

### General Description

The HSK3N10 is new generation SGT MOSFET features low on-resistance and fast switching. Making it ideal for high efficiency power management applications.

The HSK3N10 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

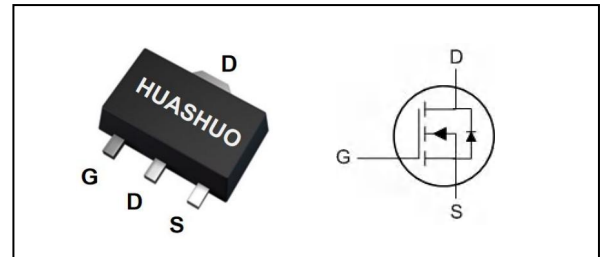
### Product Summary

|                  |     |            |
|------------------|-----|------------|
| $V_{DS}$         | 100 | V          |
| $R_{DS(ON),TYP}$ | 100 | m $\Omega$ |
| $I_D$            | 3   | A          |

### Features

- Super Low Gate Charge
- Green Device Available
- Excellent Cdv/dt effect decline
- Optimized for fast-switching application

### SOT-89 Pin Configuration



### Absolute Maximum Ratings

| Symbol                       | Parameter                                  | Rating     | Units              |
|------------------------------|--------------------------------------------|------------|--------------------|
| $V_{DS}$                     | Drain-Source Voltage                       | 100        | V                  |
| $V_{GS}$                     | Gate-Source Voltage                        | $\pm 20$   | V                  |
| $I_D@T_A=25^{\circ}\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 3          | A                  |
| $I_D@T_A=70^{\circ}\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 2.3        | A                  |
| $I_{DM}$                     | Pulsed Drain Current <sup>2</sup>          | 12         | A                  |
| EAS                          | Single Pulse Avalanche Energy <sup>3</sup> | 0.3        | mJ                 |
| $P_D@T_A=25^{\circ}\text{C}$ | Total Power Dissipation <sup>3</sup>       | 1.7        | W                  |
| $P_D@T_A=70^{\circ}\text{C}$ | Total Power Dissipation <sup>3</sup>       | 1.4        | 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> | ---  | 100  | $^{\circ}\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 24   | $^{\circ}\text{C/W}$ |



### Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)

| Symbol                              | Parameter                                      | Conditions                                                                           | Min. | Typ.  | Max. | Unit  |
|-------------------------------------|------------------------------------------------|--------------------------------------------------------------------------------------|------|-------|------|-------|
| BV <sub>DSS</sub>                   | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA                                           | 100  | ---   | ---  | V     |
| ΔBV <sub>DSS</sub> /ΔT <sub>J</sub> | BVDSS Temperature Coefficient                  | Reference to 25°C, I <sub>D</sub> =1mA                                               | ---  | 0.098 | ---  | V/°C  |
| R <sub>DS(ON)</sub>                 | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =2A                                             | ---  | 100   | 120  | mΩ    |
|                                     |                                                | V <sub>GS</sub> =4.5V, I <sub>D</sub> =1A                                            | ---  | 130   | 150  | mΩ    |
| V <sub>GS(th)</sub>                 | Gate Threshold Voltage                         | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA                             | 1.0  | 1.8   | 2.5  | V     |
| ΔV <sub>GS(th)</sub>                | V <sub>GS(th)</sub> Temperature Coefficient    |                                                                                      | ---  | -4.57 | ---  | mV/°C |
| I <sub>DSS</sub>                    | Drain-Source Leakage Current                   | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                      | ---  | ---   | 1    | uA    |
|                                     |                                                | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C                      | ---  | ---   | 5    |       |
| I <sub>GSS</sub>                    | Gate-Source Leakage Current                    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                           | ---  | ---   | ±100 | nA    |
| R <sub>g</sub>                      | Gate Resistance                                | V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz                                     | ---  | 4     | ---  | Ω     |
| Q <sub>g</sub>                      | Total Gate Charge (10V)                        | V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =2A                       | ---  | 5.4   | ---  | nC    |
| Q <sub>gs</sub>                     | Gate-Source Charge                             |                                                                                      | ---  | 3.1   | ---  |       |
| Q <sub>gd</sub>                     | Gate-Drain Charge                              |                                                                                      | ---  | 0.9   | ---  |       |
| T <sub>d(on)</sub>                  | Turn-On Delay Time                             | V <sub>DD</sub> =50V, V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω<br>I <sub>D</sub> =2A | ---  | 5     | ---  | ns    |
| T <sub>r</sub>                      | Rise Time                                      |                                                                                      | ---  | 3     | ---  |       |
| T <sub>d(off)</sub>                 | Turn-Off Delay Time                            |                                                                                      | ---  | 20    | ---  |       |
| T <sub>f</sub>                      | Fall Time                                      |                                                                                      | ---  | 5     | ---  |       |
| C <sub>iss</sub>                    | Input Capacitance                              | V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz                                    | ---  | 310   | ---  | pF    |
| C <sub>oss</sub>                    | Output Capacitance                             |                                                                                      | ---  | 20    | ---  |       |
| C <sub>rss</sub>                    | Reverse Transfer Capacitance                   |                                                                                      | ---  | 3.7   | ---  |       |

### Diode Characteristics

| Symbol          | Parameter                                | Conditions                                                    | Min. | Typ. | Max. | Unit |
|-----------------|------------------------------------------|---------------------------------------------------------------|------|------|------|------|
| I <sub>S</sub>  | Continuous Source Current <sup>1,5</sup> | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current             | ---  | ---  | 3    | A    |
| I <sub>SM</sub> | Pulsed Source Current <sup>2,5</sup>     |                                                               | ---  | ---  | 12   | A    |
| V <sub>SD</sub> | Diode Forward Voltage <sup>2</sup>       | V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C | ---  | ---  | 1.2  | V    |
| t <sub>rr</sub> | Reverse Recovery Time                    | I <sub>F</sub> =2A, dI/dt=100A/μs, T <sub>J</sub> =25°C       | ---  | 18   | ---  | nS   |
| Q <sub>rr</sub> | Reverse Recovery Charge                  |                                                               | ---  | 48   | ---  | 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 ≤ 300us, duty cycle ≤ 2%

3.The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH

4.The power dissipation is limited by 150°C junction temperature

5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.



### Typical Characteristics

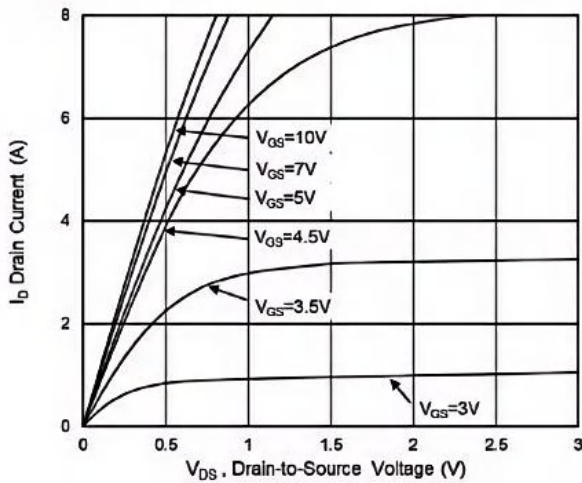


Fig.1 Typical Output Characteristics

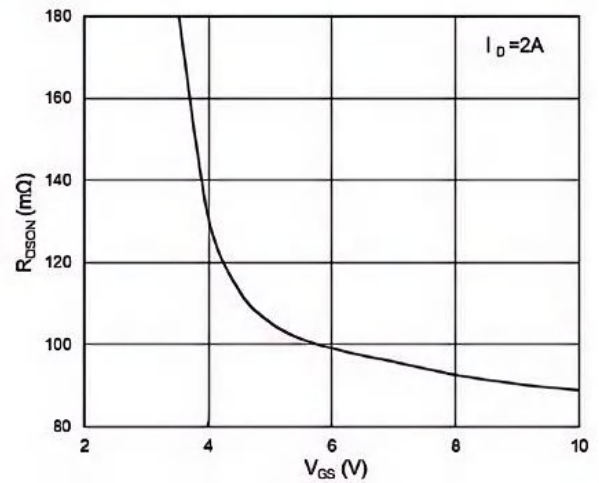


Fig.2 On-Resistance vs. G-S Voltage

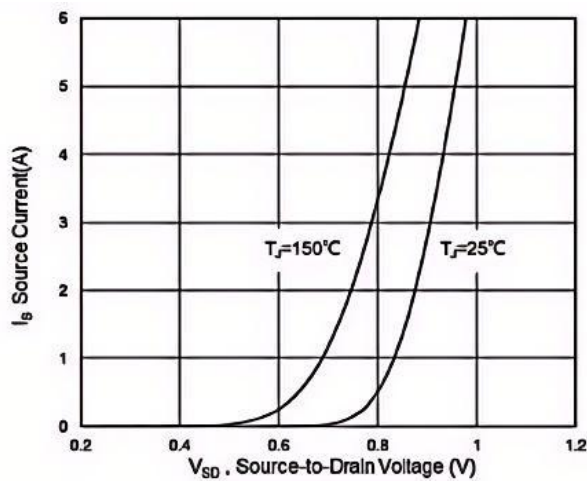


Fig.3 Source Drain Forward Characteristics

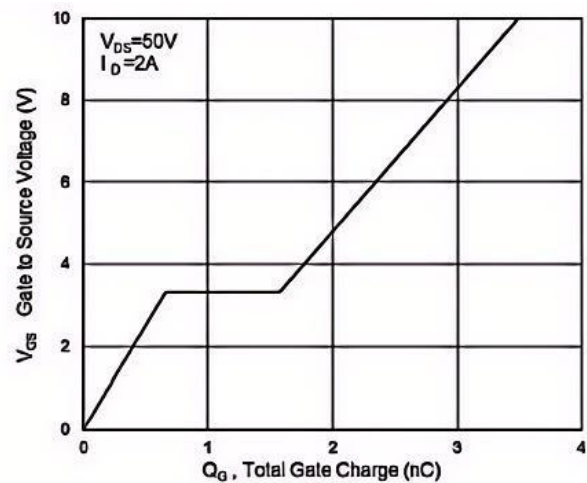


Fig.4 Gate-Charge Characteristics

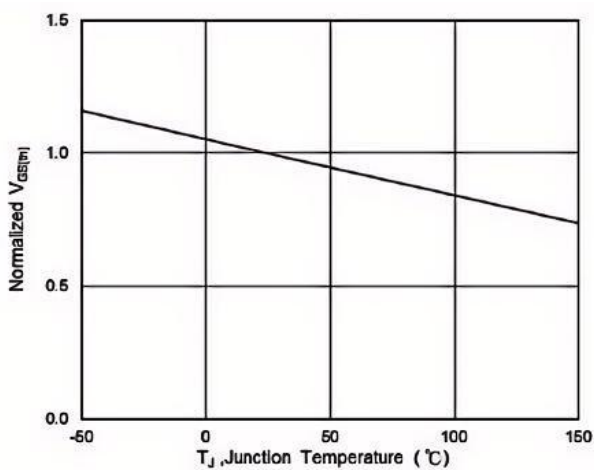


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

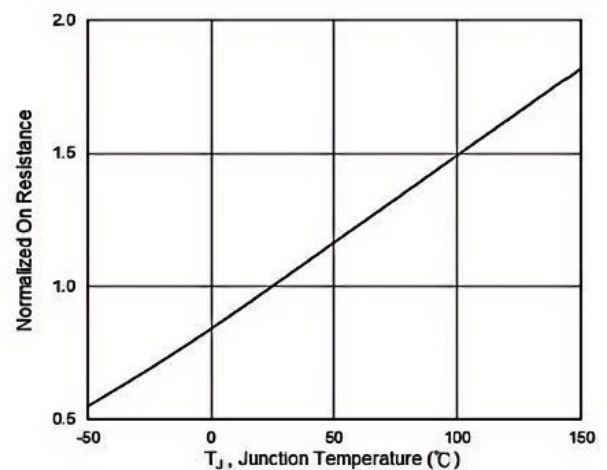


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$

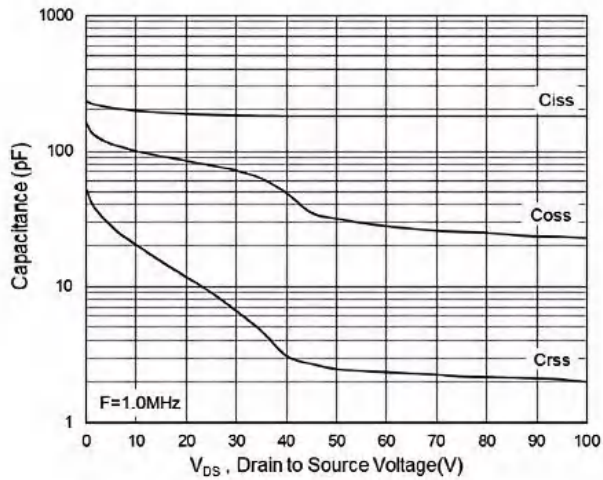


Fig.7 Capacitance

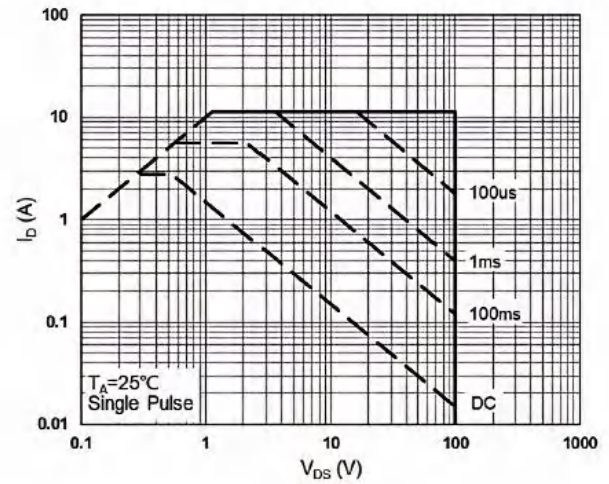


Fig.8 Safe Operating Area

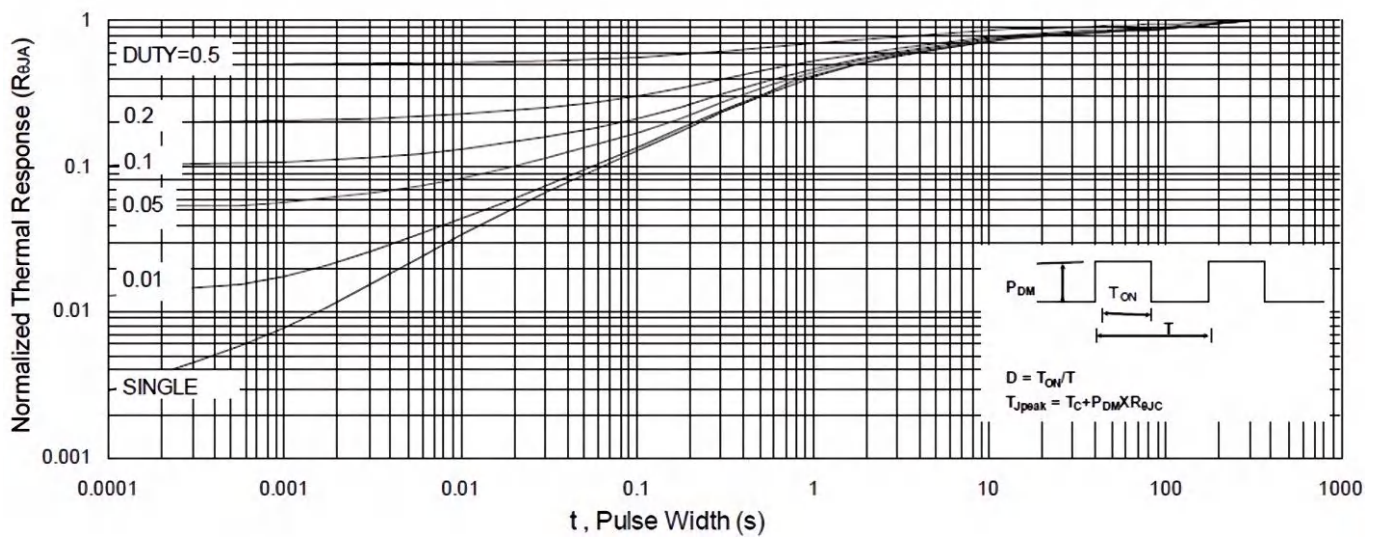


Fig.9 Normalized Maximum Transient Thermal Impedance

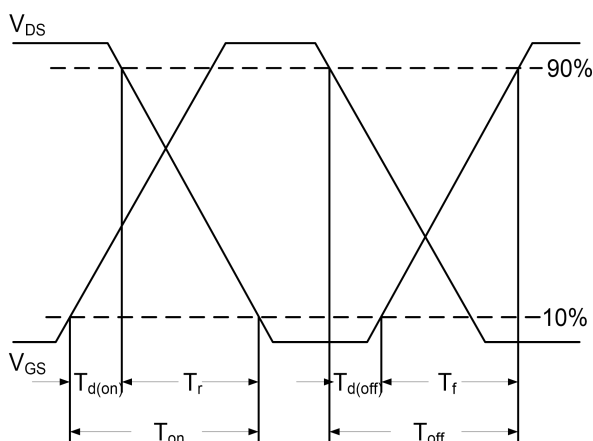


Fig.10 Switching Time Waveform

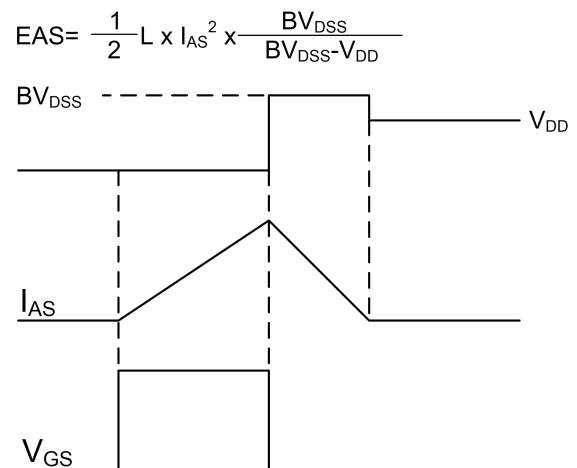


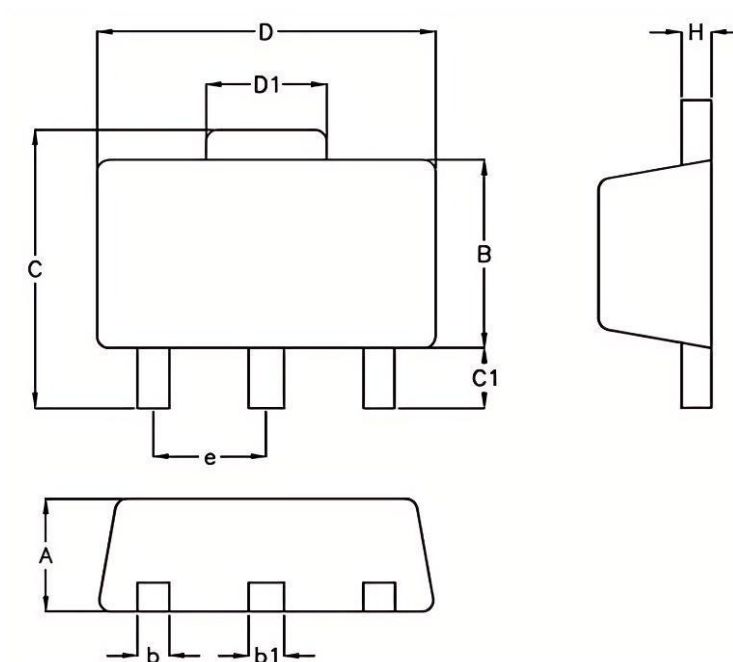
Fig.11 Unclamped Inductive Switching Waveform



## Ordering Information

| Part Number | Package code | Packaging      |
|-------------|--------------|----------------|
| HSK3N10     | SOT-89       | 1000/Tape&Reel |

### SOT-89 Package Outline



| SYMBOLS | MILLIMETERS |       | NCES  |       |
|---------|-------------|-------|-------|-------|
|         | MIN         | MAX   | MIN   | MAX   |
| A       | 1.397       | 1.600 | 0.055 | 0.063 |
| b       | 0.420       | 0.540 | 0.017 | 0.021 |
| b1      | 0.420       | 0.540 | 0.017 | 0.021 |
| B       | 2.388       | 2.591 | 0.094 | 0.102 |
| C       | 3.937       | 4.242 | 0.155 | 0.167 |
| C1      | 0.787       | 1.194 | 0.031 | 0.047 |
| D       | 4.394       | 4.597 | 0.173 | 0.181 |
| D1      | 1.397       | 1.753 | 0.055 | 0.069 |
| e       | 1.448       | 1.549 | 0.057 | 0.061 |
| H       | 0.350       | 0.44  | 0.014 | 0.017 |



## HSK3N10 TOP Marking

