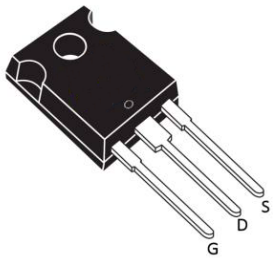
*Silicon N-Channel Power MOSFET*

## General Description :

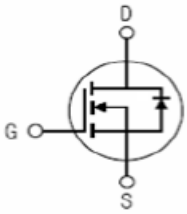
The HMP180N10 uses Super Trench technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and $Q_g$. This device is ideal for high-frequency switching and synchronous rectification. The package form is TO-247, which accords with the RoHS standard.

| | | |
|---|---|---|
| $V_{DSS}$ | 100 | V |
| $I_D$ | 180 | A |
| $P_D$ | 300 | W |
| $R_{DS(ON)MAX}$ | 4.5 | mΩ |

TO-247




Inner Equivalent Principium Chart




## Features :

- $R_{DS(ON)}$ <4.5mΩ @ $V_{GS}$=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 ( Tc= 25℃ unless otherwise specified ) :

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DSS}$ | Drain-to-Source Voltage | 100 | V |
| $I_D$ | Continuous Drain Current | 180 | A |
| $I_{DM}$ | Pulsed Drain Current | 720 | A |
| $V_{GS}$ | Gate-to-Source Voltage | ±20 | V |
| $P_D$ | Power Dissipation | 300 | W |
| $E_{AS}$ | Single pulse avalanche energy[a5] | 610 | 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 | 100 | -- | -- | V |
| $I_{DSS}$ | Drain to Source Leakage Current | $V_{DS}$=100V, $V_{GS}$= 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,$I_D$=95A | -- | -- | 4.5 | mΩ |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 1.0 | -- | 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 | $V_{DS}$=10V,$I_D$=50A | 40 | -- | -- | S |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V,$V_{DS}$=50V f=1.0MHz | -- | 7200 | -- | pF |
| $C_{oss}$ | Output Capacitance | | -- | 1500 | -- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | -- | 60 | -- | |

| **Resistive Switching Characteristics**[a4] | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $t_{d(ON)}$ | Turn-on Delay Time | $V_{DD}$=50V,$I_D$=100A $V_{GS}$=10V,$R_G$=1.6Ω | -- | 32 | -- | ns |
| tr | Rise Time | | -- | 30 | -- | |
| $t_{d(OFF)}$ | Turn-Off Delay Time | | -- | 95 | -- | |
| $t_f$ | Fall Time | | -- | 36 | -- | |
| $Q_g$ | Total Gate Charge | $V_{DD}$=50V, $I_D$=100A $V_{GS}$=10V | -- | 130 | -- | nC |
| $Q_{gs}$ | Gate to Source Charge | | -- | 33 | -- | |
| $Q_{gd}$ | Gate to Drain ( “Miller” )Charge | | -- | 29 | -- | |

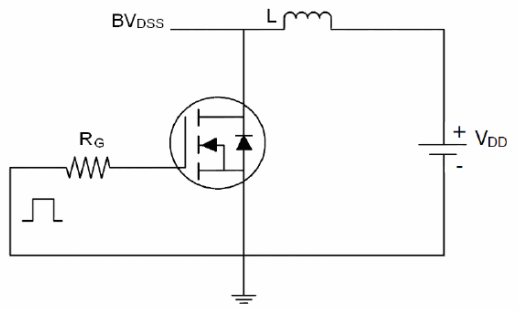
| Source-Drain Diode Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Symbol | Parameter | Test Conditions | Rating | | | Units |
| | | | Min. | Typ. | Max. | |
| $I_S$ | Continuous Source Current [a2](Body Diode) | | -- | -- | 180 | A |
| $V_{SD}$ | Diode Forward Voltage[a3] | $I_S$=180A,$V_{GS}$=0V | -- | -- | 1.2 | V |

| Symbol | Parameter | Typ. | Units |
|---|---|---|---|
| $R_{\theta JC}$ | Junction-to-Case[a2] | 0.5 | ℃/W |

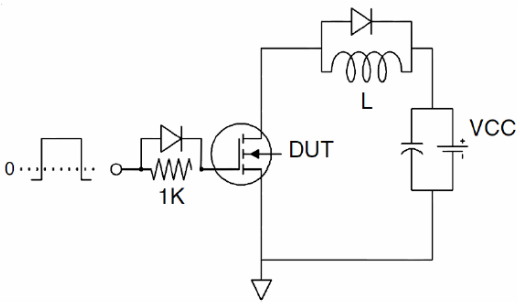
[a1] : Repetitive Rating: Pulse width limited by maximum junction temperature.
[a2] : Surface Mounted on FR4 Board, t≤10sec.
[a3] : Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%.
[a4] : Guaranteed by design, not subject to production
[a5] : EAS condition : Tj=25℃,$V_{DD}$=50V,$V_G$=10V,L=0.5mH,Rg=25Ω

## Test circurt

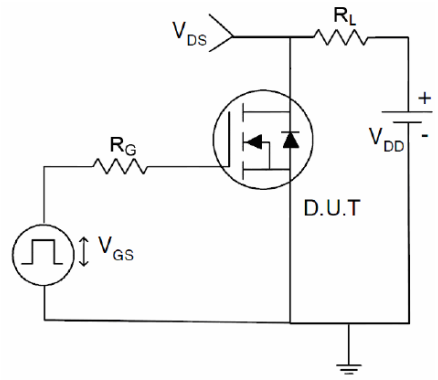
**1) EAS test Circuit**




**2) Gate charge test Circuit**




**3) Switch Time Test Circuit**



## Characteristics Curve :

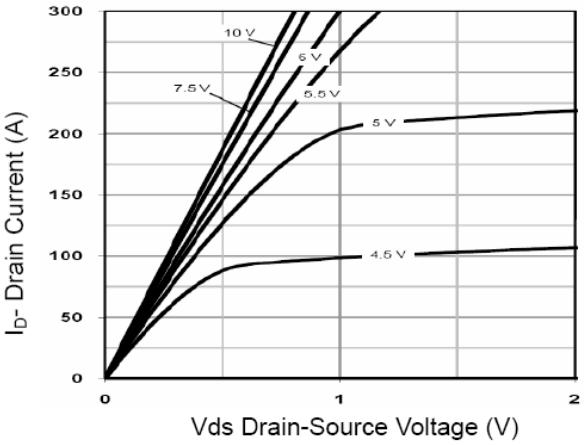



**Figure 1 Output Characteristics**

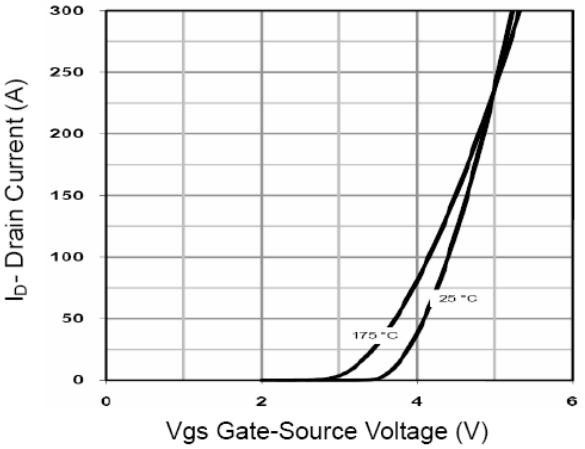



**Figure 2 Transfer Characteristics**

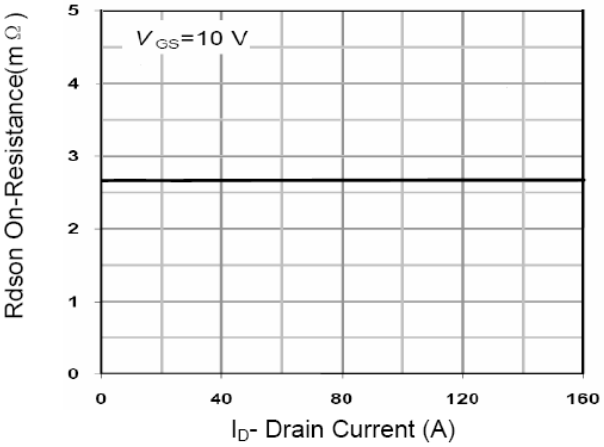



**Figure 3 Rdson- Drain Current**

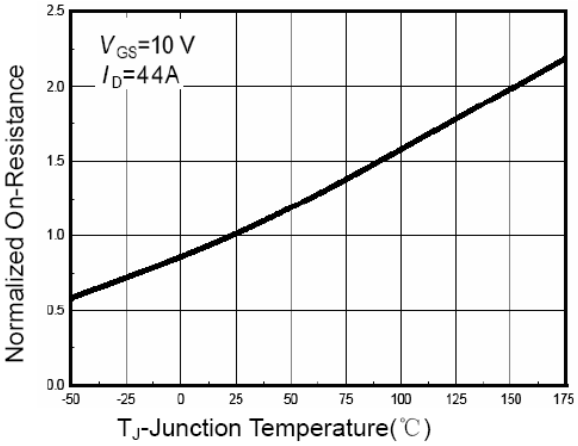



**Figure 4 Rdson-JunctionTemperature**

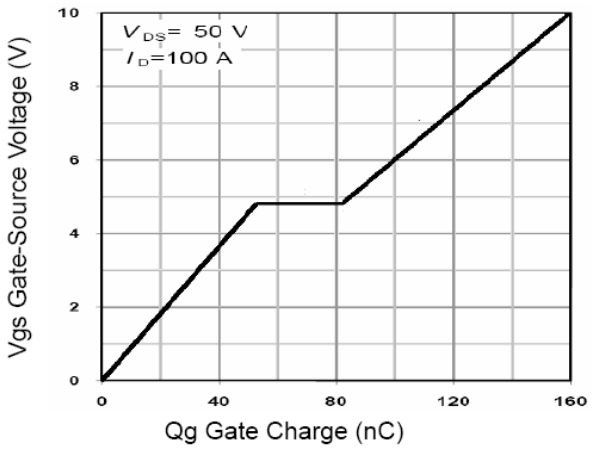



**Figure 5 Gate Charge**

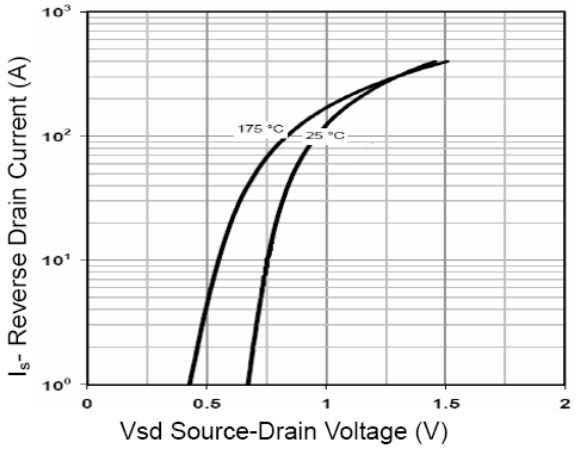



