

BMW65N028UA1

N-Channel Power MOSFET

650 V, 90 A, 28 mΩ

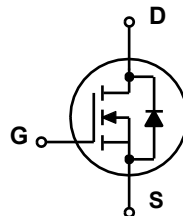
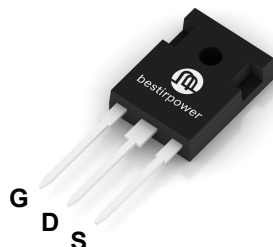
Description

BMW65N028UA1 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.

$BV_{DSS} @ T_{J,max}$	I_D	$R_{DS(on),max}$	$Q_{g,typ}$
700 V	90 A	28 mΩ	147 nC

Applications

ÇSwitch Mode Power Supply (SMPS)
ÇUninterruptible Power Supply (UPS)
ÇPower Factor Correction (PFC)
ÇLLC Half-bridge
ÇCharger



Features

ÇUltra-fast body diode
ÇVery low FOM $R_{DS(on)} \times Q_g$
ÇEasy to use/drive
Ç100% avalanche tested
ÇRoHS compliant



Absolute Maximum Ratings

Symbol	Parameter		Value max	Unit	Note
V_{DSS}	Drain to Source Voltage		650	V	
V_{GSS}	Gate to Source Voltage		±30	V	
I_D	Drain Current	Continuous ($T_C = 25^\circ\text{C}$)	90	A	
		Continuous ($T_C = 100^\circ\text{C}$)	57	A	
I_{DM}	Drain Current	Pulsed (note 1)	270	A	
E_{AS}	Single Pulse Avalanche Energy (note 2)		1920	mJ	
dv/dt	MOSFET dv/dt Ruggedness, $V_{DS} = 0 \dots 650\text{V}$		50	V/ns	
	Power Dissipation For TO-247		50		
P_D	Power Dissipation	($T_C = 25^\circ\text{C}$)	450	W	
T_J, T_{STG}	Operating junction and storage temperature		-55 to 150	°C	
I_S	Continuous diode forward current	($T_C = 25^\circ\text{C}$)	90	A	Fig 6
$I_{S,pulse}$	Diode pulse current (note 1)		270	A	
E_{AR}	Repetitive Avalanche Energy (note 2)		7.6	mJ	
I_{AS}	Avalanche Current		19.6	A	

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L=10\text{mH}$, $V_{DD} = 70\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
3. Identical low side and high side switch with identical R_G

Thermal Characteristics

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal Resistance, Junction to Case	0.28	°C/W
R_{thJA}	Thermal Resistance, Junction to Ambient	62	
T_{sold}	Soldering temperature, wave soldering only allowed at leads	260	°C

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit	Note
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	650	-	-	V	Fig.8
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=650V, V_{GS}=0V, T_J=25^\circ\text{C}$	-	-	10	μA	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 30V$	-	-	± 100	nA	

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	3	3.8	5	V	Fig.2
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10V, I_D = 40A, T_J=25^\circ\text{C}$	-	24.5	28	mΩ	Fig.7
		$V_{GS} = 10V, I_D = 40A, T_J=125^\circ\text{C}$		68	78		

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=50V, f=1\text{MHz}$	-	8172	-	pF	Fig.3
C_{oss}	Output Capacitance		-	434	-	pF	
C_{rss}	Reverse Transfer Capacitance		-	3.6	-	pF	
$Q_{g(tot)}$	Total Gate Charge at 10 V	$V_{GS}=10V,$ $V_{DD}=520V, I_D=40A$	-	147	-	nC	Fig.5
Q_{gs}	Gate to Source Charge		-	50	-	nC	
Q_{gd}	Gate to Drain Charge		-	52	-	nC	
R_G	Gate Resistance	$f = 1.0\text{MHz}$ open drain	-	1.05	-	Ω	
$t_{d(on)}$	Turn-on Delay Time	$I_D=40A,$ $V_{DD}=400V,$ $R_g=2\Omega, V_{GS}=10V,$	-	68.5	-	ns	
t_r	Rise Time		-	207	-	ns	
$t_{d(off)}$	Turn-off Delay Time		-	94.7	-	ns	
t_f	Fall Time		-	4.5	-	ns	

Source-Drain Diode Characteristics

V_{SD}	Diode Forward Voltage	$V_{GS} = 0V, I_{SD}=50A, T_J=25^\circ\text{C}$	-	0.9	1.3	V	
t_{rr}	Reverse Recovery Time	$V_R = 400V, I_S = 40A,$ $di_F/dt = 100A/\mu s$	-	153	-	ns	
Q_{rr}	Reverse Recovery Charge		-	1.21	-	μC	
I_{rm}	Peak Reverse Recovery Current		-	13.8	-	A	

Typical Performance Characteristics

Figure 1. Output Characteristics

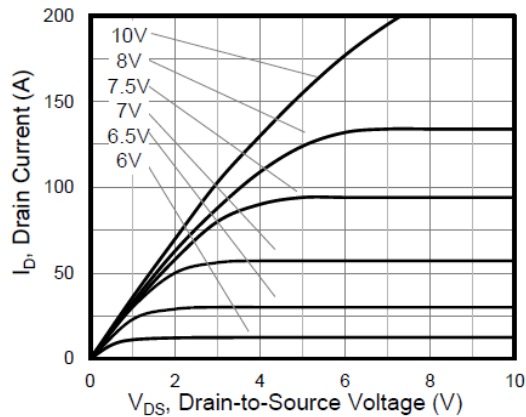


Figure 2. Transfer Characteristics

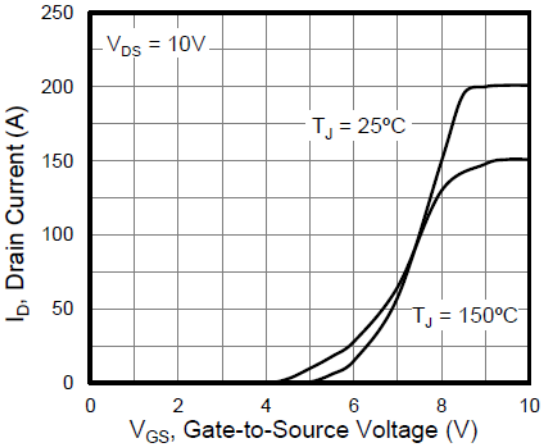


Figure 3. Capacitance

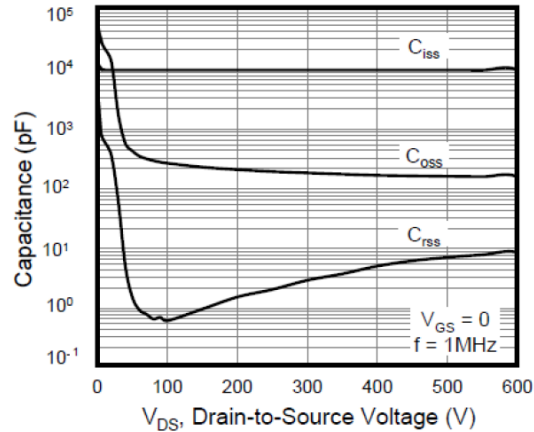


Figure 4. Typ. Coss Stored Energy

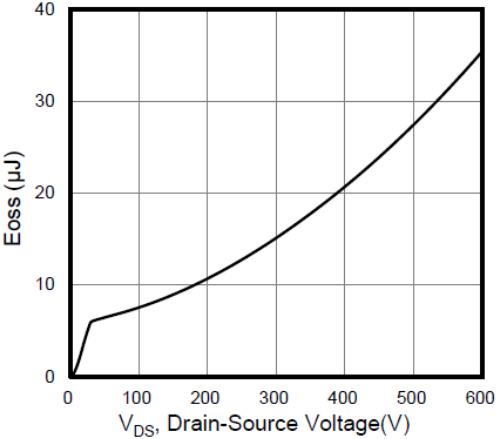


Figure 5. Gate Charge

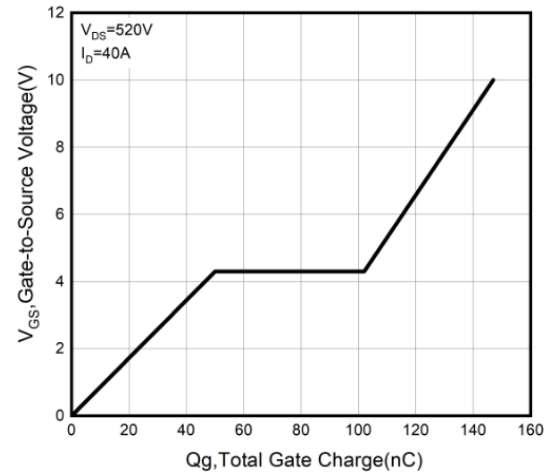
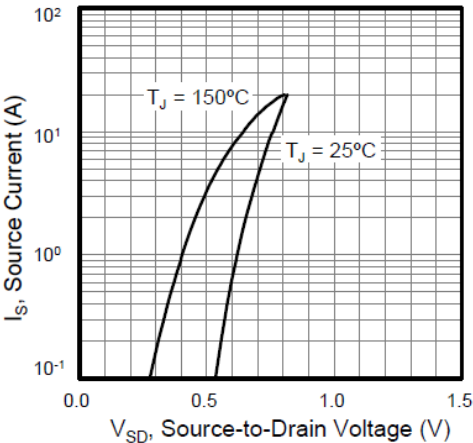


Figure 6. Body Diode Forward Voltage



Typical Performance Characteristics

Figure 7. On-Resistance vs. Temperature

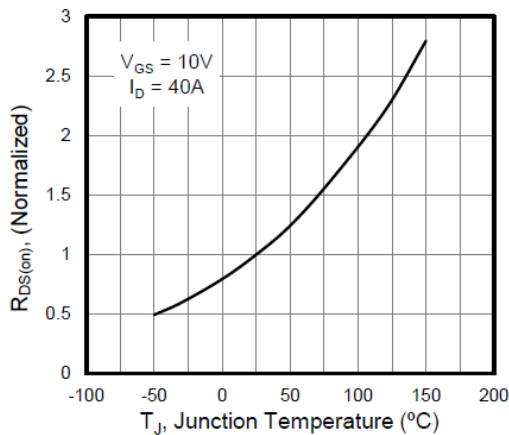


Figure 8. Breakdown voltage vs. Junction Temperature

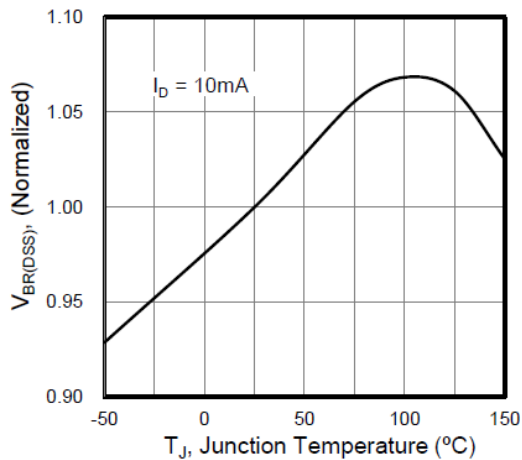


Figure 9. Transient Thermal Impedance

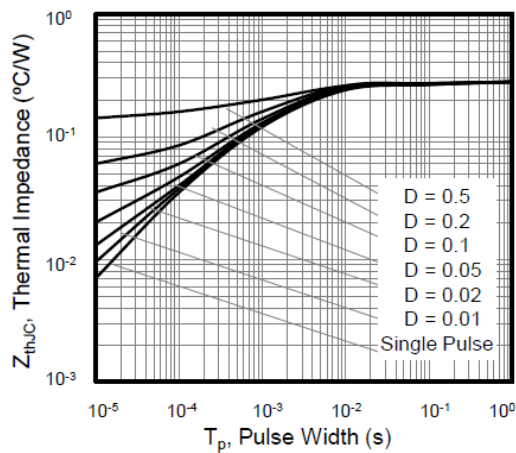
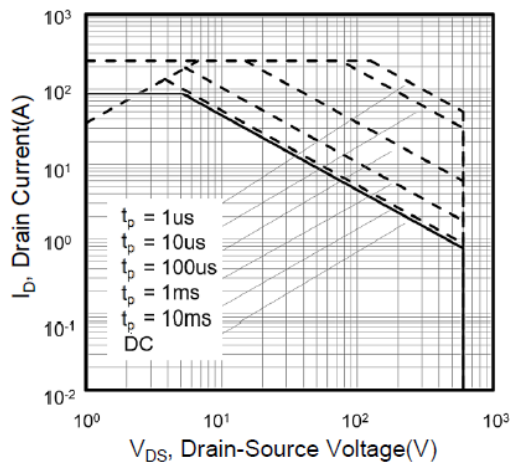


Figure 10. Safe Operation Area



Test Circuits

Figure 11: Gate Charge Test Circuit and Waveform

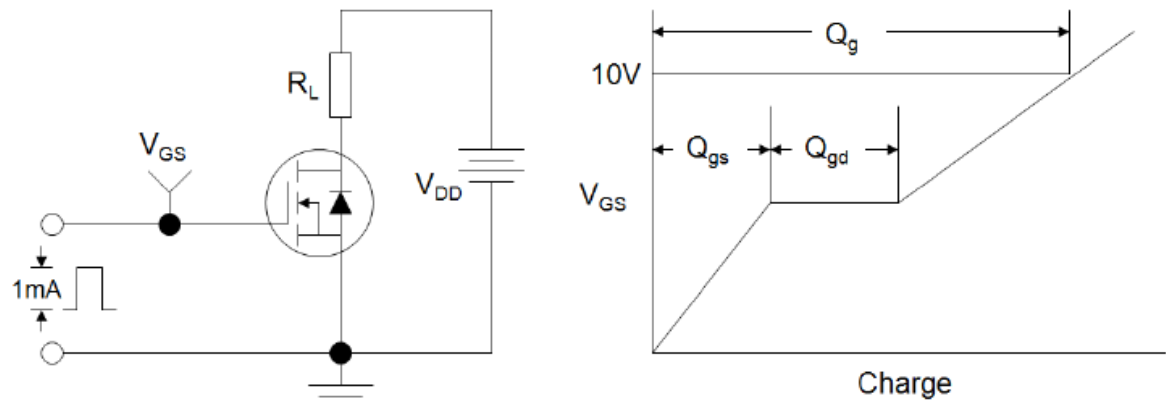


Figure 12: Resistive Switching Test Circuit and Waveform

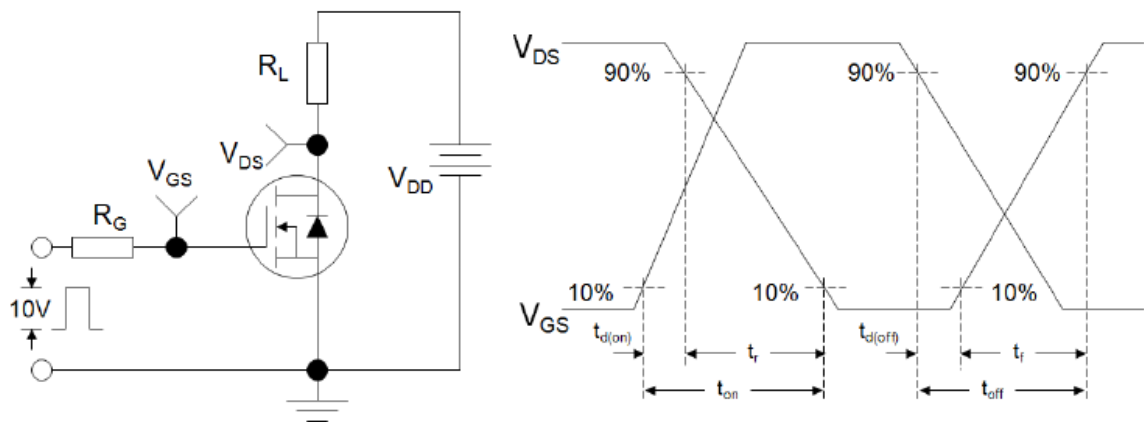
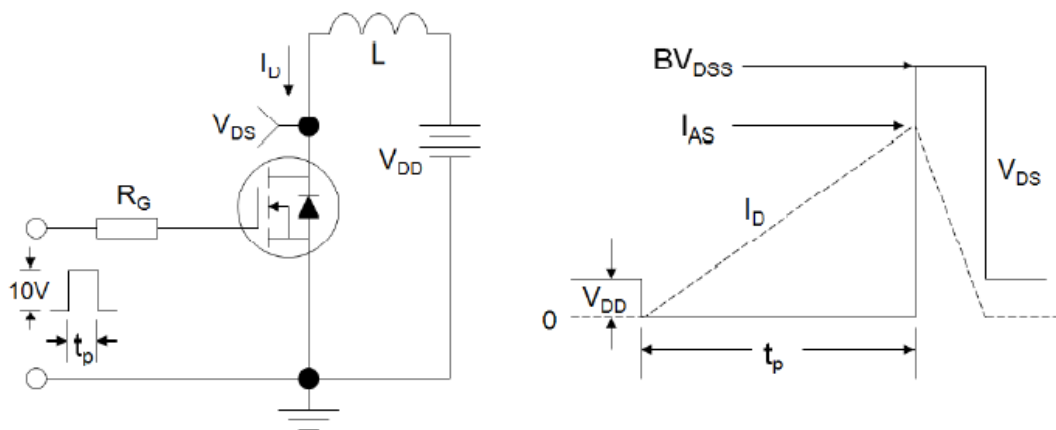
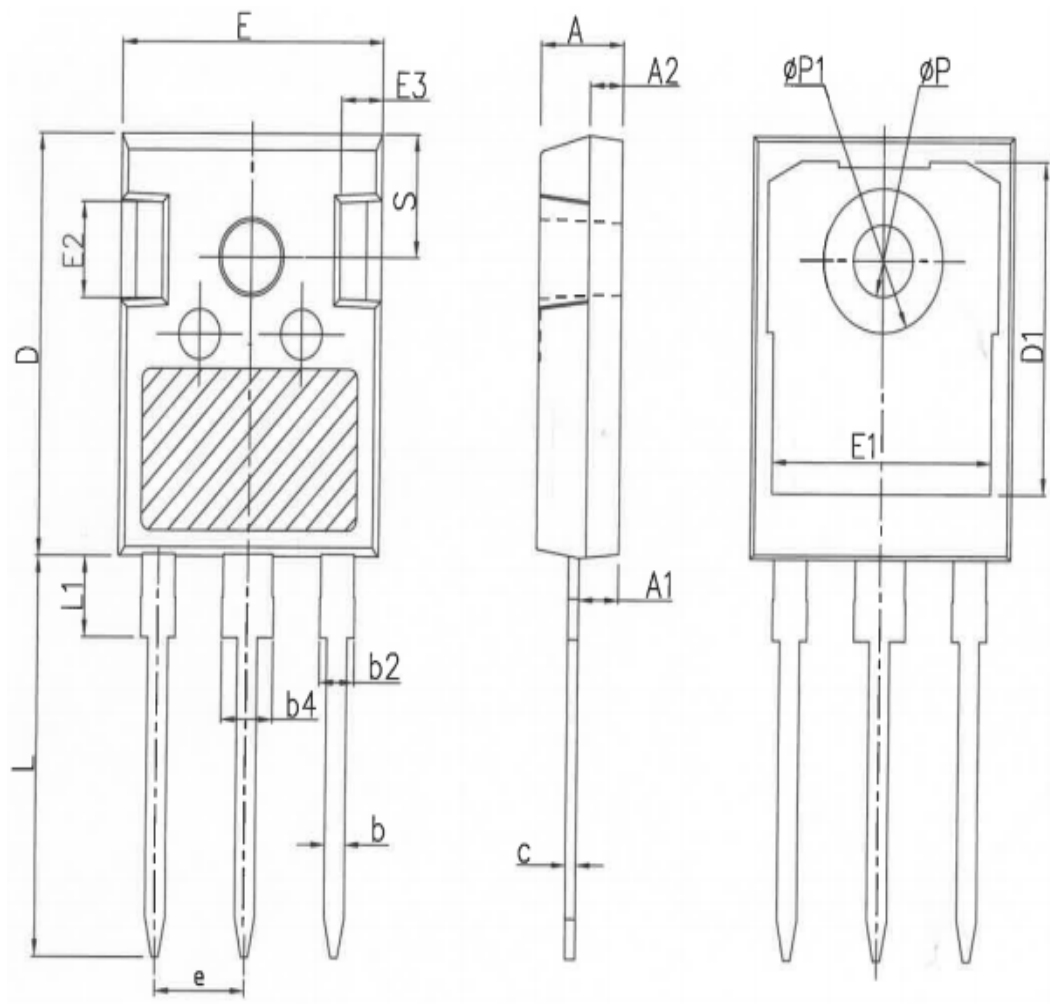


Figure 13: Unclamped Inductive Switching Test Circuit and Waveform



Package Outlines

TO247-3L



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
BMW65N028UA1	BMW65N028UA1	TO247-3L	Tube	30 units

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