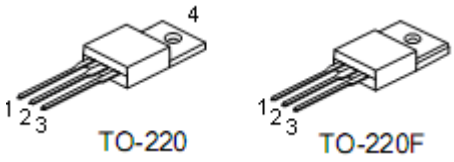
## 1.Description

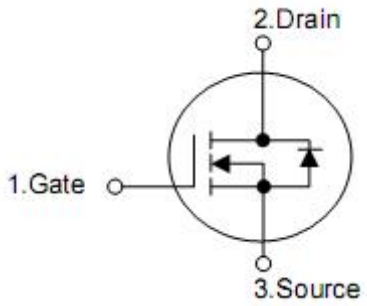
This Power MOSFET is produced using SL semi`s advanced planar stripe DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance,and withstand high energy pulse in the avalanche and commutation mode.These devices are well suited for high effciency switched mode power supplies, active power factor correction based on half bridge topology.

## 2. Features

- $R_{DS(on)}$=1.4Ω @ $V_{GS}$=10V
- Low gate charge ( typical 27nC)
- High ruggedness
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

## 3. Pin configuration




| Pin | Function |
|---|---|
| 1 | Gate |
| 2 | Drain |
| 3 | Source |
| 4 | Drain |

## 4. Absolute maximum ratings

($T_C$= 25 ºC , unless otherwise noted)

| Parameter | | Symbol | Rating | | Units |
|---|---|---|---|---|---|
| | | | 7N80HP | 7N80HF | |
| Drain-source voltage | | $V_{DSS}$ | 800 | | V |
| Gate-source voltage | | $V_{GSS}$ | ±30 | | V |
| Drain current continuous | $T_C$=25ºC | $I_D$ | 7.0 | 7.0* | A |
| | $T_C$=100ºC | | 4.2 | 4.2* | A |
| Drain current pulsed (note1) | | $I_{DM}$ | 28 | 28* | A |
| Avalanche energy | Repetitive (note1) | $E_{AR}$ | 16.7 | | mJ |
| | Single pulse (note2) | $E_{AS}$ | 650 | | mJ |
| Peak diode recovery dv/dt (note3) | | dv/dt | 4.5 | | V/ns |
| Total power dissipation | $T_C$=25 ºC | $P_D$ | 167 | 56 | W |
| | derate above 25 ºC | | 1.33 | 0.44 | W/ºC |
| Operating and storage temperature range | | $T_J$, $T_{STG}$ | -55~+150 | | ºC |
| Maximum lead temperature for soldering purposes, 1/8″ from case for 5 seconds | | $T_L$ | 300 | | ºC |

* Drain current limited by maximum junction temperature

## 5. Thermal characteristics

| Parameter | Symbol | Rating | | Unit |
|---|---|---|---|---|
| | | 7N80HP | 7N80HF | |
| Thermal resistance,Junction-ambient | $R_{thJA}$ | 62.5 | | ºC/W |
| Thermal resistance,case-to-sink typ. | $R_{thCS}$ | 0.5 | - | ºC/W |
| Thermal resistance,Junction-case | $R_{thJC}$ | 0.75 | 2.25 | ºC/W |

## 6. Electrical characteristics

($T_C$=25°C,unless otherwise noted)

| Parameter | | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| Off characteristics | | | | | | | |
| Drain-source breakdown voltage | | $BV_{DSS}$ | $V_{GS}$=0V,$I_D$=250μA | 800 | - | - | V |
| Zero gate voltage drain current | | $I_{DSS}$ | $V_{DS}$=800V ,$V_{GS}$=0V | - | - | 10 | μA |
| | | | $V_{DS}$=640V ,$T_C$=125℃ | - | - | 100 | μA |
| Gate-body leakage current | Forward | $I_{GSS}$ | $V_{GS}$=30V,$V_{DS}$=0V | - | - | 100 | nA |
| | Reverse | | $V_{GS}$=-30V,$V_{DS}$=0V | - | - | -100 | nA |
| Breakdown voltage temperature coefficient | | △$BV_{DSS}$/△$T_J$ | $I_D$=250μA,referenced to 25°C | - | 1 | - | V/°C |
| On characteristics | | | | | | | |
| Gate threshold voltage | | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 3.0 | - | 5.0 | V |
| Static drain-source on-resistance | | $R_{DS(on)}$ | $V_{DS}$=10V,$I_D$=3.5A | - | 1.4 | 1.9 | Ω |
| Dynamic characteristics | | | | | | | |
| Input capacitance | | $C_{iss}$ | $V_{DS}$=25V,$V_{GS}$=0V, f=1MHz | - | 1300 | - | pF |
| Output capacitance | | $C_{oss}$ | | - | 120 | - | pF |
| Reverse transfer capacitance | | $C_{rss}$ | | - | 10 | - | pF |
| Switching characteristics | | | | | | | |
| Turn-on delay time | | $t_{d(on)}$ | $V_{DD}$=400V,$I_D$=7A, $R_G$=25Ω (note4,5) | - | 40 | - | ns |
| Rise time | | $t_r$ | | - | 100 | - | ns |
| Turn-off delay time | | $t_{d(off)}$ | | - | 50 | - | ns |
| Fall time | | $t_f$ | | - | 60 | - | ns |
| Total gate charge | | $Q_g$ | $V_{DS}$=640V,$I_D$=7A , $V_{GS}$=10V (note4,5) | - | 27 | - | nC |
| Gate-source charge | | $Q_{gs}$ | | - | 8 | - | nC |
| Gate-drain charge | | $Q_{gd}$ | | - | 11 | - | nC |
| Drain-source diode characteristics and maximum ratings | | | | | | | |
| Drain-source diode forward voltage | | $V_{SD}$ | $V_{GS}$=0V,$I_{SD}$=7A | - | - | 1.5 | V |
| Continuous drain-source current | | $I_{SD}$ | | - | - | 7.0 | A |
| Pulsed drain-source current | | $I_{SM}$ | | - | - | 28 | A |
| Reverse recovery time | | $t_{rr}$ | $V_{GS}$=0V,$I_{SD}$=7A $dI_F/dt$=100A/μs (note4) | - | 650 | - | ns |
| Reverse recovery charge | | $Q_{rr}$ | | - | 7.0 | - | μC |

Note:1.repetitive rating:pulse width limited by maximum junction temperature

2.L=25mH,$I_{AS}$=7A,$V_{DD}$=50V,$R_G$=25Ω,staring $T_J$=25℃

3.$I_{SD}$≤7.0A,di/dt≤200A/μs,$V_{DD}$≤$BV_{DSS}$,staring $T_J$=25 ℃

4.Pulse test:pulse width≤300μs,duty cycle≤2%

5.Essentially independent of operating temperature

## 7.Test circuits and waveforms

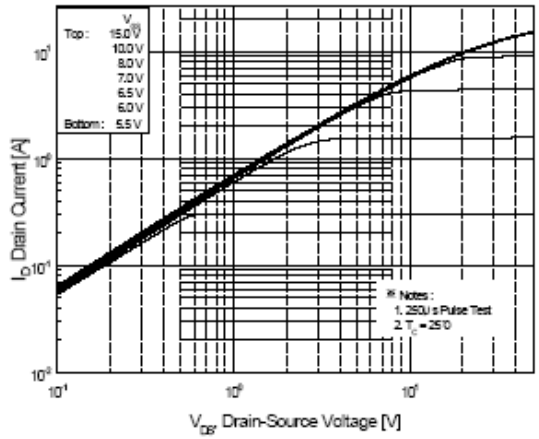



**Figure 1. On-Region Characteristics**

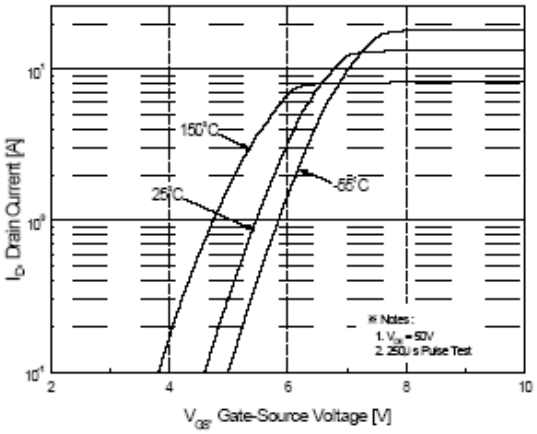



**Figure 2. Transfer Characteristics**

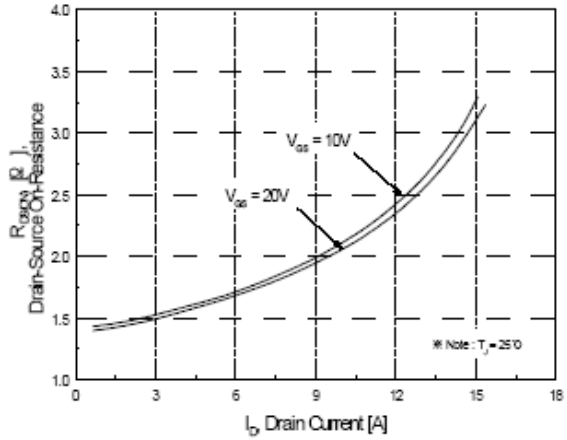



**Figure 3.On-Tesistance Variation vs Drain Current and GateVoltage**

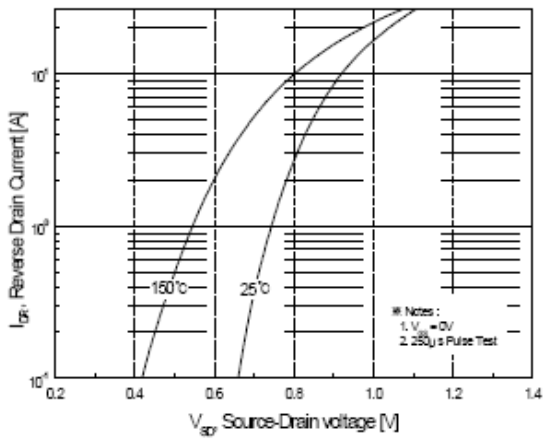



**Figure 4.Body Diode Forward Voltag Variation with Source Current**

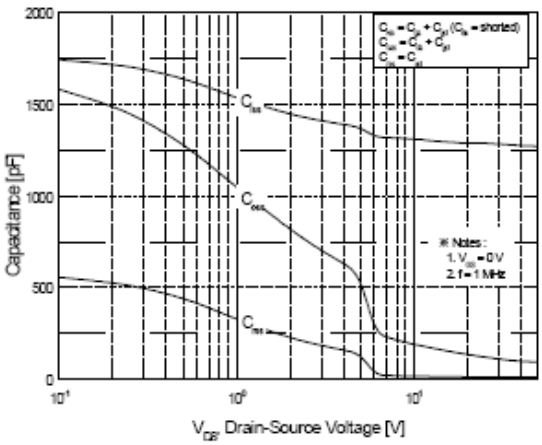



**Figure 5. Capacitance Characteristics**

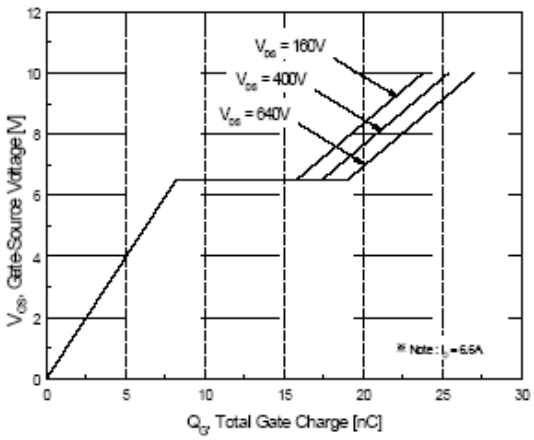



**Figure 6. Gate Charge Characteristics**

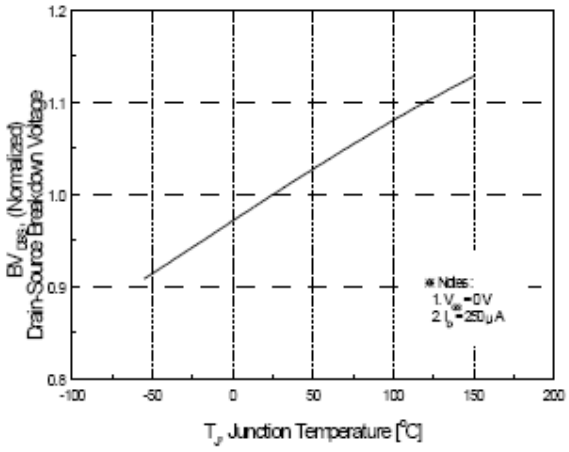



Figure 7.Breakdown Voltage Variation vs Temaperature

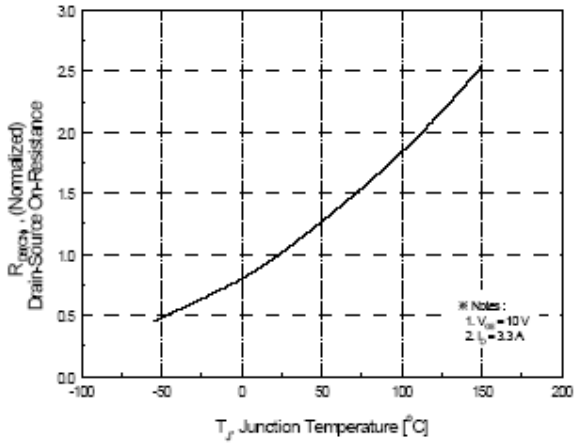



