

General Description

The HMM90N80 uses advanced trench technology and design to provide excellent RDS(ON) with low gate charge. It can be used in a wide variety of applications. The package form is Sot-227B, which accords with the RoHS standard.

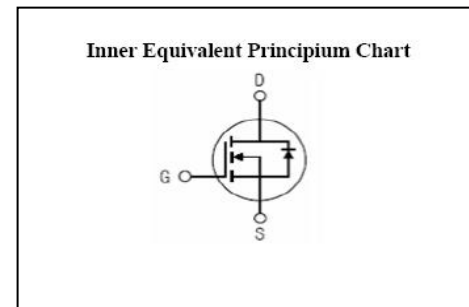
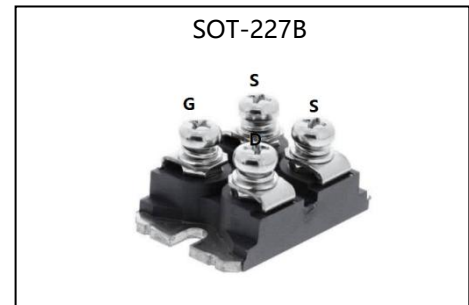
Features

- FminiBLOC, with Aluminium Nitride Isolation
- International Standard Package
- Low Gate Charge and Rds(on)
- High Current Handling Capability

Applications

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- PFC Circuits
- AC and DC Motor Drives
- Robotics and Servo Controls

| | | |
|------------------|------|------------|
| V_{DSS} | 800 | V |
| I_D | 90 | A |
| P_D | 1200 | W |
| $R_{DS(ON)type}$ | 35 | m Ω |



Absolute (Tc= 25°C unless otherwise specified)

| Symbol | Parameter | Rating | Units |
|----------------|--|-----------------|-------------|
| V_{DSS} | Drain-to-Source Voltage | 800 | V |
| I_D | Continuous Drain Current | 90 | A |
| I_{DM}^{a1} | Pulsed Drain Current | 270 | A |
| V_{GS} | Gate-to-Source Voltage | ± 30 | V |
| E_{AS}^{a2} | Single Pulse Avalanche Energy | 4000 | mJ |
| P_D | Power Dissipation | 1200 | W |
| T_J, T_{stg} | Operating Junction and Storage Temperature Range | 150, -55 to 150 | $^{\circ}C$ |
| T_L | Maximum Temperature for Soldering | 300 | $^{\circ}C$ |

Thermal Characteristics

| Symbol | Parameter | Typ. | Units |
|-----------------|------------------|-------|---------------|
| $R_{\theta JC}$ | Junction-to-Case | 0.104 | $^{\circ}C/W$ |

Electrical Characteristics (Tc= 25°C unless otherwise specified)

| OFF Characteristics | | | | | | |
|-------------------------------------|-----------------------------------|---|--------|------|------|-------|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| V _{DSS} | Drain to Source Breakdown Voltage | V _{GS} =0V, I _D =250μA | 800 | -- | -- | V |
| ΔBV _{DSS} /ΔT _J | Bvdss Temperature Coefficient | I _D =250uA, Reference 25°C | -- | 0.8 | -- | V/°C |
| I _{DSS} | Drain to Source Leakage Current | V _{DS} =800V, V _{GS} = 0V, T _a =25°C | -- | -- | 50 | μA |
| | | V _{DS} =640V, V _{GS} =0V, T _a =125°C | -- | -- | 5000 | |
| I _{GSS(F)} | Gate to Source Forward Leakage | V _{GS} = +30V | -- | -- | 800 | nA |
| I _{GSS(R)} | Gate to Source Reverse Leakage | V _{GS} = -30V | -- | -- | -800 | nA |

| ON Characteristics | | | | | | |
|--------------------------------|-------------------------------|--|--------|------|------|-------|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| R _{DS(ON)} | Drain-to-Source On-Resistance | V _{GS} =10V, I _D =45A | -- | 35 | 41 | mΩ |
| V _{GS(TH)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D =250μA | 2.0 | -- | 4.0 | V |
| Pulse width tp ≤ 380μs, δ ≤ 2% | | | | | | |

| Dynamic Characteristics | | | | | | |
|--------------------------------|------------------------------|---|--------|------|------|-------|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| g _{fs} | Forward Transconductance | V _{DS} =10V, I _D =45A | -- | 62 | -- | S |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =25V f=1.0MHz | -- | 7.8 | -- | nF |
| C _{oss} | Output Capacitance | | -- | 2.3 | -- | |
| C _{rss} | Reverse Transfer Capacitance | | -- | 0.13 | -- | |

| Resistive Switching Characteristics | | | | | | |
|--|-----------------------------------|--|--------|------|------|-------|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| t _{d(ON)} | Turn-on Delay Time | I _D =45A, V _{DD} =400V V _{GS} =10V, R _G =1Ω | -- | 50 | -- | ns |
| t _r | Rise Time | | -- | 25 | -- | |
| t _{d(OFF)} | Turn-Off Delay Time | | -- | 170 | -- | |
| t _f | Fall Time | | -- | 30 | -- | |
| Q _g | Total Gate Charge | I _D =45A, V _{DD} =400V V _{GS} =10V | -- | 155 | -- | nC |
| Q _{gs} | Gate to Source Charge | | -- | 40 | -- | |
| Q _{gd} | Gate to Drain ("Miller") Charge | | -- | 63 | -- | |

| Source-Drain Diode Characteristics | | | | | | |
|--|--|------------------------------|--------|------|------|-------|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| I_S | Continuous Source Current (Body Diode) | | -- | -- | 90 | A |
| I_{SM} | Maximum Pulsed Current (Body Diode) | | -- | -- | 360 | A |
| V_{SD} | Diode Forward Voltage | $I_S=90A, V_{GS}=0V$ | -- | -- | 1.4 | V |
| t_{rr} | Reverse Recovery Time | $I_S=45A, T_J=25^\circ C$ | -- | 350 | -- | ns |
| Q_{rr} | Reverse Recovery Charge | $di_f/dt=200A/us, V_{GS}=0V$ | -- | 20 | -- | uC |
| Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$ | | | | | | |

^{a1}: Repetitive rating; pulse width limited by maximum junction temperature

^{a2}: EAS condition : $T_J=25^\circ C, V_{DD}=50V, V_G=10V, L=0.5mH, R_g=25\Omega$

^{a3}: $I_S \leq I_{DM}, V_{DD} \leq V_{DSS}, T_J \leq 150^\circ C$

Typical Characteristics

Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

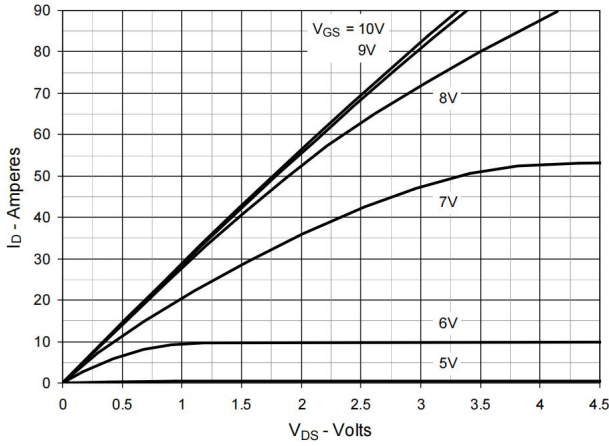


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

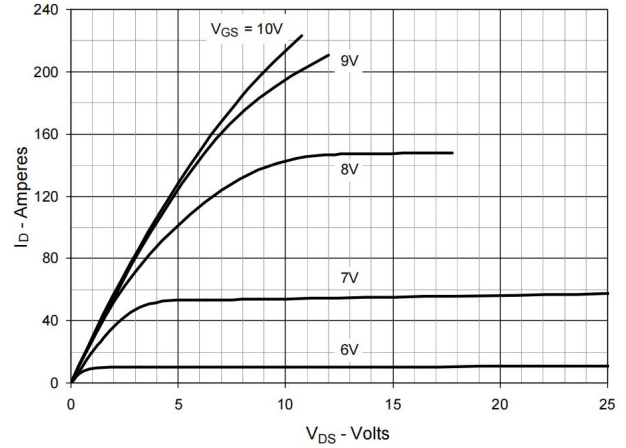


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

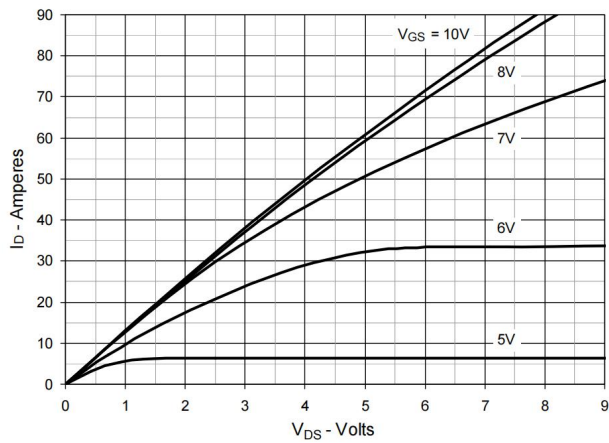


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 45\text{A}$ Value vs. Junction Temperature

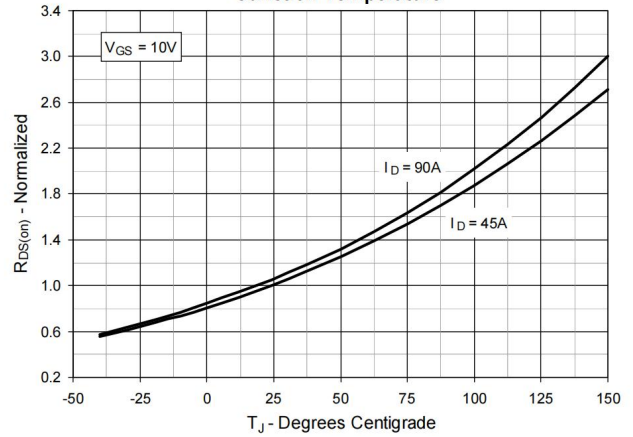


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 45\text{A}$ Value vs. Drain Current

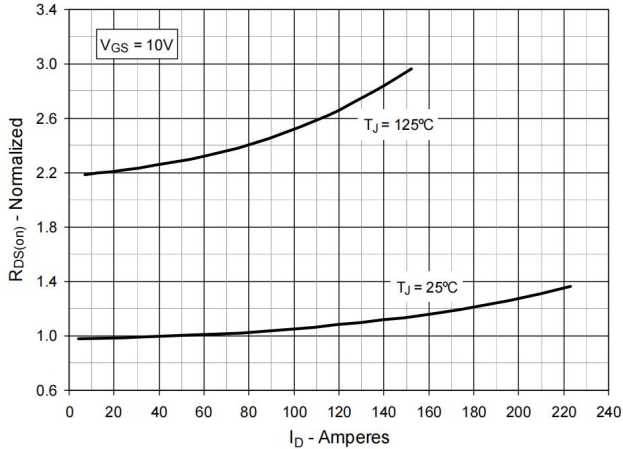


Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature

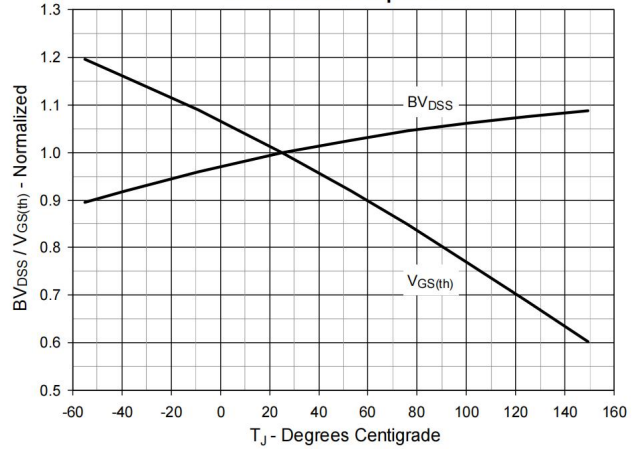


Fig. 7. Maximum Drain Current vs. Case Temperature

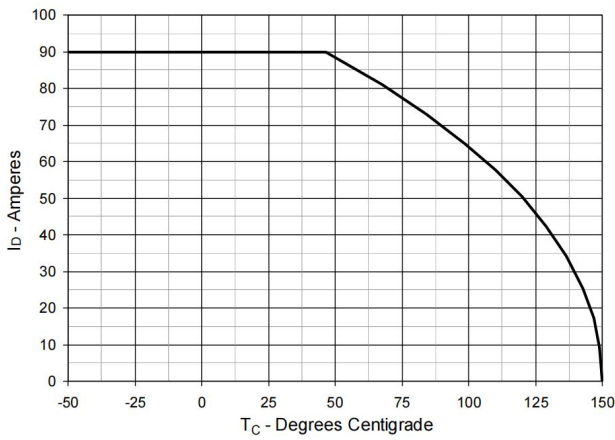


Fig. 8. Input Admittance

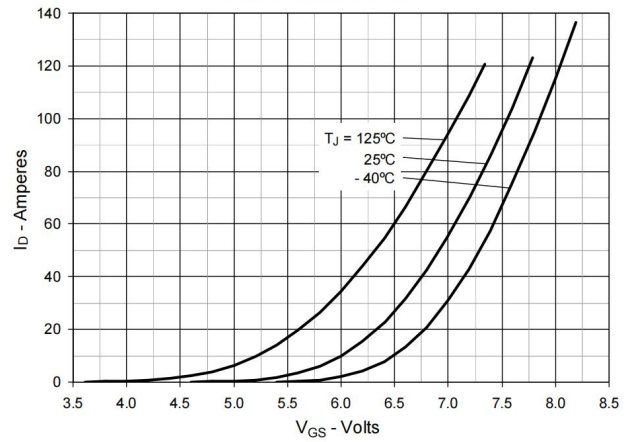


Fig. 9. Forward-Bias Safe Operating Area

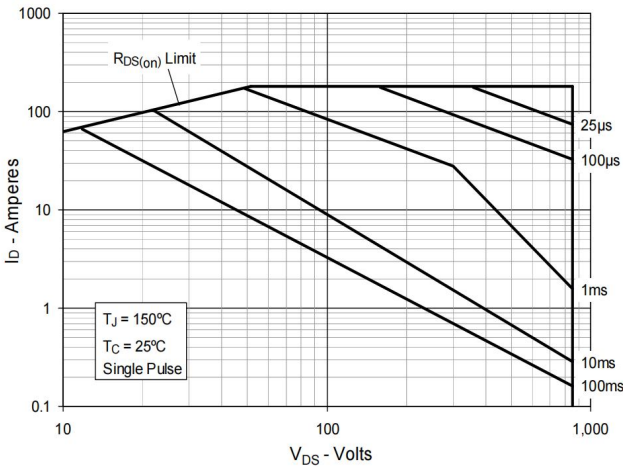


Fig. 10. Forward Voltage Drop of Intrinsic Diode

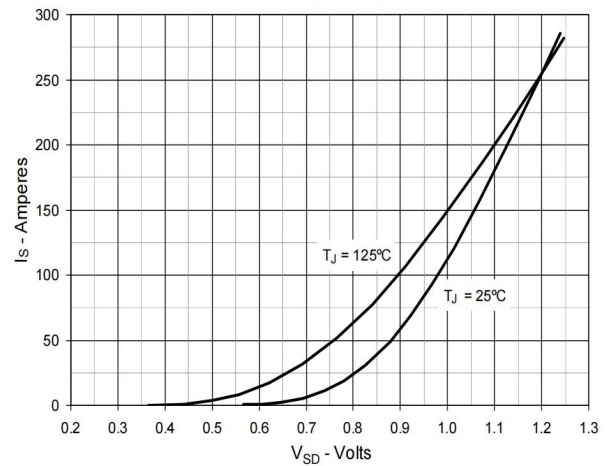


Fig. 11. Maximum Transient Thermal Impedance

