

### General Description

The HSS2301C is the high cell density trench P-ch MOSFETs, which provides excellent RDSON and efficiency for most of the small power switching and load switch applications.

The HSS2301C meet the RoHS and Green Product requirement with full function reliability approved.

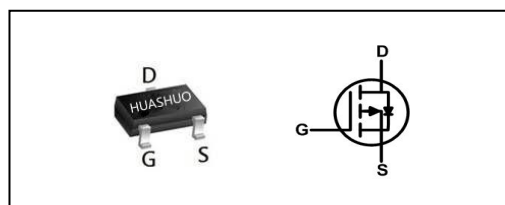
### Product Summary

|                  |     |    |
|------------------|-----|----|
| $V_{DS}$         | -20 | V  |
| $R_{DS(ON),typ}$ | 130 | mΩ |
| $I_D$            | -2  | A  |

### Features

- Green Device Available
- Super Low Gate Charge
- Excellent Cdv/dt effect decline
- Advanced high cell density Trench Technology

### SOT-23S Pin Configuration



### Absolute Maximum Ratings

| Symbol                | Parameter                                    | Rating     | Units       |
|-----------------------|----------------------------------------------|------------|-------------|
| $V_{DS}$              | Drain-Source Voltage                         | -20        | V           |
| $V_{GS}$              | Gate-Source Voltage                          | $\pm 12$   | V           |
| $I_D@T_A=25^{\circ}C$ | Continuous Drain Current, $V_{GS} @ -4.5V^1$ | -2         | A           |
| $I_D@T_A=70^{\circ}C$ | Continuous Drain Current, $V_{GS} @ -4.5V^1$ | -1.4       | A           |
| $I_{DM}$              | Pulsed Drain Current <sup>2</sup>            | -8         | A           |
| $P_D@T_A=25^{\circ}C$ | Total Power Dissipation <sup>3</sup>         | 1          | 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> | ---  | 145  | $^{\circ}C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 80   | $^{\circ}C/W$ |

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

| Symbol       | Parameter                                      | Conditions                                                    | Min. | Typ.  | Max.      | Unit      |
|--------------|------------------------------------------------|---------------------------------------------------------------|------|-------|-----------|-----------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage                 | $V_{GS}=0V$ , $I_D=-250\mu A$                                 | -20  | ---   | ---       | V         |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=-4.5V$ , $I_D=-2A$                                    | ---  | 130   | 150       | $m\Omega$ |
|              |                                                | $V_{GS}=-2.5V$ , $I_D=-1A$                                    | ---  | 170   | 190       |           |
| $V_{GS(th)}$ | Gate Threshold Voltage                         | $V_{GS}=V_{DS}$ , $I_D=-250\mu A$                             | -0.3 | -0.65 | -1.0      | V         |
| $I_{DSS}$    | Drain-Source Leakage Current                   | $V_{DS}=-16V$ , $V_{GS}=0V$ , $T_J=25^\circ\text{C}$          | ---  | ---   | -1        | $\mu A$   |
|              |                                                | $V_{DS}=-16V$ , $V_{GS}=0V$ , $T_J=55^\circ\text{C}$          | ---  | ---   | -5        |           |
| $I_{GSS}$    | Gate-Source Leakage Current                    | $V_{GS}=\pm 12V$ , $V_{DS}=0V$                                | ---  | ---   | $\pm 100$ | nA        |
| $g_{fs}$     | Forward Transconductance                       | $V_{DS}=-5V$ , $I_D=-1A$                                      | ---  | 5     | ---       | S         |
| $Q_g$        | Total Gate Charge (-4.5V)                      | $V_{DS}=-10V$ , $V_{GS}=-4.5V$ , $I_D=-2A$                    | ---  | 4.3   | ---       | nC        |
| $Q_{gs}$     | Gate-Source Charge                             |                                                               | ---  | 0.7   | ---       |           |
| $Q_{gd}$     | Gate-Drain Charge                              |                                                               | ---  | 1     | ---       |           |
| $T_{d(on)}$  | Turn-On Delay Time                             | $V_{DD}=-10V$ , $V_{GS}=-4.5V$ , $R_G=3.3\Omega$<br>$I_D=-2A$ | ---  | 12    | ---       | ns        |
| $T_r$        | Rise Time                                      |                                                               | ---  | 20    | ---       |           |
| $T_{d(off)}$ | Turn-Off Delay Time                            |                                                               | ---  | 23    | ---       |           |
| $T_f$        | Fall Time                                      |                                                               | ---  | 9     | ---       |           |
| $C_{iss}$    | Input Capacitance                              | $V_{DS}=-10V$ , $V_{GS}=0V$ , $f=1\text{MHz}$                 | ---  | 270   | ---       | pF        |
| $C_{oss}$    | Output Capacitance                             |                                                               | ---  | 54    | ---       |           |
| $C_{rss}$    | Reverse Transfer Capacitance                   |                                                               | ---  | 44    | ---       |           |

