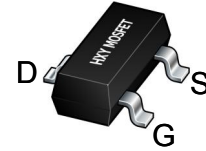


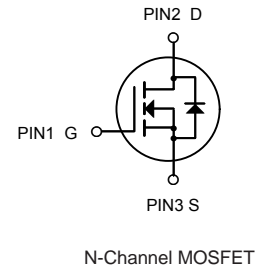


## Description

The Si2338DS-T1-GE3 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

$V_{DS} = 30V$   $I_D = 5.8A$

$R_{DS(ON)} < 28m\Omega @ V_{GS}=10V$

## Application

Battery protection  
Load switch  
Uninterruptible power supply

## Package Marking and Ordering Information

| Product ID      | Pack   | Brand      | Qty(PCS) |
|-----------------|--------|------------|----------|
| Si2338DS-T1-GE3 | SOT-23 | HXY MOSFET | 3000     |

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

| Symbol          | Parameter   | Limit      | Unit         |
|-----------------|---|------------|--------------|
| $V_{DS}$        | Drain-Source Voltage  | 30         | V            |
| $V_{GS}$        | Gate-Source Voltage   | $\pm 20$   | V            |
| $I_D$           | Drain Current-Continuous                                    | 5.8        | A            |
| $I_{DM}$        | Drain Current-Pulsed <sup>(Note 1)</sup>                    | 18.4       | A            |
| $P_D$           | Maximum Power Dissipation                                   | 1          | W            |
| $T_J, T_{STG}$  | Operating Junction and Storage Temperature Range            | -55 To 150 | $^\circ C$   |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup> | 125        | $^\circ C/W$ |



**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

| Symbol                 | Parameter                                      | Conditions   | Min. | Typ.  | Max. | Unit  |
|------------------------|--|--|------|-------|------|-------|
| BV <sub>DSS</sub>      | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA   | 30   | ---   | ---  | V     |
| ΔBV <sub>DSS</sub> /ΔT | BVDSS Temperature Coefficient                  | Reference to 25°C, I <sub>D</sub> =1mA   | ---  | 0.023 | ---  | V/°C  |
| R <sub>DS(ON)</sub>    | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =4A   | ---  | 22    | 28   | mΩ    |
|                        |  | V <sub>GS</sub> =4.5V, I <sub>D</sub> =3A  | ---  | 26    | 32   |       |
| V <sub>GS(th)</sub>    | Gate Threshold Voltage                         | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA                               | 1.0  | 1.5   | 2.5  | V     |
| ΔV <sub>GS(th)</sub>   | V <sub>GS(th)</sub> Temperature Coefficient    |  | ---  | -4.2  | ---  | mV/°C |
| I <sub>DSS</sub>       | Drain-Source Leakage Current                   | V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                        | ---  | ---   | 1    | μA    |
|                        |  | V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C                        | ---  | ---   | 5    |       |
| I <sub>GSS</sub>       | Gate-Source Leakage Current                    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V   | ---  | ---   | ±100 | nA    |
| g <sub>fs</sub>        | Forward Transconductance                       | V <sub>DS</sub> =5V, I <sub>D</sub> =4A  | ---  | 7     | ---  | S     |
| R <sub>g</sub>         | Gate Resistance                                | V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz                                       | ---  | 2.3   | 4.6  | Ω     |
| Q <sub>g</sub>         | Total Gate Charge (4.5V)                       | V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A                        | ---  | 5.0   | 6.9  | nC    |
| Q <sub>gs</sub>        | Gate-Source Charge                             |  | ---  | 1.1   | 2.2  |       |
| Q <sub>gd</sub>        | Gate-Drain Charge                              |  | ---  | 2.6   | 2.8  |       |
| T <sub>d(on)</sub>     | Turn-On Delay Time                             | V <sub>DD</sub> =15V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω<br>I <sub>D</sub> =4A | ---  | 2     | 4    | ns    |
| T <sub>r</sub>         | Rise Time                                      |  | ---  | 34.4  | 62   |       |
| T <sub>d(off)</sub>    | Turn-Off Delay Time                            |  | ---  | 13.2  | 26   |       |
| T <sub>f</sub>         | Fall Time                                      |  | ---  | 4.8   | 9.6  |       |
| C <sub>iss</sub>       | Input Capacitance                              | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz                                      | ---  | 420   | 582  | pF    |
| C <sub>oss</sub>       | Output Capacitance                             |  | ---  | 60    | 87   |       |
| C <sub>rss</sub>       | Reverse Transfer Capacitance                   |  | ---  | 53    | 71   |       |

**Diode Characteristics**

| Symbol          | Parameter                                | Conditions  | Min. | Typ. | Max. | Unit |
|-----------------|--|---|------|------|------|------|
| I <sub>S</sub>  | Continuous Source Current <sup>1,4</sup> | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current             | ---  | ---  | 4.6  | A    |
| I <sub>SM</sub> | Pulsed Source Current <sup>2,4</sup>     |   | ---  | ---  | 18.4 | A    |
| V <sub>SD</sub> | Diode Forward Voltage <sup>2</sup>       | V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C | ---  | ---  | 1.2  | V    |
| t <sub>rr</sub> | Reverse Recovery Time                    | I <sub>F</sub> =4A, dI/dt=100A/μs, T <sub>J</sub> =25°C       | ---  | 8.7  | ---  | nS   |
| Q <sub>rr</sub> | Reverse Recovery Charge                  |   | ---  | 2.3  | ---  | 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 ≤ 300us, duty cycle ≤ 2%
- 3.The power dissipation is limited by 150°C junction temperature
- 4.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.



### Typical Characteristics

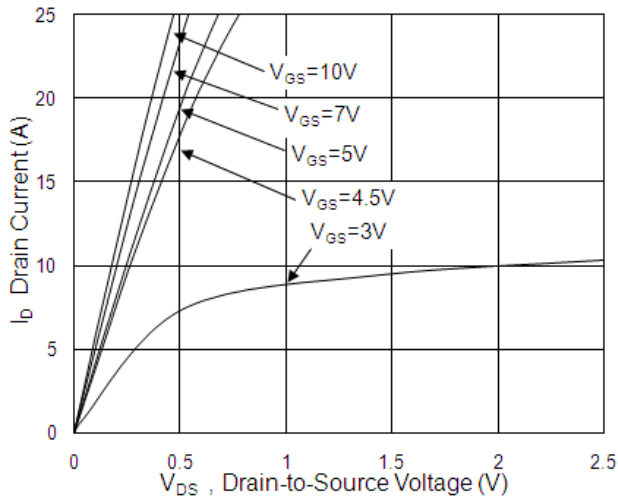


Fig.1 Typical Output Characteristics

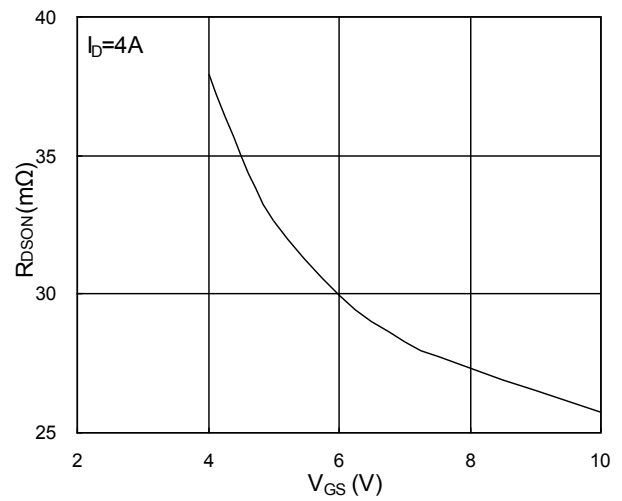


Fig.2 On-Resistance vs. Gate-Source

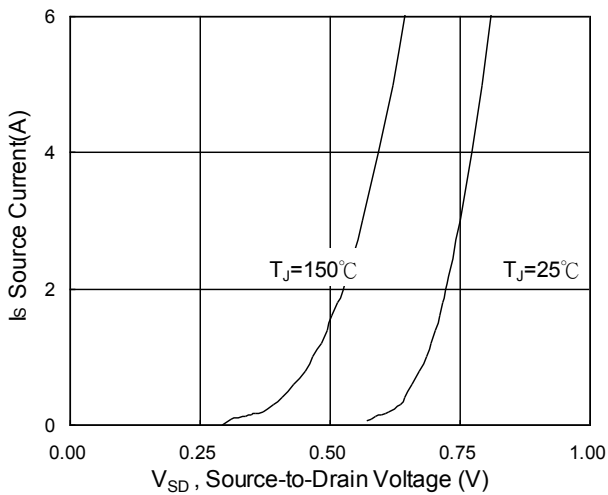


Fig.3 Forward Characteristics Of Reverse

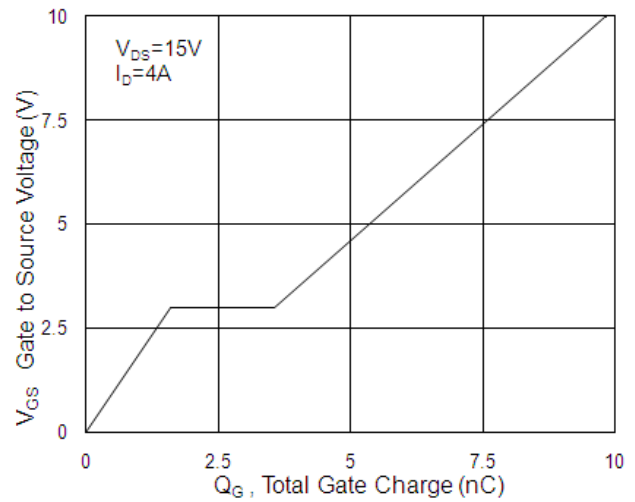


Fig.4 Gate-Charge Characteristics

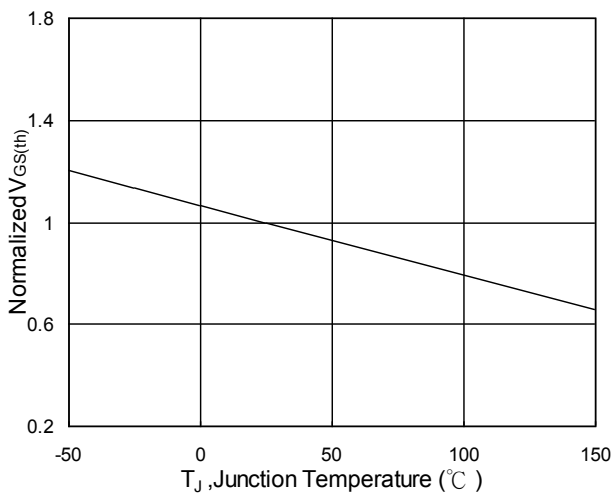


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

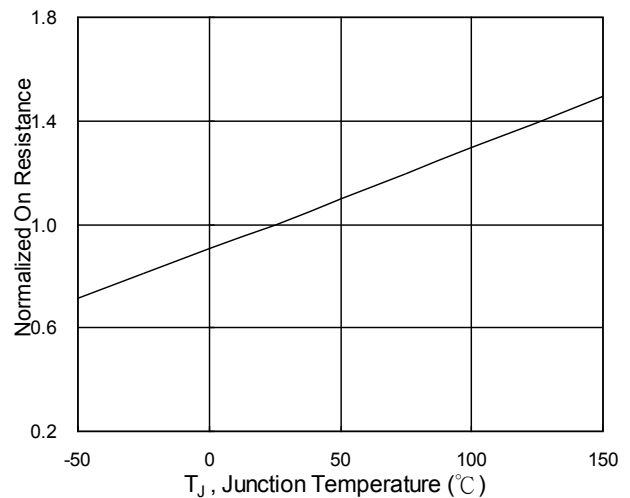


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$

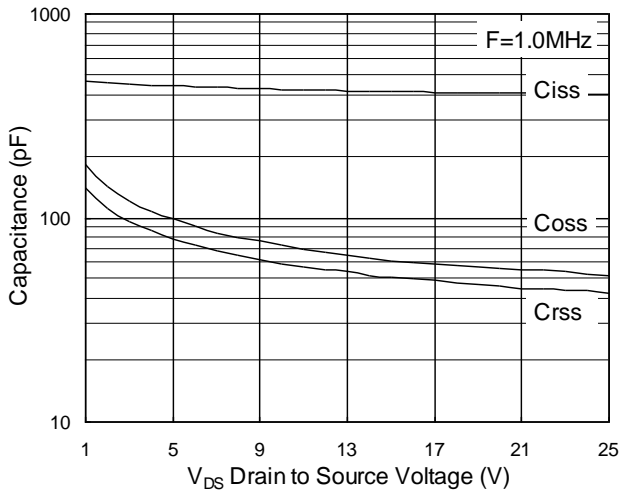


Fig.7 Capacitance

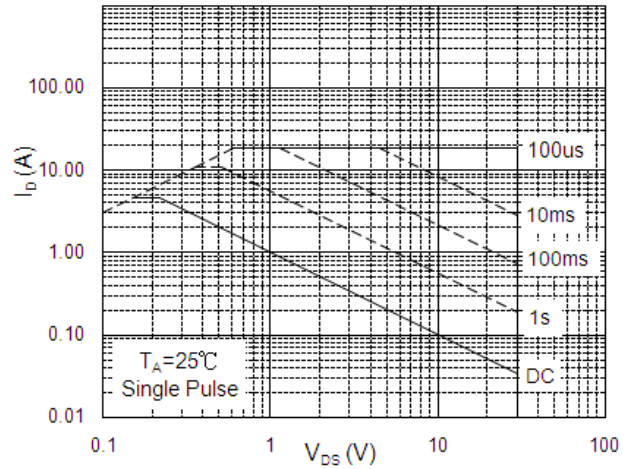


