

BMB80N180C1

Super Junction Power MOSFET

800V, 23A, 180mΩ

Description

BMB80N180C1 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
- LED lighting
- EV Charger
- Solar/UPS

Features

| $V_{DS} @ T_{J,max}$ | I_D | $R_{DS(on),max}$ | $Q_{g,typ}$ |
|----------------------|-------|------------------|-------------|
| 850V | 23 A | 180 mΩ | 56nC |

- Ultra-fast body diode.
- Extremely low losses due to very low FOM.
- Very high commutation ruggedness.
- Halogen Free, and RoHS Compliant



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

| Symbol | Parameter | Value | Unit |
|----------------|---|--|------|
| V_{DSS} | Drain to Source Voltage ¹⁾ | 800 | V |
| V_{GSS} | Gate to Source Voltage | ±30 | V |
| I_D | Drain Current ²⁾ | $V_{GS} = 10 \text{ V}, (T_C = 25^\circ\text{C})$ | 23 |
| | | $V_{GS} = 10 \text{ V}, (T_C = 100^\circ\text{C})$ | 15 |
| I_{DM} | Drain Current | Pulsed | 70 |
| E_{AS} | Single Pulsed Avalanche Energy | 845 | mJ |
| I_{AR} | Repetitive Avalanche Energy | 13 | A |
| dv/dt | MOSFET dv/dt ruggedness | 50 | V/ns |
| | Diode Recovery dv/dt ruggedness | 50 | |
| P_D | Power Dissipation ($T_C = 25^\circ\text{C}$) | 250 | W |
| T_J, T_{STG} | Storage Temperature Range | -55 to 150 | °C |
| T_L | Maximum Lead Temperature for Soldering, 1/8" from Case for 10 Seconds | 260 | °C |

Thermal Characteristics

| Symbol | Parameter | Value | Unit |
|-----------------|--|-------|------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case, Max. | 0.5 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient, Max. *minimal footprint | 62.5 | |

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 | $V_{GS} = 0\text{ V}, I_D = 250\mu\text{A}$ | 800 | - | - | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 800\text{ V}, V_{GS} = 0\text{ V}, T_J = 25^\circ\text{C}$ | - | - | 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 | $V_{GS} = V_{DS}, I_D = 250\mu\text{A}$ | 2.5 | 3.5 | 4.5 | V |
| $R_{DS(on)}$ | Static Drain to Source On Resistance | $V_{GS} = 10\text{ V}, I_D = 12\text{ A}, T_J = 25^\circ\text{C}$ | - | 150 | 180 | mΩ |

Dynamic Characteristics

| | | | | | | |
|---------------|-----------------------------------|--|---|------|---|----|
| C_{iss} | Input Capacitance | $V_{GS} = 0\text{V}, V_{DS} = 100\text{V}, f = 250\text{KHz}$ | - | 2440 | - | pF |
| C_{oss} | Output Capacitance | | - | 83 | - | pF |
| C_{rss} | Reverse Transfer Capacitance | | - | 1.9 | - | pF |
| $C_{o(er)}$ | Energy Related Output Capacitance | $V_{GS} = 0\text{V}, V_{DS} = 0\text{V to } 500\text{ V}$ | - | 66 | - | pF |
| $C_{o(tr)}$ | Time Related Output Capacitance | $V_{GS} = 0\text{V}, V_{DS} = 0\text{V to } 500\text{ V}$ | - | 214 | - | pF |
| Q_g | Total Gate Charge | $V_{GS} = 0 - 10\text{V},$ $V_{DD} = 640\text{V}, I_D = 24\text{A}$ | - | 56 | - | nC |
| Q_{gs} | Gate to Source Charge | | - | 15 | - | nC |
| Q_{gd} | Gate to Drain "Miller" Charge | | - | 21 | - | nC |
| $V_{plateau}$ | Gate plateau voltage | | - | 5.5 | - | V |
| R_G | Gate Resistance | $f = 1.0\text{MHz open drain}$ | - | 4 | - | Ω |

Switching Characteristics

| | | | | | | |
|--------------|---------------------|---|---|-----|---|----|
| $t_{d(on)}$ | Turn-On Delay Time | $V_{GS} = 10\text{V}, V_{DD} = 400\text{V}, I_D = 12\text{A}$ | - | 20 | - | ns |
| t_r | Turn-On Rise Time | | - | 13 | - | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | - | 117 | - | ns |
| t_f | Turn-Off Fall Time | | - | 12 | - | ns |

Reverse Diode Characteristics

| | | | | | | |
|----------|----------------------------------|--|---|-----|----|---------------|
| I_{SD} | Continuous Diode Forward Current | | - | - | 23 | A |
| V_{SD} | Diode Forward Voltage | $I_F = 12\text{A}, V_{GS} = 0\text{V}$ | - | 0.8 | - | V |
| t_{rr} | Reverse Recovery Time | $V_R = 60\text{V}$ | - | 375 | - | ns |
| Q_{rr} | Reverse Recovery Charge | $I_F = 24\text{A}$ | - | 6.7 | - | μC |
| I_{rm} | Reverse Recovery Current | $di_F/dt = 100\text{A}/\mu\text{s}$ | - | 29 | - | A |

Figure 1. Power dissipation

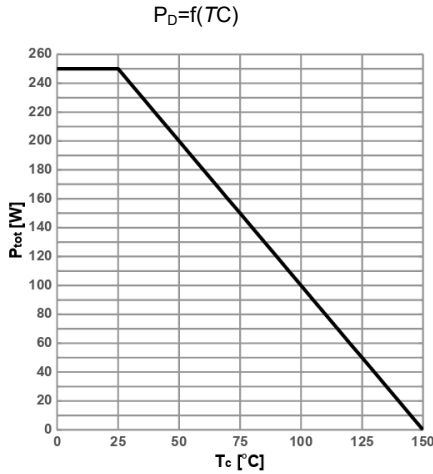


Figure 2. Max. transient thermal impedance

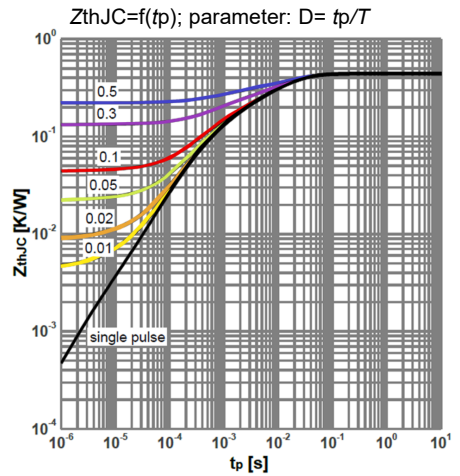


Figure 3: Safe operating area

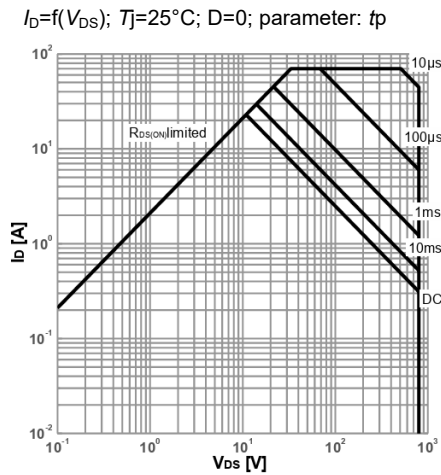


Figure 4: Typ. output characteristics

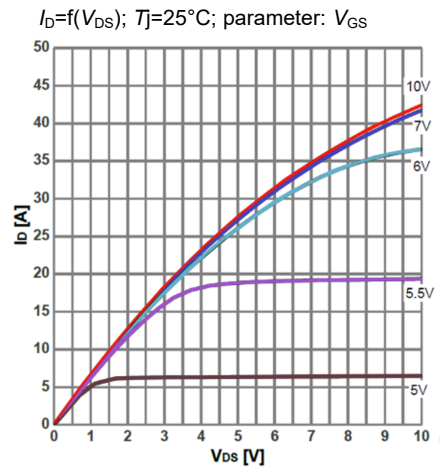


Figure 5: Typ. output characteristics

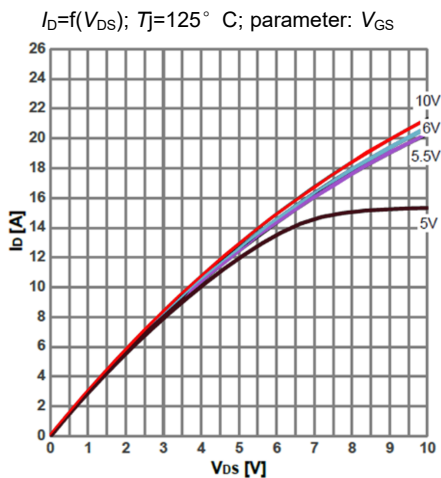


Figure 6: Typ. drain-source on-state resistance

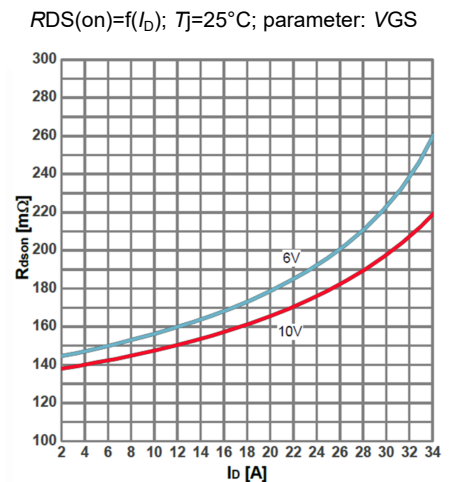


Figure 7: drain-source on-state resistance

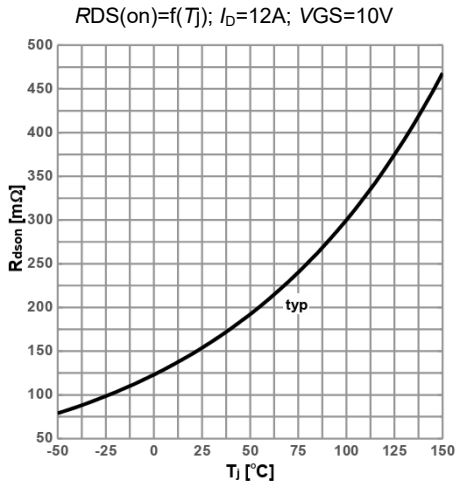


Figure 8: Typ. transfer characteristics

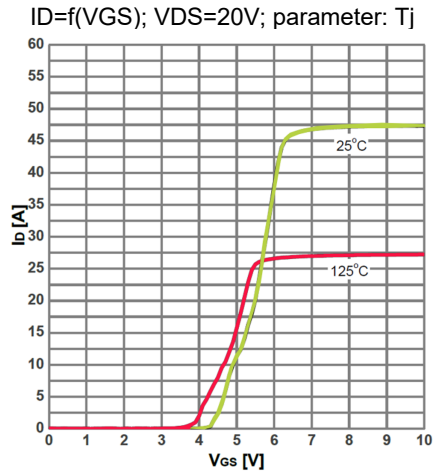


Figure 9:Typ. gate charge

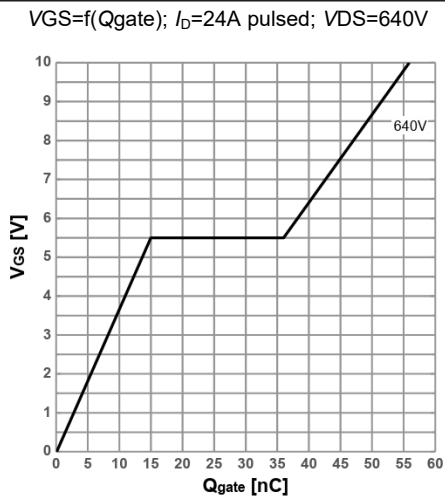


Figure10:Forward characteristics of reverse diode

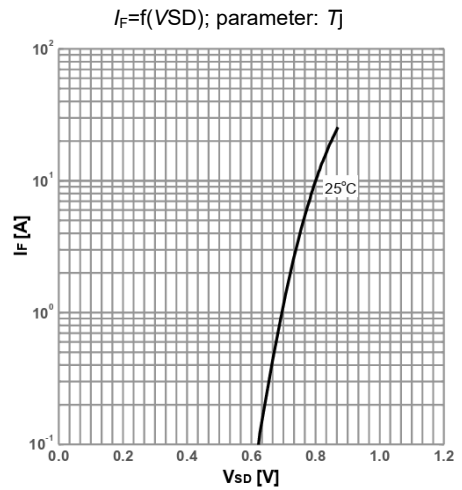


Figure11:Drain-source breakdown voltage

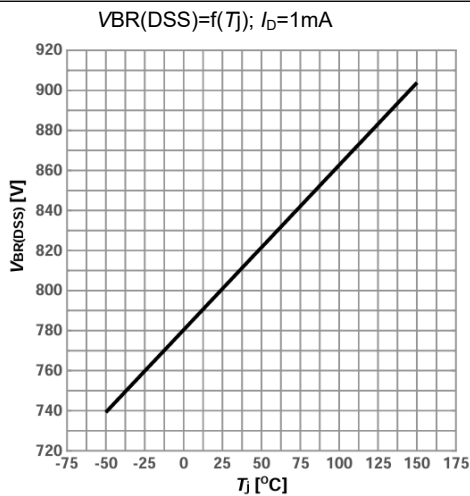


Figure12:Maximum Drain Current

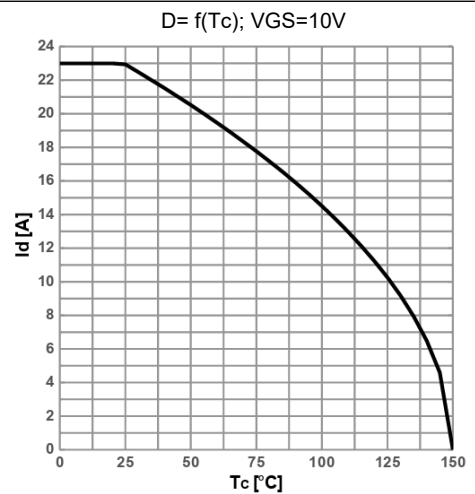


Figure13:Typ. capacitances

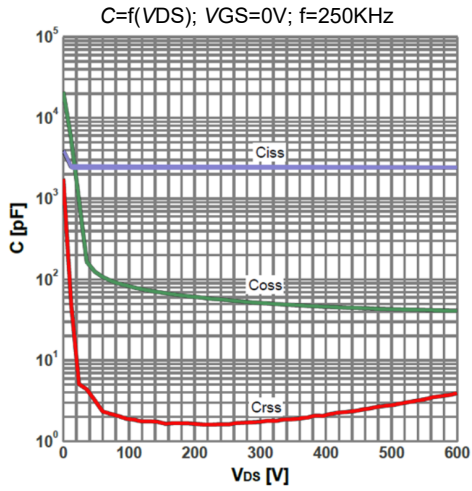
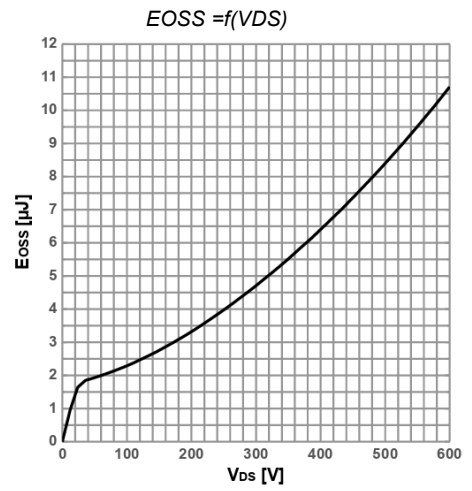


Figure14:Typ. Coss stored energy



Test Circuits

Figure15:Diode Characteristics

Test circuit for diode characteristics and Diode recovery waveform

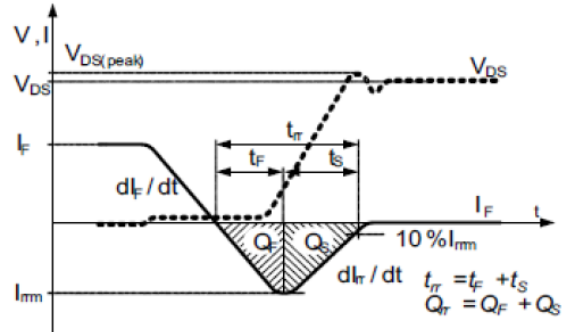
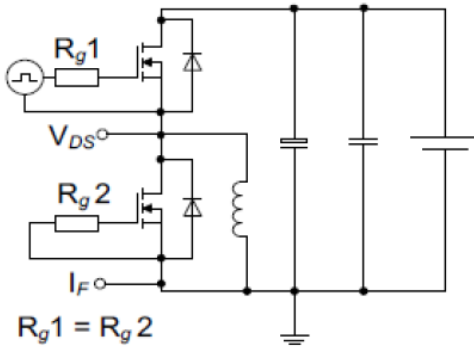


Figure16:Switching Times

Switching times test circuit for inductive load and Switching times waveform

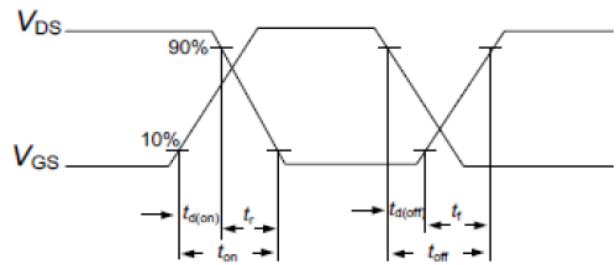
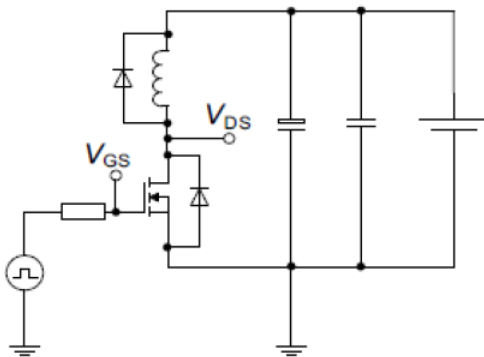
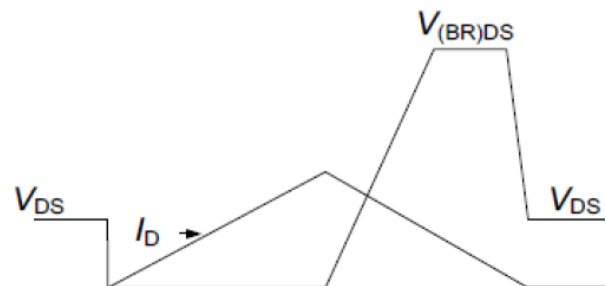
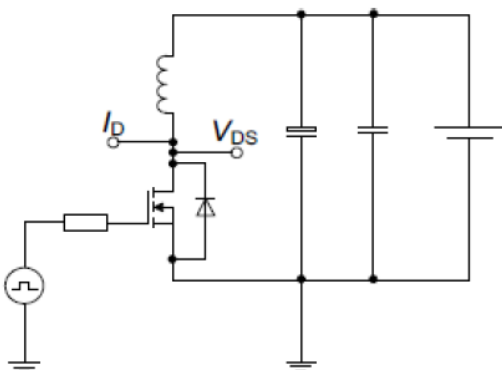


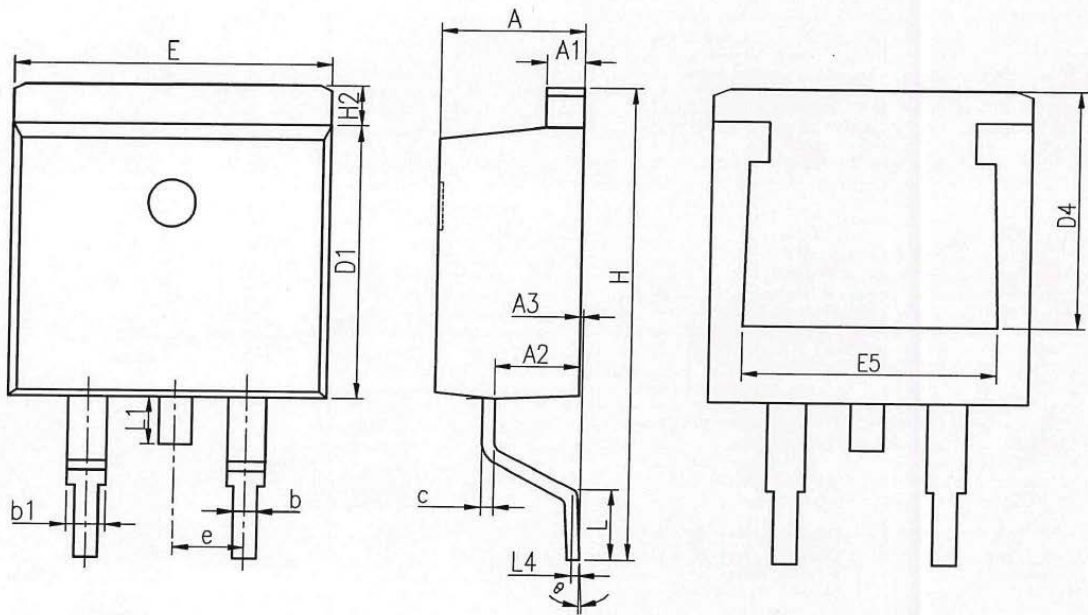
Figure17:Unclamped Inductive Load

Unclamped inductive load test circuit and Unclamped inductive waveform



Package Outlines

TO263-2L



COMMON DIMENSIONS

| SYMBOL | MM | | |
|--------|----------|-------|-------|
| | MIN | NOM | MAX |
| A | 4.37 | 4.57 | 4.77 |
| A1 | 1.22 | 1.27 | 1.42 |
| A2 | 2.49 | 2.69 | 2.89 |
| A3 | 0.00 | 0.13 | 0.25 |
| b | 0.70 | 0.81 | 0.96 |
| b1 | 1.17 | 1.27 | 1.47 |
| c | 0.30 | 0.38 | 0.53 |
| D1 | 8.50 | 8.70 | 8.90 |
| D4 | 6.60 | - | - |
| E | 9.86 | 10.16 | 10.36 |
| E5 | 7.06 | - | - |
| e | 2.54 BSC | | |
| H | 14.70 | 15.10 | 15.50 |
| H2 | 1.07 | 1.27 | 1.47 |
| L | 2.00 | 2.30 | 2.60 |
| L1 | 1.40 | 1.55 | 1.70 |
| L4 | 0.25 BSC | | |
| θ | 0° | 5° | 9° |

* Dimensions in millimeters

Package Marking and Ordering Information

| Part Number | Top Marking | Package | Packing Method | Quantity |
|-------------|-------------|----------|----------------|-----------|
| BMB80N180C1 | BMB80N180C1 | TO263-2L | Tape & Reel | 800 units |

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