

## General Description

The HSBL020N08 is the high cell density SGT N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous rectification applications.

The HSBL020N08 meet the RoHS and Halogen-Free compliant product requirement, 100% EAS guaranteed with full function reliability approved.

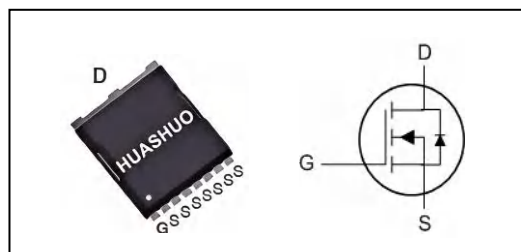
## Features

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

## Product Summary

|                  |     |            |
|------------------|-----|------------|
| $V_{DS}$         | 80  | V          |
| $R_{DS(ON),typ}$ | 1.4 | m $\Omega$ |
| $I_D$            | 240 | A          |

## TOLL Pin Configuration



## Absolute Maximum Ratings

| Symbol                      | Parameter                                      | Rating     | Units            |
|-----------------------------|------------------------------------------------|------------|------------------|
| $V_{DS}$                    | Drain-Source Voltage                           | 80         | V                |
| $V_{GS}$                    | Gate-Source Voltage                            | $\pm 20$   | V                |
| $I_D@T_C=25^\circ\text{C}$  | Continuous Drain Current, $V_{GS} @ 10V^{1,6}$ | 240        | A                |
| $I_D@T_C=100^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^{1,6}$ | 100        | A                |
| $I_{DM}$                    | Pulsed Drain Current <sup>2</sup>              | 730        | A                |
| EAS                         | Single Pulse Avalanche Energy <sup>3</sup>     | 2500       | mJ               |
| $P_D@T_C=25^\circ\text{C}$  | Total Power Dissipation <sup>4</sup>           | 225        | W                |
| $T_{STG}$                   | Storage Temperature Range                      | -55 to 150 | $^\circ\text{C}$ |
| $T_J$                       | Operating Junction Temperature Range           | -55 to 150 | $^\circ\text{C}$ |

## Thermal Data

| Symbol          | Parameter                                        | Typ. | Max. | Unit               |
|-----------------|--------------------------------------------------|------|------|--------------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient <sup>1</sup> | ---  | 60   | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 0.54 | $^\circ\text{C/W}$ |

**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                 | $V_{GS}=0V$ , $I_D=250\mu A$                               | 80   | ---   | ---       | V          |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=10V$ , $I_D=50A$                                   | ---  | 1.4   | 2.0       | m $\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage                         | $V_{GS}=V_{DS}$ , $I_D=250\mu A$                           | 2    | 3     | 4         | V          |
| $I_{DSS}$    | Drain-Source Leakage Current                   | $V_{DS}=80V$ , $V_{GS}=0V$ , $T_J=25^{\circ}\text{C}$      | ---  | ---   | 1         | $\mu A$    |
|              |                                                | $V_{DS}=80V$ , $V_{GS}=0V$ , $T_J=125^{\circ}\text{C}$     | ---  | ---   | 5         |            |
| $I_{GSS}$    | Gate-Source Leakage Current                    | $V_{GS}=\pm 20V$ , $V_{DS}=0V$                             | ---  | ---   | $\pm 100$ | nA         |
| $R_g$        | Gate Resistance                                | $V_{DS}=0V$ , $V_{GS}=0V$ , $f=1\text{MHz}$                | ---  | 2     | ---       | $\Omega$   |
| $Q_g$        | Total Gate Charge (10V)                        | $V_{DS}=40V$ , $V_{GS}=10V$ , $I_D=50A$                    | ---  | 204   | ---       | nC         |
| $Q_{gs}$     | Gate-Source Charge                             |                                                            | ---  | 54    | ---       |            |
| $Q_{gd}$     | Gate-Drain Charge                              |                                                            | ---  | 47    | ---       |            |
| $T_d(on)$    | Turn-On Delay Time                             | $V_{DD}=40V$ , $V_{GS}=10V$ , $R_L=3\Omega$ ,<br>$I_D=20A$ | ---  | 39    | ---       | ns         |
| $T_r$        | Rise Time                                      |                                                            | ---  | 136   | ---       |            |
| $T_d(off)$   | Turn-Off Delay Time                            |                                                            | ---  | 121   | ---       |            |
| $T_f$        | Fall Time                                      |                                                            | ---  | 156   | ---       |            |
| $C_{iss}$    | Input Capacitance                              | $V_{DS}=45V$ , $V_{GS}=0V$ , $f=1\text{MHz}$               | ---  | 13650 | ---       | pF         |
| $C_{oss}$    | Output Capacitance                             |                                                            | ---  | 20100 | ---       |            |
| $C_{rss}$    | Reverse Transfer Capacitance                   |                                                            | ---  | 580   | ---       |            |

**Diode Characteristics**

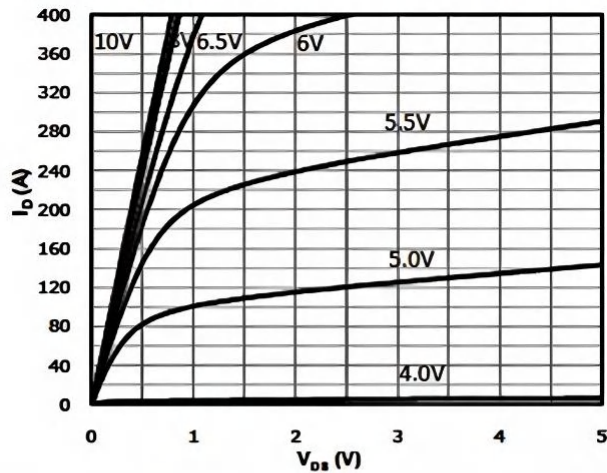
| Symbol   | Parameter                          | Conditions                                         | Min. | Typ. | Max. | Unit |
|----------|------------------------------------|----------------------------------------------------|------|------|------|------|
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup> | $V_{GS}=0V$ , $I_S=50A$ , $T_J=25^{\circ}\text{C}$ | ---  | 0.85 | 1.2  | V    |
| $T_{rr}$ | Body Diode Reverse Recovery Time   | $I_f=30A$ , $DI/dt=500A/\mu s$                     | ---  | 112  | ---  | ns   |
| $Q_{rr}$ | Body Diode Reverse Recovery charge | $I_f=30A$ , $DI/dt=500A/\mu s$                     | ---  | 313  | ---  | nC   |

Note :

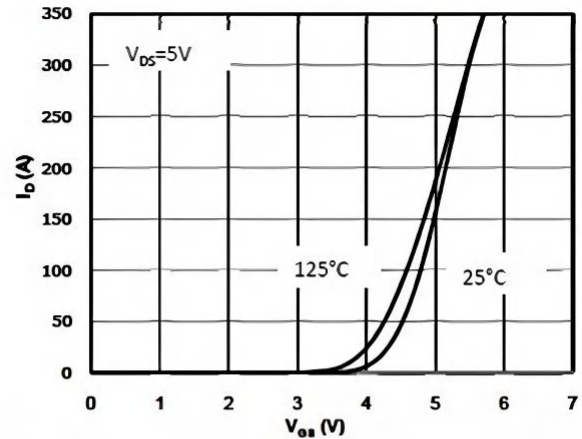
- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
- 3.The power dissipation is limited by  $150^{\circ}\text{C}$  junction temperature
- 4.The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications , should be limited by total power dissipation.
- 5.The maximum current rating is package limited.

**Typical Characteristics**

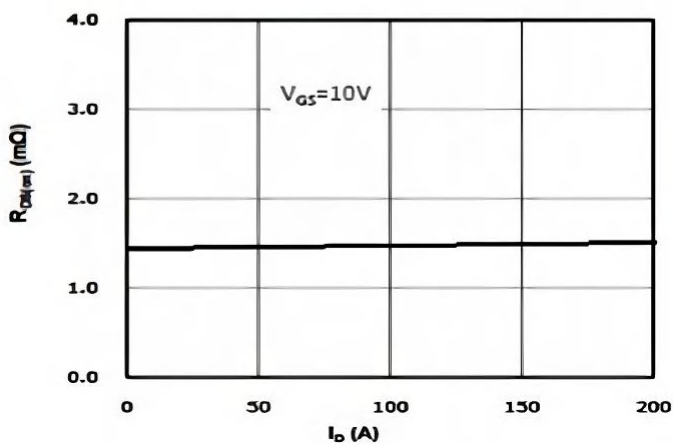
**Figure 1. Typ. Output Characteristics ( $T_j=25^\circ\text{C}$ )**



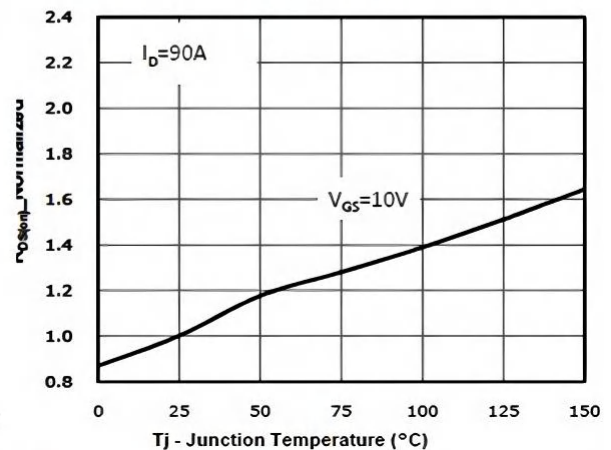
**Figure 2. Transfer Characteristics (Junction Temperature)**



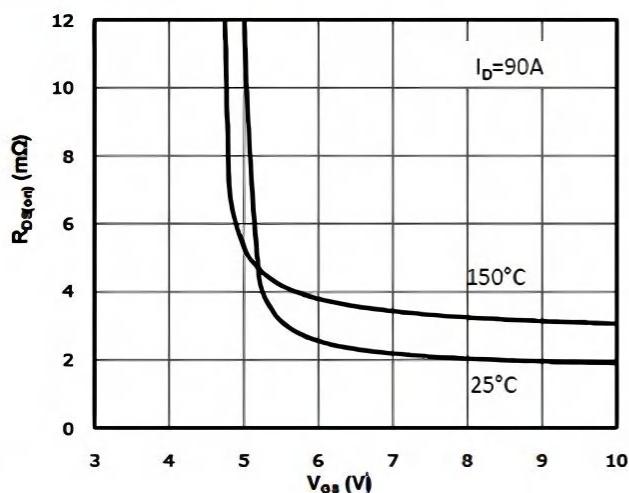
**Figure 3. On-Resistance vs. Drain Current Junction and Gate Voltage Figure**



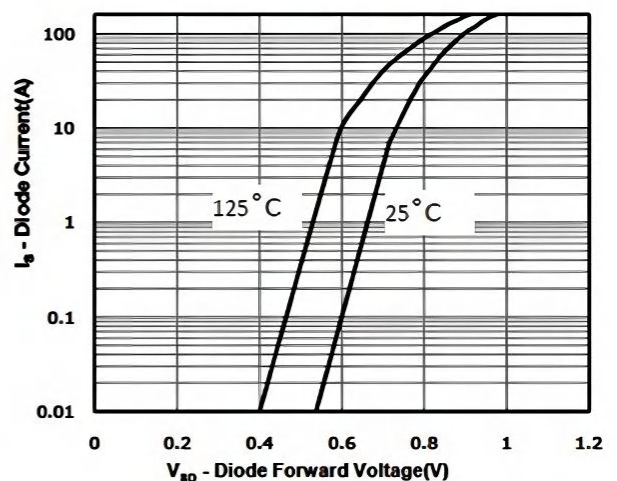
**Figure 4. On-Resistance vs. Temperature**



**Figure 5. On-Resistance vs. Gate-Source Voltage (Junction Temperature)**



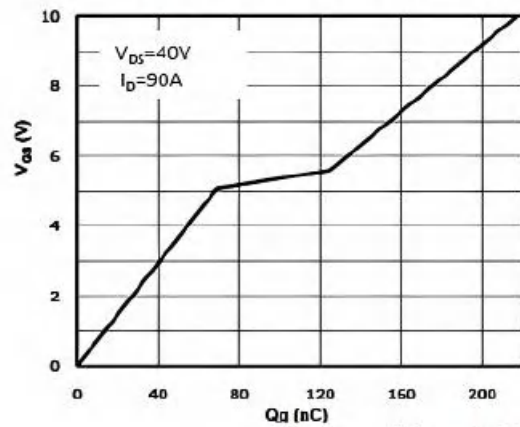
**Figure 6. Body-Diode Characteristics (Junction Temperature)**



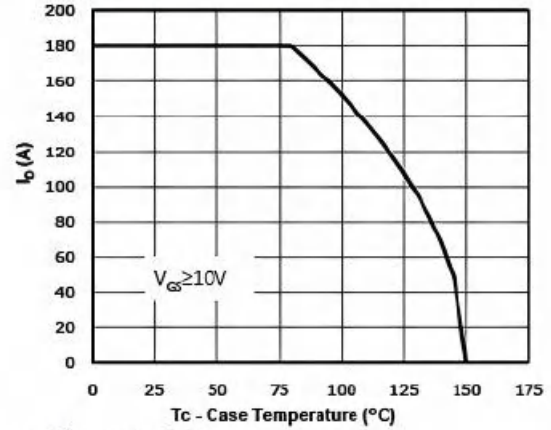


**N-Ch 80V Fast Switching MOSFETs**

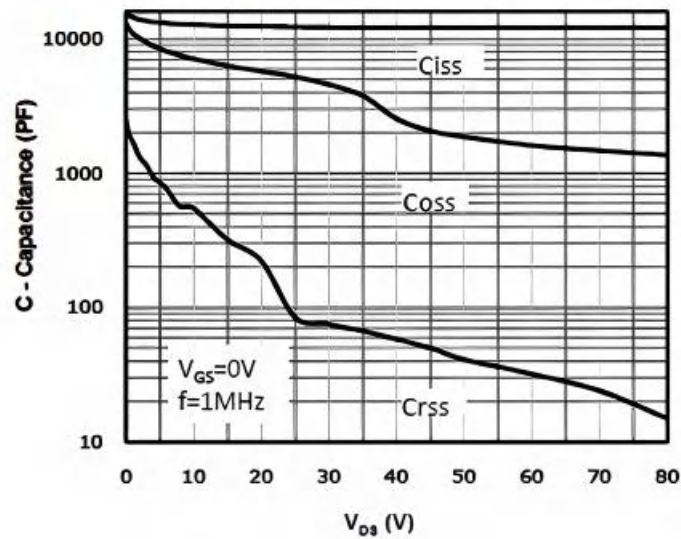
**Figure 7. Gate-Charge Characteristics**



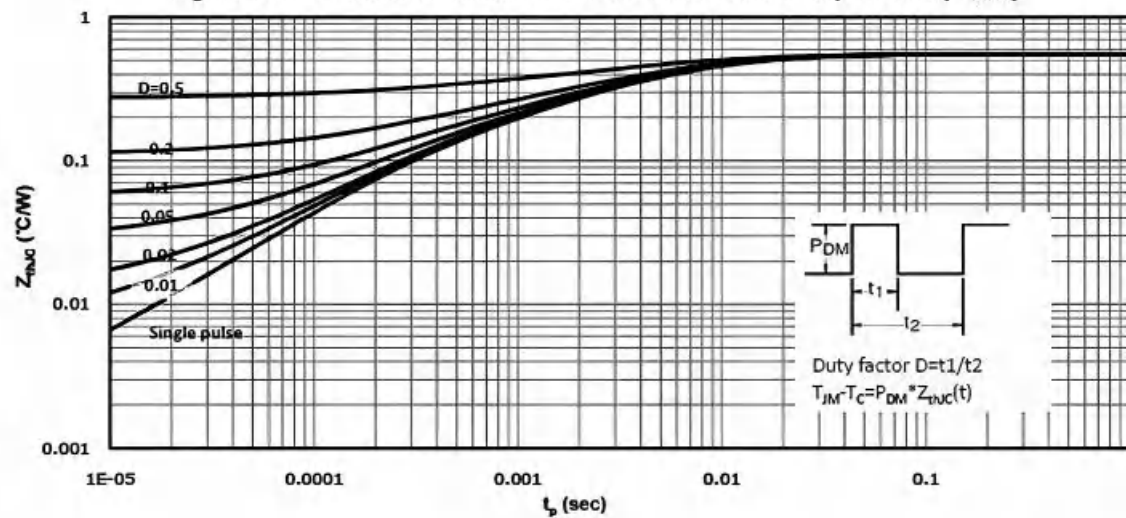
**Figure 8. Drain Current Derating**



**Figure 9. Capacitance Characteristics**



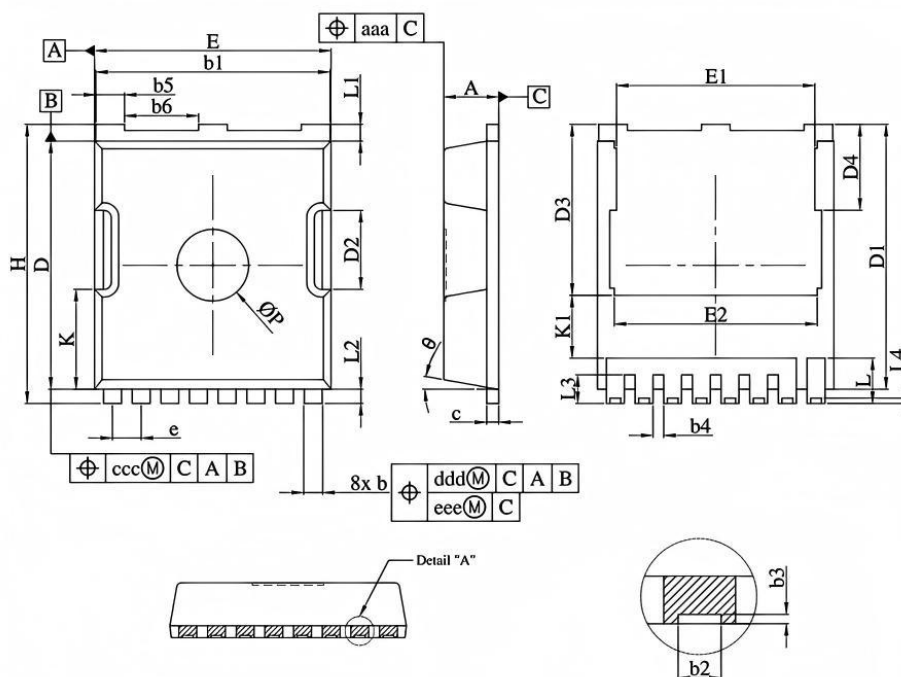
**Figure 10. Normalized Maximum Transient Thermal Impedance ( $R_{thJC}$ )**



## Ordering Information

| Part Number | Package code | Packaging      |
|-------------|--------------|----------------|
| HSBL020N08  | TOLL         | 2000/Tape&Reel |

### TOLL Package Outline



| COMMON DIMENSIONS(MM) |       |         |       |          |        |         |       |
|-----------------------|-------|---------|-------|----------|--------|---------|-------|
| SYMBOL                | MIN.  | NOMINAL | MAX.  | SYMBOL   | MIN.   | NOMINAL | MAX.  |
| A                     | 2.20  | 2.30    | 2.40  | E1       | 8.20   | 8.30    | 8.40  |
| b                     | 0.70  | 0.80    | 0.90  | E2       | 8.35   | 8.50    | 8.65  |
| b1                    | 9.70  | 9.80    | 9.90  | H        | 11.50  | 11.68   | 11.85 |
| b2                    | 0.36  | 0.45    | 0.55  | K        | 4.08   | 4.18    | 4.28  |
| b3                    | 0.05  | 0.100   | 0.35  | K1       | 2.45   | ---     | ---   |
| b4                    | 0.30  | 0.40    | 0.50  | L        | 1.60   | 1.90    | 2.10  |
| b5                    | 1.10  | 1.20    | 1.30  | L1       | 0.50   | 0.70    | 0.90  |
| b6                    | 3.00  | 3.10    | 3.20  | L2       | 0.50   | 0.60    | 0.70  |
| C                     | 0.40  | 0.50    | 0.60  | L3       | 1.00   | 1.20    | 1.30  |
| D                     | 10.28 | 10.38   | 10.55 | L4       | 0.13   | 0.23    | 0.33  |
| D1                    | 10.98 | 11.08   | 11.18 | P        | 2.85   | 3.00    | 3.15  |
| D2                    | 3.20  | 3.30    | 3.40  | $\theta$ | 10°REF |         |       |
| D3                    | 7.00  | 7.15    | 7.30  | aaa      | 0.20   |         |       |
| D4                    | 3.44  | 3.59    | 3.74  | ccc      | 0.20   |         |       |
| e                     | 1.10  | 1.20    | 1.30  | ddd      | 0.25   |         |       |
| E                     | 9.80  | 9.90    | 10.00 | eee      | 0.20   |         |       |