



bestirpower

BML60N165UC1

N-Channel Power MOSFET

600 V, 21 A, 165 mΩ

Description

BML60N165UC1 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.

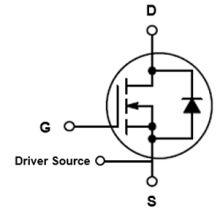
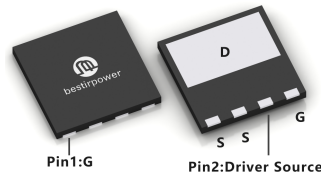
Features

$BV_{DSS} @ T_{J,max}$	I_D	$R_{DS(on),max}$	$Q_{g,typ}$
650 V	21 A	165 mΩ	40 nC

- Ultra-fast body diode.
- Extremely low losses due to very low FOM $R_{dson} * Q_g$ and E_{oss} .
- Very high commutation ruggedness.

Applications

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



Absolute Maximum Ratings ($T_C = 25^\circ\text{C}$ 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 ($T_C = 25^\circ\text{C}$)	21	A
		Continuous ($T_C = 125^\circ\text{C}$)	11	
I_{DM}	Drain Current	Pulsed ($T_C = 25^\circ\text{C}$)	60	A
E_{AS}	Single Pulsed Avalanche Energy ³⁾		320	mJ
I_{AR}	Repetitive Avalanche Energy		3.6	A
dv/dt	MOSFET dv/dt		50	V/ns
	Peak Diode Recovery dv/dt ⁴⁾		50	
P_{tot}	Power Dissipation	($T_C = 25^\circ\text{C}$)	152	W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to 150	$^\circ\text{C}$
T_{sold}	Soldering temperature, wavesoldering only allowed at leads		260	$^\circ\text{C}$

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.	0.82	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62	

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BML60N165UC1	BML60N165UC1	DFN8*8	Tape & Reel	5000 units

Electrical Characteristics (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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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°C	-	-	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 = 7 A, T _J = 25°C	-	150	165	mΩ

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 50 V, V _{GS} = 0V, f = 250 kHz	-	1670	-	pF
C _{oss}	Output Capacitance		-	68	-	pF
C _{rss}	Reverse transfer capacitance		-	4.3	-	pF
C _{o(er)}	Energy Related Output Capacitance ¹⁾	V _{DS} = 0 V to 400 V, V _{GS} = 0 V	-	53	-	pF
C _{o(tr)}	Time Related Output Capacitance ²⁾		-	268	-	pF
Q _{g(tot)}	Total Gate Charge at 10 V	V _{DD} = 400 V, I _D = 7 A, V _{GS} = 0 to 10 V	-	40	-	nC
Q _{gs}	Gate to Source Charge		-	9	-	nC
Q _{gd}	Gate to Drain "Miller" Charge		-	17	-	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 = 7 A, V _{GS} = 10 V	-	11	-	ns
t _r	Turn-On Rise Time		-	13	-	ns
t _{d(off)}	Turn-Off Delay Time		-	59	-	ns
t _f	Turn-Off Fall Time		-	5	-	ns

Source-Drain Diode Characteristics

I _S	Maximum Continuous Diode Forward Current	V _{GS} = 0 V, I _F = 7 A, T _F = 25°C	-	-	21	A
I _{SM}	Maximum Pulsed Diode Forward Current		-	-	60	A
V _{SD}	Diode Forward Voltage		-	0.88	-	V
t _{rr}	Reverse Recovery Time	V _R = 400 V, I _F = 7 A , di _F /dt = 100 A/μs	-	145	-	ns
Q _{rr}	Reverse Recovery Charge		-	1	-	μC
I _{imm}	Peak reverse recovery current		-	10	-	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

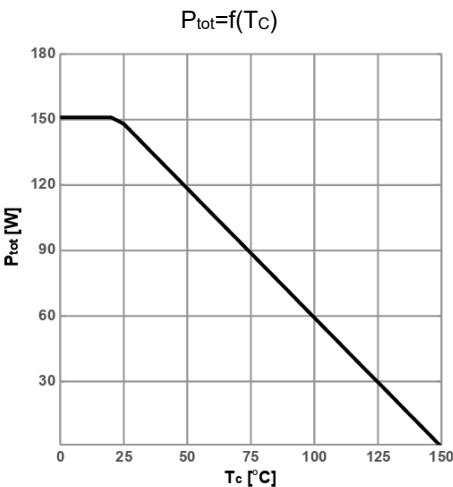


Figure 2. Max. transient thermal impedance

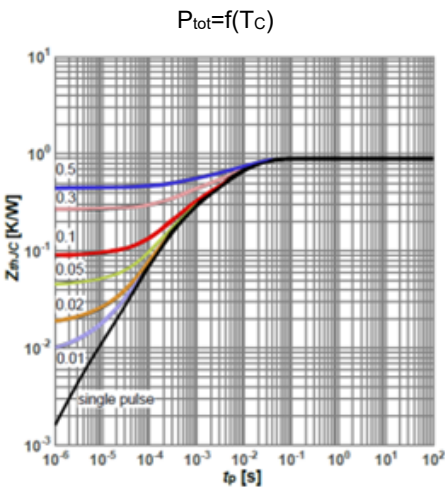


Figure 3. Safe operating area

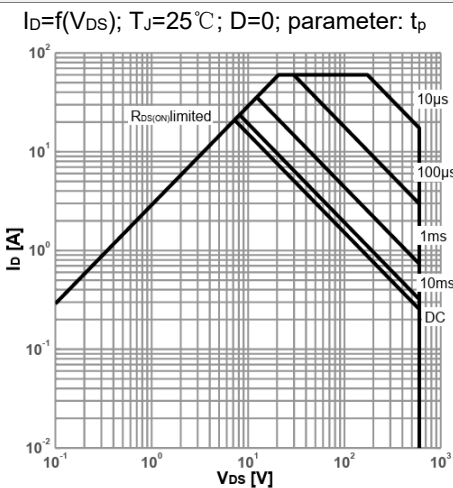


Figure 4. Typ. output characteristics

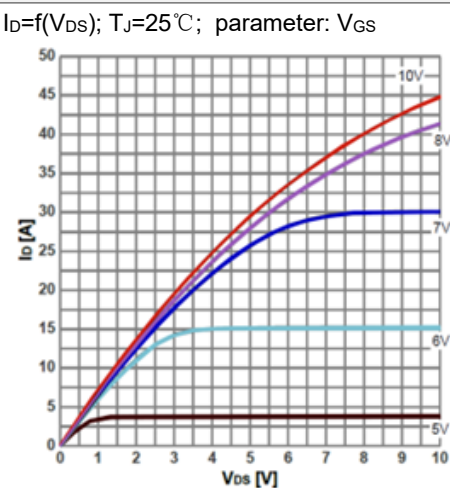


Figure 5. Typ. output Characteristics

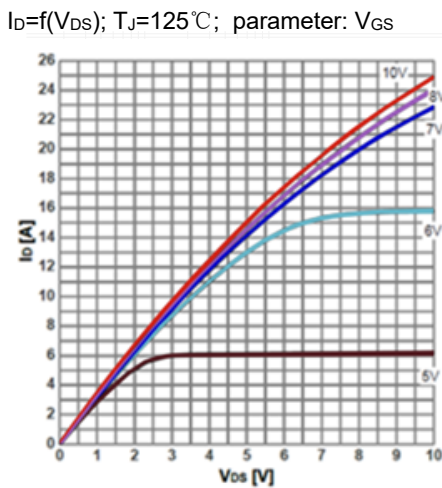
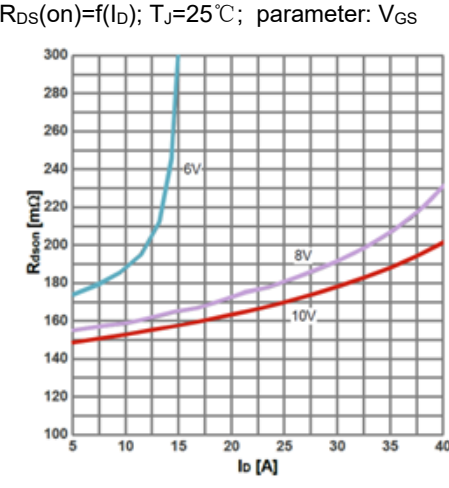


Figure 6. Typ. drain-source on-state resistance



Typical Performance Characteristics

Figure 7. Drain-soucre on-state resistance

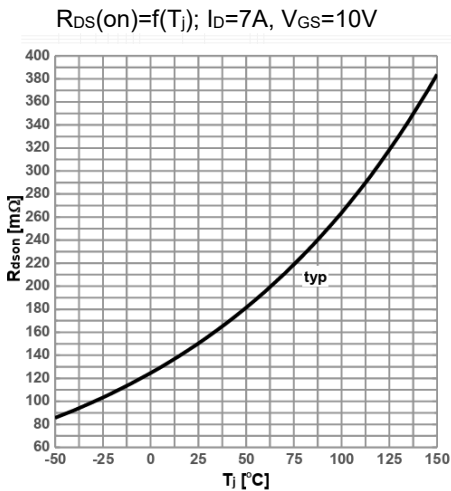


Figure 8. Typ. transfer characteristics

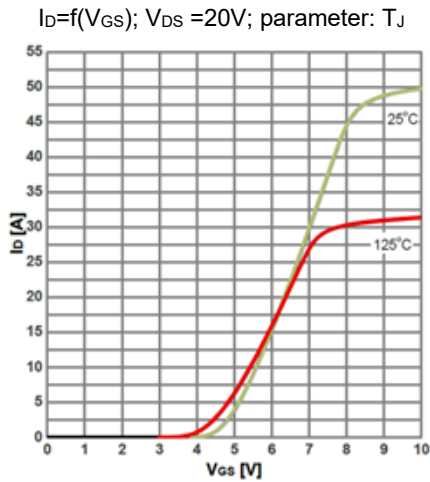


Figure 9. Typ. gate charge

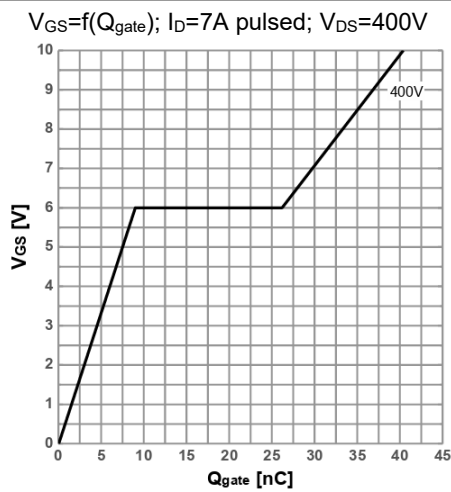


Figure 10. Foward characteristics of reverse diode

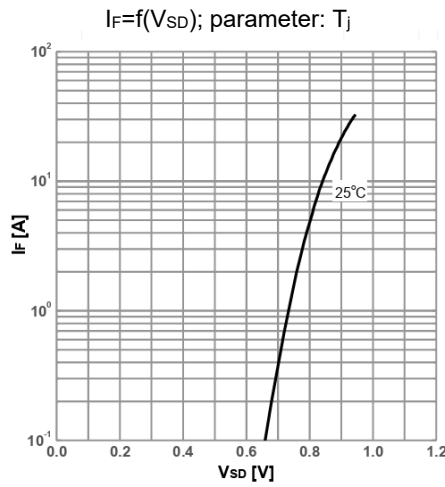


Figure 11. Drain-source breakdown coltage

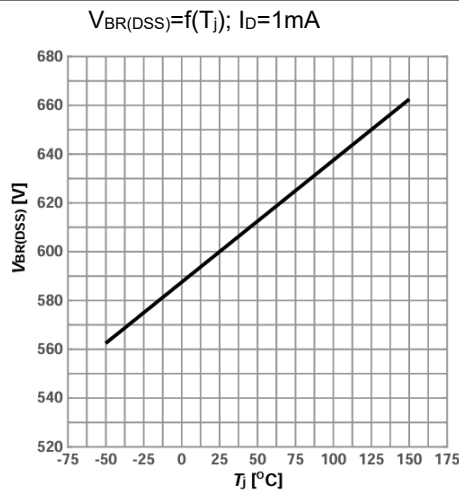


Figure 12. Typ. capacitances

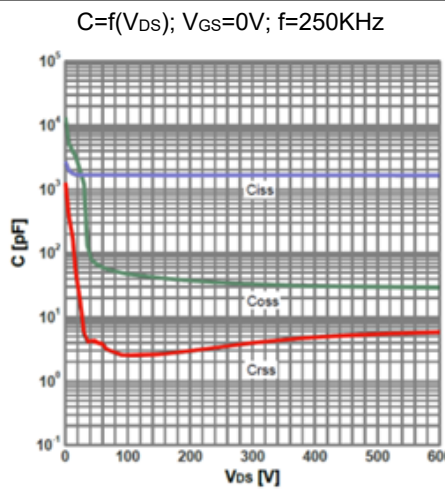


Figure 13. Typ. Coss stored energy

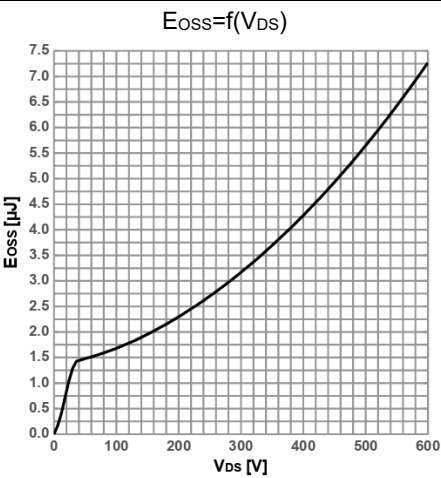


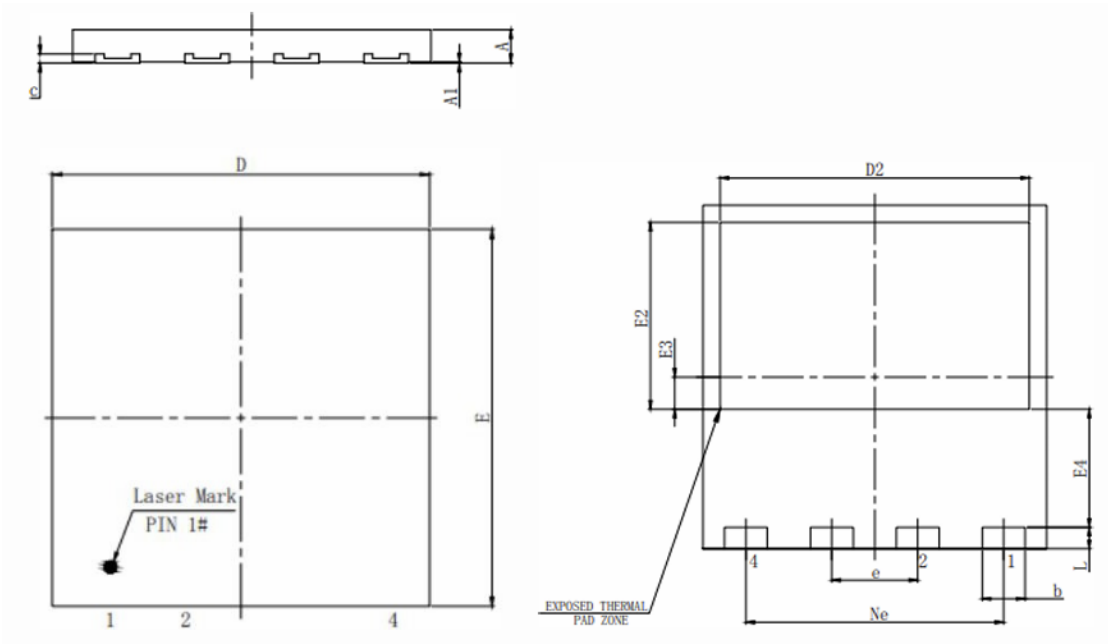
Figure 14. Diode Characteristics

The left diagram shows a half-bridge circuit with two MOSFETs, R_{g1} , R_{g2} , and I_F . The output voltage is V_{DS} . The right diagram shows the switching characteristics, including V_{DS} and I_F waveforms, and the definition of t_{rr} and Q_{rr} .

The left diagram shows a MOSFET inverter circuit. An AC voltage source is connected to the gate of an NMOS transistor through a gate resistor. The drain of the transistor is connected to a load inductor and a diode in parallel, which is then connected to a DC supply. The drain voltage is labeled V_{DS} and the gate voltage is labeled V_{GS} . The right diagram shows the switching waveforms for V_{DS} and V_{GS} . The V_{GS} waveform is a square wave with a 10% rise time $t_{r(10\%)}$ and a 90% fall time $t_{f(90\%)}$. The V_{DS} waveform shows the voltage across the load during switching, with a 90% rise time $t_{r(90\%)}$ and a 10% fall time $t_{f(10\%)}$. The total turn-on time is t_{on} and the total turn-off time is t_{off} .

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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