

# BMF60N600C1

## N-Channel Power MOSFET

600 V, 8 A, 600 mΩ



bestirpower

### Description

BMF60N600C1 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.

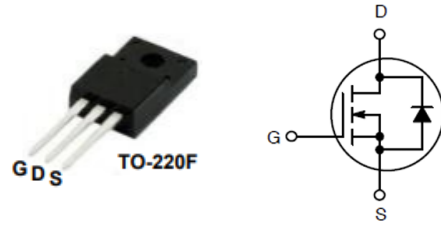
### Features

$V_{DS}@T_{J,max}$	$I_D$	$R_{DS(on),max}$	$Q_{g,typ}$
650 V	8 A	600 mΩ	15 nC

- Extremely low losses due to very low FOM  $R_{ds(on)}*Q_g$  and  $E_{oss}$ .
- Very high commutation ruggedness.

### Applications

- PFC.
- SPWM.
- LCD TV.
- Lighting.
- UPS.



### Absolute Maximum Ratings ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Unit
$V_{DSS}$	Drain to Source Voltage <sup>1)</sup>	600	V
$V_{GSS}$	Gate to Source Voltage	±30	V
$I_D$	Drain Current <sup>2)</sup>	Continuous ( $T_C = 25^\circ\text{C}$ )	8
		Continuous ( $T_C = 125^\circ\text{C}$ )	3.3
$I_{DM}$	Drain Current	Pulsed	24
$P_D$	Power Dissipation	62.5	W
$E_{AS}$	Single Pulsed Avalanche Energy <sup>3)</sup>	81	mJ
dv/dt	MOSFET dv/dt ruggedness	50	V/ns
	Diode Recovery dv/dt ruggedness <sup>4)</sup>	15	
$T_{STG}$	Storage Temperature Range	-55 to 150	°C
$T_J$	Maximum Operating Junction Temperature	150	°C
$T_L$	Maximum Lead Temperature for Soldering, 1/8" from Case for 10 Seconds	260	°C

1) Limited by  $T_J$  max. Maximum duty cycle  $D=0.75$ .

2) Pulse width  $t_p$  limited by  $T_J$ , max.

3)  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$ .

4)  $V_{DClink}=400\text{V}$ ;  $V_{DS,peak} < V_{(BR)DSS}$ ; identical low side and high side switch with identical  $R_G$ .

### Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, max $T_C = 25^\circ\text{C}$	4.9	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, max $T_C = 25^\circ\text{C}$	49	

## Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BMF60N600C1	BMF60N600C1	TO220F	Tube	50 units

## Electrical Characteristics (T<sub>C</sub> = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
BV <sub>DSS</sub>	Drain to Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250μA	600	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 600 V, V <sub>GS</sub> = 0 V T <sub>J</sub> =25°C	-	-	1	μA
		V <sub>DS</sub> = 600 V, V <sub>GS</sub> = 0 V T <sub>J</sub> =150°C	-	-	10	μA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V	-	-	±100	nA

## On Characteristics

V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250μA	2	3	4	V
R <sub>DS(on)</sub>	Static Drain to Source On Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 3.5A T <sub>J</sub> =25°C	-	500	600	mΩ

## Dynamic Characteristics

C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =50V, f = 1MHz	-	370	-	pF
C <sub>oss</sub>	Output Capacitance		-	23	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	1.3	-	pF
C <sub>o(er)</sub>	Energy Related Output Capacitance <sup>1)</sup>	V <sub>DS</sub> = 0V to 400V, V <sub>GS</sub> = 0V	-	16	-	pF
C <sub>o(tr)</sub>	Time Related Output Capacitance <sup>2)</sup>	V <sub>DS</sub> = 0V to 400V, V <sub>GS</sub> = 0V	-	87	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> = 0-10V, V <sub>DD</sub> =480V, I <sub>D</sub> = 4A	-	15	-	nC
Q <sub>gs</sub>	Gate to Source Charge		-	2.4	-	nC
Q <sub>gd</sub>	Gate to Drain "Miller" Charge		-	9	-	nC
V <sub>plateau</sub>	Gate plateau voltage		-	6	-	V
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> = 0V, f = 1MHz	-	3.6	-	Ω

## Switching Characteristics

t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> = 10V, V <sub>DD</sub> = 400V, I <sub>D</sub> =4A	-	18	-	ns
t <sub>r</sub>	Turn-On Rise Time		-	12	-	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		-	50	-	ns
t <sub>f</sub>	Turn-Off Fall Time		-	16	-	ns

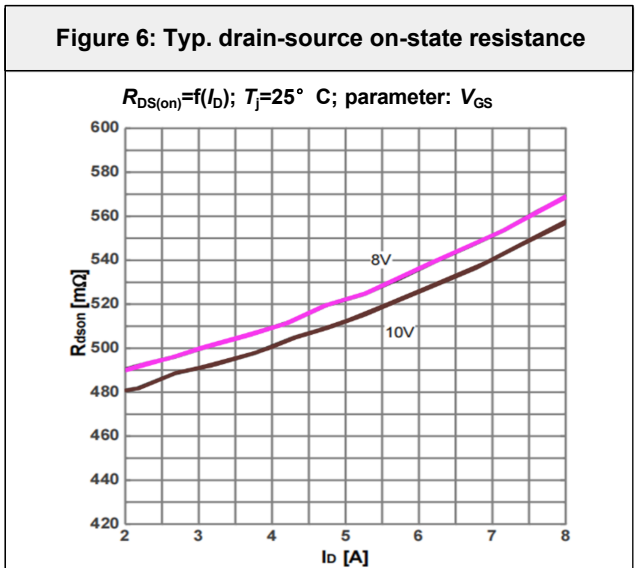
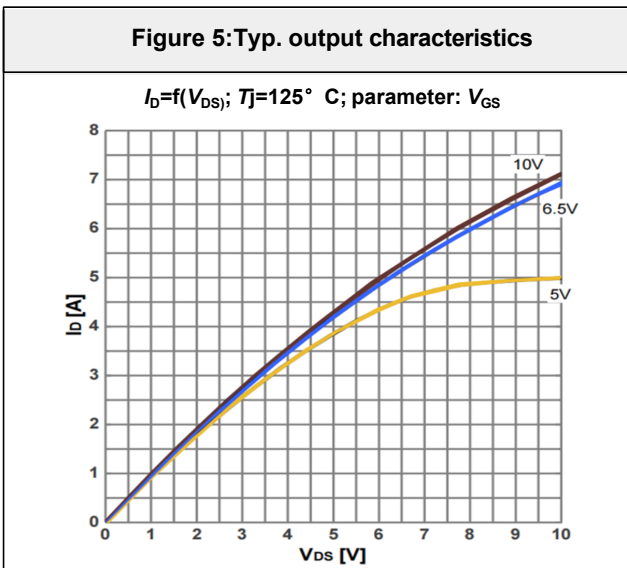
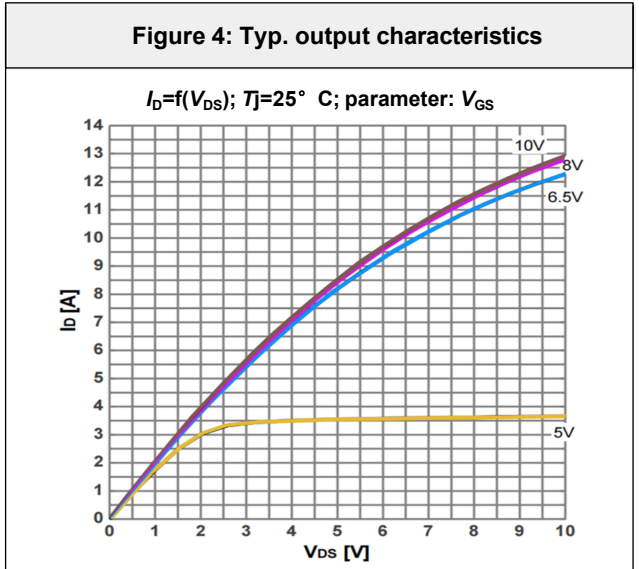
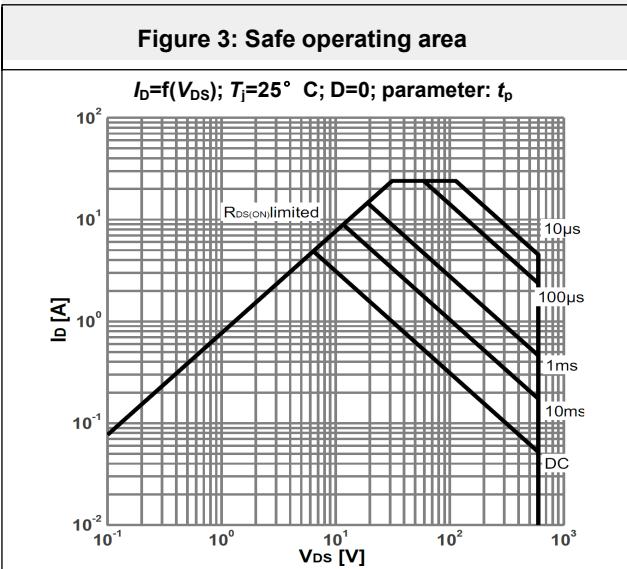
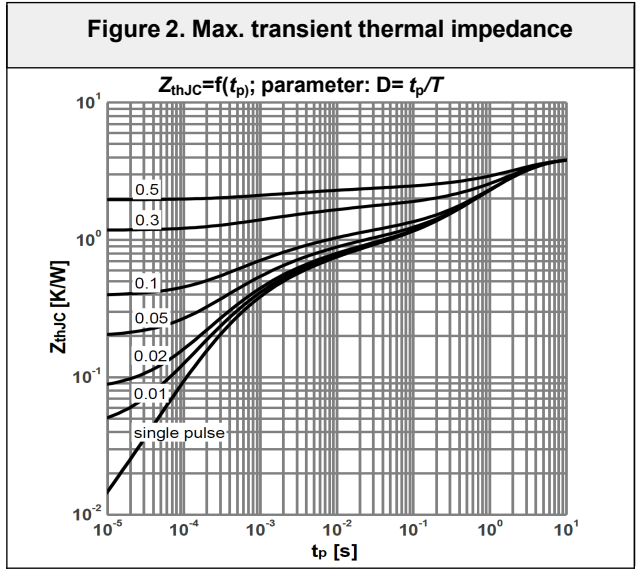
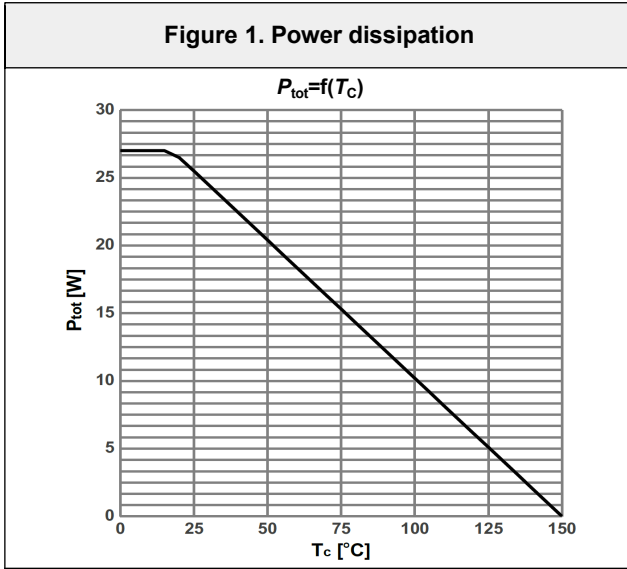
## Reverse Diode Characteristics

I <sub>SD</sub>	Continuous Diode Forward Current	T <sub>C</sub> =25°C	-	-	8	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>F</sub> = 4A, T <sub>F</sub> = 25°C	-	0.86	-	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>R</sub> =400V, I <sub>F</sub> =4A di <sub>F</sub> /dt = 100A/μs	-	200	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	1.25	-	μC
I <sub>rrm</sub>	Reverse Recovery Current		-	14	-	A

1) C<sub>o(er)</sub> is a fixed capacitance that gives the same stored energy as C<sub>oss</sub> while V<sub>DS</sub> is rising from 0 to 400V.

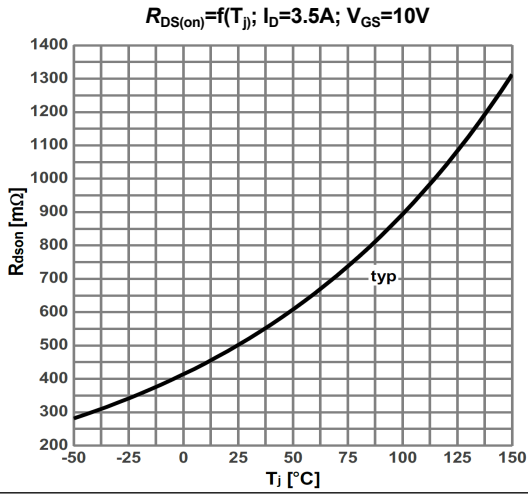
2) C<sub>o(tr)</sub> is a fixed capacitance that gives the same charging time as C<sub>oss</sub> while V<sub>DS</sub> is rising from 0 to 400V.

### Typical Performance Characteristics

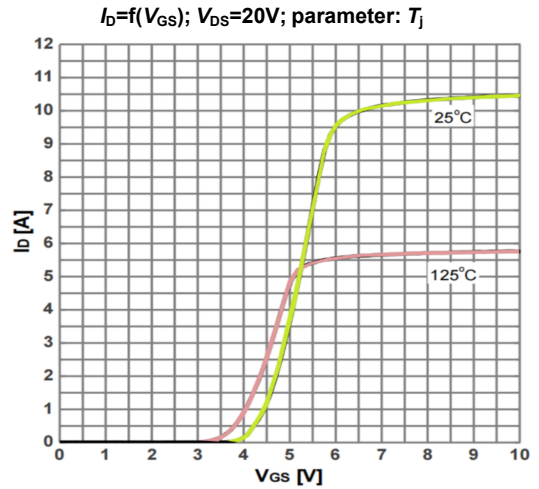


### Typical Performance Characteristics

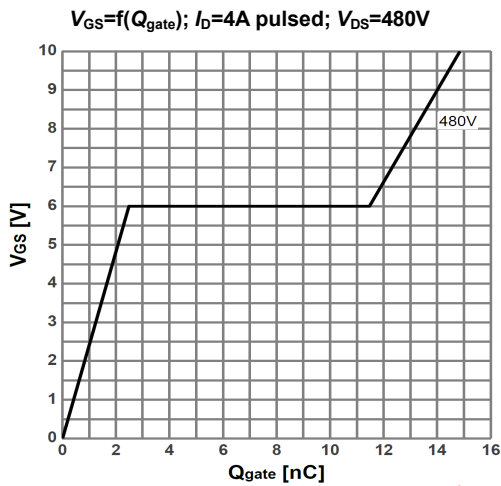
**Figure 7: drain-source on-state resistance**



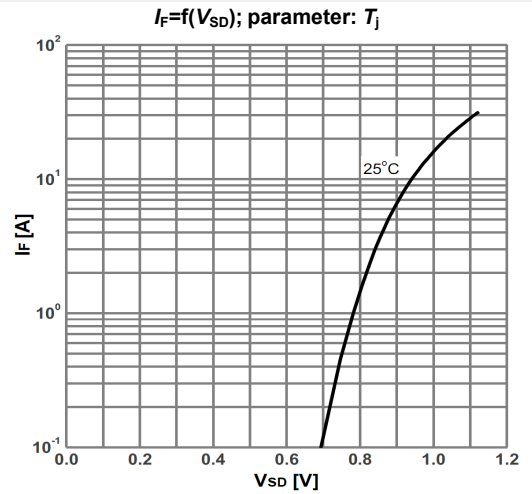
**Figure 8: Typ. transfer characteristics**



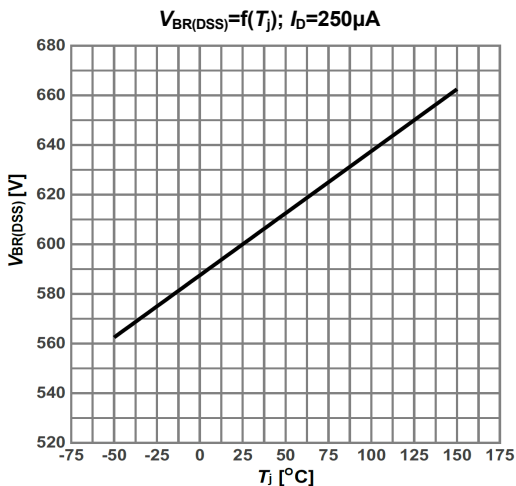
**Figure 9: Typ. gate charge**



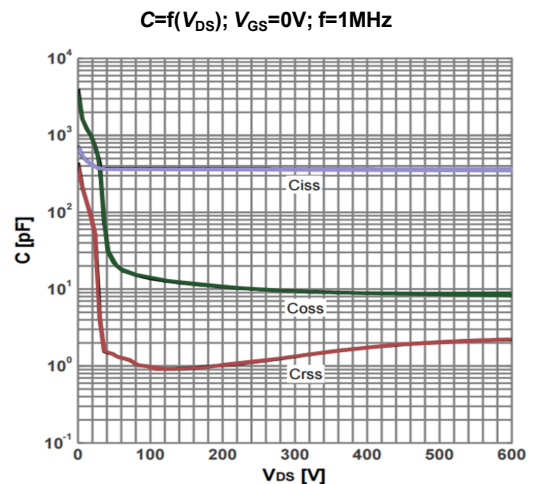
**Figure 10: Forward characteristics of reverse diode**



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

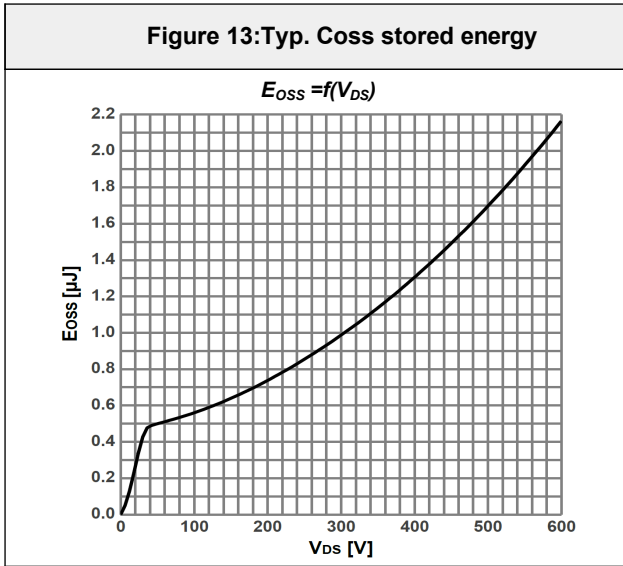


**Figure 12: Typ. capacitances**



### Typical Performance Characteristics

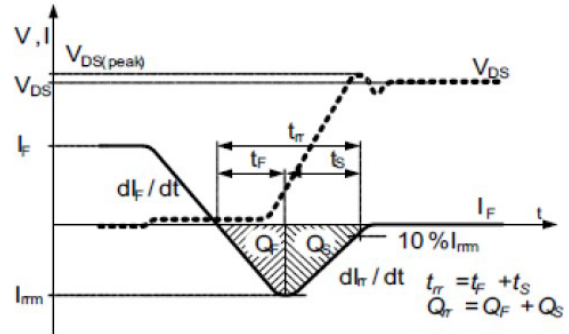
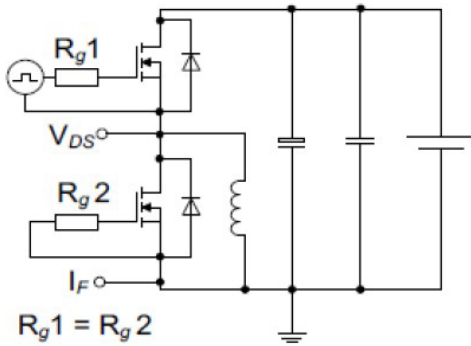
Figure 13: Typ.  $E_{oss}$  stored energy



### Test Circuits

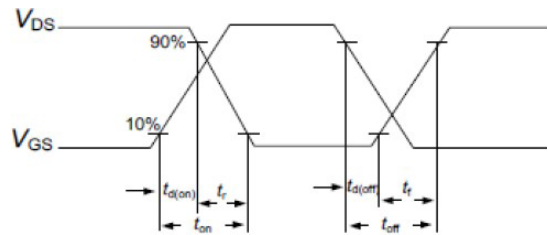
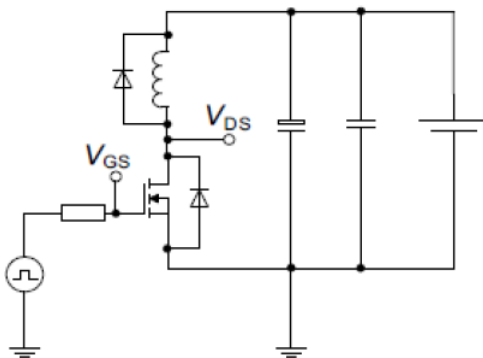
**Figure 14: Diode Characteristics**

Test circuit for diode characteristics and Diode recovery waveform



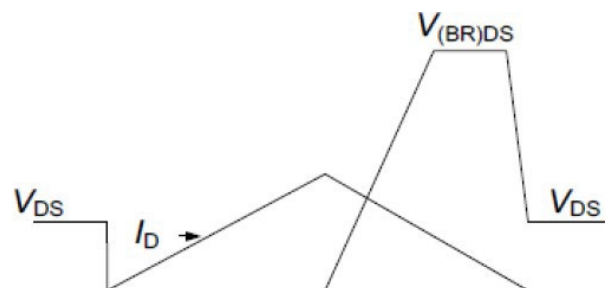
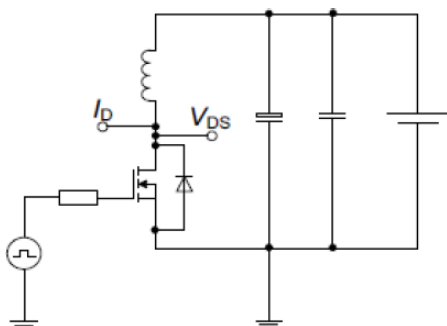
**Figure 15: Switching Times**

Switching times test circuit for inductive load and Switching times waveform



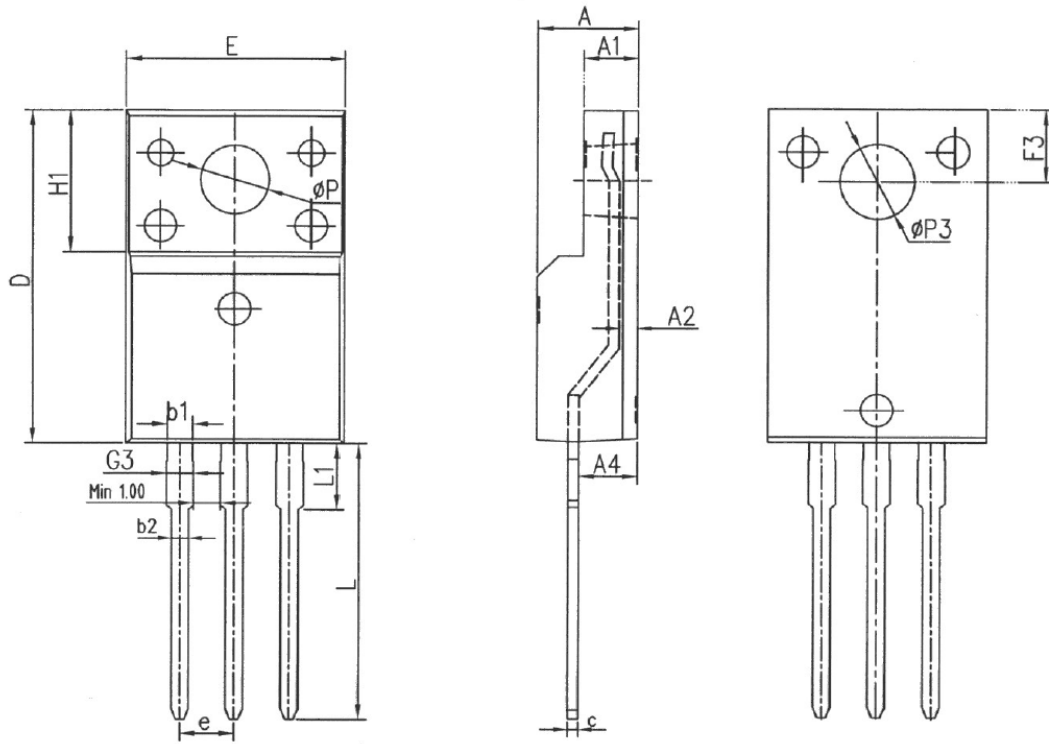
**Figure 16: Unclamped Inductive Load**

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

## **Disclaimer**

Bestirpower reserve the right to make changes, corrections, enhancements, modifications, and improvements to Bestirpower products and/or to this document at any time without notice.

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. Bestirpower does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Products or technical information described in this document.

This document is the property of Bestirpower Co., LTD., and not allowed to copy or transformed to other format if not under the authority approval.

© 2024 bestirpower – All rights reserved