



## Description

The AS2312 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

$V_{DS} = 20V$   $I_D = 6A$

$R_{DS(ON)} < 17m\Omega$  @  $V_{GS} = 4.5V$

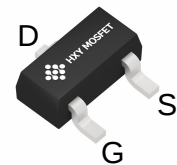
ESD=2500V HBM

## Application

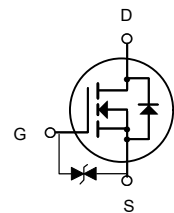
Battery protection

Load switch

Uninterruptible power supply



SOT-23



N-Channel MOSFET

## Package Marking and Ordering Information

| Product ID | Pack   | Marking | Qty(PCS) |
|------------|--------|---------|----------|
| AS2312     | SOT-23 | 3416    | 3000     |

## 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                              | $\pm 12$   | V            |
| $I_D$           | Drain Current-Continuous                         | 6          | A            |
| $I_{DM}$        | Drain Current-Pulsed (Note 1)                    | 30         | A            |
| $P_D$           | Maximum Power Dissipation                        | 1.4        | 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) | 89         | $^\circ C/W$ |



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

| Parameter                                 | Symbol              | Condition                                                                               | Min  | Typ | Max | Unit |
|-------------------------------------------|---------------------|-----------------------------------------------------------------------------------------|------|-----|-----|------|
| Drain-Source Breakdown Voltage            | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V I <sub>D</sub> =250μA                                               | 20   |     | -   | V    |
| Zero Gate Voltage Drain Current           | I <sub>DSS</sub>    | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V                                               | -    | -   | 1   | μA   |
| Gate-Body Leakage Current                 | I <sub>GSS</sub>    | V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V                                              | -    | -   | ±10 | μA   |
| Gate Threshold Voltage                    | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                | 0.45 | 0.7 | 1.0 | V    |
| Drain-Source On-State Resistance          | R <sub>DS(on)</sub> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =6.5A                                             | -    | 14  | 17  | mΩ   |
|                                           |                     | V <sub>GS</sub> =2.5V, I <sub>D</sub> =5.5A                                             | -    | 18  | 23  | mΩ   |
|                                           |                     | V <sub>GS</sub> =1.8V, I <sub>D</sub> =5A                                               | -    | 28  | 40  | mΩ   |
| Forward Transconductance                  | g <sub>FS</sub>     | V <sub>DS</sub> =5V, I <sub>D</sub> =6.5A                                               | 8    | -   | -   | S    |
| Input Capacitance                         | C <sub>iss</sub>    | V <sub>DS</sub> =10V, V <sub>GS</sub> =0V,<br>F=1.0MHz                                  | -    | 660 | -   | PF   |
| Output Capacitance                        | C <sub>oss</sub>    |                                                                                         | -    | 160 | -   | PF   |
| Reverse Transfer Capacitance              | C <sub>rss</sub>    |                                                                                         | -    | 87  | -   | PF   |
| Turn-on Delay Time                        | t <sub>d(on)</sub>  | V <sub>DD</sub> =10V, R <sub>L</sub> =1.5Ω<br>V <sub>GS</sub> =5V, R <sub>GEN</sub> =3Ω | -    | 0.5 |     | nS   |
| Turn-on Rise Time                         | t <sub>r</sub>      |                                                                                         | -    | 1   |     | nS   |
| Turn-Off Delay Time                       | t <sub>d(off)</sub> |                                                                                         | -    | 12  |     | nS   |
| Turn-Off Fall Time                        | t <sub>f</sub>      |                                                                                         | -    | 4   |     | nS   |
| Total Gate Charge                         | Q <sub>g</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =6.5A,<br>V <sub>GS</sub> =4.5V                    | -    | 8   |     | nC   |
| Gate-Source Charge                        | Q <sub>gs</sub>     |                                                                                         | -    | 2.5 | -   | nC   |
| Gate-Drain Charge                         | Q <sub>gd</sub>     |                                                                                         | -    | 3   | -   | nC   |
| Diode Forward Voltage <sup>(Note 3)</sup> | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =6.5A                                               | -    | -   | 1.2 | V    |
| Diode Forward Current <sup>(Note 2)</sup> | I <sub>S</sub>      |                                                                                         | -    | -   | 6.5 | A    |

**Notes:**

Repetitive Rating: Pulse width limited by maximum junction temperature.  
Surface Mounted on FR4 Board, t ≤ 10 sec.  
Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.  
Guaranteed by design, not subject to production



## Typical Characteristics

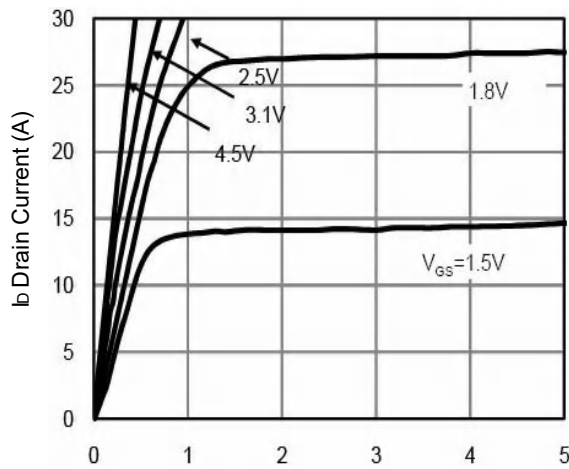


Fig.1 Typical Output Characteristics

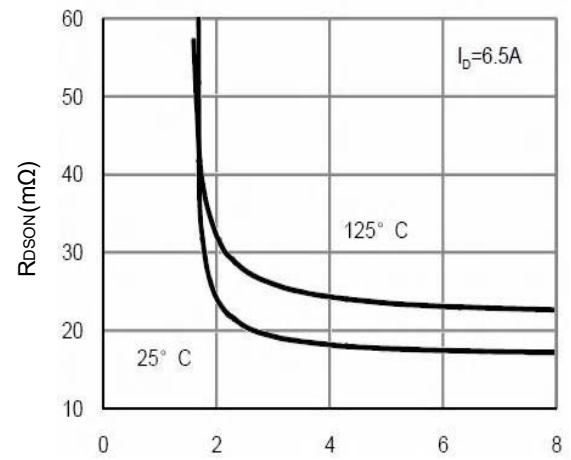


Fig.2 On-Resistance vs. Gate-Source

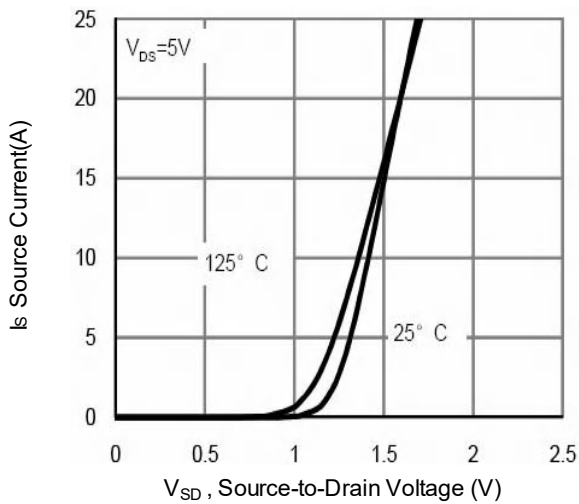


Fig.3 Forward Characteristics of Reverse

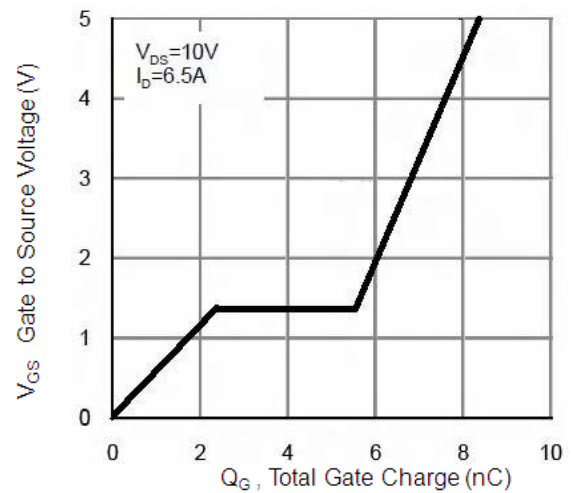


Fig.4 Gate-Charge Characteristics

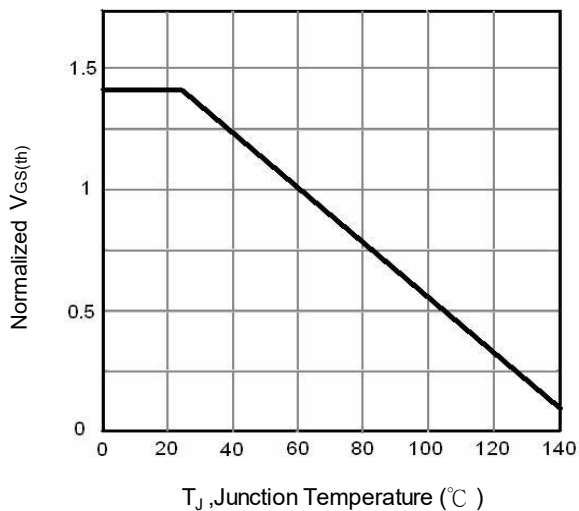


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

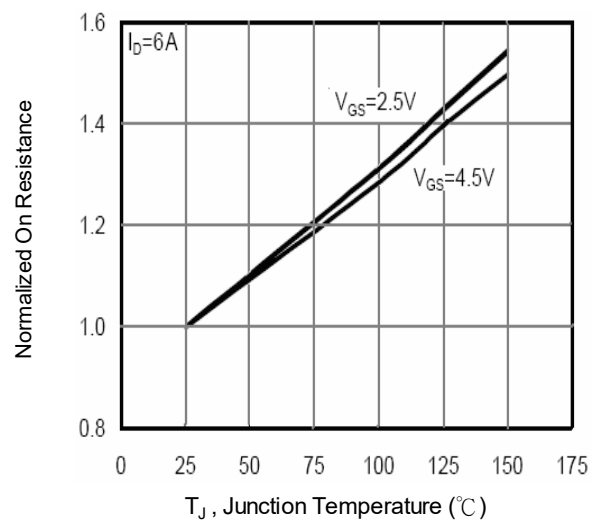


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$

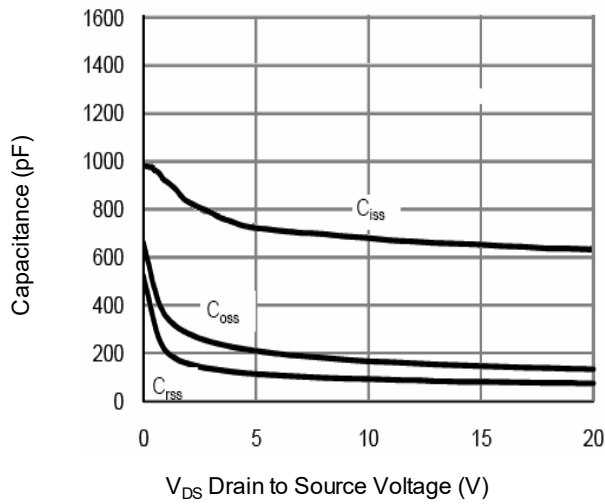


Fig.7 Capacitance

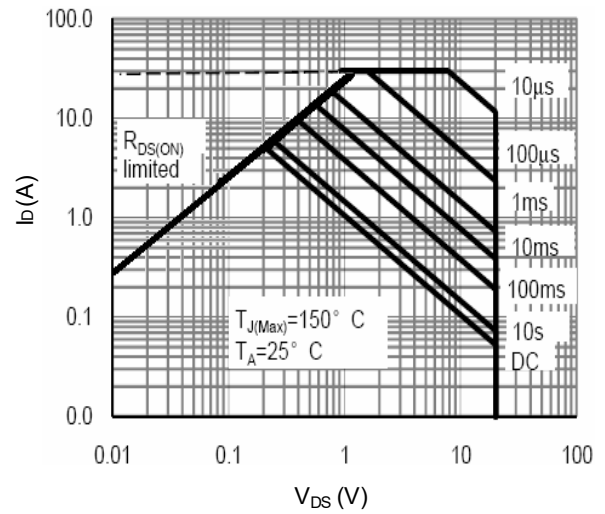


Fig.8 Safe Operating Area

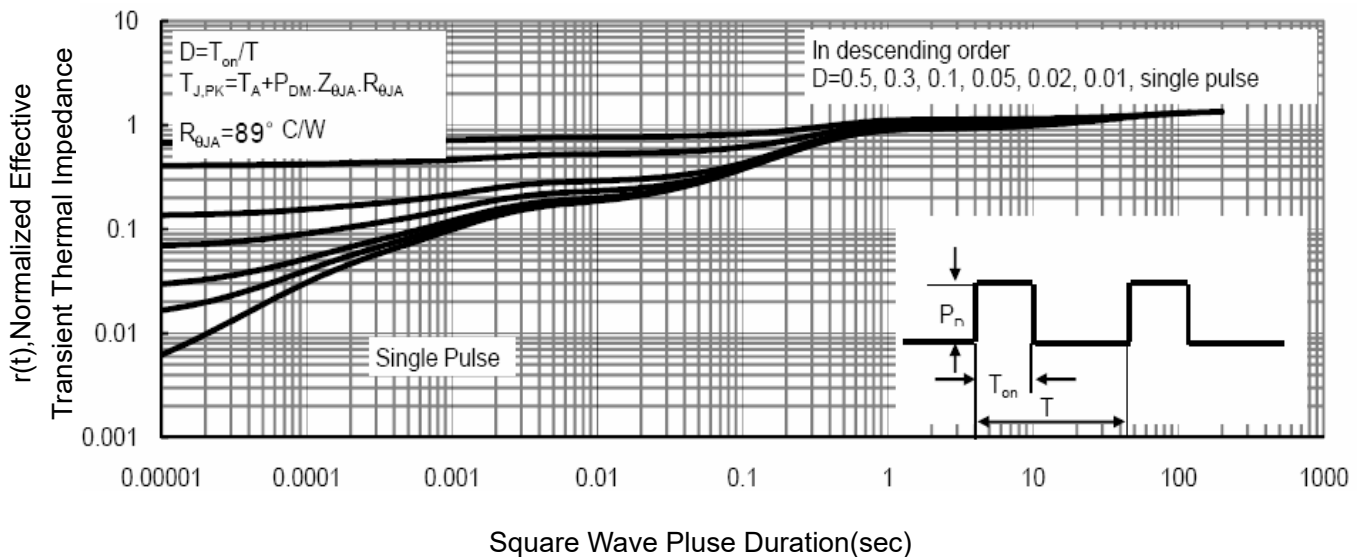


Fig.9 Normalized Maximum Transient Thermal Impedance

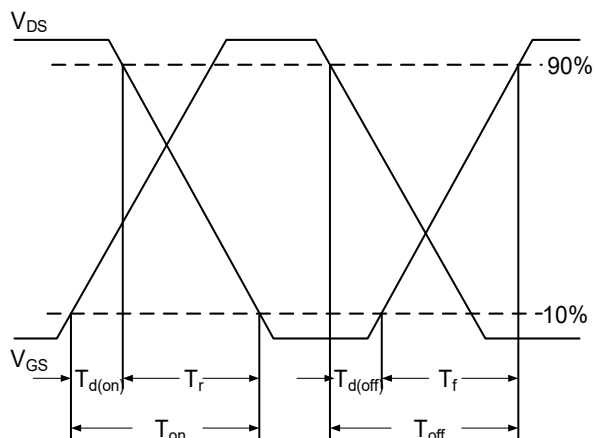


Fig.10 Switching Time Waveform

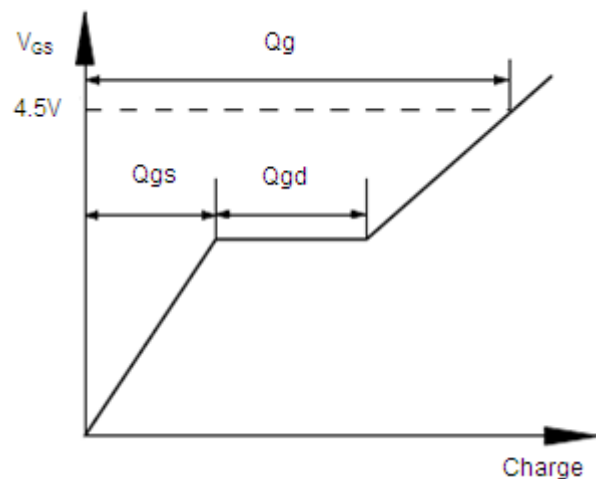
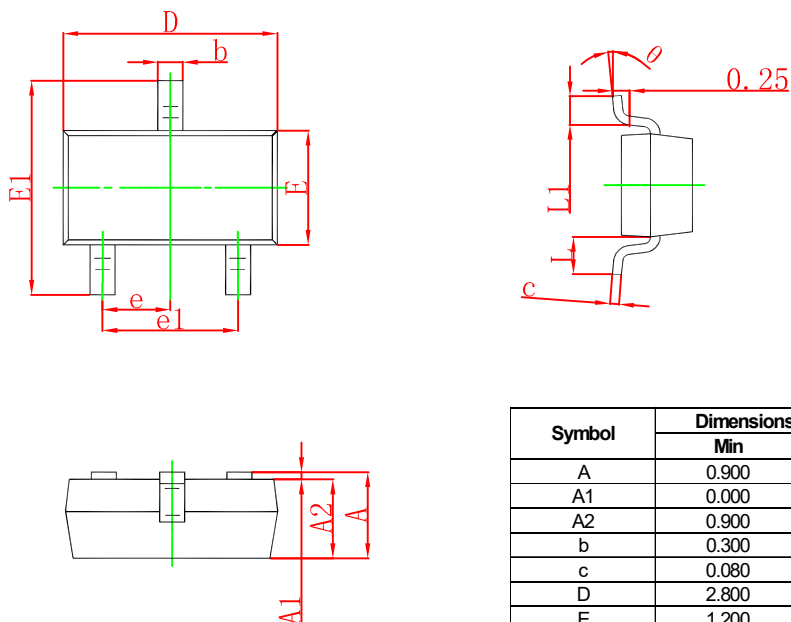


Fig.11 Gate Charge Waveform



## 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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