

Silicon N-Channel Power MOSFET

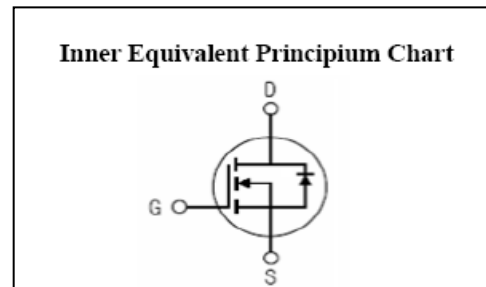
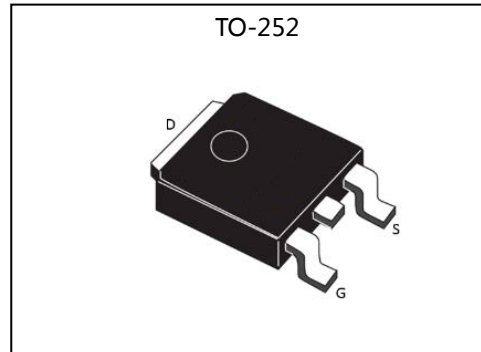
General Description :

The HMR80N03 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. The package form is TO-252, which accords with the RoHS standard.

| | | |
|-----------------|-----|------------|
| V_{DSS} | 30 | V |
| I_D | 80 | A |
| P_D | 83 | W |
| $R_{DS(ON)MAX}$ | 5.0 | m Ω |

Features :

- $R_{DS(ON)} < 5.0m\Omega @ V_{GS}=10V$
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation



Applications :

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

Absolute ($T_c = 25^\circ C$ unless otherwise specified) :

| Symbol | Parameter | Rating | Units |
|----------------|--|------------------|------------|
| V_{DSS} | Drain-to-Source Voltage | 30 | V |
| I_D | Continuous Drain Current | 80 | A |
| I_{DM} | Pulsed Drain Current | 170 | A |
| V_{GS} | Gate-to-Source Voltage | ± 20 | V |
| P_D | Power Dissipation | 83 | W |
| E_{AS} | Single pulse avalanche energy ^{a5} | 306 | mJ |
| T_J, T_{stg} | Operating Junction and Storage Temperature Range | 175 , -55 to 175 | $^\circ C$ |

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 | 30 | -- | -- | V |
| I _{DSS} | Drain to Source Leakage Current | V _{DS} =30V, V _{GS} = 0V, T _a = 25°C | -- | -- | 1.0 | μA |
| I _{GSS(F)} | Gate to Source Forward Leakage | V _{GS} = +20V | -- | -- | 0.1 | μA |
| I _{GSS(R)} | Gate to Source Reverse Leakage | V _{GS} = -20V | -- | -- | -0.1 | μA |

| ON Characteristics^{a3} | | | | | | |
|--|-------------------------------|--|--------|------|------|-------|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| R _{DS(ON)1} | Drain-to-Source On-Resistance | V _{GS} =10V, I _D =30A | -- | 3.8 | 5.0 | mΩ |
| R _{DS(ON)2} | Drain-to-Source On-Resistance | V _{GS} =4.5V, I _D =20A | -- | 4.5 | 6.0 | mΩ |
| V _{GS(TH)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D =250μA | 1.0 | 1.6 | 3.0 | V |
| Pulse width tp ≤ 380μs, δ ≤ 2% | | | | | | |

| Dynamic Characteristics^{a4} | | | | | | |
|---|------------------------------|---|--------|------|------|-------|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| g _{fs} | Forward Transconductance | V _{DS} =5V, I _D =24A | 20 | -- | -- | S |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =15V f=1.0MHz | -- | 2330 | -- | pF |
| C _{oss} | Output Capacitance | | -- | 460 | -- | |
| C _{rss} | Reverse Transfer Capacitance | | -- | 230 | -- | |

| Resistive Switching Characteristics^{a4} | | | | | | |
|---|-----------------------------------|---|--------|------|------|-------|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| t _{d(ON)} | Turn-on Delay Time | V _{DD} =10V, I _D =30A V _{GS} =10V, R _G =2.7Ω | -- | 20 | -- | ns |
| t _r | Rise Time | | -- | 15 | -- | |
| t _{d(OFF)} | Turn-Off Delay Time | | -- | 60 | -- | |
| t _f | Fall Time | | -- | 10 | -- | |
| Q _g | Total Gate Charge | V _{DD} =10V, I _D =30A V _{GS} =10V | -- | 51 | -- | nC |
| Q _{gs} | Gate to Source Charge | | -- | 14 | -- | |
| Q _{gd} | Gate to Drain ("Miller") Charge | | -- | 11 | -- | |

| Source-Drain Diode Characteristics | | | | | | |
|------------------------------------|--|----------------------|--------|------|------|-------|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| I_S | Continuous Source Current ^{a2} (Body Diode) | | -- | -- | 80 | A |
| V_{SD} | Diode Forward Voltage ^{a3} | $I_S=80A, V_{GS}=0V$ | -- | -- | 1.2 | V |

| Symbol | Parameter | Typ. | Units |
|-----------------|--------------------------------|------|-------|
| $R_{\theta JC}$ | Junction-to-Case ^{a2} | 1.8 | °C/W |

^{a1} : Repetitive Rating: Pulse width limited by maximum junction temperature.

^{a2} : Surface Mounted on FR4 Board, $t \leq 10\text{sec}$.

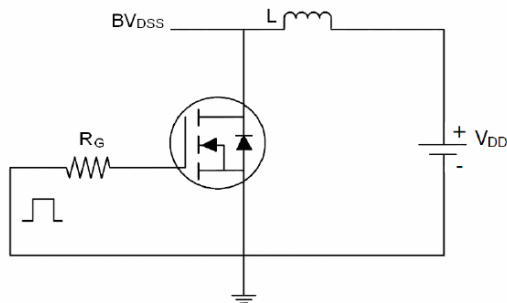
^{a3} : Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

^{a4} : Guaranteed by design, not subject to production

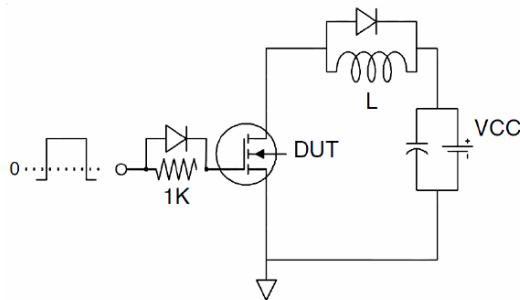
^{a5} : EAS condition : $T_j=25^\circ\text{C}, V_{DD}=15\text{V}, V_G=10\text{V}, L=0.5\text{mH}, R_g=25\Omega, I_{AS}=35\text{A}$

Test circuit

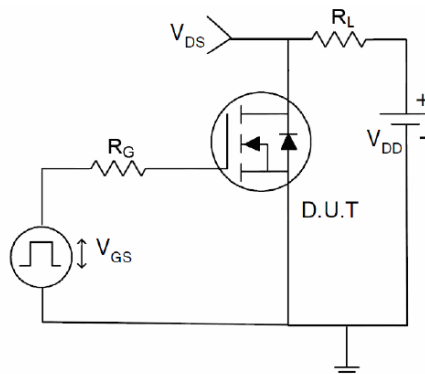
1) EAS test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Characteristics Curve :

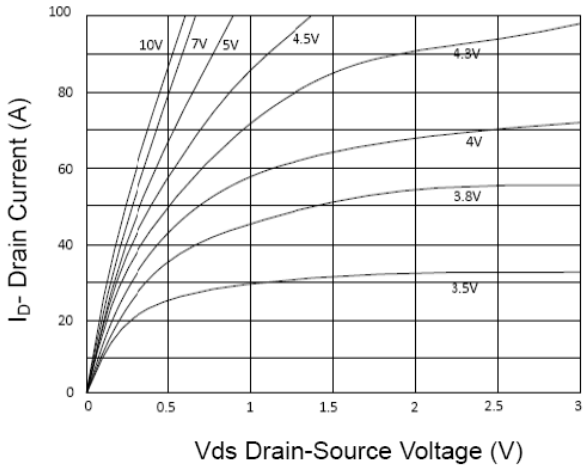


Figure 1 Output Characteristics

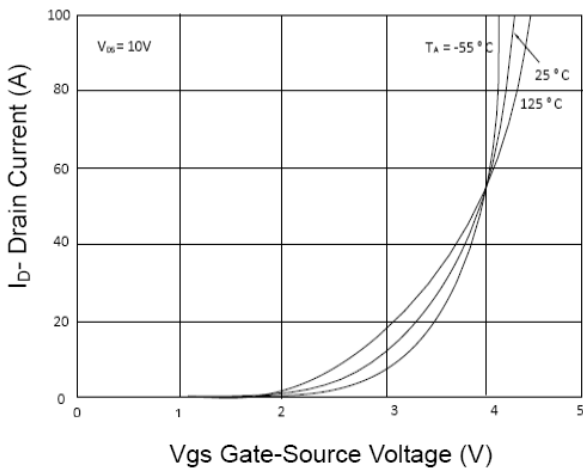


Figure 2 Transfer Characteristics

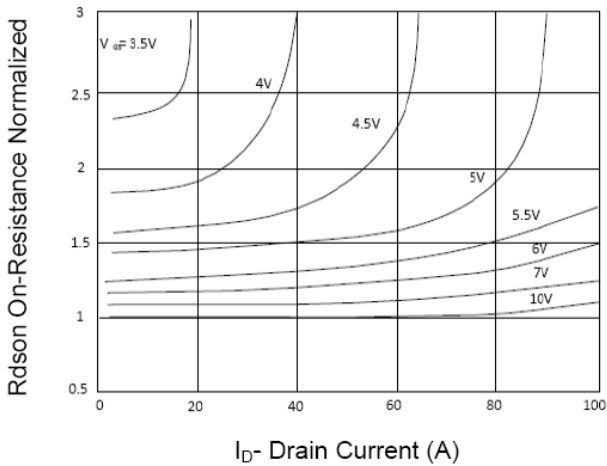


Figure 3 Rdson- Drain Current

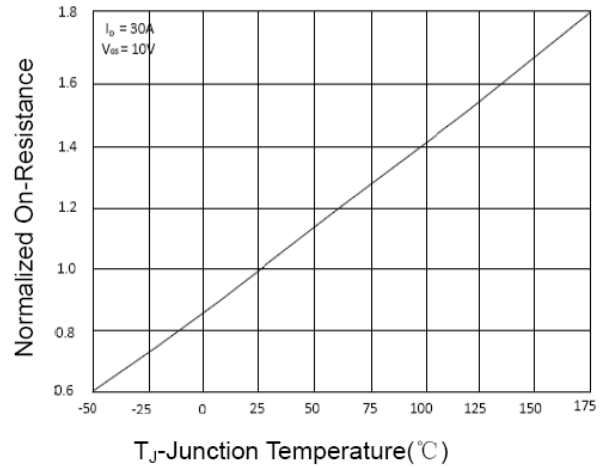


Figure 4 Rdson-Junction Temperature

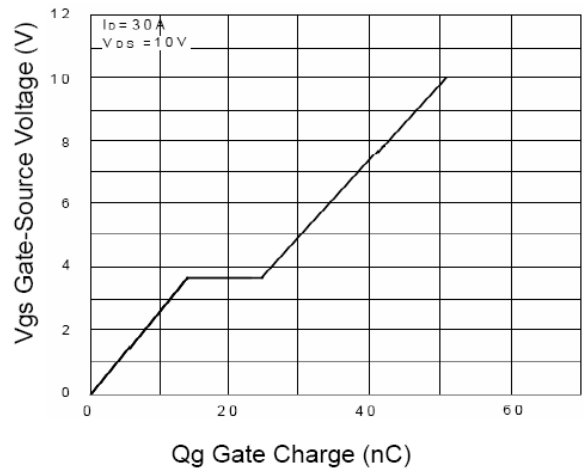


Figure 5 Gate Charge

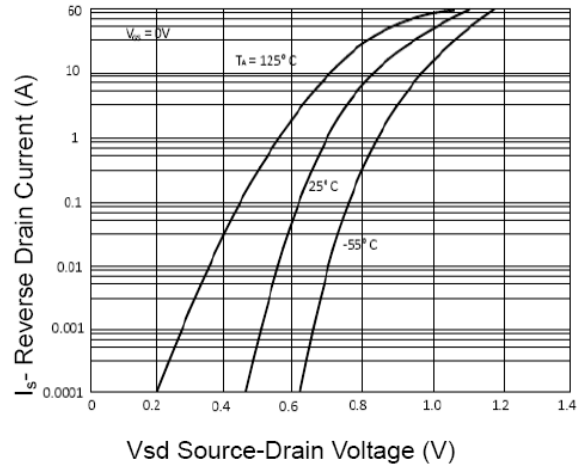
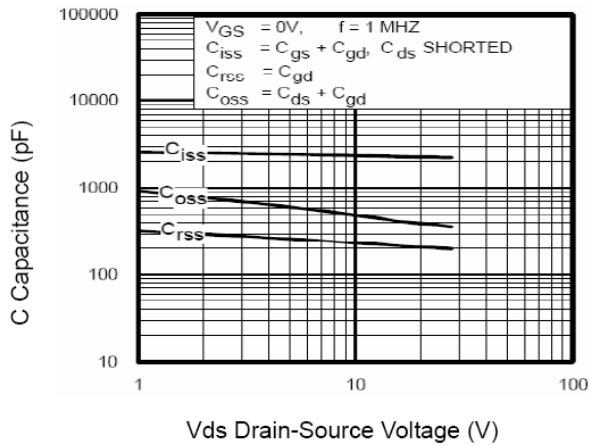
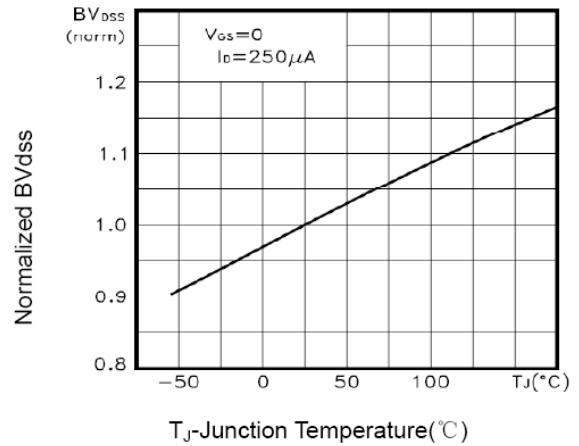


