# HUASHUO SEMICONDUCTOR

# HSU18N20

## N-Ch 200V Fast Switching MOSFETs

### Description

The HSU18N20 is the highest performance trench N-ch MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The HSU18N20 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

- Super Low Gate Charge
- Green Device Available
- Excellent Cdv/dt effect decline
- Advanced high cell density Trench technology

### Product Summary

| $V_{DS}$ | 200 | V |
|---|---|---|
| $R_{DS(ON),max}$ | 170 | mΩ |
| $I_D$ | 18 | A |

### TO252 Pin Configuration
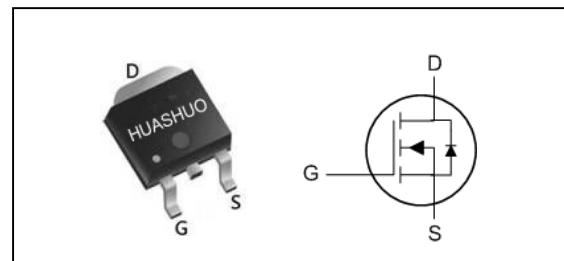


### Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 200 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25°C | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 18 | A |
| $I_D$@$T_C$=100°C | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 11.7 | A |
| $I_{DM}$ | Pulsed Drain Current[2] | 40 | A |
| EAS | Single Pulse Avalanche Energy[3] | 15 | mJ |
| $I_{AS}$ | Avalanche Current | 10 | A |
| $P_D$@$T_C$=25°C | Total Power Dissipation[3] | 83 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | °C |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | °C |

### Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{θJA}$ | Thermal Resistance Junction-ambient [1] | --- | 60 | °C/W |
| $R_{θJC}$ | Thermal Resistance Junction-Case[1] | --- | 1.5 | °C/W |

## Electrical Characteristics (T$_J$=25 ℃, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| BV$_{DSS}$ | Drain-Source Breakdown Voltage | V$_{GS}$=0V , I$_D$=250uA | 200 | --- | --- | V |
| R$_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | V$_{GS}$=10V , I$_D$=9A | --- | --- | 170 | mΩ |
| | Static Drain-Source On-Resistance[2] | V$_{GS}$=4.5V , I$_D$=9A | --- | --- | 180 | mΩ |
| V$_{GS(th)}$ | Gate Threshold Voltage | V$_{GS}$=V$_{DS}$ , I$_D$ =250uA | 1.2 | --- | 2.5 | V |
| I$_{DSS}$ | Drain-Source Leakage Current | V$_{DS}$=160V , V$_{GS}$=0V , T$_J$=25℃ | --- | --- | 1 | uA |
| | | V$_{DS}$=160V , V$_{GS}$=0V , T$_J$=55℃ | --- | --- | 5 | |
| I$_{GSS}$ | Gate-Source Leakage Current | V$_{GS}$=±20V , V$_{DS}$=0V | --- | --- | ±100 | nA |
| gfs | Forward Transconductance | V$_{DS}$=5V , I$_D$=9A | --- | 22 | --- | S |
| R$_g$ | Gate Resistance | V$_{DS}$=0V , V$_{GS}$=0V , f=1MHz | --- | 2 | --- | Ω |
| Q$_g$ | Total Gate Charge (10V) | V$_{DS}$=80V , V$_{GS}$=10V , I$_D$=9A | --- | 45 | --- | nC |
| Q$_{gs}$ | Gate-Source Charge | | --- | 9 | --- | |
| Q$_{gd}$ | Gate-Drain Charge | | --- | 10.5 | --- | |
| T$_{d(on)}$ | Turn-On Delay Time | V$_{DD}$=50V , V$_{GS}$=10V , R$_G$=3.3Ω I$_D$=9A | --- | 13 | --- | ns |
| T$_r$ | Rise Time | | --- | 8.2 | --- | |
| T$_{d(off)}$ | Turn-Off Delay Time | | --- | 25 | --- | |
| T$_f$ | Fall Time | | --- | 11 | --- | |
| C$_{iss}$ | Input Capacitance | V$_{DS}$=25V , V$_{GS}$=0V , f=1MHz | --- | 2047 | --- | pF |
| C$_{oss}$ | Output Capacitance | | --- | 109 | --- | |
| C$_{rss}$ | Reverse Transfer Capacitance | | --- | 70 | --- | |

## Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| I$_S$ | Continuous Source Current[1,5] | V$_G$=V$_D$=0V , Force Current | --- | --- | 18 | A |
| I$_{SM}$ | Pulsed Source Current[2,5] | | --- | --- | 40 | A |
| V$_{SD}$ | Diode Forward Voltage[2] | V$_{GS}$=0V , I$_S$=1A , T$_J$=25℃ | --- | --- | 1.2 | V |
| t$_{rr}$ | Reverse Recovery Time | I$_F$=10A , dI/dt=100A/μs , T$_J$=25℃ | --- | 37 | --- | nS |
| Q$_{rr}$ | Reverse Recovery Charge | | --- | 103 | --- | nC |

Note :

1.The data tested by surface mounted on a 1 inch$^2$ 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$_{DD}$=25V,V$_{GS}$=10V,L=0.3mH,I$_{AS}$=10A

4.The power dissipation is limited by 150℃ junction temperature

5.The data is theoretically the same as I$_D$ and I$_{DM}$ , in real applications , should be limited by total power dissipation.

## Typical Characteristics
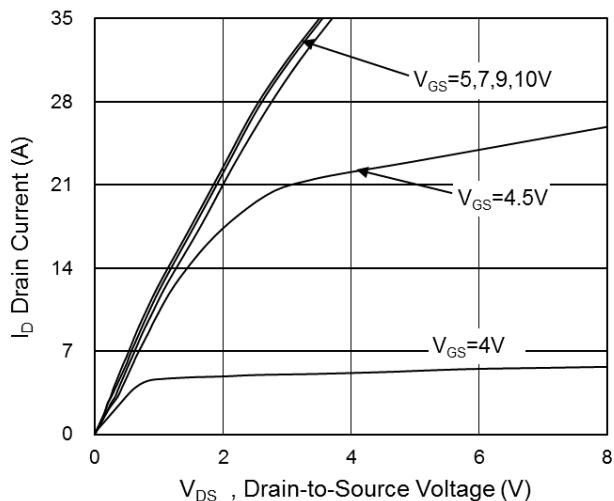


**Fig.1 Typical Output Characteristics**
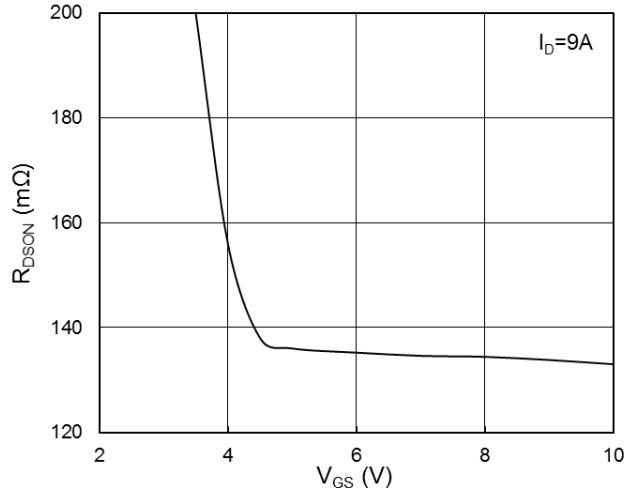


**Fig.2 On-Resistance vs. Gate-Source**
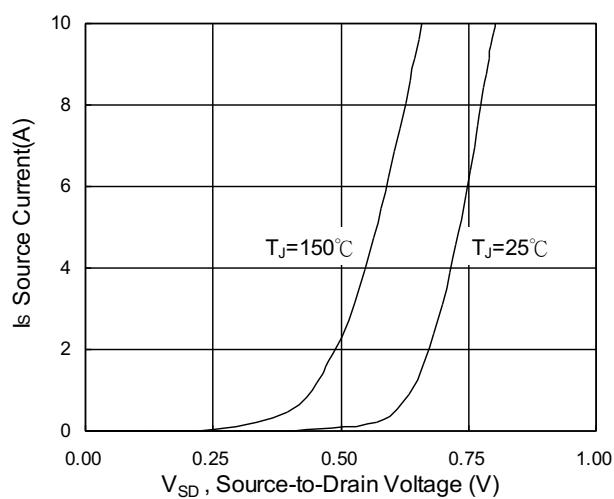


**Fig.3 Forward Characteristics Of Reverse**
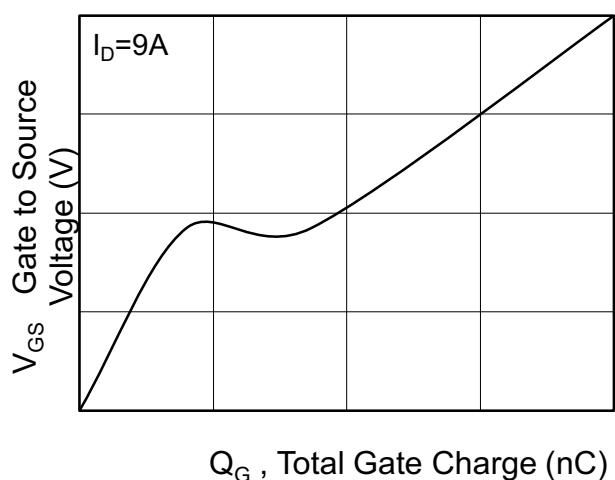


**Fig.4 Gate-Charge Characteristics**
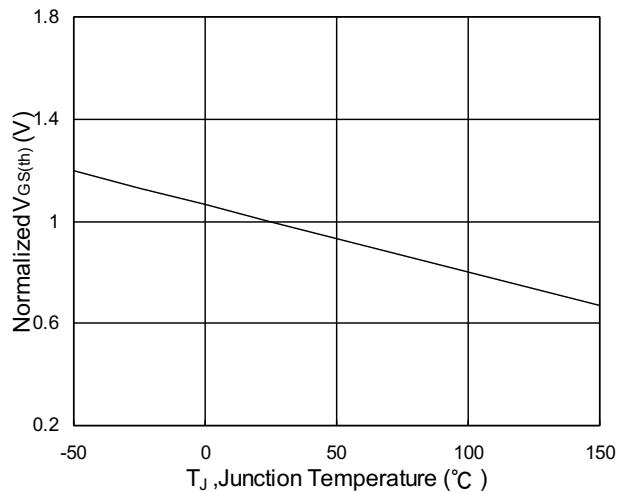


**Fig.5 Normalized $V_{GS(th)}$ vs. $T_J$**
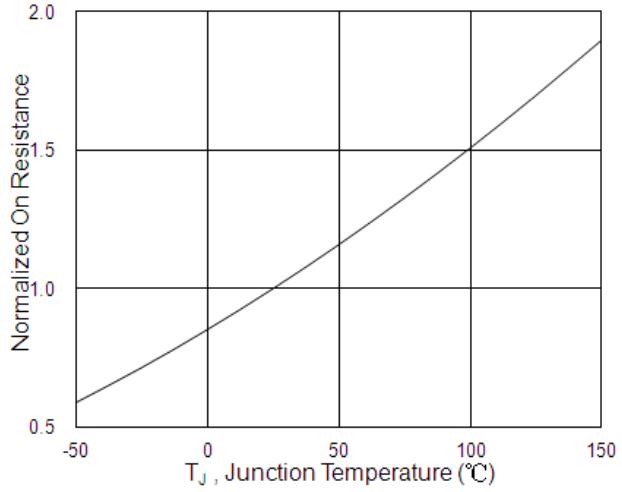


**Fig.6 Normalized $R_{DSON}$ vs. $T_J$**

**HUASHUO SEMICONDUCTOR**

## N-Ch 200V Fast Switching MOSFETs
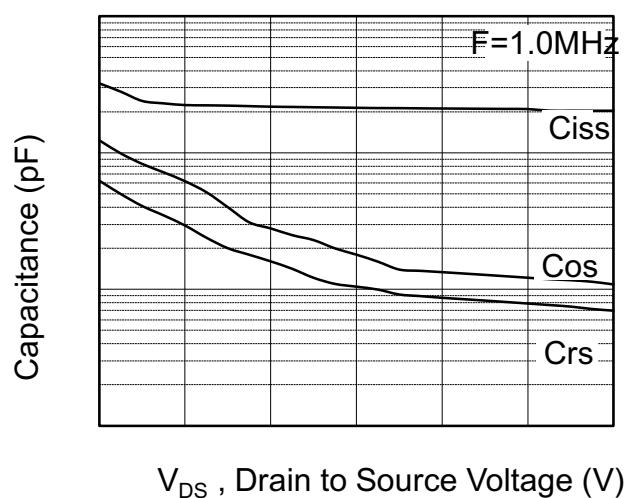


**Fig.7 Capacitance**
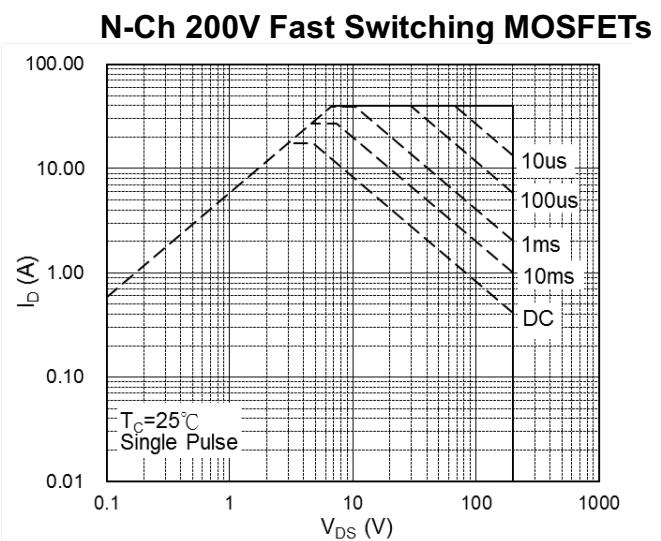


**Fig.8 Safe Operating Area**



$D = T_{ON}/T$

$T_{Jpeak} = T_C + P_{DM} \times R_{\theta JC}$
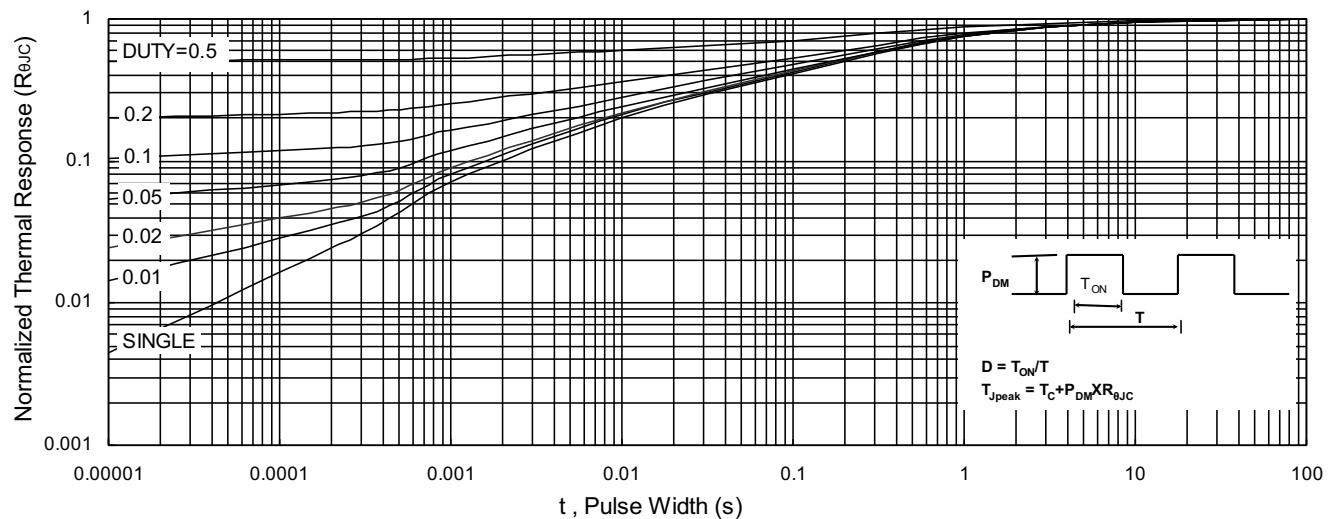
**Fig.9 Normalized Maximum Transient Thermal Impedance**
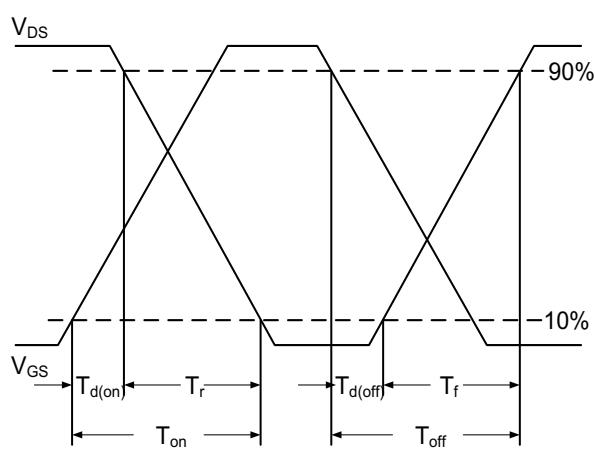


