| Maximum Junction-to-Case | Steady-State | $R_{\theta JC}$ | 1.1 | °C/W |
| Maximum Junction-to-Ambient | Steady-State | $R_{\theta JA}$ | 100 | |

## Electrical Characteristics($T_J$ =25ºC unless otherwise noted)

| Symbol | Parameter | Conditions | | Value | | | Units |
|---|---|---|---|---|---|---|---|
| | | | | Min | Typ | Max | |
| **STATIC PARAMETERS** | | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $I_D$ =250μA,$V_{GS}$ =0V | | 30 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ =30V, $V_{GS}$ =0V | $T_J$ =25ºC | | | 1 | μA |
| | | | $T_J$ =100ºC | | | 25 | |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{DS}$ =0V, $V_{GS}$ =±20V | | | | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ =$V_{GS}$, $I_D$ =250μA | | 1 | 1.7 | 2.4 | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$ =10V, $I_D$ =20A | | | 1.7 | 2.2 | mΩ |
| | | $V_{GS}$ =4.5V, $I_D$ =20A | | | 2.3 | 3 | mΩ |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ =10V, $I_D$ =20A | | | 34 | | S |
| $V_{SD}$ | Diode Forward Voltage | $I_S$ =10A, $V_{GS}$ =0V | | | | 1 | V |
| $I_S$ | Maximum Body-Diode Continuous Current [B] | | | | | 46 | A |
| **DYNAMIC PARAMETERS** | | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$ =0V, $V_{DS}$ =15V, f =1$MH_Z$ | | | 8313 | | pF |
| $C_{oss}$ | Output Capacitance | | | | 951 | | |
| $C_{rss}$ | Reverse Transfer Capacitance | | | | 897 | | |
| **SWITCHING PARAMETERS** | | | | | | | |
| $Q_g$(10V) | Total Gate Charge | $V_{GS}$ =10V,$V_{DS}$ =15V, $I_D$ =50A | | | 160 | | nC |
| $Q_{gs}$ | Gate Source Charge | | | | 18 | | |
| $Q_{gd}$ | Gate Drain Charge | | | | 34 | | |
| $t_{D(on)}$ | Turn-On Delay Time | $V_{GS}$ =10V,$V_{DS}$ =15V, $I_D$ =50A, $R_G$ =3Ω | | | 27 | | ns |
| $t_r$ | Turn-On Rise Time | | | | 25 | | |
| $T_{D(off)}$ | Turn-Off Delay Time | | | | 90 | | |
| $t_f$ | Turn-Off Fall Time | | | | 40 | | |
| $t_{rr}$ | Body Diode Reverse Recovery Time | $I_F$ =30A, di/dt =100A/μs | | | 43 | | ns |
| $Q_{rr}$ | Body Diode Reverse Recovery Charge | | | | 40 | | nC |

A. Single pulse width limited by maximum junction temperature.

B. The maximum current rating is package limited.

C. The power dissipation $P_D$ is based on $T_{J(MAX)}$ =175ºC, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

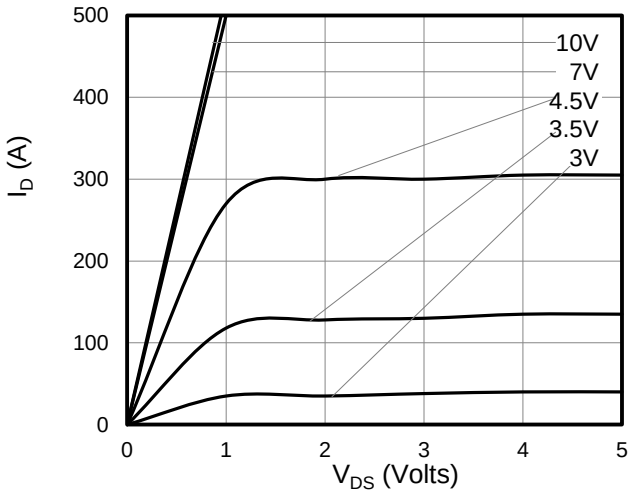



**Figure 1: On-Region Characteristics**

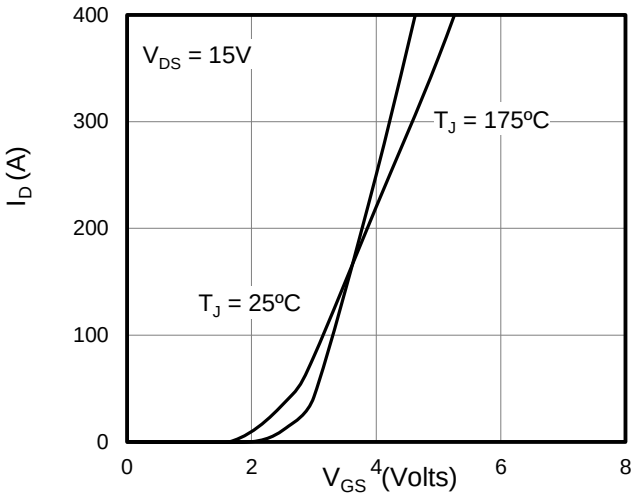



**Figure 2: Transfer Characteristics**

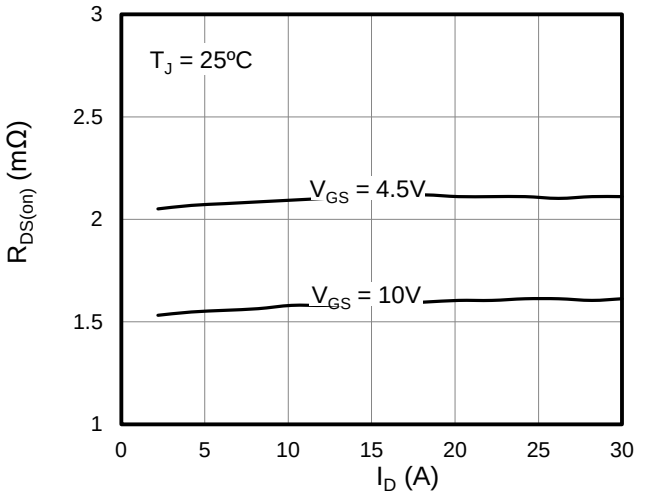



**Figure 3: On-Resistance vs. Drain Current**

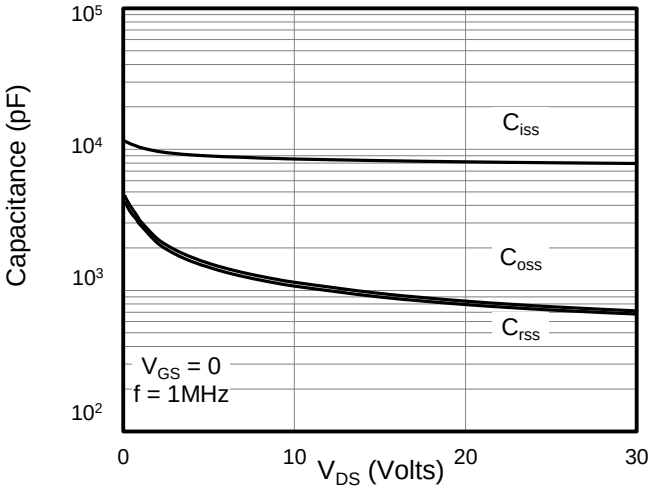



**Figure 4: Capacitance Characteristics**

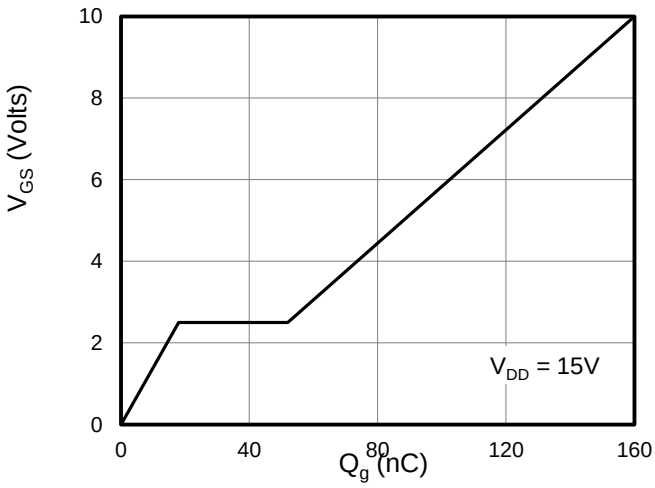



**Figure 5: Gate Charge Characteristics**

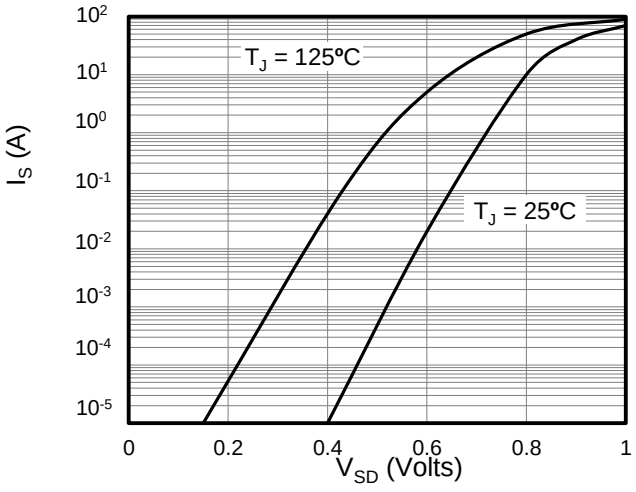



**Figure 6: Body Diode Forward Voltage**

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

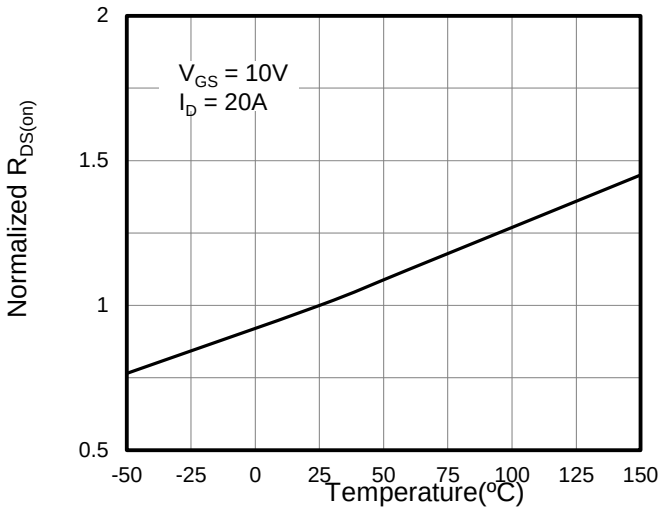



**Figure 7: On-Resistance vs. Junction Temperature**

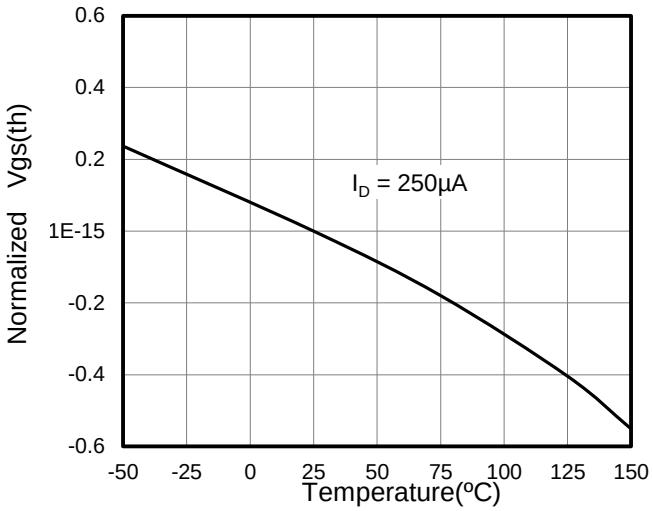



**Figure 8: Vgs(th) vs. Junction Temperature**

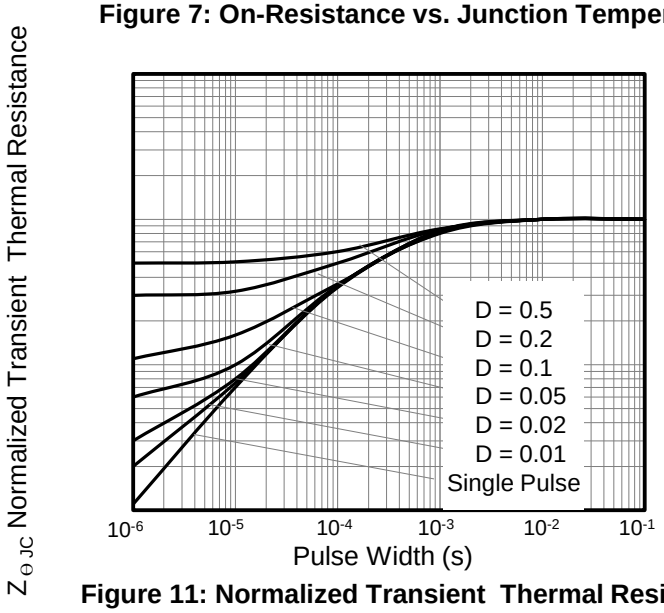



**Figure 11: Normalized Transient Thermal Resistance**

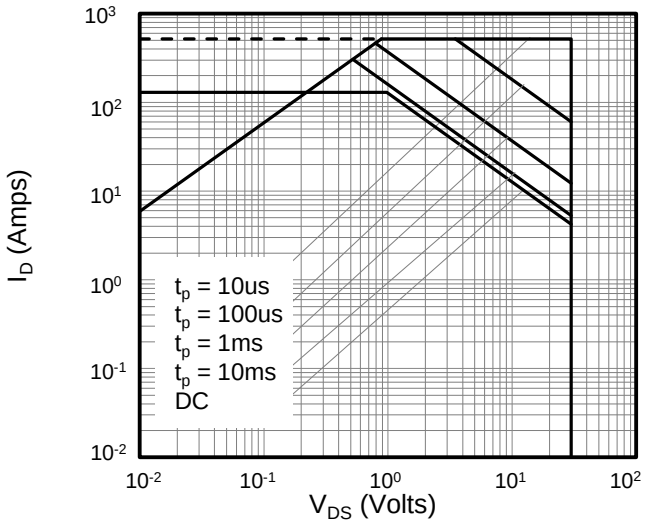



**Figure 12: Safe Operating Area**

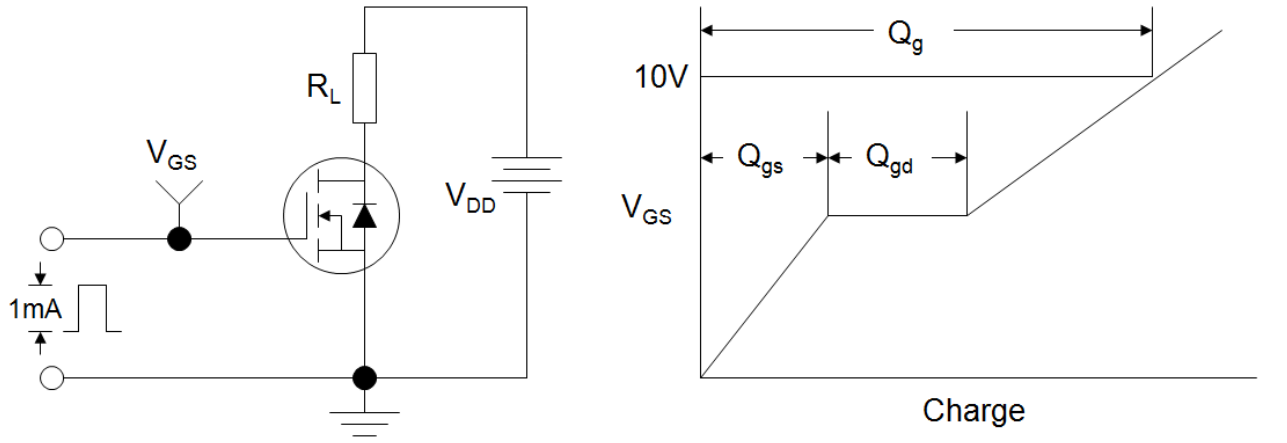



**Figure A：Gate Charge Test Circuit and Waveforms**

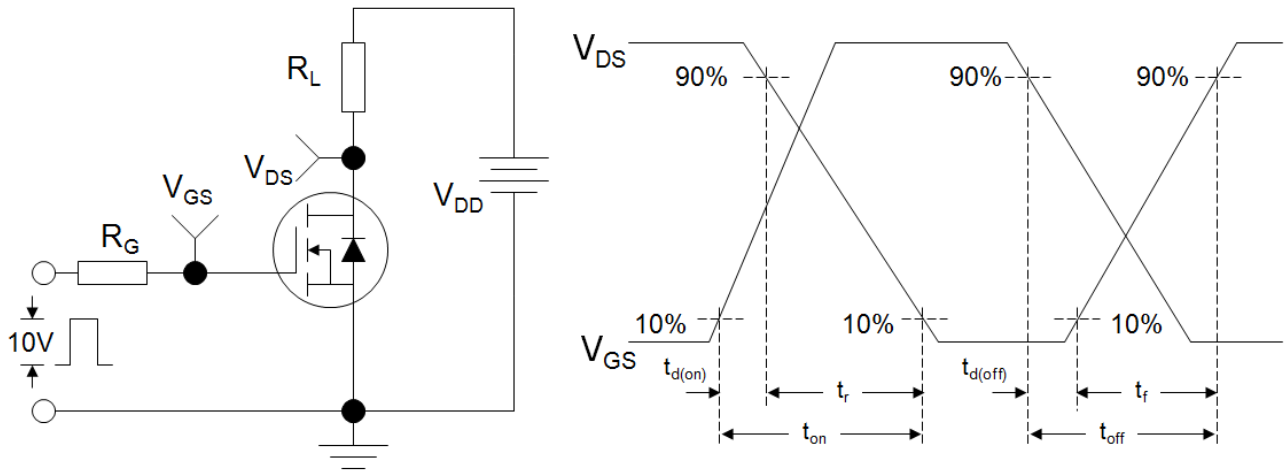