**Diode Characteristics**

| Symbol   | Parameter                                | Conditions                                       | Min. | Typ. | Max. | Unit |
|----------|------------------------------------------|--------------------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current <sup>1,4</sup> | $V_G=V_D=0V$ , Force Current                     | ---  | ---  | -2   | A    |
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup>       | $V_{GS}=0V$ , $I_S=-1A$ , $T_J=25^\circ\text{C}$ | ---  | ---  | -1.2 | V    |

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 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

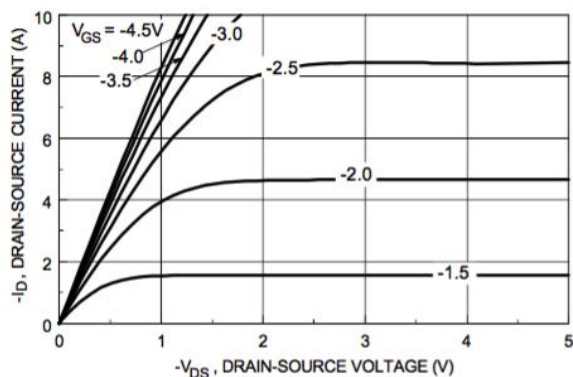


Figure 1. On-Region Characteristics.

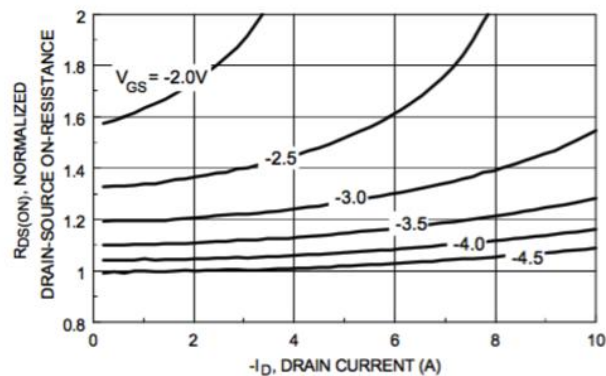


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

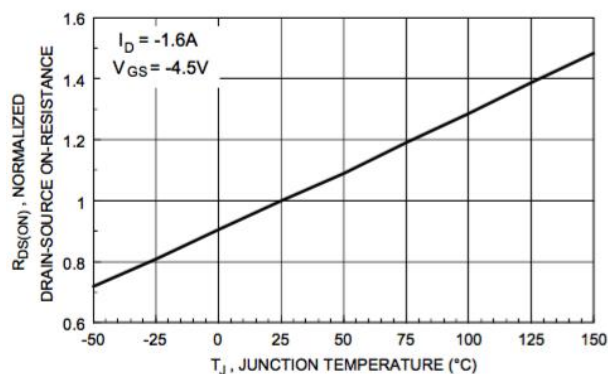


Figure 3. On-Resistance Variation with Temperature.

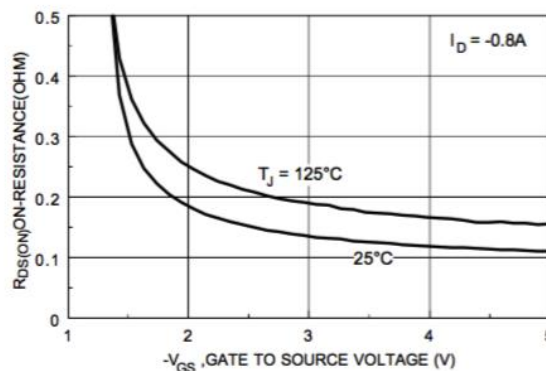


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

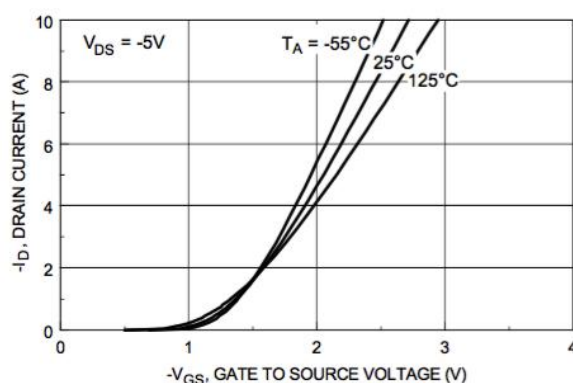


Figure 5. Transfer Characteristics.

