

## General Description

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

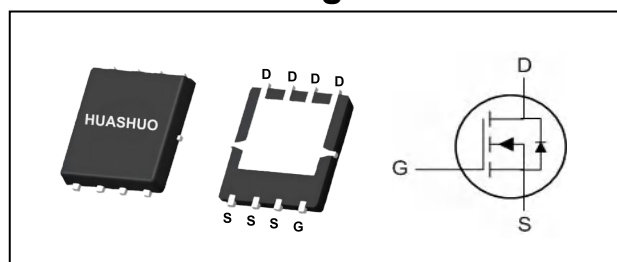
## Product Summary

|                  |     |            |
|------------------|-----|------------|
| $V_{DS}$         | 40  | V          |
| $R_{DS(ON),TYP}$ | 0.7 | m $\Omega$ |
| $I_D$            | 320 | A          |

## Applications

- SMPS Synchronous Rectification
- DC/DC Converters
- ORING

## DFN8x8 Pin Configuration



## Absolute Maximum Ratings

| Symbol                        | Parameter                                             | Rating     | Units              |
|-------------------------------|-------------------------------------------------------|------------|--------------------|
| $V_{DS}$                      | Drain-Source Voltage                                  | 40         | V                  |
| $V_{GS}$                      | Gate-Source Voltage                                   | $\pm 20$   | V                  |
| $I_D@T_C=25^{\circ}\text{C}$  | Continuous Drain Current, $V_{GS} @ 10\text{V}^{1,6}$ | 320        | A                  |
| $I_D@T_C=100^{\circ}\text{C}$ | Continuous Drain Current, $V_{GS} @ 10\text{V}^{1,6}$ | 197        | A                  |
| $I_{DM}$                      | Pulsed Drain Current <sup>2</sup>                     | 1280       | A                  |
| EAS                           | Single Pulse Avalanche Energy <sup>3</sup>            | 1410       | mJ                 |
| $I_{AS}$                      | Avalanche Current                                     | 75         | A                  |
| $P_D@T_C=25^{\circ}\text{C}$  | Total Power Dissipation <sup>4</sup>                  | 180        | 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> | ---  | 38   | $^{\circ}\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 0.78 | $^{\circ}\text{C/W}$ |

**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> | $V_{GS}=10V$ , $I_D=20A$                                     | ---  | 0.7  | 0.9       | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage                         | $V_{GS}=V_{DS}$ , $I_D=250\mu A$                             | 2.0  | 2.6  | 4.0       | 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        |
| $R_g$        | Gate Resistance                                | $V_{DS}=0V$ , $V_{GS}=0V$ , $f=1\text{MHz}$                  | ---  | 1.3  | ---       | $\Omega$  |
| $Q_g$        | Total Gate Charge (10V)                        | $V_{DS}=20V$ , $V_{GS}=10V$ , $I_D=20A$                      | ---  | 93   | ---       | nC        |
| $Q_{gs}$     | Gate-Source Charge                             |                                                              | ---  | 24   | ---       |           |
| $Q_{gd}$     | Gate-Drain Charge                              |                                                              | ---  | 28   | ---       |           |
| $T_{d(on)}$  | Turn-On Delay Time                             | $V_{DD}=20V$ , $V_{GS}=10V$ , $R_G=1.5\Omega$ ,<br>$I_D=20A$ | ---  | 41   | ---       | ns        |
| $T_r$        | Rise Time                                      |                                                              | ---  | 39   | ---       |           |
| $T_{d(off)}$ | Turn-Off Delay Time                            |                                                              | ---  | 145  | ---       |           |
| $T_f$        | Fall Time                                      |                                                              | ---  | 67   | ---       |           |
| $C_{iss}$    | Input Capacitance                              | $V_{DS}=20V$ , $V_{GS}=0V$ , $f=1\text{MHz}$                 | ---  | 6510 | ---       | pF        |
| $C_{oss}$    | Output Capacitance                             |                                                              | ---  | 3060 | ---       |           |
| $C_{rss}$    | Reverse Transfer Capacitance                   |                                                              | ---  | 162  | ---       |           |

**Diode Characteristics**

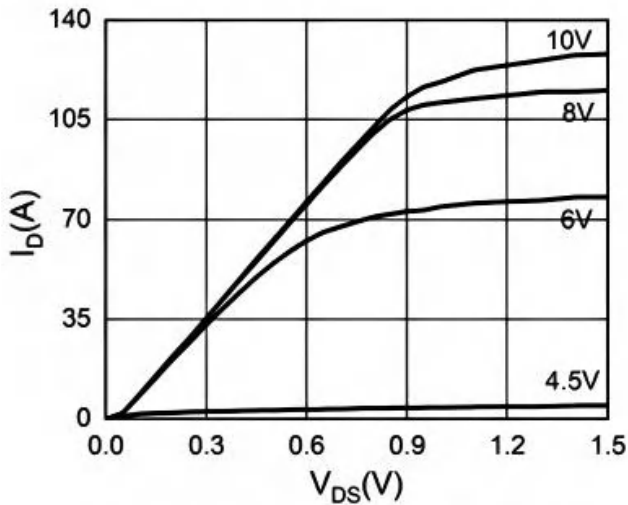
| Symbol   | Parameter                                | Conditions                                              | Min. | Typ. | Max. | Unit |
|----------|------------------------------------------|---------------------------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current <sup>1,6</sup> | $V_G=V_D=0V$ , Force Current                            | ---  | ---  | 320  | A    |
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup>       | $V_{GS}=0V$ , $I_S=1A$ , $T_J=25^\circ\text{C}$         | ---  | ---  | 1.2  | V    |
| $t_{rr}$ | Reverse Recovery Time                    | $I_F=30A$ , $dI/dt=500A/\mu s$ , $T_J=25^\circ\text{C}$ | ---  | 56   | ---  | nS   |
| $Q_{rr}$ | Reverse Recovery Charge                  |                                                         | ---  | 183  | ---  | nC   |

Note :

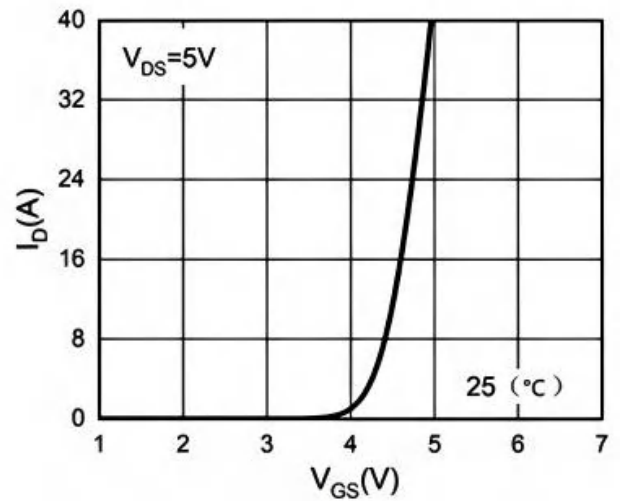
- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- 2.The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is  $V_{DD}=40V$ ,  $V_{GS}=10V$ ,  $L=0.5mH$ ,  $I_{AS}=75A$
- 4.The 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.



