

# BMP80N250C1

## Super Junction Power MOSFET

800 V, 18A, 250 mΩ



### Description

BMP80N250C1 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

- AC/DC power supply.
- PC power.
- Telecom/Sever.
- Solar inverter.
- LED lighting.
- EV Charger.
- UPS.

### Features

$BV_{DSS} @ T_{J,max}$	$I_D$	$R_{DS(on),max}$	$Q_{g,typ}$
850 V	18 A	250 mΩ	27 nC

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



### Absolute Maximum Ratings ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value max	Unit
$V_{DS}$	Drain to Source Voltage(1)	800	V
$V_{GS}$	Gate to Source Voltage	$\pm 30$	V
$I_D$	Drain Current(2)	$V_{GS} = 10 \text{ V}, (T_C = 25^\circ\text{C})$	18
		$V_{GS} = 10 \text{ V}, (T_C = 100^\circ\text{C})$	11
$I_{DM}$	Drain Current	Pulsed	54
$E_{AS}$	Single Pulsed Avalanche Energy(3)	650	mJ
$I_{AR}$	Avalanche current, repetitive	5.1	A
dv/dt	MOSFET dv/dt $V_{DS}=0$ to 520V	50	V/ns
	Peak Diode Recovery dv/dt	50	
$P_D$	Power Dissipation	$(T_C = 25^\circ\text{C})$	227
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$I_S$	Continuous diode forward current	18	A
$I_{S \text{ Pulse}}$	Diode pulse current(2)	54	A

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

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

3)  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , 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.	0.55	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62	

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800V 250mΩ Power MOSFET



## Electrical Characteristics (T<sub>J</sub> = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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### Off Characteristics

BV <sub>DSS</sub>	Drain to Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	800	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 800 V, V <sub>GS</sub> = 0 V	-	-	10	μA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> = ±30V, V <sub>DS</sub> = 0 V	-	-	±100	nA

### On Characteristics

V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250 uA	2.0	3.0	4.0	V
R <sub>DS(on)</sub>	Static Drain to Source On Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 8.5A	-	220	250	mΩ

### Dynamic Characteristics

C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V, f = 250 kHz	-	1510	-	pF
C <sub>oss</sub>	Output Capacitance		-	58	-	pF
C <sub>riss</sub>	Reverse transfer capacitance		-	2	-	pF
Q <sub>g(tot)</sub>	Total Gate Charge at 10 V	V <sub>DD</sub> = 400 V, I <sub>D</sub> = 9A, V <sub>GS</sub> = 0 to 10 V	-	27	-	nC
Q <sub>gs</sub>	Gate to Source Charge		-	5.5	-	nC
Q <sub>gd</sub>	Gate to Drain "Miller" Charge		-	8	-	nC
V <sub>plateau</sub>	Gate plateau voltage		-	3.8	-	V
R <sub>G</sub>	Gate Resistance	V <sub>DD</sub> =0V,V <sub>GS</sub> =0V,f = 1 MHz	-	15	-	Ω

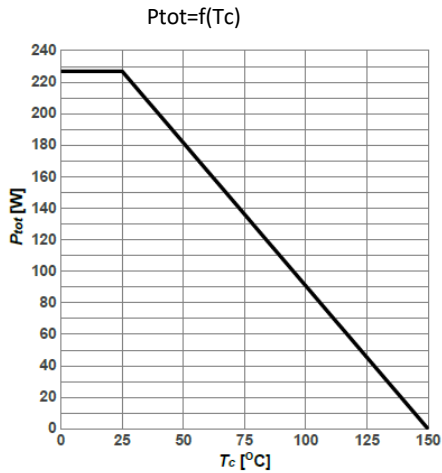
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = 400 V, I <sub>D</sub> = 18A, V <sub>GS</sub> = 10 V,	-	13	-	ns
t <sub>r</sub>	Turn-On Rise Time		-	2	-	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		-	80	-	ns
t <sub>f</sub>	Turn-Off Fall Time		-	7	-	ns

### Source-Drain Diode Characteristics

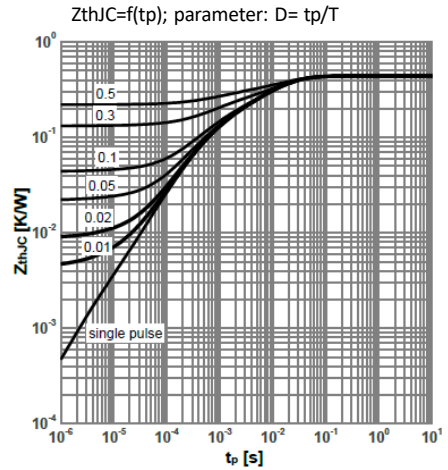
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>F</sub> = 8.5A T <sub>J</sub> = 25°C	-	0.8	-	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>R</sub> = 400 V, I <sub>F</sub> = 9 A, di <sub>F</sub> /dt = 100 A/μs	-	255	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	3.1	-	μC
I <sub>rrm</sub>	Peak reverse recovery current		-	20	-	A

# Typical Performance Characteristics

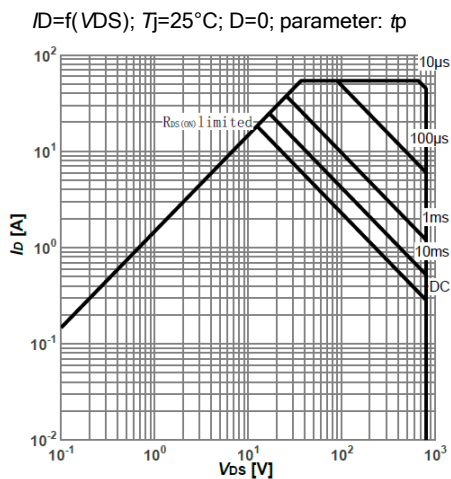
**Figure 1. Power dissipation**



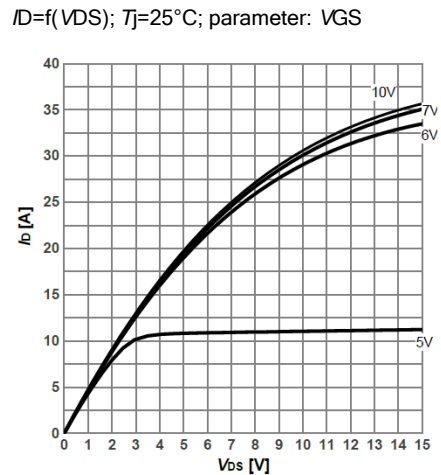
**Figure 2: Max. transient thermal impedance**



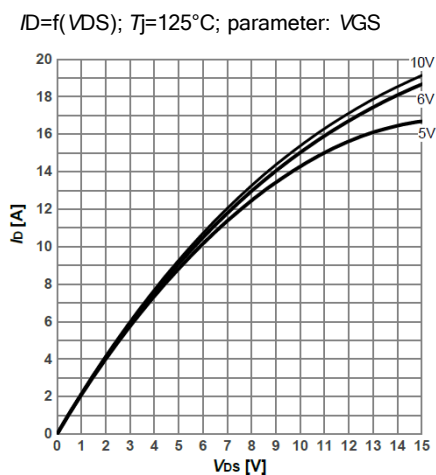
**Figure 3: Safe operating area**



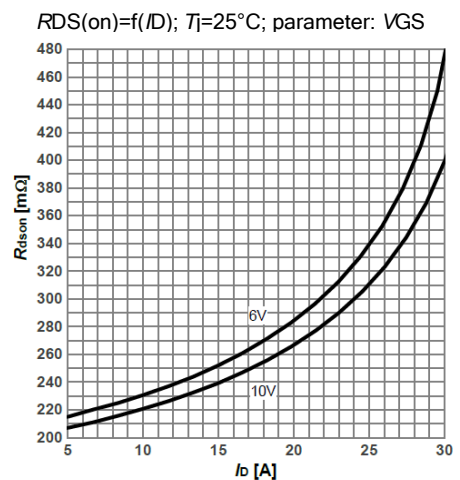
**Figure 4: Typ. output characteristics**



**Figure 5: Typ. output characteristics**

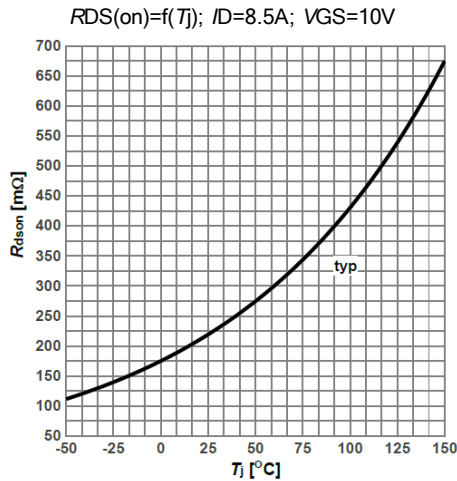


**Figure 6: Typ. drain-source on-state resistance**

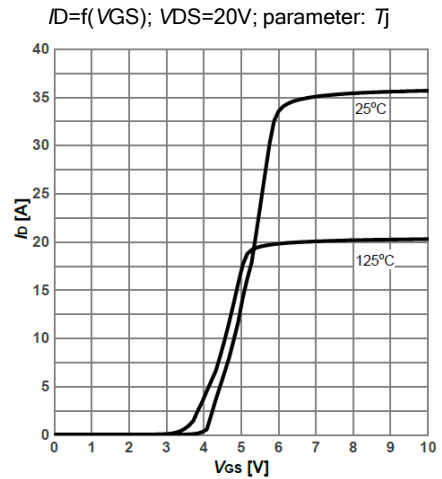


# Typical Performance Characteristics

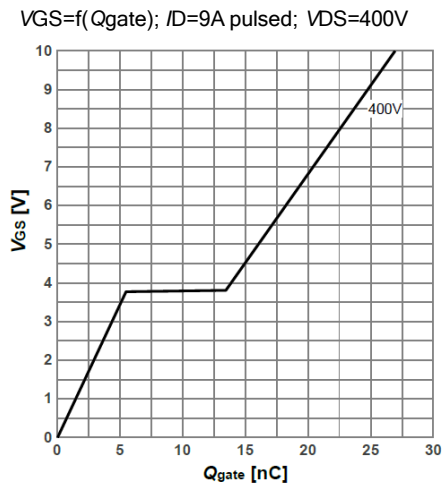
**Figure 7: Drain-source on-state resistance**



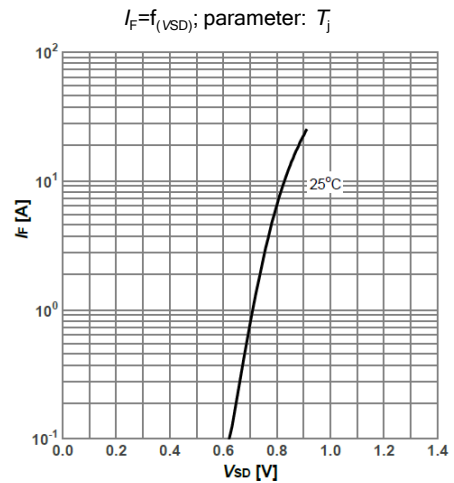
**Figure 8: Typ. transfer characteristics**



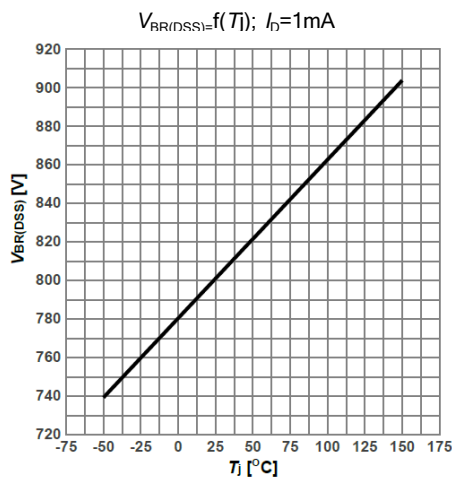
**Diagram 9: Typ. gate charge**



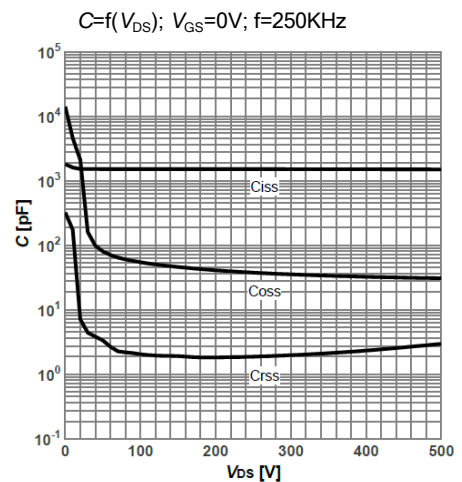
**Figure 10: Forward characteristics of reverse diode**



**Figure 11: Drain-source breakdown voltage**

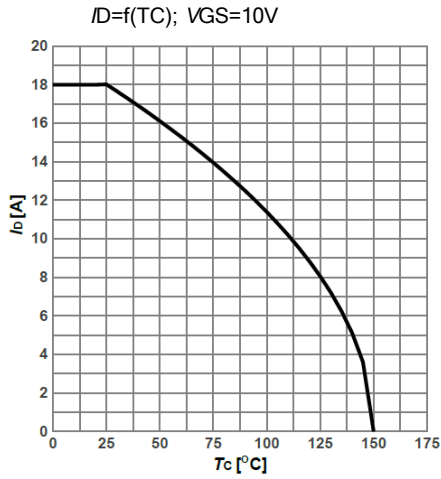


**Figure 12: Typ. capacitances**

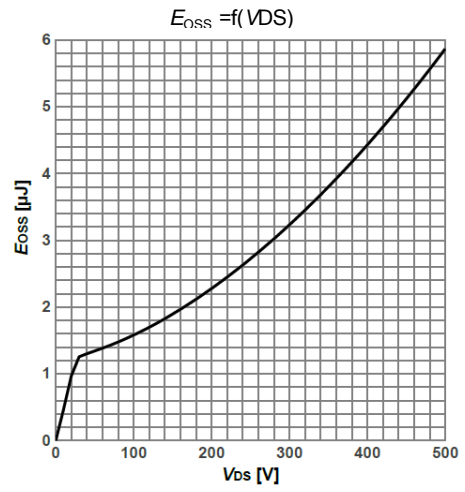


# Typical Performance Characteristics

**Figure 13: Typ. Coss stored energy**



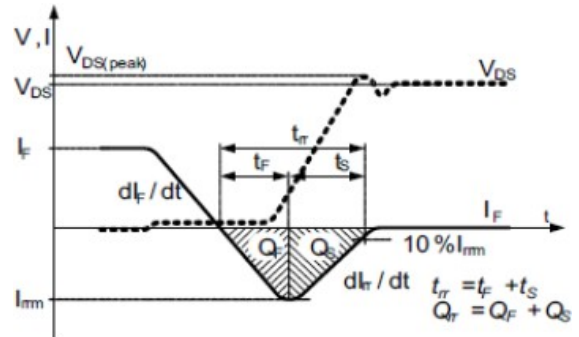
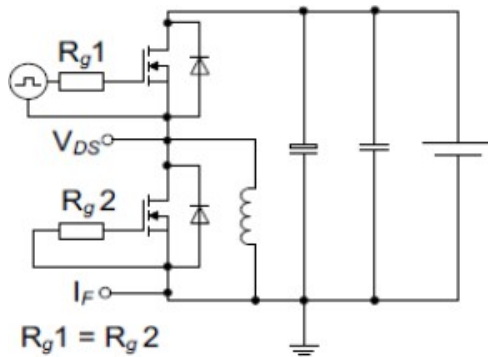
**Figure 14: Typ. Coss stored energy**



## Test Circuits

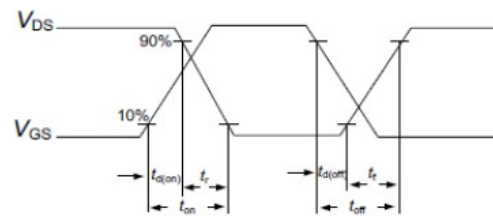
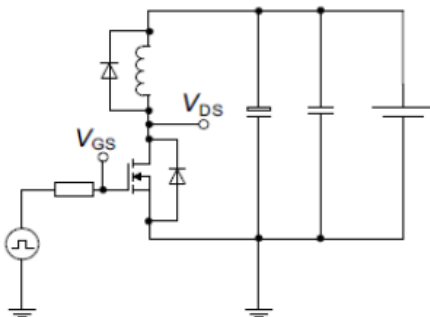
**Figure15. Diode Characteristics**

Test circuit for diode characteristics and Diode recovery waveform



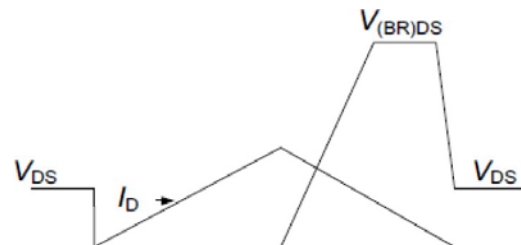
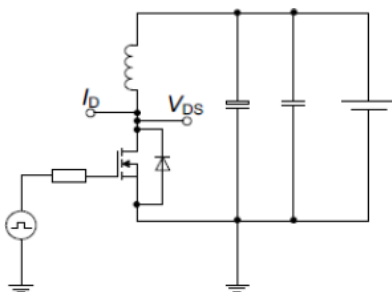
**Figure16. Switching Times**

Switching times test circuit for inductive load and Switching times waveform



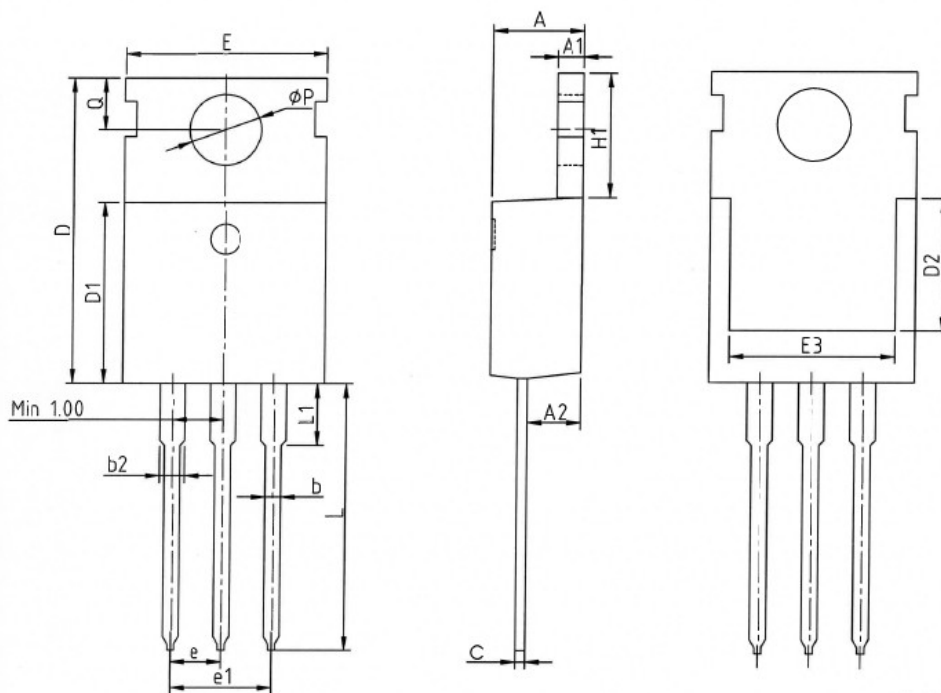
**Figure17. Unclamped Inductive Load**

Unclamped inductive load test circuit and Unclamped inductive waveform



## Package Outlines

# TO-220-3L



SYMBOL	MIN	NOM	MAX
A	4.37	4.57	4.70
A1	1.25	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.17	1.27	1.47
c	0.45	0.50	0.60
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	6.30	7.10
E	9.70	10.00	10.30
E3	7.00	7.80	8.60
e	2.54 BSC		
e1	5.08 BSC		
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	-	3.10	3.40
$\Phi P$	3.40	3.60	3.80
Q	2.60	2.80	3.00

\* Dimensions in millimeters

**Package Marking and Ordering Information**

Part Number	Top Marking	Package	Packing Method	Quantity
BMP80N250C1	BMP80N250C1	TO220	Tube	50 units

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