**Fig.10 Switching Time Waveform**

$$EAS = \frac{1}{2}L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$
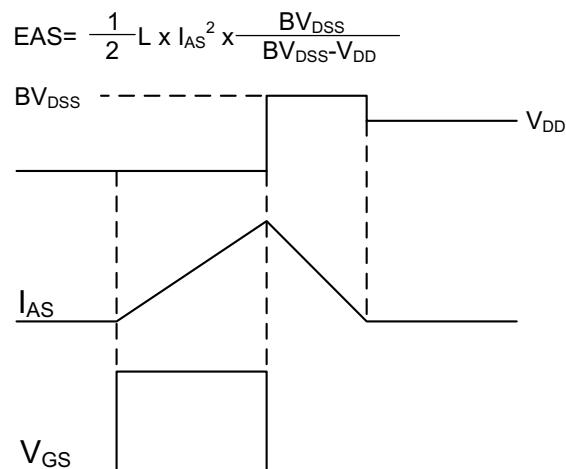


**Fig.11 Unclamped Inductive Switching**

# Ordering Information

| Part Number | Package code | Packaging |
|---|---|---|
| HSU18N20 | TO252-2 | 2500/Tape&Reel |



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 2.200 | 2.400 | 0.087 | 0.094 |
| A1 | 0.000 | 0.127 | 0.000 | 0.005 |
| B | 1.350 | 1.650 | 0.053 | 0.065 |
| b | 0.500 | 0.700 | 0.020 | 0.028 |
| b1 | 0.700 | 0.900 | 0.028 | 0.035 |
| c | 0.430 | 0.580 | 0.017 | 0.023 |
| c1 | 0.430 | 0.580 | 0.017 | 0.023 |
| D | 6.350 | 6.650 | 0.250 | 0.262 |
| D1 | 5.200 | 5.400 | 0.205 | 0.213 |
| E | 5.400 | 5.700 | 0.213 | 0.224 |
| e | 2.300 TYP. | | 0.091 TYP. | |
| e1 | 4.500 | 4.700 | 0.177 | 0.185 |
| L | 9.500 | 9.900 | 0.374 | 0.390 |
| L1 | 2.550 | 2.900 | 0.100 | 0.114 |
| L2 | 1.400 | 1.780 | 0.055 | 0.070 |
| L3 | 0.600 | 0.900 | 0.024 | 0.035 |
| V | 3.800 REF. | | 0.150 REF. | |
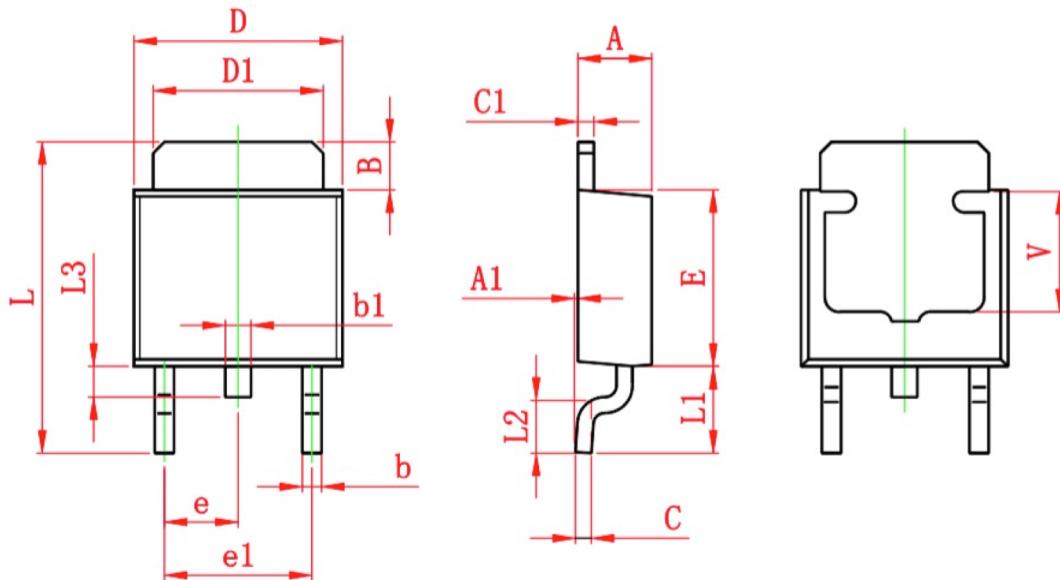
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