

HMS20N80D

800V N-Channel Super Junction MOSFET

Features

- Very Low FOM ($R_{DS(on)} \times Q_g$)
- Extremely low switching loss
- Excellent stability and uniformity
- 100% Avalanche Tested
- Built-in ESD Diode


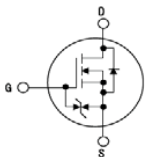
Application

- Switch Mode Power Supply (SMPS)
- TV power & LED Lighting Power
- AC to DC Converters
- Telecom

Key Parameters

| Parameter | Value | Unit |
|-----------------------|-------|----------|
| $BV_{DSS} @T_{j,max}$ | 850 | V |
| I_D | 20 | A |
| $R_{DS(on), max}$ | 0.25 | Ω |
| Q_g, Typ | 13.7 | nC |

Package & Internal Circuit

| TO-263 | SYMBOL |
|---|---|
|  |  |

Absolute Maximum Ratings

 $T_C=25^{\circ}\text{C}$ unless otherwise specified

| Symbol | Parameter | Value | Unit |
|----------------|--|-------------|--------------------|
| V_{DSS} | Drain-Source Voltage | 800 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D | Drain Current - Continuous ($T_C = 25^{\circ}\text{C}$) | 20 * | A |
| | Drain Current - Continuous ($T_C = 100^{\circ}\text{C}$) | 14 * | A |
| $I_{DM}^{1)}$ | Drain Current - Pulsed | 60 * | A |
| $E_{AS}^{2)}$ | Single Pulsed Avalanche Energy | 56 | mJ |
| I_{AR} | Avalanche Current | 1.15 | A |
| dv/dt | MOSFET dv/dt ruggedness, $V_{DS}=0\ldots 400\text{V}$ | 50 | V/ns |
| dv/dt | Reverse diode dv/dt, $V_{DS}=0\ldots 400\text{V}$, $I_{DS}\leq I_D$ | 15 | V/ns |
| P_D | Power Dissipation ($T_C = 25^{\circ}\text{C}$) | 27 | W |
| $V_{ESD(G-S)}$ | Gate source ESD(HBM-C=100pF, R=1.5K Ω) | 2000 | V |
| T_J, T_{STG} | Operating and Storage Temperature Range | -55 to +150 | $^{\circ}\text{C}$ |

* Drain current limited by maximum junction temperature

Thermal Resistance Characteristics

| Symbol | Parameter | Value | Unit |
|-----------------|--|-------|----------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case, Max. | 4.57 | $^{\circ}\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient , Max. | 80 | $^{\circ}\text{C/W}$ |

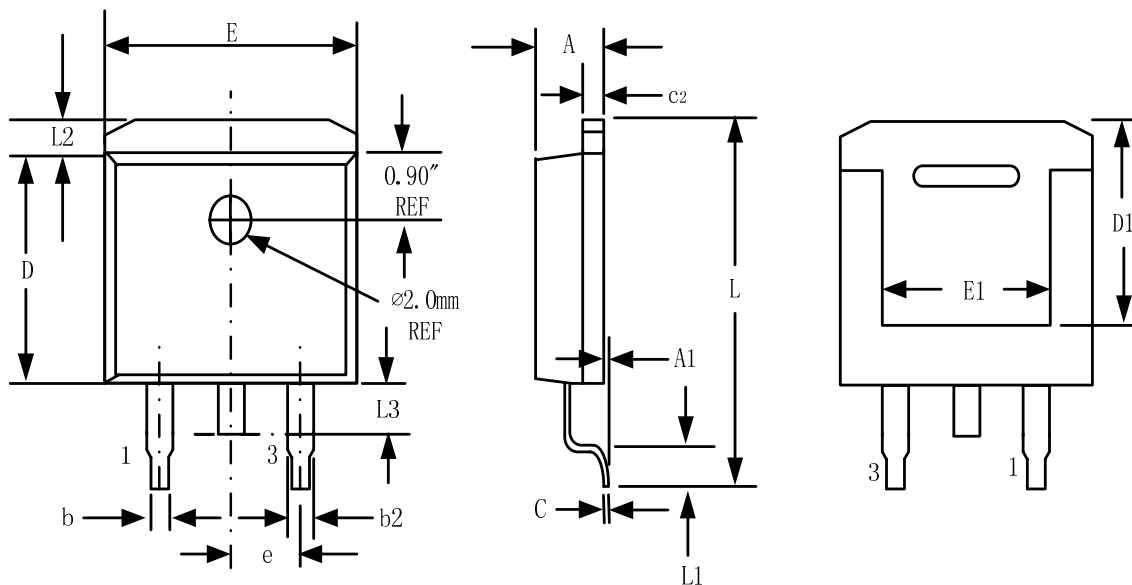
Electrical Characteristics $T_J=25^\circ\text{C}$ unless otherwise specified

