



## Description

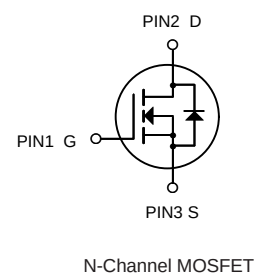
The HSi2308DS uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

## General Features

$V_{DS} = 60V$   $I_D = 3A$   
 $R_{DS(ON)} < 85m\Omega @ V_{GS}=10V$

## Application

Battery protection  
Load switch  
Uninterruptible power supply



## Package Marking and Ordering Information

| Product ID | Pack   | Marking | Qty(PCS) |
|------------|--------|---------|----------|
| HSi2308DS  | SOT-23 | S10     | 3000PCS  |

## Absolute Maximum Ratings ( $T_A=25^{\circ}C$ unless otherwise noted)

| Symbol          | Parameter                                        | Limit      | Unit          |
|-----------------|--------------------------------------------------|------------|---------------|
| $V_{DS}$        | Drain-Source Voltage                             | 60         | V             |
| $V_{GS}$        | Gate-Source Voltage                              | $\pm 20$   | V             |
| $I_D$           | Drain Current-Continuous                         | 3          | A             |
| $I_{DM}$        | Drain Current-Pulsed (Note 1)                    | 10         | A             |
| $P_D$           | Maximum Power Dissipation                        | 1.7        | W             |
| $T_J, T_{STG}$  | Operating Junction and Storage Temperature Range | -55 To 150 | $^{\circ}C$   |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient (Note 2) | 73.5       | $^{\circ}C/W$ |



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

|                                    |                     |                                                                                          |     |     |      |    |
|------------------------------------|---------------------|------------------------------------------------------------------------------------------|-----|-----|------|----|
| Gate-Body Leakage Current          | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V,                                              | -   | -   | ±100 | nA |
| On Characteristics (Note 3)        |                     |                                                                                          |     |     |      |    |
| Gate Threshold Voltage             | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                 | 0.8 | 1.3 | 2.0  | V  |
| Drain-Source On-State Resistance   | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =3A                                                 | -   | 72  | 85   | mΩ |
|                                    |                     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =1.5A                                              | -   | 85  | 103  | mΩ |
| Forward Transconductance           | g <sub>FS</sub>     | V <sub>DS</sub> =15V, I <sub>D</sub> =2A                                                 |     | 3   | -    | S  |
| Dynamic Characteristics (Note4)    |                     |                                                                                          |     |     |      |    |
| Input Capacitance                  | C <sub>ISS</sub>    | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V,<br>F=1.0MHz                                   | -   | 510 | -    | PF |
| Output Capacitance                 | C <sub>OSS</sub>    |                                                                                          | -   | 34  | -    | PF |
| Reverse Transfer Capacitance       | C <sub>RSS</sub>    |                                                                                          | -   | 26  | -    | PF |
| Switching Characteristics (Note 4) |                     |                                                                                          |     |     |      |    |
| Turn-on Delay Time                 | t <sub>d(on)</sub>  | V <sub>DD</sub> =30V, I <sub>D</sub> =1.5A<br>V <sub>GS</sub> =10V, R <sub>GEN</sub> =1Ω | -   | 6   | -    | nS |
| Turn-on Rise Time                  | t <sub>r</sub>      |                                                                                          | -   | 15  | -    | nS |
| Turn-Off Delay Time                | t <sub>d(off)</sub> |                                                                                          | -   | 15  | -    | nS |
| Turn-Off Fall Time                 | t <sub>f</sub>      |                                                                                          | -   | 10  | -    | nS |
| Total Gate Charge                  | Q <sub>g</sub>      | V <sub>DS</sub> =30V, I <sub>D</sub> =3A,<br>V <sub>GS</sub> =4.5V                       | -   | 7.5 | -    | nC |
| Gate-Source Charge                 | Q <sub>gs</sub>     |                                                                                          | -   | 1.4 | -    | nC |
| Gate-Drain Charge                  | Q <sub>gd</sub>     |                                                                                          | -   | 3   | -    | nC |
| Drain-Source Diode Characteristics |                     |                                                                                          |     |     |      |    |
| Diode Forward Voltage (Note 3)     | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =3A                                                  | -   | -   | 1.2  | V  |
| Diode Forward Current (Note 2)     | I <sub>S</sub>      |                                                                                          | -   | -   | 3    | A  |

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production



## Typical Electrical and Thermal Characteristics

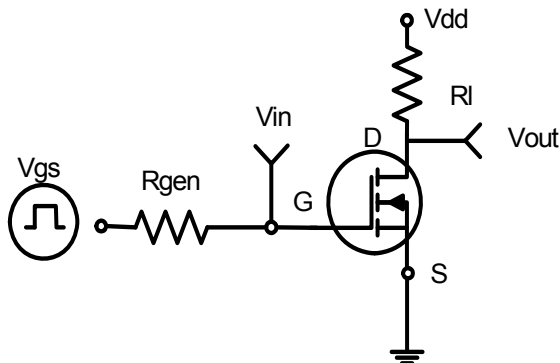


Figure 1: Switching Test Circuit

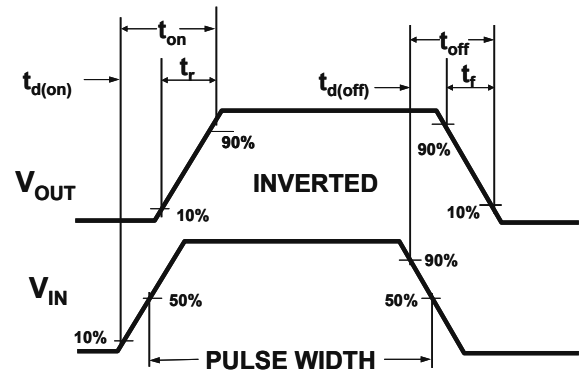


Figure 2: Switching Waveforms

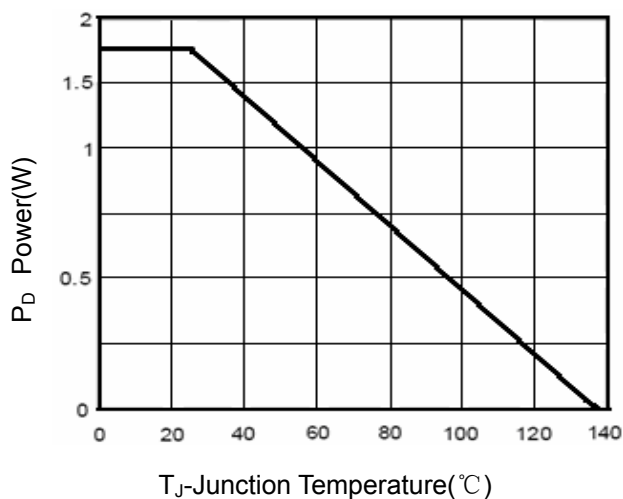


Figure 3 Power Dissipation

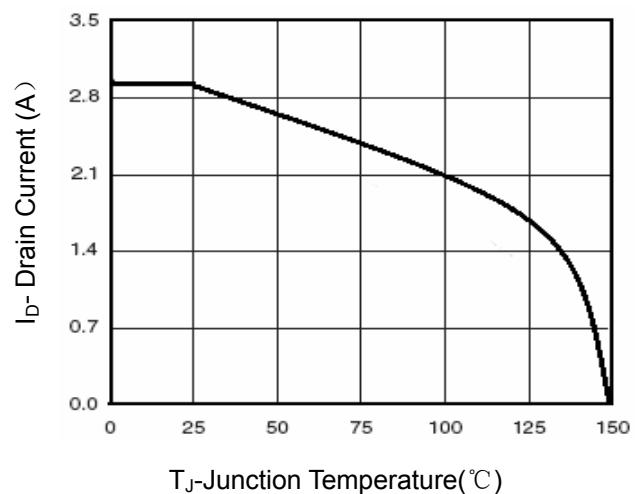


Figure 4 Drain Current

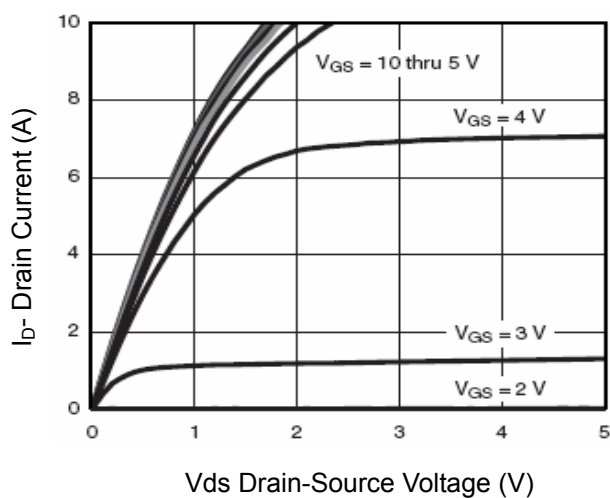


Figure 5 Output Characteristics

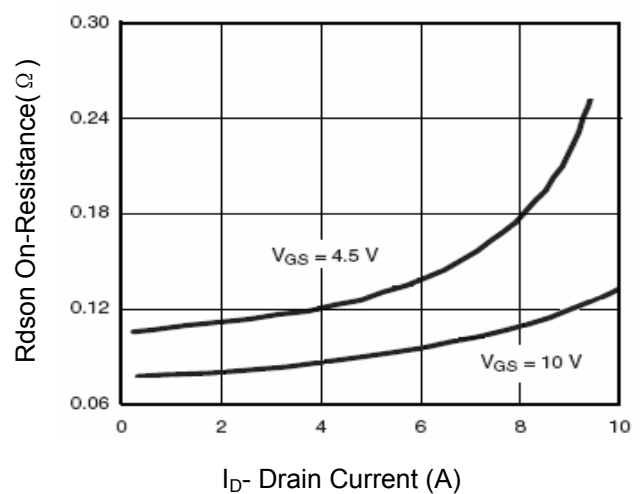


Figure 6 Drain-Source On-Resistance

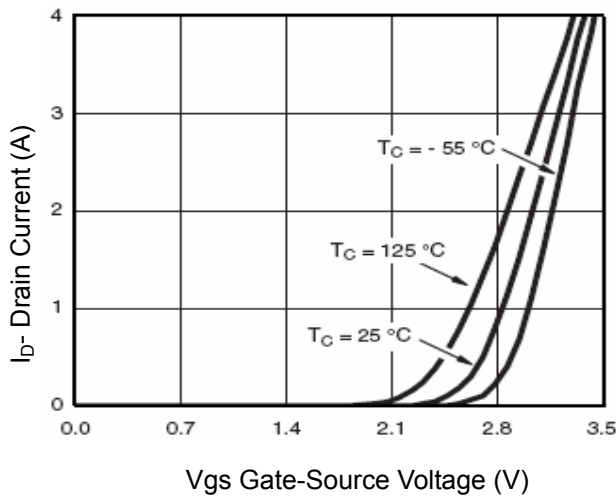


Figure 7 Transfer Characteristics

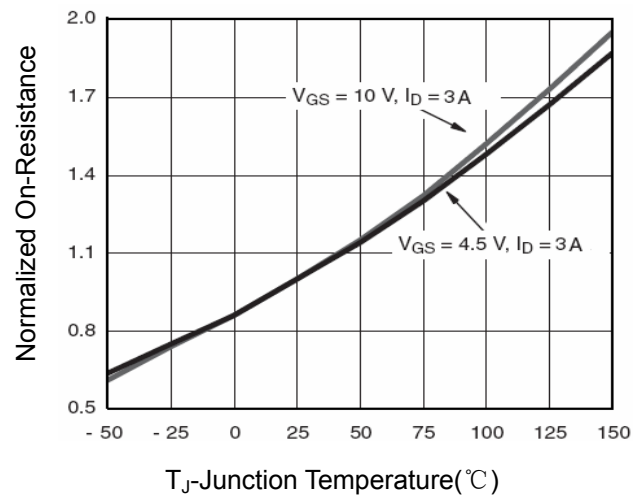


Figure 8 Drain-Source On-Resistance

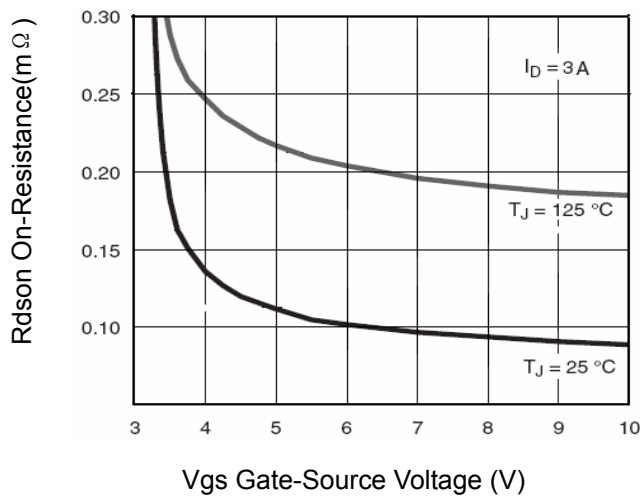


Figure 9 Rdson vs Vgs

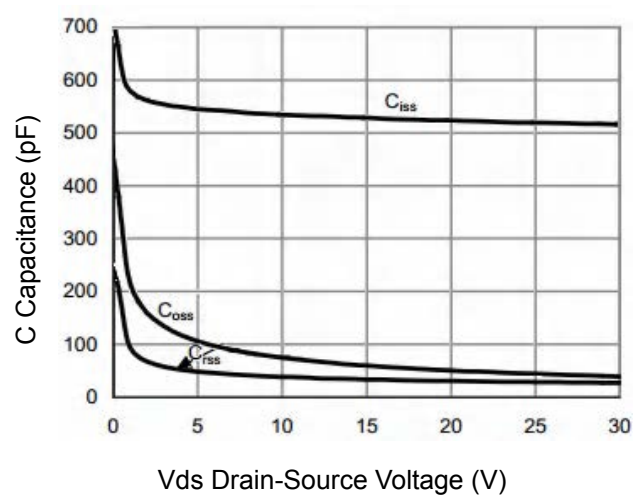


Figure 10 Capacitance vs Vds

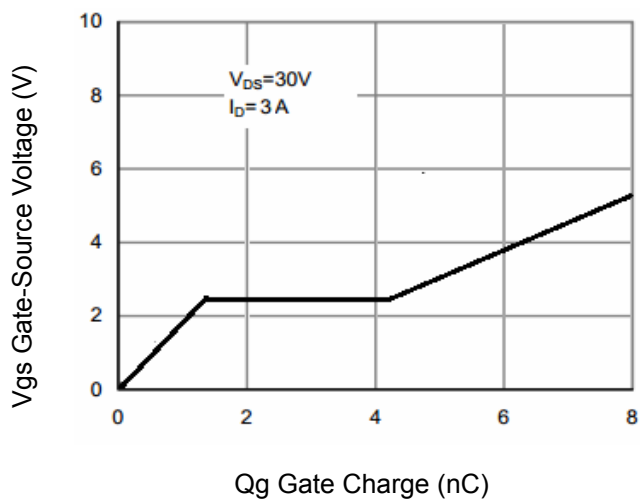


Figure 11 Gate Charge

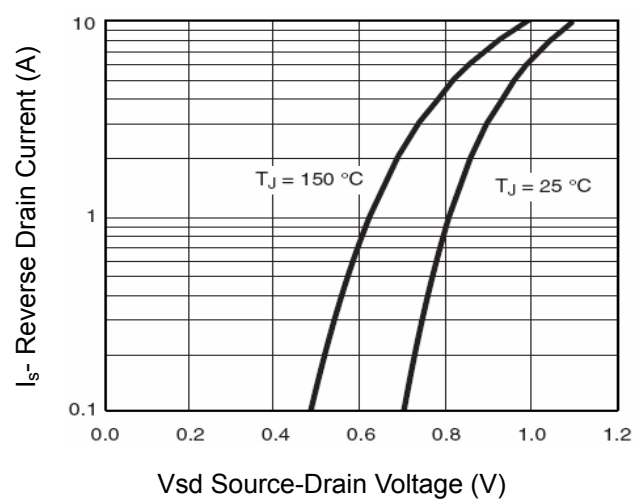


Figure 12 Source- Drain Diode Forward

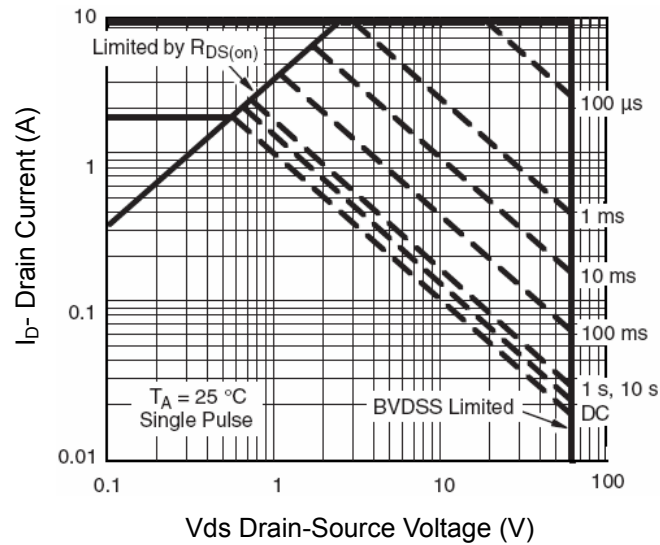


Figure 13 Safe Operation Area

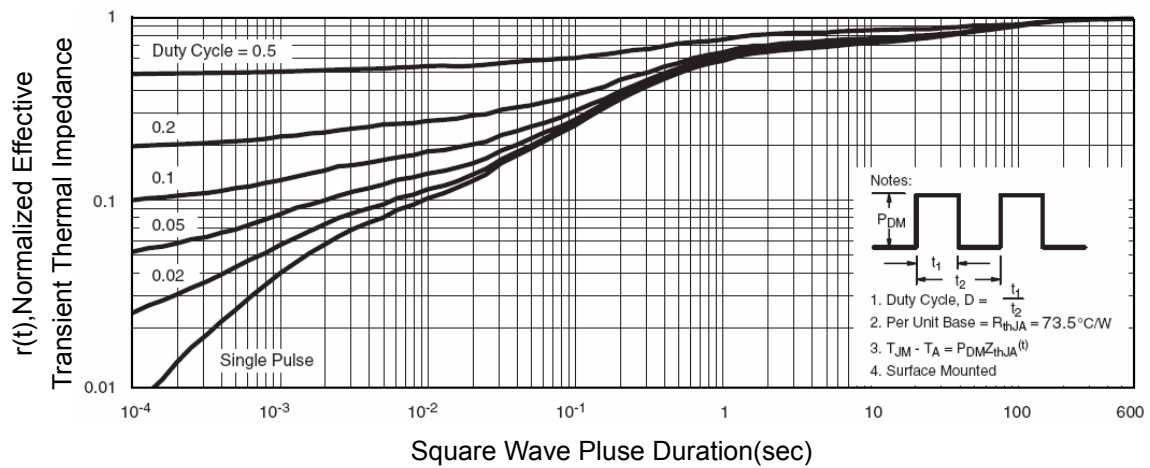
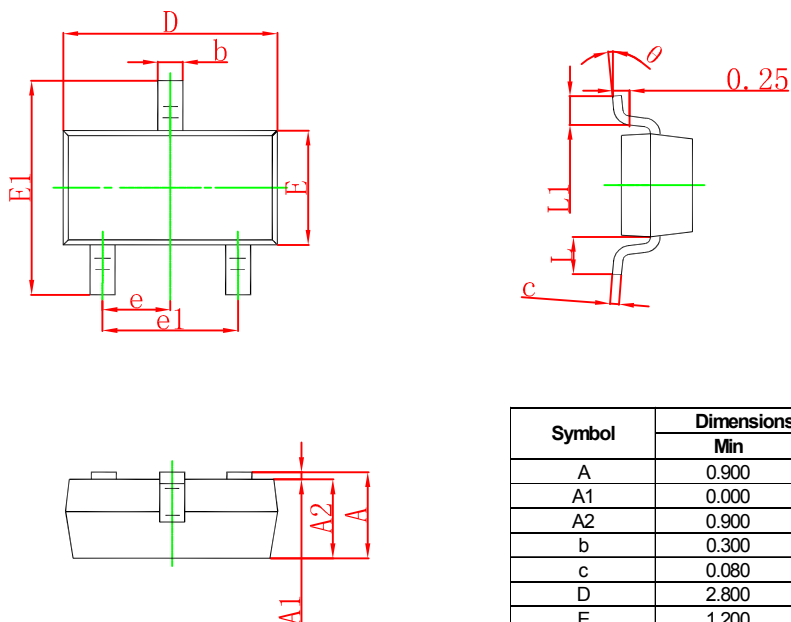


Figure 14 Normalized Maximum Transient Thermal Impedance

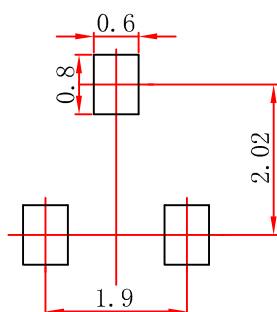


## SOT-23 Package Outline Dimensions



| 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°    |

## SOT-23 Suggested Pad Layout



Note:  
1. Controlling dimension: in millimeters.  
2. General tolerance:  $\pm 0.05\text{mm}$ .  
3. The pad layout is for reference purposes only.



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