

## General Description

The HSU4119 is the high cell density trench P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The HSU4119 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

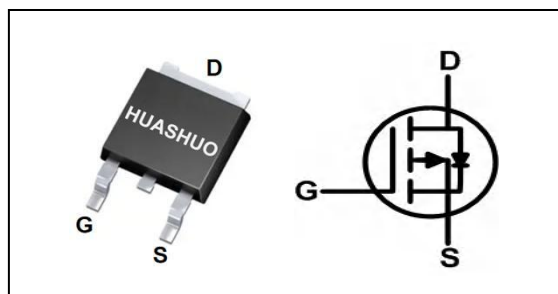
## Features

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

## Product Summary

|                  |      |    |
|------------------|------|----|
| $V_{DS}$         | -40  | V  |
| $R_{DS(ON),typ}$ | 3.5  | mΩ |
| $I_D$            | -120 | A  |

## TO-252 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, $V_{GS} @ -10V^{1,6}$ | -120       | A          |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $V_{GS} @ -10V^{1,6}$ | -90        | A          |
| $I_{DM}$              | Pulsed Drain Current <sup>2</sup>               | -480       | A          |
| EAS                   | Single Pulse Avalanche Energy <sup>3</sup>      | 1250       | mJ         |
| $I_{AS}$              | Avalanche Current                               | -70        | A          |
| $P_D@T_C=25^\circ C$  | Total Power Dissipation <sup>4</sup>            | 135        | 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> ( $t \leq 10S$ ) | ---  | 20   | $^\circ C/W$ |
|                 | Thermal Resistance Junction-ambient <sup>1</sup> (Steady State)   | ---  | 62   | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-case <sup>1</sup>                     | ---  | 1.8  | $^\circ C/W$ |

**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> | $V_{GS}=-10V, I_D=-30A$                           | ---  | 3.5   | 4.0       | $m\Omega$ |
|              |                                                | $V_{GS}=-4.5V, I_D=-20A$                          | ---  | 4.5   | 5.3       | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage                         | $V_{GS}=V_{DS}, I_D=-250\mu A$                    | -1.0 | -1.7  | -2.5      | V         |
| $I_{DSS}$    | Drain-Source Leakage Current                   | $V_{DS}=-40V, V_{GS}=0V, T_J=25^\circ\text{C}$    | ---  | ---   | -1        | $\mu A$   |
|              |                                                | $V_{DS}=-40V, V_{GS}=0V, T_J=125^\circ\text{C}$   | ---  | ---   | -100      | $\mu A$   |
| $I_{GSS}$    | Gate-Source Leakage Current                    | $V_{GS}=\pm 20V, V_{DS}=0V$                       | ---  | ---   | $\pm 100$ | nA        |
| $R_g$        | Gate resistance                                | $V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$             |      | 1.7   |           | $\Omega$  |
| $Q_g$        | Total Gate Charge (-10V)                       | $V_{DS}=-20V, V_{GS}=-10V, I_D=-20A$              | ---  | 190   | ---       | nC        |
| $Q_{gs}$     | Gate-Source Charge                             |                                                   | ---  | 24    | ---       |           |
| $Q_{gd}$     | Gate-Drain Charge                              |                                                   | ---  | 38    | ---       |           |
| $T_{d(on)}$  | Turn-On Delay Time                             | $V_{DD}=-20V, V_{GS}=-10V, R_G=3\Omega, I_D=-10A$ | ---  | 18    | ---       | ns        |
| $T_r$        | Rise Time                                      |                                                   | ---  | 3.6   | ---       |           |
| $T_{d(off)}$ | Turn-Off Delay Time                            |                                                   | ---  | 21    | ---       |           |
| $T_f$        | Fall Time                                      |                                                   | ---  | 39    | ---       |           |
| $C_{iss}$    | Input Capacitance                              | $V_{DS}=-20V, V_{GS}=0V, f=1\text{MHz}$           | ---  | 10700 | ---       | pF        |
| $C_{oss}$    | Output Capacitance                             |                                                   | ---  | 780   | ---       |           |
| $C_{rss}$    | Reverse Transfer Capacitance                   |                                                   | ---  | 660   | ---       |           |

**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                       | ---  | ---  | -120 | 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                    | $I_F=-20A, di/dt=100A/\mu s, T_J=25^\circ\text{C}$ | ---  | 52   | ---  | nS   |
| $Q_{rr}$ | Reverse Recovery Charge                  |                                                    | ---  | 128  | ---  | 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 EAS data shows Max. rating . The test condition is  $V_{DD}=-40V, V_{GS}=-10V, L=0.5mH, I_{AS}=-70A$
- 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
- 6.The maximum current rating is package limited.

### Typical Characteristics

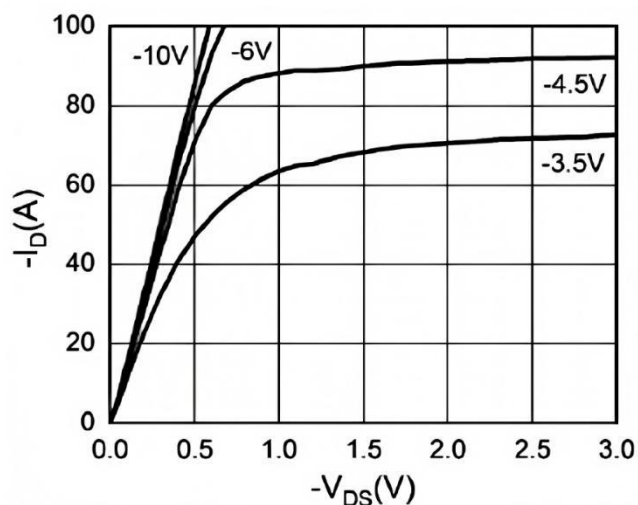


Fig.1 Output Characteristics

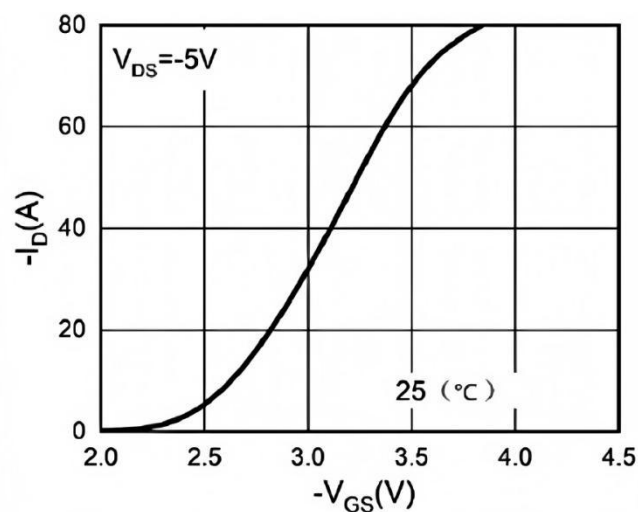


Fig.2 Transfer Characteristics

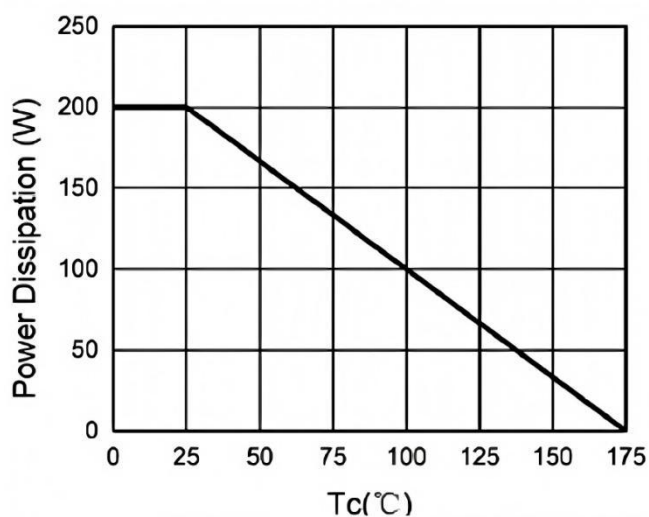


Fig.3 Power Dissipation

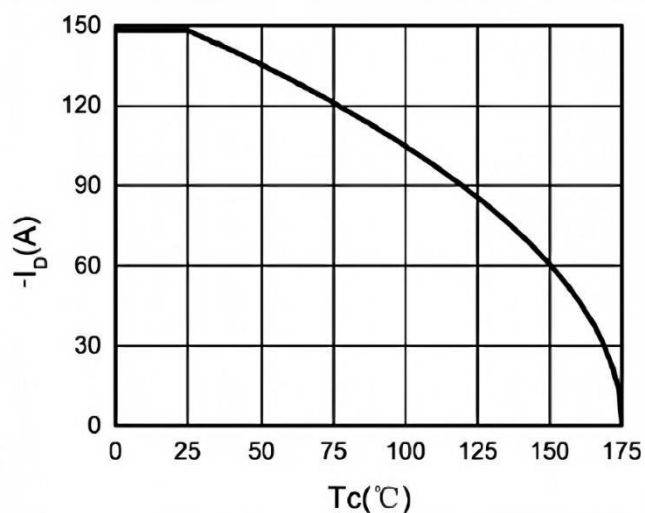


Fig.4 Drain Current

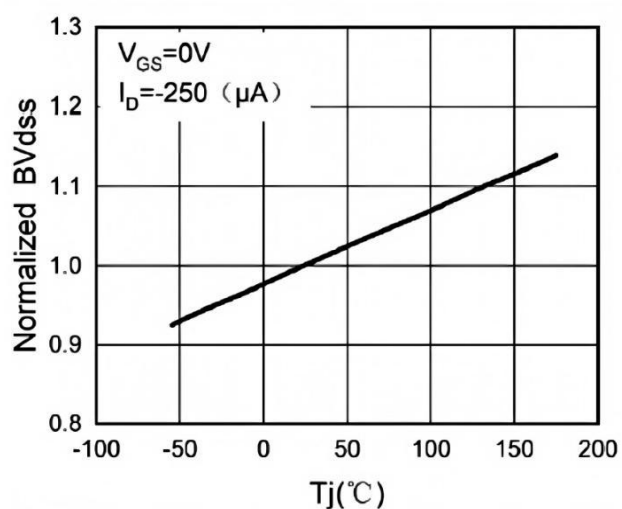


Fig.5  $BV_{dss}$  vs Junction Temperature

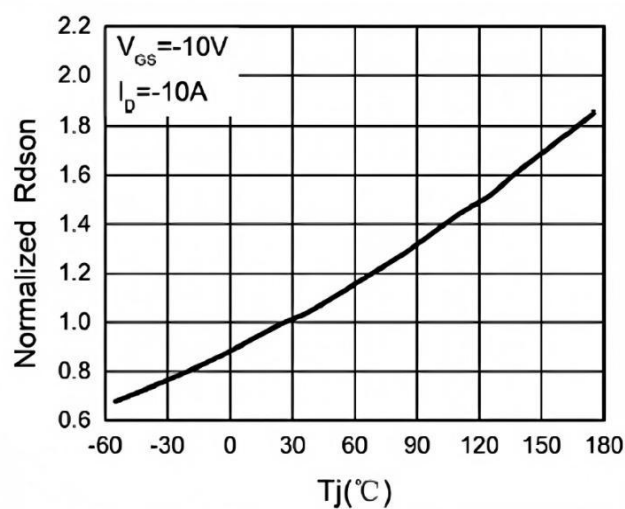
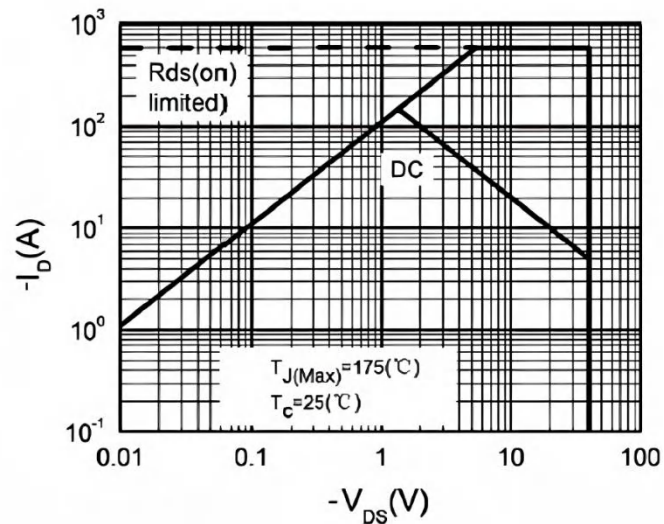
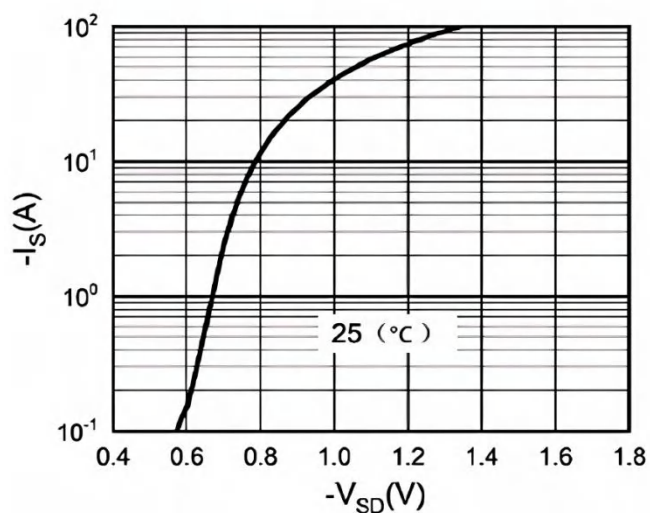
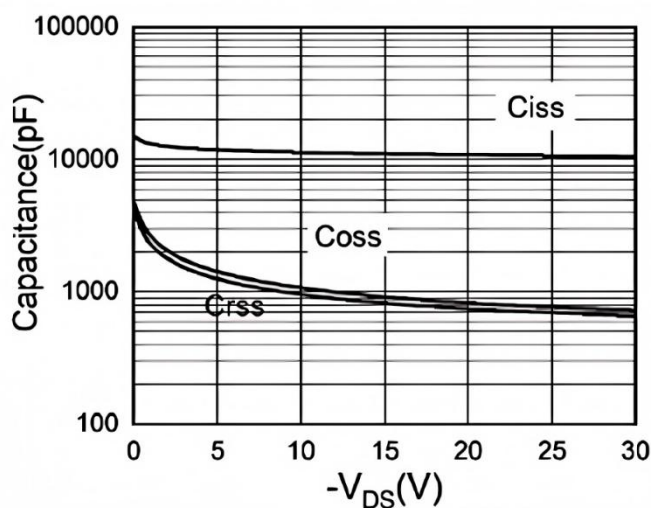
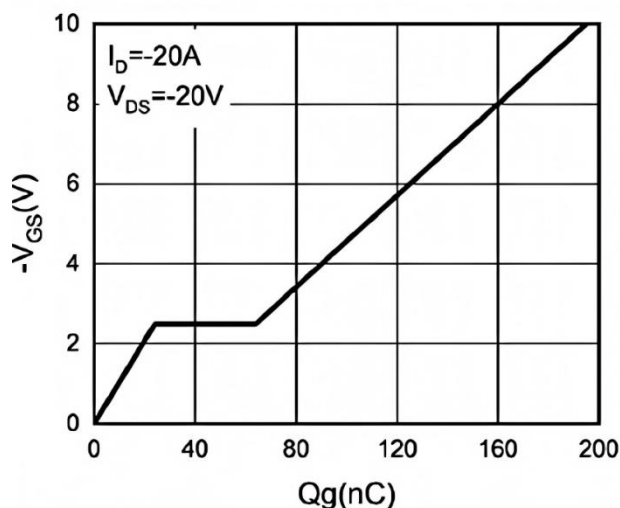


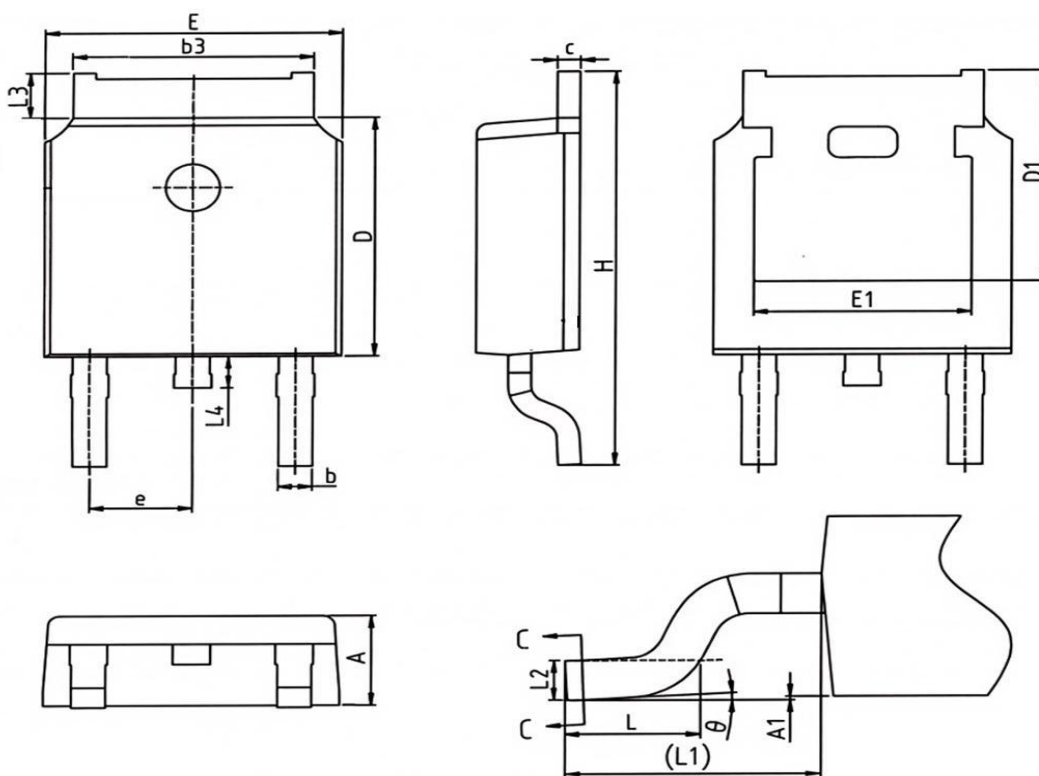
Fig.6  $R_{ds(on)}$  vs Junction Temperature



## Ordering Information

| Part Number | Package code | Packaging      |
|-------------|--------------|----------------|
| HSU4119     | TO252        | 2500/Tape&Reel |

### TO252 Package Outline



| SYMBOLS | MILLIMETERS |      | INCHES   |       |
|---------|-------------|------|----------|-------|
|         | MIN         | MAX  | MIN      | MAX   |
| A       | 2.18        | 2.40 | 0.086    | 0.095 |
| A1      | -           | 0.2  | -        | 0.008 |
| b       | 0.68        | 0.9  | 0.026    | 0.036 |
| b3      | 4.95        | 5.46 | 0.194    | 0.215 |
| C       | 0.43        | 0.89 | 0.017    | 0.035 |
| D       | 5.97        | 6.22 | 0.235    | 0.245 |
| D1      | 5.300REF    |      | 0.209REF |       |
| E       | 6.35        | 6.73 | 0.250    | 0.265 |
| E1      | 4.32        | ---  | 0.170    | -     |
| e       | 2.286BSC    |      | 0.09BSC  |       |
| H       | 9.4         | 10.5 | 0.370    | 0.413 |
| L       | 1.38        | 1.78 | 0.054    | 0.070 |
| L1      | 2.90REF     |      | 0.114REF |       |
| L2      | 0.51BSC     |      | 0.020BSC |       |
| L3      | 0.88        | 1.28 | 0.034    | 0.050 |
| L4      | 0.5         | 1    | 0.019    | 0.039 |
| θ       | 0°          | 8°   | 0°       | 8°    |

## HSU4119 Marking:

