



Description

The HSi2323DS 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.



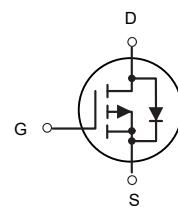
SOT-23

General Features

$V_{DS} = -20V, I_D = -5A$
 $R_{DS(ON)} < 45m\Omega$ @ $V_{GS}=4.5V$

Application

High power and current handing capability
Lead free product is acquired
Surface mount package
PWM applications
Load switch
Power management



P-Channel MOSFET

Package Marking and Ordering Information

| Product ID | Pack | Marking | Qty(PCS) |
|------------|--------|------------|----------|
| HSi2323DS | SOT-23 | A5SHB XXXX | 3000PCS |

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

| Symbol | Parameter | Limit | Unit |
|-----------------|-------------------------------------------------------------|------------|------|
| V_{DS} | Drain-Source Voltage | -20 | V |
| V_{GS} | Gate-Source Voltage | ± 12 | V |
| I_D | Drain Current-Continuous | -5 | A |
| I_{DM} | Drain Current-Pulsed ^(Note 1) | -14 | A |
| P_D | Maximum Power Dissipation | 1.31 | W |
| T_J, T_{STG} | Operating Junction and Storage Temperature Range | -55 To 150 | °C |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient ^(Note 2) | 120 | °C/W |



Electrical Characteristics (T_J=25 °C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|------------------------------------------------|------------------------------------------------------------------------------------------|------|--------|------|-------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =-250uA | -20 | --- | --- | V |
| △BV _{DSS} /△T _J | BV _{DSS} Temperature Coefficient | Reference to 25°C, I _D =-1mA | --- | -0.014 | --- | V/°C |
| R _{DS(ON)} | Static Drain-Source On-Resistance ² | V _{GS} =-4.5V, I _D =-4.9A | --- | 35 | 45 | mΩ |
| | | V _{GS} =-2.5V, I _D =-3.4A | --- | 45 | 60 | |
| | | V _{GS} =-1.8V, I _D =-2A | --- | 65 | 85 | |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =-250uA | -0.4 | --- | -1.0 | V |
| △V _{GS(th)} | V _{GS(th)} Temperature Coefficient | | --- | 3.95 | --- | mV/°C |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =-16V, V _{GS} =0V, T _J =25°C | --- | --- | -1 | uA |
| | | V _{DS} =-16V, V _{GS} =0V, T _J =55°C | --- | --- | -5 | |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±12V, V _{DS} =0V | --- | --- | ±100 | nA |
| g _{fs} | Forward Transconductance | V _{DS} =-5V, I _D =-3A | --- | 12.8 | --- | S |
| Q _g | Total Gate Charge (-4.5V) | V _{DS} =-15V, V _{GS} =-4.5V, I _D =-3A | --- | 10.2 | 14.3 | nC |
| Q _{gs} | Gate-Source Charge | | --- | 1.89 | 2.6 | |
| Q _{gd} | Gate-Drain Charge | | --- | 3.1 | 4.3 | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =-10V, V _{GS} =-4.5V, R _G =3.3Ω, I _D =-3A | --- | 5.6 | 11.2 | ns |
| T _r | Rise Time | | --- | 40.8 | 73 | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 33.6 | 67 | |
| T _f | Fall Time | | --- | 18 | 36 | |
| C _{iss} | Input Capacitance | V _{DS} =-15V, V _{GS} =0V, f=1MHz | --- | 857 | 1200 | pF |
| C _{oss} | Output Capacitance | | --- | 114 | 160 | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 108 | 151 | |
| I _s | Continuous Source Current ^{1,4} | V _G =V _D =0V, Force Current | --- | --- | -4.9 | A |
| I _{SM} | Pulsed Source Current ^{2,4} | | --- | --- | -14 | A |
| V _{SD} | Diode Forward Voltage ² | V _{GS} =0V, I _s =-1A, T _J =25°C | --- | --- | -1 | V |
| t _{rr} | Reverse Recovery Time | IF=-3A, di/dt=100A/μs, T _J =25°C | --- | 21.8 | --- | nS |
| Q _{rr} | Reverse Recovery Charge | | --- | 6.9 | --- | nC |

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- 3.The power dissipation is limited by 150°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

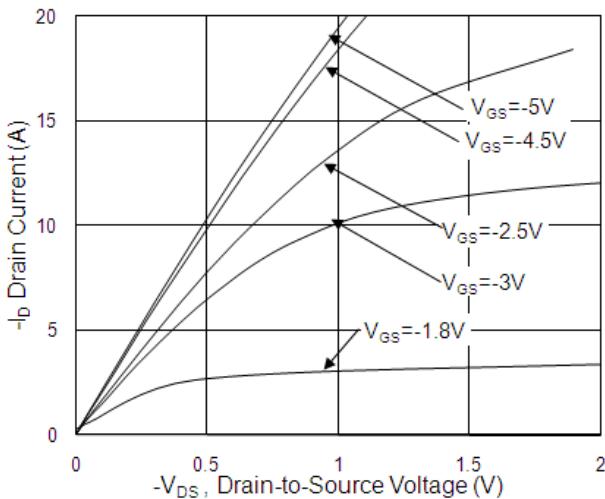


Fig.1 Typical Output Characteristics

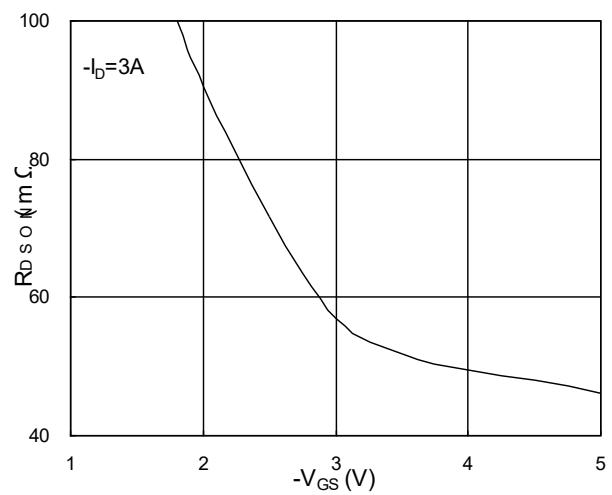


Fig.2 On-Resistance vs. G-S Voltage

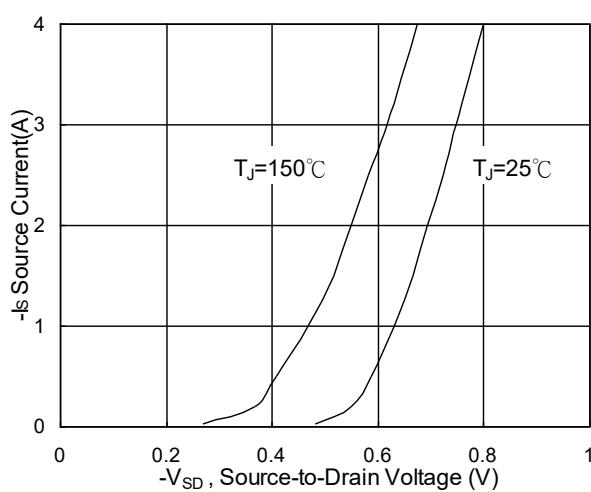


Fig.3 Forward Characteristics of Reverse

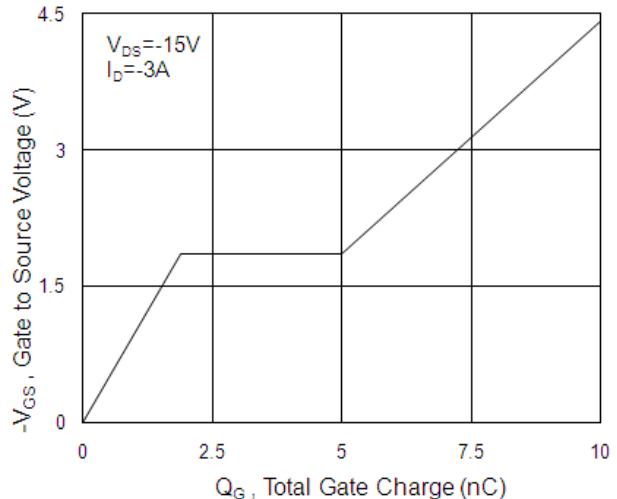


Fig.4 Gate-charge Characteristics

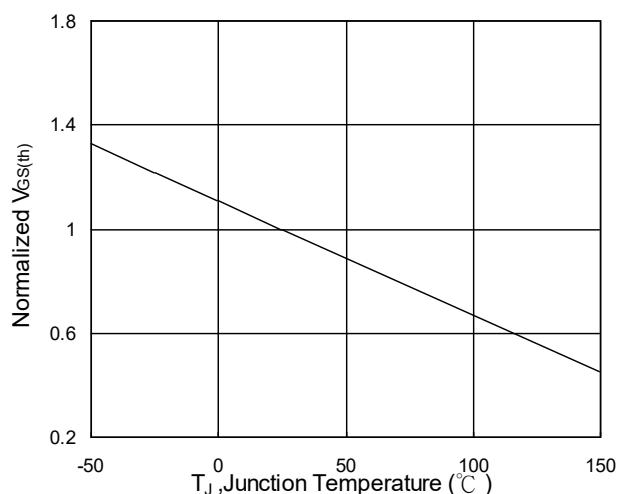


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

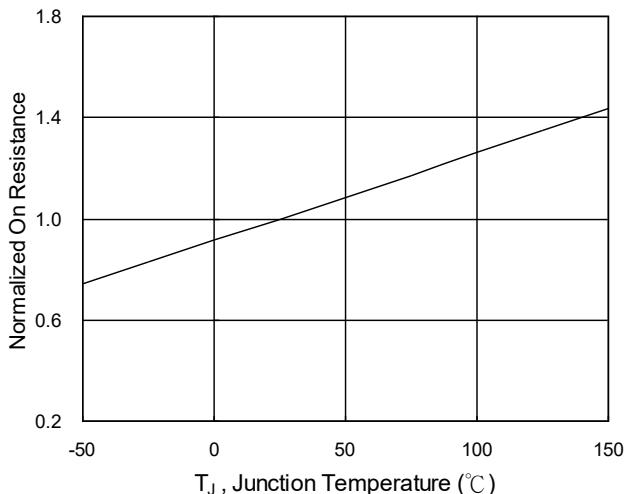


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

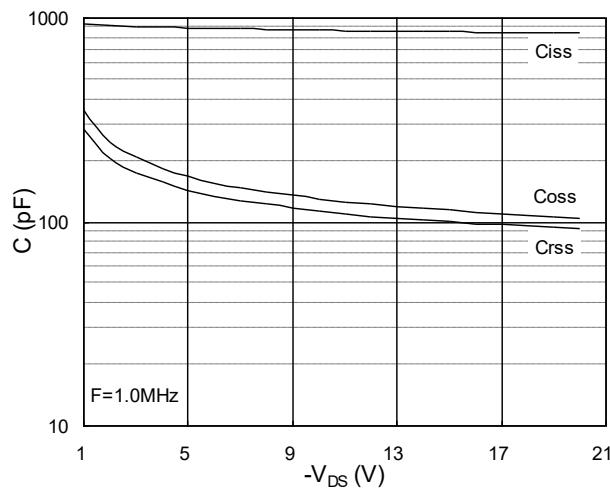


Fig.7 Capacitance

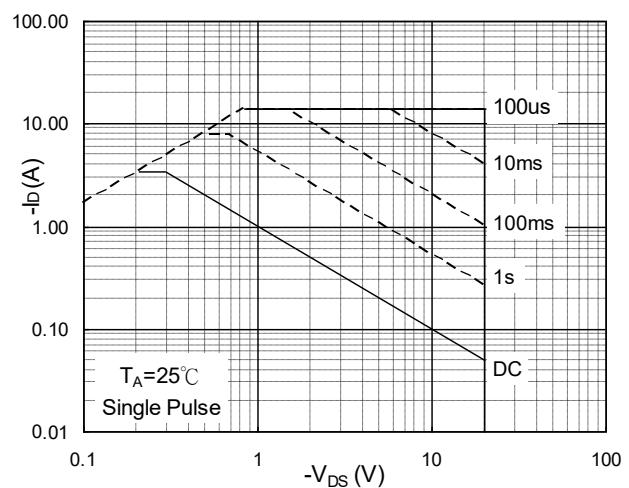


Fig.8 Safe Operating Area

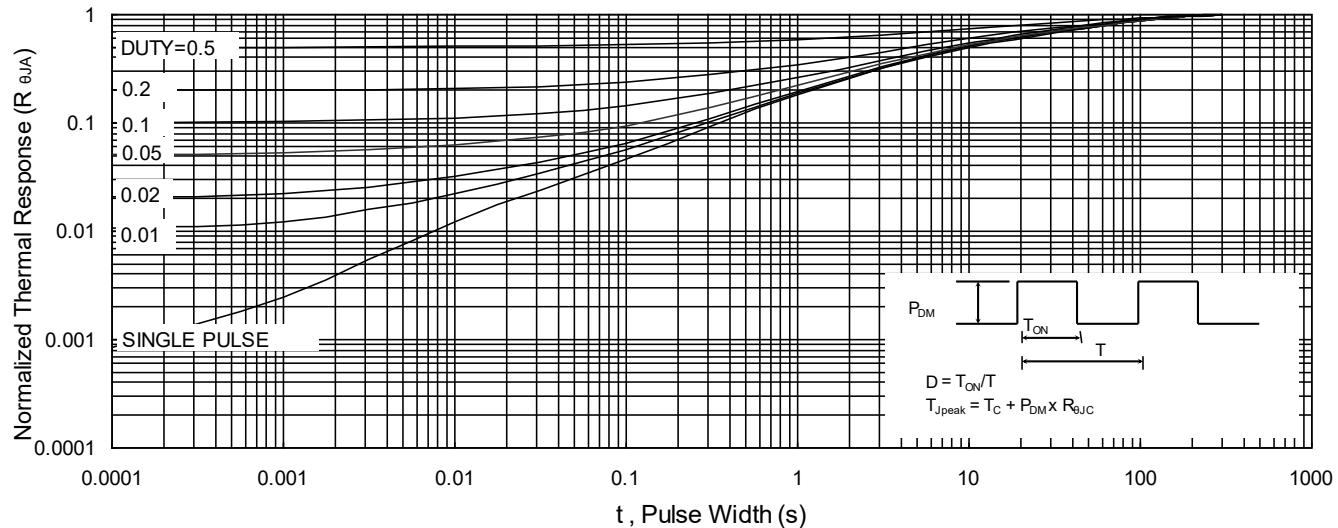


Fig.9 Normalized Maximum Transient Thermal Impedance

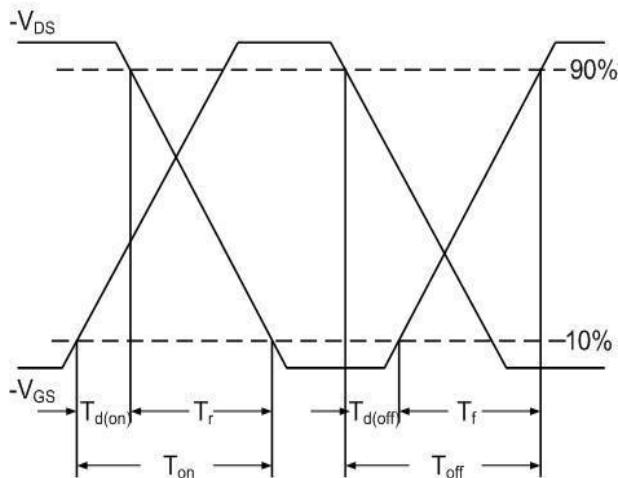


Fig.10 Switching Time Waveform

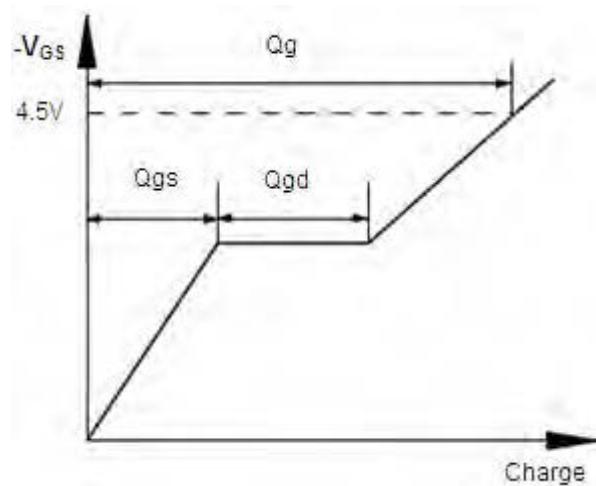
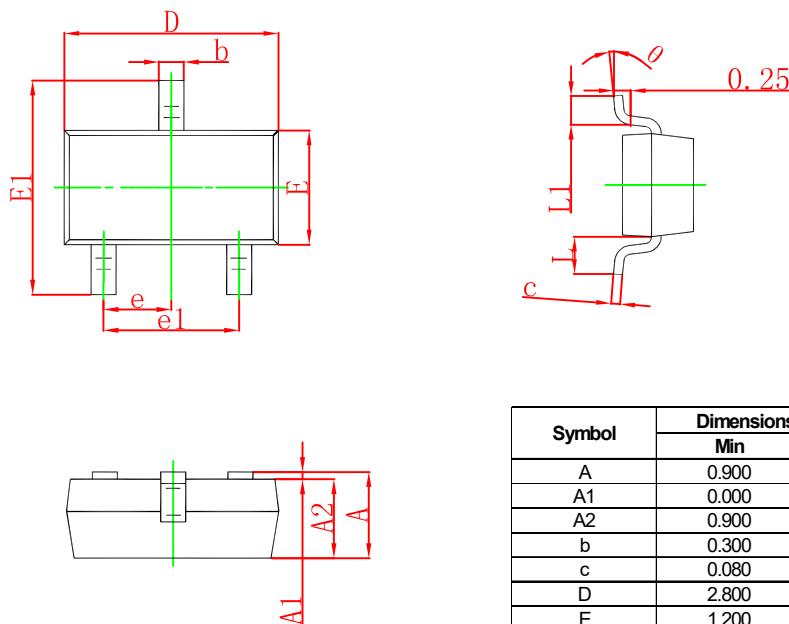


Fig.11 Gate Charge Waveform

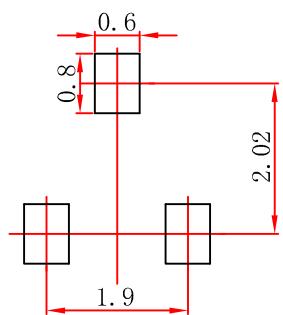


SOT-23 Package Outline Dimensions



| 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: ± 0.05 mm.
3. The pad layout is for reference purposes only.



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