**Figure 6 Source- Drain Diode Forward**

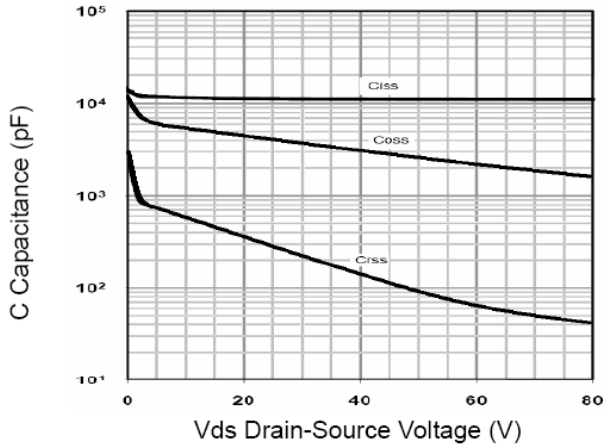



**Figure 7 Capacitance vs Vds**

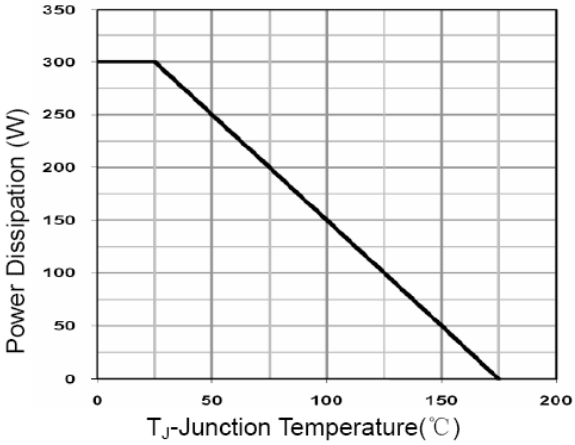



**Figure 9 Power De-rating**

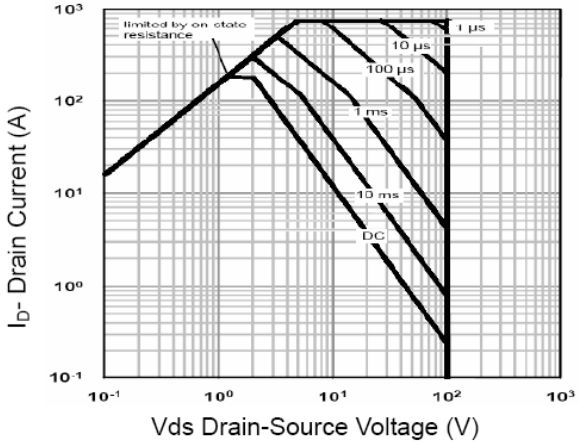



**Figure 8 Safe Operation Area**

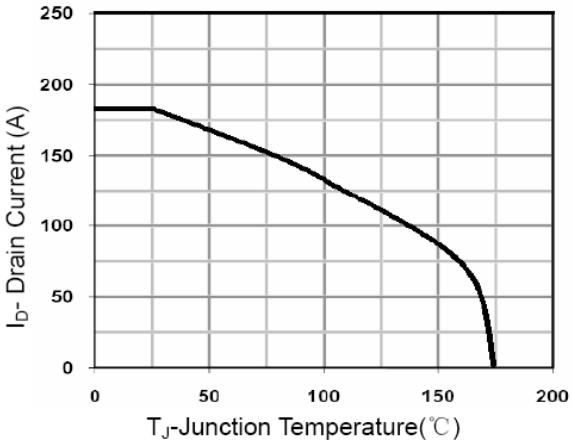



**Figure 10 Current De-rating**

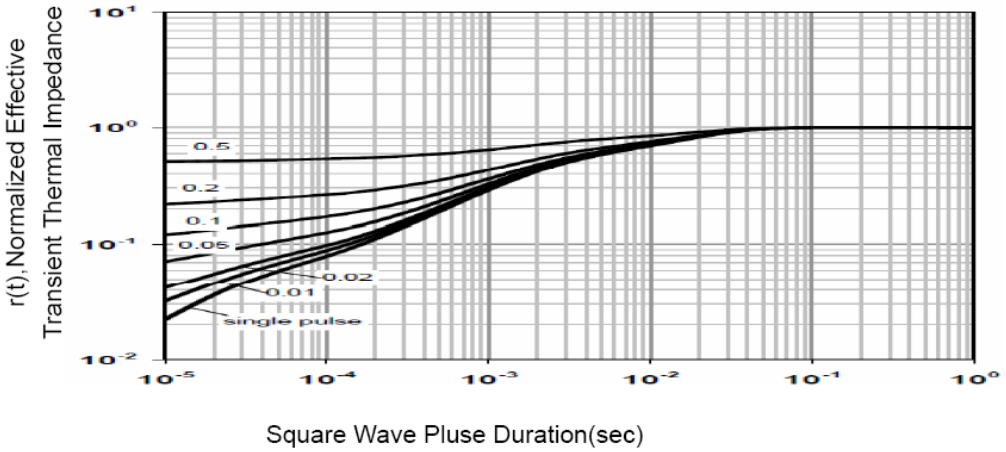



**Figure 11 Normalized Maximum Transient Thermal Impedance**