

## General Description

The HSBB10P15 uses advanced trench MOSFET technology to provide excellent  $R_{DS(ON)}$  and gate charge for use in a wide variety of other applications.

The HSBB10P15 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

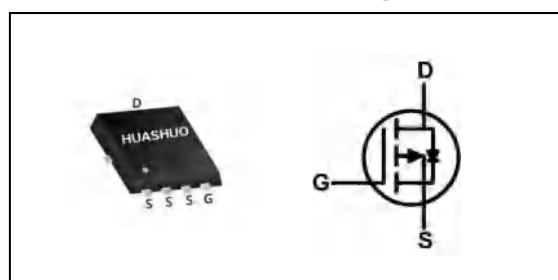
## Product Summary

|                  |      |            |
|------------------|------|------------|
| $V_{DS}$         | -150 | V          |
| $R_{DS(ON),typ}$ | 290  | m $\Omega$ |
| $I_D$            | -10  | A          |

## Features

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

## PRPAK3\*3 Pin Configuration



## Absolute Maximum Ratings

| Symbol                 | Parameter                                   | Rating     | Units       |
|------------------------|---------------------------------------------|------------|-------------|
| $V_{DS}$               | Drain-Source Voltage                        | -150       | V           |
| $V_{GS}$               | Gate-Source Voltage                         | $\pm 20$   | V           |
| $I_D@T_C=25^{\circ}C$  | Continuous Drain Current, $V_{GS} @ -10V^1$ | -10        | A           |
| $I_D@T_C=100^{\circ}C$ | Continuous Drain Current, $V_{GS} @ -10V^1$ | -7         | A           |
| $I_{DM}$               | Pulsed Drain Current <sup>2</sup>           | -35        | A           |
| EAS                    | Single Pulse Avalanche Energy <sup>3</sup>  | 73         | mJ          |
| $P_D@T_C=25^{\circ}C$  | Total Power Dissipation <sup>4</sup>        | 35         | 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 <sup>1</sup> | ---  | 62   | $^{\circ}C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 2.9  | $^{\circ}C/W$ |

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

| Symbol       | Parameter                                      | Conditions                                                     | Min. | Typ. | Max.      | Unit      |
|--------------|------------------------------------------------|----------------------------------------------------------------|------|------|-----------|-----------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage                 | $V_{GS}=0V$ , $I_D=-250\mu A$                                  | -150 | ---  | ---       | V         |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=-10V$ , $I_D=-5A$                                      | ---  | 290  | 345       | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage                         | $V_{GS}=V_{DS}$ , $I_D=-250\mu A$                              | -2   | -2.7 | -4        | V         |
| $I_{DSS}$    | Drain-Source Leakage Current                   | $V_{DS}=-150V$ , $V_{GS}=0V$ , $T_J=25^\circ\text{C}$          | ---  | ---  | -1        | $\mu A$   |
| $I_{GSS}$    | Gate-Source Leakage Current                    | $V_{GS}=\pm 20V$ , $V_{DS}=0V$                                 | ---  | ---  | $\pm 100$ | nA        |
| $g_{fs}$     | Forward Transconductance                       | $V_{DS}=-10V$ , $I_D=-5A$                                      | ---  | 10   | ---       | S         |
| $R_g$        | Gate resistance                                | $V_{GS}=0V$ , $V_{DS}=0V$ , $f=1.0\text{MHz}$                  | ---  | 5    | ---       | $\Omega$  |
| $Q_g$        | Total Gate Charge                              | $V_{DS}=-50V$ , $V_{GS}=-10V$ , $I_D=-5A$                      | ---  | 39   | ---       | nC        |
| $Q_{gs}$     | Gate-Source Charge                             |                                                                | ---  | 8.1  | ---       |           |
| $Q_{gd}$     | Gate-Drain Charge                              |                                                                | ---  | 9.5  | ---       |           |
| $T_{d(on)}$  | Turn-On Delay Time                             | $V_{DD}=-50V$ , $V_{GS}=-10V$ , $R_G=3.3\Omega$ ,<br>$I_D=-5A$ | ---  | 33   | ---       | ns        |
| $T_r$        | Rise Time                                      |                                                                | ---  | 27   | ---       |           |
| $T_{d(off)}$ | Turn-Off Delay Time                            |                                                                | ---  | 250  | ---       |           |
| $T_f$        | Fall Time                                      |                                                                | ---  | 130  | ---       |           |
| $C_{iss}$    | Input Capacitance                              | $V_{DS}=-50V$ , $V_{GS}=0V$ , $f=1\text{MHz}$                  | ---  | 2021 | ---       | pF        |
| $C_{oss}$    | Output Capacitance                             |                                                                | ---  | 44   | ---       |           |
| $C_{rss}$    | Reverse Transfer Capacitance                   |                                                                | ---  | 37   | ---       |           |

**Diode Characteristics**

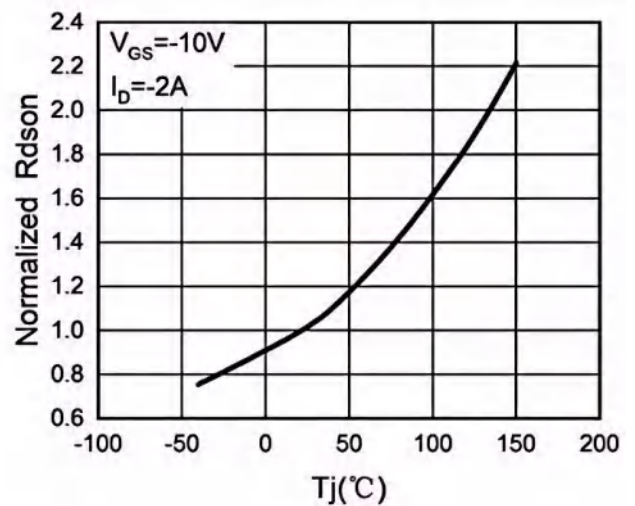
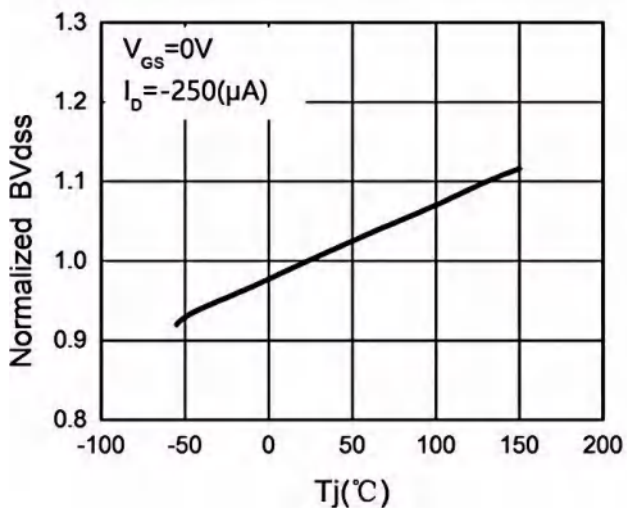
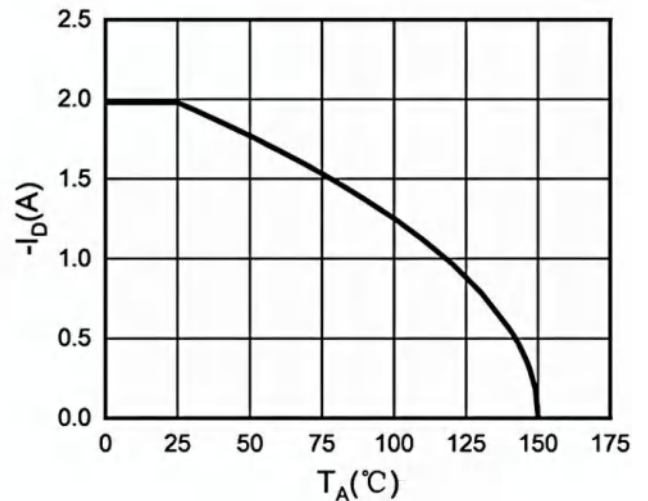
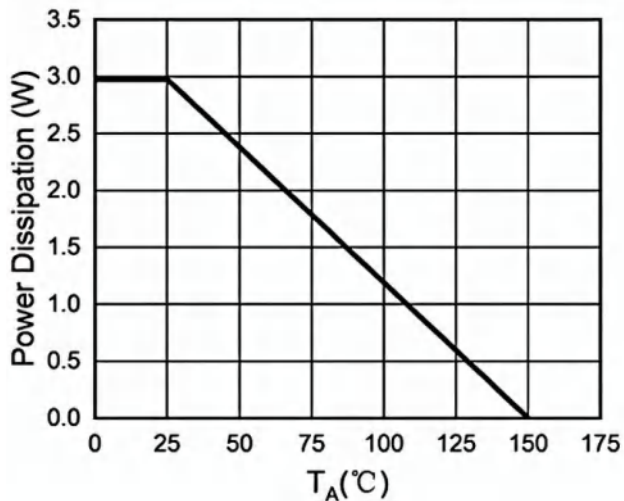
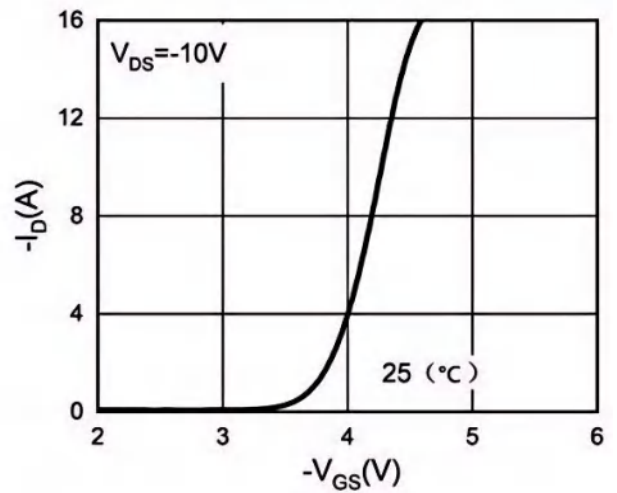
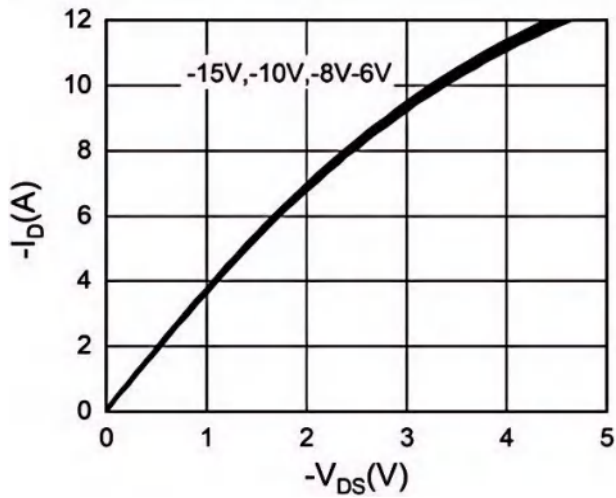
| Symbol   | Parameter                                | Conditions                                                  | Min. | Typ. | Max. | Unit |
|----------|------------------------------------------|-------------------------------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current <sup>1,5</sup> | $V_G=V_D=0V$ , Force Current                                | ---  | ---  | -10  | A    |
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup>       | $V_{GS}=0V$ , $I_S=-1A$ , $T_J=25^\circ\text{C}$            | ---  | ---  | -1.2 | V    |
| $t_{rr}$ | Reverse Recovery Time                    | $I_F=-2A$ , $di/dt=-100A/\mu s$ ,<br>$T_J=25^\circ\text{C}$ | ---  | 35   | ---  | nS   |
| $Q_{rr}$ | Reverse Recovery Charge                  |                                                             | ---  | 32   | ---  | nC   |

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- 2.The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is  $V_{DD}=-50V$ ,  $V_{GS}=-10V$ ,  $L=0.5mH$
- 4.The power dissipation is limited by  $150^\circ\text{C}$  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



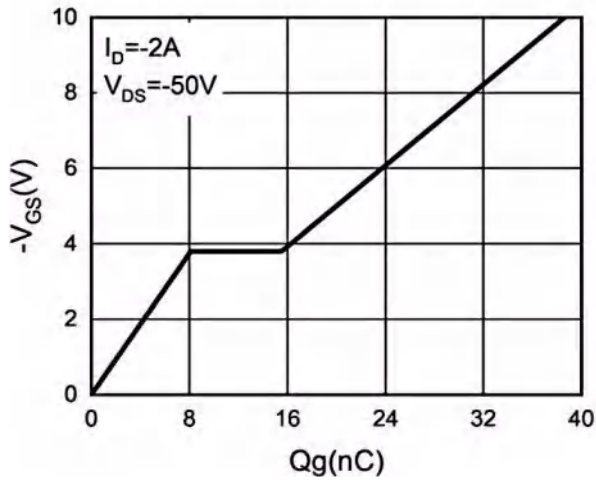


Fig.7 Gate Charge Waveforms

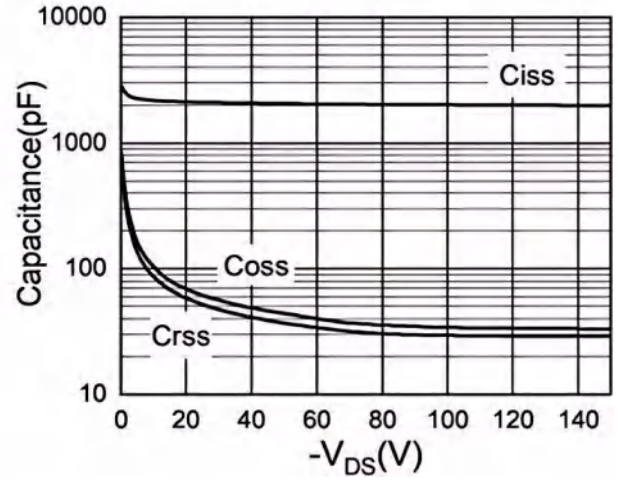


Fig.8 Capacitance

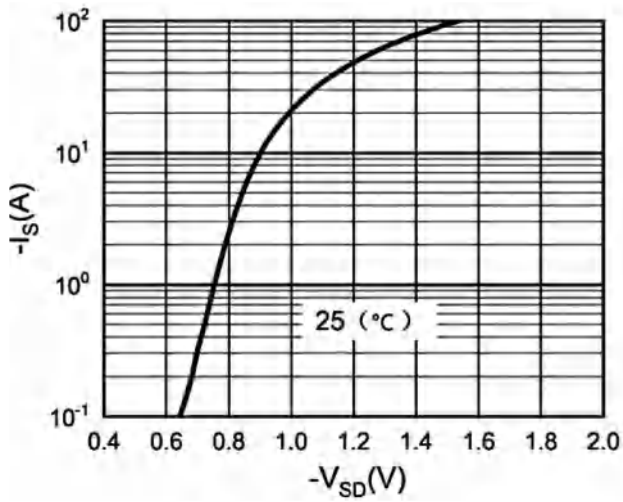


Fig.9 Body Diode Characteristics

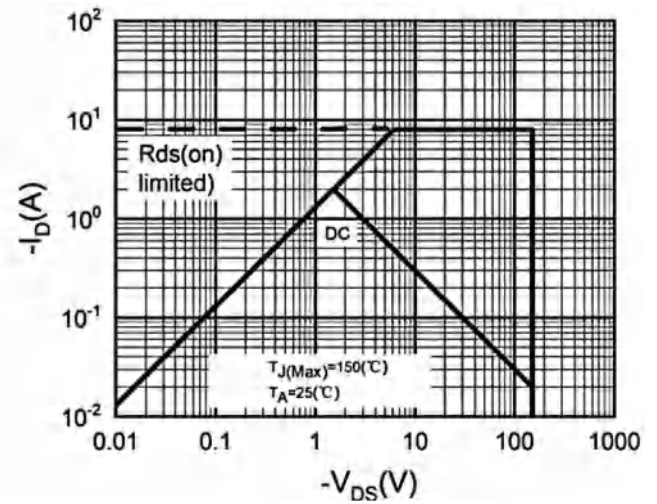
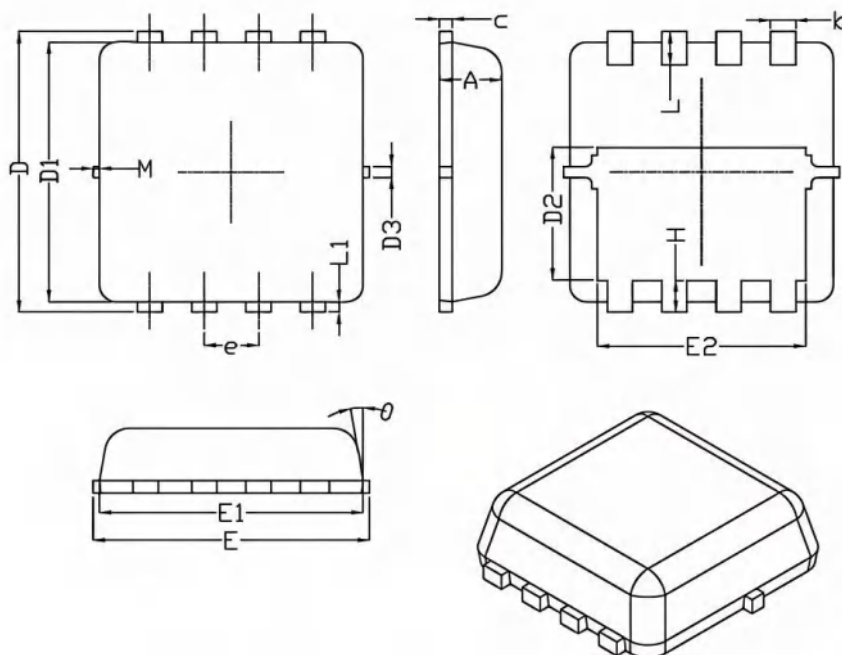


Fig.10 Maximum Safe Operating Area

## Ordering Information

| Part Number | Package code | Packaging      |
|-------------|--------------|----------------|
| HSBB10P15   | PRPAK3*3     | 3000/Tape&Reel |

**PRPAK3\*3(E) Single Package Outline**



| Symbol | Dimensions In Millimeters |      |      |
|--------|---------------------------|------|------|
|        | 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     | 1.48                      | 1.58 | 1.68 |
| D3     | -                         | 0.13 | -    |
| E      | 3.15                      | 3.30 | 3.45 |
| 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 | -    |
| M      | *                         | *    | 0.15 |
| θ      |                           | 10°  | 12°  |

## HSBB10P15 Marking:

