



Description

The HSH044N25 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.

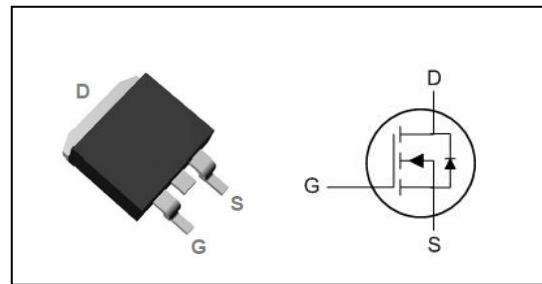
The HSH044N25 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

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

Product Summary

| | | |
|-------------------------|-----|----|
| V _{DS} | 250 | V |
| R _{DS(ON),max} | 44 | mΩ |
| I _D | 50 | A |

TO-263 Pin Configuration



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---------------------------------------|--|------------|-------|
| V _{DS} | Drain-Source Voltage | 250 | V |
| V _{GS} | Gate-Source Voltage | ± 20 | V |
| I _D @T _C =25°C | Continuous Drain Current, V _{GS} @ 10V ¹ | 50 | A |
| I _D @T _C =100°C | Continuous Drain Current, V _{GS} @ 10V ¹ | 34 | A |
| I _{DM} | Pulsed Drain Current ² | 195 | A |
| EAS | Single Pulse Avalanche Energy ³ | 165 | mJ |
| P _D @T _C =25°C | Total Power Dissipation ³ | 83 | W |
| T _{STG} | Storage Temperature Range | -55 to 175 | °C |
| T _J | Operating Junction Temperature Range | -55 to 175 | °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 | --- | 0.48 | °C/W |



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

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---------------------|--|---|------|------|-------|------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250uA | 250 | --- | --- | V |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =10V, I _D =5A | --- | 34 | 44 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 3 | --- | 5 | V |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =150V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | uA |
| | | V _{DS} =150V, V _{GS} =0V, T _J =125°C | --- | --- | 100 | |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} = ± 20V, V _{DS} =0V | --- | --- | ± 100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =10V, I _D =20A | --- | 75 | --- | S |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 1.5 | --- | Ω |
| Q _g | Total Gate Charge (10V) | V _{DS} =50V, V _{GS} =10V, I _D =40A | --- | 155 | --- | nC |
| Q _{gs} | Gate-Source Charge | | --- | 23 | --- | |
| Q _{gd} | Gate-Drain Charge | | --- | 45 | --- | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =50V, V _{GS} =10V, R _G =3.3Ω I _D =40A | --- | 33 | --- | ns |
| T _r | Rise Time | | --- | 8.2 | --- | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 65 | --- | |
| T _f | Fall Time | | --- | 6 | --- | |
| C _{iss} | Input Capacitance | V _{DS} =50V, V _{GS} =0V, f=1MHz | --- | 8547 | --- | pF |
| C _{oss} | Output Capacitance | | --- | 429 | --- | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 85 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|--|------|------|------|------|
| I _S | Continuous Source Current ^{1,5} | V _G =V _D =0V, Force Current | --- | --- | 50 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _S =20A, T _J =25°C | --- | --- | 1.2 | V |
| t _{rr} | Reverse Recovery Time | I _F =40A, dI/dt=100A/μs, | --- | 157 | --- | nS |
| Q _{rr} | Reverse Recovery Charge | T _J =25°C | --- | 1073 | --- | 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}=40V, V_{GS}=10V, L=0.5mH, R_g=25Ω
- 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

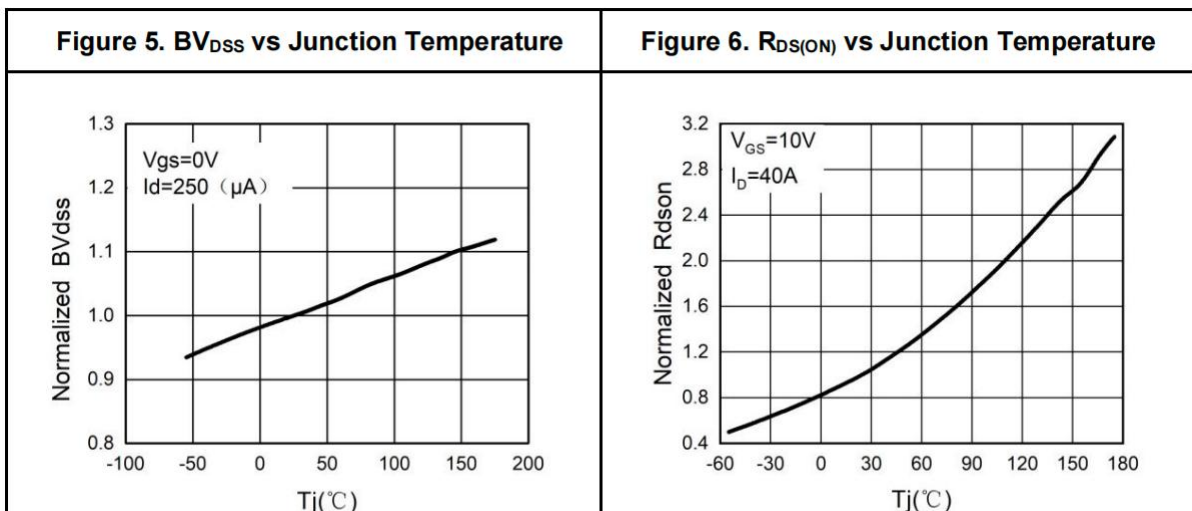
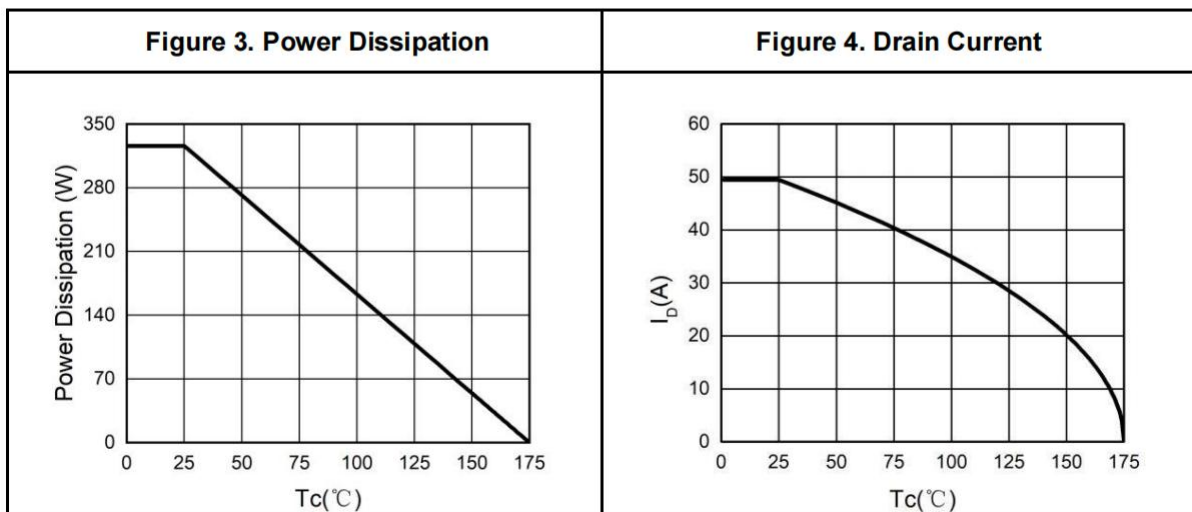
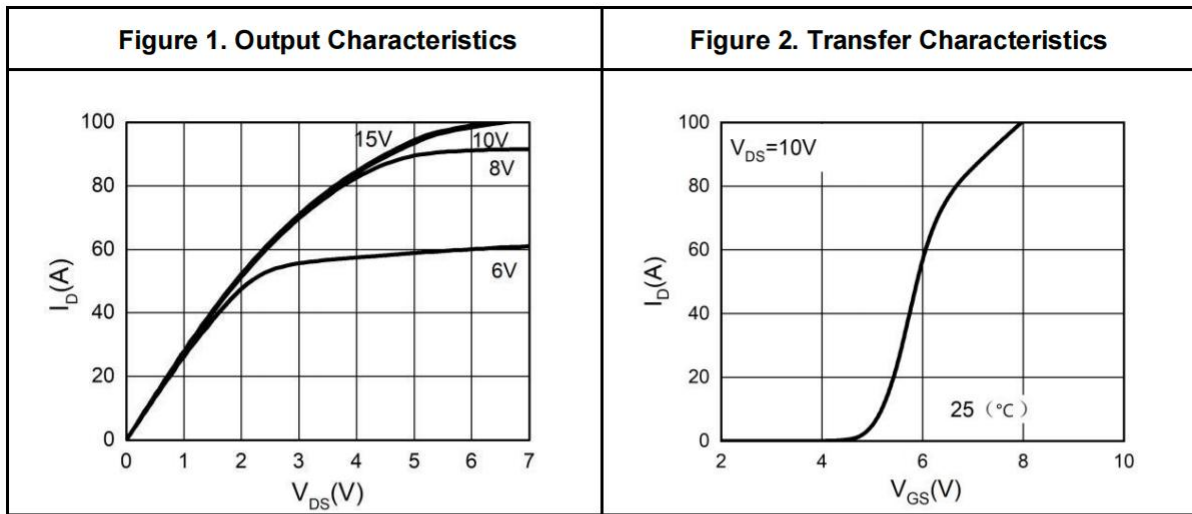




Figure 7. Gate Charge Waveforms

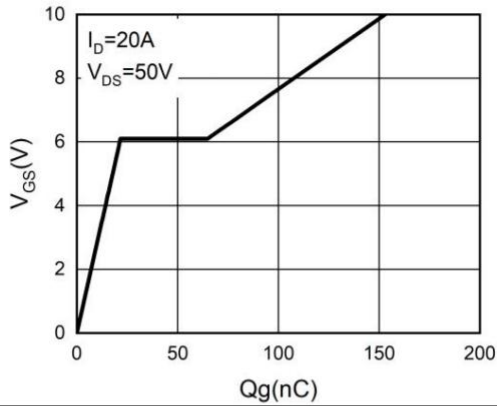


Figure 8. Capacitance

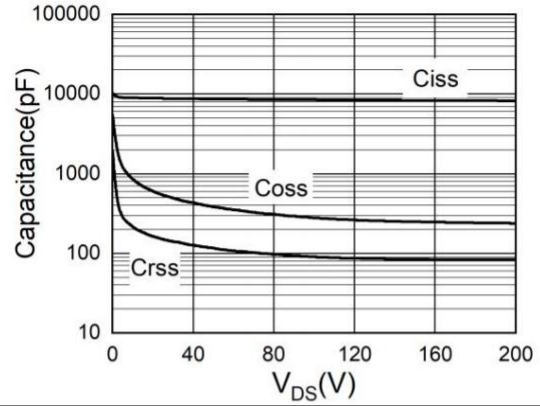


Figure 9. Body-Diode Characteristics

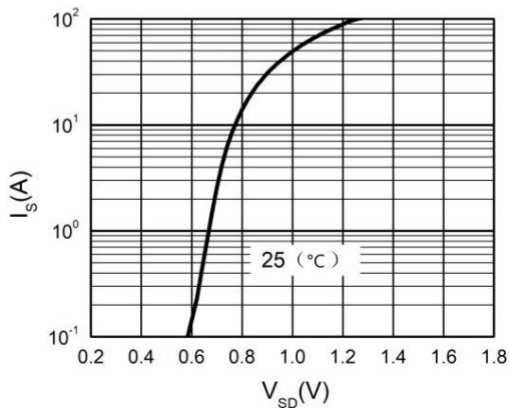
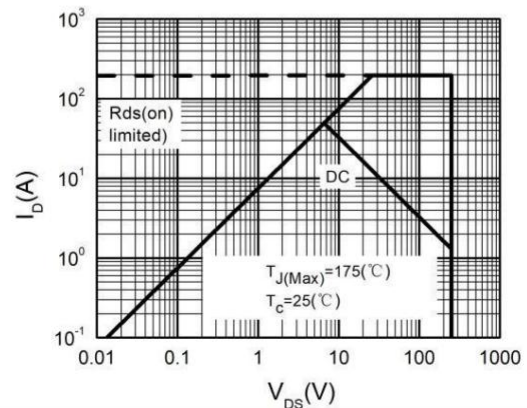
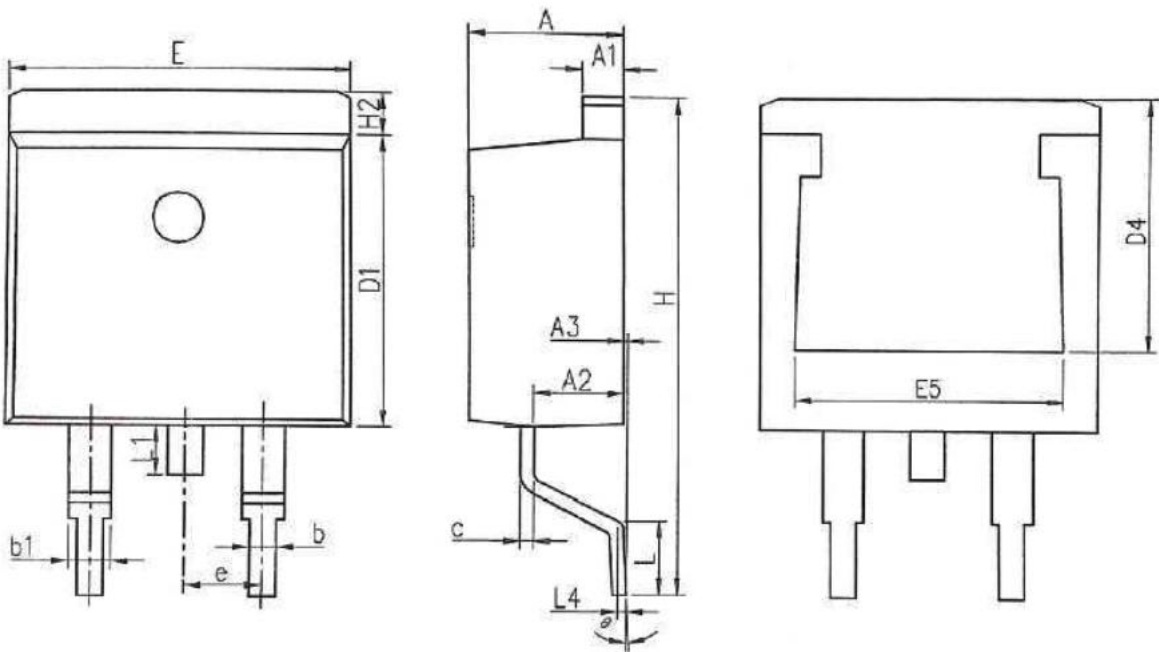


Figure 10. Maximum Safe Operating Area





| SYMBOLS | MILLIMETERS | | INCHES | |
|---------|-------------|-------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 4.370 | 4.770 | 0.172 | 0.188 |
| A1 | 1.220 | 1.420 | 0.048 | 0.056 |
| A2 | 2.200 | 2.890 | 0.087 | 0.114 |
| A3 | 0.000 | 0.250 | 0.000 | 0.010 |
| b | 0.700 | 0.960 | 0.028 | 0.038 |
| b1 | 1.170 | 1.470 | 0.046 | 0.058 |
| c | 0.300 | 0.530 | 0.012 | 0.021 |
| D1 | 8.500 | 9.300 | 0.335 | 0.366 |
| D4 | 6.600 | - | 0.260 | - |
| E | 9.860 | 10.36 | 0.388 | 0.408 |
| E5 | 7.060 | - | 0.278 | - |
| e | 2.540 BSC | | 0.100 BSC | |
| H | 14.70 | 15.70 | 0.579 | 0.618 |
| H2 | 1.070 | 1.470 | 0.042 | 0.058 |
| L | 2.000 | 2.600 | 0.079 | 0.102 |
| L1 | 1.400 | 1.750 | 0.055 | 0.069 |
| L4 | 0.250 BSC | | 0.010 BSC | |
| Θ | 0° | 9° | 0° | 9° |

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