BMF65N190C1

Super Junction Power MOSFET

650 V, 20 A, 190 mΩ

bestirpower

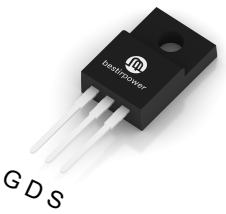
Description

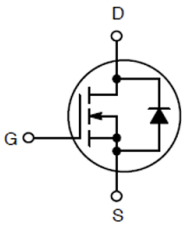
BMF65N190C1 is power MOSFET using bestirpower's advanced super junction technology that can realize very low on-resistance and gate charge. It will provide much high efficiency by using optimized charge coupling technology. These user friendly devices give an advantage of Low EMI to designers as well as low switching loss.

Features

BV_{DSS} @ $T_{J,max}$	I_D@25°C	$R_{DS(on),max}$	$Q_{g,typ}$
700 V	20A	190 mΩ	40 nC

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





Applications

- AC/DC Power Supply
- PC Power
- Solar invertor
- Telecom / Server

RoHS compliant

HF

Absolute Maximum Ratings (T_J = 25℃ unless otherwisenoted)

Symbol	Parameter		Value	Unit
V_{DSS}	Drain to Source Voltage[1]		650	V
V_{GSS}	Gate to Source Voltage		±30	V
I_D	Drain Current[2]	V_{GS} = 10 V, (T_C = 25℃)	20	A
		V_{GS} = 10 V, (T_C = 100℃)	12	
I_{DM}	Drain Current	Pulsed	58	A
P_{tot}	Power Dissipation		34	W
E_{AS}	Single Pulsed Avalanche Energy[3]		306	mJ
I_{AR}	Repetitive Avalance Energy		3.5	A
dv/dt	MOSFET dv/dt ruggedness		50	V/ns
	Diode Recovery dv/dt ruggedness[4]		50	
T_{STG}	Storage Temperature Range		-55 to 150	℃
T_J	Maximum Operating Junction Temperature		150	℃

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. *minimal footprint	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= 1mA	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}= 650 V, V_{GS}= 0 V,T_J=25°C	-	-	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= 250μA	2.5	3.3	4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS}= 10 V, I_D= 10A T_J=25° C	-	165	190	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} =0V, V_{DS} =50V, f =250KHz	-	1690	-	pF
C_{oss}	Output Capacitance		-	78	-	pF
C_{rss}	Reverse Transfer Capacitance		-	3.3	-	pF
$C_{o(er)}$	Energy Related Output Capacitance[1]	V_{DS} = 0V to 400V, V_{GS} = 0V	-	50	-	pF
$C_{o(tr)}$	Time Related Output Capacitance[2]		-	245	-	pF
Q_g	Total Gate Charge	V_{GS} = 0-10V, V_{DD} =400V, I_D = 7A	-	40	-	nC
Q_{gs}	Gate to Source Charge		-	9	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	17	-	nC
Vplateau	Gate plateau voltage		-	6	-	V
R_G	Gate Resistance	V_{GS} = 0V, f =1.0MHz， open drain	-	4	-	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{GS} = 10V, V_{DD} = 400V, I_D =7A	-	10	-	ns
t_r	Turn-On Rise Time		-	16	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	55	-	ns
t_f	Turn-Off Fall Time		-	14	-	ns
Reverse Diode Characteristics						
I_{SD}	Continuous Diode Forward Current		-	-	20	A
V_{SD}	Diode Forward Voltage	V_{GS} = 0V,I_F=10A,T_J= 25°C	-	0.85	-	V
t_{rr}	Reverse Recovery Time	V_R=400V, I_F=10A diF/dt = 100A/μs	-	320	-	ns
Q_{rr}	Reverse Recovery Charge		-	2.5	-	μC
I_{rrm}	Reverse Recovery Current		-	14	-	A

1) *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.
2) *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.

