



### General Description

The HSM10N15A is the highest performance SGT N-ch MOSFETs with extreme high cell density, which provide excellent  $R_{DS(ON)}$  and gate charge for most of the synchronous buck converter applications.

The HSM10N15A meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

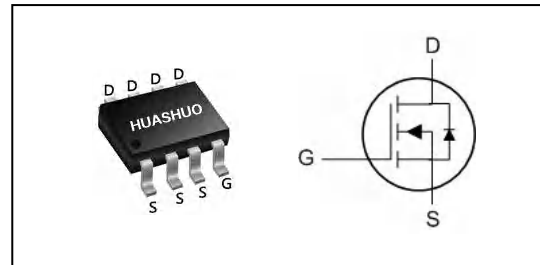
### Features

- Super Low Gate Charge
- Green Device Available
- Excellent  $C_{dv/dt}$  effect decline
- Advanced high cell density Trench Technology

### Product Summary

|                  |     |            |
|------------------|-----|------------|
| $V_{DS}$         | 150 | V          |
| $R_{DS(ON),typ}$ | 35  | m $\Omega$ |
| $I_D$            | 10  | A          |

### SOP-8 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, $V_{GS} @ 10V^1$ | 8          | A          |
| $I_D@T_A=25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 5          | A          |
| $I_D@T_A=70^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 3.8        | A          |
| $I_{DM}$              | Pulsed Drain Current <sup>2</sup>          | 50         | A          |
| $P_D@T_A=25^\circ C$  | Total Power Dissipation <sup>3</sup>       | 2.7        | 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> | ---  | 85   | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 23   | $^\circ C/W$ |



### 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                                             | 150  | ---  | ---  | V    |
| R <sub>DS(ON)</sub> | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =4A                                               | ---  | 35   | 56   | mΩ   |
| V <sub>GS(th)</sub> | Gate Threshold Voltage                         | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA                               | 2    | 2.9  | 4    | V    |
| I <sub>DSS</sub>    | Drain-Source Leakage Current                   | V <sub>DS</sub> =120V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                       | ---  | ---  | 1    | uA   |
|                     |                                                | V <sub>DS</sub> =120V, 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   |
| g <sub>fs</sub>     | Forward Transconductance                       | V <sub>DS</sub> =5V, I <sub>D</sub> =4A                                                | ---  | 25   | ---  | S    |
| Q <sub>g</sub>      | Total Gate Charge                              | V <sub>DS</sub> =75V, V <sub>GS</sub> =10V, I <sub>D</sub> =4A                         | ---  | 23   | ---  | nC   |
| Q <sub>gs</sub>     | Gate-Source Charge                             |                                                                                        | ---  | 5.8  | ---  |      |
| Q <sub>gd</sub>     | Gate-Drain Charge                              |                                                                                        | ---  | 4.2  | ---  |      |
| T <sub>d(on)</sub>  | Turn-On Delay Time                             | V <sub>DD</sub> =75V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω<br>I <sub>D</sub> =4A | ---  | 16   | ---  | ns   |
| T <sub>r</sub>      | Rise Time                                      |                                                                                        | ---  | 18.6 | ---  |      |
| T <sub>d(off)</sub> | Turn-Off Delay Time                            |                                                                                        | ---  | 28.5 | ---  |      |
| T <sub>f</sub>      | Fall Time                                      |                                                                                        | ---  | 6.5  | ---  |      |
| C <sub>iss</sub>    | Input Capacitance                              | V <sub>DS</sub> =75V, V <sub>GS</sub> =0V, f=1MHz                                      | ---  | 1190 | ---  | pF   |
| C <sub>oss</sub>    | Output Capacitance                             |                                                                                        | ---  | 73   | ---  |      |
| C <sub>rss</sub>    | Reverse Transfer Capacitance                   |                                                                                        | ---  | 4    | ---  |      |

### Diode Characteristics

| Symbol          | Parameter                          | Conditions                                                    | Min. | Typ. | Max. | Unit |
|-----------------|------------------------------------|---------------------------------------------------------------|------|------|------|------|
| 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> =4A, dI/dt=100A/μs,<br>T <sub>J</sub> =25°C    | ---  | 45   | ---  | nS   |
| Q <sub>rr</sub> | Reverse Recovery Charge            |                                                               | ---  | 138  | ---  | 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 ≤ 300us , duty cycle ≤ 2%
- 3.The power dissipation is limited by 150°C junction temperature
- 4.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

