# HMF80N06

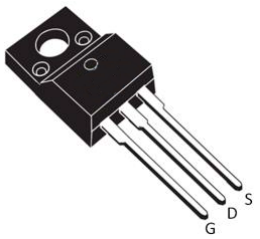
*Silicon N-Channel Power MOSFET*

## General Description:

The HMF80N06 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-220F, which accords with the RoHS standard.

| | | |
|---|---|---|
| $V_{DSS}$ | 60 | V |
| $I_D$ | 80 | A |
| $P_D$ | 60 | W |
| $R_{DS(ON)type}$ | 6.5 | mΩ |

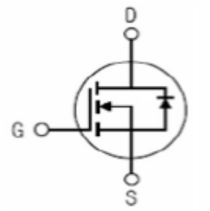
TO-220F




## Features:

- $R_{DS(ON)}$ <8.0mΩ @ $V_{GS}$=10V (Typ6.5mΩ)
- High density cell design for ultra low $R_{dson}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

Inner Equivalent Principium Chart




## Applications:

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

## Absolute (Tc= 25℃ unless otherwise specified):

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DSS}$ | Drain-to-Source Voltage | 60 | V |
| $I_D$ | Continuous Drain Current | 80 | A |
| $I_{DM}$ | Pulsed Drain Current | 180 | A |
| $V_{GS}$ | Gate-to-Source Voltage | ±20 | V |
| $P_D$ | Power Dissipation | 110 | W |
| $E_{AS}$ | Single pulse avalanche energy[a5] | 390 | mJ |
| $T_J$, $T_{stg}$ | Operating Junction and Storage Temperature Range | 175, −55 to 175 | ℃ |

## Electrical Characteristics (Tc= 25℃ 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 | 60 | -- | -- | V |
| $I_{DSS}$ | Drain to Source Leakage Current | $V_{DS}$=60V, $V_{GS}$= 0V,$T_a$=25℃ | -- | -- | 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. | |
| $R_{DS(ON)}$ | Drain-to-Source On-Resistance | $V_{GS}$=10V,$I_D$=40A | -- | 6.5 | 8.0 | mΩ |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 1.0 | -- | 2.5 | 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,$I_D$=20A | -- | 20 | -- | S |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V,$V_{DS}$=30V f=1.0MHz | -- | 4000 | -- | pF |
| $C_{oss}$ | Output Capacitance | | -- | 290 | -- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | -- | 210 | -- | |

| Resistive Switching Characteristics[a4] | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $t_{d(ON)}$ | Turn-on Delay Time | $V_{DD}$=30V,$R_L$=1Ω $V_{GS}$=10V,$R_G$=3Ω | -- | 8.5 | -- | ns |
| tr | Rise Time | | -- | 7 | -- | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | | -- | 40 | -- | |
| $t_f$ | Fall Time | | -- | 15 | -- | |
| $Q_g$ | Total Gate Charge | $V_{DD}$=30V, $I_D$=20A $V_{GS}$=10V | -- | 90 | -- | nC |
| $Q_{gs}$ | Gate to Source Charge | | -- | 9 | -- | |
| $Q_{gd}$ | Gate to Drain ( “Miller” )Charge | | -- | 18 | -- | |

| 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 | -- | -- | 1.5 | V |

| Symbol | Parameter | Typ. | Units |
|---|---|---|---|
| $R_{\theta JC}$ | Junction-to-Case[a2] | 2.08 | ℃/W |

[a1]: Repetitive Rating: Pulse width limited by maximum junction temperature.

[a2]: Surface Mounted on FR4 Board, t≤10sec.

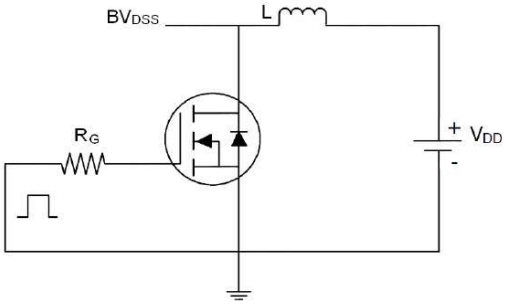
[a3]: Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%.

[a4]: Guaranteed by design, not subject to production

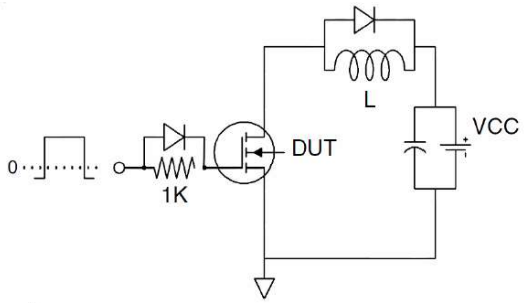
[a5]: EAS condition: Tj=25℃,$V_{DD}$=20V,$V_G$=10V,L=0.5mH,Rg=25Ω

## Test circurt

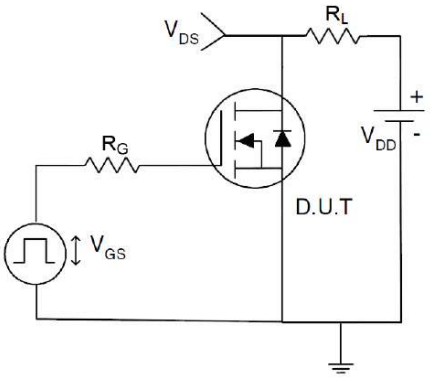
**1) EAS test Circuit**




**2) Gate charge test Circuit**




**3) Switch Time Test Circuit**



## Characteristics Curve:

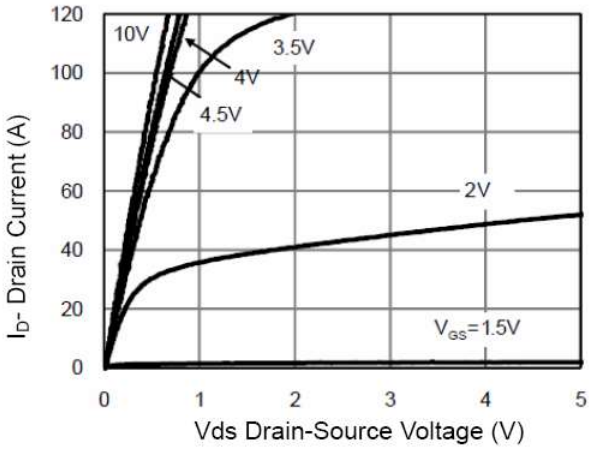



**Figure 1 Output Characteristics**

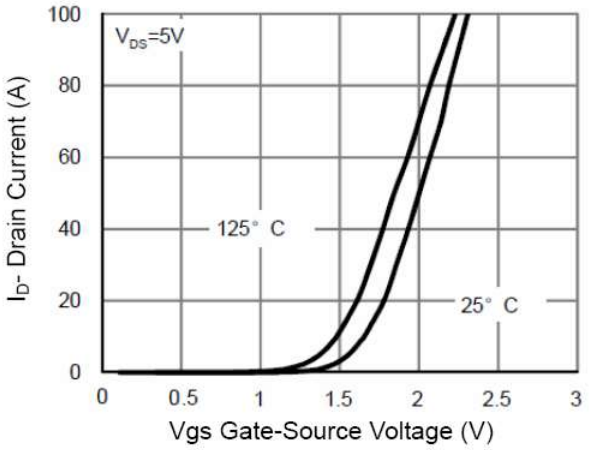



**Figure 2 Transfer Characteristics**

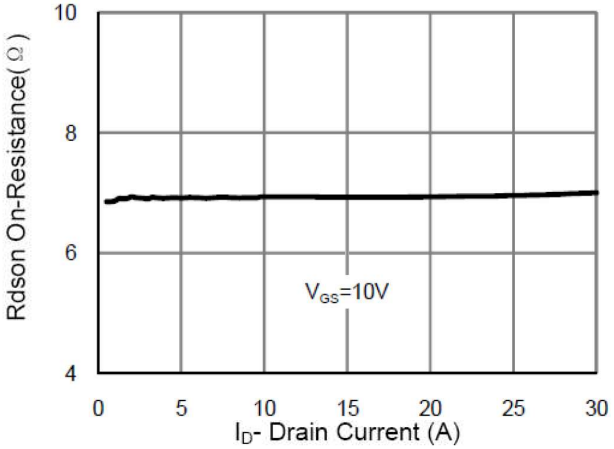



**Figure 3 Rdson- Drain Current**

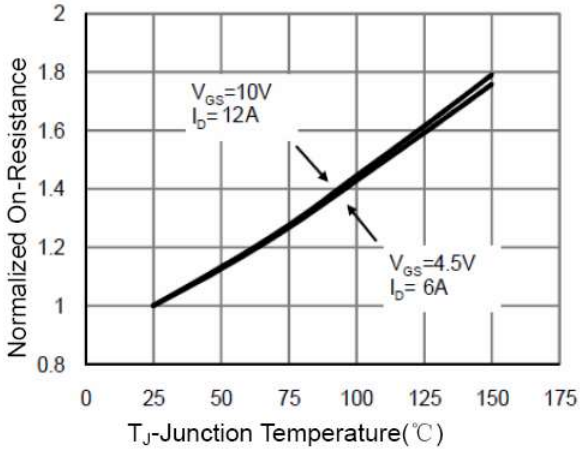



**Figure 4 Rdson-JunctionTemperature**

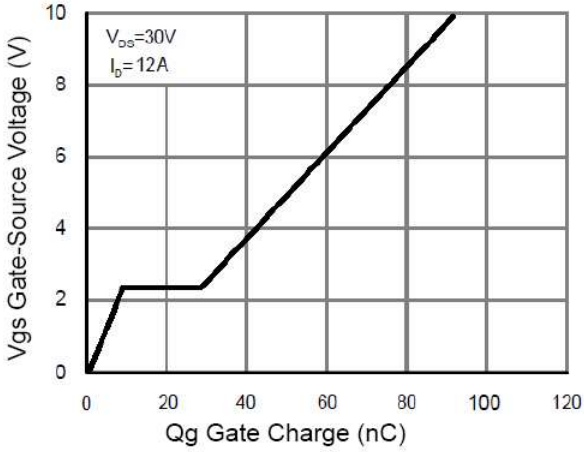



**Figure 5 Gate Charge**

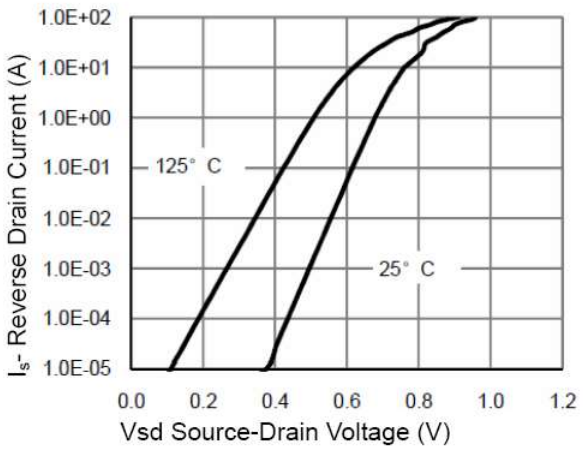



**Figure 6 Source- Drain Diode Forward**

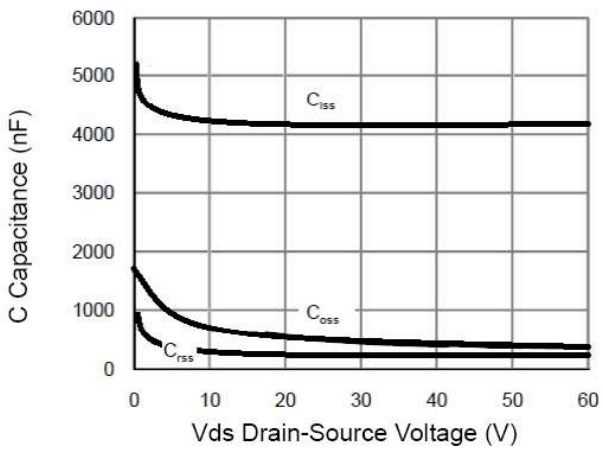



**Figure 7 Capacitance vs Vds**

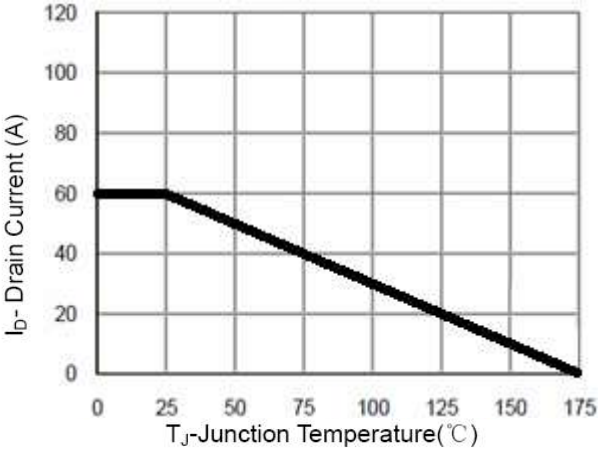



**Figure 9 Current De-rating**

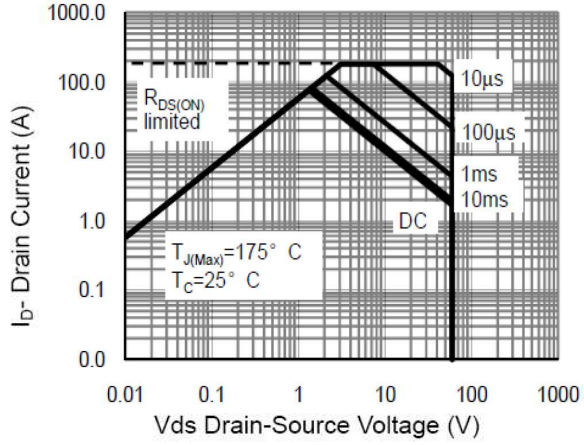



**Figure 8 Safe Operation Area**

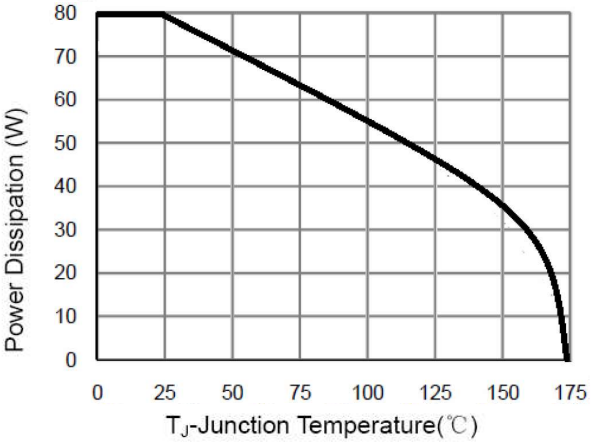



**Figure 10 Power De-rating**

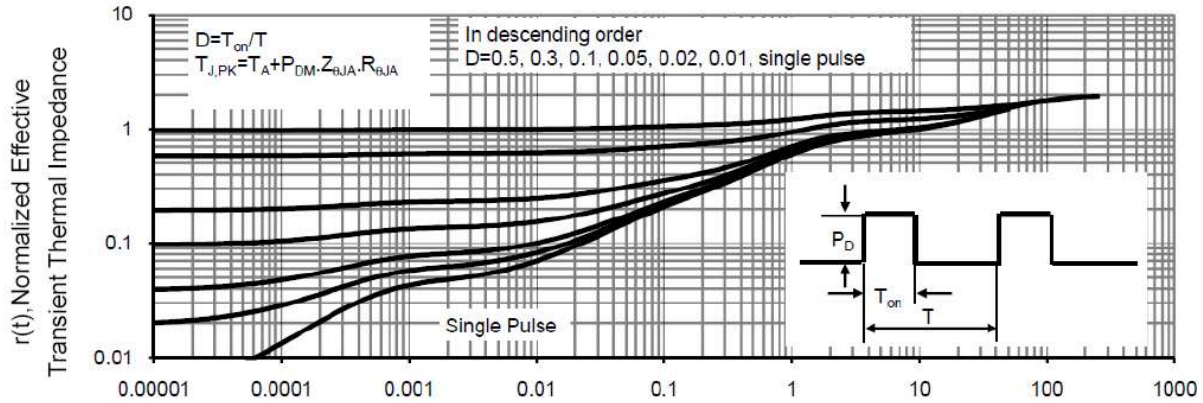



**Figure 11 Normalized Maximum Transient Thermal Impedance**