

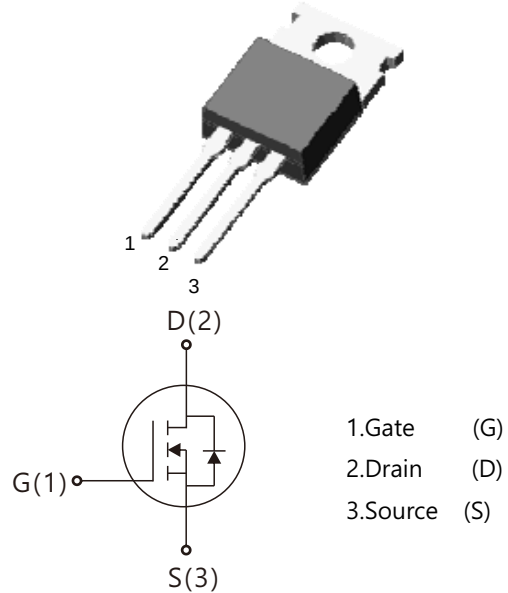


# HGS120N80C 80V N-Channel MOSFET

## Features:

- High Voltage:  $BV_{DSS}=80V$ ( Min.)
- Low  $C_{rss}$  :  $C_{rss}=24.4pF$ (Typ.)
- Low gate charge :  $Q_g=55.7nC$ (Typ.)
- Low  $R_{DS(on)}$  :  $R_{DS(on)}=5.2m\Omega$ (Typ.)

TO-220-3L



## Absolute Maximum Ratings (Ta=25°C unless otherwise noted)

| Characteristic                   | Symbol           |                      | Rating  | Unit |
|----------------------------------|------------------|----------------------|---------|------|
| Drain-source voltage             | V <sub>DSS</sub> |                      | 80      | V    |
| Gate-source voltage              | V <sub>GSS</sub> |                      | ±20     | V    |
| Drain current (DC) *             | I <sub>D</sub>   | T <sub>C</sub> =25℃  | 120     | A    |
|                                  |                  | T <sub>C</sub> =100℃ | 73      | A    |
| Drain current (Pulsed) *         | I <sub>DM</sub>  |                      | 480     | A    |
| Drain power dissipation          | P <sub>D</sub>   |                      | 150     | W    |
| Avalanche current (Single) ②     | I <sub>A</sub>   |                      | 120     | A    |
| Single pulsed avalanche energy ② | E <sub>AS</sub>  |                      | 300     | mJ   |
| Avalanche current (Repetitive) ① | I <sub>AR</sub>  |                      | 120     | A    |
| Repetitive avalanche energy ①    | E <sub>AR</sub>  |                      | 8.6     | mJ   |
| Junction temperature             | T <sub>J</sub>   |                      | 150     | ℃    |
| Storage temperature range        | T <sub>sta</sub> |                      | -55~150 | ℃    |

\* Limited by maximum junction temperature

| Characteristic     |                  | Symbol        | Typ. | Max | Unit |
|--------------------|------------------|---------------|------|-----|------|
| Thermal resistance | Junction-case    | $R_{th(J-C)}$ | -    | 5.0 | °C/W |
|                    | Junction-ambient | $R_{th(J-A)}$ | -    | 60  |      |



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## Electrical Characteristics (T<sub>C</sub>=25°C unless otherwise noted)

| Characteristic                 | Symbol               | Test Condition                                                            | Min. | Typ. | Max. | Unit |
|--------------------------------|----------------------|---------------------------------------------------------------------------|------|------|------|------|
| Drain-source breakdown voltage | V <sub>(BR)DSS</sub> | I <sub>D</sub> =250 μA, V <sub>GS</sub> =0V                               | 80   | 85   | -    | V    |
| Gate threshold voltage         | V <sub>GS(th)</sub>  | I <sub>D</sub> =250 μA, V <sub>GS</sub> =V <sub>DS</sub>                  | 2.5  | -    | 3.5  | V    |
| Drain-source cut-off current   | I <sub>DSS</sub>     | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V                                 | -    | -    | 1    | μA   |
| Gate leakage current           | I <sub>GSS</sub>     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                | -    | -    | ±100 | nA   |
| Drain-source on-resistance ④   | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                                 | -    | 5.2  | 6    | mΩ   |
| Forward transfer conductance ④ | g <sub>fs</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =20A                                 | -    | 5    | -    | S    |
| Input capacitance              | C <sub>iss</sub>     | V <sub>GS</sub> =0V, V <sub>DS</sub> =40V<br>f=1 MHz                      | -    | 3730 | -    | pF   |
| Output capacitance             | C <sub>oss</sub>     |                                                                           | -    | 670  | -    |      |
| Reverse transfer capacitance   | C <sub>rss</sub>     |                                                                           | -    | 24.4 | -    |      |
| Turn-on delay time             | t <sub>d(on)</sub>   | V <sub>DD</sub> =40V, I <sub>D</sub> =10.0A<br>R <sub>G</sub> =10Ω<br>③④  | -    | 16.5 | -    | ns   |
| Rise time                      | t <sub>r</sub>       |                                                                           | -    | 13.7 | -    |      |
| Turn-off delay time            | t <sub>d(off)</sub>  |                                                                           | -    | 35.9 | -    |      |
| Fall time                      | t <sub>f</sub>       |                                                                           | -    | 13.5 | -    |      |
| Total gate charge              | Q <sub>g</sub>       | V <sub>DS</sub> =40V, V <sub>GS</sub> =10V<br>I <sub>D</sub> =20.0A<br>③④ | -    | 55.7 | -    | nC   |
| Gate-source charge             | Q <sub>gs</sub>      |                                                                           | -    | 14.5 | -    |      |
| Gate-drain charge              | Q <sub>gd</sub>      |                                                                           | -    | 14   | -    |      |

## Source-Drain Diode Ratings and Characteristics (T<sub>C</sub>=25°C unless otherwise noted)

| Characteristic            | Symbol          | Test Condition                                                          | Min | Typ | Max | Unit |
|---------------------------|-----------------|-------------------------------------------------------------------------|-----|-----|-----|------|
| Source current (DC)       | I <sub>S</sub>  | Integral reverse diode<br>in the MOSFET                                 | -   | -   | 120 | A    |
| Source current (Pulsed) ① | I <sub>SP</sub> |                                                                         | -   | -   | 480 |      |
| Forward voltage ④         | V <sub>SD</sub> | V <sub>GS</sub> =0V, I <sub>S</sub> =18A                                | -   | -   | 1.4 | V    |
| Reverse recovery time     | t <sub>rr</sub> | I <sub>S</sub> =20A, V <sub>GS</sub> =0V<br>dI <sub>S</sub> /dt=100A/μs | -   | 40  | -   | ns   |
| Reverse recovery charge   | Q <sub>rr</sub> |                                                                         | -   | 1.0 | -   | μC   |

Note ;

- ① Repetitive rating : Pulse width limited by maximum junction temperature
- ② L=2.0mH, I<sub>AS</sub>=10A, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, Starting T<sub>J</sub> = 25°C
- ③ Pulse Test : Pulse width ≤ 300 μs, Duty cycle ≤ 2%
- ④ Essentially independent of operating temperature



## Electrical Characteristic Curves

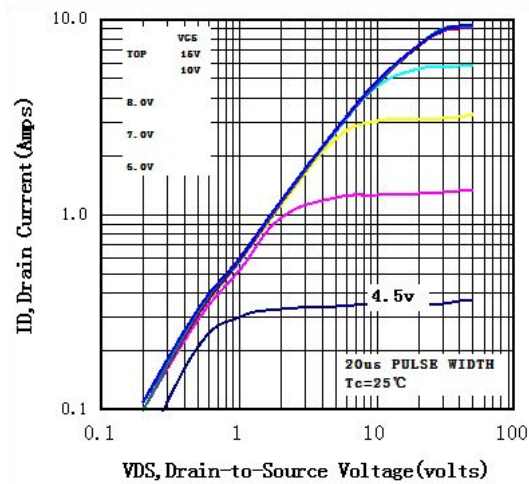


Fig1 Typical Output Characteristics,  $T_c = 25^\circ\text{C}$

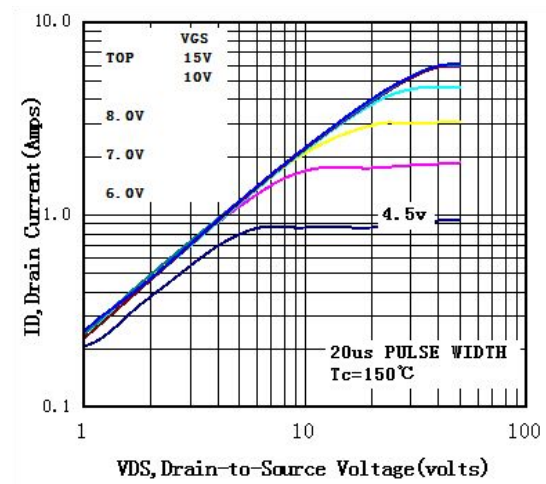


Fig2 Typical Output Characteristics,  $T_c = 150^\circ\text{C}$

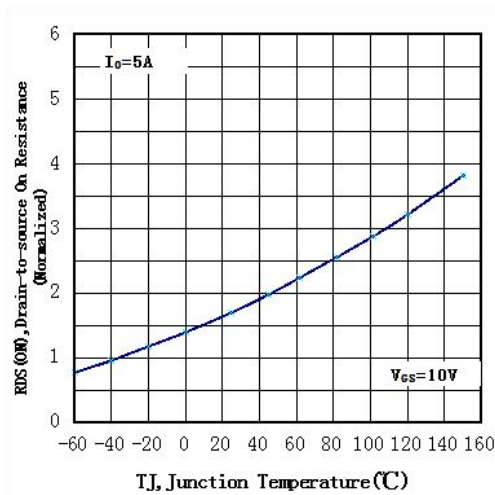


Fig3 Normalized Resistance Vs. Temperature

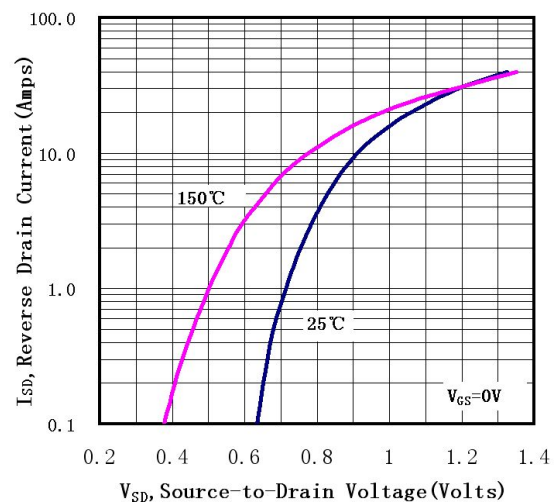


Fig4 Typical Source-Drain Diode Forward Voltage

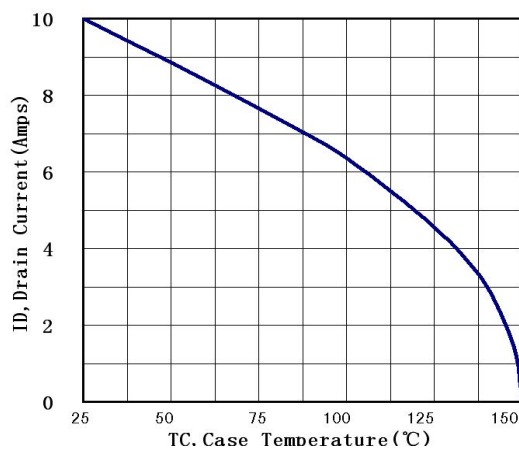


Fig5 Maximum Drain Current Vs. Case Temperature



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Fig. 11 Gate Charge Test Circuit & Waveform

