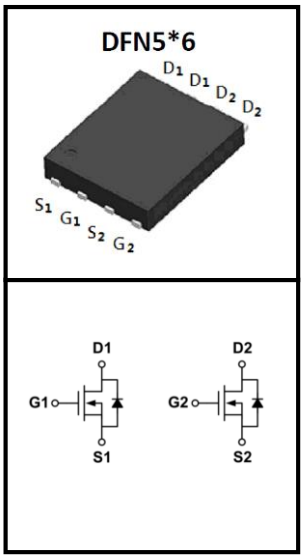
# 40V N-Channel Trench MOSFET

## 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)
- Power Factor Correction (PFC)

RoHS

## Device Marking and Package Information

| Device | Package | Marking |
|---|---|---|
| CTN04NN7P5 | DFN5*6 | CTN04NN7P5 |

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

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage ($V_{GS}$ = 0V) | $V_{DSS}$ | 40 | V |
| Drain Current-Continuous(Tc =25℃) (note1) | $I_D$ | 65 | A |
| Drain Current-Continuous(Tc =100°C) (note1) | | 40 | |
| Pulsed Drain Current (note2) | $I_{DM}$ | 140 | A |
| Gate Source Voltage | $V_{GSS}$ | ±20 | V |
| Power Dissipation $T_C$ = 25ºC (note4) | $P_D$ | 1.5 | W |
| Single Pulse Avalanche Energy (note3) | Eas | 16.3 | mJ |
| Operating Junction and Storage Temperature Range | $T_J$, $T_{stg}$ | -55~+175 | ºC |

## Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance,Junction-ambient | $R_{\theta JA}$ | 62 | ℃/W |
| Thermal Resistance Junction-Case | $R_{\theta Jc}$ | 25 | ℃/W |
| Thermal Resistance,Junction-to-Ambient | $R_{\theta JA}$ | 55 | ℃/W |

| **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 | 40 | -- | -- | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 32V, $V_{GS}$ = 0V, $T_J$ = 25ºC | -- | -- | 1 | uA |
| Zero Gate Voltage Drain Current | | $V_{DS}$ = 32V, $V_{GS}$ = 0V, $T_J$ = 55ºC | -- | -- | 5 | |
| Gate-Source Leakage | $I_{GSS}$ | $V_{GS}$ = ±20V | -- | -- | ±100 | nA |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 1.2 | 1.5 | 2.5 | V |
| Drain-Source On-Resistance (note2) | $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 30A | -- | 6.3 | 7.5 | mΩ |
| | | $V_{GS}$ = 4.5V, $I_D$ = 20A | -- | 8.5 | 10 | mΩ |
| **Dynamic** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$ = 0V, $V_{DS}$ = 15V, f = 1.0MHz | -- | 2332 | -- | pF |
| Output Capacitance | $C_{oss}$ | | -- | 193 | -- | |
| Reverse Transfer Capacitance | $C_{rss}$ | | -- | 138 | -- | |
| Total Gate Charge （4.5V） | $Q_g$ | $V_{DS}$ = 20V, $I_D$ = 20A, $V_{GS}$ = 4.5V | -- | 18.8 | -- | nC |
| Gate-Source Charge | $Q_{gs}$ | | -- | 4.7 | -- | |
| Gate-Drain Charge | $Q_{gd}$ | | -- | 8.2 | -- | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DS}$ = 15V, $I_D$ = 1A $V_{GS}$ = 10V,$R_G$ = 3.3Ω | -- | 14.3 | -- | ns |
| Turn-on Rise Time | $t_r$ | | -- | 2.6 | -- | |
| Turn-off Delay Time | $t_{d(off)}$ | | -- | 77 | -- | |
| Turn-off Fall Time | $t_f$ | | -- | 4.8 | -- | |
| Body Diode Characteristics | | | | | | |
| Source-Drain Current(Body Diode) | $I_{SD}$ | | -- | -- | 65 | A |
| Pulsed Source-Drain Current(Body Diode) | $I_{SDM}$ | | -- | -- | 140 | A |
| Body Diode Voltage | $V_{SD}$ | $I_{SD}$ = 1A, $V_{GS}$ = 0V | -- | -- | 1.2 | V |

**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 VDD =25V,VGS =10V,L=0.1mH
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

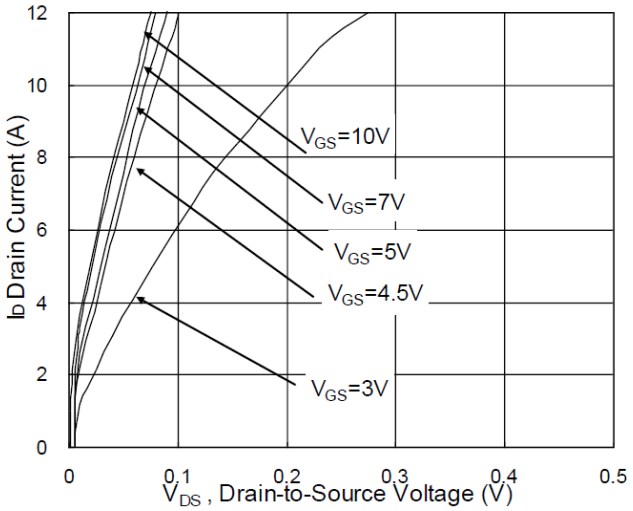



**Fig.1 Typical Output Characteristics**

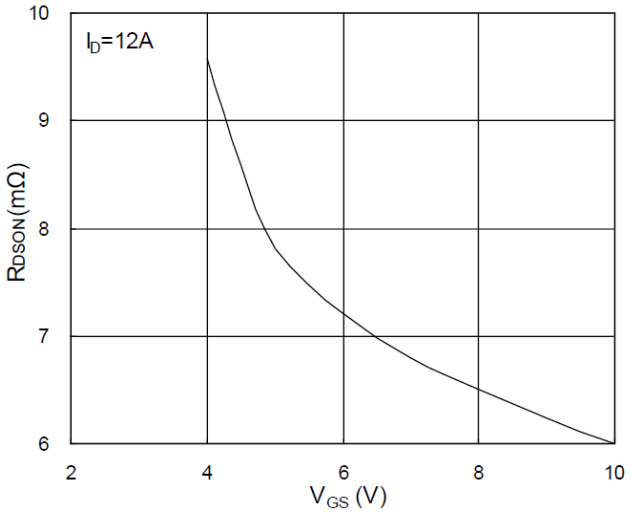



**Fig.2 On-Resistance vs. G-S Voltage**

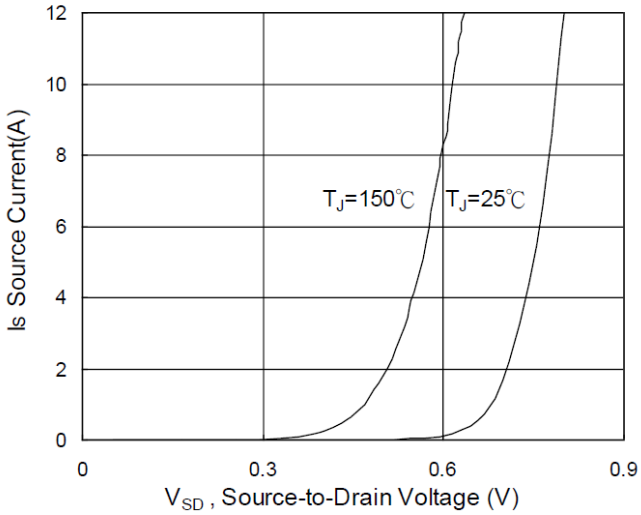



**Fig.3 Forward Characteristics Of Reverse**

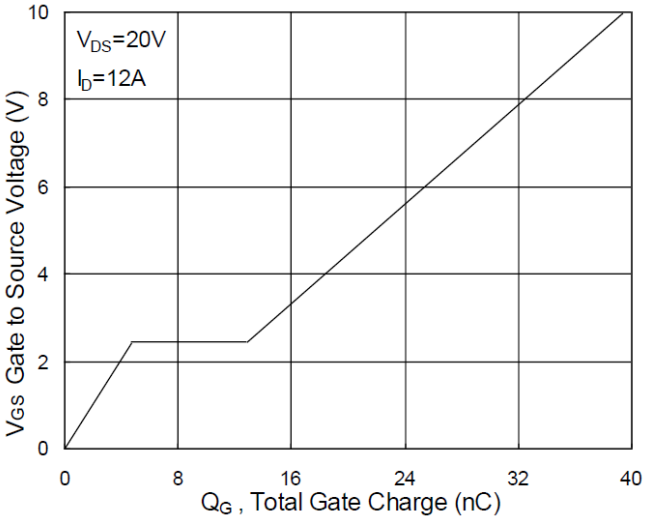