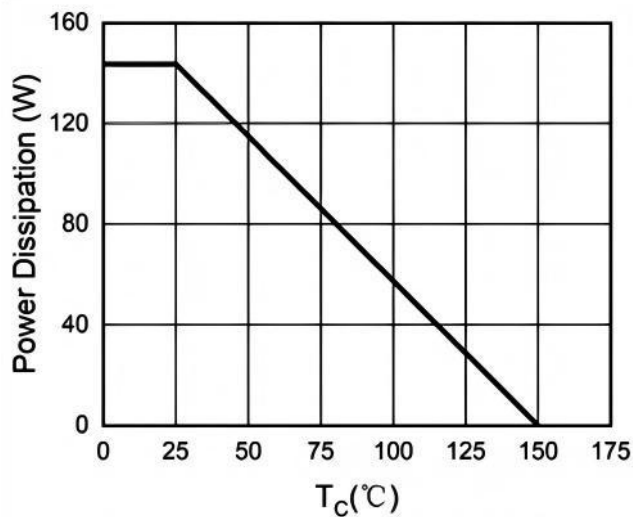
**Typical Characteristics**



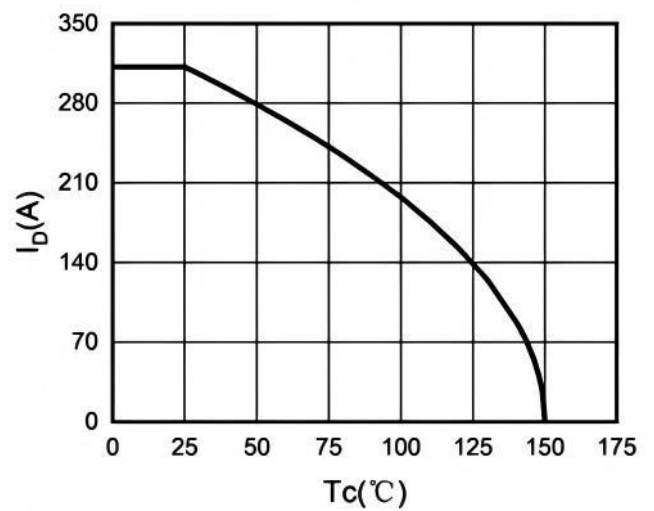
**Figure 1. Output Characteristics**



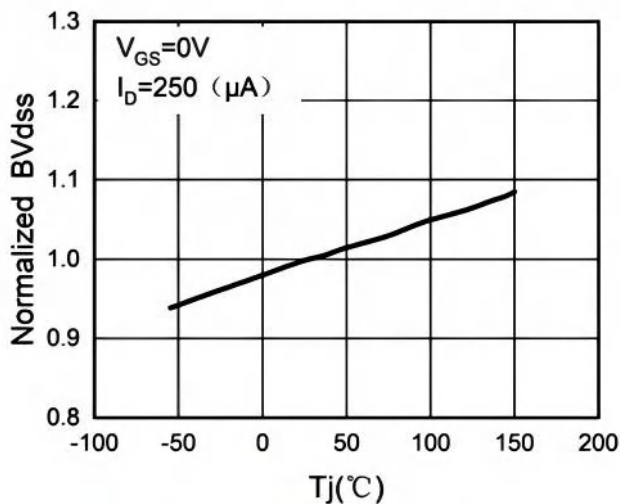
**Figure 2. Transfer Characteristics**



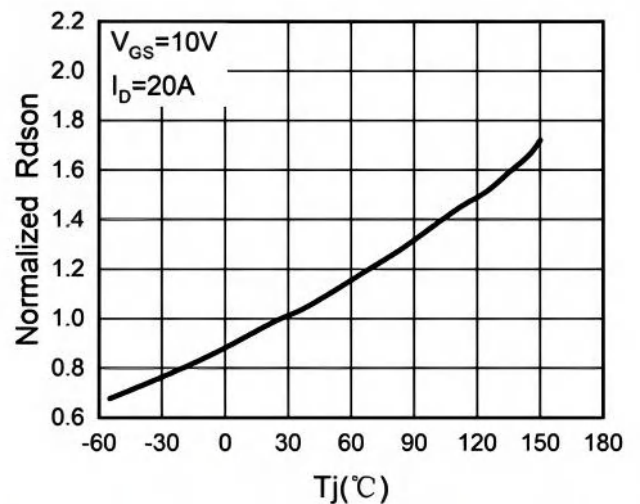
**Figure 3. Power Dissipation**



**Figure 4. Drain Current**



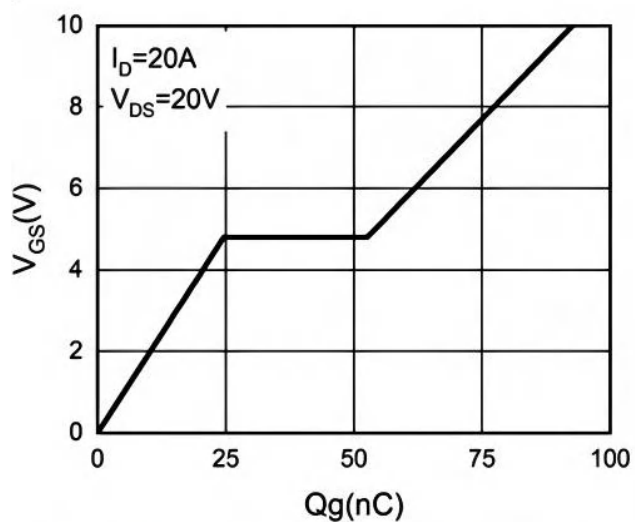
**Figure 5.  $BV_{DS}$  vs Junction Temperature**



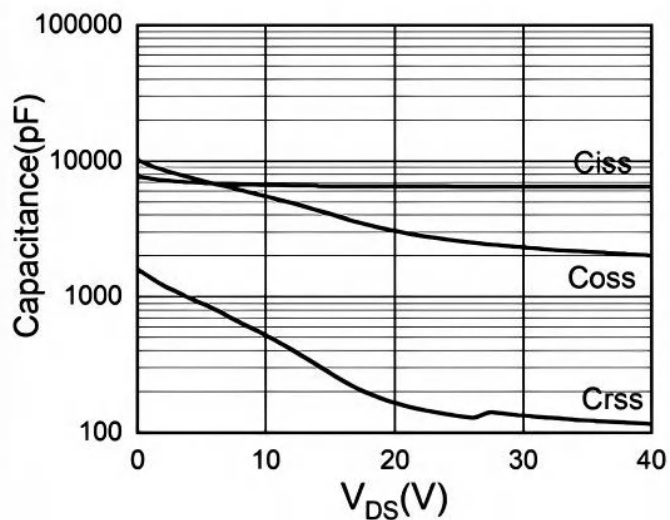
**Figure 6.  $R_{DS(on)}$  vs Junction Temperature**



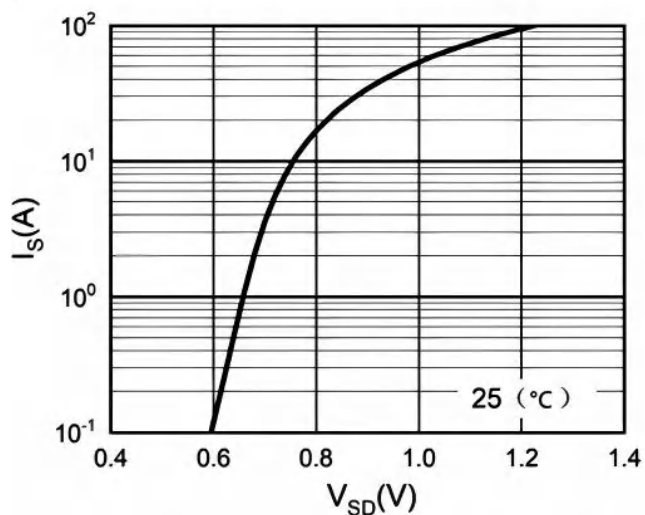
**N-Ch 40V Fast Switching MOSFETs**



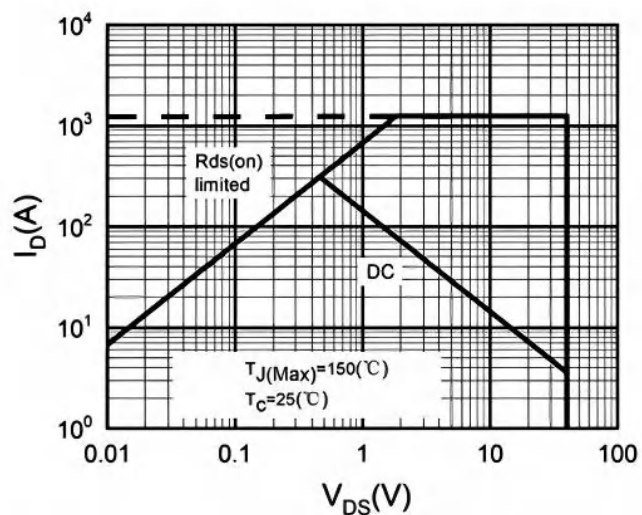
**Figure 7. Gate Charge Waveforms**



**Figure 8. Capacitance**



**Figure 9. Body-Diode Characteristics**

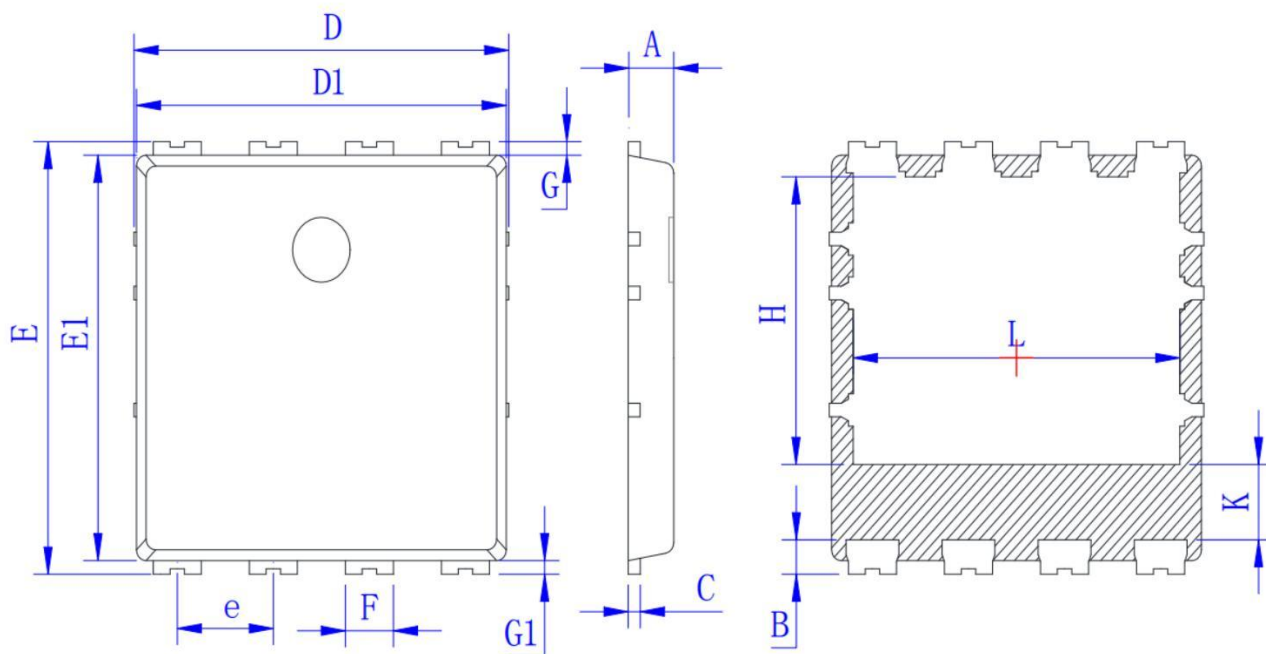


**Figure 10. Maximum Safe Operating Area**

## Ordering Information

| Part Number | Package code | Packaging      |
|-------------|--------------|----------------|
| HSKA4090A   | DFN8*8       | 2500/Tape&Reel |

**DFN8\*8 Package Outline**



**COMMON DIMENSIONS (UNITS OF MEASURE=mm)**

| Symbol | Min  | Typ  | Max  |
|--------|------|------|------|
| A      | 0.90 | 0.95 | 1.00 |
| B      | 0.50 | 0.60 | 0.70 |
| C      | 0.23 | 0.25 | 0.30 |
| D      | 7.75 | 7.80 | 7.85 |
| D1     | 7.65 | 7.70 | 7.75 |
| E      | 7.95 | 8.00 | 8.05 |
| E1     | 7.45 | 7.50 | 7.55 |
| e      | 1.95 | 2.00 | 2.05 |
| F      | 0.95 | 1.00 | 1.05 |
| G      | 0.20 | 0.25 | 0.30 |
| G1     | 0.20 | 0.25 | 0.30 |
| H      | 5.20 | 5.30 | 5.40 |
| L      | 6.70 | 6.80 | 6.90 |
| K      | 1.30 | 1.38 | 1.50 |

## HSKA4090A Marking:

