

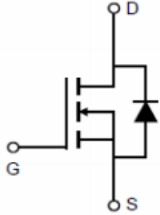


**30V N-Channel Trench MOSFET(Preliminary)**

| | | | | | | | | | | | | | |
|--|----------------|--|----------------|-----------------|-----|--|------|---|---------|--|---------|-----------------|--|
| General Description <ul style="list-style-type: none"> ● Trench Power Technology ● Low $R_{DS(ON)}$ ● Low Gate Charge ● Optimized for fast-switching Applications Applications <ul style="list-style-type: none"> ● Synchronous Rectification in DC/DC and AC/DC Converters ● Isolated DC/DC Converters in Telecom and Industrial | | Product Summary <table> <tr> <td>V_{DS}</td> <td>30V</td> </tr> <tr> <td>I_D (at V_{GS}=10V)</td> <td>120A</td> </tr> <tr> <td>R_{DS(ON)} (at V_{GS}=10V)</td> <td>< 3.4mΩ</td> </tr> <tr> <td>R_{DS(ON)} (at V_{GS}=4.5V)</td> <td>< 4.7mΩ</td> </tr> <tr> <td>100% UIS Tested</td> <td></td> </tr> </table>  | | V _{DS} | 30V | I _D (at V _{GS} =10V) | 120A | R _{DS(ON)} (at V _{GS} =10V) | < 3.4mΩ | R _{DS(ON)} (at V _{GS} =4.5V) | < 4.7mΩ | 100% UIS Tested | |
| V _{DS} | 30V | | | | | | | | | | | | |
| I _D (at V _{GS} =10V) | 120A | | | | | | | | | | | | |
| R _{DS(ON)} (at V _{GS} =10V) | < 3.4mΩ | | | | | | | | | | | | |
| R _{DS(ON)} (at V _{GS} =4.5V) | < 4.7mΩ | | | | | | | | | | | | |
| 100% UIS Tested | | | | | | | | | | | | | |
| TO-220  | |  | | | | | | | | | | | |
| Device | Package | Form | Marking | | | | | | | | | | |
| TTP120N03AT | TO-220 | Tube | 120N03AT | | | | | | | | | | |

Absolute Maximum Ratings T_C = 25°C, unless otherwise noted

| Parameter | Symbol | Value | Unit |
|--|-----------------------------------|----------------|------|
| Drain-Source Voltage | V _{DS} | 30 | V |
| Gate-Source Voltage | V _{GS} | ±20 | V |
| Continuous Drain Current ^B | T _C = 25°C | 105 | A |
| | T _C = 100°C | 76 | |
| Pulsed Drain Current ^A | I _{DM} | 480 | A |
| Avalanche Current ^A | I _{AS} | 30 | A |
| Single Pulse Avalanche Energy L = 0.3mH ^A | E _{AS} | 135 | mJ |
| Power Dissipation ^C | T _C = 25°C | P _D | 127 |
| | T _C = 100°C | P _D | 82 |
| Operating Junction and Storage Temperature Range | T _J , T _{STG} | -55 to 175 | °C |

Thermal Resistance

| Parameter | Symbol | Value | Unit |
|---|------------------|-------|------|
| Thermal Resistance, Junction-to-Case | R _{θJC} | 1.24 | °C/W |
| Thermal Resistance, Junction-to-Ambient | R _{θJA} | 100 | |



| Electrical Characteristics($T_J = 25^\circ\text{C}$ unless otherwise noted) | | | | | | | |
|--|--|---|---------------------------|------|-----------|------------------|---------------|
| Symbol | Parameter | Conditions | Value | | | Units | |
| | | | Min | Typ | Max | | |
| STATIC PARAMETERS | | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$ | 30 | -- | -- | V | |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$ | $T_J = 25^\circ\text{C}$ | -- | -- | 1 | μA |
| | | | $T_J = 100^\circ\text{C}$ | -- | -- | 25 | |
| I_{GSS} | Gate-Body Leakage Current | $V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$ | -- | -- | ± 100 | nA | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ | 1 | 1.7 | 2.4 | V | |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS} = 10\text{V}, I_D = 20\text{A}$ | -- | 2.6 | 3.4 | $\text{m}\Omega$ | |
| | | $V_{GS} = 4.5\text{V}, I_D = 20\text{A}$ | -- | 3.6 | 4.7 | $\text{m}\Omega$ | |
| g_{FS} | Forward Transconductance | $V_{DS} = 10\text{V}, I_D = 20\text{A}$ | 24.16 | -- | -- | S | |
| V_{SD} | Diode Forward Voltage | $I_S = 30\text{A}, V_{GS} = 0\text{V}$ | -- | -- | 1 | V | |
| I_S | Maximum Body-Diode Continuous Current ^B | | -- | -- | 105 | A | |
| DYNAMIC PARAMETERS | | | | | | | |
| C_{iss} | Input Capacitance | $V_{GS} = 0\text{V}, V_{DS} = 15\text{V}, f = 1\text{MHz}$ | -- | 2113 | -- | pF | |
| C_{oss} | Output Capacitance | | -- | 801 | -- | | |
| C_{rss} | Reverse Transfer Capacitance | | -- | 356 | -- | | |
| SWITCHING PARAMETERS | | | | | | | |
| Q_g | Total Gate Charge | $V_{GS} = 10\text{V}, V_{DS} = 15\text{V}, I_D = 50\text{A}$ | -- | 89 | -- | nC | |
| Q_{gs} | Gate Source Charge | | -- | 9 | -- | | |
| Q_{gd} | Gate Drain Charge | | -- | 16 | -- | | |
| $t_{D(on)}$ | Turn-On Delay Time | $V_{GS} = 10\text{V}, V_{DS} = 15\text{V}, I_D = 50\text{A}, R_G = 3\Omega$ | -- | 12 | -- | ns | |
| t_r | Turn-On Rise Time | | -- | 11 | -- | | |
| $T_{D(off)}$ | Turn-Off Delay Time | | -- | 40 | -- | | |
| t_f | Turn-Off Fall Time | | -- | 12 | -- | | |
| t_{rr} | Body Diode Reverse Recovery Time | $I_F = 30\text{A}, di/dt = 100\text{A}/\mu\text{s}$ | -- | 60 | -- | ns | |
| Q_{rr} | Body Diode Reverse Recovery Charge | | -- | 120 | -- | 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 $T_{J(MAX)} = 175^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

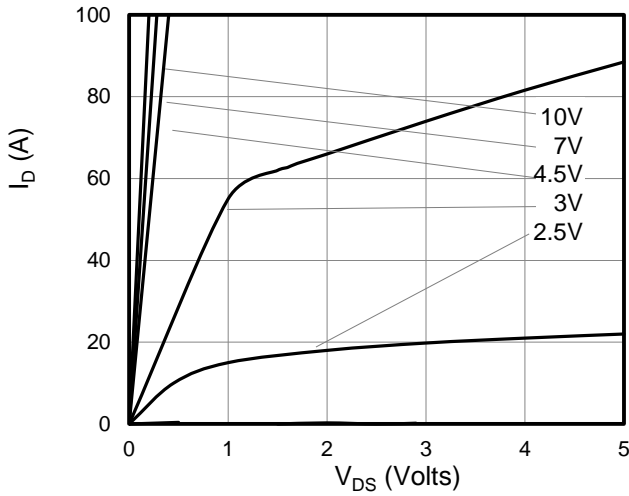


Figure 1: On-Region Characteristics

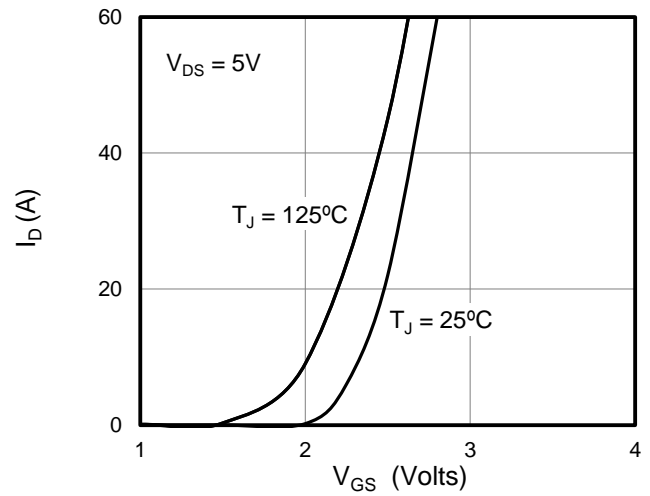


Figure 2: Transfer Characteristics

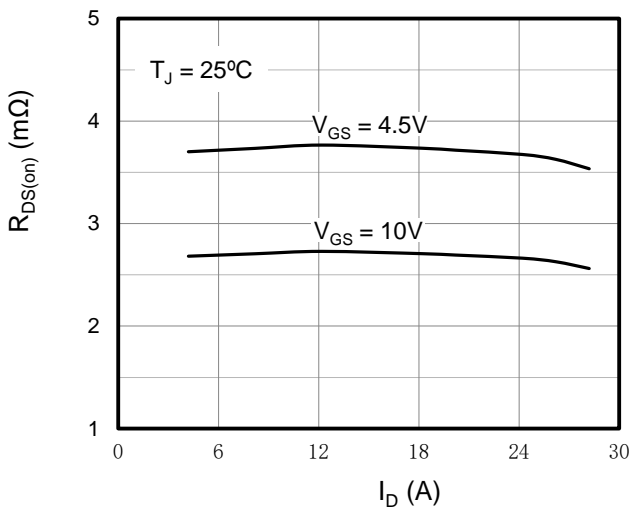


Figure 3: On-Resistance vs. Drain Current

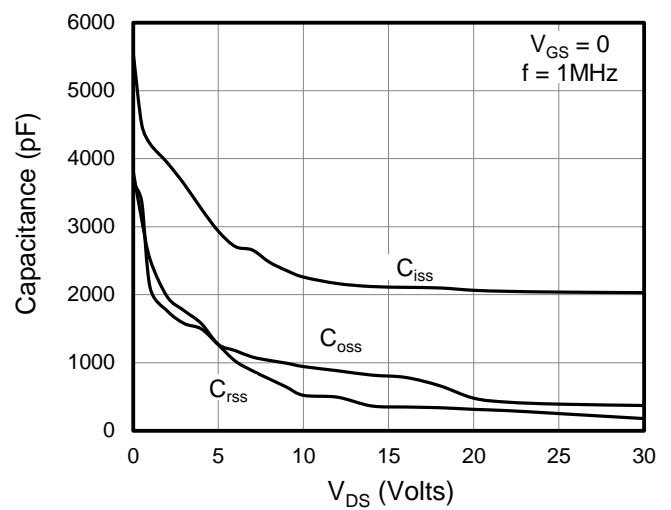


Figure 4: Capacitance Characteristics

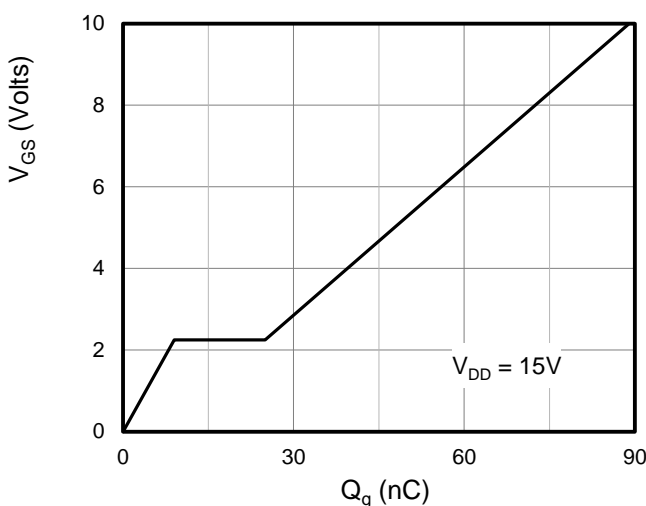


Figure 5: Gate Charge Characteristics

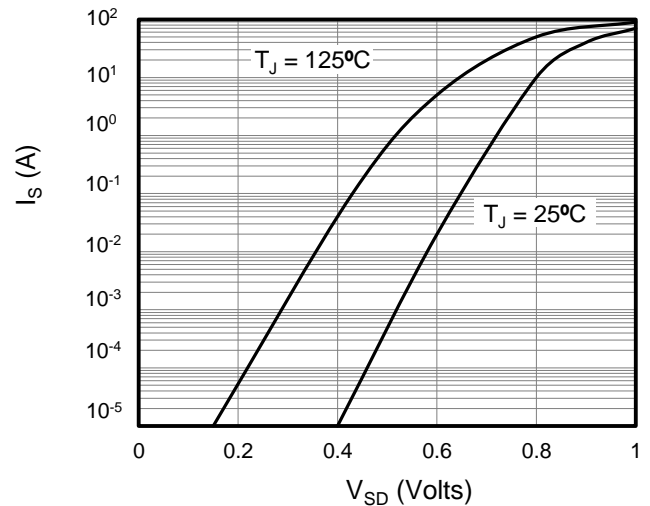


Figure 6: Body Diode Forward Voltage



Typical Characteristics $T_J = 25^{\circ}\text{C}$, unless otherwise noted

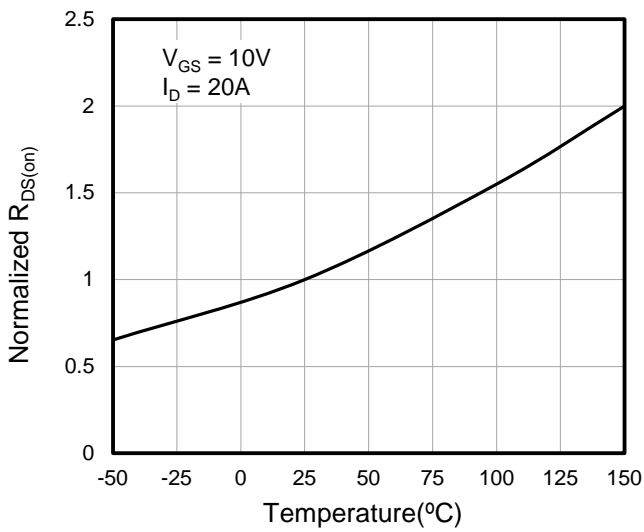


Figure 7: On-Resistance vs. Junction Temperature

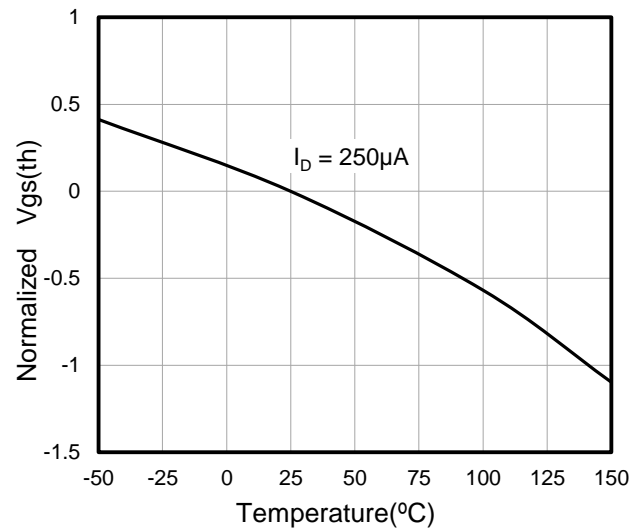


Figure 8: $V_{GS(th)}$ vs. Junction Temperature

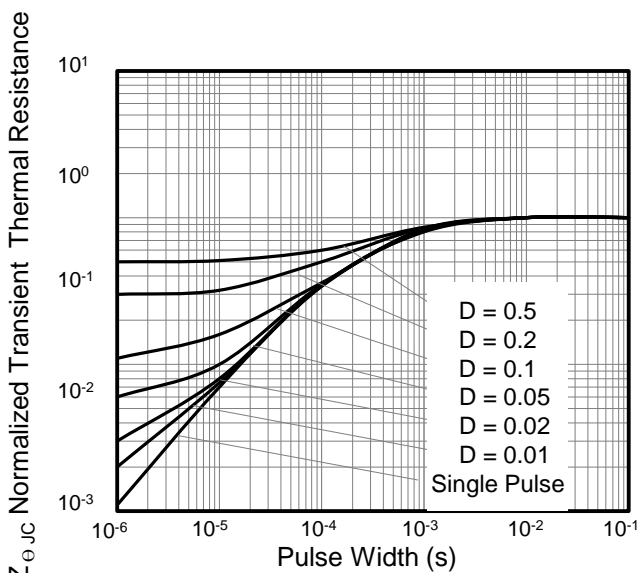


Figure 9: Normalized Transient Thermal Resistance

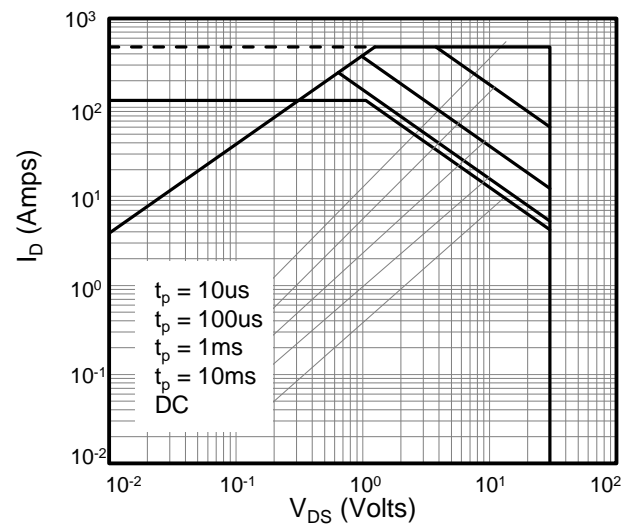


Figure 10: Safe Operating Area



Figure A: Gate Charge Test Circuit and Waveform

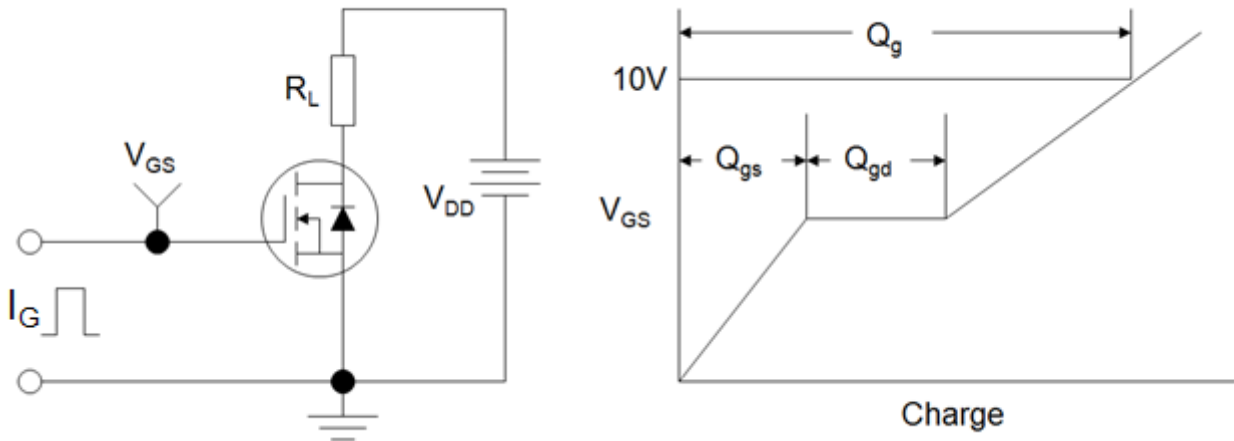


Figure B: Resistive Switching Test Circuit and Waveform

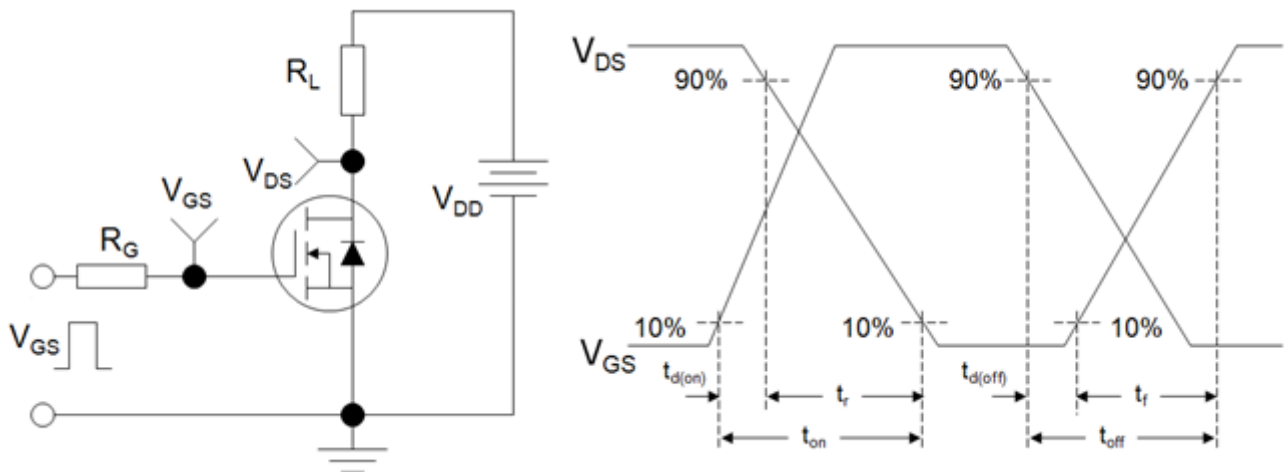
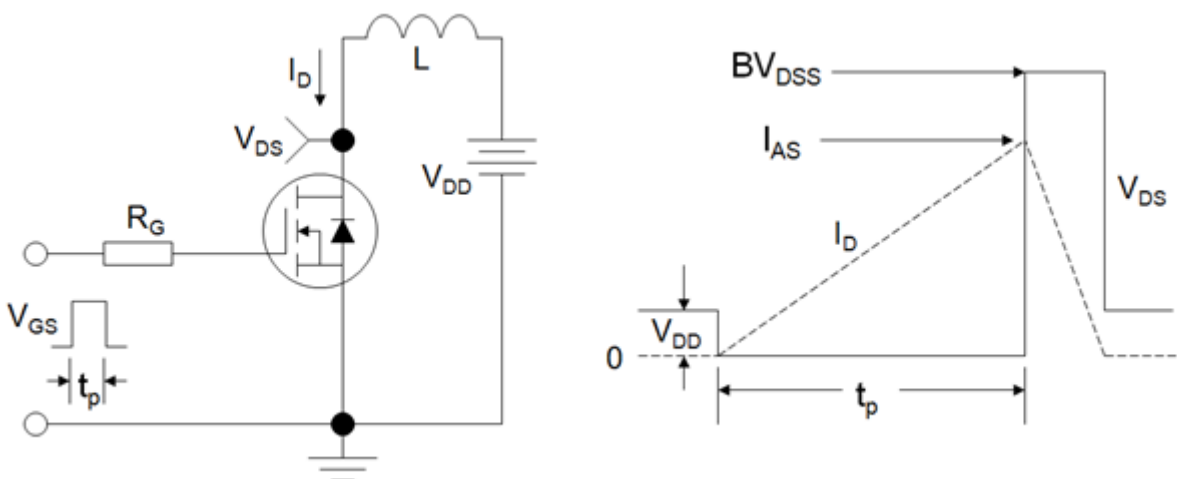
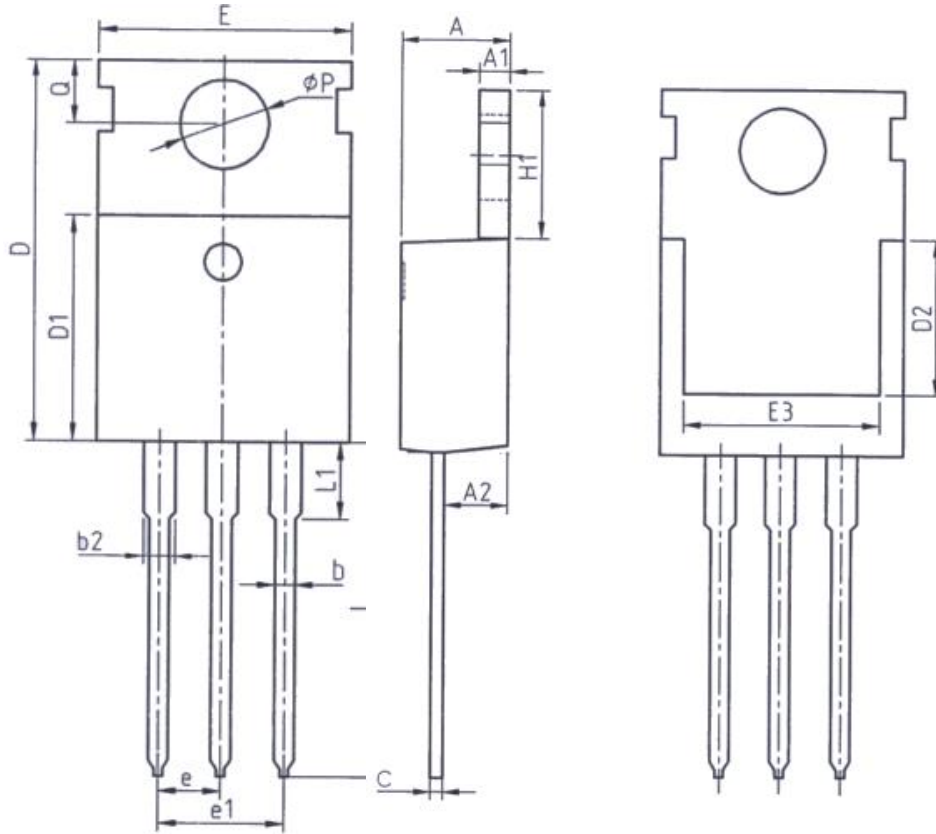


Figure C: Unclamped Inductive Switching Test Circuit and Waveform





TO-220



| Unit: mm | | |
|----------|-------|-------|
| Symbol | Min. | Max. |
| A | 4.37 | 4.77 |
| A1 | 1.25 | 1.45 |
| A2 | 2.20 | 2.60 |
| b | 0.70 | 0.95 |
| b2 | 1.17 | 1.47 |
| c | 0.40 | 0.65 |
| D | 15.10 | 16.10 |
| D1 | 8.80 | 9.40 |
| D2 | 5.50 | - |

| Unit: mm | | |
|----------|---------|-------|
| Symbol | Min. | Max. |
| E | 9.70 | 10.30 |
| E3 | 7.00 | - |
| e | 2.54BSC | |
| e1 | 5.08BSC | |
| H1 | 6.25 | 6.85 |
| L | 12.75 | 13.80 |
| L1 | - | 3.40 |
| P | 3.40 | 3.80 |
| Q | 2.60 | 3.00 |



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