

## General Description

- 100% UIS Tested
- Advanced SGT MOS Technology
- Low Gate Charge
- High Current Capability
- RoHS and Halogen-Free Compliant
- 100% EAS Guaranteed

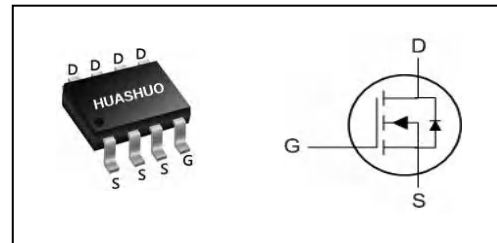
## Product Summary

|                  |     |            |
|------------------|-----|------------|
| $V_{DS}$         | 40  | V          |
| $R_{DS(ON),typ}$ | 2.5 | m $\Omega$ |
| $I_D$            | 24  | A          |

## Applications

- SMPS Synchronous Rectification
- DC/DC Converters
- ORING

## SOP-8 Pin Configuration



## Absolute Maximum Ratings

| Symbol                 | Parameter                                      | Rating     | Units       |
|------------------------|------------------------------------------------|------------|-------------|
| $V_{DS}$               | Drain-Source Voltage                           | 40         | V           |
| $V_{GS}$               | Gate-Source Voltage                            | $\pm 20$   | V           |
| $I_D@T_C=25^{\circ}C$  | Continuous Drain Current, $V_{GS} @ 10V^{1,6}$ | 24         | A           |
| $I_D@T_C=100^{\circ}C$ | Continuous Drain Current, $V_{GS} @ 10V^{1,6}$ | 19         | A           |
| $I_{DM}$               | Pulsed Drain Current <sup>2</sup>              | 70         | A           |
| EAS                    | Single Pulse Avalanche Energy <sup>3</sup>     | 80         | mJ          |
| $P_D@T_A=25^{\circ}C$  | Total Power Dissipation <sup>4</sup>           | 3          | 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> | ---  | 75   | $^{\circ}C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 40   | $^{\circ}C/W$ |

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

| Symbol       | Parameter                                      | Conditions                                     | Min. | Typ. | Max.      | Unit      |
|--------------|------------------------------------------------|------------------------------------------------|------|------|-----------|-----------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage                 | $V_{GS}=0V, I_D=250\mu A$                      | 40   | ---  | ---       | V         |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=10V, I_D=20A$                          | ---  | 2.5  | 3.2       | $m\Omega$ |
|              |                                                | $V_{GS}=4.5V, I_D=15A$                         | ---  | 3.8  | 5.3       |           |
| $V_{GS(th)}$ | Gate Threshold Voltage                         | $V_{GS}=V_{DS}, I_D=250\mu A$                  | 1.2  | 1.7  | 2.2       | V         |
| $I_{DSS}$    | Drain-Source Leakage Current                   | $V_{DS}=32V, V_{GS}=0V, T_J=25^\circ\text{C}$  | ---  | ---  | 1         | $\mu A$   |
|              |                                                | $V_{DS}=32V, V_{GS}=0V, T_J=55^\circ\text{C}$  | ---  | ---  | 5         |           |
| $I_{GSS}$    | Gate-Source Leakage Current                    | $V_{GS}=\pm 20V, V_{DS}=0V$                    | ---  | ---  | $\pm 100$ | nA        |
| $g_{fs}$     | Forward Transconductance                       | $V_{DS}=5V, I_D=20A$                           | ---  | 75   | ---       | S         |
| $R_g$        | Gate Resistance                                | $V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$          | ---  | 1.5  | ---       | $\Omega$  |
| $Q_g$        | Total Gate Charge (4.5V)                       | $V_{DS}=20V, V_{GS}=4.5V, I_D=20A$             | ---  | 22.7 | ---       | nC        |
| $Q_{gs}$     | Gate-Source Charge                             |                                                | ---  | 7.5  | ---       |           |
| $Q_{gd}$     | Gate-Drain Charge                              |                                                | ---  | 5.5  | ---       |           |
| $T_{d(on)}$  | Turn-On Delay Time                             | $V_{DD}=20V, V_{GS}=10V, R_G=3\Omega, I_D=20A$ | ---  | 10   | ---       | ns        |
| $T_r$        | Rise Time                                      |                                                | ---  | 5    | ---       |           |
| $T_{d(off)}$ | Turn-Off Delay Time                            |                                                | ---  | 33   | ---       |           |
| $T_f$        | Fall Time                                      |                                                | ---  | 6.5  | ---       |           |
| $C_{iss}$    | Input Capacitance                              | $V_{DS}=20V, V_{GS}=0V, f=1\text{MHz}$         | ---  | 2650 | ---       | pF        |
| $C_{oss}$    | Output Capacitance                             |                                                | ---  | 899  | ---       |           |
| $C_{rss}$    | Reverse Transfer Capacitance                   |                                                | ---  | 71   | ---       |           |

