

Description

The HSBA3004 is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most applications.

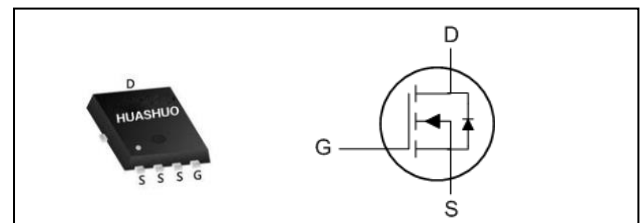
The HSBA3004 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

- 100% EAS Guaranteed
- Green Device Available
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

Product Summary

| | | |
|------------------|-----|------------|
| V_{DS} | 30 | V |
| $R_{DS(ON),max}$ | 8.5 | m Ω |
| I_D | 58 | A |

PRPAK5X6 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 | 58 | A |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, V_{GS} @ 10V ₁ | 38 | A |
| $I_D@T_A=25^\circ C$ | Continuous Drain Current, V_{GS} @ 10V ₁ | 12 | A |
| $I_D@T_A=70^\circ C$ | Continuous Drain Current, V_{GS} @ 10V ₁ | 9.6 | A |
| I_{DM} | Pulsed Drain Current ₂ | 115 | A |
| EAS | Single Pulse Avalanche Energy ₃ | 57.8 | mJ |
| I_{AS} | Avalanche Current | 34 | A |
| $P_D@T_C=25^\circ C$ | Total Power Dissipation ₄ | 46 | 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 | --- | 2.7 | $^\circ C/W$ |



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 | 30 | --- | --- | V |
| ΔBV _{DSS} /ΔT _J | BVDSS Temperature Coefficient | Reference to 25°C, I _D =1mA | --- | 0.027 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ₂ | V _{GS} =10V, I _D =30A | --- | 6.5 | 8.5 | mΩ |
| | | V _{GS} =4.5V, I _D =15A | --- | 11 | 14 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250uA | 1.2 | 1.5 | 2.5 | V |
| ΔV _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | -5.8 | --- | 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 =30A | --- | 38 | --- | S |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 1.7 | 2.9 | Ω |
| Q _g | Total Gate Charge (4.5V) | V _{DS} =15V, V _{GS} =4.5V, I _D =15A | --- | 12.6 | 17.6 | nC |
| Q _{gs} | Gate-Source Charge | | --- | 4.2 | 5.9 | |
| Q _{gd} | Gate-Drain Charge | | --- | 5.1 | 7.1 | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =15V, V _{GS} =10V, R _G =3.3Ω I _D =15A | --- | 4.6 | 9.2 | ns |
| T _r | Rise Time | | --- | 12.2 | 22 | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 26.6 | 53 | |
| T _f | Fall Time | | --- | 8 | 16 | |
| C _{iss} | Input Capacitance | V _{DS} =15V, V _{GS} =0V, f=1MHz | --- | 1317 | 1844 | pF |
| C _{oss} | Output Capacitance | | --- | 163 | 228 | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 131 | 183 | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|--|---|------|------|------|------|
| I _S | Continuous Source Current _{1,5} | V _G =V _D =0V, Force Current | --- | --- | 58 | A |
| I _{SM} | Pulsed Source Current _{2,5} | | --- | --- | 115 | A |
| V _{SD} | Diode Forward Voltage ₂ | V _{GS} =0V, I _S =1A, T _J =25°C | --- | --- | 1 | V |
| t _{rr} | Reverse Recovery Time | I _F =30A, dI/dt=100A/μs, | --- | 9.2 | --- | nS |
| Q _{rr} | Reverse Recovery Charge | T _J =25°C | --- | 2 | --- | 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}=34A
- 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

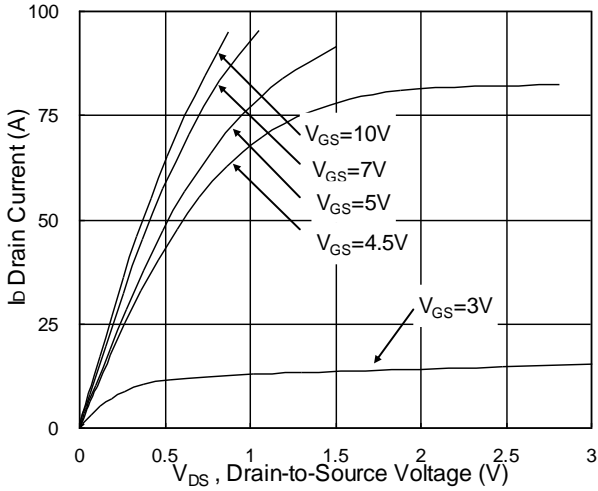


Fig.1 Typical Output Characteristics

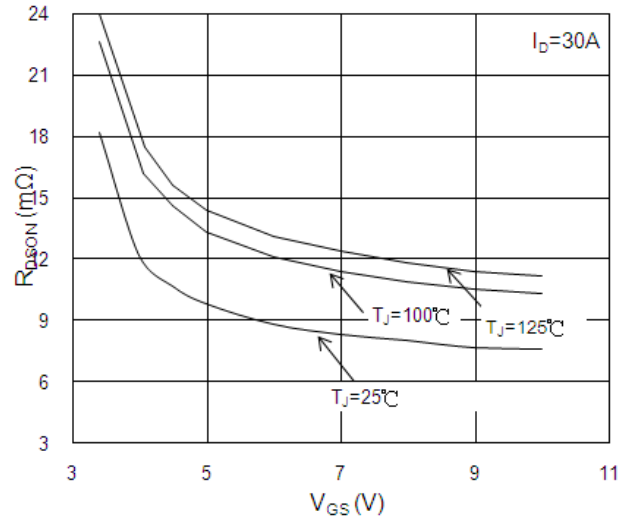


Fig.2 On-Resistance vs. Gate-Source

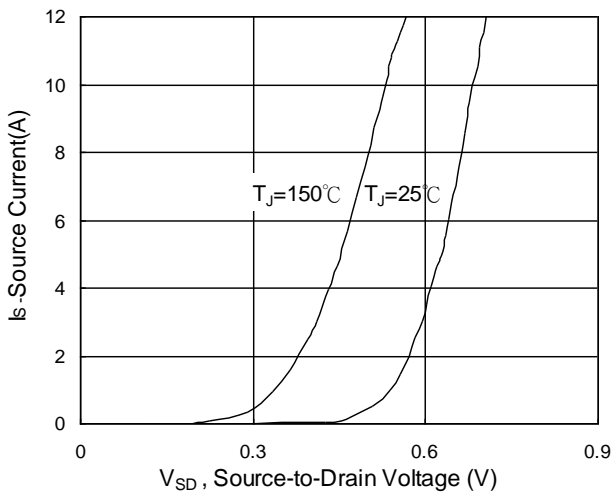


Fig.3 Forward Characteristics of reverse

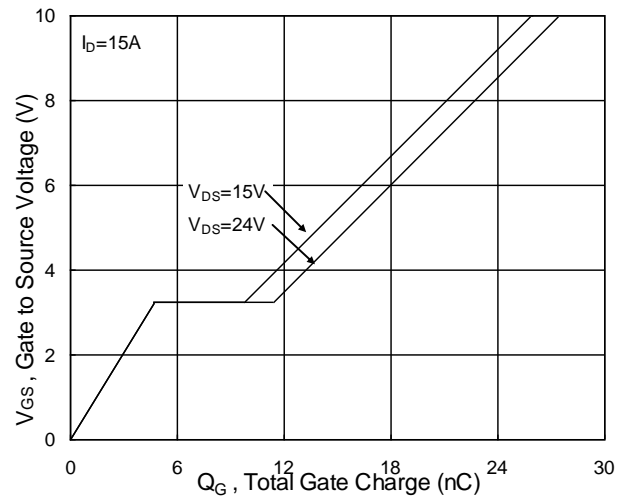


Fig.4 Gate-Charge Characteristics

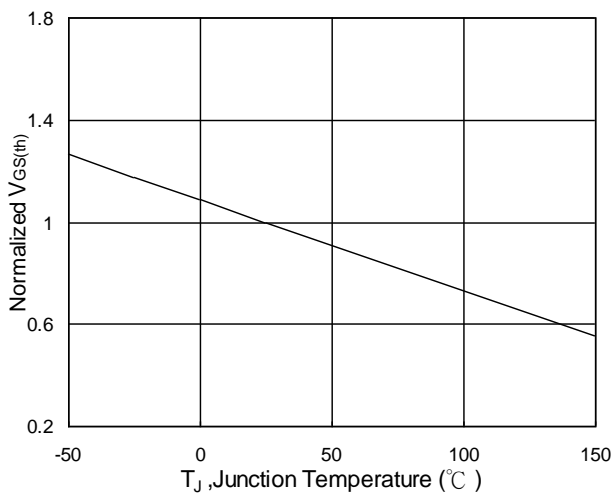


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

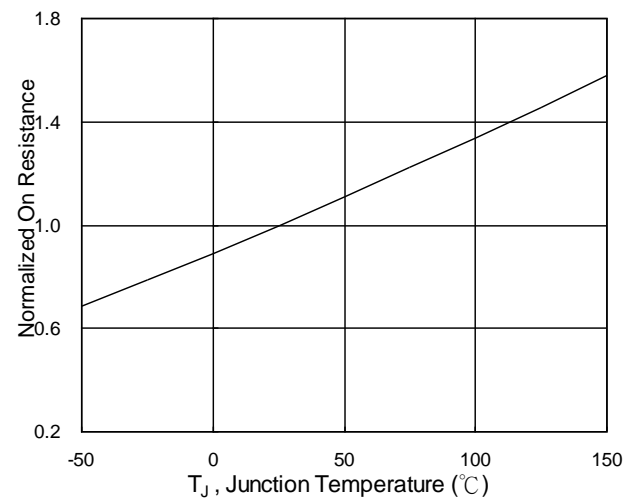


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

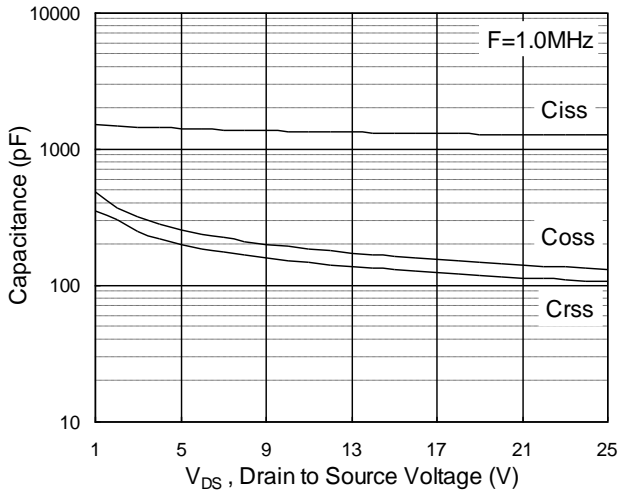


Fig.7 Capacitance

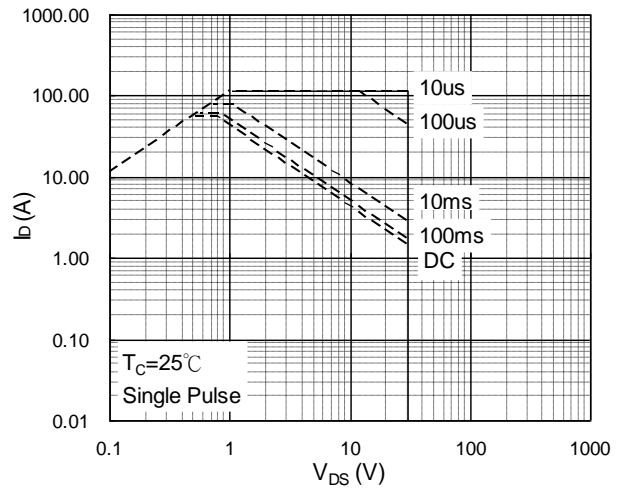


Fig.8 Safe Operating Area

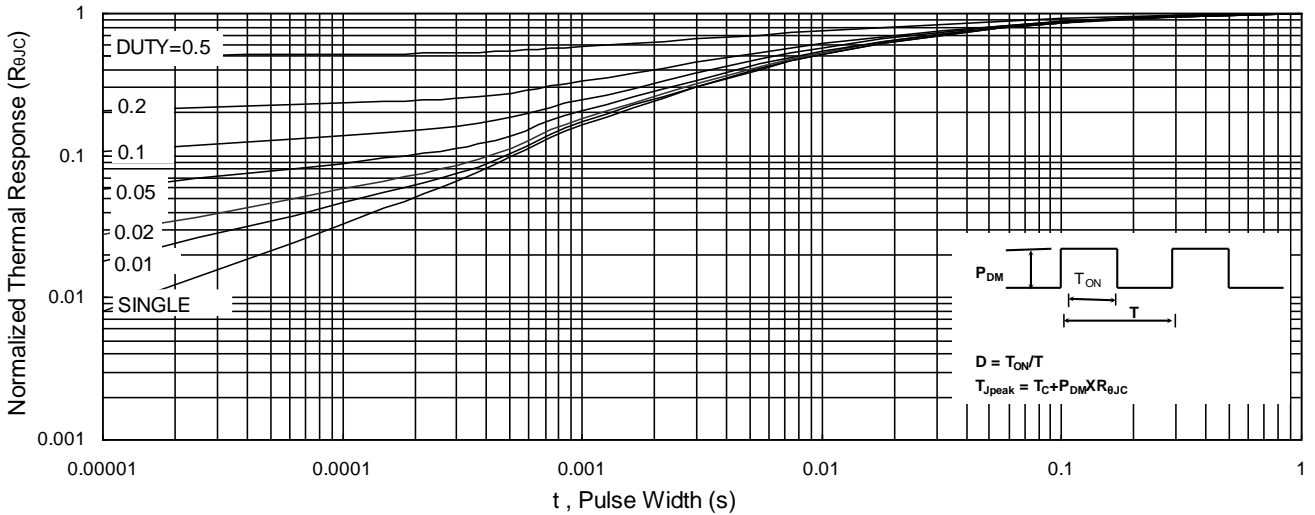


Fig.9 Normalized Maximum Transient Thermal Impedance

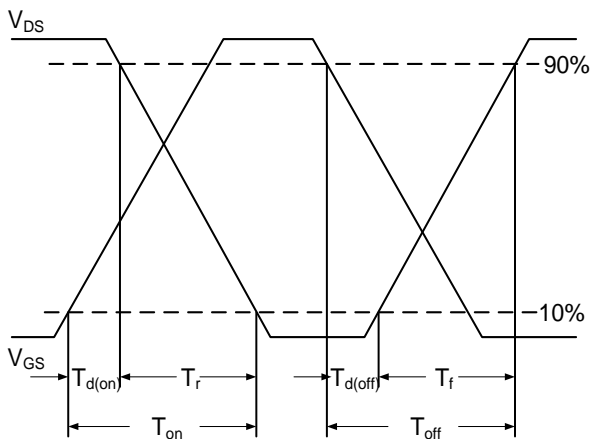


Fig.10 Switching Time Waveform

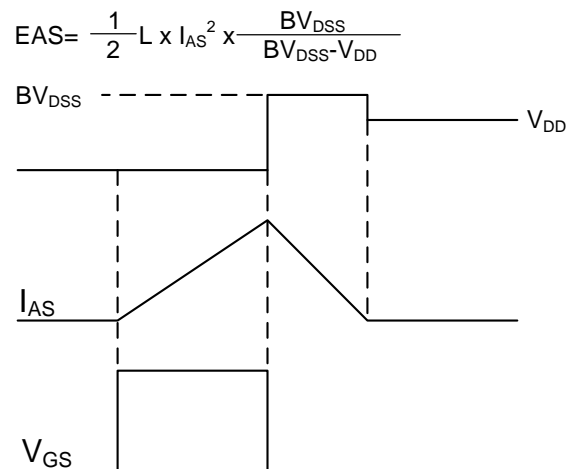
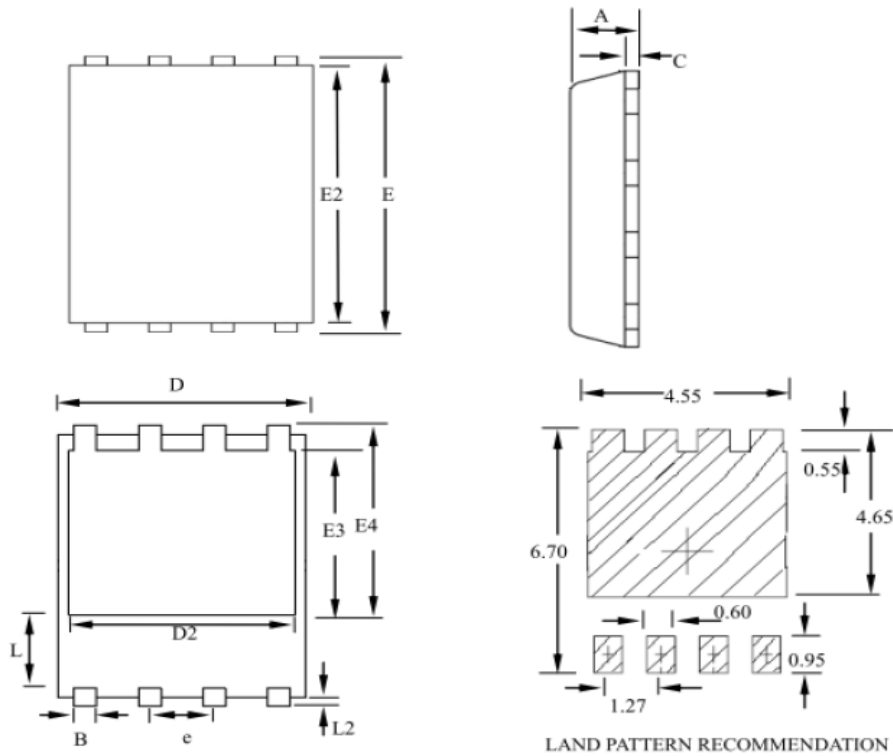


Fig.11 Unclamped Inductive Switching

Ordering Information

| Part Number | Package code | Packaging |
|-------------|--------------|----------------|
| HSBA3004 | PRPAK5*6 | 3000/Tape&Reel |



| SYMBOLS | MILLIMETERS | | | INCHES | | |
|---------|-------------|------|------|--------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.80 | -- | 1.20 | 0.031 | -- | 0.047 |
| B | 0.30 | -- | 0.51 | 0.012 | -- | 0.020 |
| C | 0.15 | -- | 0.35 | 0.006 | -- | 0.014 |
| D | 4.80 | -- | 5.30 | 0.189 | -- | 0.209 |
| D2 | 3.61 | -- | 4.35 | 0.142 | -- | 0.171 |
| E | 5.90 | -- | 6.35 | 0.232 | -- | 0.250 |
| E2 | 5.42 | -- | 5.90 | 0.213 | -- | 0.232 |
| E3 | 3.23 | -- | 3.90 | 0.127 | -- | 0.154 |
| E4 | 3.69 | -- | 4.55 | 0.145 | -- | 0.179 |
| L | 0.61 | -- | 1.80 | 0.024 | -- | 0.071 |
| L2 | 0.05 | -- | 0.36 | 0.002 | -- | 0.014 |
| e | -- | 1.27 | -- | -- | 0.050 | -- |