Figure 1. Power dissipation

P_{tot}=f(TC)

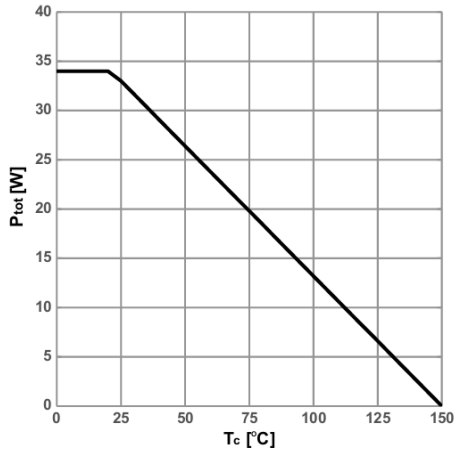


Figure 2. Max. transient thermal impedance

ZthJC=f(*tp*); parameter: D= *tp*/*T*

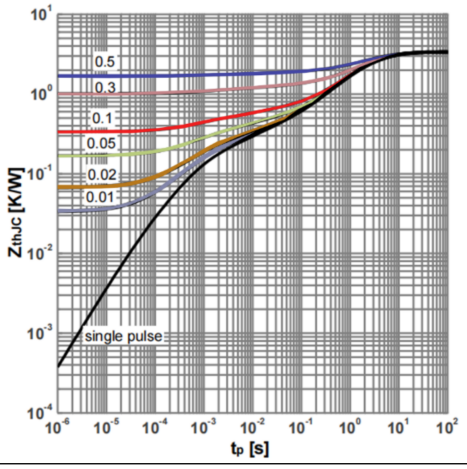


Figure 3: Safe operating area

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

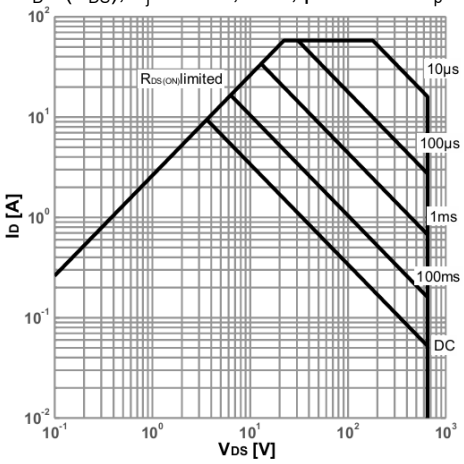


Figure 4: Typ. output characteristics

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

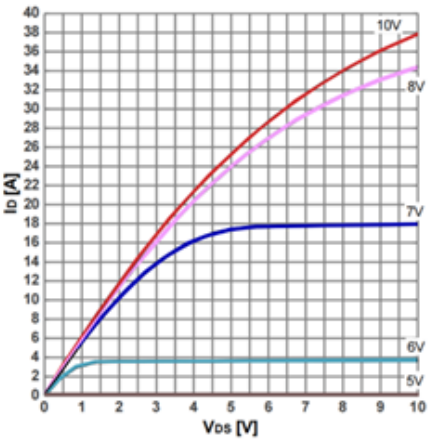


Figure 5:Typ. output characteristics

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

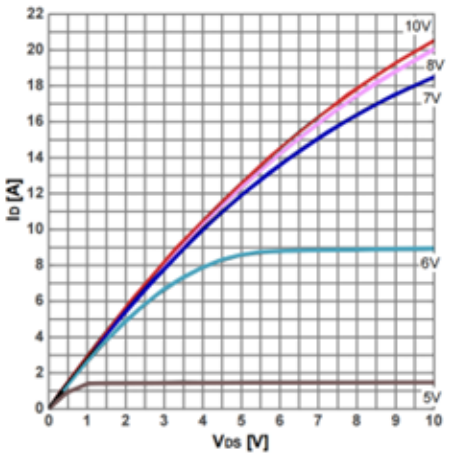


Figure 6: Typ. drain-source on-state resistance

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

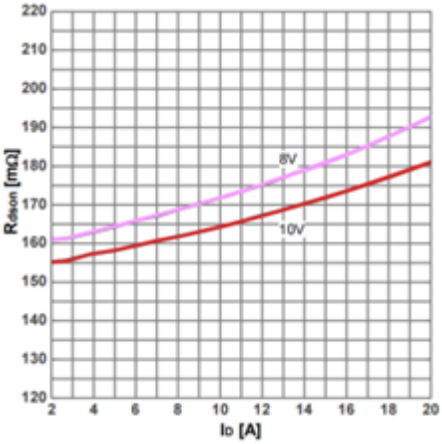


Figure 7: drain-source on-state resistance

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

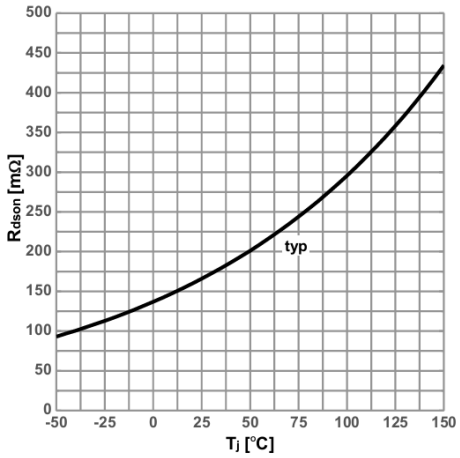


Figure 8: Typ. transfer characteristics

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

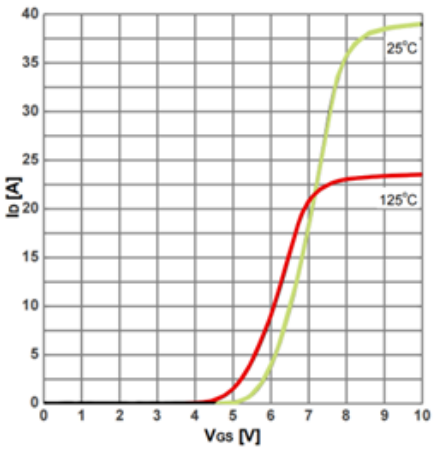


Figure 9:Typ. gate charge

$V_{GS}=f(Q_{gate})$; I_D=7A pulsed; V_{DS}=400V

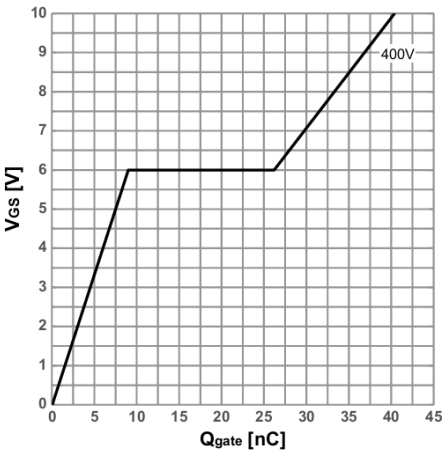


Figure 10:Forward characteristics of reverse diode

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

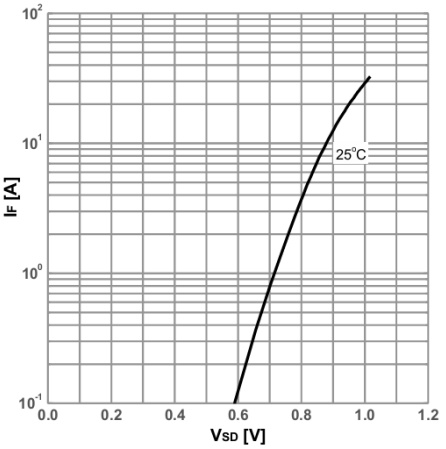


Figure 11: Drain-source breakdown voltage

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

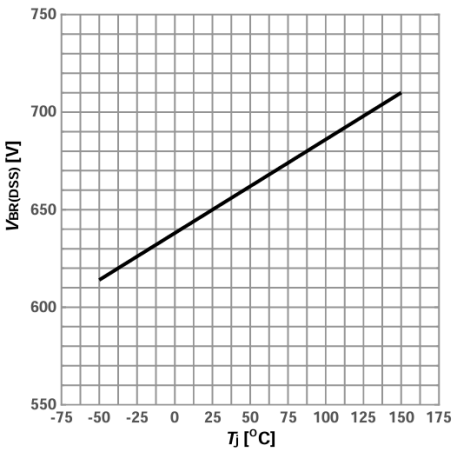


Figure 12:Typ. capacitances

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

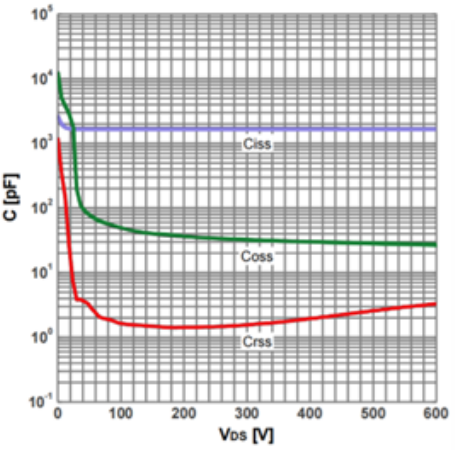
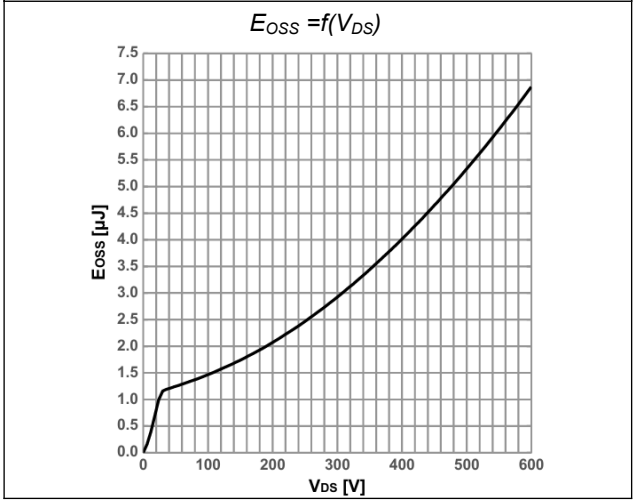


Figure 13:Typ. Coss stored energy



Test Circuits

Figure 14:Diode Characteristics

Test circuit for diode characteristics and Diode recovery waveform

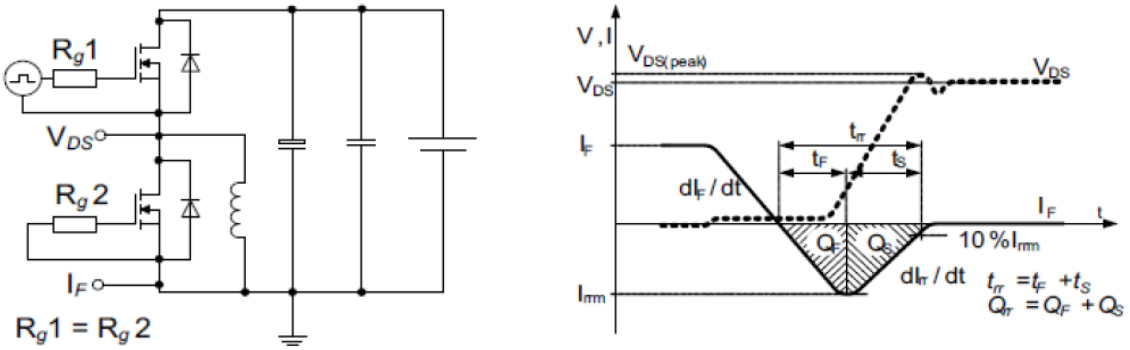


Figure 15:Switching Times

Switching times test circuit for inductive load and Switching times waveform

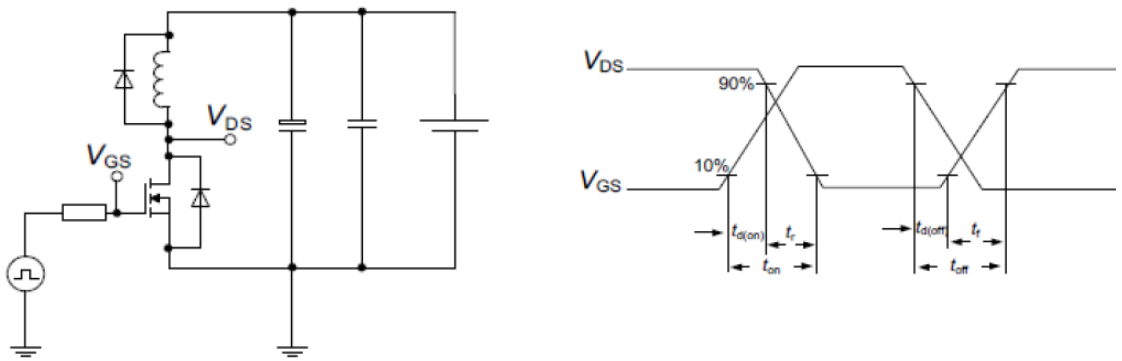
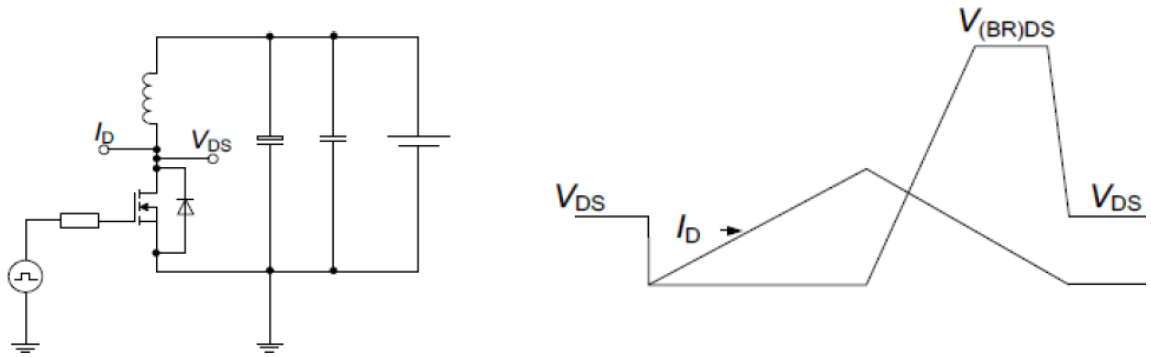


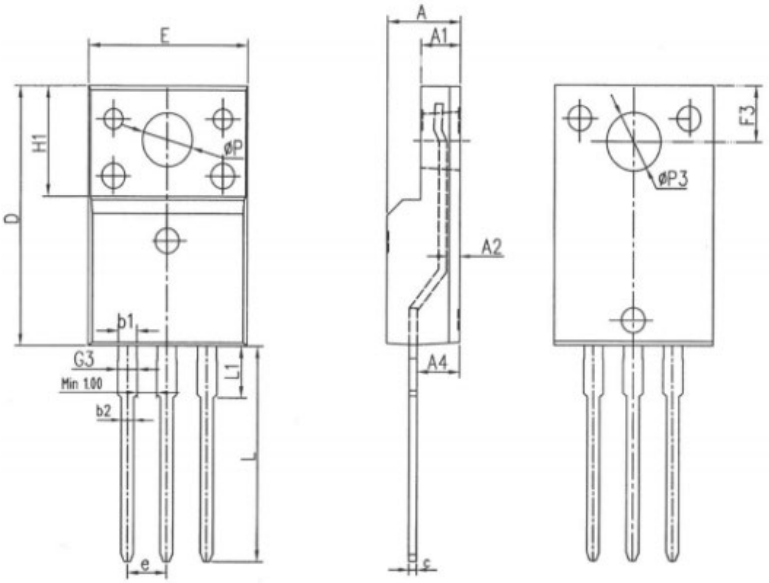
Figure 16:Unclamped Inductive Load

Unclamped inductive load test circuit and Unclamped inductive waveform



Package Outlines

TO-220F



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
BMF65N190C1	BMF65N190C1	TO-220F	Tube	50 units

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