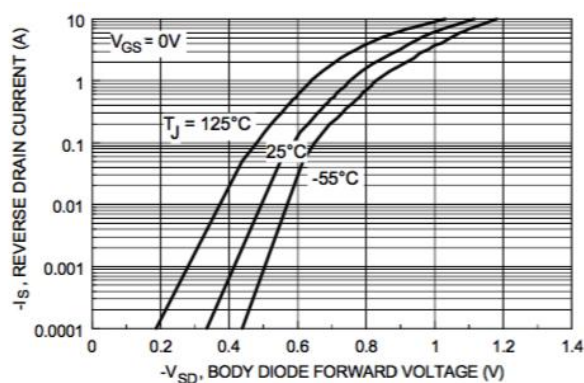


Figure 6 . Body Diode Forward Voltage Variation with Source Current and Temperature.



## P-Ch 20V Fast Switching MOSFETs

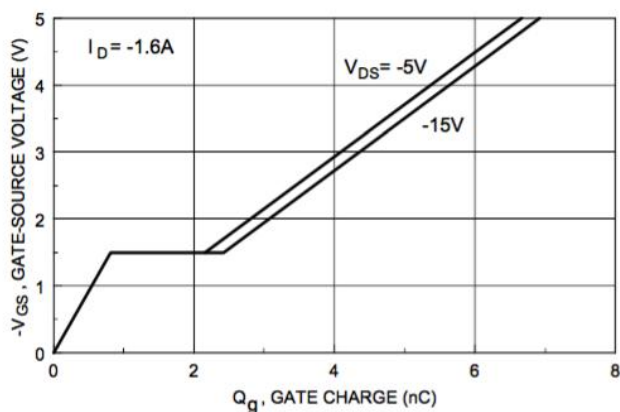


Figure 7. Gate Charge Characteristics.

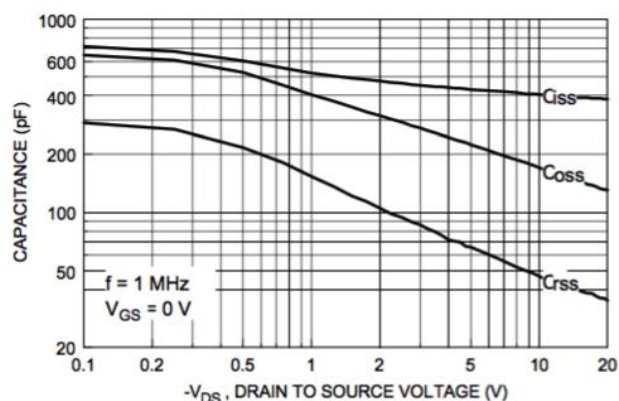


Figure 8. Capacitance Characteristics.

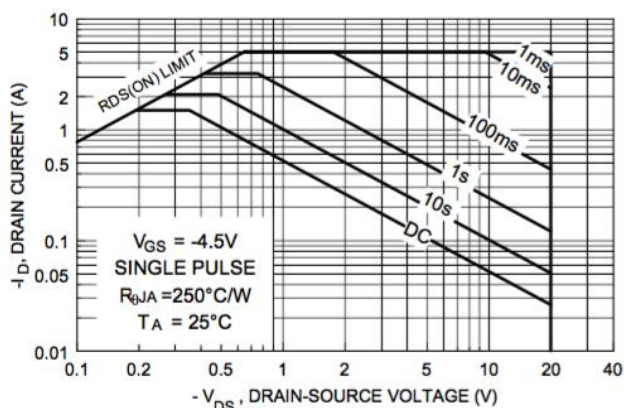


Figure 9. Maximum Safe Operating Area.

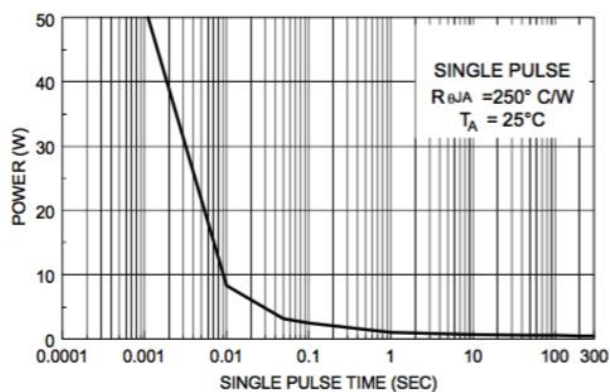


Figure 10. Single Pulse Maximum Power Dissipation.

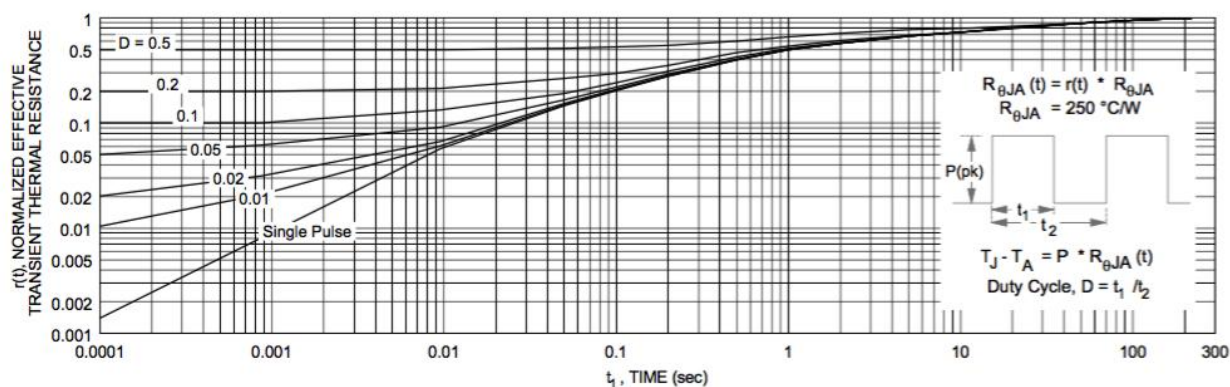
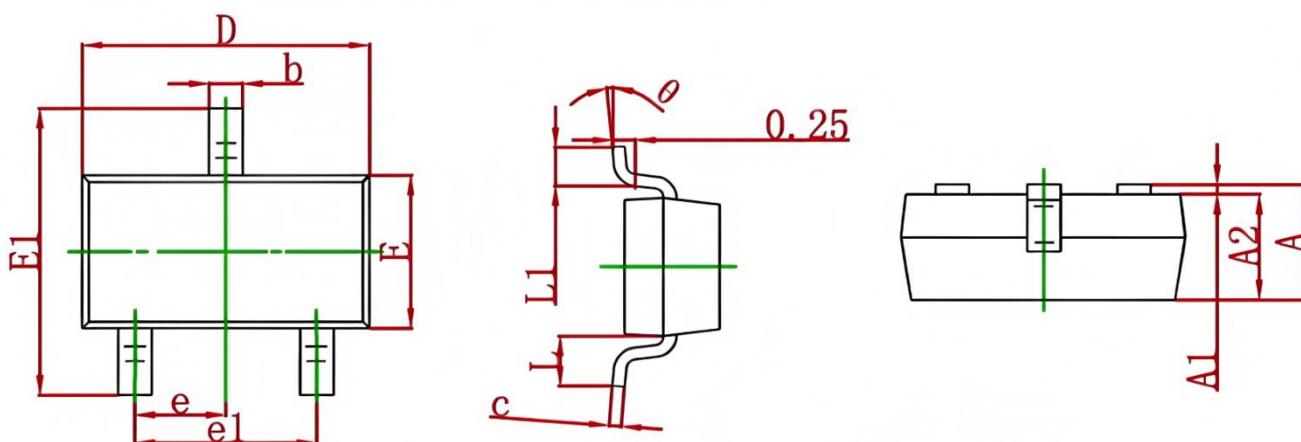


Figure 11. Transient Thermal Response Curve.

## Ordering Information

| Part Number | Package code | Packaging      |
|-------------|--------------|----------------|
| HSS2301C    | SOT-23S      | 3000/Tape&Reel |

### SOT-23S Package Outline



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 0.900                     | 1.150 | 0.035                | 0.045 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                     | 1.050 | 0.035                | 0.041 |
| b      | 0.300                     | 0.500 | 0.012                | 0.020 |
| C      | 0.080                     | 0.150 | 0.003                | 0.006 |
| D      | 2.800                     | 3.000 | 0.110                | 0.118 |
| E      | 1.200                     | 1.400 | 0.047                | 0.055 |
| E1     | 2.250                     | 2.550 | 0.089                | 0.100 |
| e      | 0.950 TYP                 |       | 0.037 TYP            |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.550 REF                 |       | 0.022 REF            |       |
| L1     | 0.300                     | 0.500 | 0.012                | 0.020 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |

## HSS2301C TOP Marking

