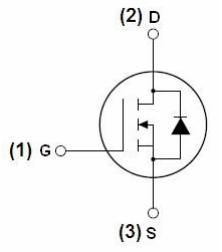
# HM3N20MR

## 200V N-Channel Enhancement Mode MOSFET

### Description

The HM3N20MR uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.




### General Features

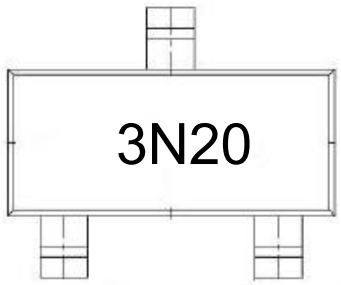
$V_{DS}$ = 200V,$I_D$ =3A

$R_{DS(ON)}$ < 1300mΩ @ $V_{GS}$=10V (Typ:1000mΩ)

High density cell design for ultra low Rdson

Fully characterized avalanche voltage and current

Excellent package for good heat dissipation

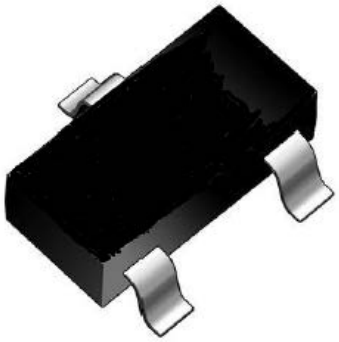



### Application

Power switching application

Hard switched and high frequency circuits

Uninterruptible power supply



### Package Marking and Ordering Information

| Product ID | Pack | Marking | Qty(PCS) |
|---|---|---|---|
| HM3N20MR | SOT23-3 | 3N20 | 3000 |

### Absolute Maximum Ratings ($T_A$=25℃unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 200 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | $I_D$ | 3 | A |
| Drain Current-Pulsed (Note 1) | $I_{DM}$ | 9 | A |
| Maximum Power Dissipation | $P_D$ | 3 | W |
| Operating Junction and Storage Temperature Range | $T_J$,$T_{STG}$ | -55 To 150 | ℃ |
| Thermal Resistance,Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 41.7 | ℃/W |

# 200V N-Channel Enhancement Mode MOSFET

## Electrical Characteristics ($T_A$=25℃unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=250μA | 200 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=200V,$V_{GS}$=0V | - | - | 1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V,$V_{DS}$=0V | - | - | ±100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 2 | | 4 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=3A | - | 1000 | 1300 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=15V,$I_D$=3A | - | 8 | - | S |
| Input Capacitance | $C_{lss}$ | $V_{DS}$=25V,$V_{GS}$=0V, F=1.0MHz | - | 580 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 90 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 3 | - | PF |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=100V, $R_L$=15Ω $V_{GS}$=10V,$R_G$=2.5Ω | - | 10 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 12 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 15 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 15 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=100V,$I_D$=3A, $V_{GS}$=10V | - | 12 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 2.5 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 3.8 | - | nC |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=3A | - | - | 1.2 | V |
| Diode Forward Current (Note 2) | $I_S$ | | - | - | 3 | A |

## Notes:

**1.** Repetitive Rating: Pulse width limited by maximum junction temperature.

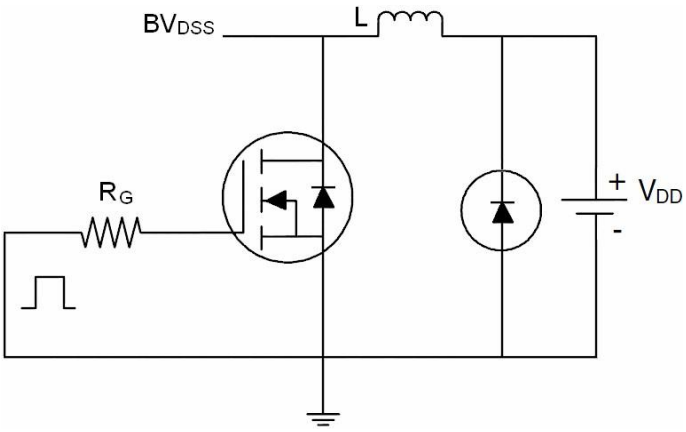
**2.** Surface Mounted on FR4 Board, t ≤ 10 sec.

**3.** Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

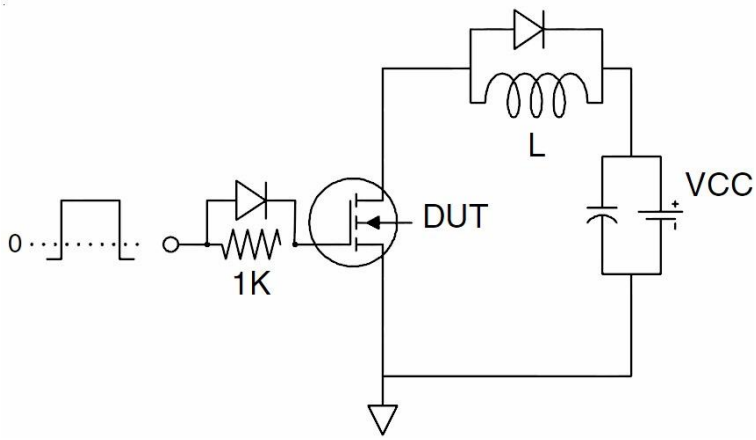
**4.** Guaranteed by design, not subject to production

## Test Circuit

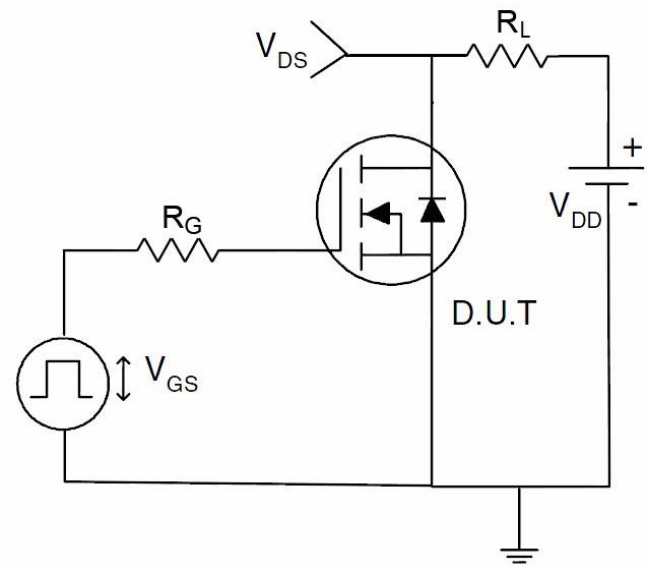
### 1）$E_{AS}$ test circuit




### 2）Gate charge test circuit




### 3）Switch Time Test Circuit



## Typical Electrical and Thermal Characteristics (Curves)

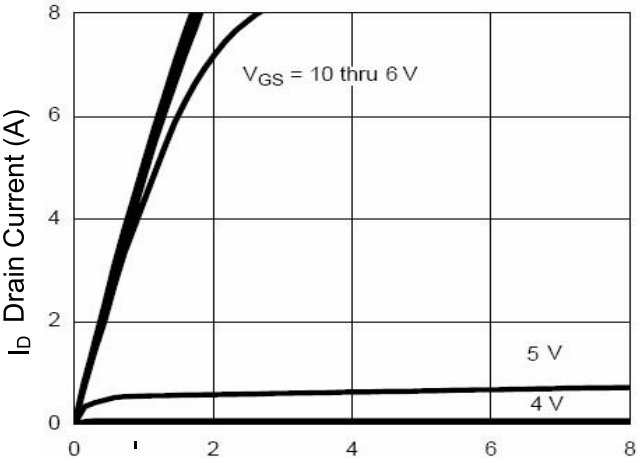



**Figure 1 Output Characteristics**

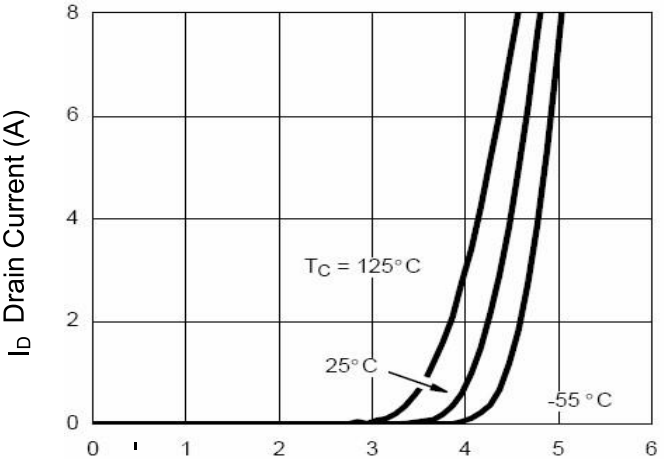



**Figure 2 Transfer Characteristics**

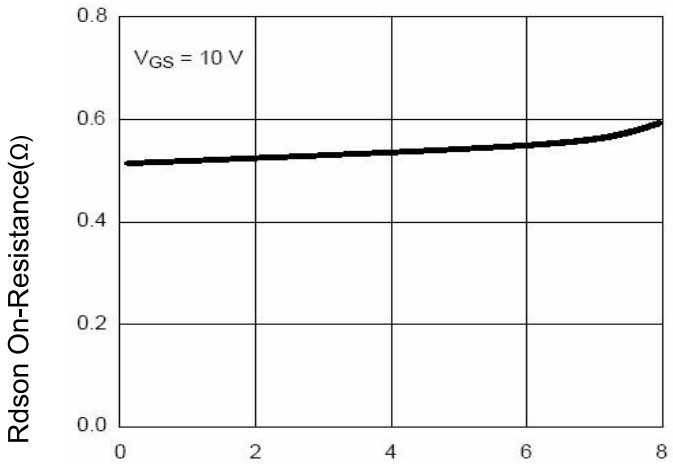



**Figure 3 Rdson- Drain Current**

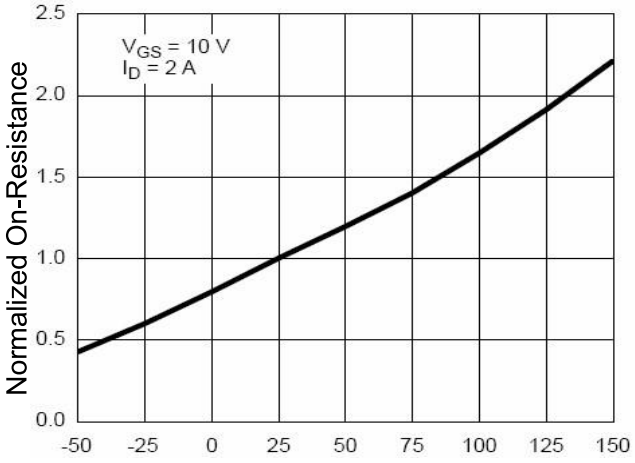



**Figure 4 Rdson-JunctionTemperature**

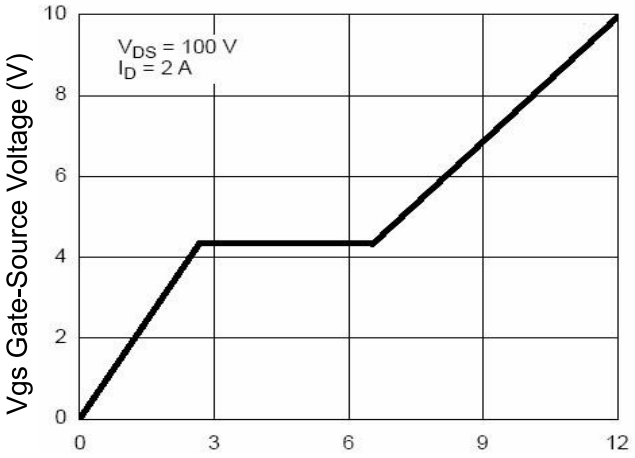



**Figure 5 Gate Charge**

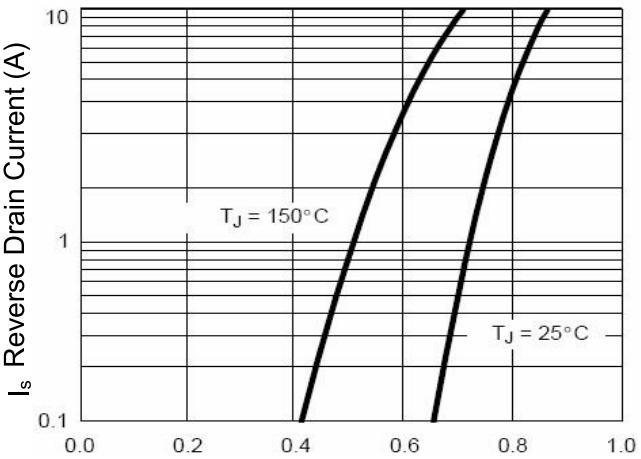



**Figure 6 Source- Drain Diode Forward**

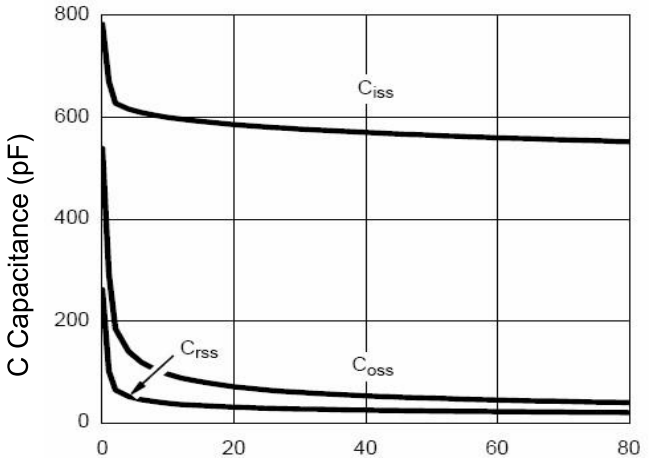



**Figure 7 Capacitance vs Vds**

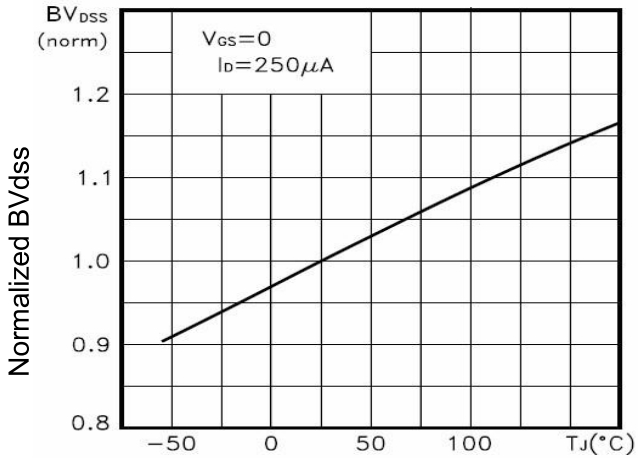



**Figure 9 $BV_{DSS}$ vs Junction Temperature**

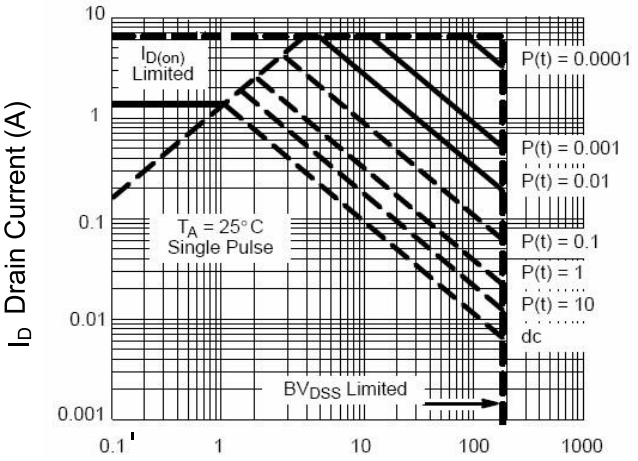



**Figure 8 Safe Operation Area**

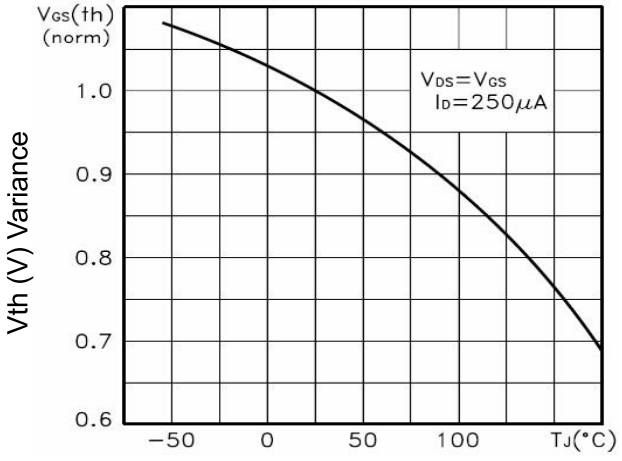



**Figure 10 $V_{GS(th)}$ vs Junction Temperature**

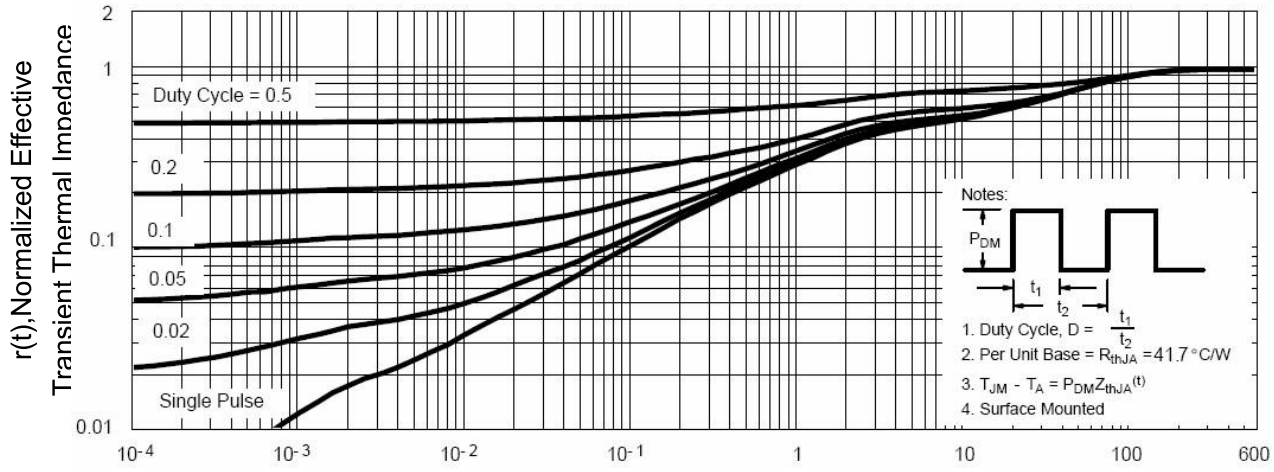
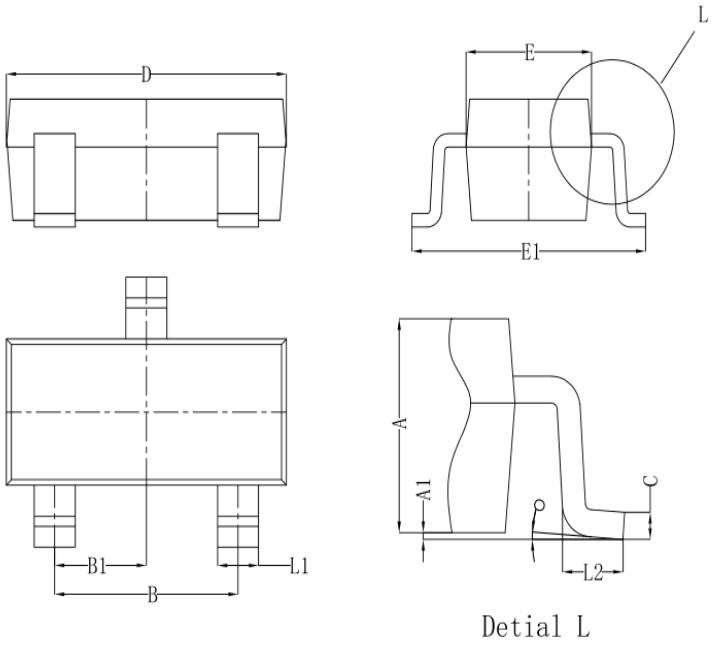



**Figure 11 Normalized Maximum Transient Thermal Impedance**

SOT23-3L Package outline




Detial L

| Symbol | Dim in mm | | |
|---|---|---|---|
| | Min | Nor | Max |
| A | 1.050 | 1.100 | 1.150 |
| A1 | 0.000 | 0.050 | 0.100 |
| L1 | 0.300 | 0.400 | 0.500 |
| C | 0.100 | 0.150 | 0.200 |
| D | 2.820 | 2.920 | 3.020 |
| E | 1.500 | 1.600 | 1.700 |
| E1 | 2.650 | 2.800 | 2.950 |
| B | 1.800 | 1.900 | 2.000 |
| B1 | 0.950 TYP | | |
| L2 | 0.300 | 0.450 | 0.600 |
| θ | 0° | 4° | 8° |