**Fig.4 Gate-Charge Characteristics**

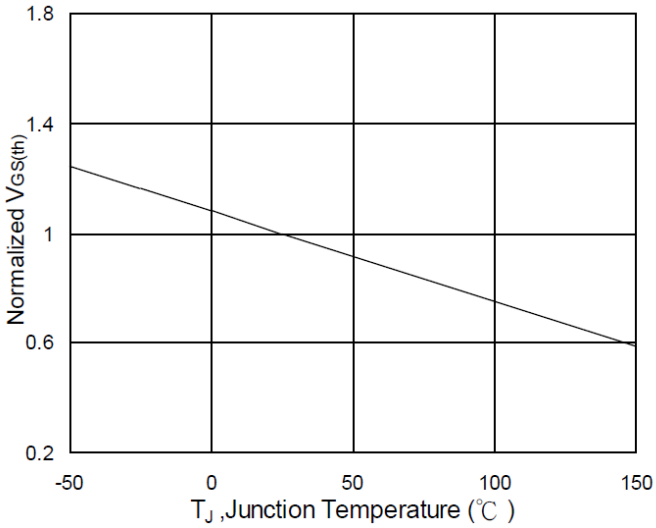



**Fig.5 Normalized VGS(th) vs. TJ**

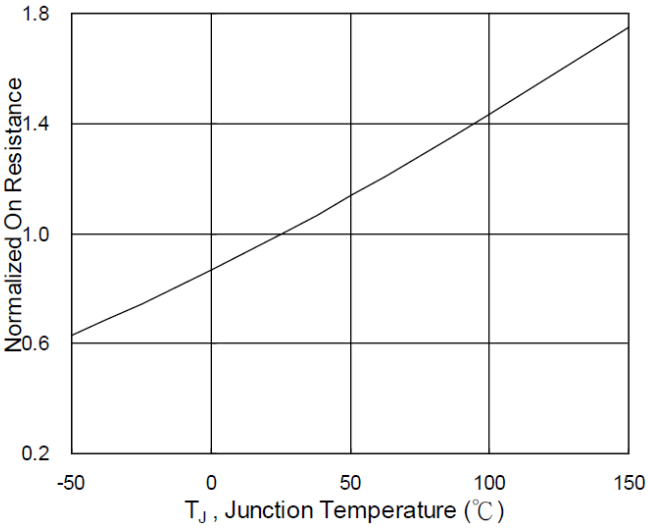



**Fig.6 Normalized RDSON vs. TJ**

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

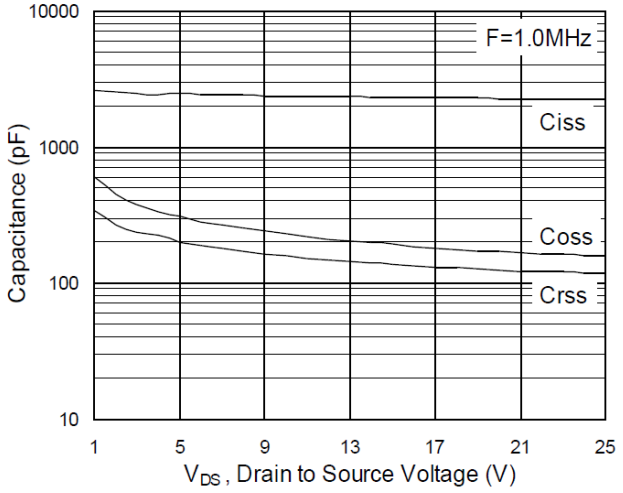



**Fig.7 Capacitance**

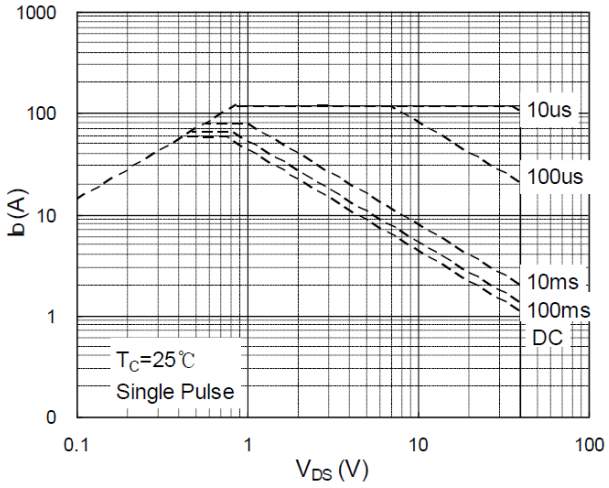



**Fig.8 Safe Operating Area**

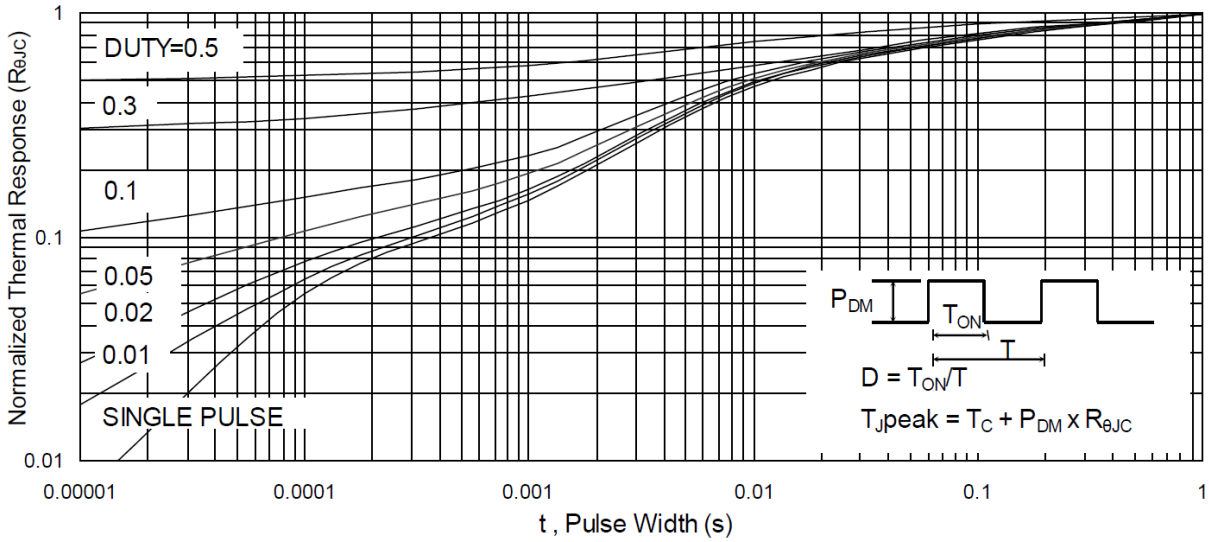



**Fig.9 Normalized Maximum Transient Thermal Impedance**

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

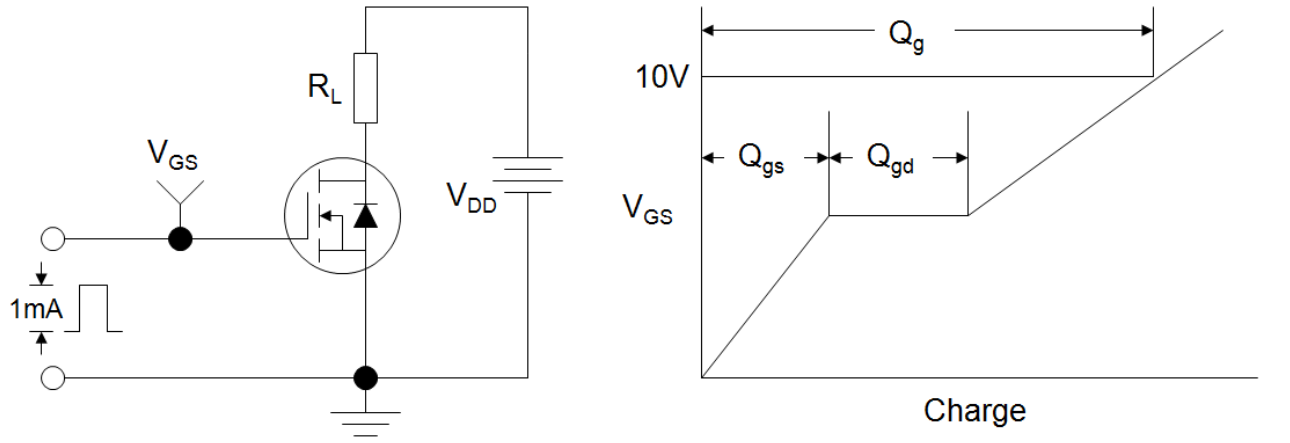



**Figure B：Resistive Switching Test Circuit and Waveform**

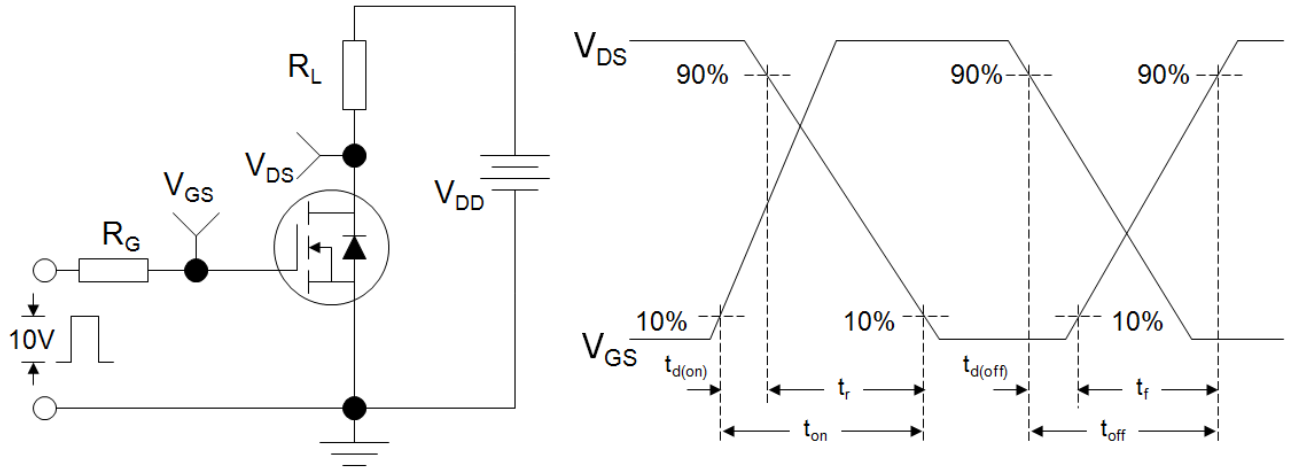
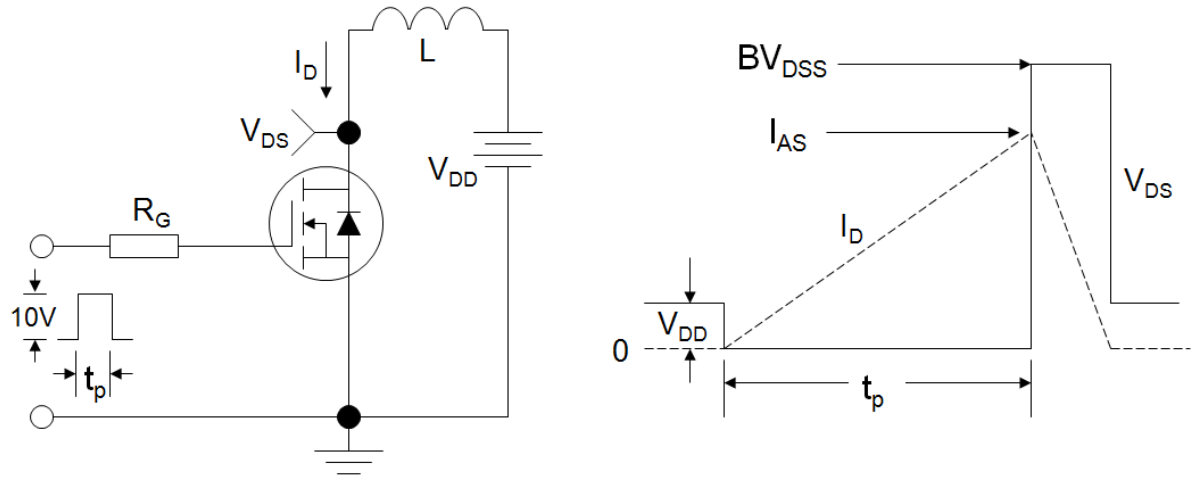
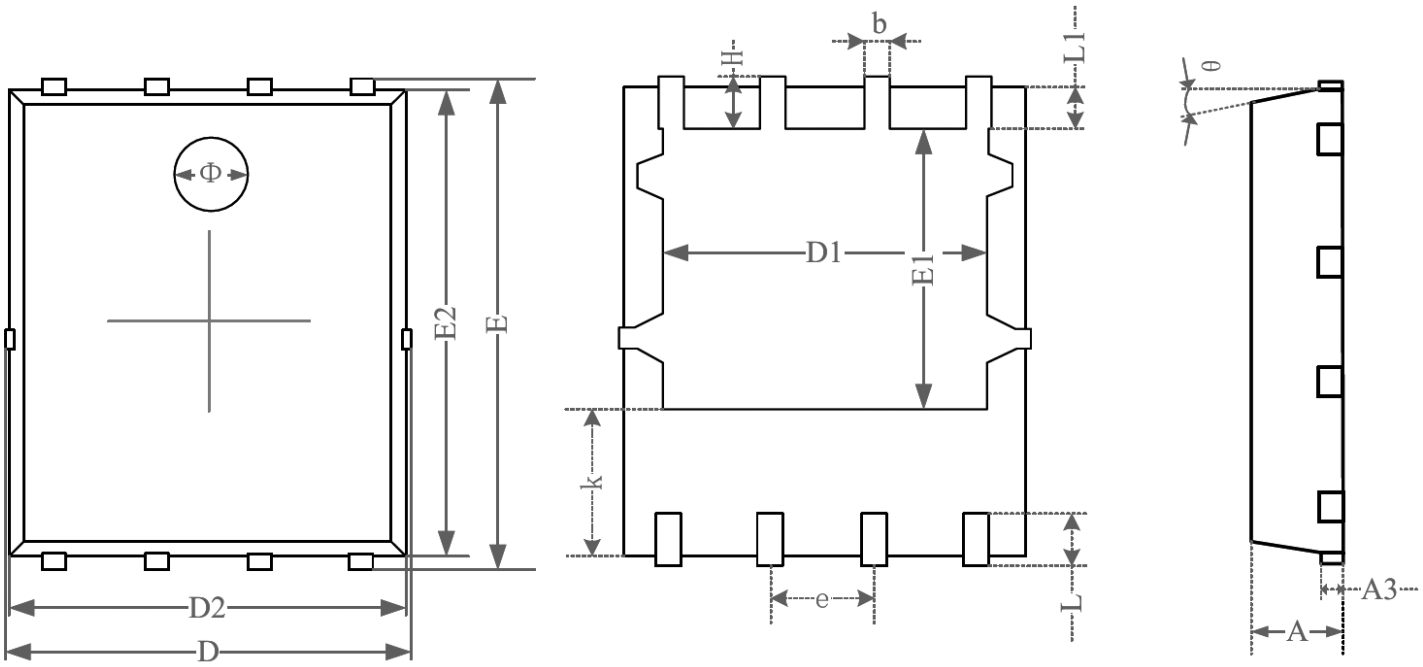



**Figure C：Unclamped Inductive Switching Test Circuit and Waveform**



# DFN5*6




| SYMBOLS | DIMENSIONS IN MILLIMETERS | | | DIMENSIONS IN INCHES | | |
|---|---|---|---|---|---|---|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.870 | 0.900 | 0.930 | 0.034 | 0.035 | 0.036 |
| A3 | 0.152REF. | | | 0.006REF. | | |
| D | 4.944 | 5.020 | 5.096 | 0.195 | 0.198 | 0.201 |
| E | 5.974 | 6.050 | 6.126 | 0.235 | 0.238 | 0.241 |
| D1 | 3.910 | 4.010 | 4.110 | 0.154 | 0.158 | 0.162 |
| E1 | 3.375 | 3.475 | 3.575 | 0.133 | 0.137 | 0.141 |
| D2 | 4.870 | 4.900 | 4.930 | 0.192 | 0.193 | 0.194 |
| E2 | 5.720 | 5.750 | 5.780 | 0.226 | 0.227 | 0.228 |
| k | 1.190 | 1.290 | 1.390 | 0.047 | 0.051 | 0.055 |
| b | 0.350 | 0.380 | 0.410 | 0.014 | 0.015 | 0.016 |
| e | 1.270TYP. | | | 0.050TYP. | | |
| L | 0.559 | 0.635 | 0.711 | 0.022 | 0.025 | 0.028 |
| L1 | 0.424 | 0.500 | 0.576 | 0.017 | 0.020 | 0.023 |
| H | 0.574 | 0.650 | 0.726 | 0.023 | 0.026 | 0.029 |
| θ | 10° | 11° | 12° | 10° | 11° | 12° |
| Φ | 1.150 | 1.200 | 1.250 | 0.045 | 0.047 | 0.049 |

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