**Figure B：Resistive Switching Test Circuit and Waveforms**

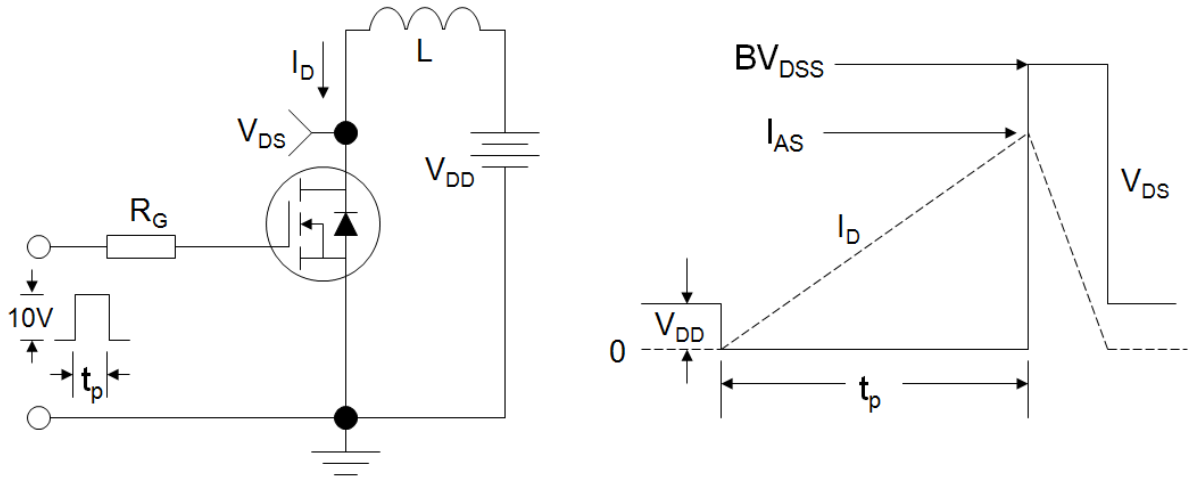
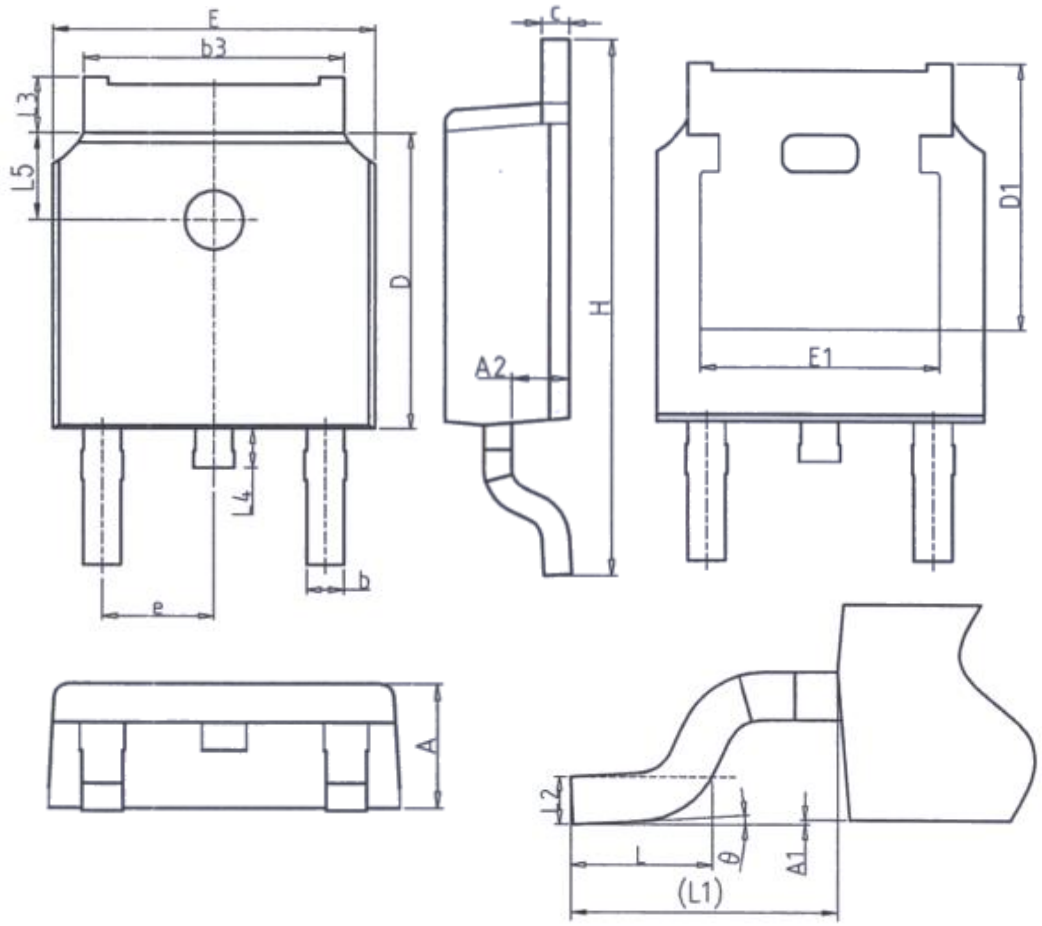



**Figure C：Unclamped Inductive Switching (UIS) Test Circuit and Waveforms**

# 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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