

## Features

- 100% EAS Guaranteed
- Green Device Available
- Excellent CdV/dt effect decline
- Advanced high cell density SGT MOS Technology

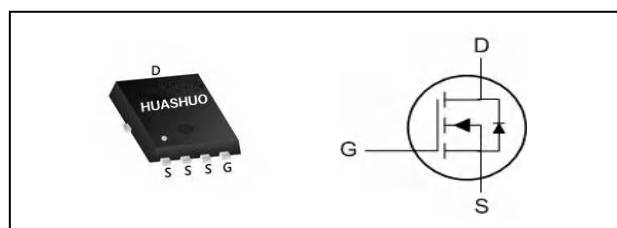
## Product Summary

|                  |     |            |
|------------------|-----|------------|
| $V_{DS}$         | 100 | V          |
| $R_{DS(ON),typ}$ | 5.0 | m $\Omega$ |
| $I_D$            | 90  | A          |

## Applications

- BLDC MOTOR Driver.
- BMS.
- High frequency switching and synchronous rectification.

## PRPAK5\*6 Pin Configuration



## Absolute Maximum Ratings

| Symbol                 | Parameter                                  | Rating     | Units       |
|------------------------|--------------------------------------------|------------|-------------|
| $V_{DS}$               | Drain-Source Voltage                       | 100        | V           |
| $V_{GS}$               | Gate-Source Voltage                        | $\pm 20$   | V           |
| $I_D@T_C=25^{\circ}C$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 90         | A           |
| $I_D@T_C=100^{\circ}C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 58         | A           |
| $I_D@T_A=25^{\circ}C$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 13.5       | A           |
| $I_D@T_A=70^{\circ}C$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 10.3       | A           |
| $I_{DM}$               | Pulsed Drain Current <sup>2</sup>          | 305        | A           |
| $I_{AS}$               | Avalanche Current                          | 13         | A           |
| EAS                    | Single Pulse Avalanche Energy <sup>3</sup> | 43         | mJ          |
| $P_D@T_C=25^{\circ}C$  | Total Power Dissipation <sup>4</sup>       | 92         | W           |
| $P_D@T_C=100^{\circ}C$ | Total Power Dissipation <sup>4</sup>       | 36         | W           |
| $P_D@T_A=25^{\circ}C$  | Total Power Dissipation <sup>4</sup>       | 2.2        | W           |
| $P_D@T_A=70^{\circ}C$  | Total Power Dissipation <sup>4</sup>       | 1.5        | 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>    | ---  | 1.35 | $^{\circ}C/W$ |

**N-Ch 100V Fast Switching MOSFETs**
**Electrical Characteristics ( $T_J=25^\circ\text{C}$ , unless otherwise noted)**

| Symbol       | Parameter                                      | Conditions                                       | Min. | Typ. | Max.      | Unit      |
|--------------|------------------------------------------------|--------------------------------------------------|------|------|-----------|-----------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage                 | $V_{GS}=0V, I_D=250\mu A$                        | 100  | ---  | ---       | V         |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=10V, I_D=20A$                            | ---  | 5.0  | 6.0       | $m\Omega$ |
|              |                                                | $V_{GS}=4.5V, I_D=15A$                           | ---  | 6.5  | 7.8       | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage                         | $V_{GS}=V_{DS}, I_D=250\mu A$                    | 1.2  | 1.6  | 2.2       | V         |
| $I_{DSS}$    | Drain-Source Leakage Current                   | $V_{DS}=80V, V_{GS}=0V, T_J=25^\circ\text{C}$    | ---  | ---  | 1         | $\mu A$   |
|              |                                                | $V_{DS}=80V, V_{GS}=0V, T_J=55^\circ\text{C}$    | ---  | ---  | 10        |           |
| $I_{GSS}$    | Gate-Source Leakage Current                    | $V_{GS}=\pm 20V, V_{DS}=0V$                      | ---  | ---  | $\pm 100$ | nA        |
| gfs          | Forward Transconductance                       | $V_{DS}=5V, I_D=8A$                              | ---  | 35   | ---       | S         |
| $R_g$        | Gate Resistance                                | $V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$            | ---  | 1.3  | ---       | $\Omega$  |
| Qg           | Total Gate Charge (10V)                        | $V_{DS}=30V, V_{GS}=10V, I_D=20A$                | ---  | 38   | ---       | nC        |
| Qgs          | Gate-Source Charge                             |                                                  | ---  | 12   | ---       |           |
| Qgd          | Gate-Drain Charge                              |                                                  | ---  | 8    | ---       |           |
| Td(on)       | Turn-On Delay Time                             | $V_{DD}=50V, V_{GS}=10V, R_G=6.2\Omega, I_D=20A$ | ---  | 20   | ---       | ns        |
| Tr           | Rise Time                                      |                                                  | ---  | 45   | ---       |           |
| Td(off)      | Turn-Off Delay Time                            |                                                  | ---  | 53   | ---       |           |
| Tf           | Fall Time                                      |                                                  | ---  | 18   | ---       |           |
| Ciss         | Input Capacitance                              | $V_{DS}=40V, V_{GS}=0V, f=1\text{MHz}$           | ---  | 1995 | ---       | pF        |
| Coss         | Output Capacitance                             |                                                  | ---  | 796  | ---       |           |
| Crss         | Reverse Transfer Capacitance                   |                                                  | ---  | 28   | ---       |           |

**Diode Characteristics**

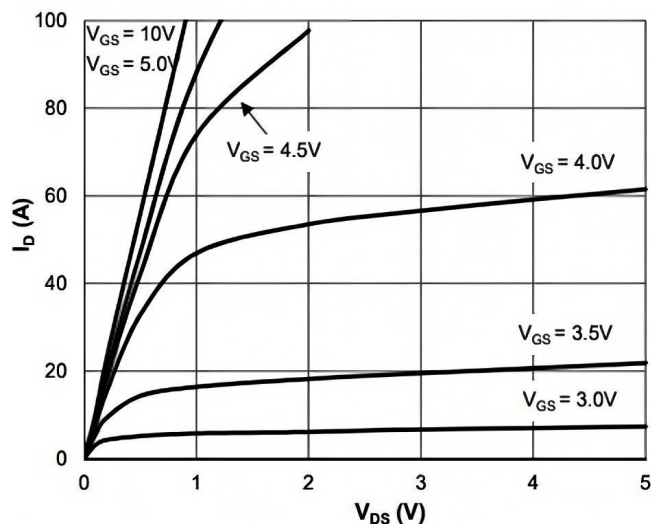
| Symbol   | Parameter                                | Conditions                                        | Min. | Typ. | Max. | Unit |
|----------|------------------------------------------|---------------------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current <sup>1,5</sup> | $V_G=V_D=0V$ , Force Current                      | ---  | ---  | 90   | A    |
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup>       | $V_{GS}=0V, I_S=20A, T_J=25^\circ\text{C}$        | ---  | ---  | 1.2  | V    |
| $t_{rr}$ | Reverse Recovery Time                    | $I_F=20A, di/dt=100A/\mu s, T_J=25^\circ\text{C}$ | ---  | 18   | ---  | nS   |
| $Q_{rr}$ | Reverse Recovery Charge                  |                                                   | ---  | 24   | ---  | nC   |

Note :

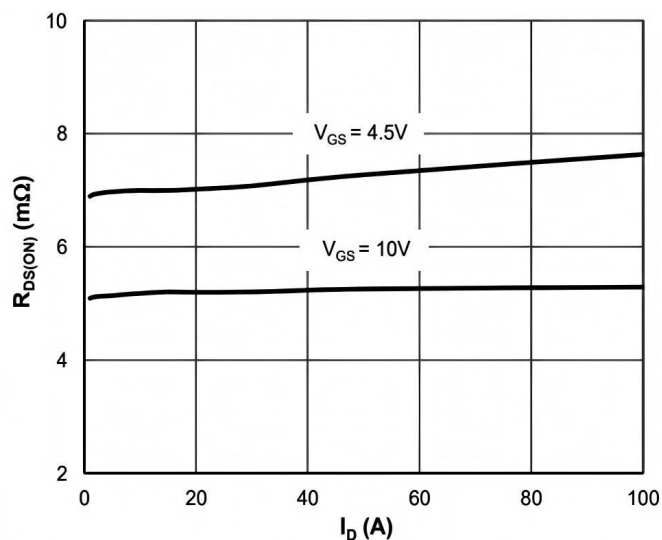
- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- 2.The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is  $V_{DD}=50V, V_{GS}=10V, L=0.5mH, I_{AS}=13A$
- 4.The power dissipation 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.

**N-Ch 100V Fast Switching MOSFETs**

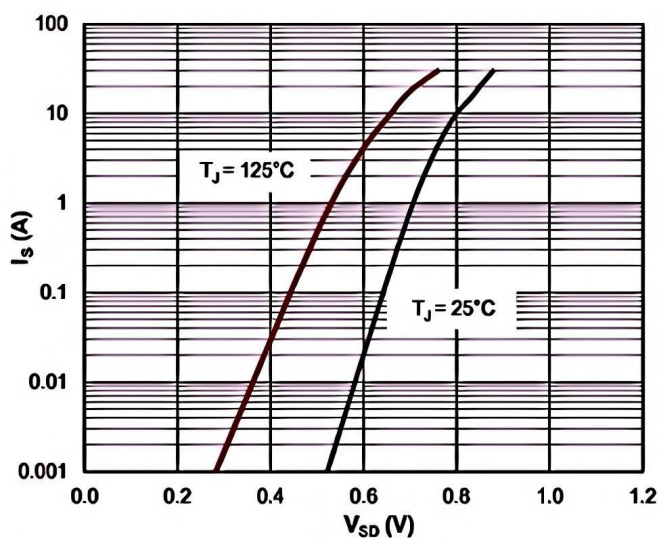
**Typical Characteristics**



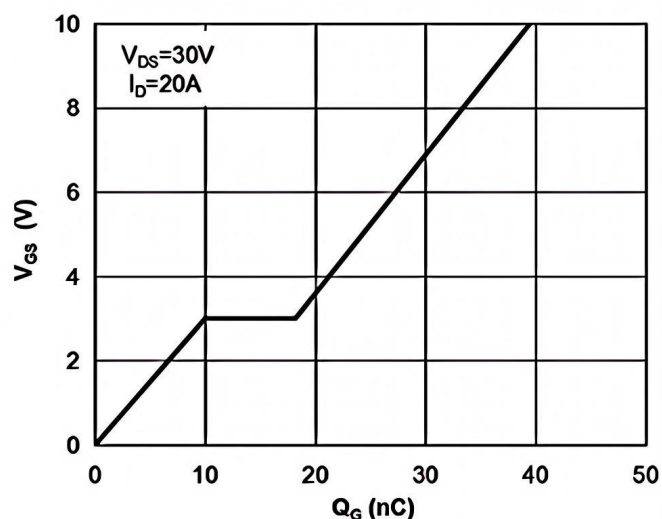
**Fig.1 Typical Output Characteristics**



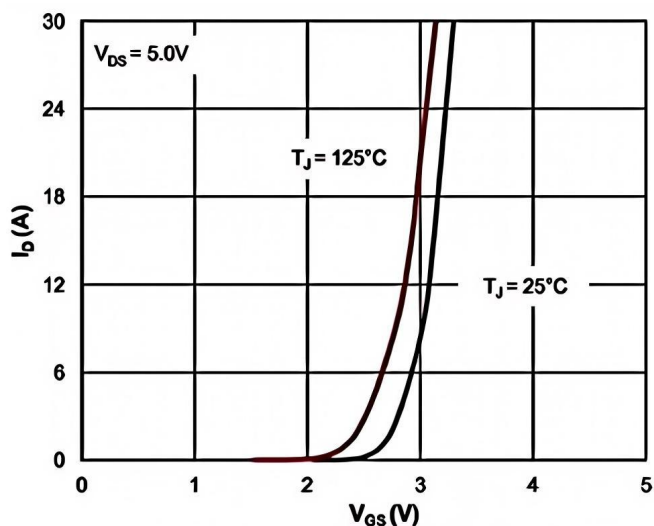
**Fig.2 On-Resistance vs Drain Current**



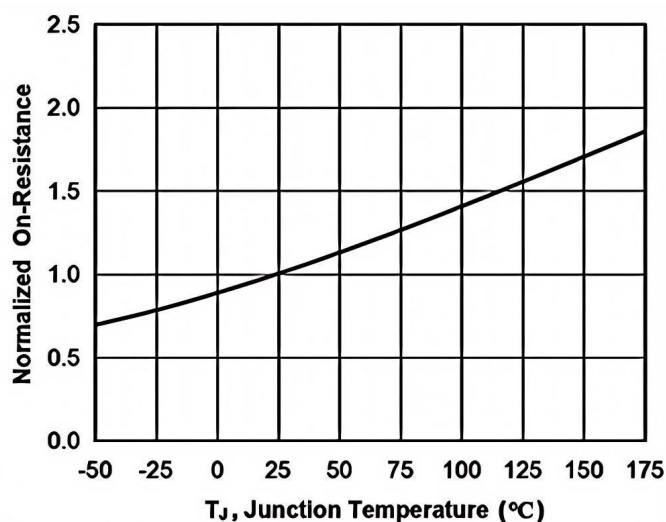
**Fig.3 Forward Characteristics of Reverse**



**Fig.4 Gate-Charge Characteristics**

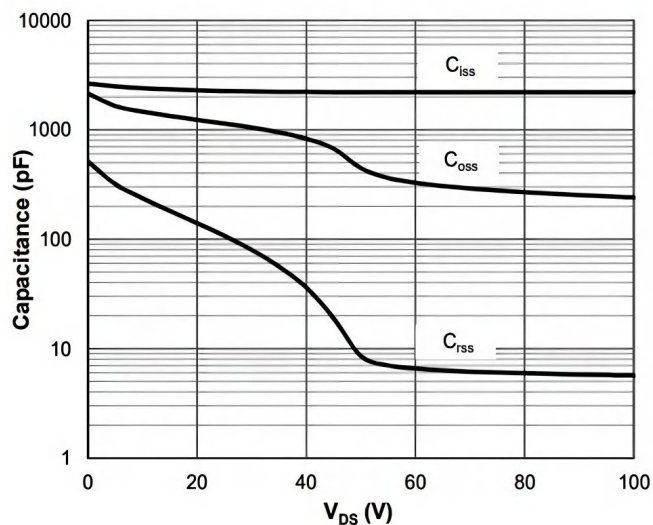


**Fig.5 Typical Transfer Characteristics**

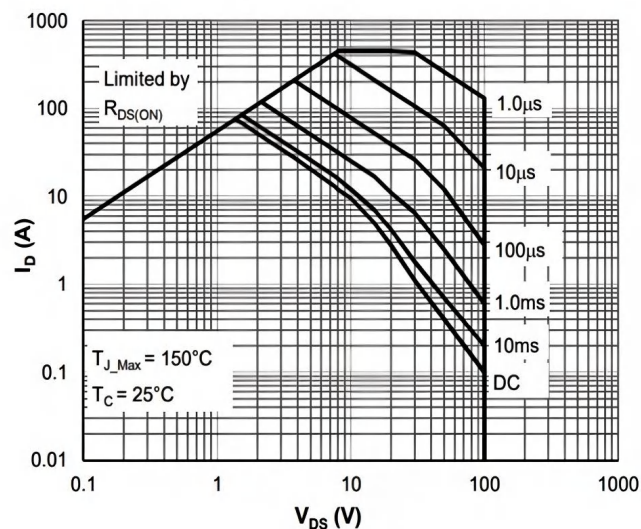


**Fig.6 Normalized  $R_{DS(on)}$  VS  $T_J$**

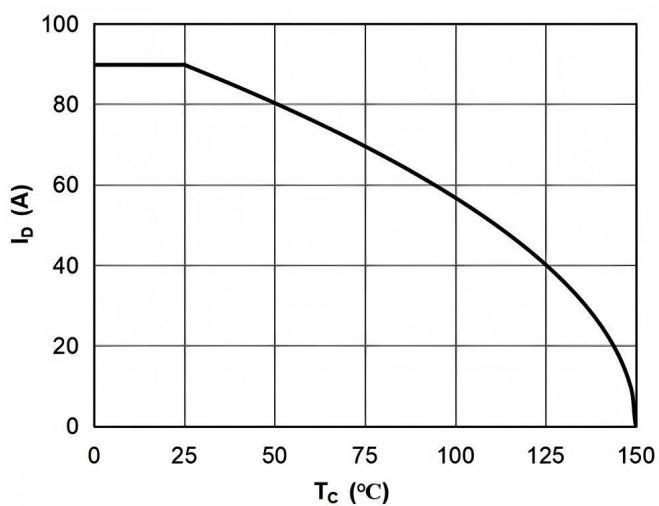
**N-Ch 100V Fast Switching MOSFETs**



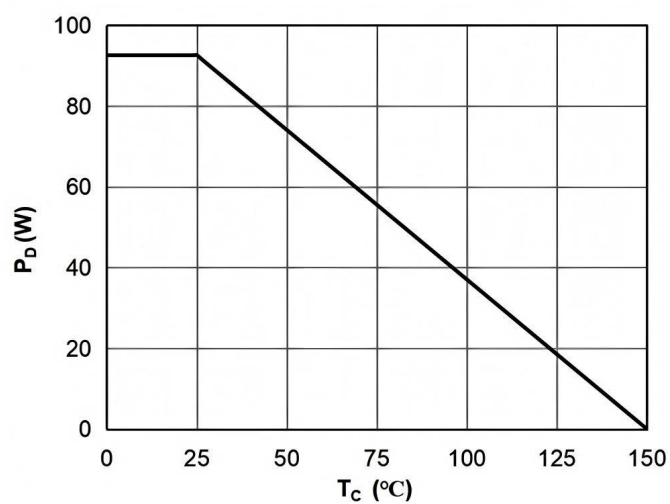
**Fig.7 Capacitance**



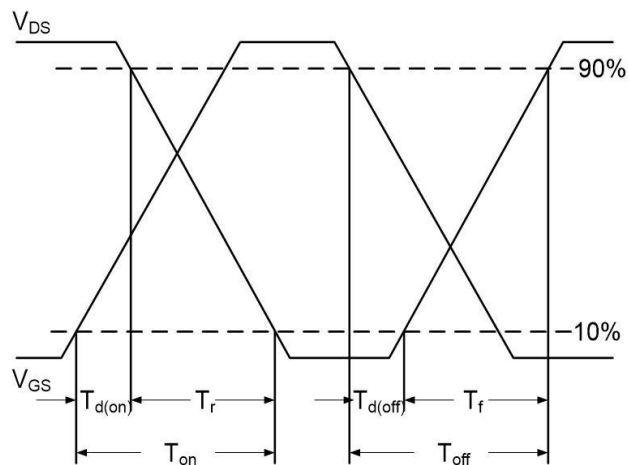
**Fig.8 Safe Operating Area**



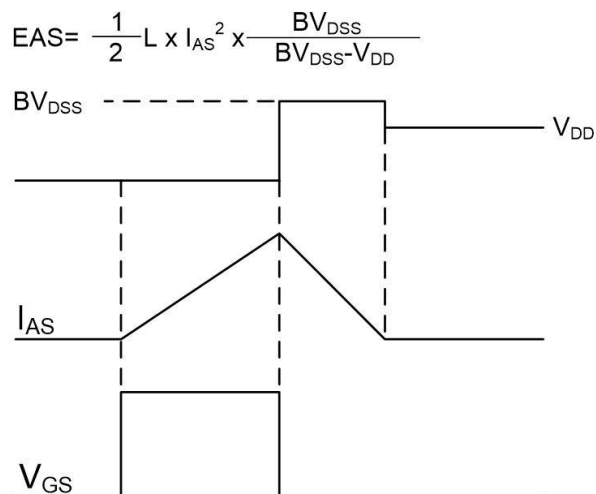
**Fig.9 Drain Current**



**Fig.10 Power Dissipation**



**Fig.11 Switching Time Waveform**

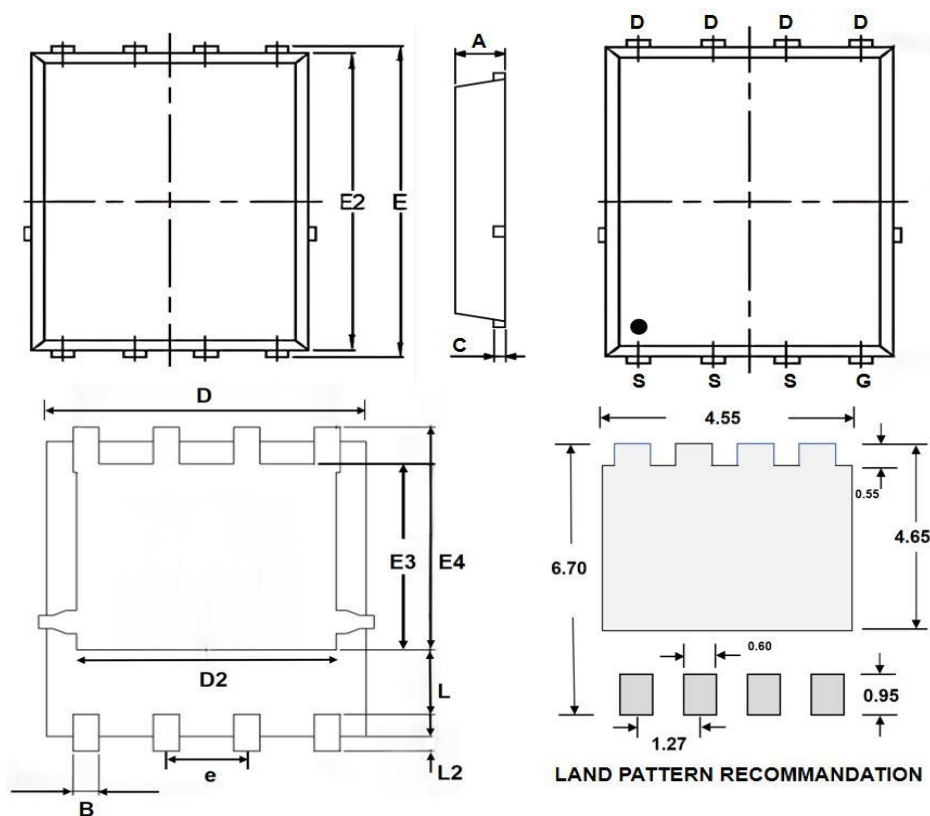


**Fig.12 Unclamped Inductive Switching Waveform**

## Ordering Information

| Part Number     | Package code    | Packaging                 |
|-----------------|-----------------|---------------------------|
| <b>HSBA0072</b> | <b>PRPAK5*6</b> | <b>3000/Tape&amp;Reel</b> |

**PRPAK5\*6 Package Outline**



| SYMBOLS | MILLIMETERS |      |      | INCHES |       |       |
|---------|-------------|------|------|--------|-------|-------|
|         | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A       | 0.80        | --   | 1.20 | 0.031  | --    | 0.047 |
| B       | 0.25        | --   | 0.51 | 0.012  | --    | 0.020 |
| C       | 0.15        | --   | 0.35 | 0.006  | --    | 0.014 |
| D       | 4.80        | --   | 5.45 | 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        | --   | 6.06 | 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 | --    |

## HSBA0072 Marking:

