BMF60N076UC1

Super Junction Power MOSFET

600 V, 52 A, 76 mΩ

bestirpower

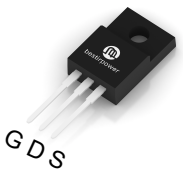
Description

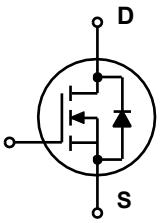
BMF60N076UC1 is power MOSFET using bestirpower's advanced super junction technology that can realize very low on resistance and gate charge.
It will provide much high efficiency by using optimized charge coupling technology. These user friendly devices give an advantage of Low EMI to designers as well as low switching loss.

Features

BV_{DSS} @ $T_{J,max}$	I_D	$R_{DS(on),max}$	$Q_{g,typ}$
650V	52 A	76 mΩ	80 nC

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





Applications

- PC power.
- Server power supply.
- Telecom.
- Solar invertor.
- Super charger for automobiles.

RoHS compliant

HF

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

Symbol	Parameter		Value	Unit
V_{DSS}	Drain to Source Voltage[1]		600	V
V_{GSS}	Gate to Source Voltage		±30	V
I_D	Drain Current[2]	V_{GS} = 10 V, (T_C = 25℃)	52	A
		V_{GS} = 10 V, (T_C = 100℃)	33	
I_{DM}	Drain Current	Pulsed	155	A
E_{AS}	Single Pulsed Avalanche Energy[3]		625	mJ
I_{AR}	Avalanche Current		5	A
dv/dt	MOSFET dv/dt		50	V/ns
	Peak Diode Recovery dv/dt[4]		50	
P_D	Power Dissipation	(T_C = 25℃)	34	W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to 150	℃
T_L	Maximum Lead Temperature for Soldering, 1/8" from Case for 10 Seconds		260	℃

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}=50V, R_G=25Ω, Starting T_j=25°C.
4) V_{DClink}=400V; $V_{DS,peak}$<$V_{(BR)DSS}$; 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.	3.67	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	

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 = 1 mA	600	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 600 V, V_{GS} = 0 V, T_J = 25℃	-	-	10	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 = 1 mA	3.0	4.0	5.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 23 A, T_J = 25℃	-	70	76	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0 V, V_{DS} = 50V, f = 250 kHz	-	3440	-	pF
C_{oss}	Output Capacitance		-	162	-	pF
C_{rss}	Reverse transfer capacitance		-	7	-	pF
$C_{o(tr)}$	Time Related Output Capacitance[1]	V_{DS} = 0 V to 400 V, V_{GS} = 0 V	-	557	-	pF
$C_{o(er)}$	Energy Related Output Capacitance[2]		-	107	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10 V	V_{DD}= 400 V, I_D = 23 A, V_{GS} = 0 to 10 V	-	80	-	nC
Q_{gs}	Gate to Source Charge		-	19	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	34	-	nC
$V_{plateau}$	Gate plateau voltage		-	6	-	V
R_G	Gate resistance	f = 1 MHz ,open drain	-	3.5	-	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 400 V, I_D = 23 A, V_{GS} = 10 V	-	85	-	ns
t_r	Turn-On Rise Time		-	14	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	130	-	ns
t_f	Turn-Off Fall Time		-	14	-	ns
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage	V_{GS} = 0 V, I_F = 23 A, T_f= 25℃	-	0.89	-	V
t_{rr}	Reverse Recovery Time	V_R = 400 V, I_F = 23 A, di_F/dt = 100 A/μs	-	145	-	ns
Q_{rr}	Reverse Recovery Charge		-	1.15	-	μC
I_{rrm}	Peak reverse recovery current		-	14	-	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 400V.
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 400V.

