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SemiHow
Know-How for Semiconductor

HFG1N80

800V N-Channel MOSFET

FEATURES

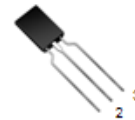
- Originative New Design
- Superior Avalanche Rugged Technology
- Robust Gate Oxide Technology
- Very Low Intrinsic Capacitances
- Excellent Switching Characteristics
- Unrivalled Gate Charge : 7.5 nC (Typ.)
- Extended Safe Operating Area
- Lower $R_{DS(ON)}$: 13 Ω (Typ.) @ $V_{GS}=10V$

$$BV_{DSS} = 800 \text{ V}$$

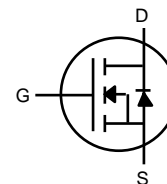
$$R_{DS(on) \text{ typ}} = 13 \Omega$$

$$I_D = 1.0 \text{ A}$$

TO-92L



1.Gate 2. Drain 3. Source



Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise specified

| Symbol | Parameter | Value | Units |
|----------------|---|-------------|---------------------|
| V_{DSS} | Drain-Source Voltage | 800 | V |
| I_D | Drain Current – Continuous ($T_C = 25^\circ\text{C}$) | 1.0 | A |
| | Drain Current – Continuous ($T_C = 100^\circ\text{C}$) | 0.63 | A |
| I_{DM} | Drain Current – Pulsed (Note 1) | 4.0 | A |
| V_{GS} | Gate-Source Voltage | ± 30 | V |
| E_{AS} | Single Pulsed Avalanche Energy (Note 2) | 90 | mJ |
| I_{AR} | Avalanche Current (Note 1) | 1.0 | A |
| E_{AR} | Repetitive Avalanche Energy (Note 1) | 4.5 | mJ |
| dv/dt | Peak Diode Recovery dv/dt (Note 3) | 4.0 | V/ns |
| P_D | Power Dissipation ($T_A = 25^\circ\text{C}$) * | 2.5 | W |
| | Power Dissipation ($T_C = 25^\circ\text{C}$) – Derate above 25°C | 45 | W |
| | | 0.36 | W/ $^\circ\text{C}$ |
| T_J, T_{STG} | Operating and Storage Temperature Range | -55 to +150 | $^\circ\text{C}$ |
| T_L | Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds | 300 | $^\circ\text{C}$ |

Thermal Resistance Characteristics

| Symbol | Parameter | Typ. | Max. | Units |
|-----------------|----------------------|------|------|---------------------------|
| $R_{\theta JC}$ | Junction-to-Case | -- | 2.78 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Junction-to-Ambient* | -- | 50 | |
| $R_{\theta A}$ | Junction-to-Ambient | -- | 110 | |

* When mounted on the minimum pad size recommended (PCB Mount)

Electrical Characteristics $T_C=25\text{ }^\circ\text{C}$ unless otherwise specified

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|--------|-----------|-----------------|-----|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-----|-------|

On Characteristics

| | | | | | | |
|--------------|-----------------------------------|--|-----|----|-----|----------|
| V_{GS} | Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$ | 2.5 | -- | 4.5 | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS} = 10\ \text{V}, I_D = 0.5\ \text{A}$ | -- | 13 | 16 | Ω |

Off Characteristics

| | | | | | | |
|--------------------------------|---|---|-----|-----|------|---------------------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS} = 0\ \text{V}, I_D = 250\ \mu\text{A}$ | 800 | -- | -- | V |
| $\Delta BV_{DSS} / \Delta T_J$ | Breakdown Voltage Temperature Coefficient | $I_D = 250\ \mu\text{A}$, Referenced to $25\text{ }^\circ\text{C}$ | -- | 1.0 | -- | $\text{V}/^\circ\text{C}$ |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 800\ \text{V}, V_{GS} = 0\ \text{V}$ | -- | -- | 1 | μA |
| | | $V_{DS} = 640\ \text{V}, T_C = 125\text{ }^\circ\text{C}$ | -- | -- | 10 | μA |
| I_{GSSF} | Gate-Body Leakage Current, Forward | $V_{GS} = 30\ \text{V}, V_{DS} = 0\ \text{V}$ | -- | -- | 100 | nA |
| I_{GSSR} | Gate-Body Leakage Current, Reverse | $V_{GS} = -30\ \text{V}, V_{DS} = 0\ \text{V}$ | -- | -- | -100 | nA |

Dynamic Characteristics

| | | | | | | |
|-----------|------------------------------|---|----|-----|-----|----|
| C_{iss} | Input Capacitance | $V_{DS} = 25\ \text{V}, V_{GS} = 0\ \text{V},$ $f = 1.0\ \text{MHz}$ | -- | 150 | 195 | pF |
| C_{oss} | Output Capacitance | | -- | 20 | 26 | pF |
| C_{rss} | Reverse Transfer Capacitance | | -- | 5.5 | 7.2 | pF |

Switching Characteristics

| | | | | | | | |
|--------------|---------------------|---|------------|-----|------|-----|----|
| $t_{d(on)}$ | Turn-On Time | $V_{DS} = 400\ \text{V}, I_D = 1.0\ \text{A},$ $R_G = 25\ \Omega$ | -- | 12 | 30 | ns | |
| t_r | Turn-On Rise Time | | -- | 40 | 90 | ns | |
| $t_{d(off)}$ | Turn-Off Delay Time | | (Note 4,5) | -- | 25 | 60 | ns |
| t_f | Turn-Off Fall Time | | | -- | 45 | 100 | ns |
| Q_g | Total Gate Charge | $V_{DS} = 640\ \text{V}, I_D = 1.0\ \text{A},$ $V_{GS} = 10\ \text{V}$ | -- | 7.5 | 10.0 | nC | |
| Q_{gs} | Gate-Source Charge | | (Note 4,5) | -- | 1.2 | -- | nC |
| Q_{gd} | Gate-Drain Charge | | | -- | 4.5 | -- | nC |

Source-Drain Diode Maximum Ratings and Characteristics

| | | | | | | |
|----------|---|---|----|-----|-----|---------------|
| I_S | Continuous Source-Drain Diode Forward Current | -- | -- | 1.0 | A | |
| I_{SM} | Pulsed Source-Drain Diode Forward Current | -- | -- | 4.0 | | |
| V_{SD} | Source-Drain Diode Forward Voltage | $I_S = 1.0\ \text{A}, V_{GS} = 0\ \text{V}$ | -- | -- | 1.4 | V |
| t_{rr} | Reverse Recovery Time | $I_S = 1.0\ \text{A}, V_{GS} = 0\ \text{V}$ $di_f/dt = 100\ \text{A}/\mu\text{s}$ (Note 4) | -- | 310 | -- | ns |
| Q_{rr} | Reverse Recovery Charge | | -- | 0.8 | -- | μC |

Notes ;

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L=170\text{mH}, I_{AS}=1.0\text{A}, V_{DD}=50\text{V}, R_G=25\Omega$, Starting $T_J=25\text{ }^\circ\text{C}$
3. $I_{SD} \leq 1.0\text{A}, di/dt \leq 200\text{A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J=25\text{ }^\circ\text{C}$
4. Pulse Test : Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature