

### Description

The HSX80N20 is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent  $R_{DS(ON)}$  and gate charge for most of the synchronous buck converter applications.

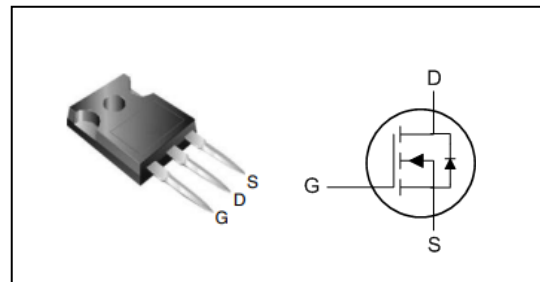
The HSX80N20 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

- Power Switching application
- Green Device Available
- Excellent  $C_{dv/dt}$  effect decline
- Advanced high cell density Trench technology

### Product Summary

|                  |     |           |
|------------------|-----|-----------|
| $V_{DS}$         | 200 | V         |
| $R_{DS(ON),typ}$ | 20  | $m\Omega$ |
| $I_D$            | 80  | A         |

### T0-247 Pin Configuration



### Absolute Maximum Ratings

| Symbol                | Parameter                                  | Rating     | Units      |
|-----------------------|--|------------|------------|
| $V_{DS}$              | Drain-Source Voltage                       | 200        | V          |
| $V_{GS}$              | Gate-Source Voltage                        | $\pm 20$   | V          |
| $I_D@T_C=25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 80         | A          |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 55         | A          |
| $I_{DM}$              | Pulsed Drain Current <sup>2</sup>          | 280        | A          |
| EAS                   | Single Pulse Avalanche Energy <sup>3</sup> | 400        | mJ         |
| $P_D@T_C=25^\circ C$  | Total Power Dissipation <sup>3</sup>       | 370        | W          |
| $T_{STG}$             | Storage Temperature Range                  | -55 to 150 | $^\circ C$ |
| $T_J$                 | Operating Junction Temperature Range       | -55 to 150 | $^\circ C$ |

### Thermal Data

| Symbol          | Parameter  | Typ. | Max. | Unit         |
|-----------------|--|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient <sup>1</sup> | ---  | 40   | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 0.4  | $^\circ C/W$ |



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

| Symbol              | Parameter                                      | Conditions   | Min. | Typ. | Max. | Unit |
|---------------------|--|--|------|------|------|------|
| BV <sub>DSS</sub>   | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA   | 200  | ---  | ---  | V    |
| R <sub>DS(ON)</sub> | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =30A  | ---  | 20   | 24   | mΩ   |
| V <sub>GS(th)</sub> | Gate Threshold Voltage                         | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA                                 | 2    | 3.3  | 4    | V    |
| I <sub>DSS</sub>    | Drain-Source Leakage Current                   | V <sub>DS</sub> =200V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                         | ---  | ---  | 1    | uA   |
|                     |  | V <sub>DS</sub> =200V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C                         | ---  | ---  | 5    |      |
| I <sub>GSS</sub>    | Gate-Source Leakage Current                    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V   | ---  | ---  | ±100 | nA   |
| R <sub>g</sub>      | Gate Resistance                                | V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz   | ---  | 1.1  | ---  | Ω    |
| Q <sub>g</sub>      | Total Gate Charge (10V)                        | V <sub>DS</sub> =100V, V <sub>GS</sub> =10V, I <sub>D</sub> =30A                         | ---  | 115  | ---  | nC   |
| Q <sub>gs</sub>     | Gate-Source Charge                             |  | ---  | 32   | ---  |      |
| Q <sub>gd</sub>     | Gate-Drain Charge                              |  | ---  | 20.3 | ---  |      |
| T <sub>d(on)</sub>  | Turn-On Delay Time                             | V <sub>DD</sub> =100V, V <sub>GS</sub> =10V, R <sub>G</sub> =2.5Ω<br>I <sub>D</sub> =30A | ---  | 27   | ---  | ns   |
| T <sub>r</sub>      | Rise Time                                      |  | ---  | 38   | ---  |      |
| T <sub>d(off)</sub> | Turn-Off Delay Time                            |  | ---  | 22   | ---  |      |
| T <sub>f</sub>      | Fall Time                                      |  | ---  | 23   | ---  |      |
| C <sub>iss</sub>    | Input Capacitance                              | V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz  | ---  | 7490 | ---  | pF   |
| C <sub>oss</sub>    | Output Capacitance                             |  | ---  | 267  | ---  |      |
| C <sub>rss</sub>    | Reverse Transfer Capacitance                   |  | ---  | 37   | ---  |      |

**Diode Characteristics**

| Symbol          | Parameter                                | Conditions   | Min. | Typ. | Max. | Unit |
|-----------------|--|--|------|------|------|------|
| I <sub>S</sub>  | Continuous Source Current <sup>1,5</sup> | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current              | ---  | ---  | 80   | A    |
| I <sub>SM</sub> | Pulsed Source Current <sup>2,5</sup>     |  | ---  | ---  | 280  | A    |
| V <sub>SD</sub> | Diode Forward Voltage <sup>2</sup>       | V <sub>GS</sub> =0V, I <sub>S</sub> =30A, T <sub>J</sub> =25°C | ---  | ---  | 1.2  | V    |

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.5mH
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.



### Typical Characteristics

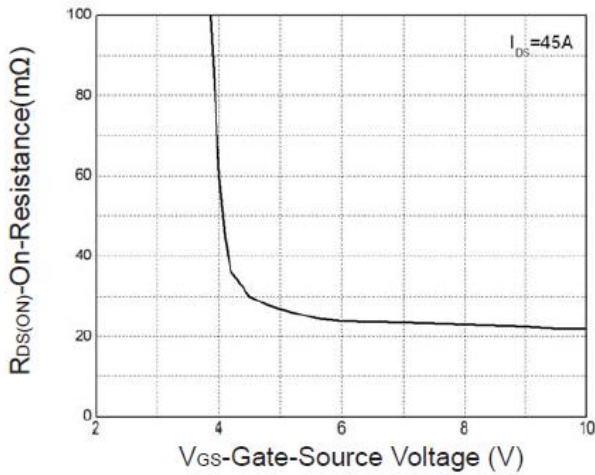


Fig.1 Gate-Source Vs.On-Resistance

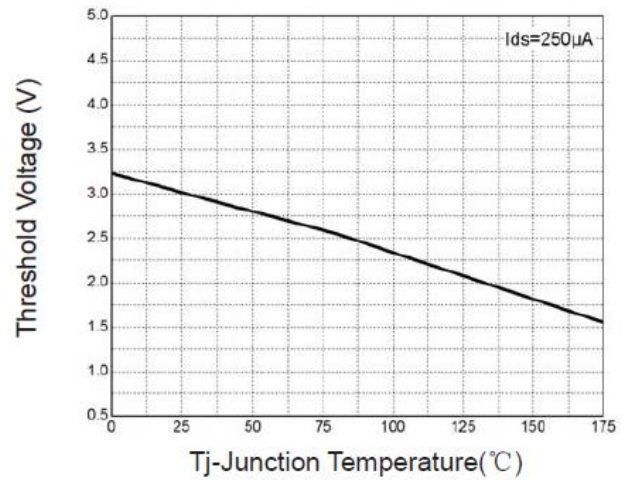


Fig.2 Gate-Source Forward

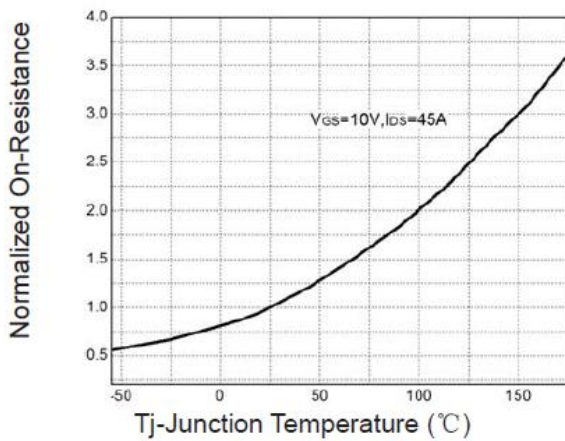


Fig.3 On-Resistance VS.Temperature

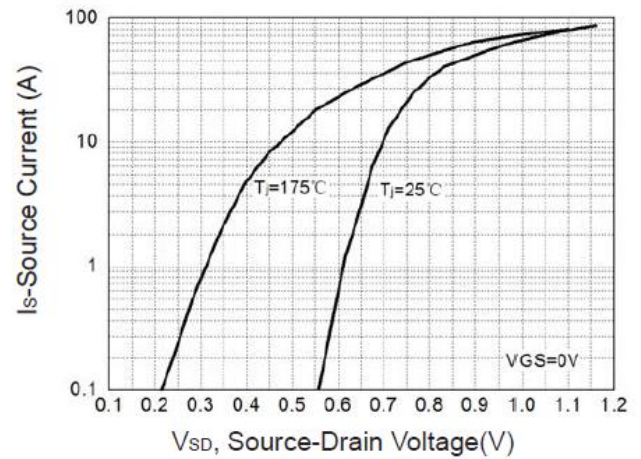


Fig.4 Source-Drain Diode Forward

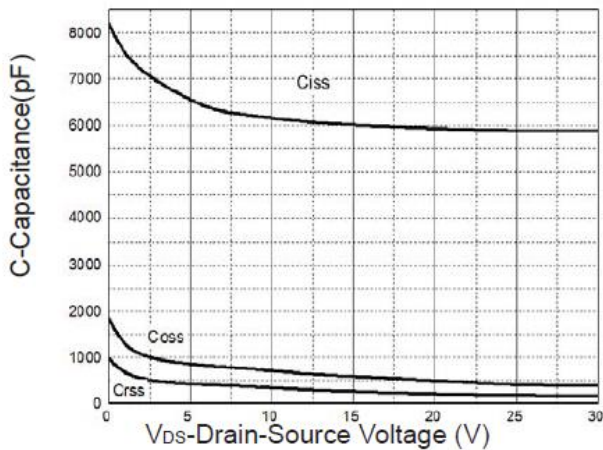


Fig.5 Capacitance Characteristics

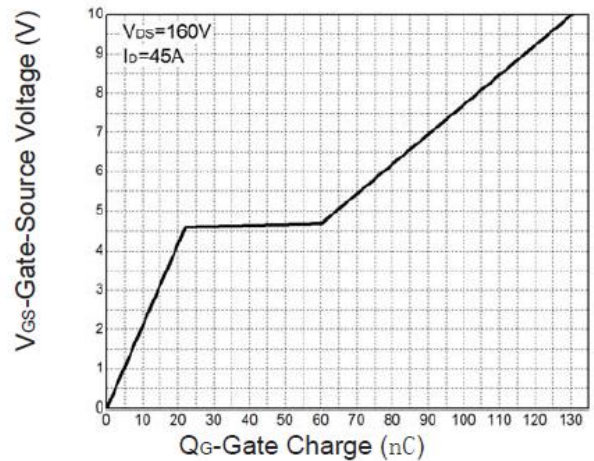


Fig.6 Gate Charge Characteristics





## N-Ch 200V Fast Switching MOSFETs

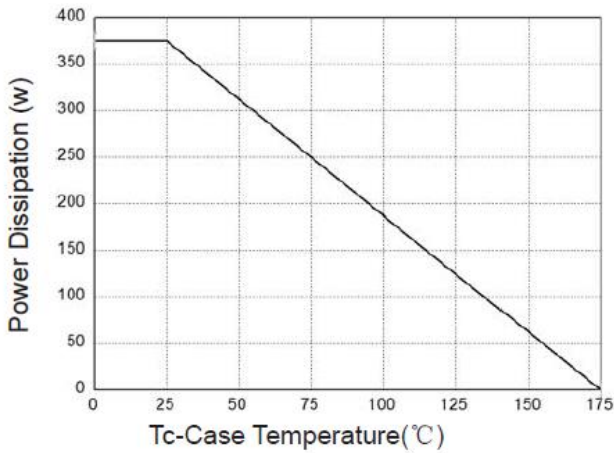


Fig.7 Power Dissipation

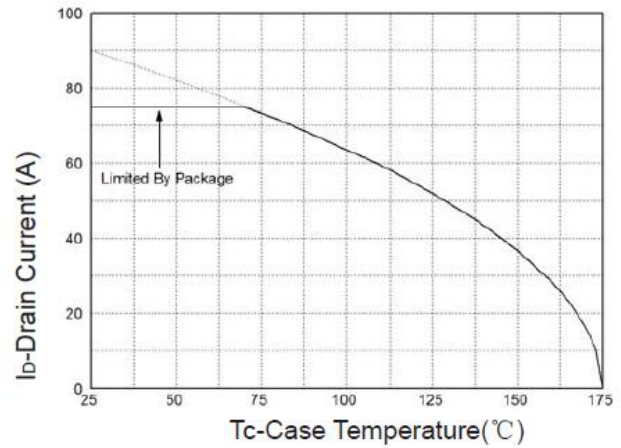


Fig.8 Drain Current

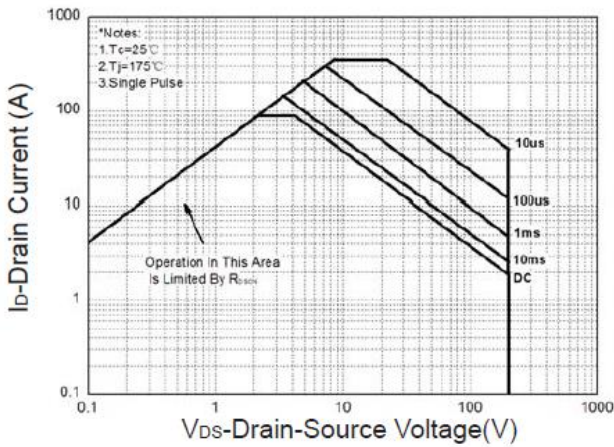
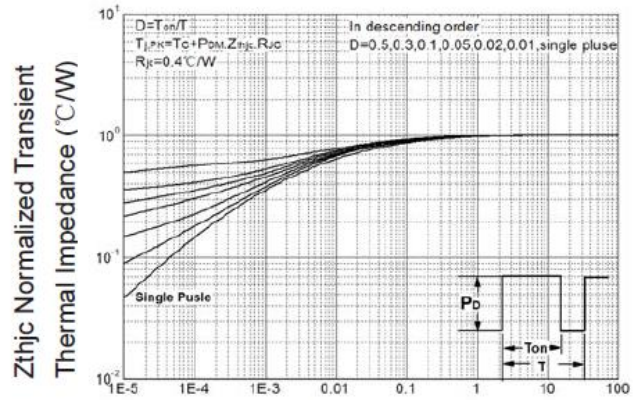


Fig.9 Safe Operation Area



Maximum Effective Transient Thermal Impedance, Junction-to-Case

Fig.10 Thermal Transient Impedance

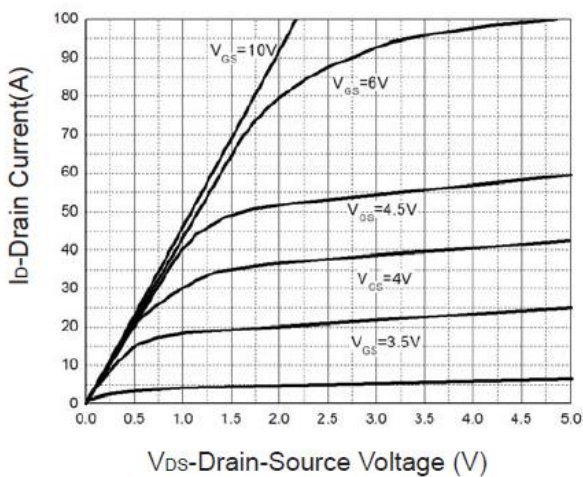


Fig.11 Output Characteristics

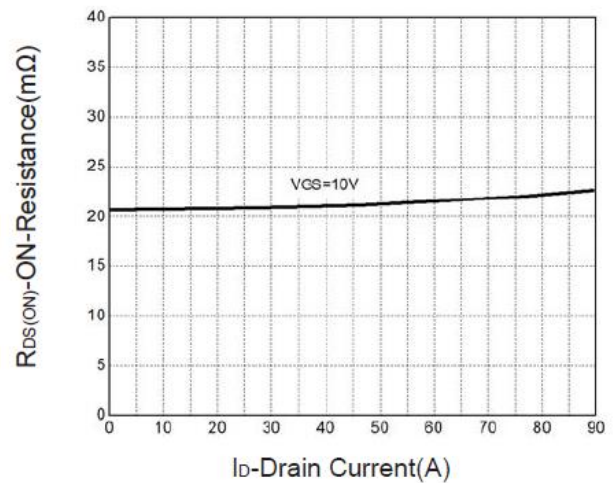


Fig.12 Drain-Source On Resistance