BML60N120UC1

N-Channel Power MOSFET

600 V, 28 A, 120 mΩ

bestirpower

Description

BML60N120UC1 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.

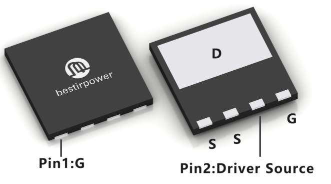
Features

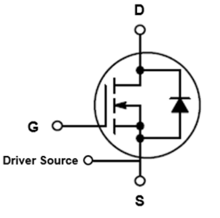
BV_{DSS} @ $T_{J,max}$	I_D	$R_{DS(on),max}$	$Q_{g,typ}$
650 V	23A	120 mΩ	53 nC

- 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.

Applications

- AC/DC power supply.
- PC power.
- Telecom/Sever.
- Solar invertor.





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

Symbol	Parameter		Value	Unit
V_{DSS}	Drain to Source Voltage[1)]		600	V
V_{GSS}	Gate to Source Voltage[2)]		±30	V
I_D	Drain Current	Continuous (T_C = 25℃)	23	A
		Continuous (T_C = 125℃)	10	
I_{DM}	Drain Current	Pulsed (T_C = 25℃)	84	A
E_{AS}	Single Pulsed Avalanche Energy[3)]		506	mJ
I_{AR}	Repetitive Avalanche Energy		4.5	A
dv/dt	MOSFET dv/dt		50	V/ns
	Peak Diode Recovery dv/dt[4)]		50	
P_{tot}	Power Dissipation	(T_C = 25℃)	152	W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to 150	℃
T_{sold}	Soldering temperature, wavesoldering only allowed at leads		260	℃

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) *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.	0.82	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62	

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BML60N120UC1	BML60N120UC1	DFN8*8	Tape & Reel	5000 units

Electrical Characteristics (T_C = 25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-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_{DS} = V_{GS}, I_D = 250μA	3.0	4.0	5.0	V
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 13A, T_j = 25℃	-	100	120	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0V, f = 250 kHz	-	2380	-	pF
C_{oss}	Output Capacitance		-	89	-	pF
C_{rss}	Reverse transfer capacitance		-	4	-	pF
$C_{o(er)}$	Energy Related Output Capacitance[1)]	V_{DS} = 0 V to 400 V, V_{GS} = 0 V	-	73	-	pF
$C_{o(tr)}$	Time Related Output Capacitance[2)]		-	379	-	pF
$Q_{g(tot)}$	Total Gate Charge at 10 V	V_{DD} = 400 V, I_D = 20A, V_{GS} = 0 to 10 V	-	53	-	nC
Q_{gs}	Gate to Source Charge		-	15	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	18	-	nC
R_G	Gate Resistance	V_{DD} = 0V, V_{GS}=0V, F = 1 MHz	-	4	-	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 400 V, I_D = 20A, V_{GS} = 10 V	-	15	-	ns
t_r	Turn-On Rise Time		-	24	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	72	-	ns
t_f	Turn-Off Fall Time		-	6	-	ns
Source-Drain Diode Characteristics						
I_S	Maximum Continuous Diode Forward Current		-	-	23	A
V_{SD}	Diode Forward Voltage	V_{GS} = 0 V, I_F = 13 A, T_f = 25℃	-	0.85	-	V
t_{rr}	Reverse Recovery Time	V_R = 400 V, I_F = 20A, di_F/dt = 100 A/μs	-	160	-	ns
Q_{rr}	Reverse Recovery Charge		-	1.03	-	μC
I_{rrm}	Peak reverse recovery current		-	12	-	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.

Typical Performance Characteristics

Figure 1. Power dissipation

$P_{tot} = f(T_C)$

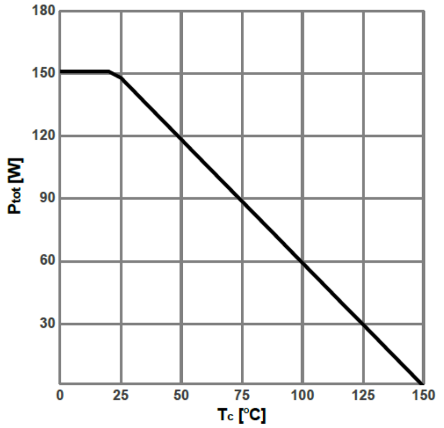


Figure 2. Max. transient thermal impedance

$P_{tot} = f(T_C)$

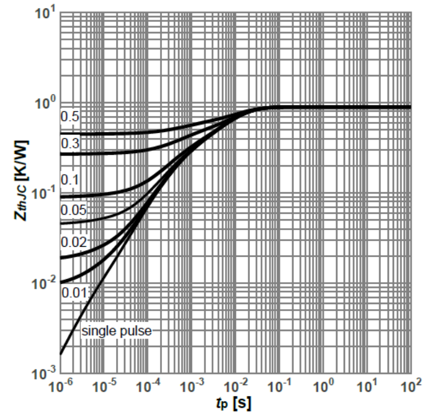


Figure 3. Safe operating area

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

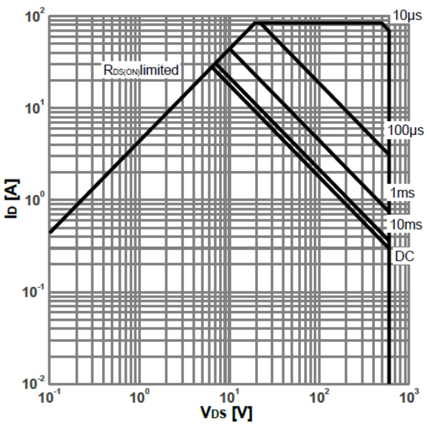


Figure 4. Typ. output characteristics

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

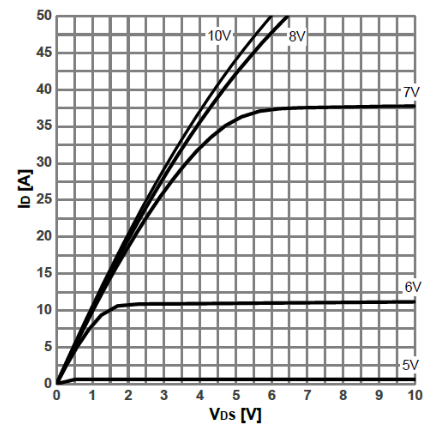


Figure 5. Typ. output Characteristics

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

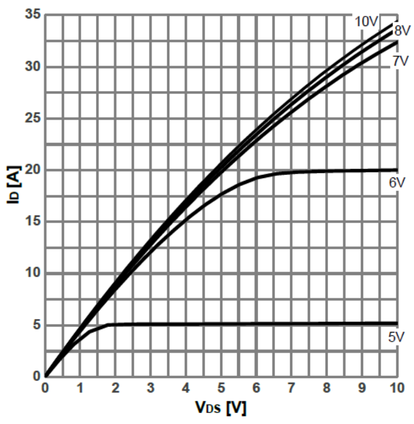
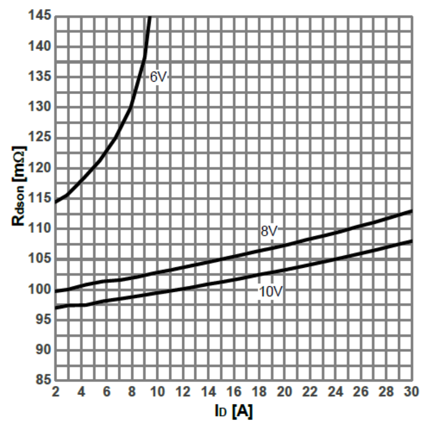


Figure 6. Typ. drain-soucre on-state resistance

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



Typical Performance Characteristics

Figure 7. Drain-soucre on-state resistance

$R_{DS(on)}$=f(Tj); I_D=13A; V_{GS}=10V

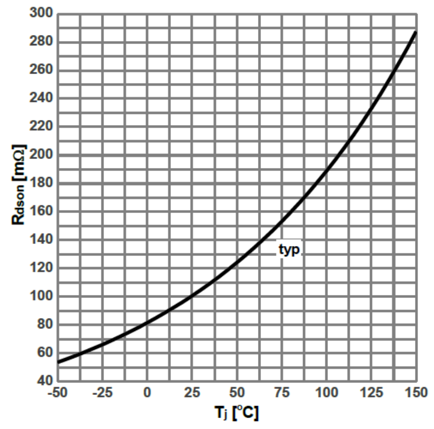


Figure 8. Typ. transfer characteristics

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

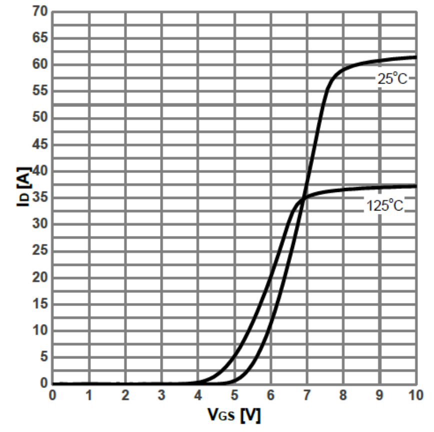


Figure 9. Typ. gate charge

V_{GS}=f(Qgate); I_D=20A pulsed; V_{DS}=400V

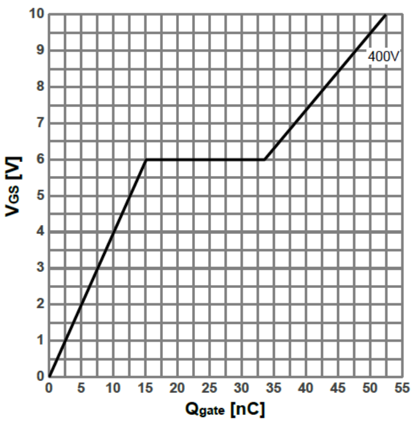


Figure 10. Foward characteristics of reverse diode

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

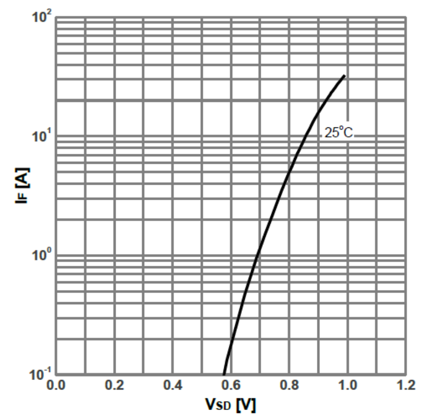


Figure 11. Drain-source breakdown coltage

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

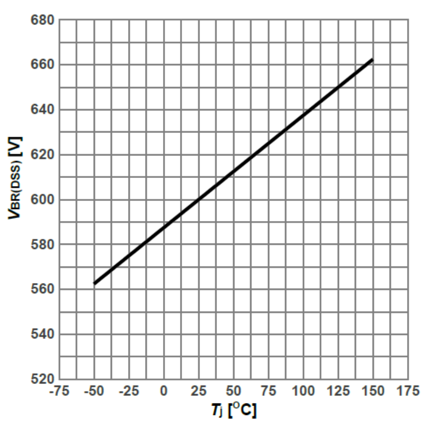


Figure 12. Typ. capacitances

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

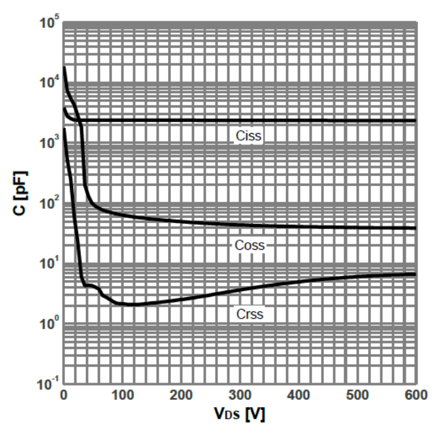
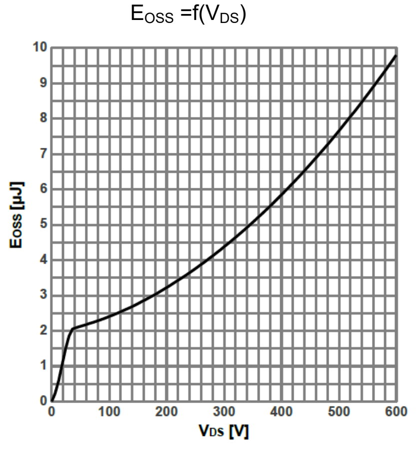


Figure 13. Typ. Coss stored energy


Test Circuits

Figure 14. Diode Characteristics

Test circuit for diode characteristics and Diode recovery waveform

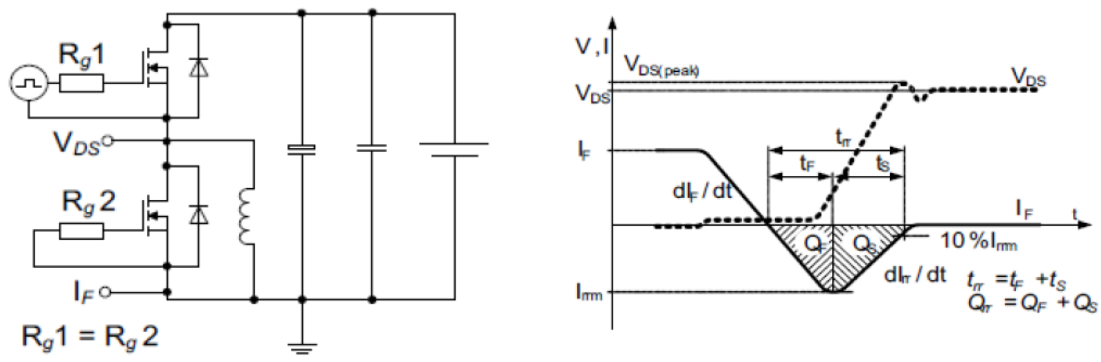


Figure 15. Switching Times

Switching times test circuit for inductive load and Switching times waveform

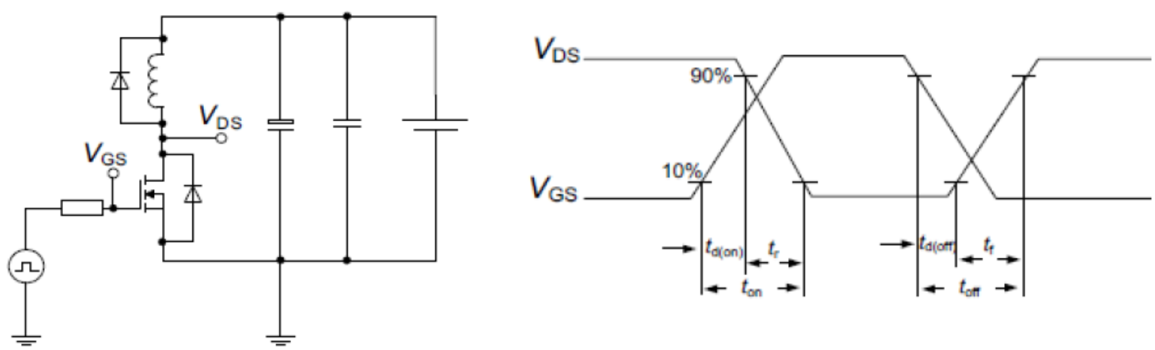
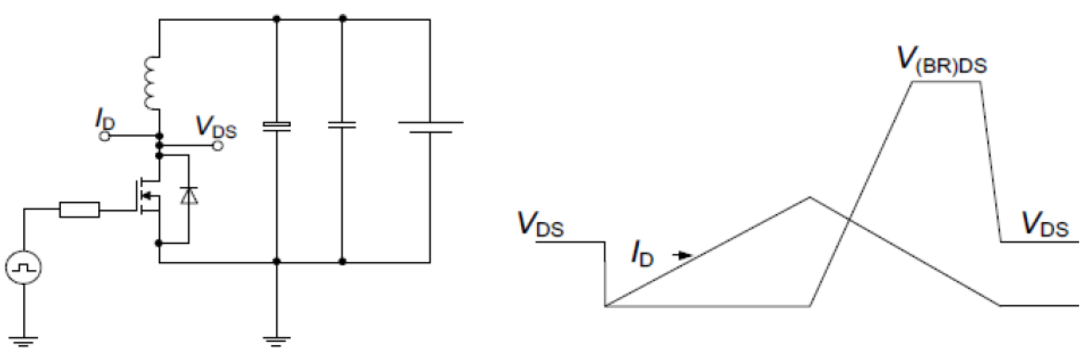


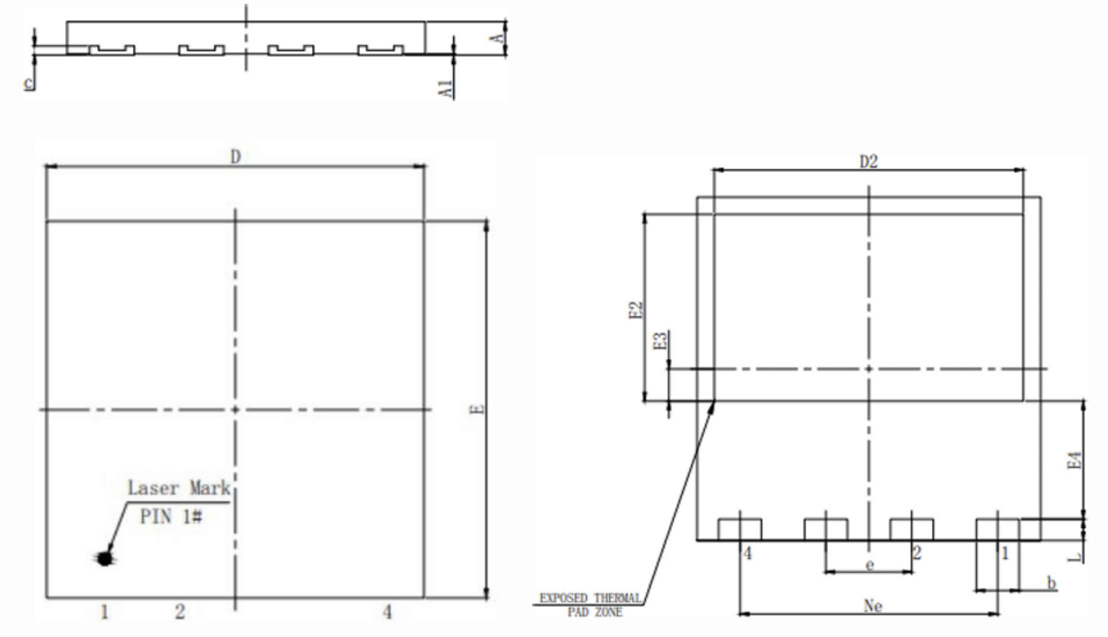
Figure 16. Unclamped Inductive Load

Unclamped inductive load test circuit and Unclamped inductive waveform



Package Outlines

DFN 8*8



Symbol	Dimensions In Millimeters		
	Min	Nom	Max
D	7.90	8.00	8.10
E	7.90	8.00	8.10
D2	7.10	7.20	7.30
E2	4.25	4.35	4.45
e	2. 00BSC		
E3	0.75REF		
E4	2.75REF		
Ne	6.00BSC		
b	0.95	1.00	1.05
A	0.70	0.75	0.80
c	0.203REF		
A1	0	/	0.050
L	0.40	0.50	0.55

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