Fig.8 Safe Operating Area

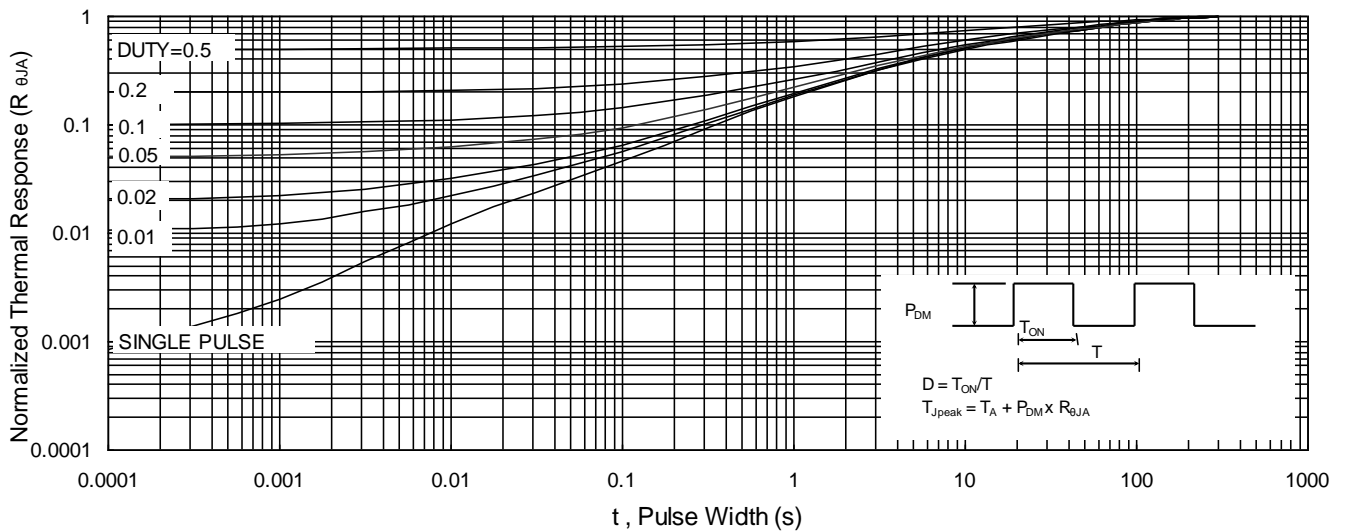


Fig.9 Normalized Maximum Transient Thermal Impedance

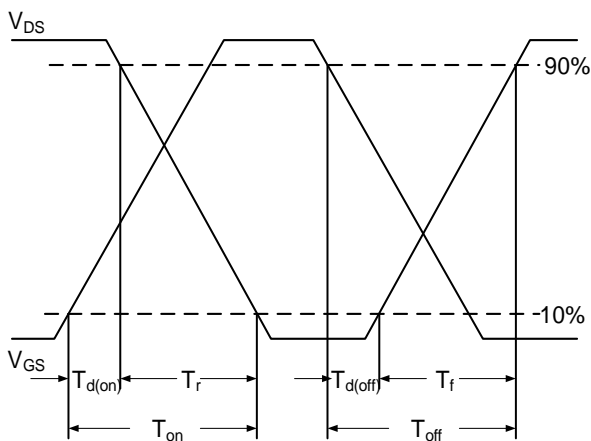


Fig.10 Switching Time Waveform

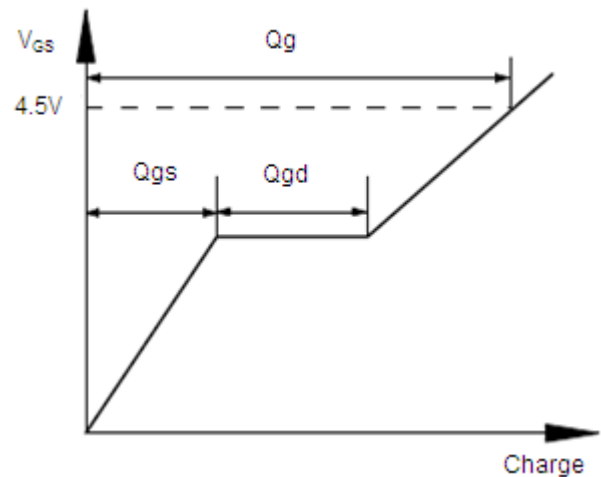
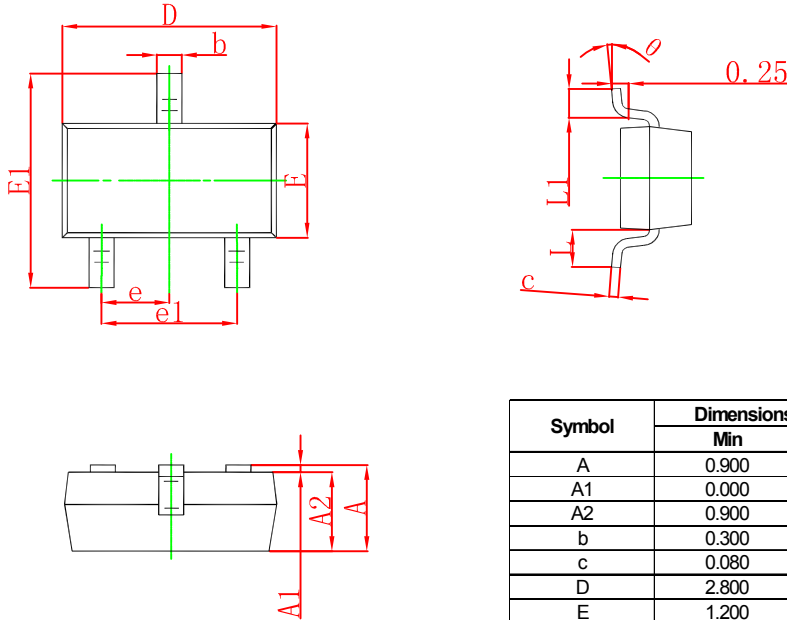


Fig.11 Gate Charge Waveform

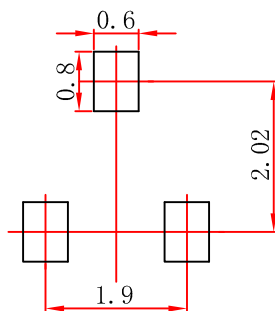


### SOT-23 Package Outline Dimensions



| 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:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.



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