华润微电子(重庆)有限公司

# CRTT026NE4N

Trench N-MOSFET 45V, 2.2mΩ, 120A

## Features

- Uses CRM(CQ) advanced Trench technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g$x$R_{DS(on)}$ product(FOM)
- Qualified according to JEDEC criteria

## Applications

- Motor control and drive
- Battery management
- UPS (Uninterrupible Power Supplies)

## Product Summary

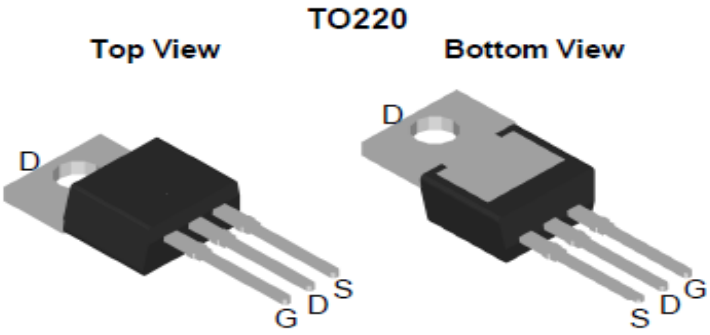
| | |
|---|---|
| $V_{DS}$ | 45V |
| $R_{DS(on)\ typ.}$ | 2.2mΩ |
| $I_D$ | 120A |

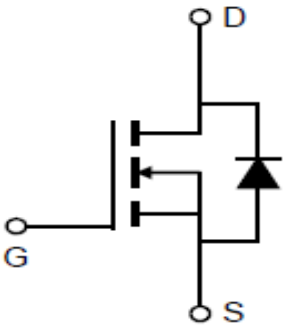
***100% DVDS Tested***

***100% Avalanche Tested***

RoHS HF

TO220




## Package Marking and Ordering Information

| Part # | Marking | Package | Packing | Reel Size | Tape Width | Qty |
|---|---|---|---|---|---|---|
| CRTT026NE4N | CRTT026NE4N | TO-220 | Tube | N/A | N/A | 50pcs |

## Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-source voltage | $V_{DS}$ | 45 | V |
| Continuous drain current<br>$T_C$ = 25°C (Silicon limit)<br>$T_C$ = 25°C (Package limit)<br>$T_C$ = 100°C (Silicon limit) | $I_D$ | <br>246<br>120<br>156 | A |
| Pulsed drain current ($T_C$ = 25°C, $t_p$ limited by $T_{jmax}$) | $I_{D\ pulse}$ | 480 | A |
| Avalanche energy, single pulse (L=0.5mH, Rg=25Ω) | $E_{AS}$ | 529 | mJ |
| Gate-Source voltage | $V_{GS}$ | ±25 | V |
| Power dissipation ($T_C$ = 25°C) | $P_{tot}$ | 254 | W |
| Operating junction and storage temperature | $T_j$ , $T_{stg}$ | -55...+150 | °C |
| Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s) | $T_{sold}$ | 260 | °C |

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## Thermal Resistance

| Parameter | Symbol | Max | Unit |
|---|---|---|---|
| Thermal resistance, junction – case. | $R_{thJC}$ | 0.49 | °C/W |
| Thermal resistance, junction – ambient(min. footprint) | $R_{thJA}$* | 84 | |

## Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

| Parameter | Symbol | Value | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | min. | typ. | max. | | |
| **Static Characteristic** | | | | | | |
| Drain-source breakdown voltage | $BV_{DSS}$ | 45 | - | - | V | $V_{GS}$=0V, $I_D$=250uA |
| Gate threshold voltage | $V_{GS(th)}$ | 2.4 | 3 | 3.6 | V | $V_{DS}$=$V_{GS}$,$I_D$=250uA |
| Zero gate voltage drain current | $I_{DSS}$ | -<br>- | 0.05<br>- | 1<br>200 | μA | $V_{DS}$=45V,$V_{GS}$=0V<br>$T_j$=25°C<br>$T_j$=150°C |
| Gate-source leakage current | $I_{GSS}$ | - | ±10 | ±100 | ±nA | $V_{GS}$=25V,$V_{DS}$=0V |
| Drain-source on-state resistance | $R_{DS(on)}$ | -<br>- | 2.2<br>3.6 | 2.6<br>4.5 | mΩ | $V_{GS}$=10V, $I_D$=60A,<br>$T_j$=25°C<br>$T_j$=150°C |
| Transconductance | $g_{fs}$ | - | 173 | - | S | $V_{DS}$=5V,$I_D$=60A |
| **Dynamic Characteristic** | | | | | | |
| Input Capacitance | $C_{iss}$ | - | 6012 | - | pF | $V_{GS}$=0V, $V_{DS}$=25V, f=1MHz |
| Output Capacitance | $C_{oss}$ | - | 1398 | - | | |
| Reverse Transfer Capacitance | $C_{rss}$ | - | 635 | - | | |
| Gate Total Charge | $Q_G$ | - | 150 | - | nC | $V_{GS}$=10V, $V_{DS}$=25V, $I_D$=60A, f=1MHz |
| Gate-Source charge | $Q_{gs}$ | - | 32 | - | | |
| Gate-Drain charge | $Q_{gd}$ | - | 65 | - | | |
| Turn-on delay time | $t_{d(on)}$ | - | 26 | - | ns | $V_{GS}$=10V, $V_{DD}$=25V, $R_{G_ext}$=2.7Ω,$I_D$=60A |
| Rise time | $t_r$ | - | 120 | - | | |
| Turn-off delay time | $t_{d(off)}$ | - | 57 | - | | |
| Fall time | $t_f$ | - | 122 | - | | |
| Gate resistance | $R_G$ | - | 0.9 | - | Ω | $V_{GS}$=0V, $V_{DS}$=0V, f=1MHz |

## Body Diode Characteristic

| Parameter | Symbol | Value | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | min. | typ. | max. | | |
| Body Diode Forward Voltage | $V_{SD}$ | - | 0.9 | 1.3 | V | $V_{GS}$=0V,$I_{SD}$=60A |
| Body Diode Continuous Forward Current | $I_S$ | | | 120 | A | $T_C$ = 25°C |
| Body Diode Reverse Recovery Time | $t_{rr}$ | - | 53 | - | ns | $I_F$=60A, dI/dt=100A/μs |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | - | 73 | - | nC | |

*The value of $R_{thJA}$ is measured by placing the device in a still air box which is one cubic foot.

## Typical Performance Characteristics

Fig 1: Output Characteristics

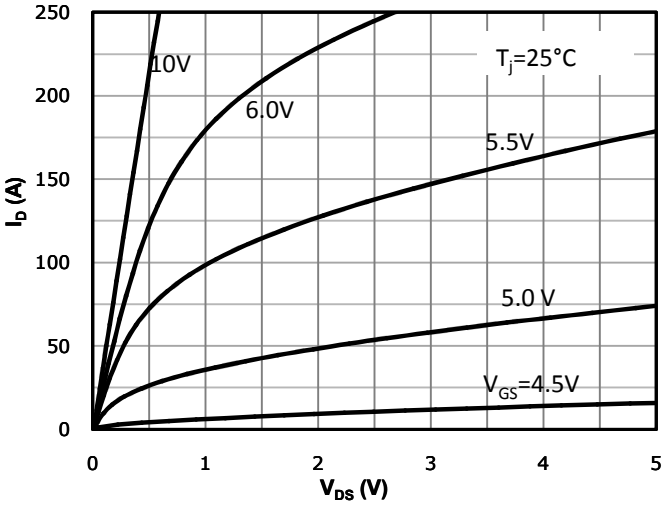



Fig 2: Transfer Characteristics

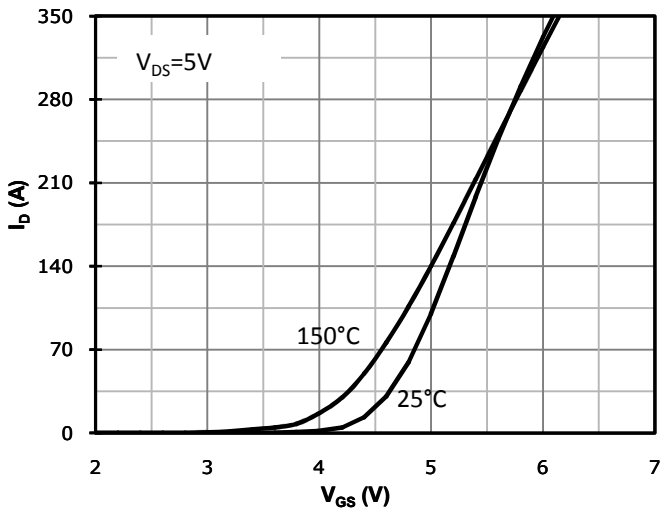



Fig 3: Rds(on) vs Drain Current and Gate Voltage

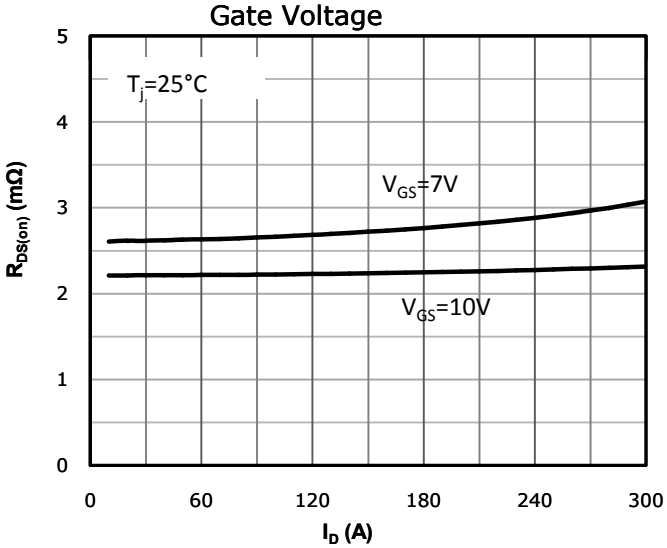



Fig 4: Rds(on) vs Gate Voltage

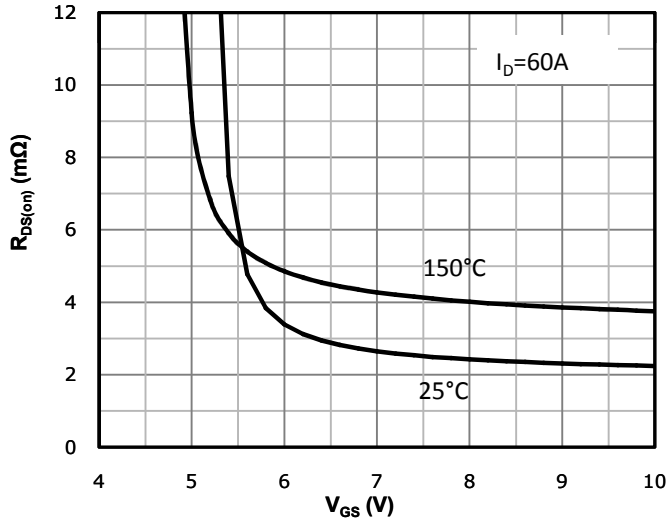



Fig 5: Rds(on) vs. Temperature

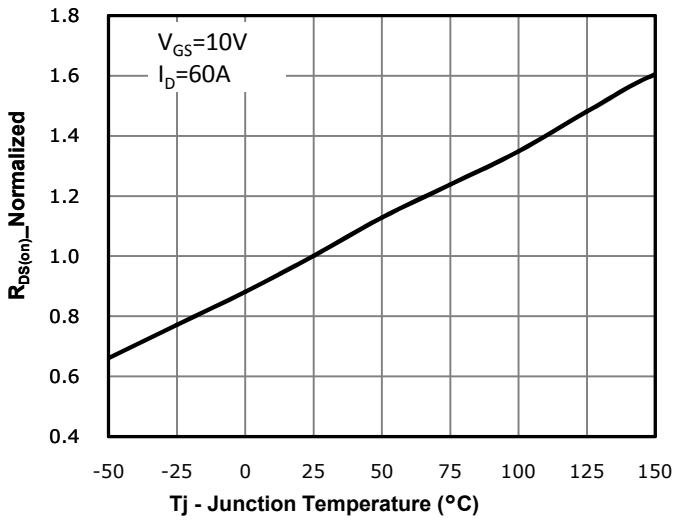



Fig 6: Capacitance Characteristics

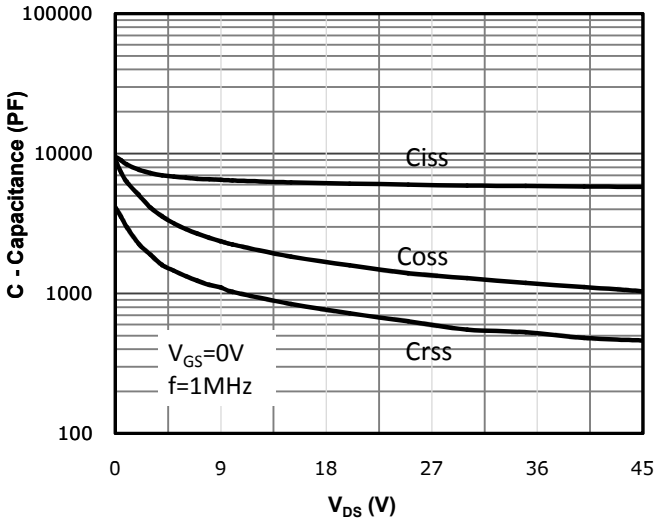


Fig 7: Gate Charge Characteristics

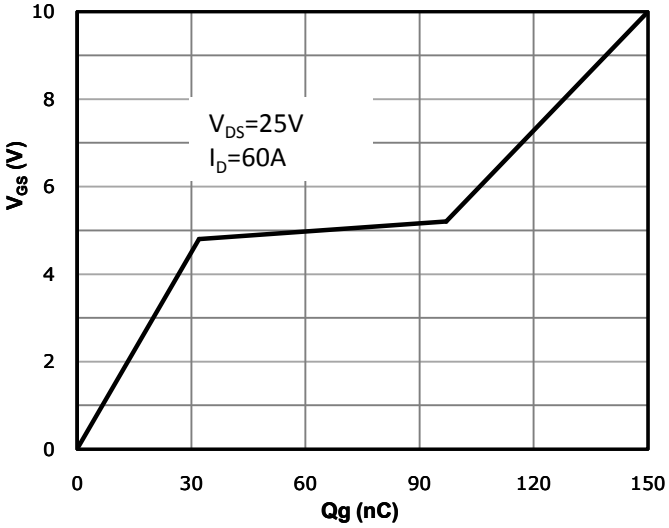



Fig 8: Body-diode Forward Characteristics

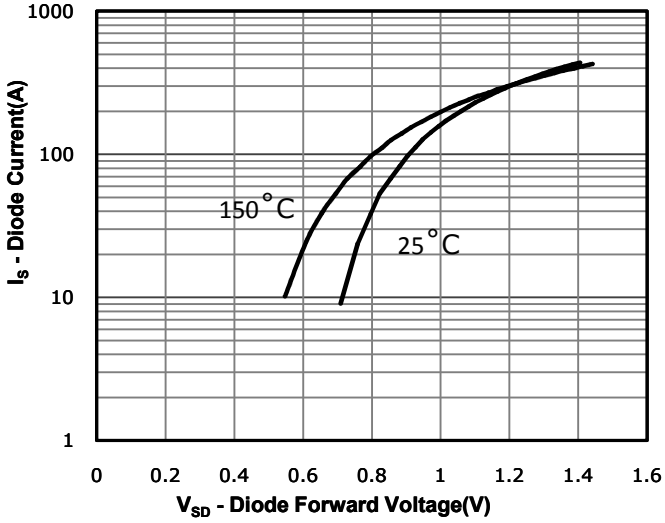



Fig 9: Power Dissipation

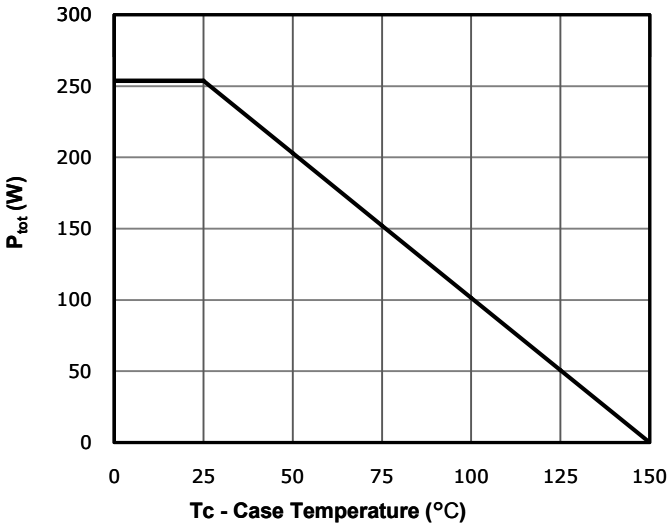



Fig 10: Drain Current Derating

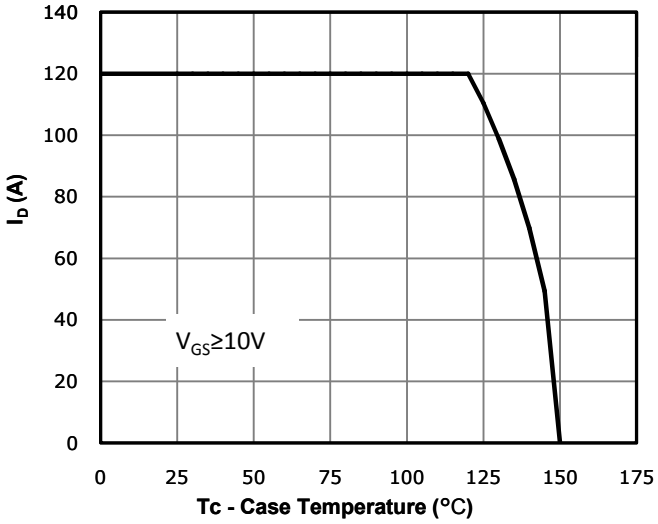



Fig 11: Safe Operating Area

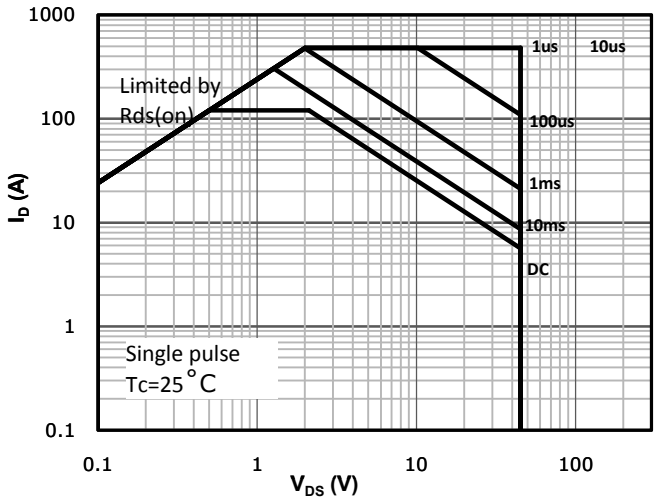
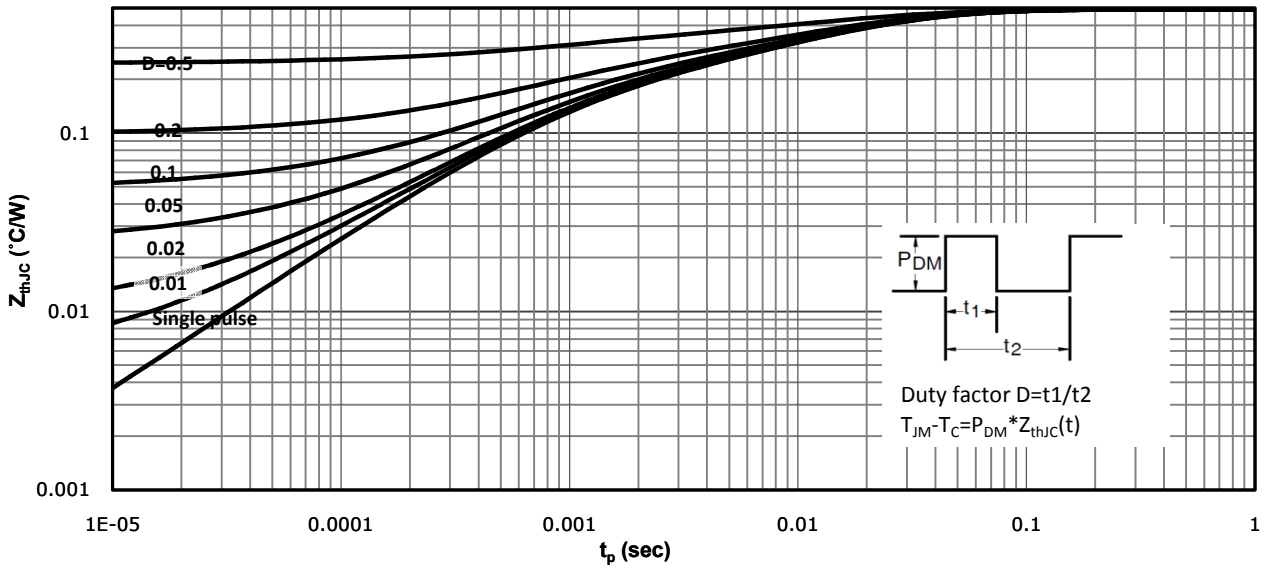
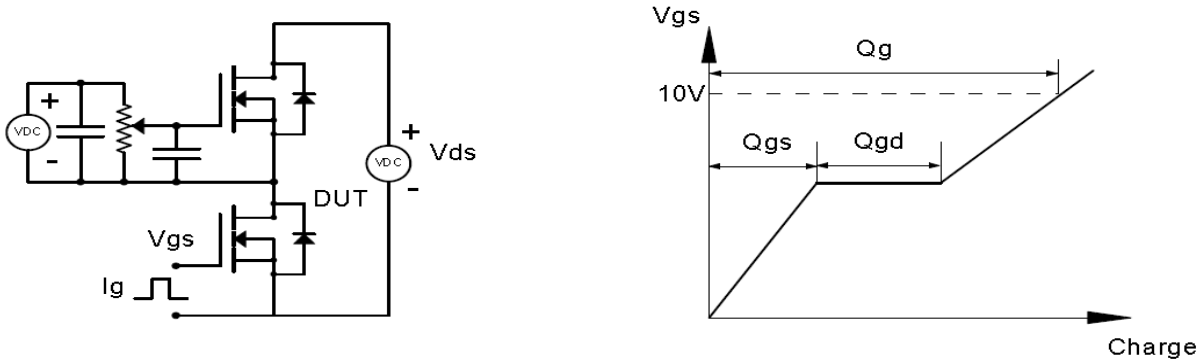


Fig 12: Max. Transient Thermal Impedance

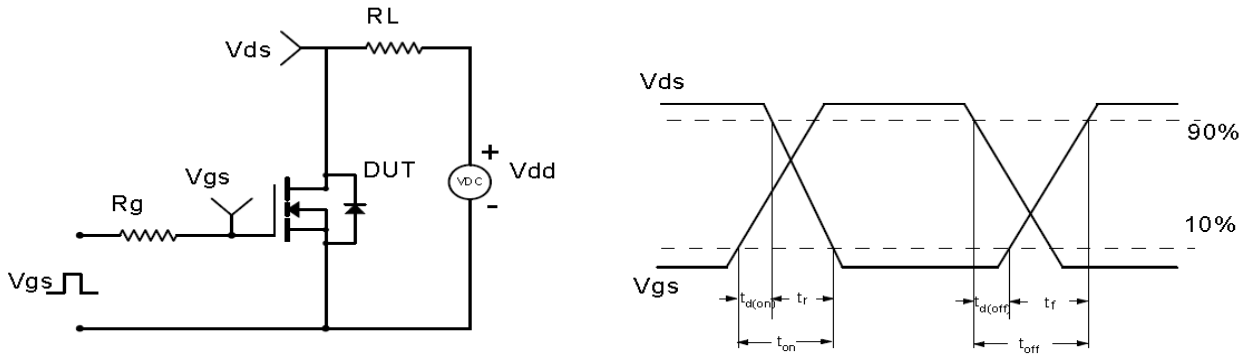


## Test Circuit & Waveform

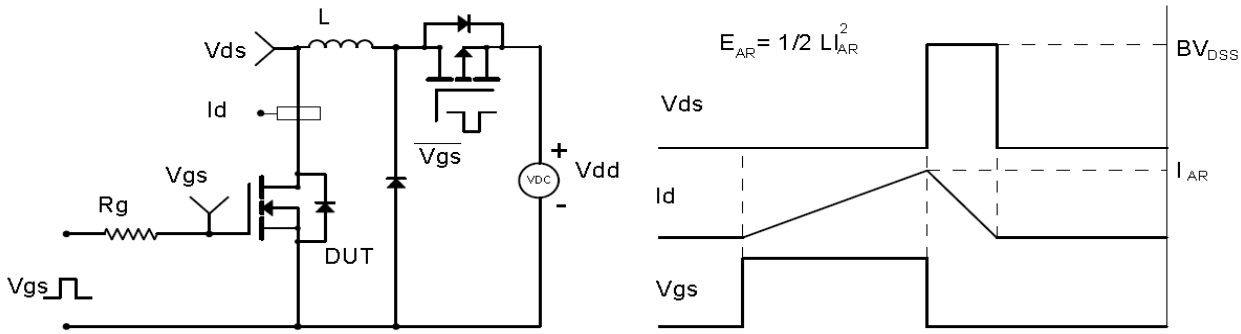
Gate Charge Test Circuit & Waveform



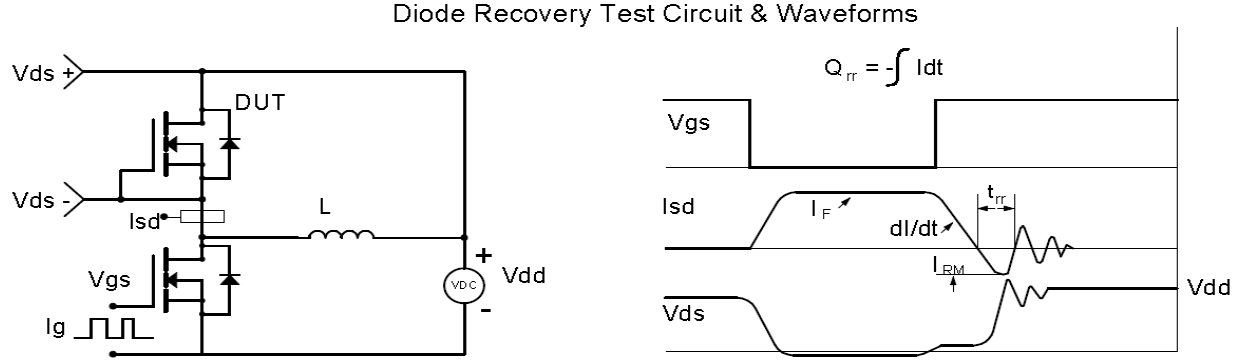

Resistive Switching Test Circuit & Waveforms



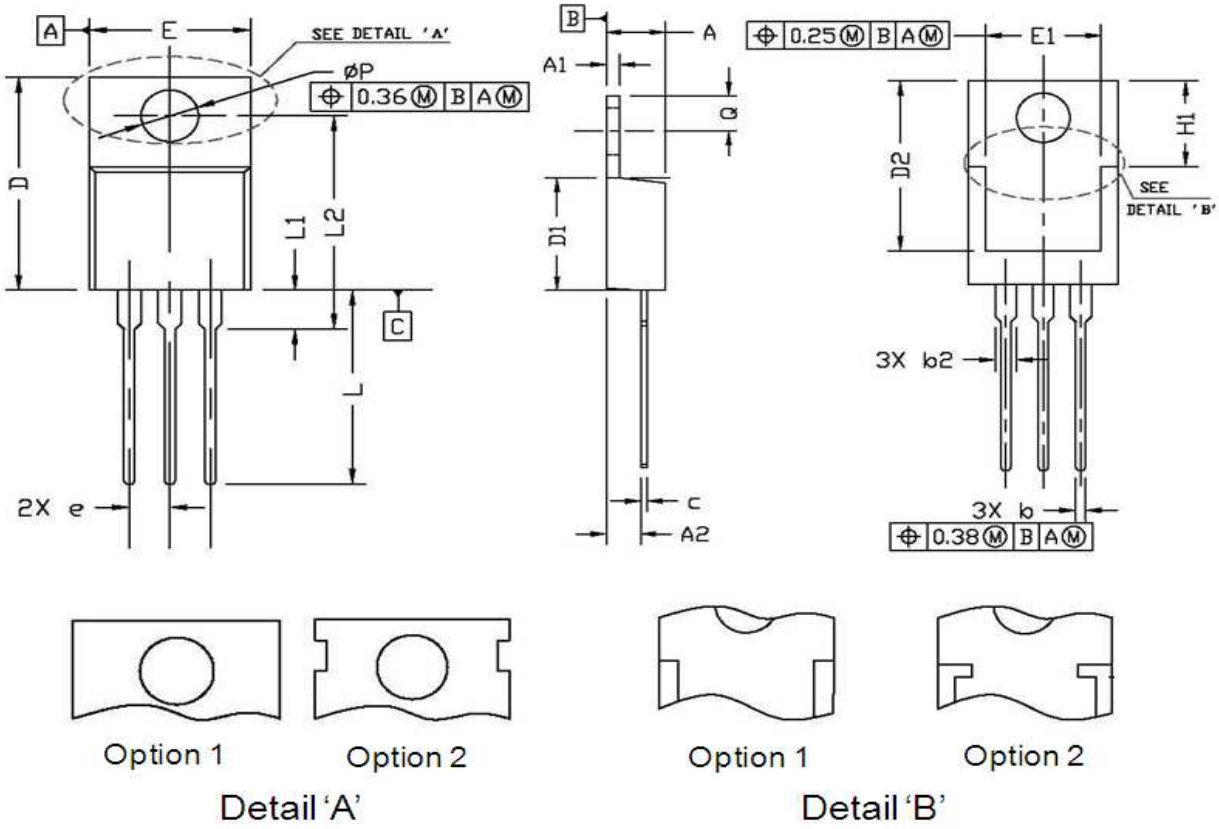

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms




Diode Recovery Test Circuit & Waveforms



## Package Outline: TO-220-3L




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 4.30 | 4.80 | 0.169 | 0.189 |
| A1 | 1.20 | 1.45 | 0.047 | 0.057 |
| A2 | 2.20 | 2.90 | 0.087 | 0.114 |
| b | 0.69 | 0.95 | 0.027 | 0.037 |
| b2 | 1.00 | 1.60 | 0.039 | 0.063 |
| c | 0.33 | 0.65 | 0.013 | 0.026 |
| D | 14.70 | 16.20 | 0.579 | 0.638 |
| D1 | 8.59 | 9.65 | 0.338 | 0.380 |
| D2 | 11.75 | 13.60 | 0.463 | 0.535 |
| e | 2.54 BSC. | | 0.100 BSC. | |
| E | 9.60 | 10.60 | 0.378 | 0.417 |
| E1 | 7.00 | 8.46 | 0.276 | 0.333 |
| H1 | 6.20 | 7.00 | 0.244 | 0.276 |
| L | 12.60 | 14.80 | 0.496 | 0.583 |
| L1 | 2.70 | 3.80 | 0.106 | 0.150 |
| L2 | 12.13 | 16.50 | 0.478 | 0.650 |
| Q | 2.40 | 3.10 | 0.094 | 0.122 |
| P | 3.50 | 3.90 | 0.138 | 0.154 |

## Revision History

| Revison | Date | Major changes |
|---|---|---|
| 1.0 | 2018/6/26 | Release of formal version |
| 2.0 | 2019/7/22 | Increase the environmental labeling, $I_S$, $T_{sold}$, $I_{GSS}$ test value at $V_{GS}$=-25V;Update $C_{iss}$/$C_{oss}$/$C_{rss}$ test values;Update $R_{DS(on)}$, $Q_G$/$Q_{gs}$/$Q_{gd}$,$g_{fs}$,$V_{SD}$,$t_{d(on)}$/$t_r$/$t_{d(off)}$/$t_f$ and $t_{rr}$/$Q_{rr}$ test current from 40A to 60A;Update Fig1/Fig3/Fig4 of Typical Performance Characteristics;Update Package Outline. |

## Disclaimer

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