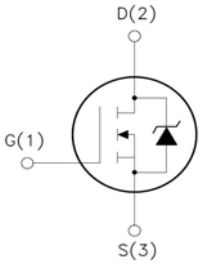
**N-Channel Power MOSFET**

## Description

The DMN10H220LE-13 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.

It is ESD protected.

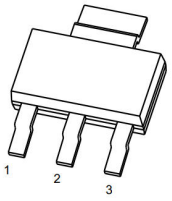



**Schematic diagram**

## General Features

| $V_{DSS}$ | $R_{DS(ON)}$ @10V (typ) | $I_D$ |
|---|---|---|
| 100V | 125 mΩ | 5A |

- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation




**SOT-223**

## Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply
- Motor control

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

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 100 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | $I_D$ | 5 | A |
| Drain Current-Pulsed (Note 1) | $I_{DM}$ | 21 | A |
| Maximum Power Dissipation | $P_D$ | 5 | W |
| Operating Junction and Storage Temperature Range | $T_J$,$T_{STG}$ | -55 To 150 | ℃ |

## Thermal Characteristic

| | | | |
|---|---|---|---|
| Thermal Resistance,Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 41.7 | ℃/W |

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

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=250μA | 100 | 110 | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=80V, $V_{GS}$=0V | - | - | 800 | nA |

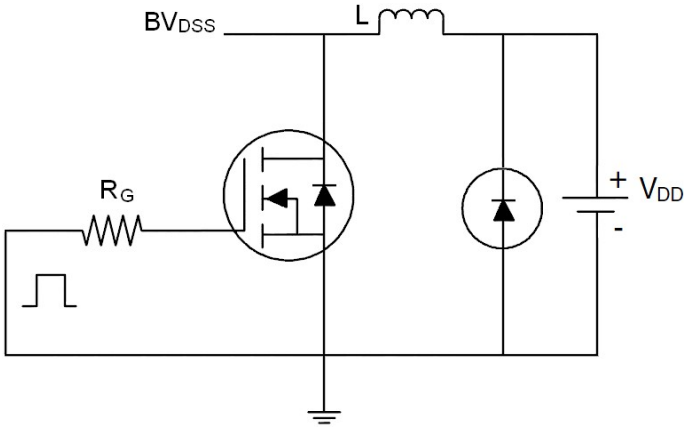
| | | | | | | |
|---|---|---|---|---|---|---|
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V,$V_{DS}$=0V | - | - | ±100 | nA |
| **On Characteristics** (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 1 | 1.8 | 3 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=3A | | 125 | 145 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=5V,$I_D$=2.9A | - | 8 | - | S |
| **Dynamic Characteristics** (Note4) | | | | | | |
| Input Capacitance | $C_{lss}$ | $V_{DS}$=25V,$V_{GS}$=0V, F=1.0MHz | - | 210 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 30 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 14 | - | PF |
| **Switching Characteristics** (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=50V,$I_D$=5A,$R_L$=15Ω $V_{GS}$=10V,$R_G$=2.5Ω | - | 15 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 3.4 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 21 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 3.1 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=50V,$I_D$=5A, $V_{GS}$=10V | | 4.5 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 1.5 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 1.2 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=6A | - | - | 1.2 | V |
| Diode Forward Current (Note 2) | $I_S$ | | - | - | 5 | A |

## Notes:

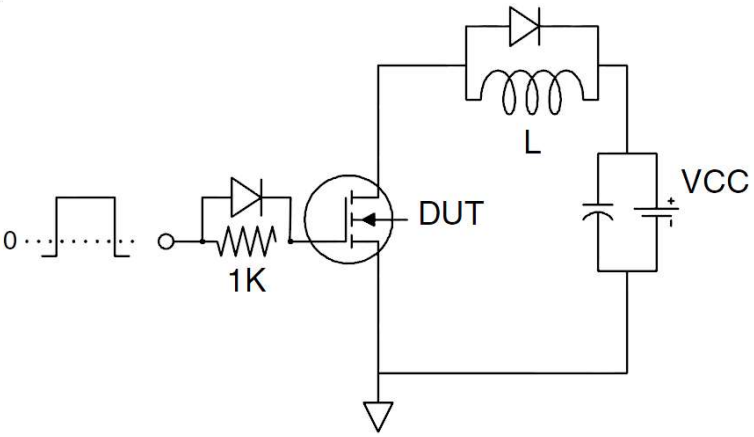
**1.** Repetitive Rating: Pulse width limited by maximum junction temperature.
**2.** Surface Mounted on FR4 Board, t ≤ 10 sec.
**3.** Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
**4.** Guaranteed by design, not subject to production