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|--|---|---|-----|------|------|------|
| On Characteristics | | | | | | |
| V _{GS} | Gate Threshold Voltage | V _{DS} = V _{GS} , I _D = 220 μA | 2.0 | - | 4.0 | V |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} = 10 V, I _D = 1.6 A | - | 0.22 | 0.25 | Ω |
| Off Characteristics | | | | | | |
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} = 0 V, I _D = 1mA | 800 | - | - | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} = 800 V, V _{GS} = 0 | - | - | 1 | μA |
| | | V _{DS} = 800 V, T _C = 150°C | - | - | 100 | μA |
| I _{GSS} | Gate-Body Leakage Current | V _{GS} = ±20 V, V _{DS} = 0 V | - | - | ±1 | μA |
| Dynamic Characteristics | | | | | | |
| C _{iss} | Input Capacitance | V _{DS} = 500 V, V _{GS} = 0 V, f = 1.0 MHz | - | 564 | - | pF |
| C _{oss} | Output Capacitance | | - | 13.6 | - | pF |
| C _{rss} | Reverse Transfer Capacitance | | - | 2.1 | - | pF |
| Switching Characteristics | | | | | | |
| t _{d(on)} | Turn-On Time | V _{DS} = 400 V, I _D = 2.8 A, R _G = 25 Ω (Note 3,4) | - | 18 | - | ns |
| t _r | Turn-On Rise Time | | - | 16 | - | ns |
| t _{d(off)} | Turn-Off Delay Time | | - | 72 | - | ns |
| t _f | Turn-Off Fall Time | | - | 13 | - | ns |
| Q _{g(} | Total Gate Charge | V _{DS} = 640 V, I _D = 2.8 A, V _{GS} = 10 V (Note 3,4) | - | 13.7 | - | nC |
| Q _{gs} | Gate-Source Charge | | - | 2.5 | - | nC |
| Q _{gd} | Gate-Drain Charge | | - | 4.3 | - | nC |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| I _S | Maximum Continuous Drain-Source Diode Forward Current | | - | - | 7.0 | A |
| I _{SM} | Maximum Pulsed Drain-Source Diode Forward Current | | - | - | 21 | A |
| V _{SD} | Drain-Source Diode Forward Voltage | V _{GS} = 0 V, I _S = 2.8 A | - | - | 1.3 | V |
| t _{rr} | Reverse Recovery Time | V _R = 400 V, I _F = 2.8 A di _F /dt = 100 A/μs | - | 230 | - | ns |
| Q _{rr} | Reverse Recovery Charge | | - | 1.7 | - | μC |

Notes :

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $I_{AS}=1.15\text{A}$ $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
3. Pulse Test : Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
4. Essentially Independent of Operating Temperature

TO-263-3L Package Information



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.32 | 4.57 | 0.170 | 0.180 |
| A1 | - | 0.25 | | 0.010 |
| b | 0.71 | 0.94 | 0.028 | 0.037 |
| b2 | 1.15 | 1.40 | 0.045 | 0.055 |
| c | 0.46 | 0.61 | 0.018 | 0.024 |
| c2 | 1.22 | 1.40 | 0.048 | 0.055 |
| D | 8.89 | 9.40 | 0.350 | 0.370 |
| D1 | 8.01 | 8.23 | 0.315 | 0.324 |
| E | 10.04 | 10.28 | 0.395 | 0.405 |
| E1 | 7.88 | 8.08 | 0.310 | 0.318 |
| e | 2.54 BSC | | 0.100 BSC | |
| L | 14.73 | 15.75 | 0.580 | 0.620 |
| L1 | 2.29 | 2.79 | 0.090 | 0.110 |
| L2 | 1.15 | 1.39 | 0.045 | 0.055 |
| L3 | 1.27 | 1.77 | 0.050 | 0.070 |