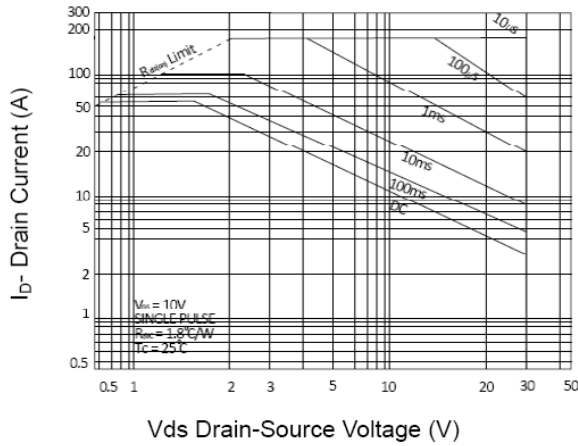
Figure 6 Source- Drain Diode Forward



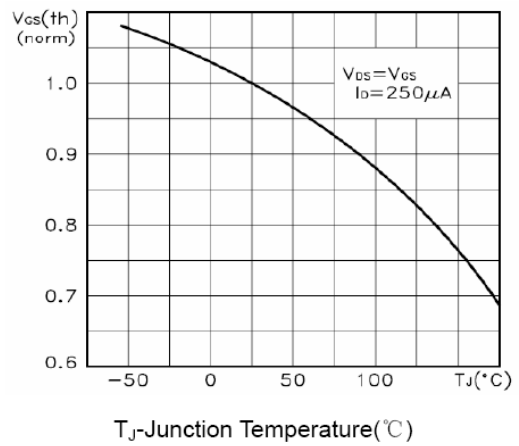
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



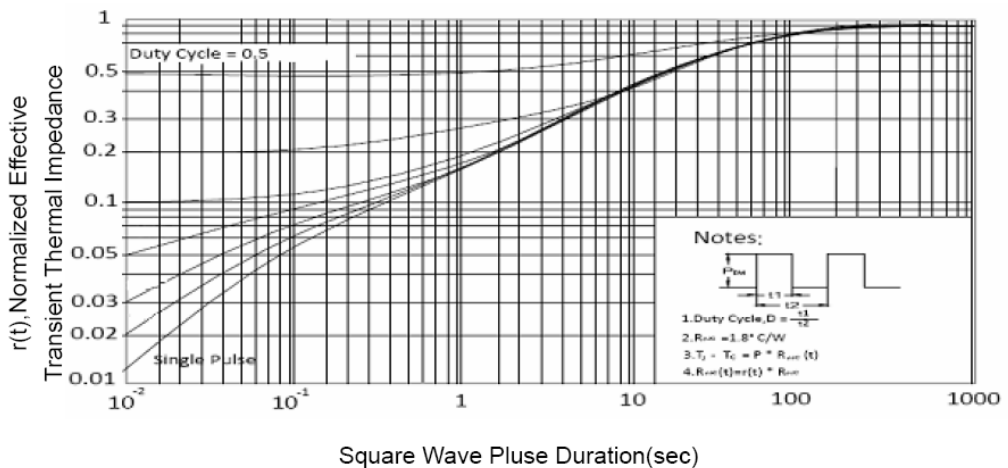
T_J-Junction Temperature(°C)
Figure 9 BV_{DSS} vs Junction Temperature



Vds Drain-Source Voltage (V)
Figure 8 Safe Operation Area



T_J-Junction Temperature(°C)
Figure 10 V_{GS(th)} vs Junction Temperature



Square Wave Pulse Duration(sec)
Figure 11 Normalized Maximum Transient Thermal Impedance