**Diode Characteristics**

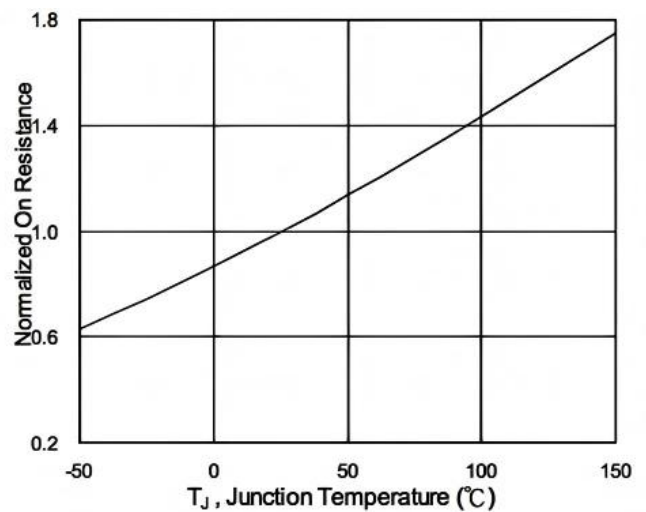
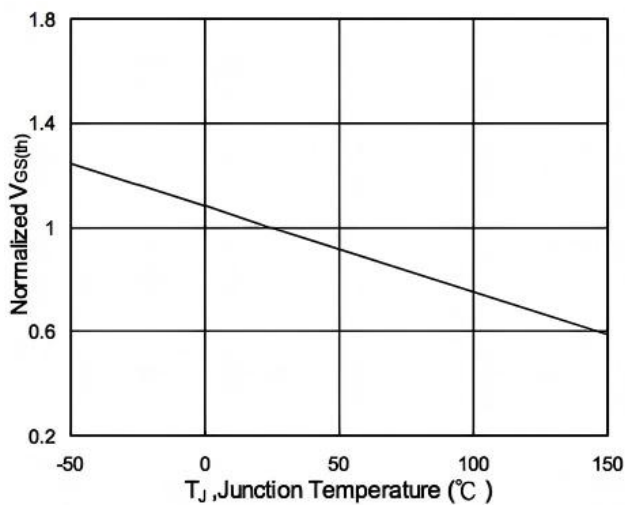
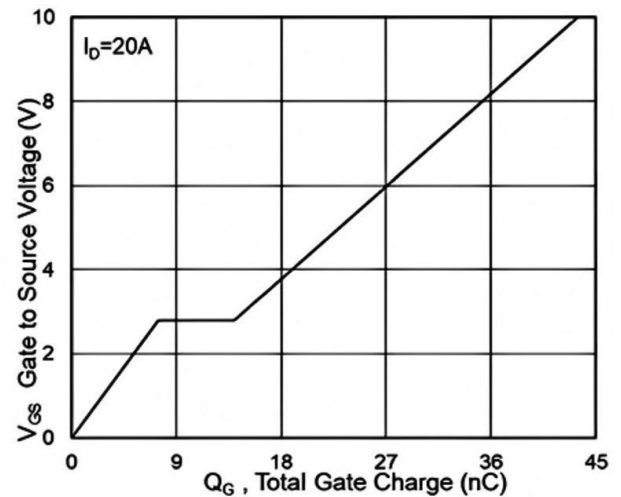
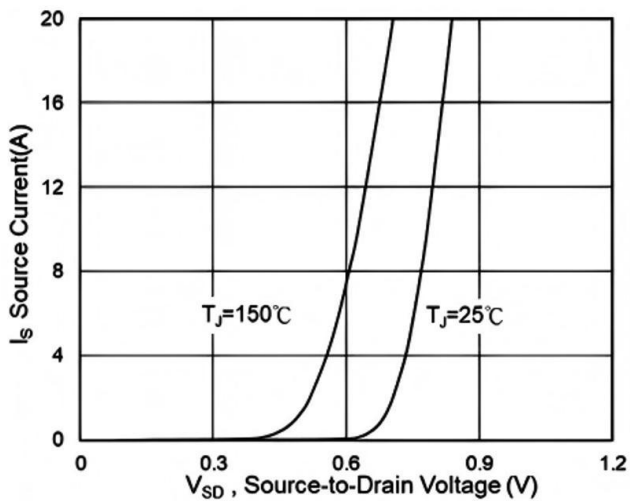
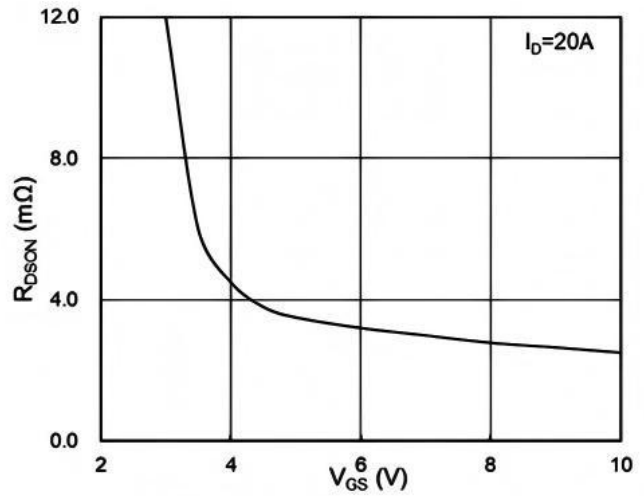
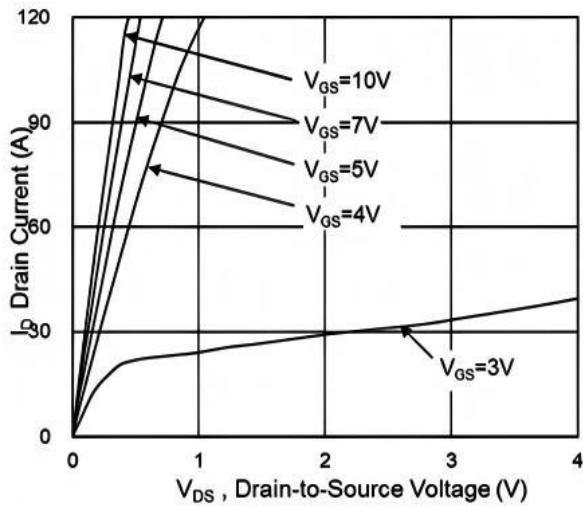
| Symbol   | Parameter                                | Conditions                                | Min. | Typ. | Max. | Unit |
|----------|------------------------------------------|-------------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current <sup>1,6</sup> | $V_G=V_D=0V$ , Force Current              | ---  | ---  | 24   | A    |
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup>       | $V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$ | ---  | ---  | 1    | V    |

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.

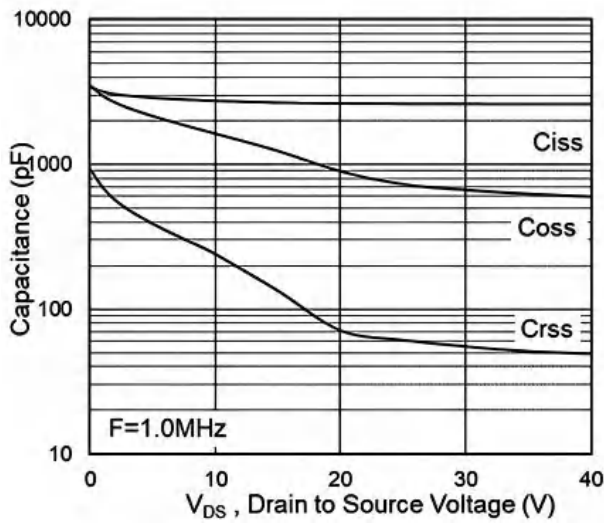


**Typical Characteristics**

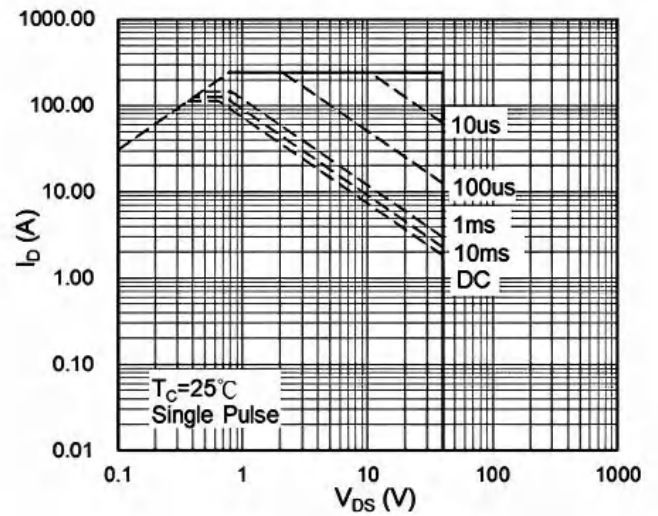




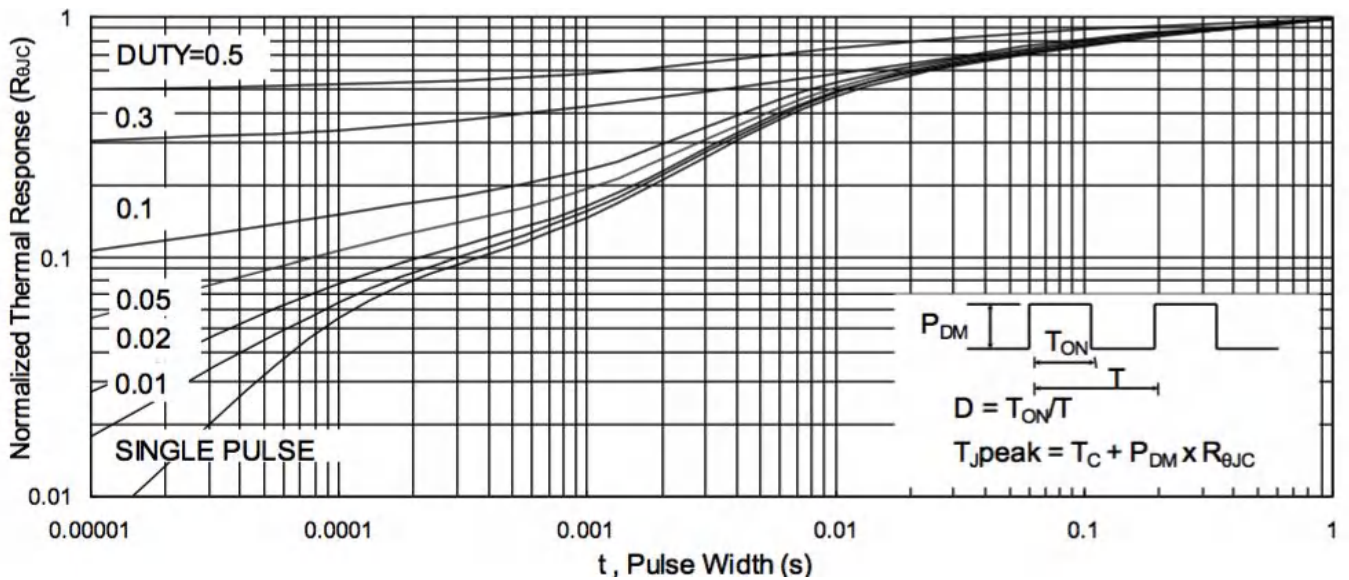
**N-Ch 40V Fast Switching MOSFETs**



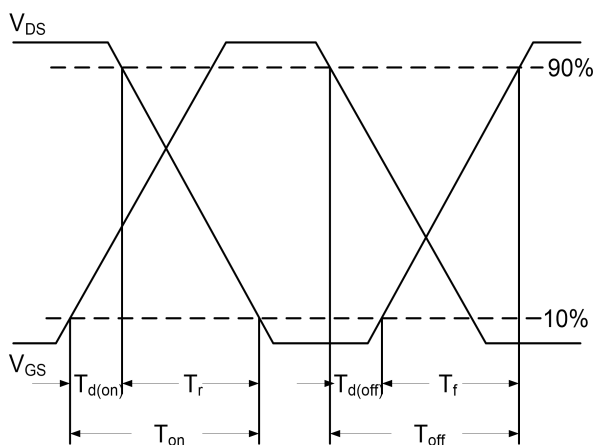
**Fig.7 Capacitance**



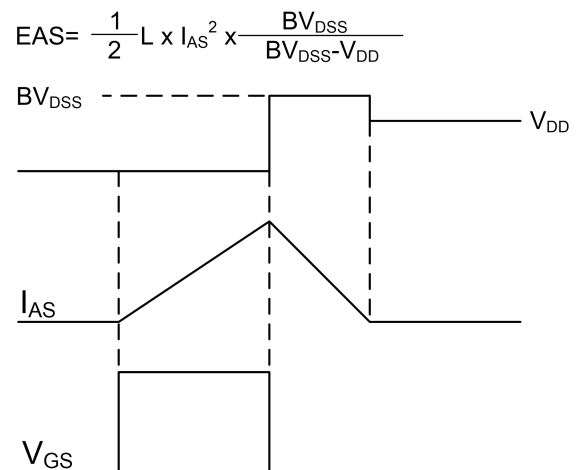
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**

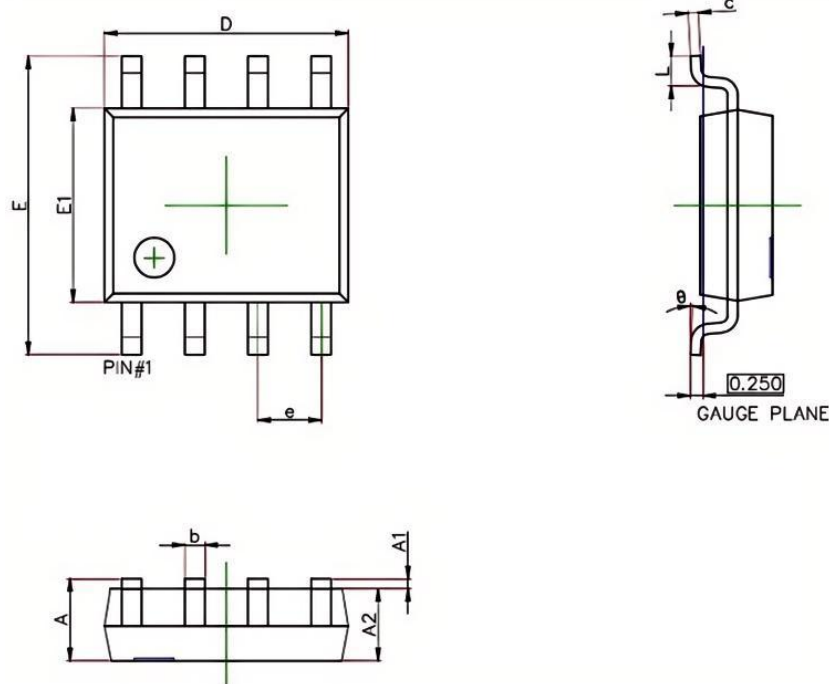


**Fig.11 Unclamped Inductive Switching Waveform**

## Ordering Information

| Part Number    | Package code | Packaging                 |
|----------------|--------------|---------------------------|
| <b>HSM4094</b> | <b>SOP-8</b> | <b>2500/Tape&amp;Reel</b> |

### 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°    |

## HSM4094 Marking:

