

Description

The HSBB3202 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.

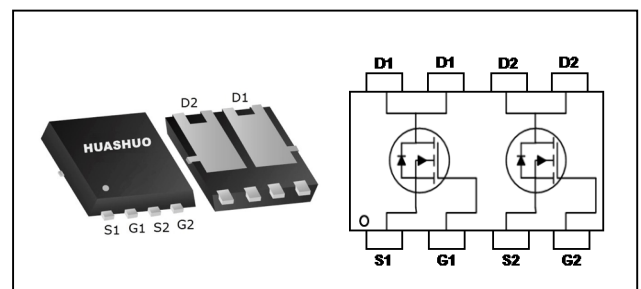
The HSBB3202 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

- 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 |
| $R_{DS(ON),max}$ | 18 | m Ω |
| I_D | 28 | A |

PRPAK3X3 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, $V_{GS} @ 10V^1$ | 28 | A |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 18 | A |
| $I_D@T_A=25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 7.4 | A |
| $I_D@T_A=70^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 6 | A |
| I_{DM} | Pulsed Drain Current ² | 56 | A |
| EAS | Single Pulse Avalanche Energy ³ | 22.1 | mJ |
| I_{AS} | Avalanche Current | 21 | 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 | 1.67 | 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 | --- | 75 | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | --- | 6 | $^\circ C/W$ |



Electrical Characteristics ($T_J=25\text{ }^\circ\text{C}$, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------|--|---|------|-------|-----------|----------------------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 30 | --- | --- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | BVDSS Temperature Coefficient | Reference to 25°C , $I_D=1\text{mA}$ | --- | 0.022 | --- | $V/^\circ\text{C}$ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance ² | $V_{GS}=10V, I_D=10A$ | --- | --- | 18 | m Ω |
| | | $V_{GS}=4.5V, I_D=5A$ | --- | --- | 30 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=250\mu A$ | 1.0 | --- | 2.5 | V |
| $\Delta V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | -5.1 | --- | $\text{mV}/^\circ\text{C}$ |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=24V, V_{GS}=0V, T_J=25^\circ\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=24V, V_{GS}=0V, T_J=55^\circ\text{C}$ | --- | --- | 5 | |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | --- | --- | ± 100 | nA |
| gfs | Forward Transconductance | $V_{DS}=5V, I_D=10A$ | --- | 4.5 | --- | S |
| R_g | Gate Resistance | $V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$ | --- | 2.5 | --- | Ω |
| Q_g | Total Gate Charge (4.5V) | $V_{DS}=20V, V_{GS}=4.5V, I_D=10A$ | --- | 7.2 | --- | nC |
| Q_{gs} | Gate-Source Charge | | --- | 1.4 | --- | |
| Q_{gd} | Gate-Drain Charge | | --- | 2.2 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}=12V, V_{GS}=10V, R_G=3.3\Omega$ $I_D=5A$ | --- | 4.1 | --- | ns |
| T_r | Rise Time | | --- | 9.8 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 15.5 | --- | |
| T_f | Fall Time | | --- | 6.0 | --- | |
| C_{iss} | Input Capacitance | $V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$ | --- | 572 | --- | pF |
| C_{oss} | Output Capacitance | | --- | 81 | --- | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 65 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------|--|---|------|------|------|------|
| I_S | Continuous Source Current ^{1,5} | $V_G=V_D=0V$, Force Current | --- | --- | 28 | A |
| I_{SM} | Pulsed Source Current ^{2,5} | | --- | --- | 56 | A |
| V_{SD} | Diode Forward Voltage ² | $V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$ | --- | --- | 1.2 | V |

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 $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=21A$
- 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

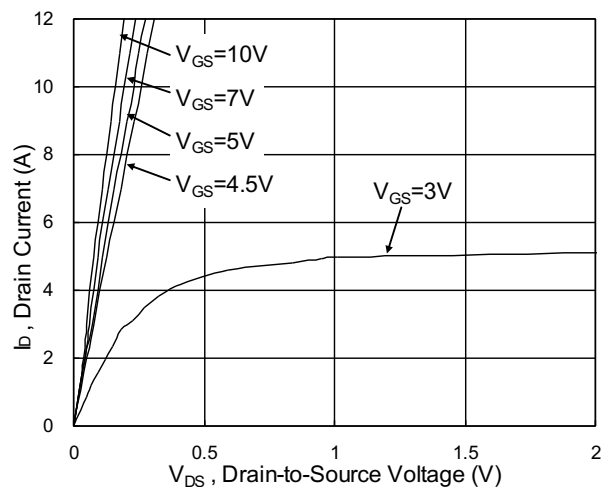


Fig.1 Typical Output Characteristics

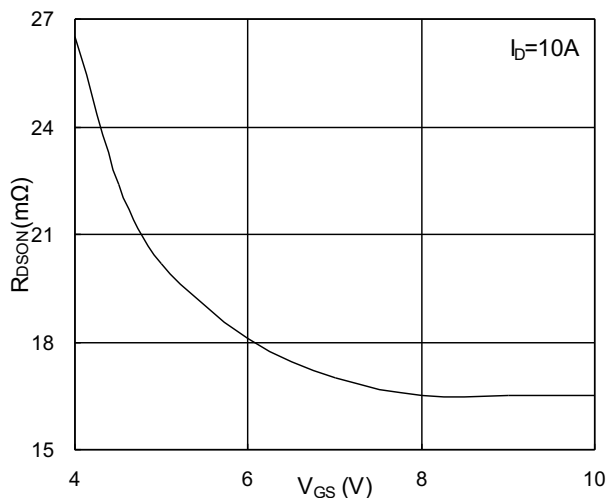


Fig.2 On-Resistance vs. G-S Voltage

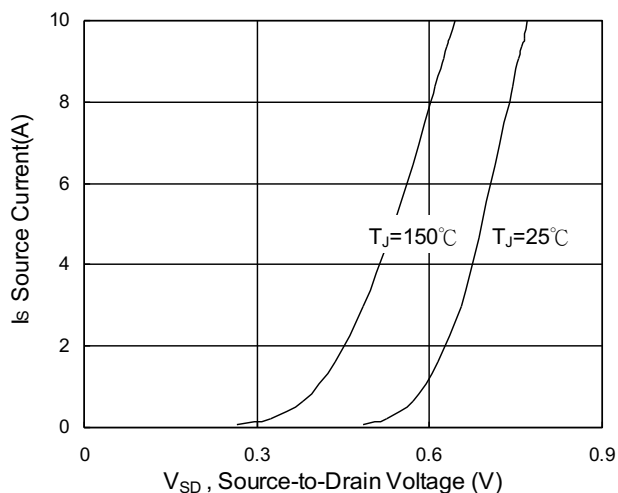


Fig.3 Source Drain Forward Characteristics

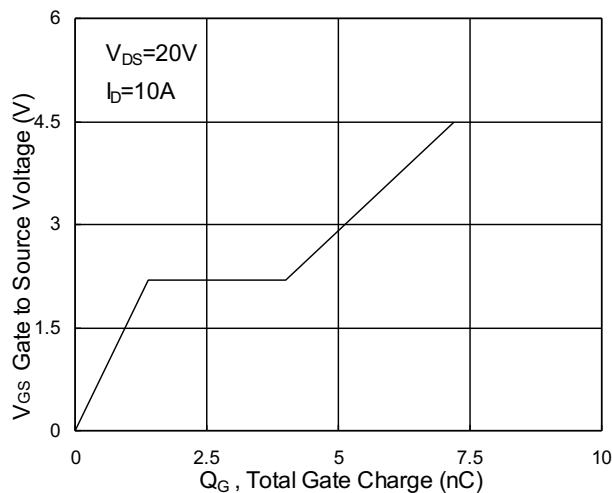


Fig.4 Gate-Charge Characteristics

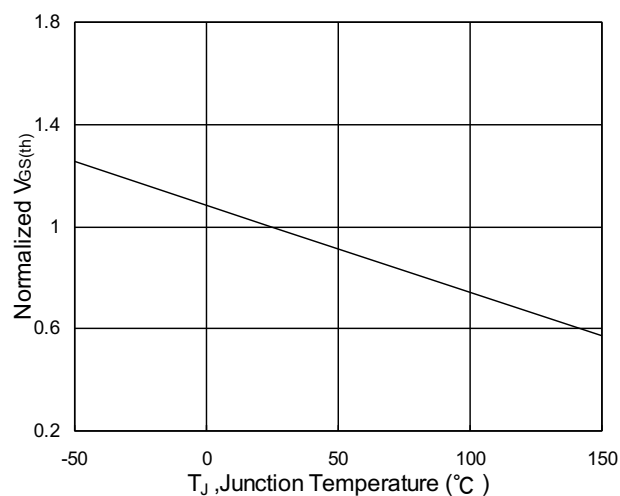


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

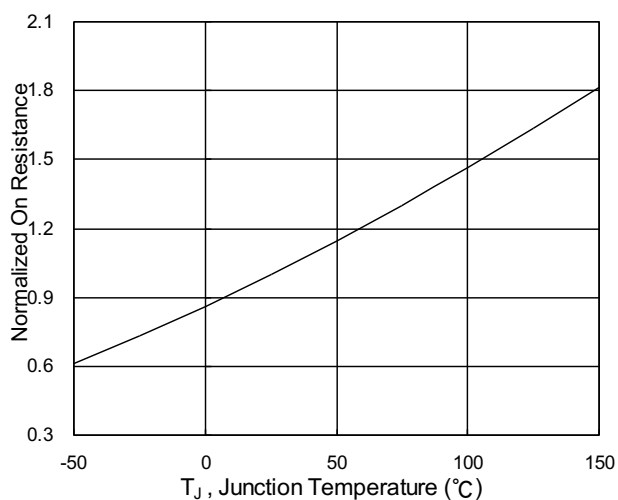


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

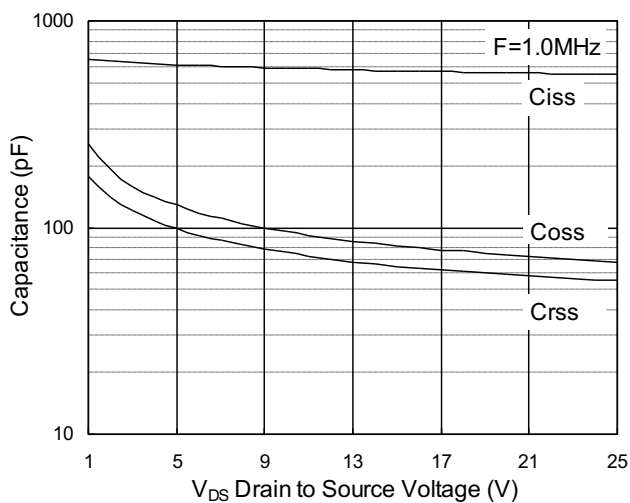


Fig.7 Capacitance

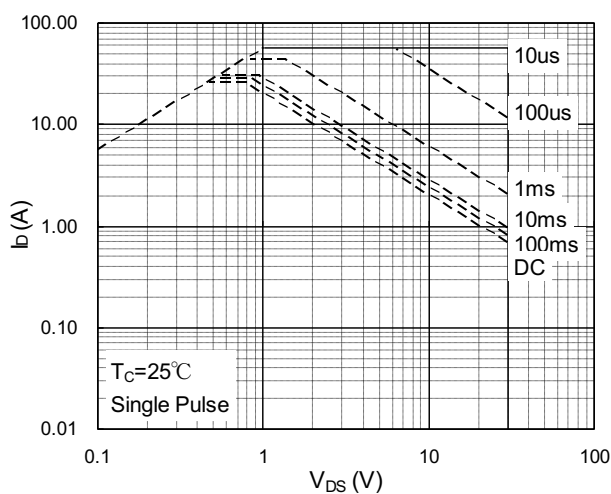


Fig.8 Safe Operating Area

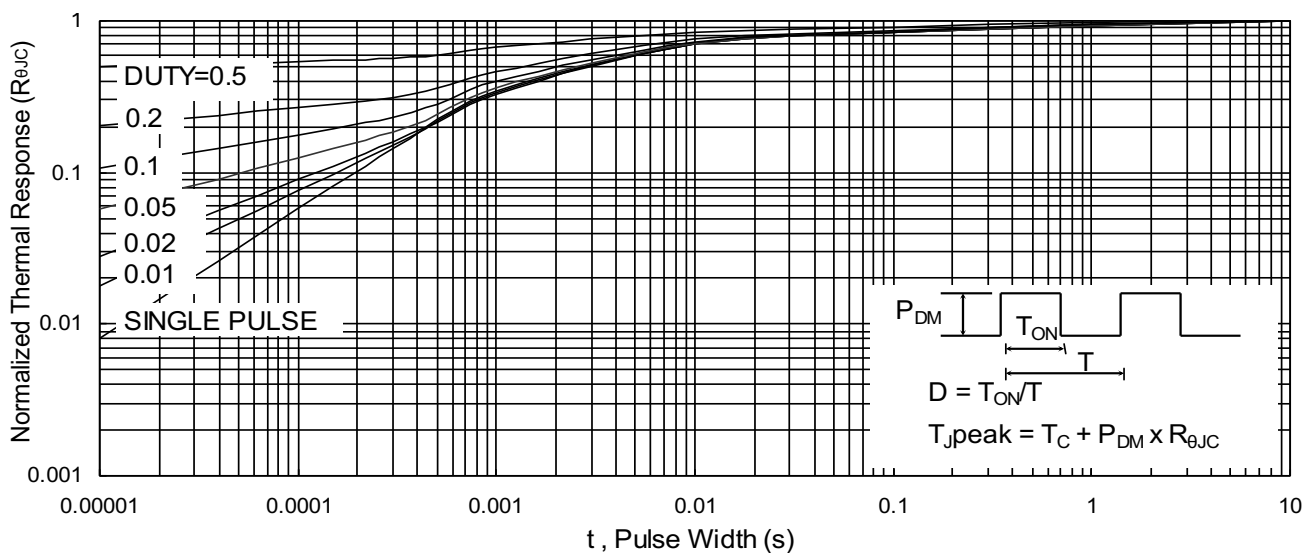


Fig.9 Normalized Maximum Transient Thermal Impedance

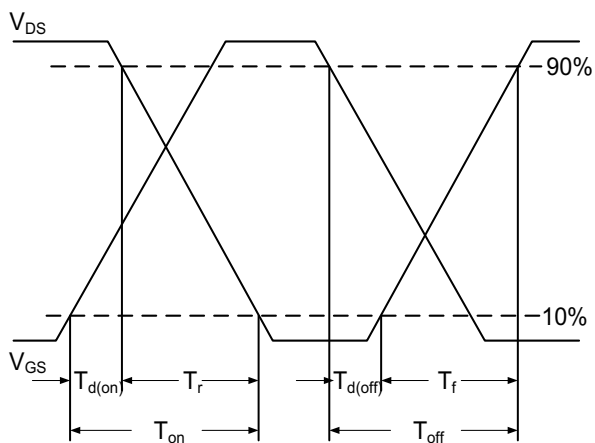


Fig.10 Switching Time Waveform

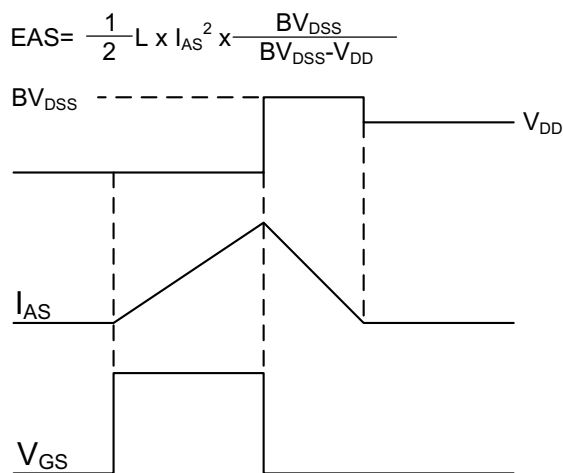
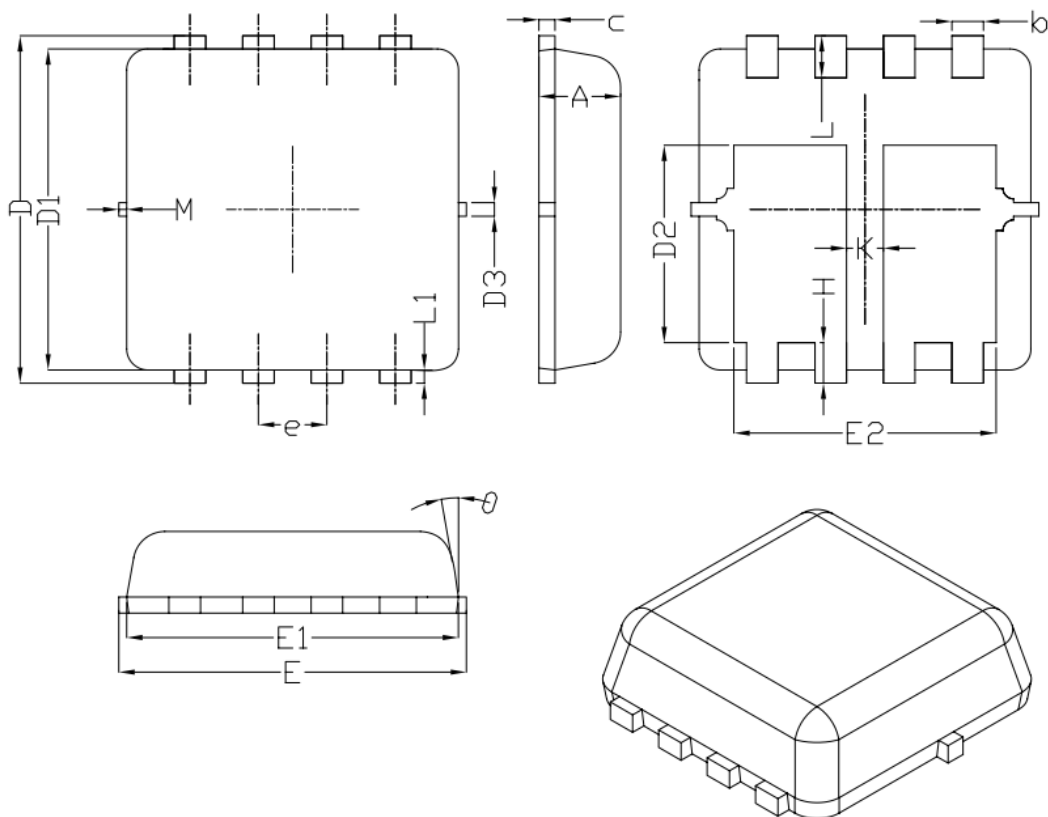


Fig.11 Unclamped Inductive Switching Waveform



PRPAK3X3 Package Outline Dimensions



| SYMBOL | DIMENSIONAL REQMTS | | |
|-----------------|--------------------|------|------|
| | MIN | NOM | MAX |
| A | 0.70 | 0.75 | 0.80 |
| b | 0.25 | 0.30 | 0.35 |
| c | 0.10 | 0.15 | 0.25 |
| D | 3.25 | 3.35 | 3.45 |
| D1 | 3.00 | 3.10 | 3.20 |
| D2 | 1.78 | 1.88 | 1.98 |
| D3 | --- | 0.13 | --- |
| E | 3.20 | 3.30 | 3.40 |
| E1 | 3.00 | 3.15 | 3.20 |
| E2 | 2.39 | 2.49 | 2.59 |
| e | 0.65BSC | | |
| H | 0.30 | 0.39 | 0.50 |
| L | 0.30 | 0.40 | 0.50 |
| L1 | --- | 0.13 | --- |
| K | 0.30 | --- | --- |
| theta | --- | 10° | 12° |
| M | * | * | 0.15 |
| * Not specified | | | |