

BMW65N038UC1

Super Junction Power MOSFET

650 V, 78 A, 38 mΩ



Description

BMW65N038UC1 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.

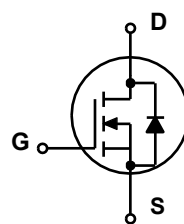
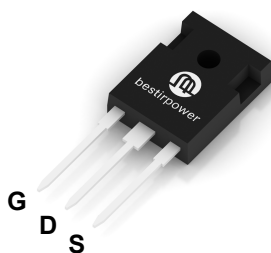
Applications

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

Features

$BV_{DSS} @ T_{J,max}$	I_D	$R_{DS(on),max}$	$Q_{g,typ}$
700 V	78 A	38 mΩ	100 nC

- Extremely low losses due to very low FOM $R_{ds(on)} \cdot Q_g$ and E_{oss} .
- Very high commutation ruggedness
- 100% UIS Tested



Absolute Maximum Ratings ($T_J = 25^\circ\text{C}$ 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)	$V_{GS} = 10\text{ V}, (T_C = 25^\circ\text{C})$	78	A
		$V_{GS} = 10\text{ V}, (T_C = 100^\circ\text{C})$	49	
I_{DM}	Drain Current	Pulsed	234	A
E_{AS}	Single Pulsed Avalanche Energy(3)		1600	mJ
dv/dt	MOSFET dv/dt		50	V/ns
	Peak Diode Recovery dv/dt		50	
P_D	Power Dissipation	$(T_C = 25^\circ\text{C})$	500	W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to 150	$^\circ\text{C}$
I_S	Continuous diode forward current		78	A
$I_{S\text{ Pulse}}$	Diode pulse current(2)		234	A

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

2) Pulse width t_p limited by $T_{J,max}$.

3) $V_{DD}=100\text{V}$, $R_G=25\Omega$, 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.	0.25	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62	
T_{sold}	Soldering temperature, wavesoldering only allowed at leads	260	$^\circ\text{C}$

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	$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}, T_J = 25^\circ\text{C}$			10	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	$V_{GS} = V_{DS}, I_D = 250\text{ uA}$	3.5		5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}, I_D = 40\text{ A}$		34	38	mΩ

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V},$ $f = 100\text{ KHz}$		5000		pF
C_{oss}	Output Capacitance			315		pF
C_{rss}	Reverse transfer capacitance			7.8		pF
$C_{o(tr)}$	Time Related Output Capacitance ⁽²⁾	$V_{DS} = 0\text{ V to } 400\text{ V}, V_{GS} = 0\text{ V}$		974		pF
$C_{o(er)}$	Energy Related Output Capacitance ⁽¹⁾			20.3		pF
$Q_{g(tot)}$	Total Gate Charge at 10 V	$V_{DD} = 400\text{ V}, I_D = 80\text{ A},$ $V_{GS} = 0\text{ to } 10\text{ V}$		100		nC
Q_{gs}	Gate to Source Charge			35		nC
Q_{gd}	Gate to Drain "Miller" Charge			43		nC
R_G	Gate Resistance	$V_{DD} = 0\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		6		Ω
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 400\text{ V}, I_D = 80\text{ A},$ $V_{GS} = 10\text{ V}$		47		ns
t_r	Turn-On Rise Time			21		ns
$t_{d(off)}$	Turn-Off Delay Time			75		ns
t_f	Turn-Off Fall Time			7		ns

Source-Drain Diode Characteristics

V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_F = 40\text{ A}, T_J = 25^\circ\text{C}$		0.88		V
t_{rr}	Reverse Recovery Time	$V_R = 400\text{ V}, I_F = 80\text{ A},$ $di_F/dt = 150\text{ A}/\mu\text{s}$		145		ns
Q_{rr}	Reverse Recovery Charge			1.05		μC
I_{mm}	Peak reverse recovery current			15		A

Typical Performance Characteristics

Figure 1. Power dissipation

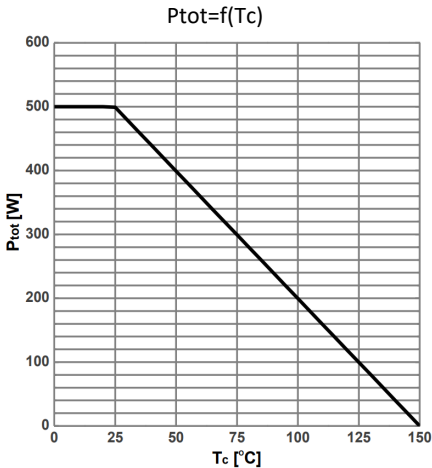


Figure 2. MAX.transient thermal impedance

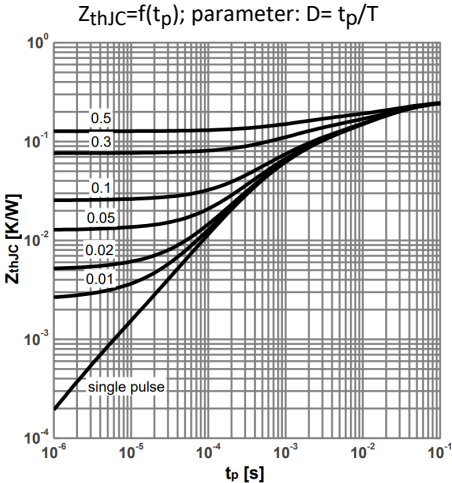


Figure 3. Safe operating area

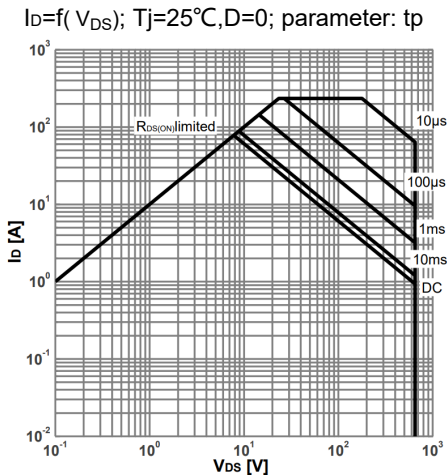


Figure 4. Typ. output characteristics

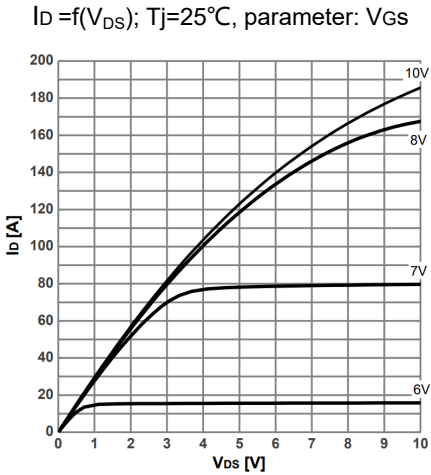


Figure 5. Typ. output characteristics

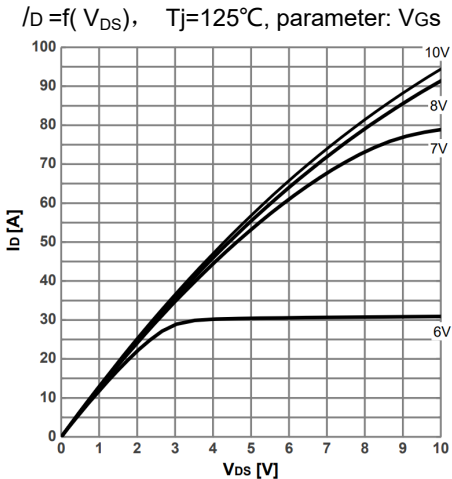
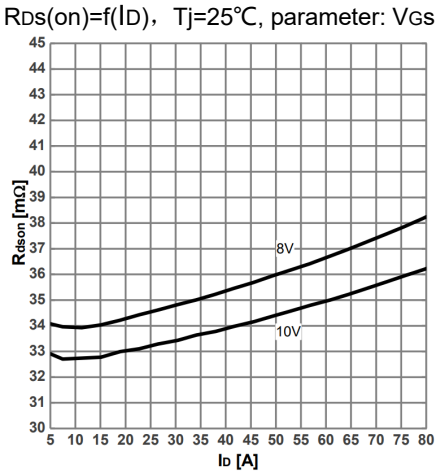


Figure 6. Typ. drain-source on-state resistance



Typical Performance Characteristics

Figure 7. Drain-source on-state resistance

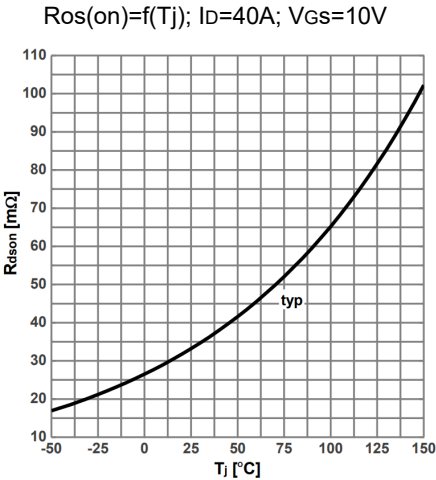


Figure 8. Typ. transfer characteristics

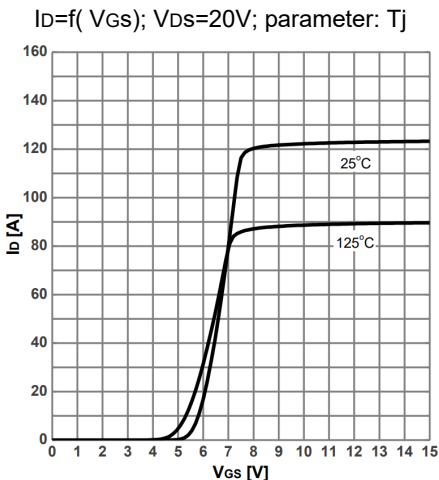


Figure 9. Typ.gate charge

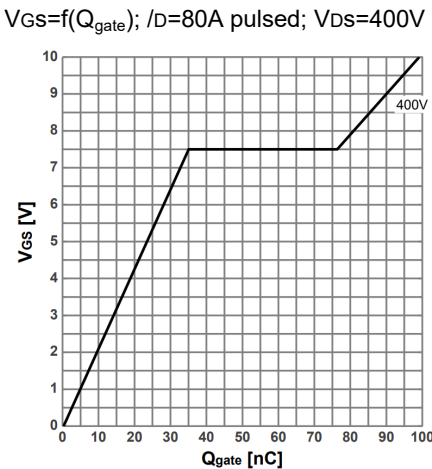


Figure 10. Forward characteristics of reverse diode

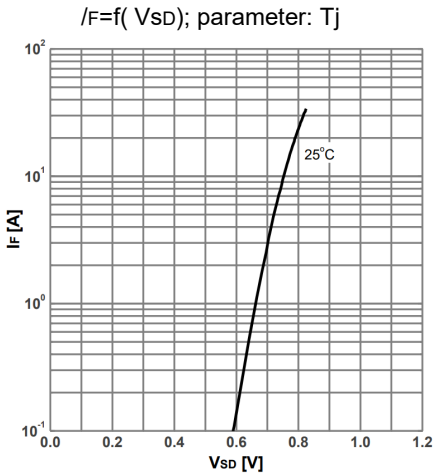


Figure 11. Drain-source breakdown voltage

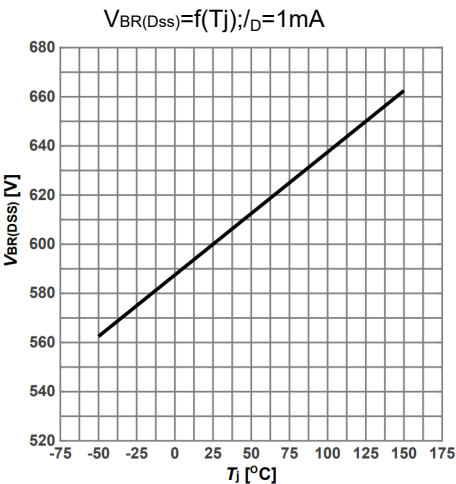


Figure 12. Maximum Drain Current

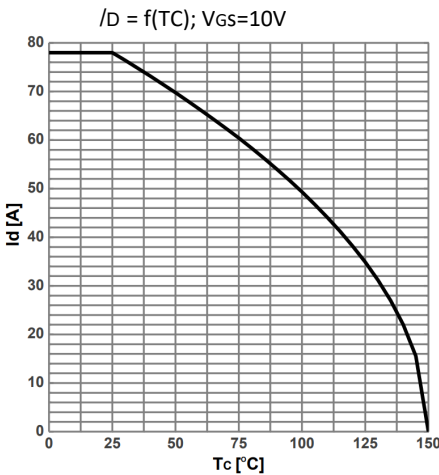


Figure 13. Typ. capacitances

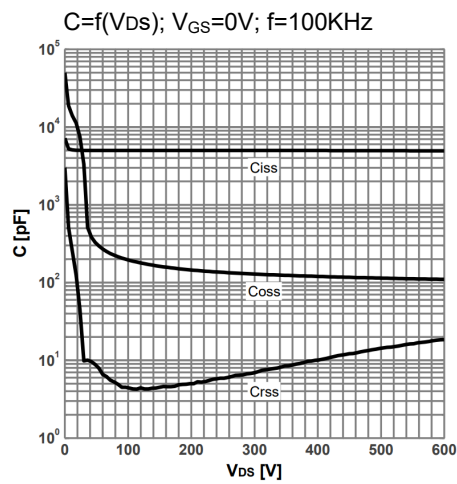
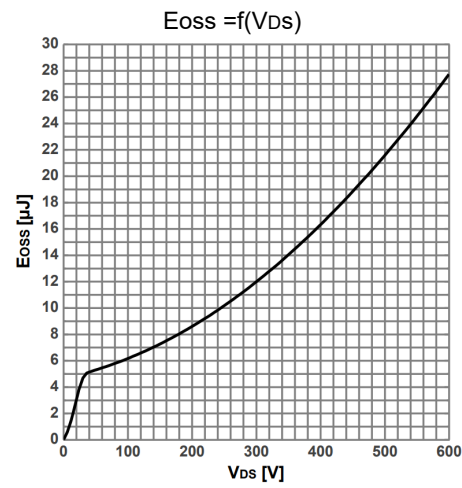


Figure 14. Typ. Coss stored energy



Test Circuits

Figure 15. Diode Characteristics

Test circuit for diode characteristics and Diode recovery waveform

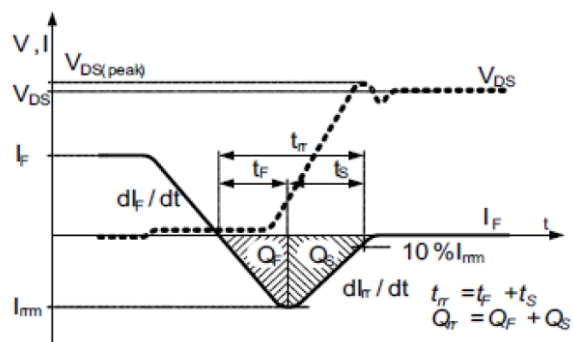
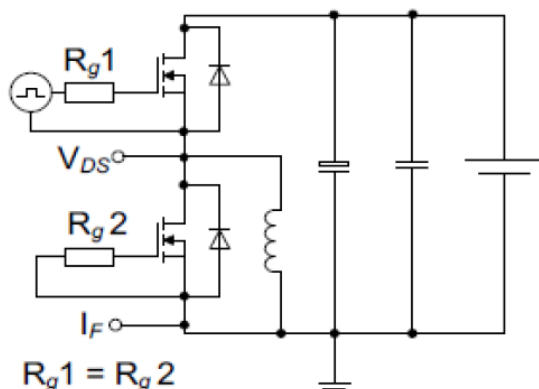


Figure 16. Switching Times

Switching times test circuit for inductive load and Switching times waveform

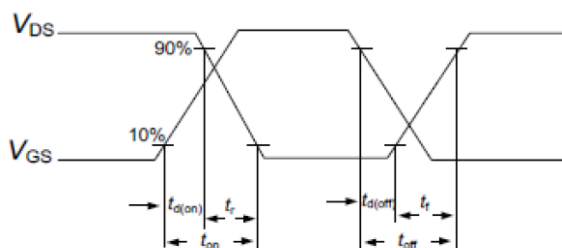
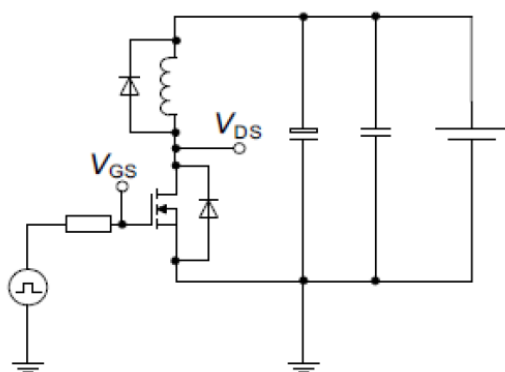
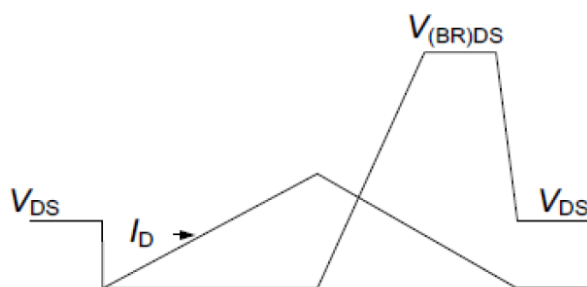
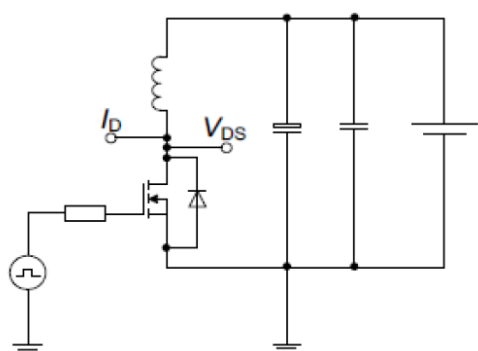


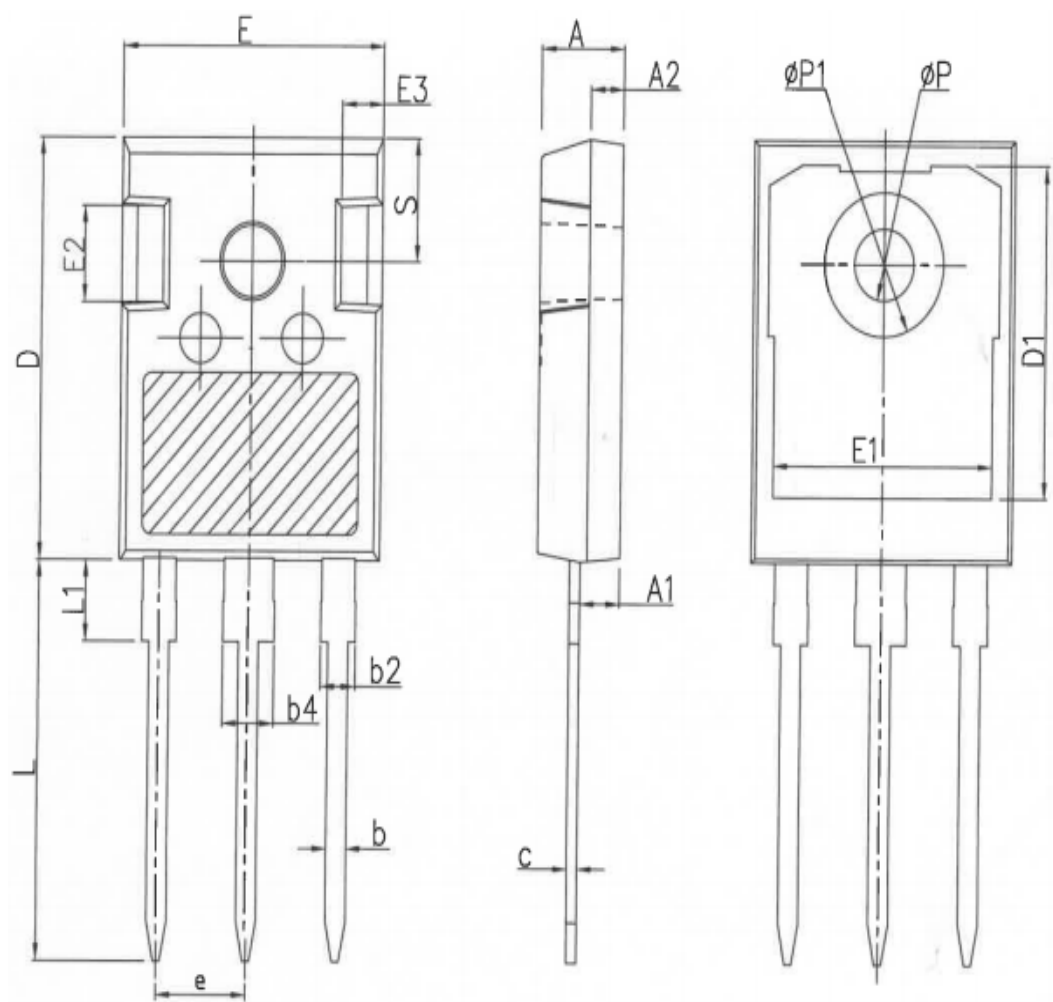
Figure 17. Unclamped Inductive Load

Unclamped inductive load test circuit and Unclamped inductive waveform



Package Outlines

TO247-3



COMMON DIMENSIONS			
SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ϕP	3.40	3.60	3.80
$\phi P1$	-	-	7.30
S	6.15BSC		

* Dimensions in millimeters

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BMW65N038UC1	BMW65N038UC1	TO247-3	Tube	30 units

Disclaimer

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