BMW65N040UC1

N-Channel Power MOSFET

650 V, 80 A, 40 mΩ

bestirpower

Description

BMW65N040UC1 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.

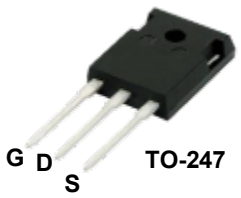
Features

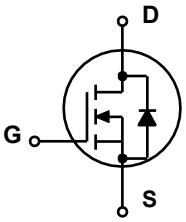
BV_{DSS} @ $T_{J,max}$	I_D	$R_{DS(on),max}$	$Q_{g,typ}$
700 V	80 A	40 mΩ	133 nC

- Extremely low losses due to very low FOM Rdson*Qg and Eoss.
- Very high commutation ruggedness
- 100% UIS Tested

Applications

- PC power.
- Server power supply.
- Telecom.
- Solar invertor.
- Super charger for automobiiles





Absolute Maximum Ratings (T_C = 25℃ 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)	Continuous (T_C = 25℃)	80	A
		Continuous (T_C = 125℃)	35	
I_{DM}	Drain Current	Pulsed	240	A
E_{AS}	Single Pulsed Avalanche Energy(3)		2025	mJ
dv/dt	MOSFET dv/dt		50	V/ns
	Peak Diode Recovery dv/dt		50	
P_D	Power Dissipation	(T_C = 25℃)	500	W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to 150	℃
Is	Continuous diode forward current		80	A
Is Pulse	Diode pulse current(2)		240	A

1) Limited by Tj max. Maximum duty cycle D=0.75.
2) Pulse width tp limited by Tj,max.
3) VDD=100V, RG=25Ω, Starting Tj=25° C.
4) VDClink=400V; VDS,peak<V(BR)DSS; identical low side and high side switch with identical RG

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.25	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62	
Tsold	Soldering temperature, wavesoldering only allowed at leads	260	℃

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
BMW65N040UC1	BMW65N040UC1	TO247-3	Tube	30 units

Electrical Characteristics (T_C = 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 = 1 mA	650			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 650 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_{GS} = V_{DS} , I_D = 2 mA	3.0	3.8	4.5	V
R_{DS}(on)	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D =40 A		33	40	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0 V,V_{DS} = 50 V, f = 100 KHz		8100		pF
C_{oss}	Output Capacitance			352		pF
C_{rss}	Reverse transfer capacitance			10		pF
$C_{o(tr)}$	Time Related Output Capacitance(2)	V_{DS} = 0 V to 480 V, V_{GS} = 0 V		934		pF
$C_{o(er)}$	Energy Related Output Capacitance(1)			200		pF
$Q_{g(tot)}$	Total Gate Charge at 10 V	V_{DD} = 400 V, I_D = 40 A, V_{GS} =0 to 10 V		133		nC
Q_{gs}	Gate to Source Charge			33		nC
Q_{gd}	Gate to Drain “Miller” Charge			39		nC
R_G	Gate Resistance	V_{DD}= 0 V, V_{GS} = 0 V, F = 1 MHz		2.5		Ω
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 400 V, I_D = 40A, V_{GS} = 10 V		27		ns
t_r	Turn-On Rise Time			8		ns
$t_{d(off)}$	Turn-Off Delay Time			151		ns
t_f	Turn-Off Fall Time			5		ns
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage	V_{GS} = 0 V,I_F=40A Tf=25℃		0.9		V
t_{rr}	Reverse Recovery Time	V_R = 400 V, I_F= 40 A, di_F/dt = 150 A/μs		155		ns
Q_{rr}	Reverse Recovery Charge			1.9		μC
I_{mm}	Peak reverse recovery current			22		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 480V.
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 480V.

Typical Performance Characteristics

Figure 1. Power dissipation

Ptot=f(Tc)

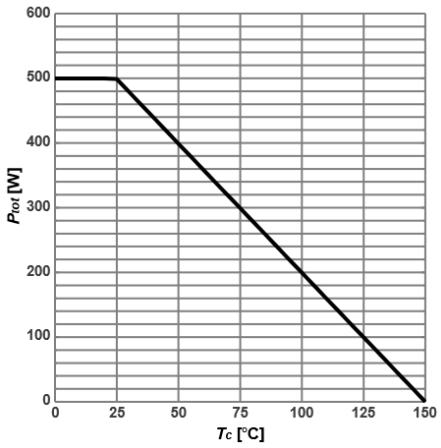


Figure 2. MAX.transient thermal impedance

$Z_{thJC}=f(t_p)$; parameter: D= t_p/T

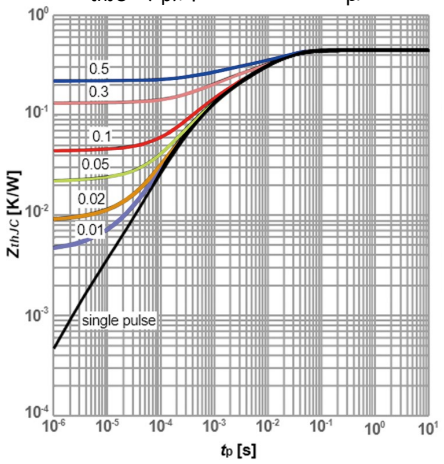


Figure 3. Safe operating area

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

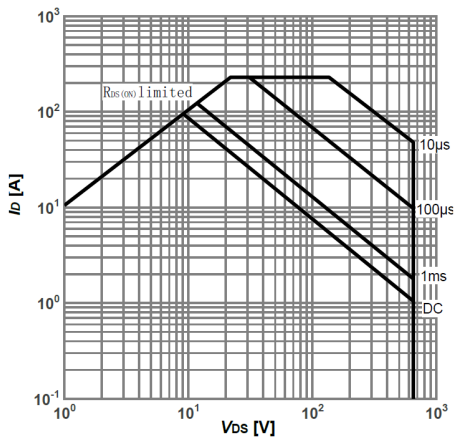


Figure 4. Typ. output characteristics

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

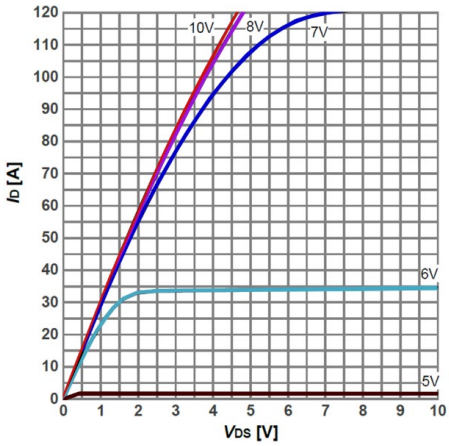


Figure 5. Typ. output characteristics

$I_D=f(V_{DS})$, Tj=125℃, parameter: V_{GS}

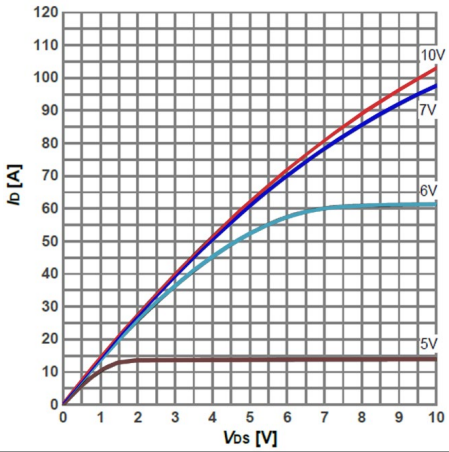
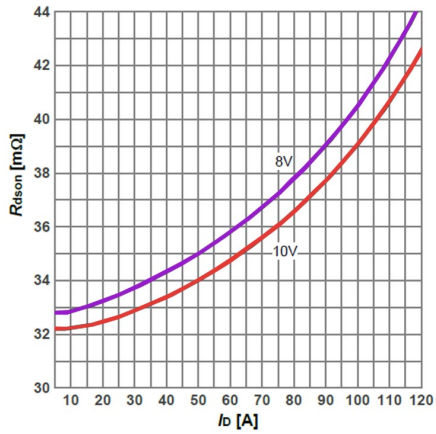


Figure 6. Typ. drain-source on-state resistance

$R_{DS(on)}=f(I_D)$, Tj=25℃, parameter: V_{GS}



Typical Performance Characteristics

Figure 7. Drain-source on-state resistance

Ros(on)=f(Tj); I_D=40A; V_{GS}=10V

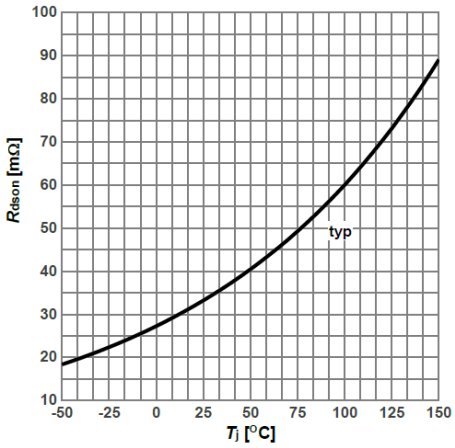


Figure 8. Typ. transfer characteristics

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

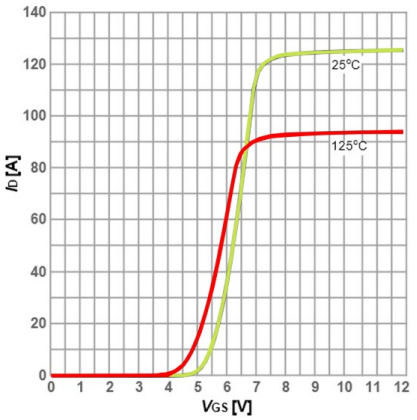


Figure 9. Typ.gate charge

V_{GS}=f(Qgate); I_D=40A pulsed; V_{DS}=400V

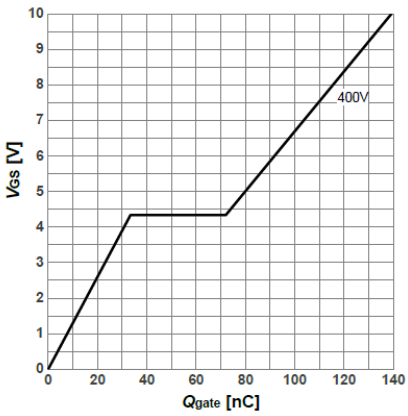


Figure 10. Forward characteristics of reverse diode

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

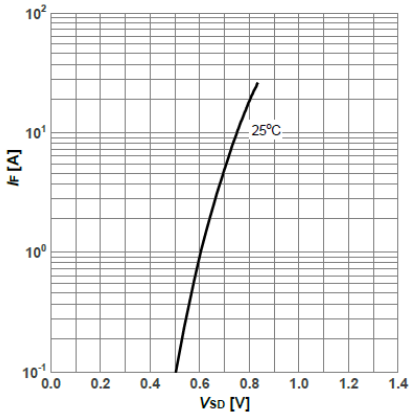


Figure 11. Drain-source breakdown voltage

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

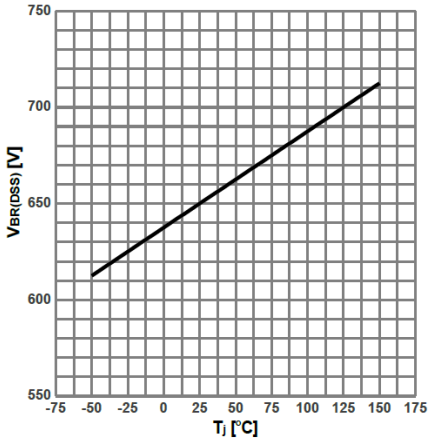


Figure 12. Maximum Drain Current

I_D = f(TC); V_{GS}=10V

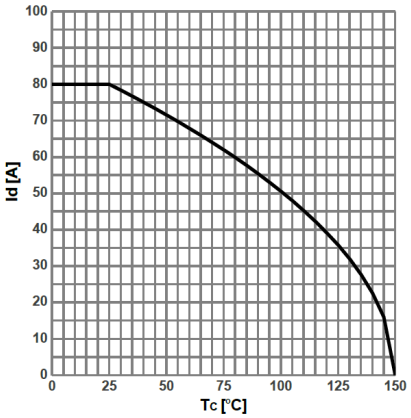


Figure 13. Typ. capacitances

C=f(V_{DS}); V_{GS}=0V; f=100KHZ

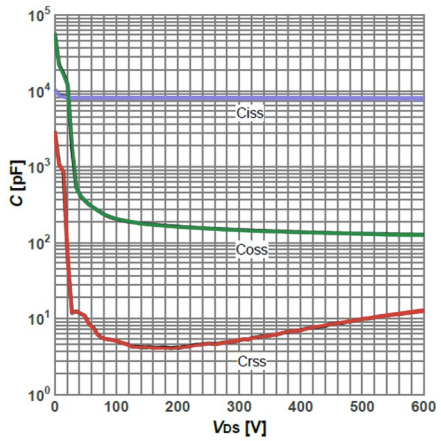
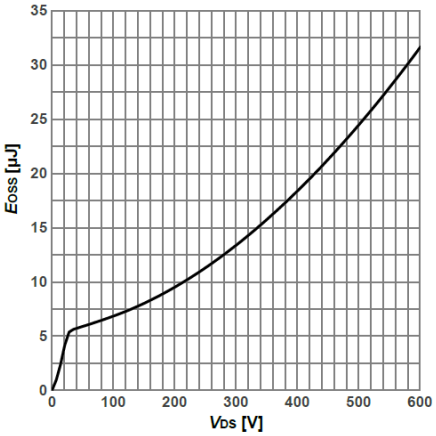


Figure 14. Typ. Coss stored energy

Eoss =f(V_{DS})



Test Circuits

Figure 15. Diode Characteristics

Test circuit for diode characteristics and Diode recovery waveform

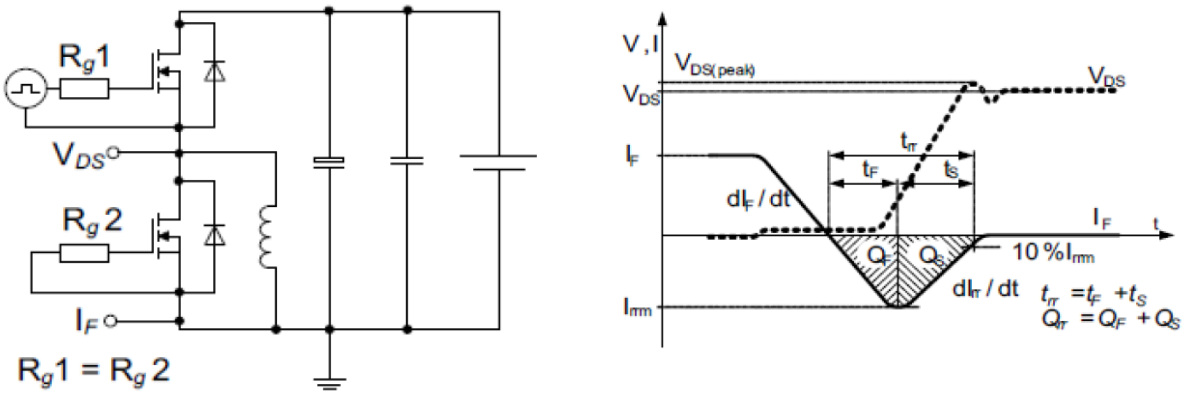


Figure 16. Switching Times

Switching times test circuit for inductive load and Switching times waveform

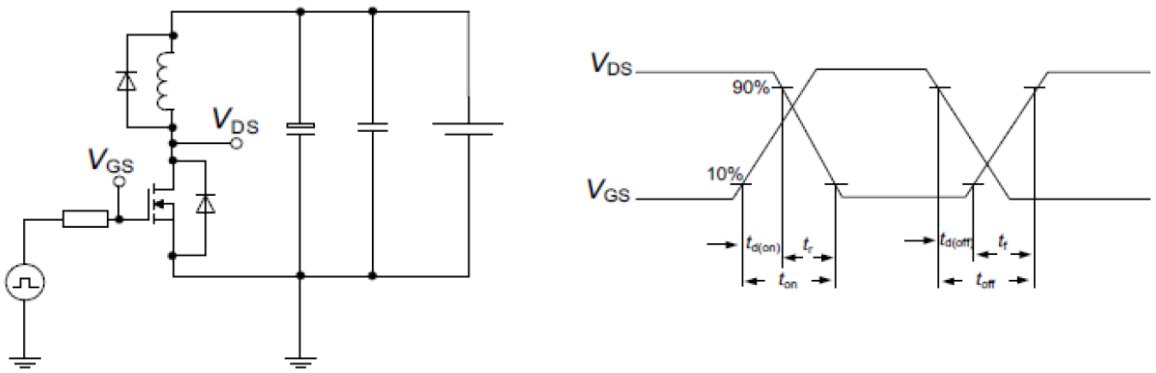
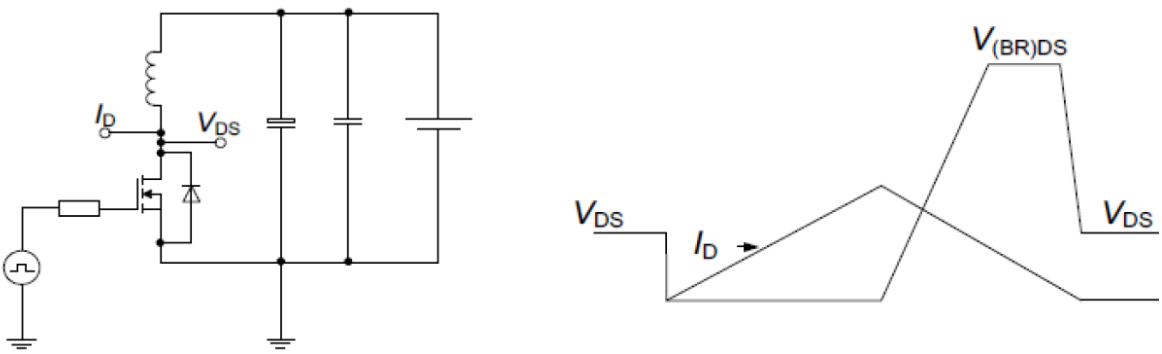


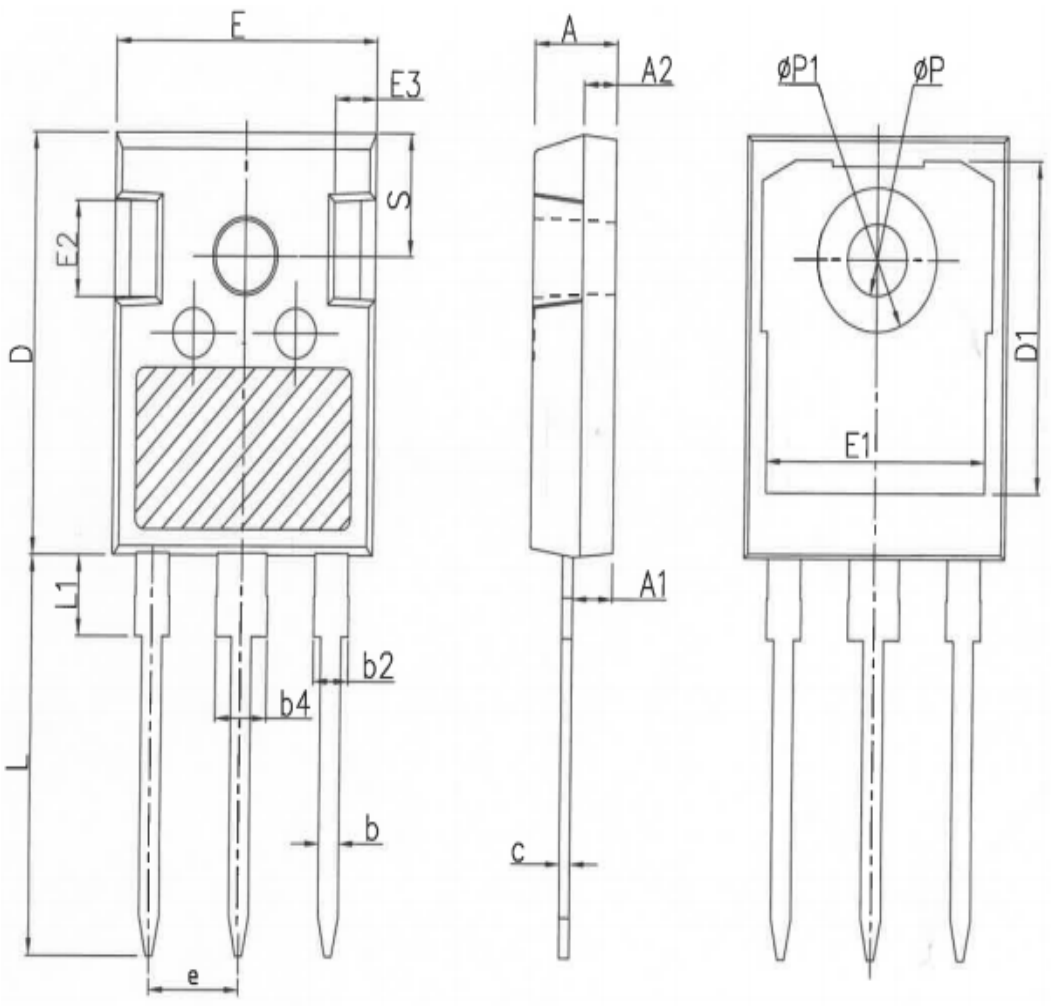
Figure 17Unclamped Inductive Load

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
ΦP1	–	–	7.30
S	6.15BSC		

* Dimensions in millimeters

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