## Test Circuit

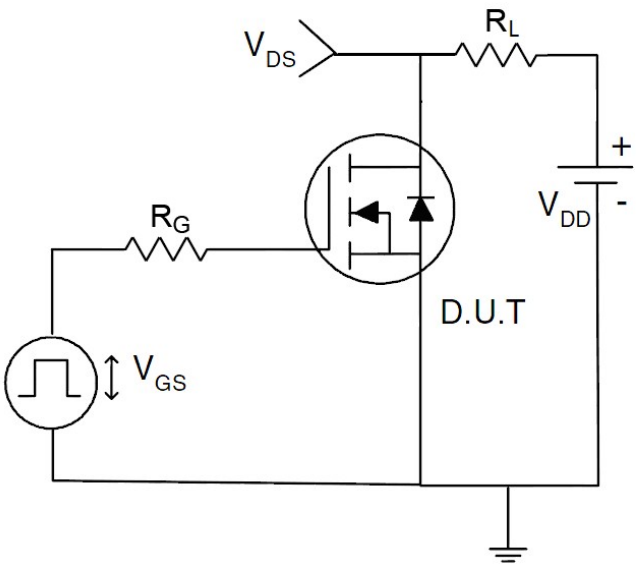
**1）$E_{AS}$ test circuit**




**2）Gate charge test circuit**




**3）Switch Time Test Circuit**



## Typical Electrical and Thermal Characteristics (curves)

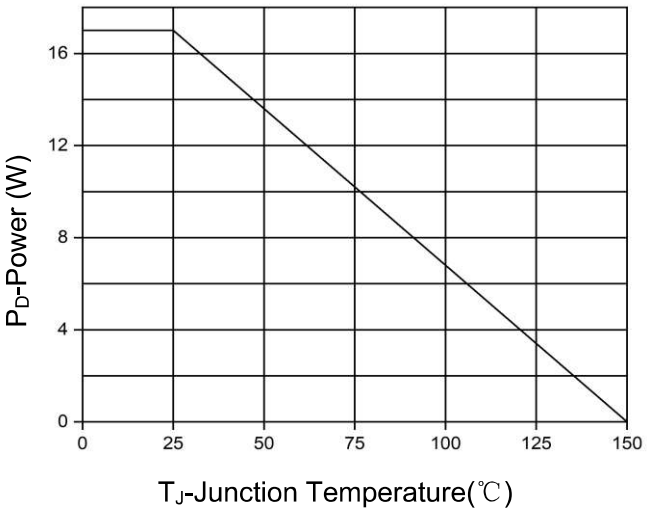



**Figure 1. Power Dissipation**

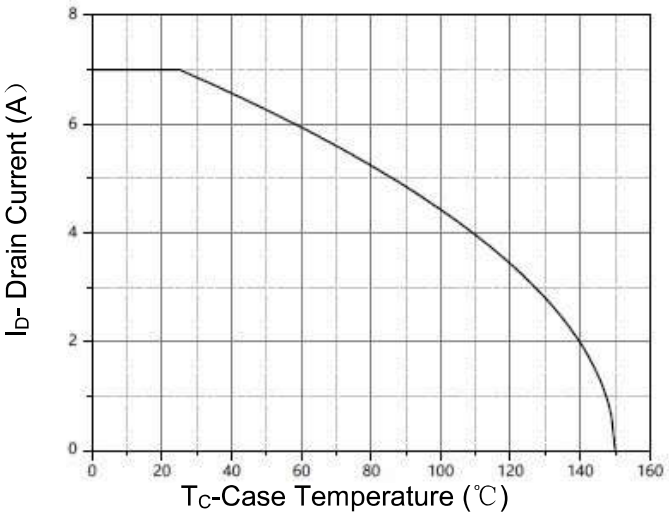



**Figure 2. Drain Current**

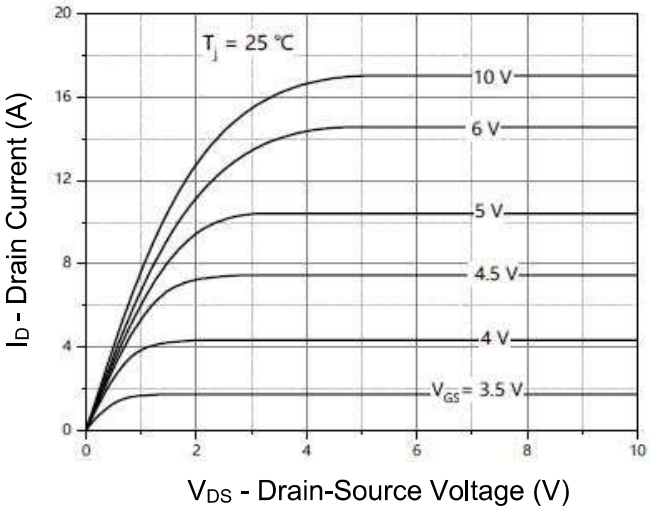



**Figure 3. Output characteristics**

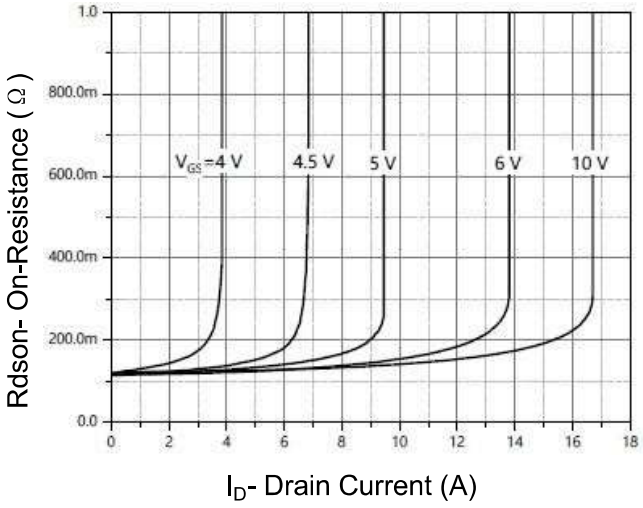



**Figure 4. Drain-Source On-state resistance**

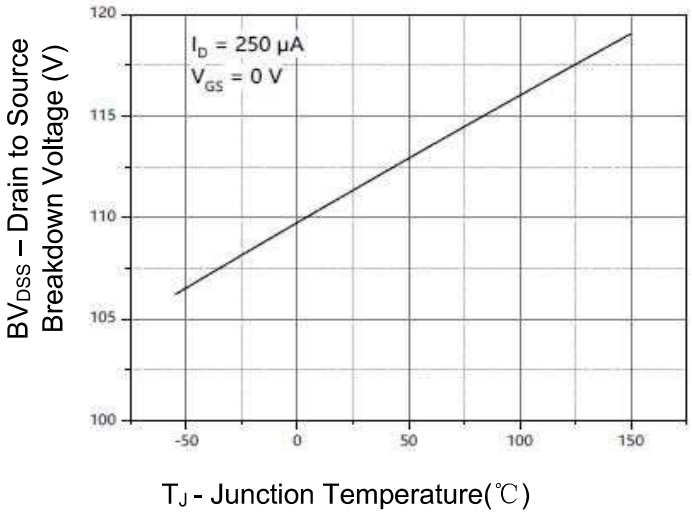



**Figure 5. Drain-source breakdown voltage**

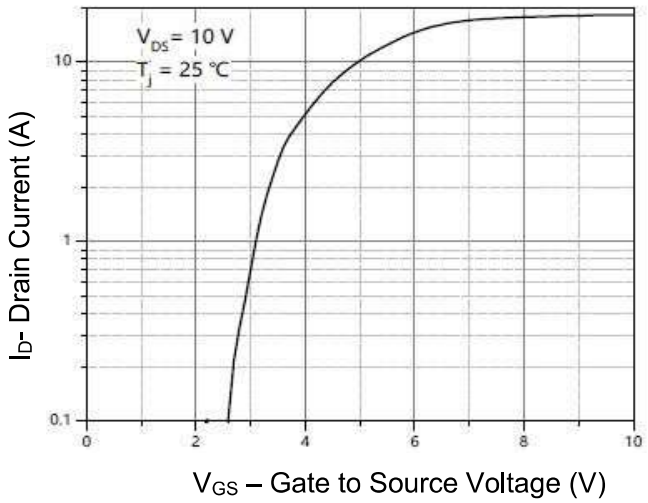



**Figure 6. Transfer Characteristics**

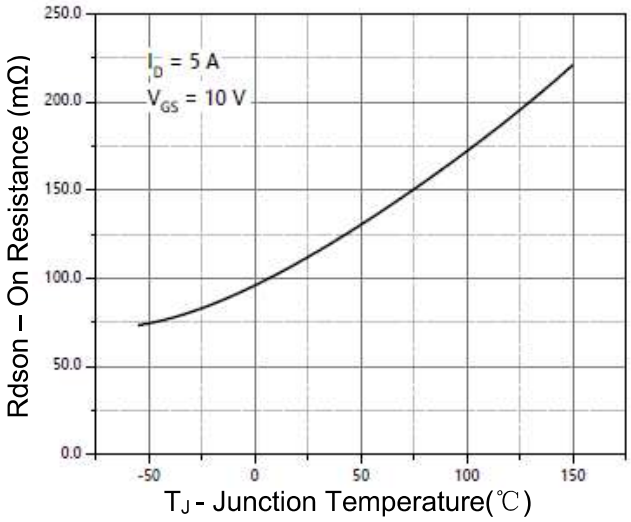



**Figure 7. Drain-Source On-State Resistance**

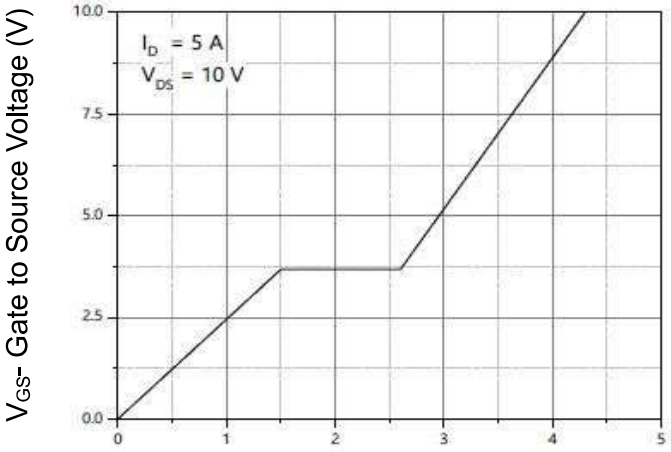



**Figure 8. Gate Charge**

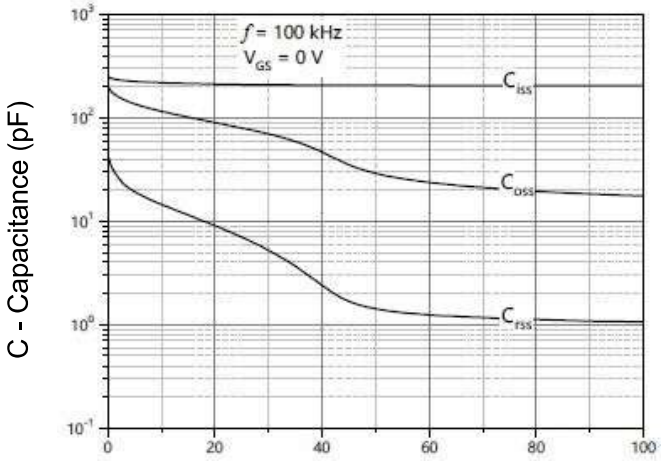



**Figure 9 . Capacitance vs Vds**

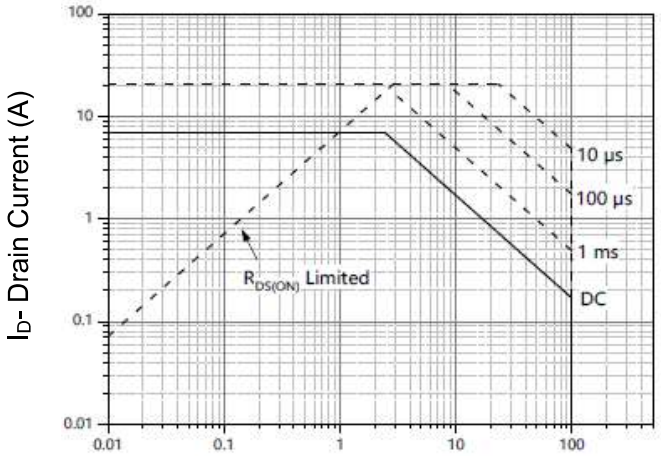



**Figure 10. Safe Operation Area**

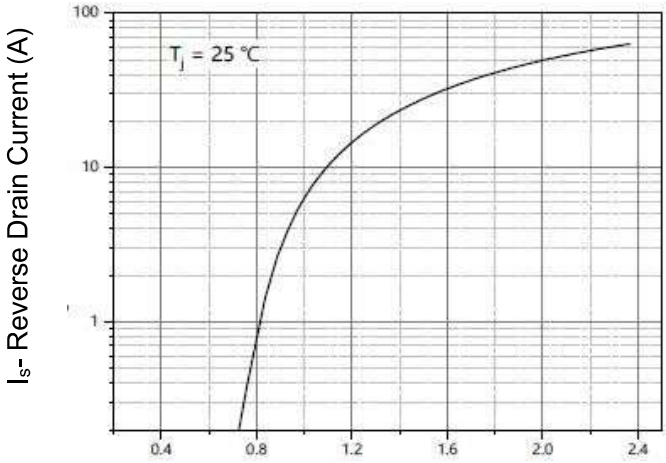



**Figure 11. Source- Drain Diode Forward**