Typical Performance Characteristics

Figure 1. Power dissipation

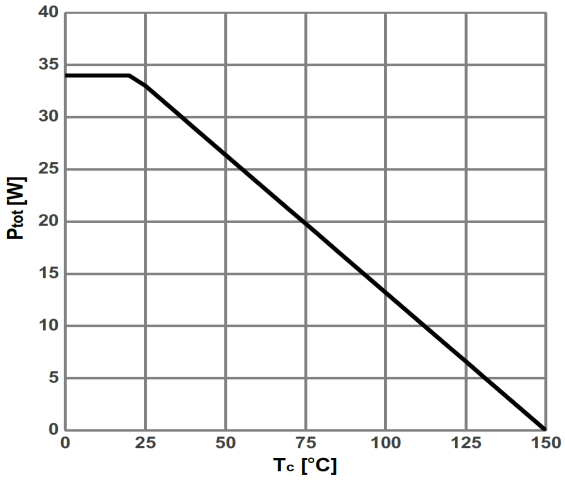


Figure 2. Max. transient thermal impedance

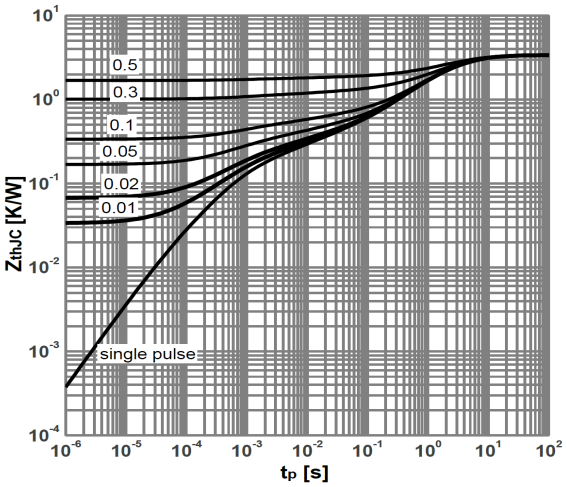


Figure 3. Safe operating area

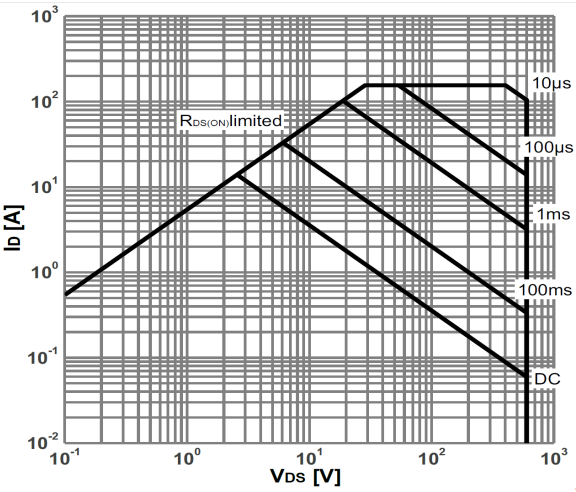


Figure 4. Typ. Output characteristics@T_J25°C

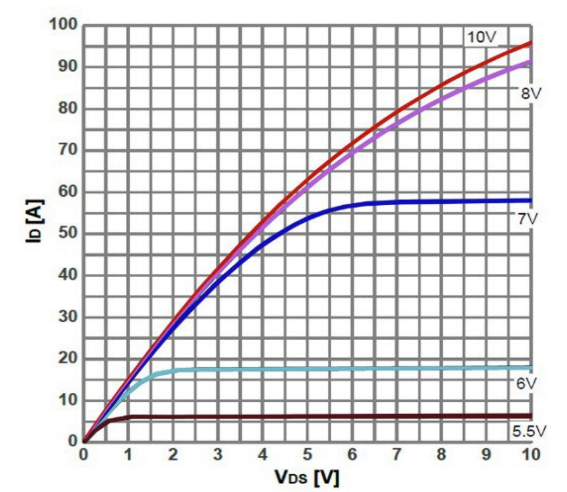


Figure 5. Typ. Output characteristics@T_J125°C

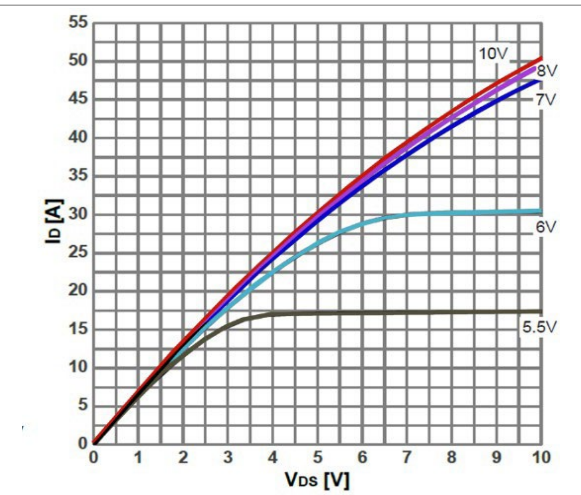
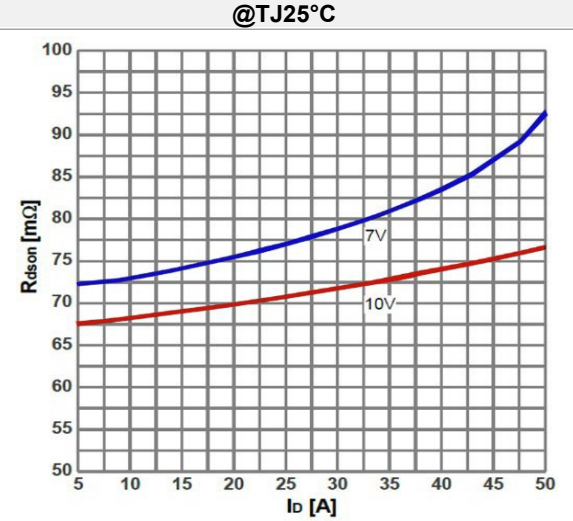


Figure 6. Typ.drain-source on-state resistance @TJ25°C



Typical Performance Characteristics

Figure 7. Typ. drain-source on-state resistance

$R_{DS}(on)=f(T_j)$;I_D=23A; V_{GS}=10V

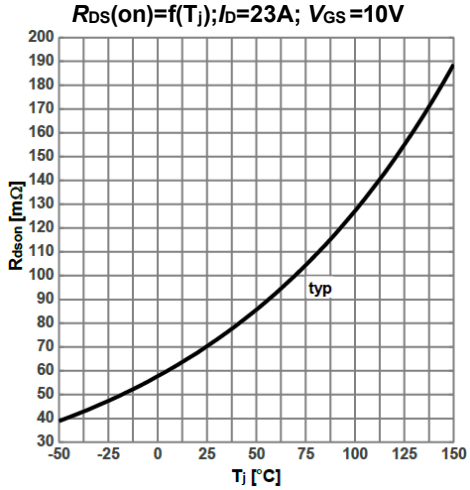


Figure 8. Typ. Transfer characteristics

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

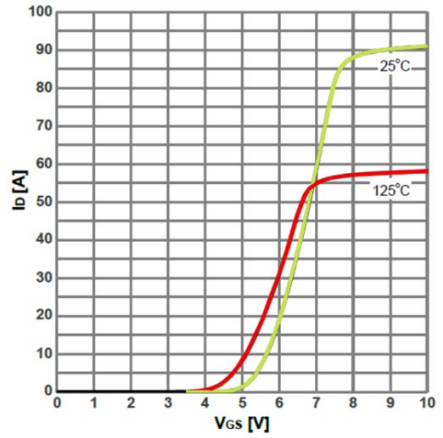


Figure 9. Typ. gate charge

$V_{GS}=f(Qgate)$;I_D=25A pulsed; V_{DS}=400V

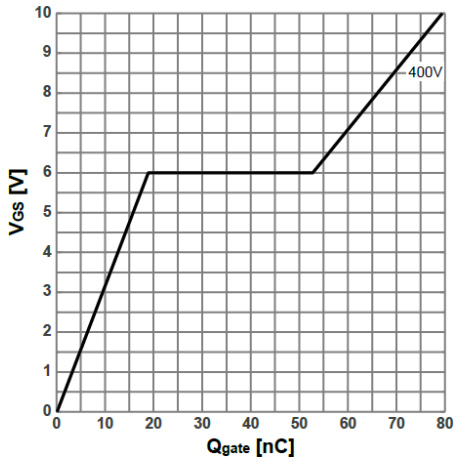


Figure 10. Typ. forward characteristics of reverse diode

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

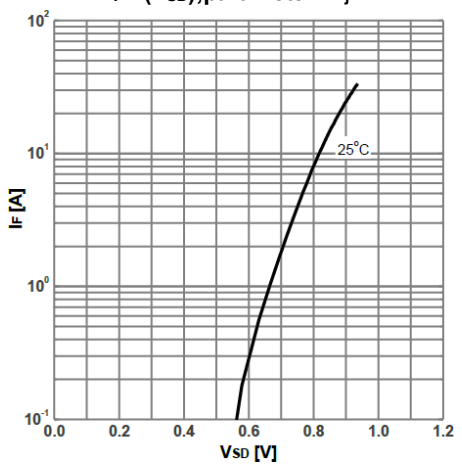


Figure 11. Typ. drain-source breakdown voltage

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

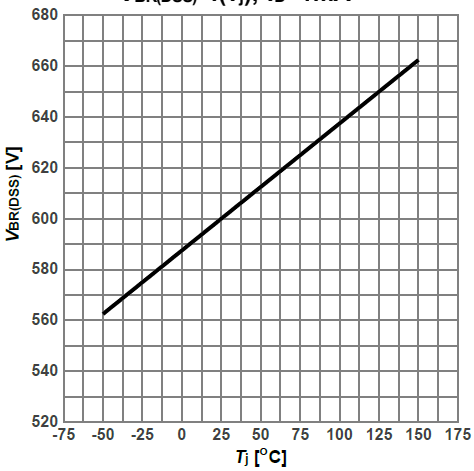
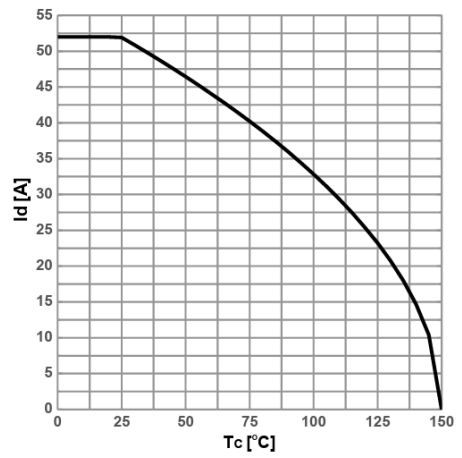


Figure 12. Maximum drain current

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



Typical Performance Characteristics

Figure 13. Typ. Capacitances

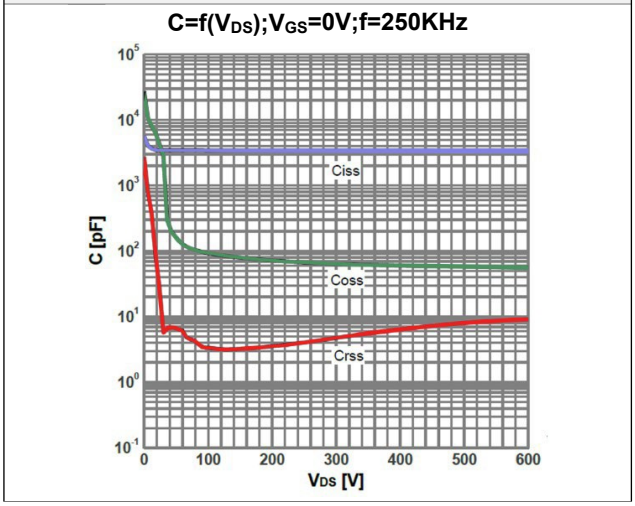
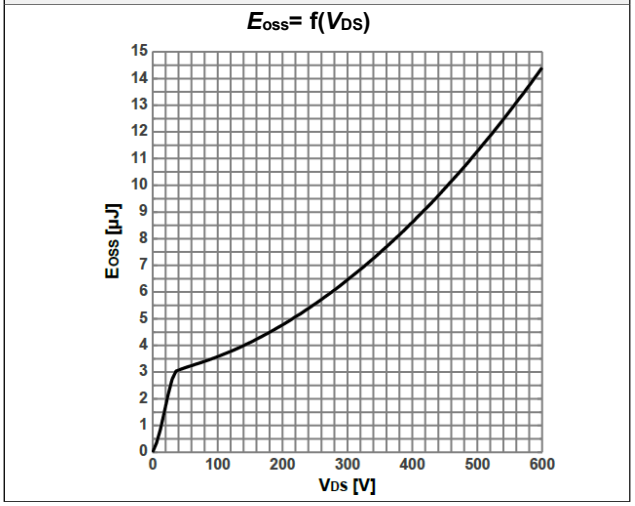


Figure 14. Typ. coss stored energy



Test Circuits

Figure 15. Diode Characteristics

est circuit for diode characteristics and Diode recovery waveform

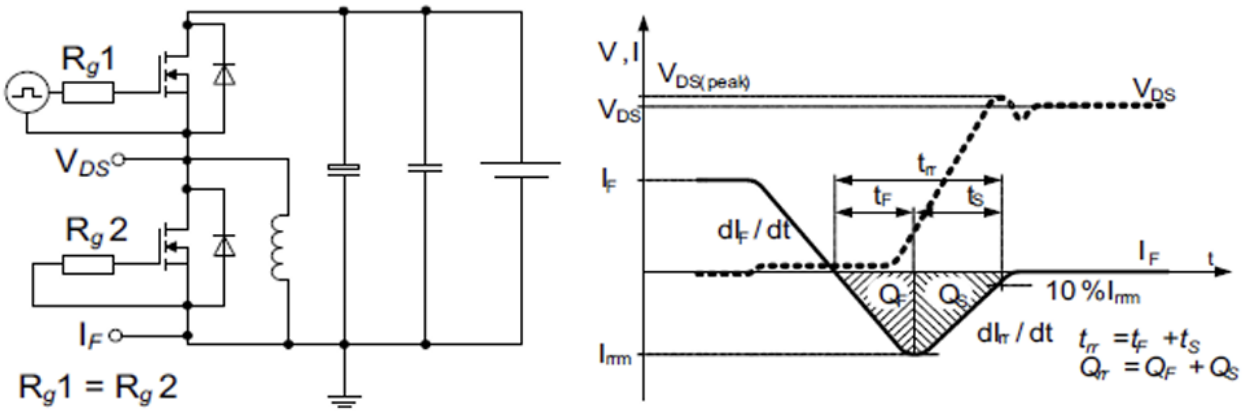


Figure 16. Switching Times

Switching times test circuit for inductive load and Switching times waveform

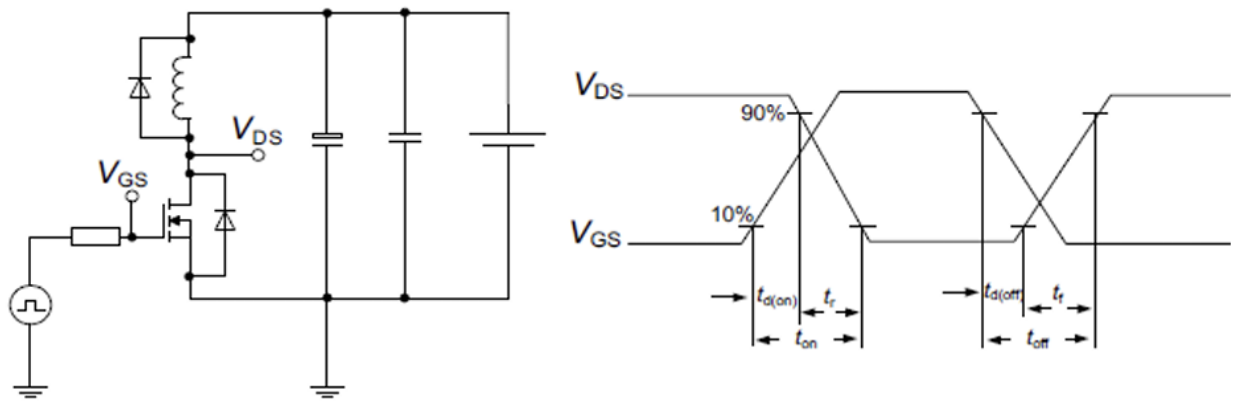
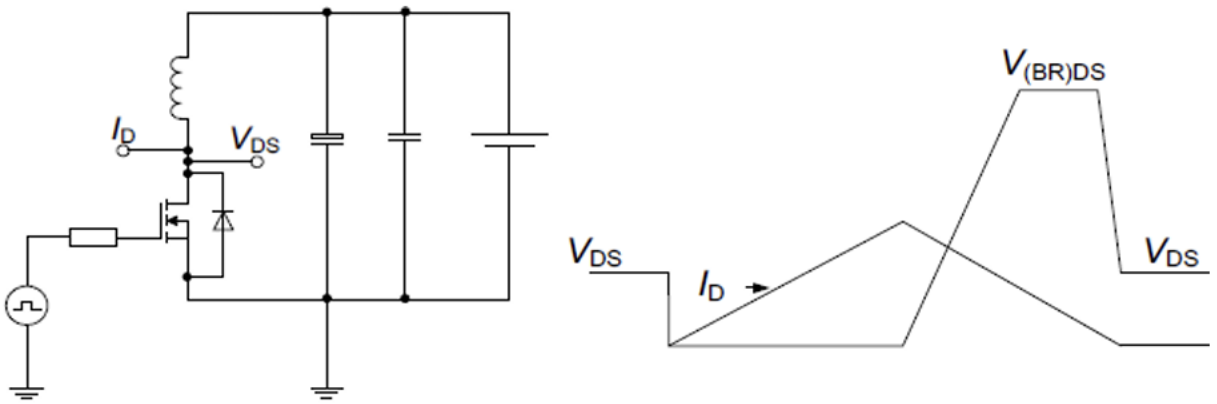


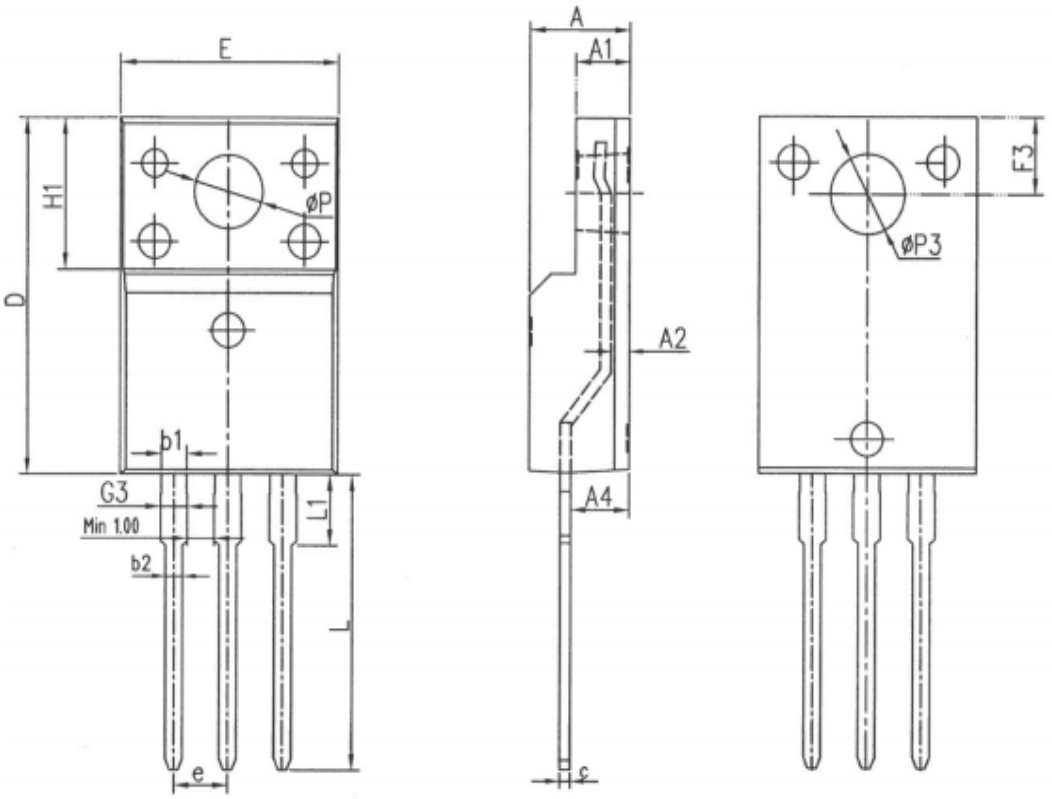
Figure 17. Unclamped Inductive Load

Unclamped inductive load test circuit and Unclamped inductive waveform



Package Outlines

TO-220F



COMMON DIMENSIONS

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
BMF60N076UC1	BMF60N076UC1	TO220F-3	Tube	50 units

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