

N-Ch 30V Fast Switching MOSFETs
Description

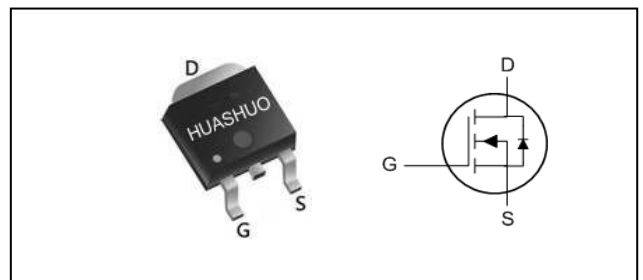
The HSU3008 is the high cell density trenched N-ch MOSFETs, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The HSU3008 meet the RoHS and Green Product requirement with full function reliability approved.

- Green Device Available
- Super Low Gate Charge
- Excellent $C_{dv/dt}$ effect decline
- Advanced high cell density Trench technology

Product Summary

| | | |
|------------------|----|-----------|
| V_{DS} | 30 | V |
| $R_{DS(ON),max}$ | 25 | $m\Omega$ |
| I_D | 24 | A |

TO252 Pin Configuration

Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|-----------------------|--|------------|------------|
| V_{DS} | Drain-Source Voltage | 30 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| $I_D@T_C=25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V_1$ | 24 | A |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V_1$ | 15 | A |
| $I_D@T_A=25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V_1$ | 7.3 | A |
| $I_D@T_A=70^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V_1$ | 5.8 | A |
| I_{DM} | Pulsed Drain Current ₂ | 50 | A |
| EAS | Single Pulse Avalanche Energy ₃ | 8.1 | mJ |
| I_{AS} | Avalanche Current | 12.7 | A |
| $P_D@T_C=25^\circ C$ | Total Power Dissipation ₄ | 20.8 | W |
| $P_D@T_A=25^\circ C$ | Total Power Dissipation ₄ | 2 | 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 ₁ | --- | 62 | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ₁ | --- | 6 | $^\circ C/W$ |

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Electrical Characteristics (T_J=25 °C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------------|--|---|------|-------|------|-------|
| B _{VDS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250uA | 30 | --- | --- | V |
| ΔB _{VDS} /ΔT _J | B _{VDS} Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.023 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ₂ | V _{GS} =10V, I _D =10A | --- | --- | 25 | mΩ |
| | | V _{GS} =4.5V, I _D =8A | --- | --- | 38 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1.0 | --- | 2.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | -4.2 | --- | mV/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =24V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =24V, V _{GS} =0V, T _J =55°C | --- | --- | 5 | |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =5V, I _D =10A | --- | 5.5 | --- | S |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 2.3 | --- | Ω |
| Q _g | Total Gate Charge (4.5V) | V _{DS} =15V, V _{GS} =4.5V, I _D =10A | --- | 4.9 | --- | nC |
| Q _{gs} | Gate-Source Charge | | --- | 1.66 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 1.85 | --- | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =15V, V _{GS} =10V, R _G =3.3Ω I _D =10A | --- | 1.6 | --- | ns |
| T _r | Rise Time | | --- | 15.8 | --- | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 13 | --- | |
| T _f | Fall Time | | --- | 4.8 | --- | |
| C _{iss} | Input Capacitance | V _{DS} =15V, V _{GS} =0V, f=1MHz | --- | 416 | --- | pF |
| C _{oss} | Output Capacitance | | --- | 62 | --- | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 51 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|---|------|------|------|------|
| I _S | Continuous Source Current _{1,5} | V _G =V _D =0V, Force Current | --- | --- | 24 | A |
| I _{SM} | Pulsed Source Current _{2,5} | | --- | --- | 50 | A |
| V _{SD} | Diode Forward Voltage ₂ | V _{GS} =0V, I _S =1A, T _J =25°C | --- | --- | 1.2 | V |
| t _{rr} | Reverse Recovery Time | I _F =10A, di/dt=100A/μs, | --- | 8.7 | --- | nS |
| Q _{rr} | Reverse Recovery Charge | T _J =25°C | --- | 1.95 | --- | nC |

Note :

- 1.The data tested by surface mounted on a 1 inch₂ 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=0.1mH, I_{AS}=12.7A
- 4.The power dissipation is limited by 150°C 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

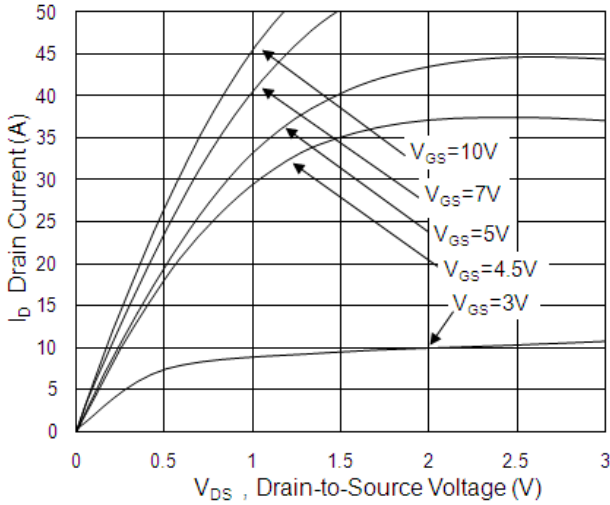


Fig.1 Typical Output Characteristics

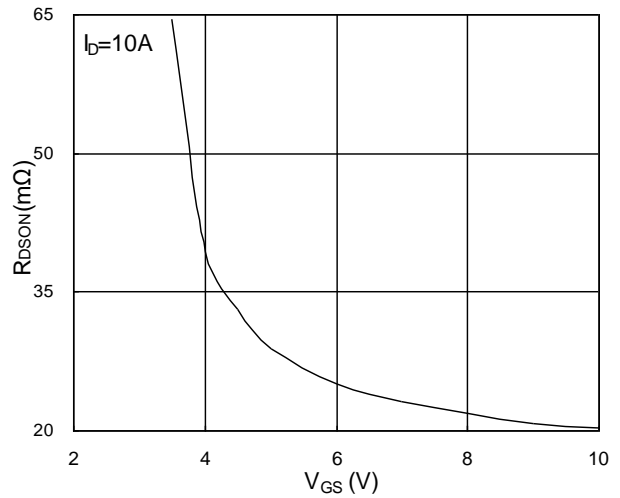


Fig.2 On-Resistance vs. Gate-Source

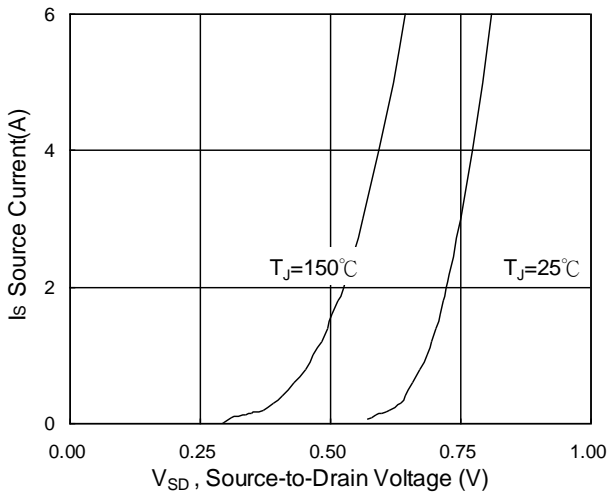


Fig.3 Forward Characteristics Of Reverse

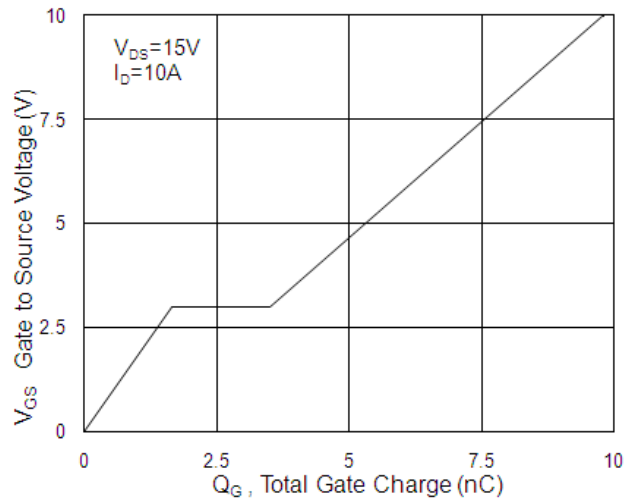


Fig.4 Gate-Charge Characteristics

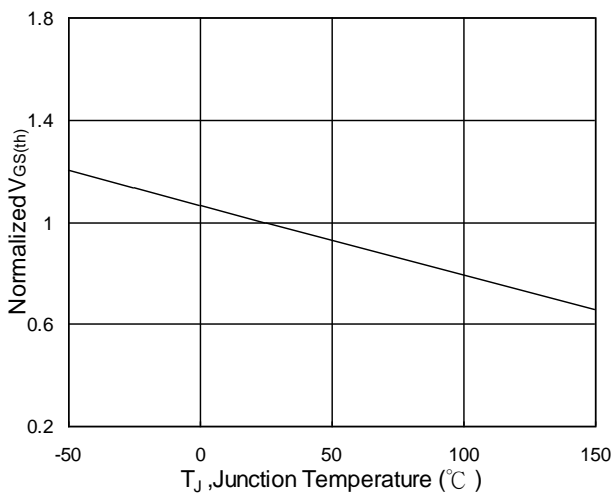


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

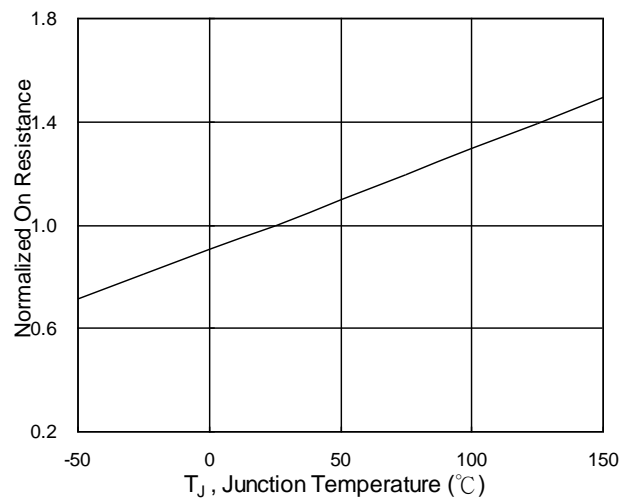


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

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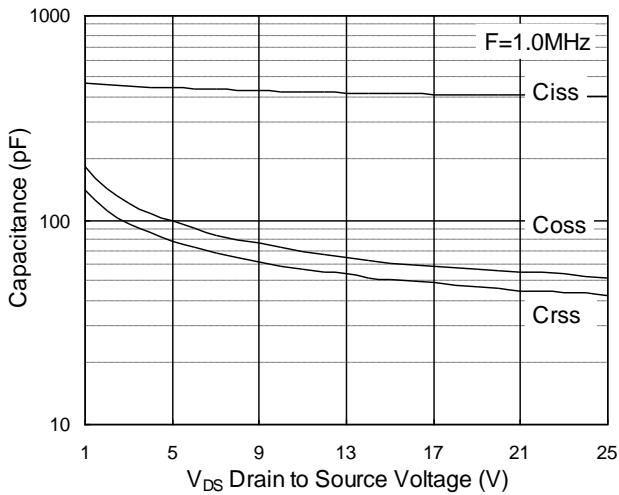


Fig.7 Capacitance

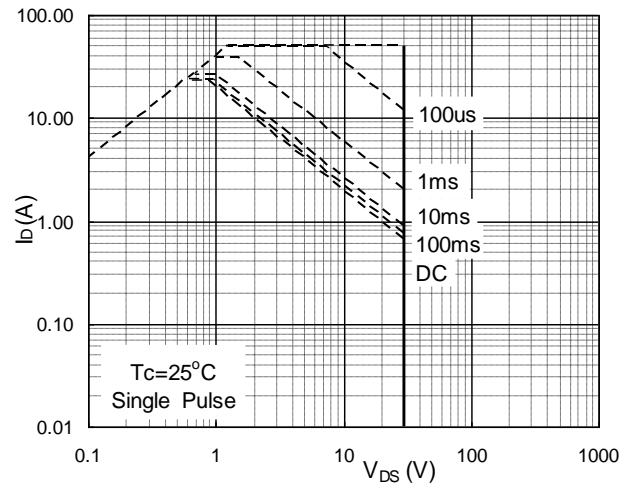


Fig.8 Safe Operating Area

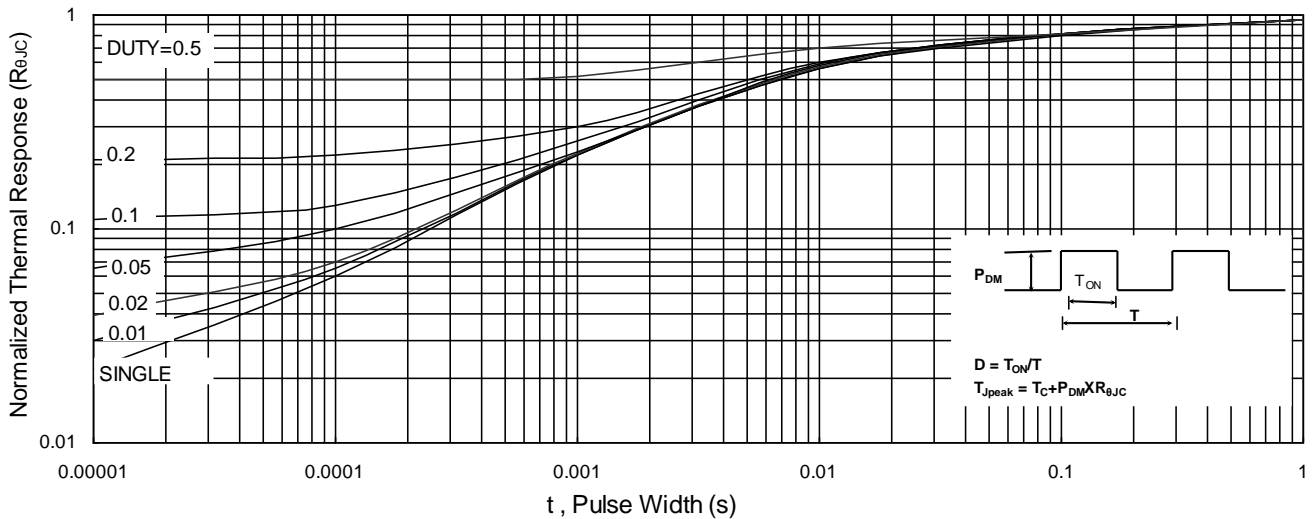


Fig.9 Normalized Maximum Transient Thermal Impedance

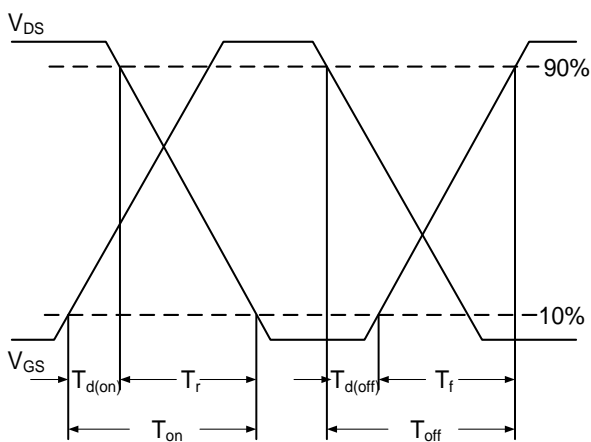


Fig.10 Switching Time Waveform

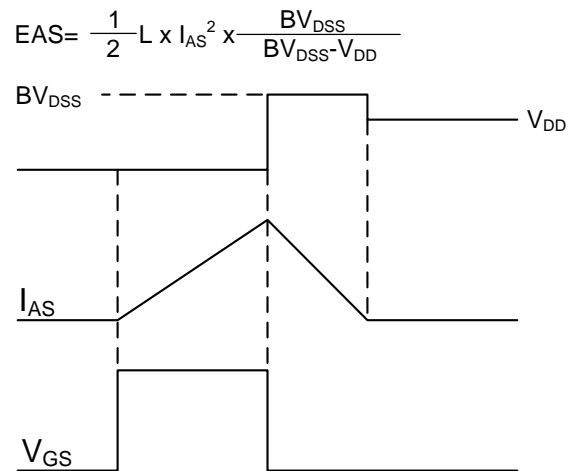
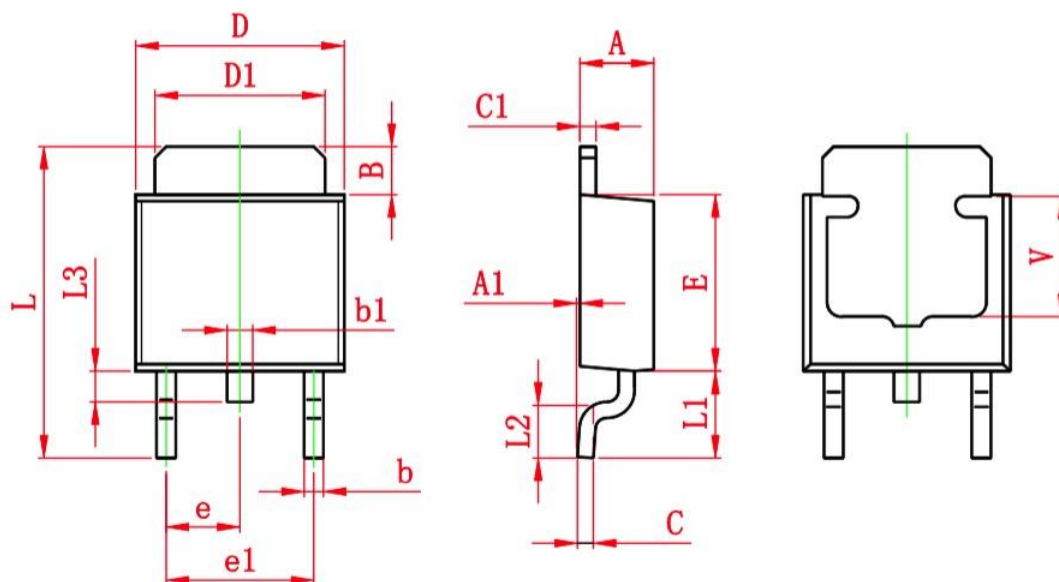


Fig.11 Unclamped Inductive Switching

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

Ordering Information

| Part Number | Package code | Packaging |
|-------------|--------------|----------------|
| HSU3008 | 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. | |