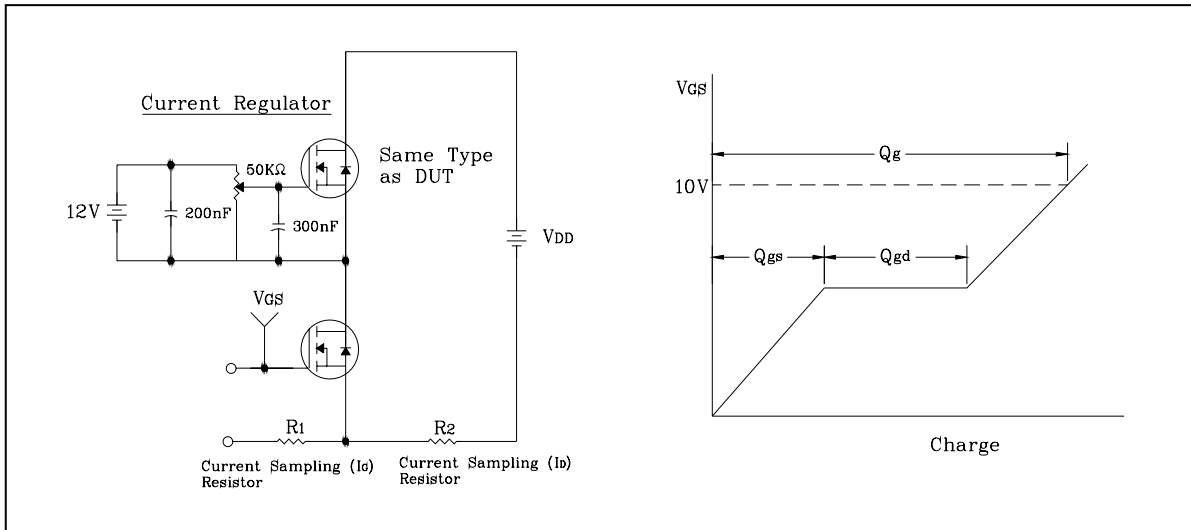


Fig. 12 Resistive Switching Test Circuit & Waveform

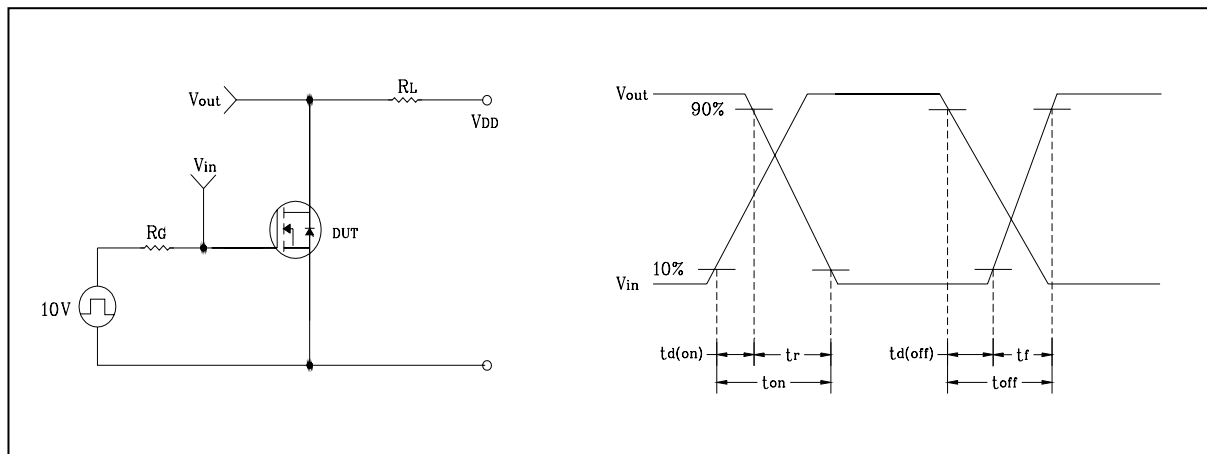
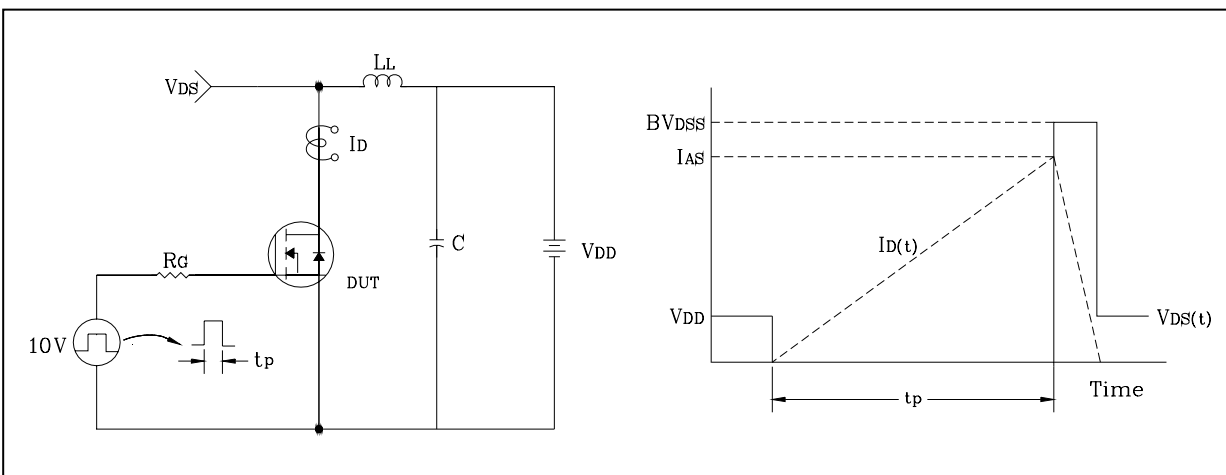


Fig. 13  $E_{AS}$  Test Circuit & Waveform





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## TO-220-3L Package Information

unit : mm

