# BMP80N250C1

## N-Channel Power MOSFET

800 V, 18A, 250 mΩ

bestirpower

## Description

BMP80N250C1 is power MOSFET using bestirpower's advanced super junction technology that can realize very low on resistance and gate charge.
It will provide much high efficiency by using optimized charge coupling technology. These user friendly devices give an advantage of Low EMI to designers as well as low switching loss.

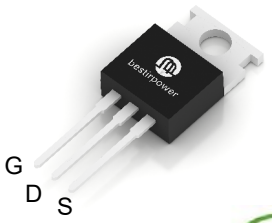
## Features

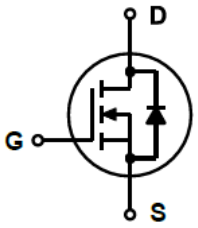
| $BV_{DSS}$ @ $T_{J,max}$ | $I_D$ | $R_{DS(on),max}$ | $Q_{g,typ}$ |
|---|---|---|---|
| 850 V | 18 A | 250 mΩ | 27 nC |

- Ultra-fast body diode.
- Extremely low losses due to very low FOM Rdson*Qg and Eoss.
- Very high commutation ruggedness.

## Applications

- AC/DC power supply.
- PC power.
- Telecom/Sever.
- Solar invertor.
- LED lighting.
- EV Charger.
- UPS.




RoHS compliant HF

## Absolute Maximum Ratings ($T_C$ = 25℃ unless otherwise noted)

| Symbol | Parameter | | Value max | Unit |
|---|---|---|---|---|
| $V_{DS}$ | Drain to Source Voltage(1) | | 800 | V |
| $V_{GS}$ | Gate to Source Voltage | | ±30 | V |
| $I_D$ | Drain Current(2) | Continuous ($T_C$ = 25℃) | 18 | A |
| | | Continuous ($T_C$ = 125℃) | 8 | |
| $I_{DM}$ | Drain Current | Pulsed | 54 | A |
| $E_{AS}$ | Single Pulsed Avalanche Energy(3) | | 650 | mJ |
| $I_{AR}$ | Avalanche current, repetitive | | 5.1 | A |
| dv/dt | MOSFET dv/dt $V_{DS}$=0 to 520V | | 50 | V/ns |
| | Peak Diode Recovery dv/dt | | 50 | |
| $P_D$ | Power Dissipation | ($T_C$ = 25℃) | 227 | W |
| $T_J$, $T_{STG}$ | Operating and Storage Temperature Range | | -55 to 150 | ℃ |
| Is | Continuous diode forward current | | 18 | A |
| Is Pulse | Diode pulse current(2) | | 54 | A |

1) Limited by Tj max. Maximum duty cycle D=0.75.
2) Pulse width tp limited by Tj,max.
3) VDD=50V, RG=25Ω, Starting Tj=25° C.
*4) VDClink=400V; VDS,peak<V(BR)DSS; identical low side and high side switch with identical RG.*

## Thermal Characteristics

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max. | 0.55 | ℃/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient, Max. | 62 | |

## Package Marking and Ordering Information

| Part Number | Top Marking | Package | Packing Method | Quantity |
|---|---|---|---|---|
| BMP80N250C1 | BMP80N250C1 | TO220 | Tube | 50 units |

## Electrical Characteristics ($T_C$ = 25℃ unless otherwise noted)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain to Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_D$ = 250 μA | 800 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 800 V, $V_{GS}$ = 0 V | - | - | 10 | μA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$ = ±30V, $V_{DS}$ = 0 V | - | - | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS}$(th) | Gate Threshold Voltage | $V_{GS}$ = $V_{DS}$ , $I_D$ = 250 uA | 2.0 | 3.0 | 4.0 | V |
| $R_{DS}$(on) | Static Drain to Source On Resistance | $V_{GS}$ = 10 V, $I_D$ =8.5A | - | 220 | 250 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 100 V, $V_{GS}$ = 0 V, f = 250 kHz | - | 1510 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 58 | - | pF |
| $C_{rss}$ | Reverse transfer capacitance | | - | 2 | - | pF |
| $Q_{g(tot)}$ | Total Gate Charge at 10 V | $V_{DD}$ = 400 V, $I_D$ = 9A, $V_{GS}$ =0 to 10 V | - | 27 | - | nC |
| $Q_{gs}$ | Gate to Source Charge | | - | 5.5 | - | nC |
| $Q_{gd}$ | Gate to Drain “Miller” Charge | | - | 8 | - | nC |
| $V_{plateau}$ | Gate plateau voltage | | - | 3.8 | - | V |
| $R_G$ | Gate Resistance | VDD=0V,VGS=0V,f = 1 MHz | - | 15 | - | Ω |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$ = 400 V, $I_D$ = 18A, $V_{GS}$ = 10 V, | - | 13 | - | ns |
| $t_r$ | Turn-On Rise Time | | - | 2 | - | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | - | 80 | - | ns |
| $t_f$ | Turn-Off Fall Time | | - | 7 | - | ns |
| **Source-Drain Diode Characteristics** | | | | | | |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$ = 0 V,$I_F$=8.5A Tf=25℃ | - | 0.8 | - | V |
| $t_{rr}$ | Reverse Recovery Time | $V_R$ = 400 V, $I_F$= 9 A, $di_F/dt$ = 100 A/μs | - | 255 | - | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | - | 3.1 | - | μC |
| $I_{rrm}$ | Peak reverse recovery current | | - | 20 | - | A |

# Typical Performance Characteristics

**Figure 1. Power dissipation**

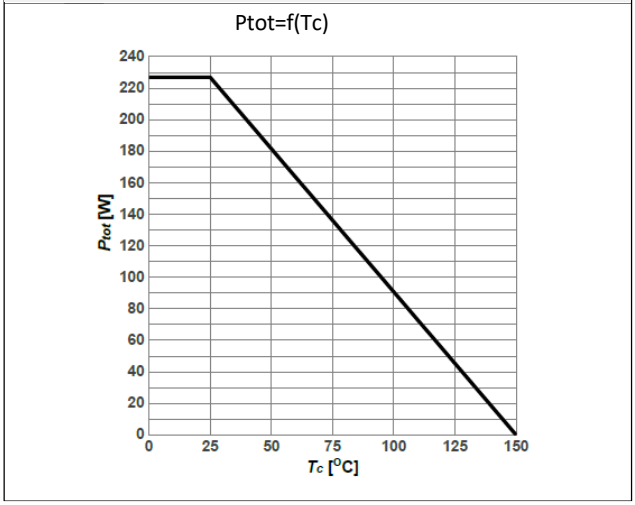



**Figure 2: Max. transient thermal impedance**

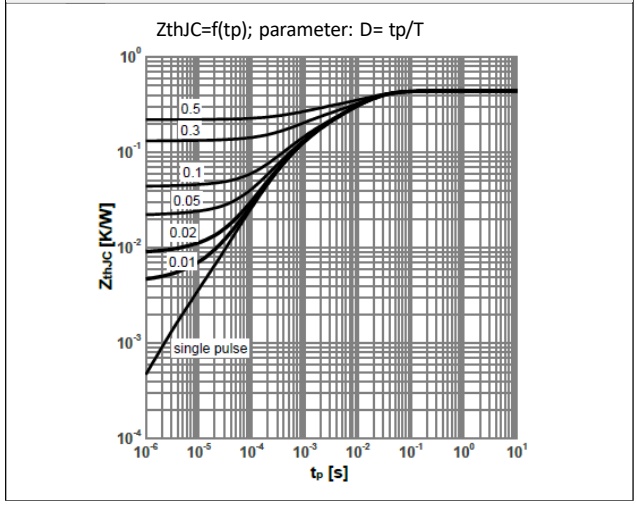



**Figure 3: Safe operating area**

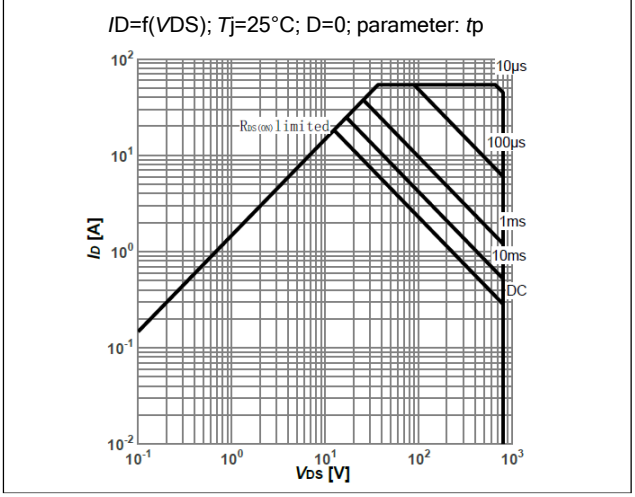



**Figure 4: Typ. output characteristics**

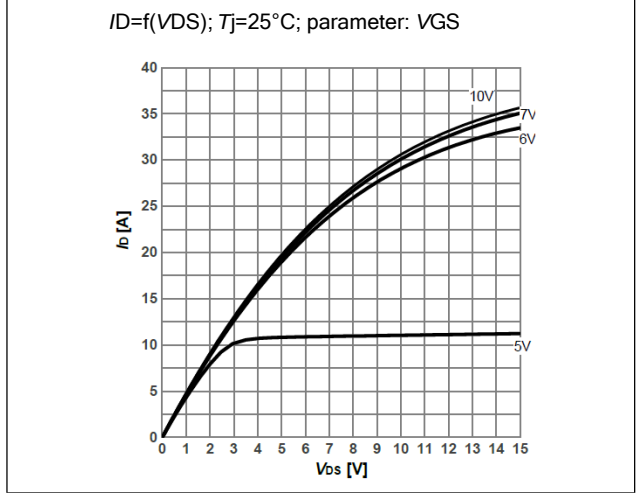



**Figure 5: Typ. output characteristics**

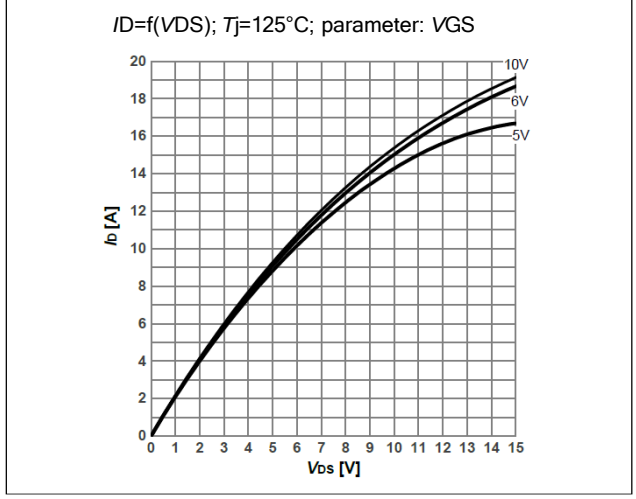
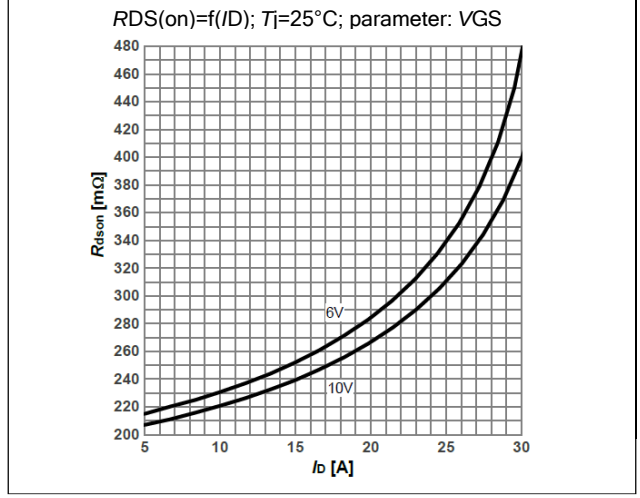



**Figure 6: Typ. drain-source on-state resistance**



# Typical Performance Characteristics

**Figure 7: Drain-source on-state resistance**

*R*DS(on)=f(*T*j); *I*D=8.5A; *V*GS=10V

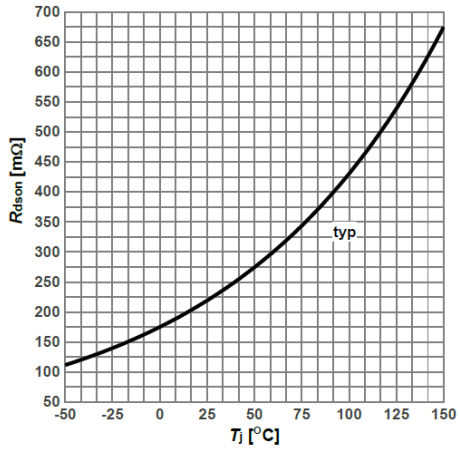



**Figure 8: Typ. transfer characteristics**

*I*D=f(*V*GS); *V*DS=20V; parameter: *T*j

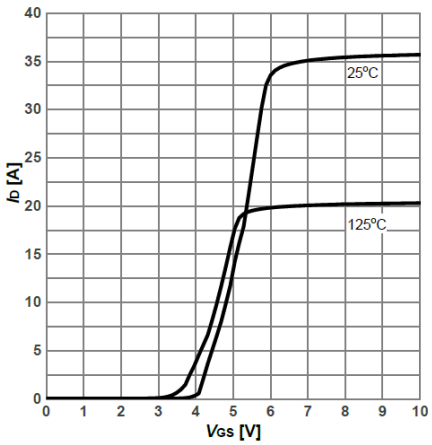



**Diagram 9: Typ. gate charge**

*V*GS=f(*Q*gate); *I*D=9A pulsed; *V*DS=400V

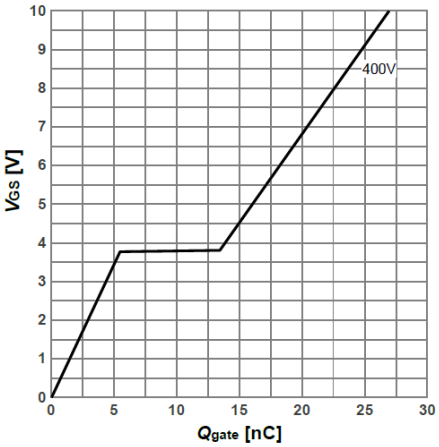



**Figure 10: Forward characteristics of reverse diode**

$I_F$=f$_{(VSD)}$; parameter: $T_j$

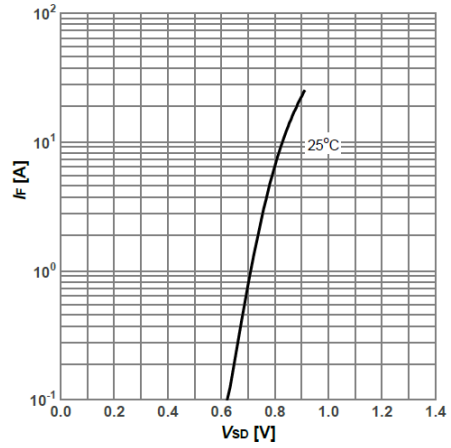



**Figure 11: Drain-source breakdown voltage**

$V_{BR(DSS)}$=f($T_j$); $I_D$=1mA

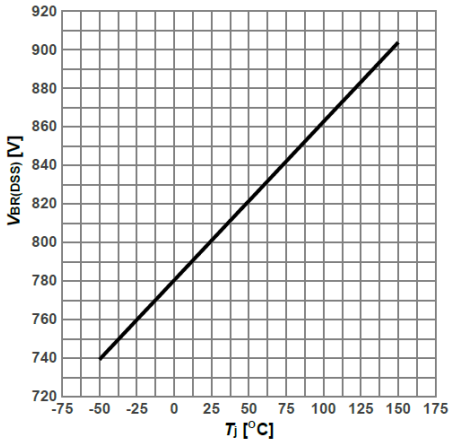
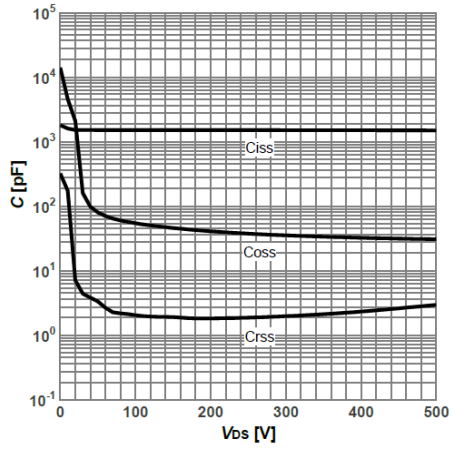



**Figure 12: Typ. capacitances**

*C*=f($V_{DS}$); $V_{GS}$=0V; f=250KHz



# Typical Performance Characteristics

**Figure 13: Typ. Coss stored energy**

*I*D=f(TC); *V*GS=10V

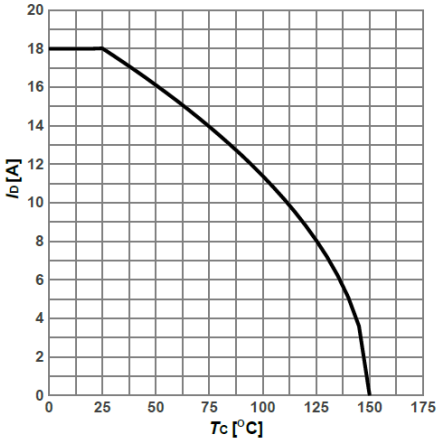
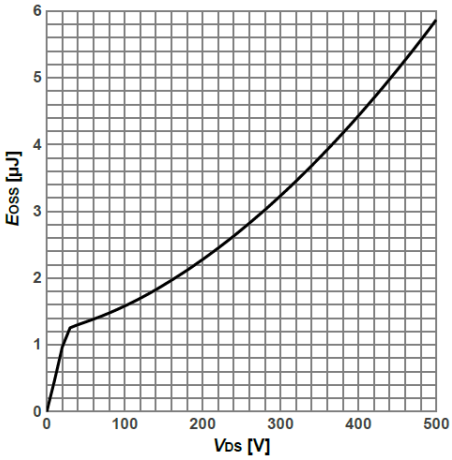



**Figure 14: Typ. Coss stored energy**

$E_{OSS}$ =f(*V*DS)



# Test Circuits

**Figure15. Diode Characteristics**

Test circuit for diode characteristics and Diode recovery waveform

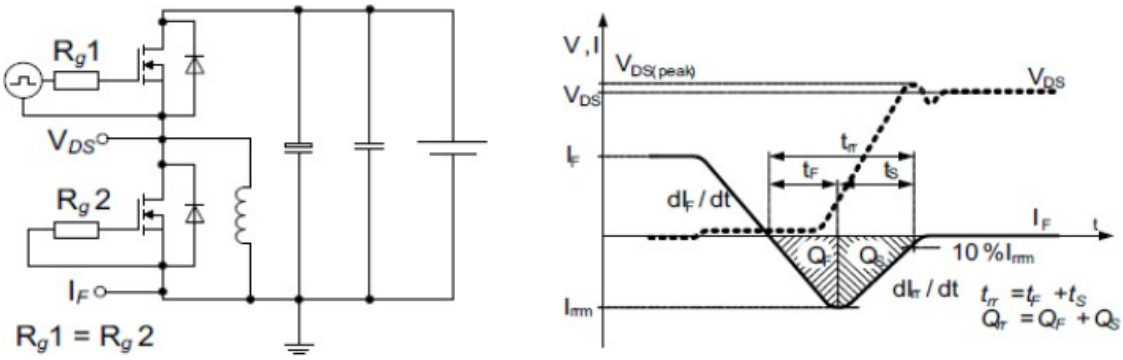



**Figure16. Switching Times**

Switching times test circuit for inductive load and Switching times waveform

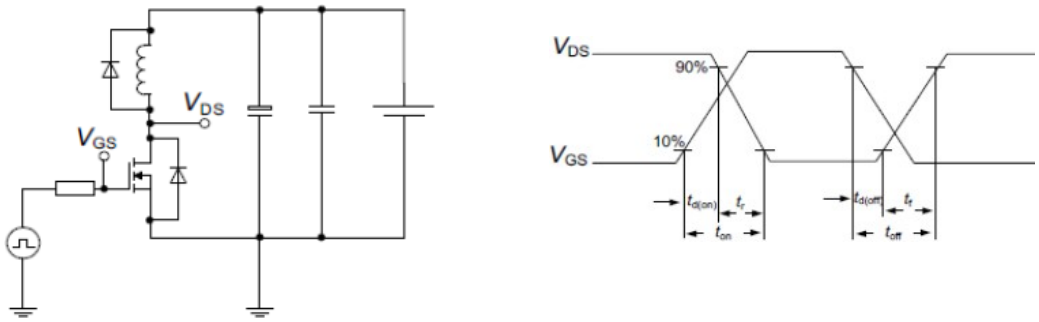
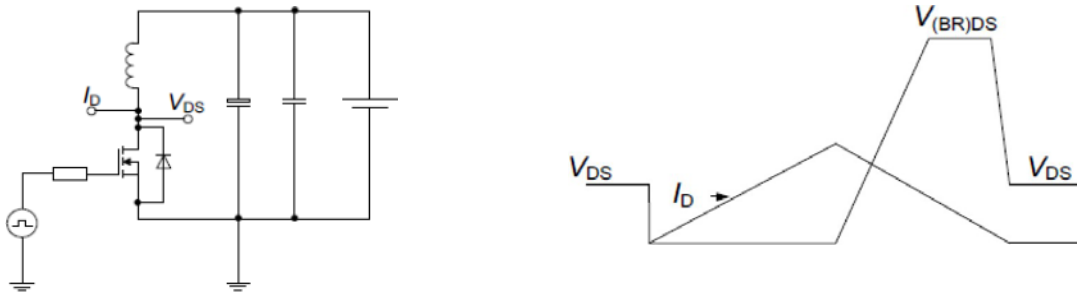


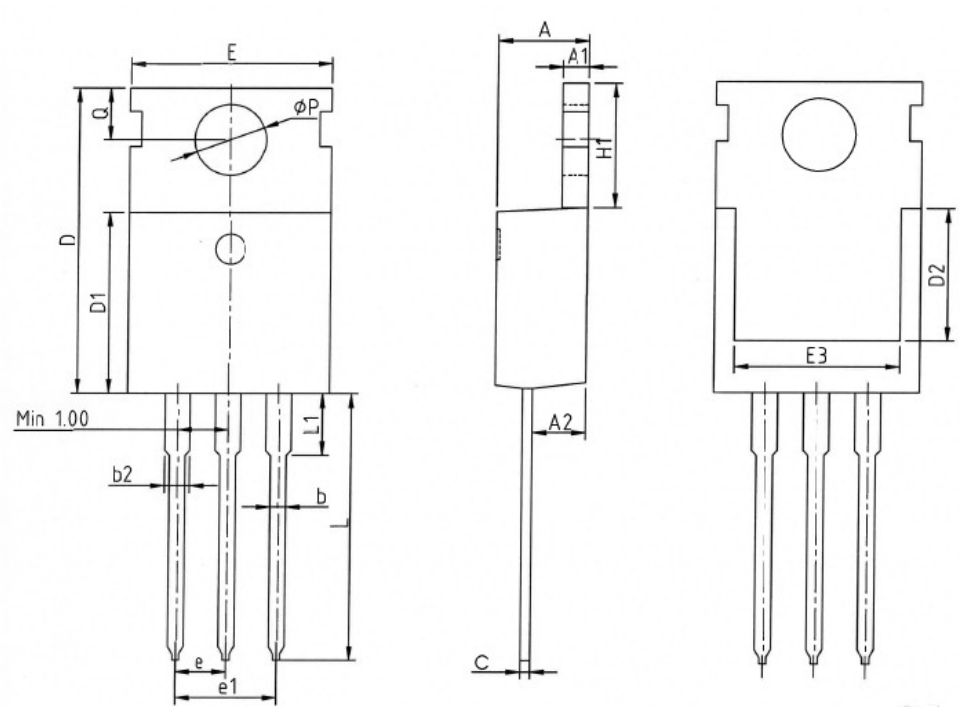

**Figure17. Unclamped Inductive Load**

Unclamped inductive load test circuit and Unclamped inductive waveform



## Package Outlines

# TO-220-3L




| SYMBOL | MIN | NOM | MAX |
|---|---|---|---|
| A | 4.37 | 4.57 | 4.70 |
| A1 | 1.25 | 1.30 | 1.40 |
| A2 | 2.20 | 2.40 | 2.60 |
| b | 0.70 | 0.80 | 0.95 |
| b2 | 1.17 | 1.27 | 1.47 |
| c | 0.45 | 0.50 | 0.60 |
| D | 15.10 | 15.60 | 16.10 |
| D1 | 8.80 | 9.10 | 9.40 |
| D2 | 5.50 | 6.30 | 7.10 |
| E | 9.70 | 10.00 | 10.30 |
| E3 | 7.00 | 7.80 | 8.60 |
| e | | 2.54 BSC | |
| e1 | | 5.08 BSC | |
| H1 | 6.25 | 6.50 | 6.85 |
| L | 12.75 | 13.50 | 13.80 |
| L1 | - | 3.10 | 3.40 |
| ΦP | 3.40 | 3.60 | 3.80 |
| Q | 2.60 | 2.80 | 3.00 |

* Dimensions in millimeters

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