# BMF80N360C1

## Super Junction Power MOSFET

800 V, 17 A, 360 mΩ

bestirpower

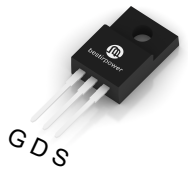
## Description

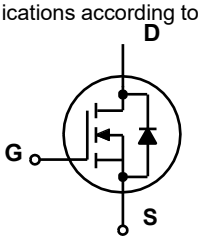
BMF80N360C1 is power MOSFET using bestirpower's advanced super junction technology that can realize very low on resistance and gate charge.
It will provide much high efficiency by using optimized charge coupling technology. These user friendly devices give an advantage of Low EMI to designers as well as low switching loss.

## Features

| $BV_{DSS}$ @ $T_{J,max}$ | $I_D$ | $R_{DS(on),max}$ | $Q_{g,typ}$ |
|---|---|---|---|
| 850 V | 17A | 360 mΩ | 30 nC |

- Ultra-fast body diode.
- Extremely low losses due to very low FOM Rdson*Qg and Eoss.
- Very high commutation ruggedness.
- Qualified for industrial grade applications according to JEDEC.




- PC power.
- Server power supply.
- Telecom.
- LED lighting.
- EV Charger.
- Solar/UPS.

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

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{DSS}$ | Drain to Source Voltage[1] | | 800 | V |
| $V_{GSS}$ | Gate to Source Voltage | | ±30 | V |
| $I_D$ | Drain Current[2] | $V_{GS}$ = 10 V, ($T_C$ = 25℃) | 17 | A |
| | | $V_{GS}$ = 10 V, ($T_C$ = 100℃) | 7.5 | |
| $I_{DM}$ | Drain Current | Pulsed | 51 | A |
| $E_{AS}$ | Single Pulsed Avalanche Energy[3] | | 506 | mJ |
| $I_{AR}$ | Avalanche Current | | 4.5 | A |
| dv/dt | MOSFET dv/dt ruggedness | | 50 | V/ns |
| | Reverse diode dv/dt[4] | | 50 | |
| $P_D$ | Power Dissipation | ($T_C$ = 25℃) | 35 | W |
| $T_J$, $T_{STG}$ | Operating and Storage Temperature Range | | -55 to 150 | ℃ |
| $I_S$ | Continuous diode forward current | | 17 | A |
| $I_{S,pulse}$ | Diode pulse current[2] | | 51 | 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 - case | 3.57 | ℃/W |
| $R_{\theta JA}$ | Thermal resistance, junction - ambient | 62.5 | |
| $T_{sold}$ | Soldering temperature, wavesoldering only allowed at leads | 260 | ℃ |

## Electrical Characteristics ($T_J$ = 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, $I_D$ = 250uA | 800 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 800 V, $V_{GS}$ = 0 V, $T_J$ = 25℃ | - | - | 1 | μA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$ = ±30 V, $V_{DS}$ = 0 V | - | - | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$ = $V_{DS}$, $I_D$ = 250uA | 2.5 | 3.5 | 4.5 | V |
| $R_{DS(on)}$ | Static Drain to Source On Resistance | $V_{GS}$ = 10 V, $I_D$ = 5.5 A, $T_J$ = 25℃ | - | 280 | 360 | mΩ |
| $R_G$ | Gate resistance | $V_{DD}$ = 0 V, $V_{GS}$=0V, F=1MHz | - | 5 | | Ω |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$ = 0 V, $V_{DS}$ = 100V, f = 250 kHz | - | 1280 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 47 | - | pF |
| $C_{rss}$ | Reverse transfer capacitance | | - | 1.6 | - | pF |
| $C_{o(tr)}$ | Time Related Output Capacitance[1] | $V_{DS}$ = 0 V to 500 V, $V_{GS}$ = 0 V | - | 133 | - | pF |
| $C_{o(er)}$ | Energy Related Output Capacitance[2] | | - | 38 | - | pF |
| $Q_{g(tot)}$ | Total Gate Charge | $V_{DD}$= 640 V, $I_D$ = 6 A, $V_{GS}$ = 0 to 10 V | - | 30 | - | nC |
| $Q_{gs}$ | Gate to Source Charge | | - | 4 | - | nC |
| $Q_{gd}$ | Gate to Drain “Miller” Charge | | - | 9.6 | - | nC |
| $V_{plateau}$ | Gate plateau voltage | | - | 5.7 | - | V |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$ = 400 V, $I_D$ = 8A, $V_{GS}$ = 10 V | - | 50 | - | ns |
| $t_r$ | Turn-On Rise Time | | - | 19 | - | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | - | 64 | - | ns |
| $t_f$ | Turn-Off Fall Time | | - | 9 | - | ns |
| **Source-Drain Diode Characteristics** | | | | | | |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$ = 0 V, $I_F$ = 5.5 A, $T_J$ = 25℃ | - | 0.81 | - | V |
| $t_{rr}$ | Reverse Recovery Time | $V_R$ = 400 V, $I_F$ = 8 A, $di_F/dt$ = 100 A/μs | - | 226 | - | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | - | 3.1 | - | μC |
| $I_{rmm}$ | Peak reverse recovery current | | - | 26 | - | A |

1) $C_{o(tr)}$ is a fixed capacitance that gives the same charging time as $C_{oss}$ while $V_{DS}$ is rising from 0 to 500V.
2) $C_{o(er)}$ is a fixed capacitance that gives the same stored energy as $C_{oss}$ while $V_{DS}$ is rising from 0 to 500

## Typical Performance Characteristics

**Figure 1. Power dissipation**

$P_{tot}=f(T_C)$

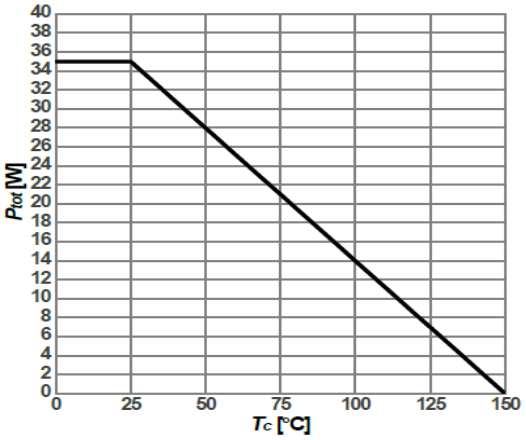



**Figure 2. Max. transient thermal impedance**

$Z_{thJC}=f(t_p)$; parameter: $D= t_p/T$

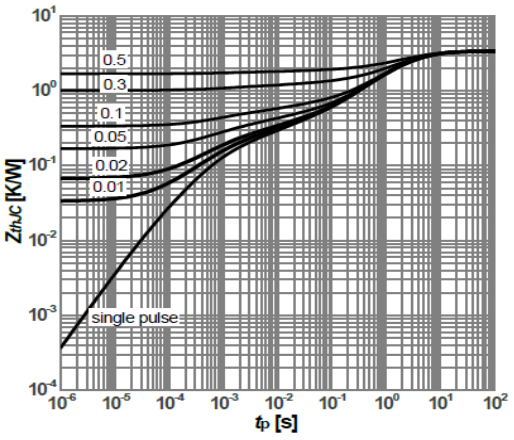



**Figure 3. Safe operating area**

$I_D=f(V_{DS})$; $T_j$=25°C; D=0; parameter: $t_p$

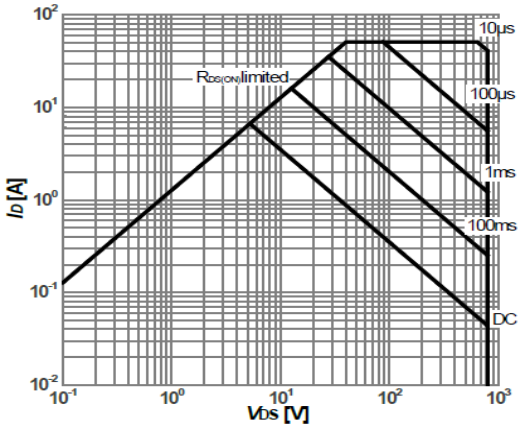



**Figure 4. Typ. Output characteristics**

$I_D=f(V_{DS})$; $T_j$=25°C; parameter: $V_{GS}$

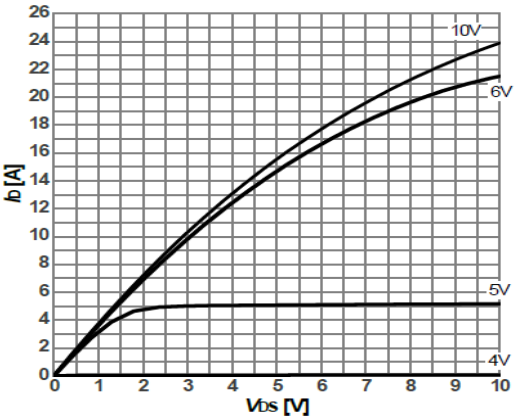



**Figure 5. Typ. Output characteristics**

$I_D=f(V_{DS})$; $T_j$=125°C; parameter: $V_{GS}$

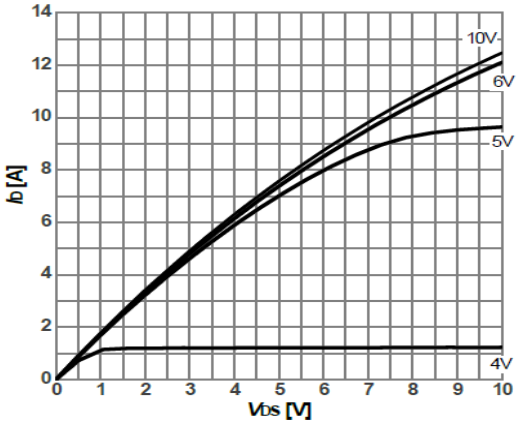
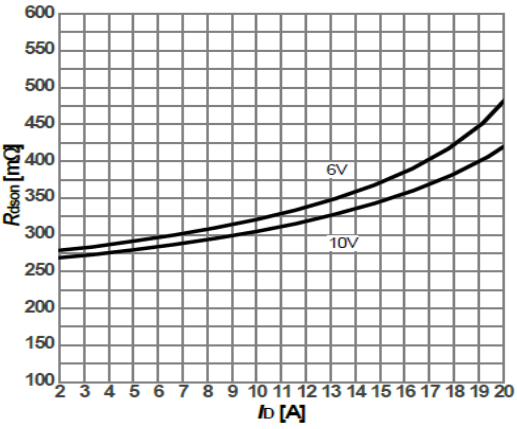



**Figure 6. Typ. drain-source on-state resistance**

$R_{DS}(on)=f(I_D)$; $T_j$=25°C; parameter: $V_{GS}$



## Typical Performance Characteristics

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

$R_{DS}(on)=f(T_j)$;$I_D$=5.5A; $V_{GS}$=10V

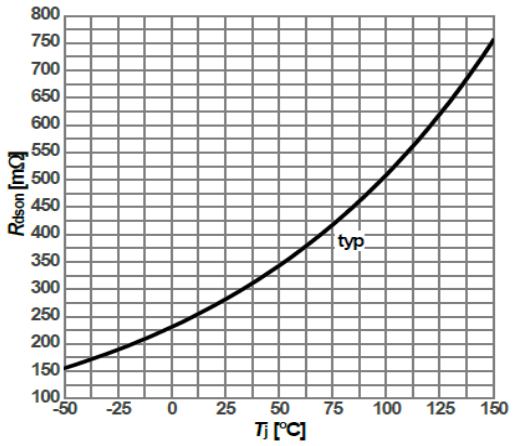



**Figure 8. Typ. Transfer characteristics**

$I_D=f(V_{GS})$; $V_{DS}$=20V; parameter: $T_j$

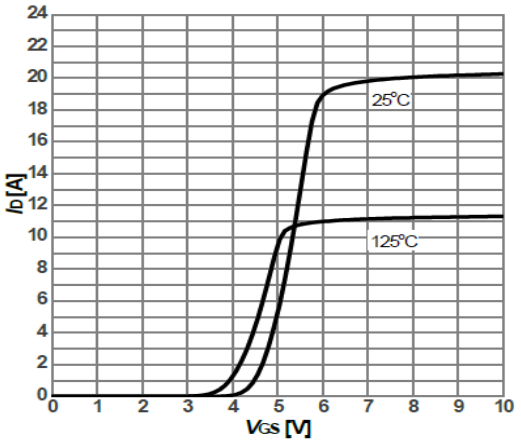



**Figure 9. Typ. gate charge**

$V_{GS}=f(Qgate)$;$I_D$=6A pulsed; $V_{DS}$=640V

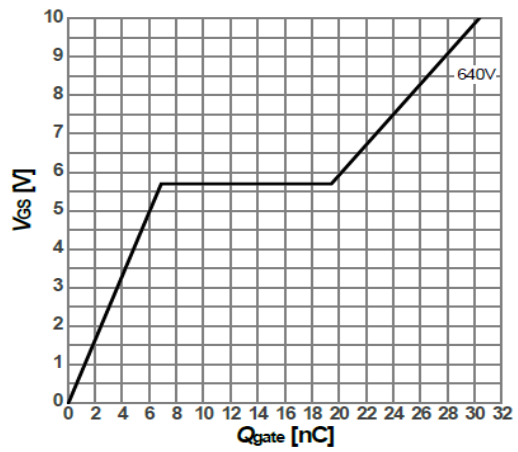



**Figure 10. Typ. forward characteristics of reverse diode**

$I_F=f(V_{SD})$;parameter: $T_j$

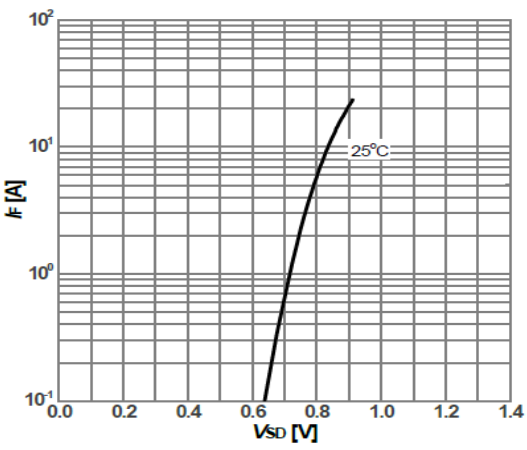



**Figure 11. Typ. drain-source breakdown voltage**

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

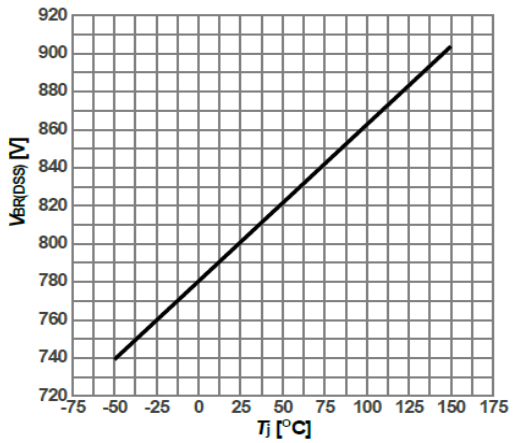
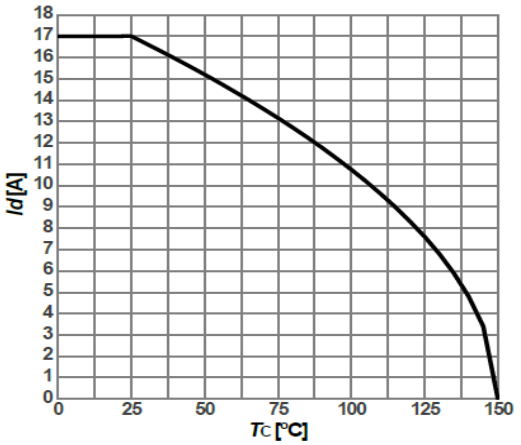



**Figure 12. Maximum drain current**

$I_D=f(T_C)$; $V_{GS}$=10V



## Typical Performance Characteristics

**Figure 13. Typ. Capacitances**

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

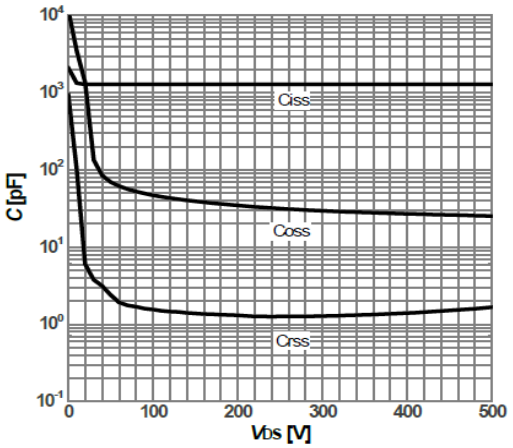
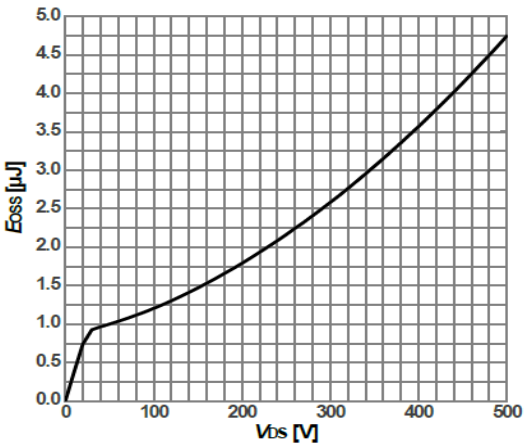



**Figure 14. Typ. coss stored energy**

$E_{oss}= f(V_{DS})$



## Test Circuits

**Figure 15. Diode Characteristics**

est circuit for diode characteristics and Diode recovery waveform

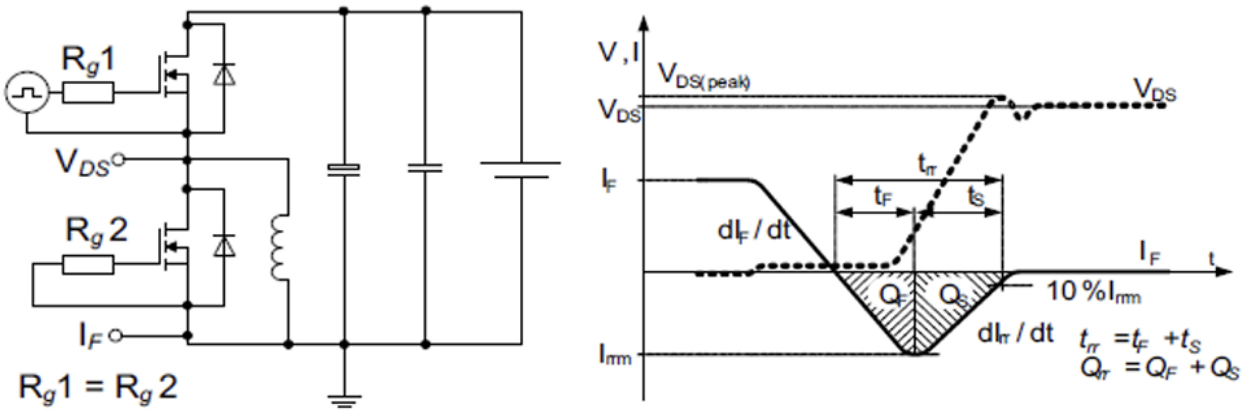



**Figure 16. Switching Times**

Switching times test circuit for inductive load and Switching times waveform

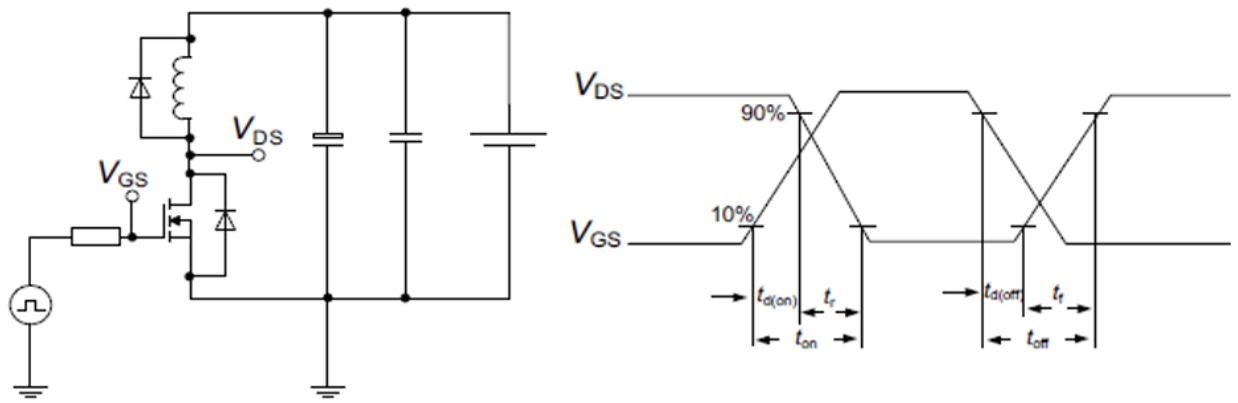
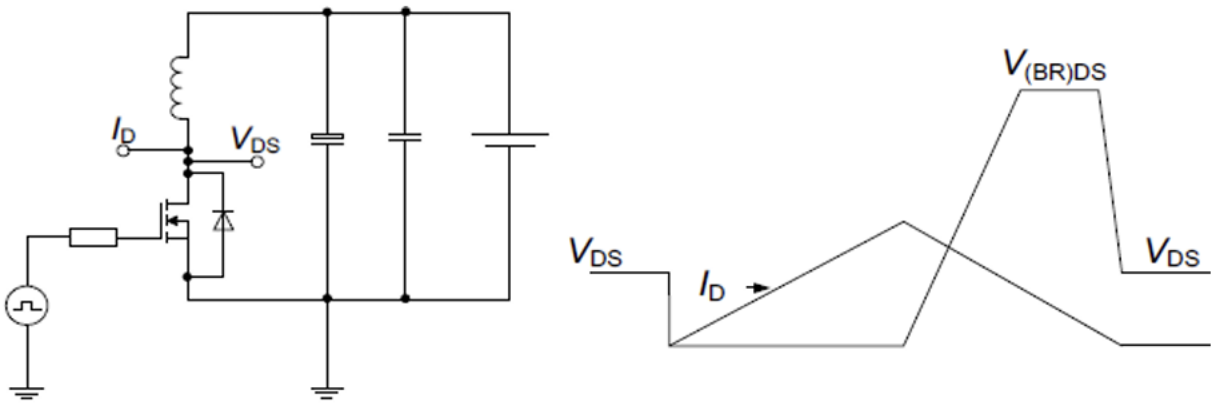


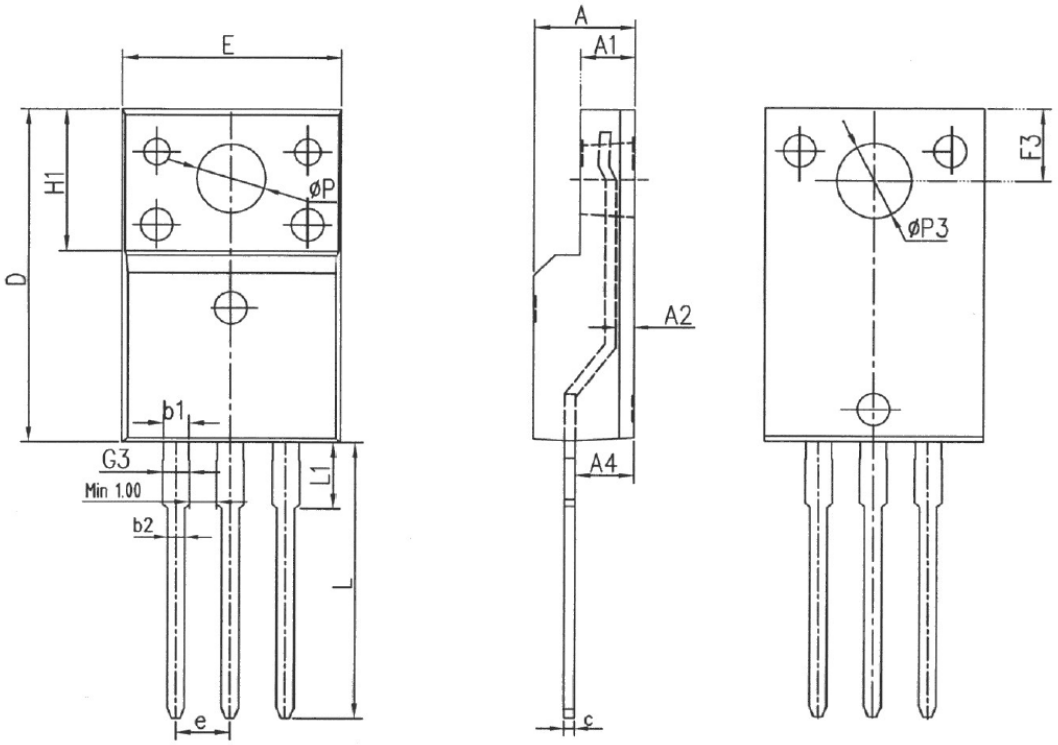

**Figure 17. Unclamped Inductive Load**

Unclamped inductive load test circuit and Unclamped inductive waveform



## Package Outlines

# TO-220F




| SYMBOL | MM | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| E | 10.00 | 10.20 | 10.40 |
| A | 4.50 | 4.70 | 4.90 |
| A1 | 2.34 | 2.54 | 2.74 |
| A2 | 0.65 | 0.85 | 1.30 |
| A4 | 2.55 | 2.75 | 2.95 |
| c | 0.40 | 0.50 | 0.65 |
| D | 15.57 | 15.87 | 16.17 |
| H1 | 6.70REF | | |
| e | 2.54BSC | | |
| ΦP | 3.183REF | | |
| L | 12.68 | 12.98 | 13.28 |
| L1 | 3.25 | 3.45 | 3.65 |
| ΦP3 | 3.45REF | | |
| F3 | 3.10 | 3.30 | 3.50 |
| G3 | 1.10 | 1.30 | 1.50 |
| b1 | 1.05 | 1.20 | 1.35 |
| b2 | 0.70 | 0.80 | 0.92 |

* Dimensions in millimeters

## Package Marking and Ordering Information

| Part Number | Top Marking | Package | Packing Method | Quantity |
|---|---|---|---|---|
| BMF80N360C1 | BMF80N360C1 | TO-220F | Tube | 50units |

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