Figure 8.On-Resistance Variation vs Temperature

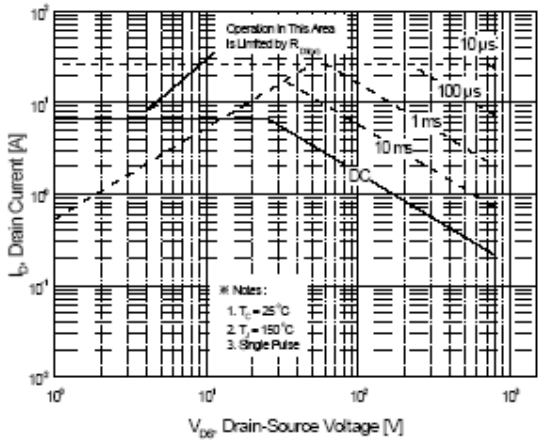



Figure 9-1. Maximum Safe Operating Area for 7N80HP

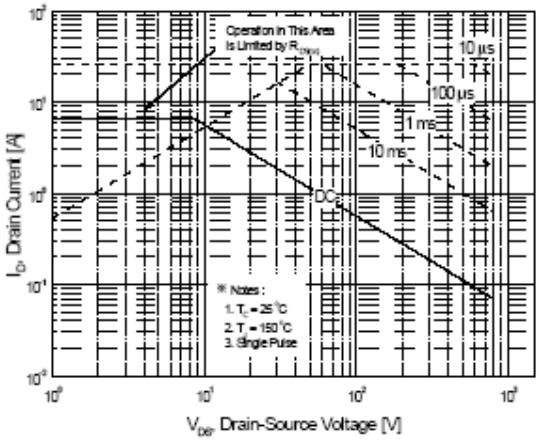



Figure 9-2. Maximum Safe Operating Area for 7H80HF

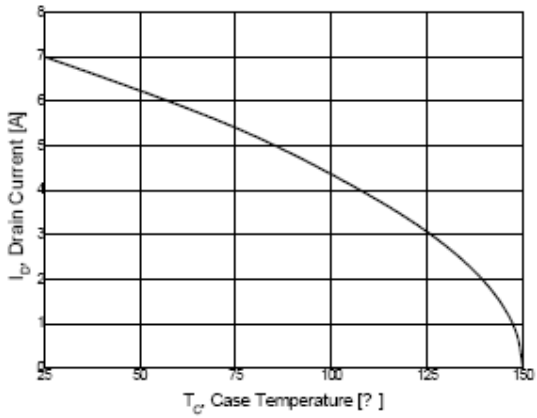



Figure 10. Maximum Drain Current vs Case Temperature

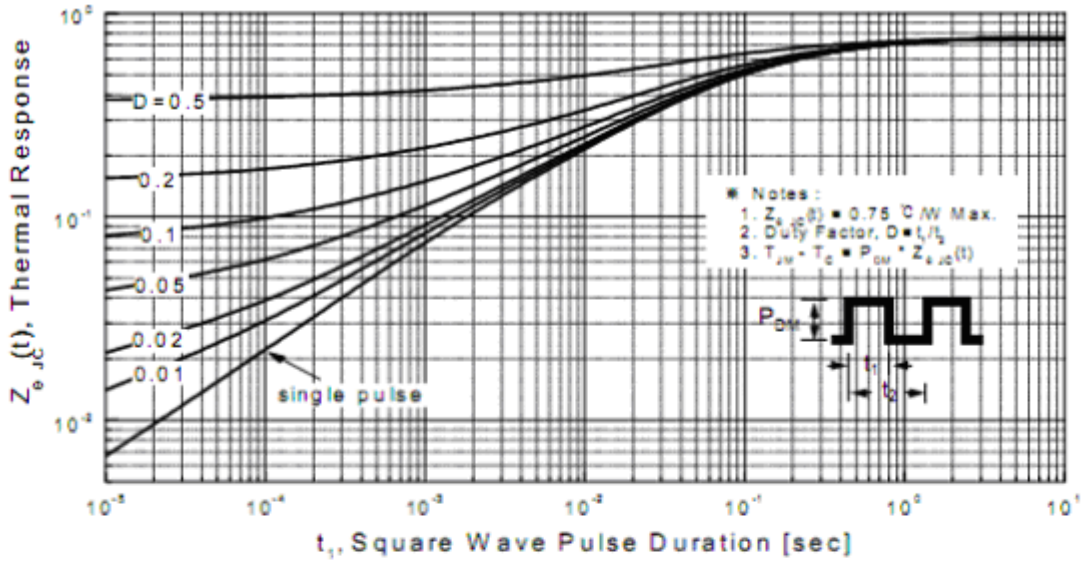



**Figure 11-1. Transient Thermal Response Curve for TO220**

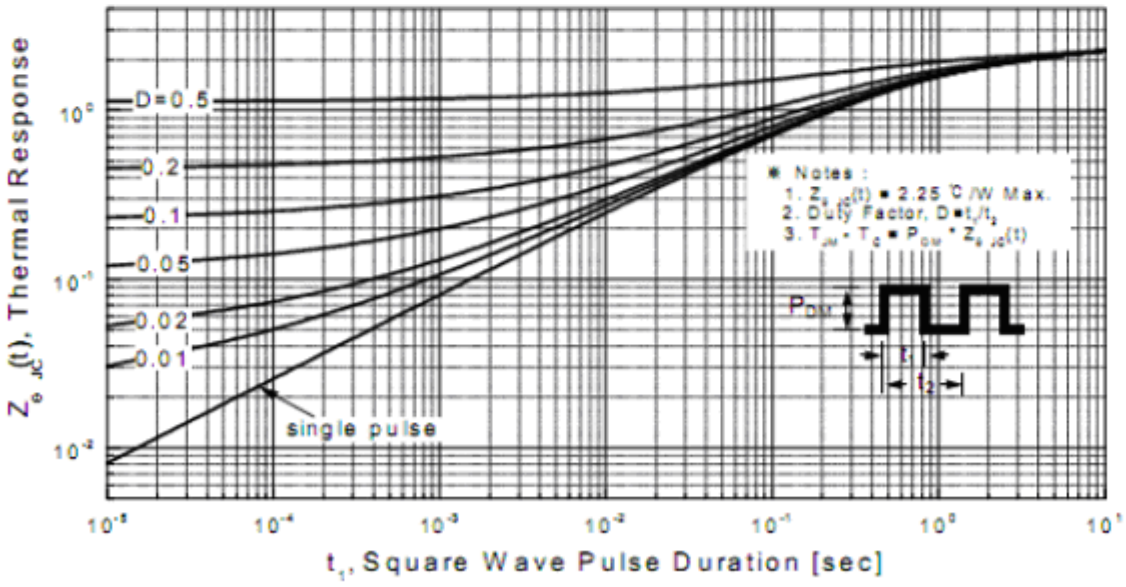



**Figure 11-2. Transient Thermal Response Curve for TO220F**