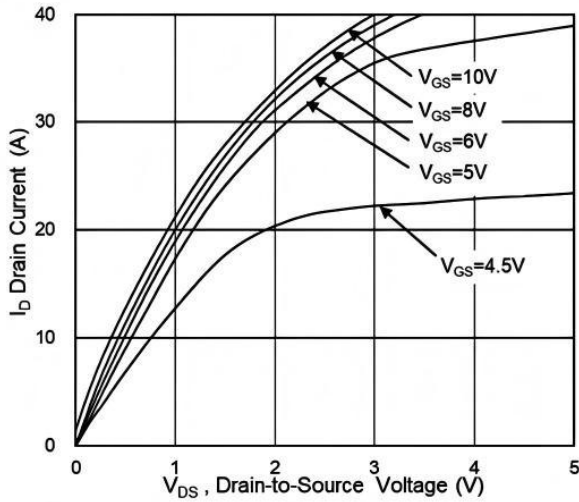


Fig.1 Typical Output Characteristics

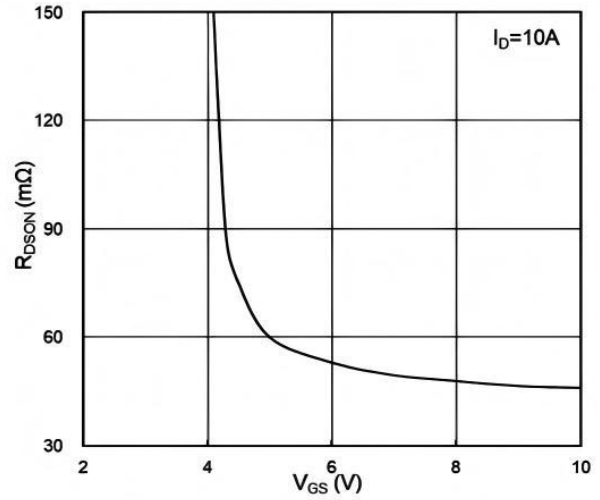


Fig.2 On-Resistance vs. Gate-Source Voltage

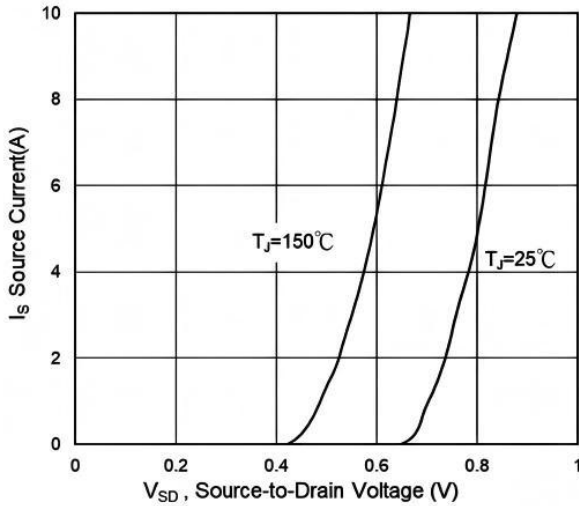


Fig.3 Forward Characteristics of Reverse

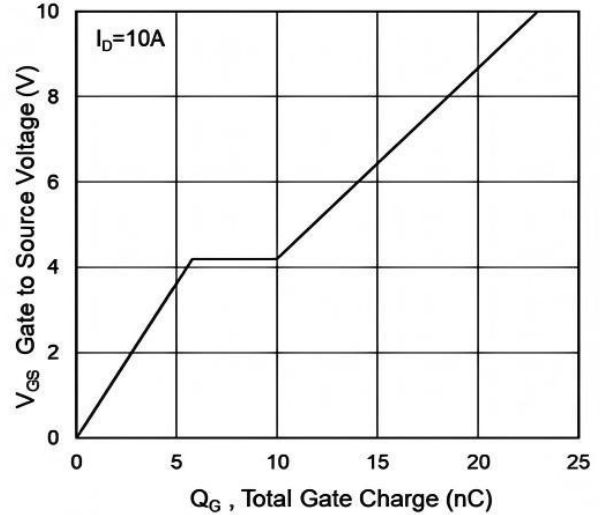


Fig.4 Gate-Charge Characteristics

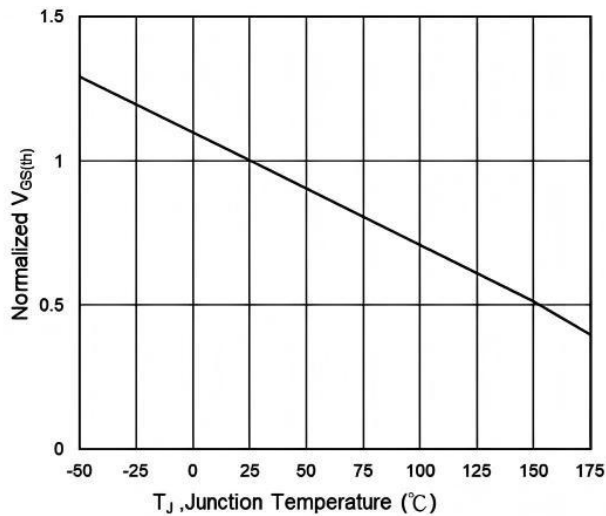


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

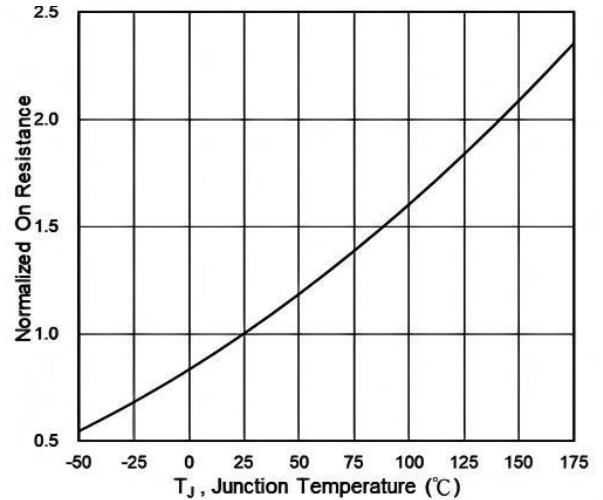


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$

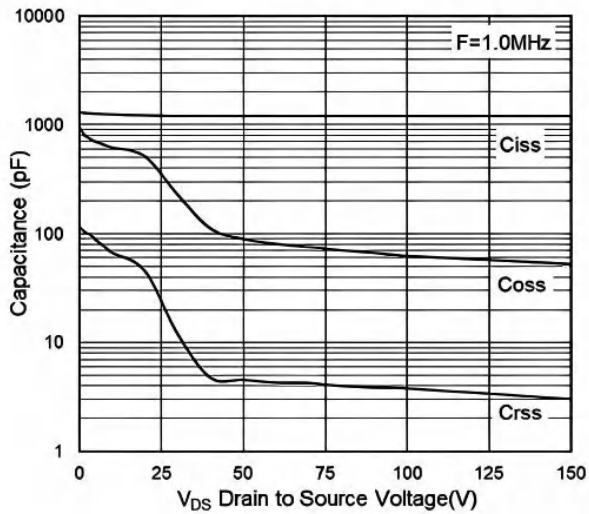


Fig.7 Capacitance

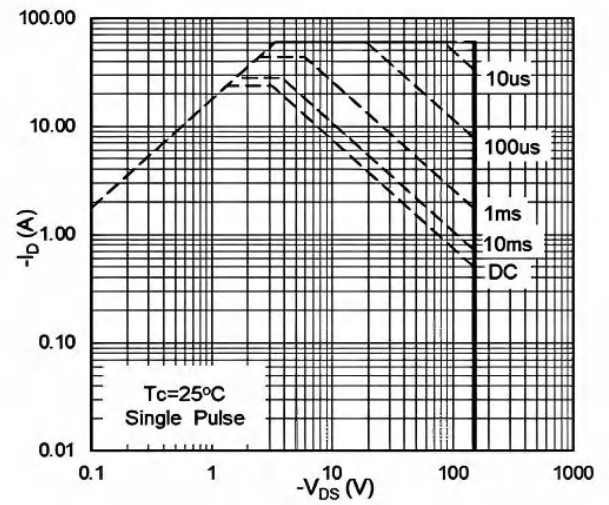


Fig.8 Safe Operating Area

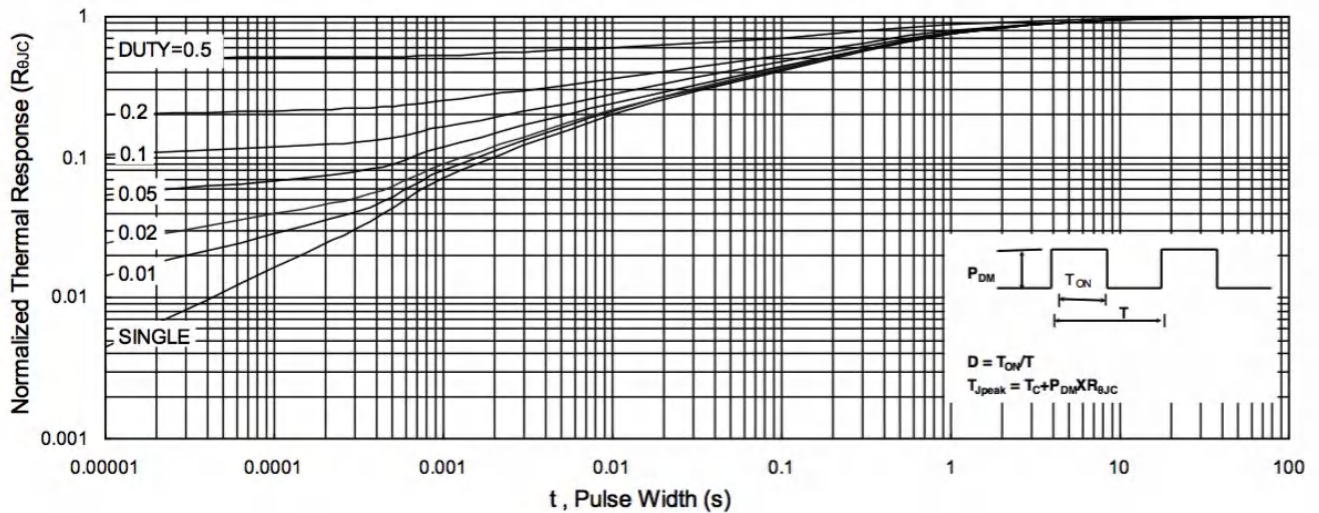


Fig.9 Normalized Maximum Transient Thermal Impedance

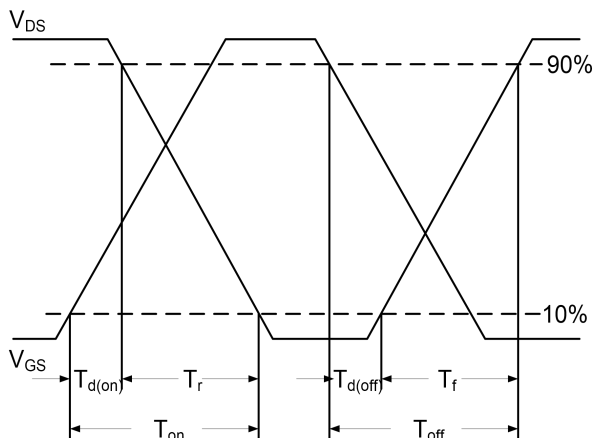


Fig.10 Switching Time Waveform

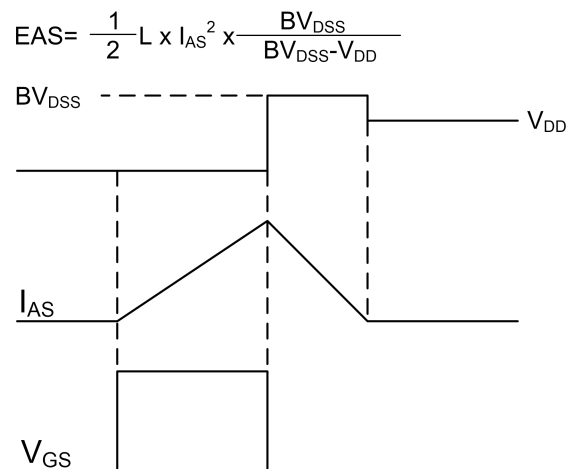


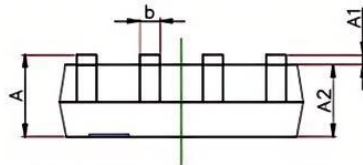
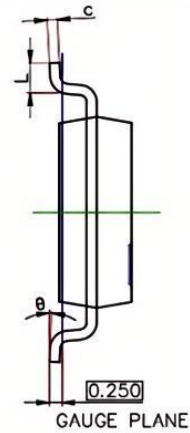
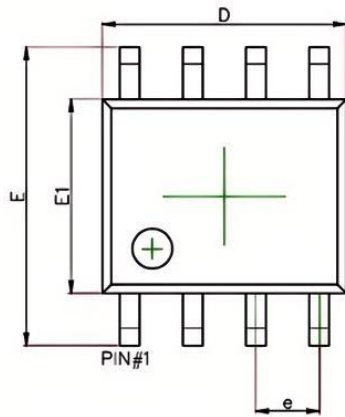
Fig.11 Unclamped Inductive Switching Waveform



## Ordering Information

| Part Number | Package code | Packaging      |
|-------------|--------------|----------------|
| HSM10N15A   | SOP-8        | 2500/Tape&Reel |

## SOP-8 Package Outline



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 1.350                     | 1.750 | 0.053                | 0.069 |
| A1     | 0.100                     | 0.250 | 0.004                | 0.010 |
| A2     | 1.350                     | 1.550 | 0.053                | 0.061 |
| b      | 0.330                     | 0.510 | 0.013                | 0.020 |
| C      | 0.170                     | 0.250 | 0.007                | 0.010 |
| D      | 4.800                     | 5.000 | 0.189                | 0.197 |
| e      | 1.270 (BSC)               |       | 0.050(BSC)           |       |
| E      | 5.800                     | 6.200 | 0.228                | 0.244 |
| E1     | 3.800                     | 4.000 | 0.150                | 0.157 |
| L      | 0.400                     | 1.270 | 0.016                | 0.050 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |



## HSM10N15A Marking:

