

BMF65N190C1

Super Junction Power MOSFET

650 V, 20 A, 190 mΩ



bestirpower

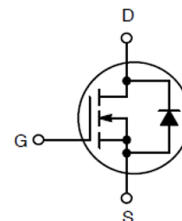
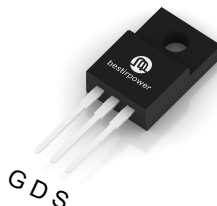
Description

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

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

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



Applications

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



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

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⁾	$V_{GS} = 10 \text{ V}, (T_C = 25^{\circ}C)$	20	A
		$V_{GS} = 10 \text{ V}, (T_C = 100^{\circ}C)$	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 Avalanche 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	°C
T_J	Maximum Operating Junction Temperature		150	°C

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

2)Pulse width t_p limited by T_J ,max.

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

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	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max. *minimal footprint	62.5	

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}, T_J = 25^\circ\text{C}$	-	-	1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS} = \pm 30\text{ V}, V_{DS} = 0\text{ V}$	-	-	± 100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	2.5	3.3	4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}, I_D = 10\text{ A}, T_J = 25^\circ\text{C}$	-	165	190	mΩ

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V}, f = 250\text{ KHz}$	-	1690	-	pF
C_{oss}	Output Capacitance		-	78	-	pF
C_{rss}	Reverse Transfer Capacitance		-	3.3	-	pF
$C_{o(er)}$	Energy Related Output Capacitance ¹⁾	$V_{DS} = 0\text{ V to } 400\text{ V}, V_{GS} = 0\text{ V}$	-	50	-	pF
$C_{o(tr)}$	Time Related Output Capacitance ²⁾		-	245	-	pF
Q_g	Total Gate Charge	$V_{GS} = 0\text{--}10\text{ V},$ $V_{DD} = 400\text{ V}, I_D = 7\text{ A}$	-	40	-	nC
Q_{gs}	Gate to Source Charge		-	9	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	17	-	nC
$V_{plateau}$	Gate plateau voltage		-	6	-	V
R_G	Gate Resistance	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, \text{ open drain}$	-	4	-	Ω

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = 10\text{ V},$ $V_{DD} = 400\text{ V}, I_D = 7\text{ A}$	-	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	$V_{GS} = 0\text{ V}, I_F = 10\text{ A}, T_J = 25^\circ\text{C}$	-	0.85	-	V
t_{rr}	Reverse Recovery Time	$V_R = 400\text{ V}, I_F = 10\text{ A}$ $diF/dt = 100\text{ A}/\mu\text{s}$	-	320	-	ns
Q_{rr}	Reverse Recovery Charge		-	2.5	-	μC
I_{rm}	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

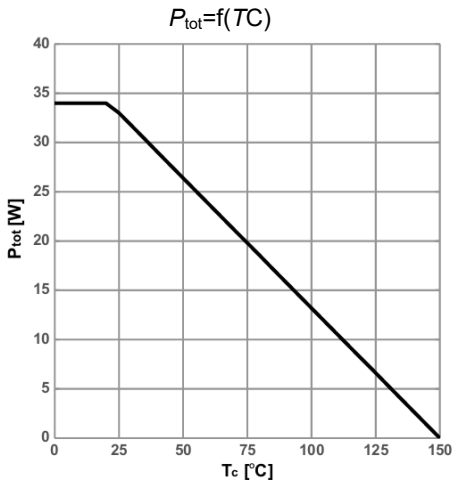


Figure 2. Max. transient thermal impedance

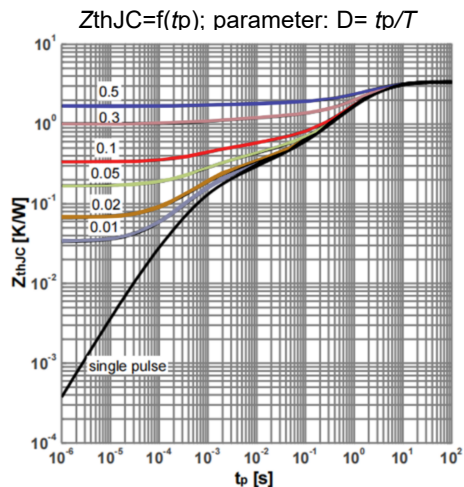


Figure 3: Safe operating area

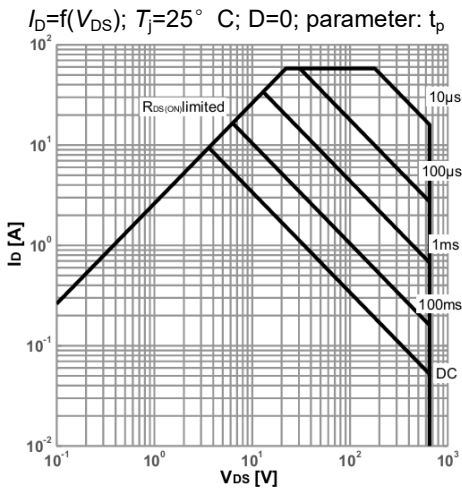


Figure 4: Typ. output characteristics

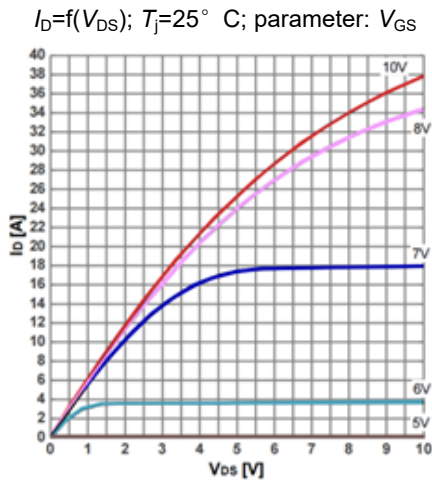


Figure 5:Typ. output characteristics

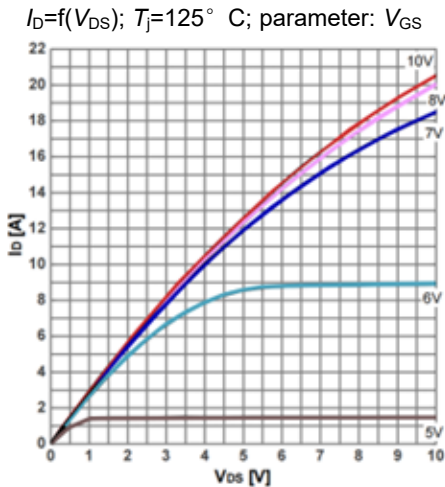


Figure 6: Typ. drain-source on-state resistance

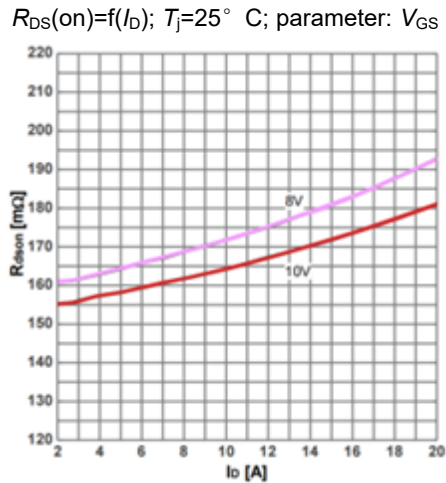


Figure 7: drain-source on-state resistance

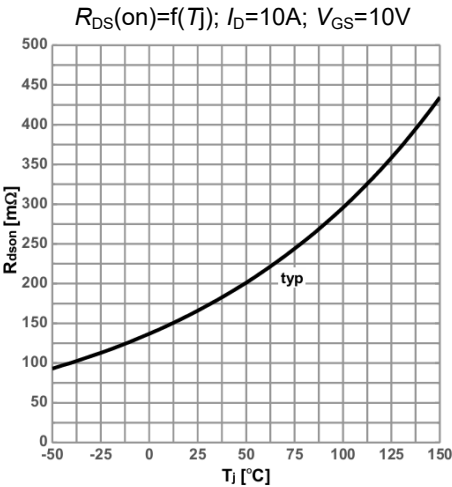


Figure 8: Typ. transfer characteristics

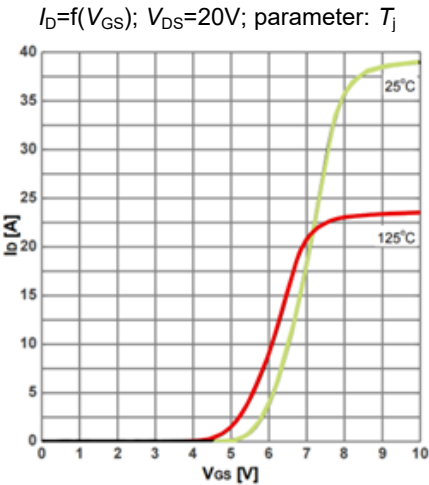


Figure 9:Typ. gate charge

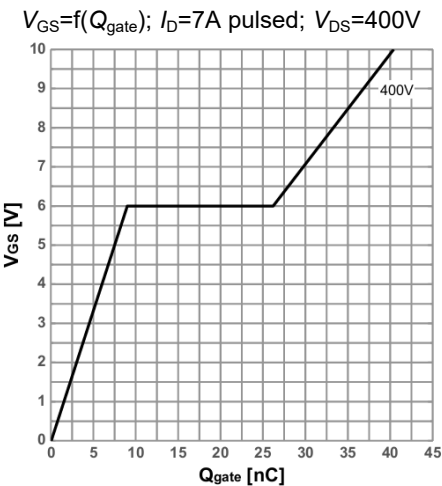


Figure 10:Forward characteristics of reverse diode

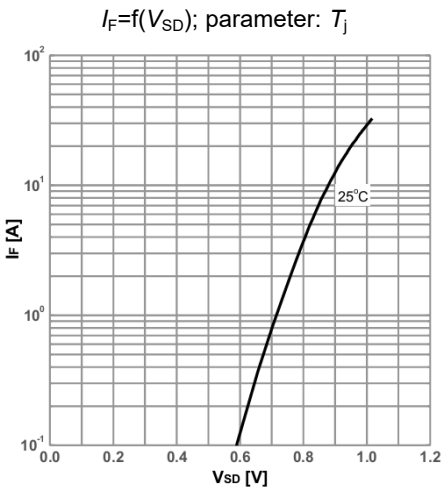


Figure 11: Drain-source breakdown voltage

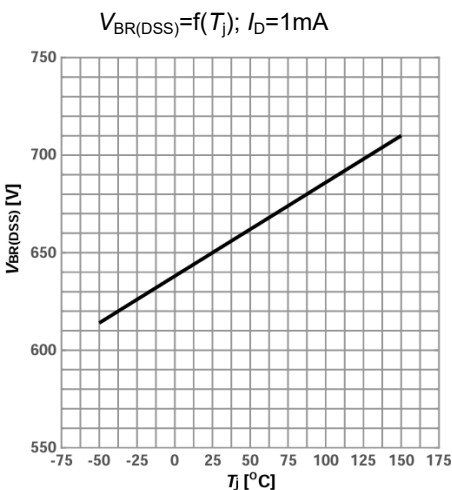


Figure 12:Typ. capacitances

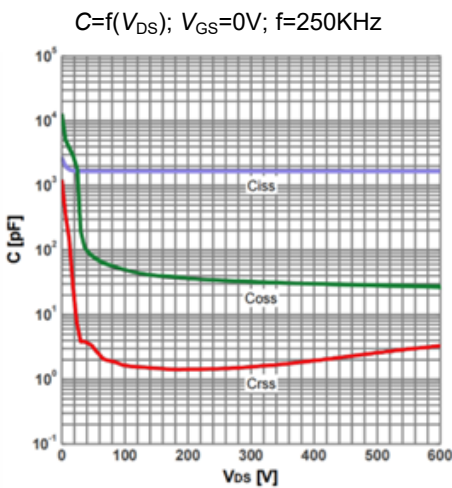
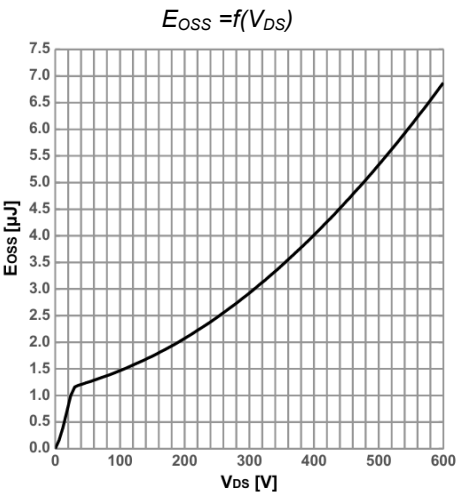


Figure 13:Typ. Coss stored energy



Test Circuits

Figure 14: Diode Characteristics

Test circuit for diode characteristics and Diode recovery waveform

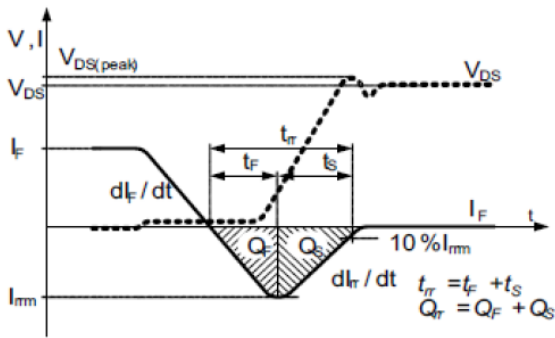
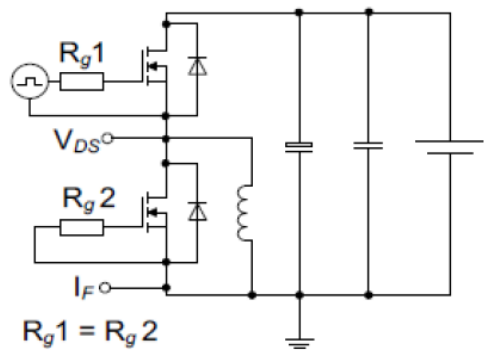


Figure 15: Switching Times

Switching times test circuit for inductive load and Switching times waveform

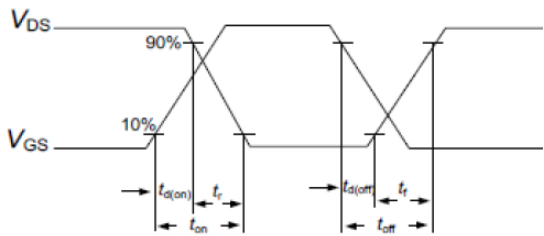
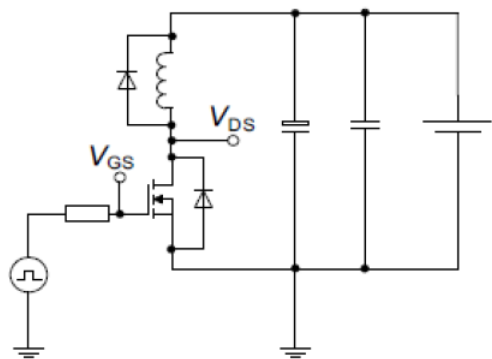
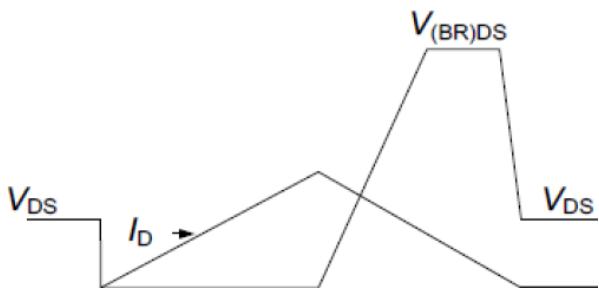
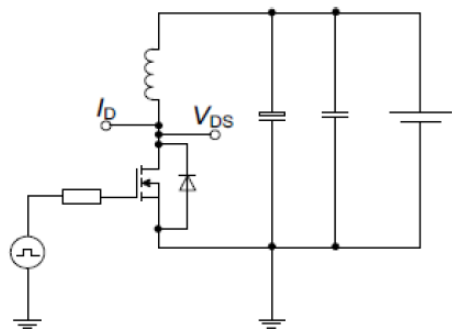


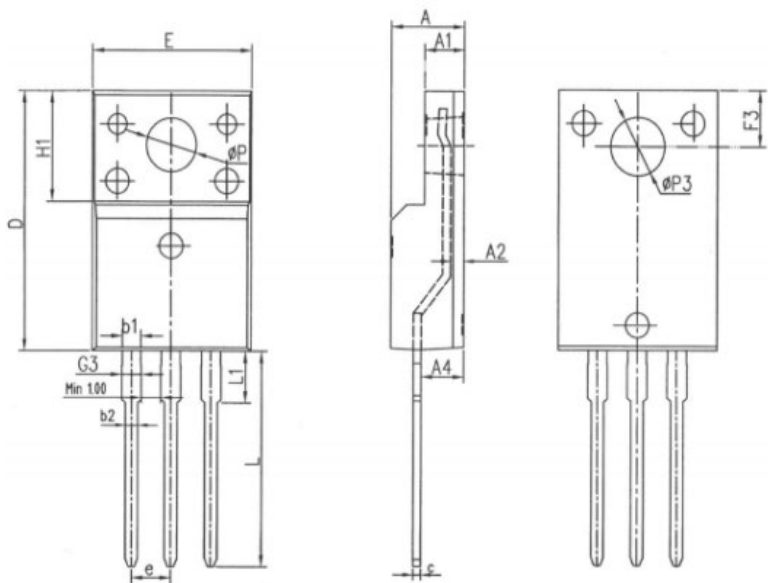
Figure 16: Unclamped Inductive Load

Unclamped inductive load test circuit and Unclamped inductive waveform



Package Outlines

TO-220F



COMMON DIMENSIONS

SYMBOL	MM		
	MTN	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		
Φ P	3.183REF		
L	12.68	12.98	13.28
L1	3.25	3.45	3.65
Φ P3	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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