



## Description

The SM2306SRL 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

$V_{DS} = 30V$   $I_D = 4A$

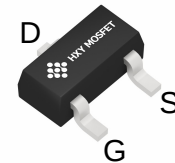
$R_{DS(ON)} < 38m\Omega$  @  $V_{GS}=10V$

## Application

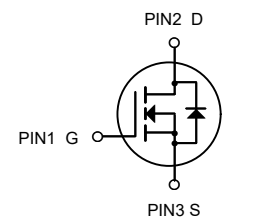
Battery protection

Load switch

Uninterruptible power supply



SOT-23



N-Channel MOSFET

## Ordering Information

| Product ID | Pack   | Brand      | Qty(PCS) |
|------------|--------|------------|----------|
| SM2306SRL  | 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                         | 4          | A             |
| $I_{DM}$        | Drain Current-Pulsed (Note 1)                    | 16.4       | 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 (Note 2) | 125        | $^{\circ}C/W$ |



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

| Symbol               | Parameter                                                 | Test Condition                                                                             | Min. | Typ. | Max. | Units |
|----------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------------|------|------|------|-------|
| V <sub>(BR)DSS</sub> | Drain-Source Breakdown Voltage                            | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                                 | 30   | -    | -    | V     |
| I <sub>DSS</sub>     | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V,                                                 | -    | -    | 1.0  | μA    |
| I <sub>GSS</sub>     | Gate to Body Leakage Current                              | V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V                                                | -    | -    | ±100 | nA    |
| V <sub>GS(th)</sub>  | Gate Threshold Voltage                                    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                   | 1.0  | 1.5  | 2.5  | V     |
| R <sub>DS(on)</sub>  | Static Drain-Source on-Resistance<br><small>note2</small> | V <sub>GS</sub> =10V, I <sub>D</sub> =4A                                                   | -    | 29   | 38   | mΩ    |
|                      |                                                           | V <sub>GS</sub> =4.5V, I <sub>D</sub> =3A                                                  | -    | 45   | 65   |       |
| C <sub>iss</sub>     | Input Capacitance                                         | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V,<br>f=1.0MHz                                     | -    | 233  | -    | pF    |
| C <sub>oss</sub>     | Output Capacitance                                        |                                                                                            | -    | 44   | -    | pF    |
| C <sub>rss</sub>     | Reverse Transfer Capacitance                              |                                                                                            | -    | 33   | -    | pF    |
| Q <sub>g</sub>       | Total Gate Charge                                         | V <sub>DS</sub> =15V, I <sub>D</sub> =2A,<br>V <sub>GS</sub> =10V                          | -    | 3    | -    | nC    |
| Q <sub>gs</sub>      | Gate-Source Charge                                        |                                                                                            | -    | 0.5  | -    | nC    |
| Q <sub>gd</sub>      | Gate-Drain(“Miller”) Charge                               |                                                                                            | -    | 0.8  | -    | nC    |
| t <sub>d(on)</sub>   | Turn-on Delay Time                                        | V <sub>DS</sub> =15V,<br>I <sub>D</sub> =4A, R <sub>GEN</sub> =3Ω,<br>V <sub>GS</sub> =10V | -    | 4    | -    | ns    |
| t <sub>r</sub>       | Turn-on Rise Time                                         |                                                                                            | -    | 2.1  | -    | ns    |
| t <sub>d(off)</sub>  | Turn-off Delay Time                                       |                                                                                            | -    | 15   | -    | ns    |
| t <sub>f</sub>       | Turn-off Fall Time                                        |                                                                                            | -    | 3.2  | -    | ns    |
| I <sub>s</sub>       | Maximum Continuous Drain to Source Diode Forward Current  |                                                                                            | -    | -    | 4    | A     |
| I <sub>SM</sub>      | Maximum Pulsed Drain to Source Diode Forward Current      |                                                                                            | -    | -    | 16   | A     |
| V <sub>SD</sub>      | Drain to Source Diode Forward Voltage                     | V <sub>GS</sub> =0V, I <sub>S</sub> =4A                                                    | -    | -    | 1.2  | V     |

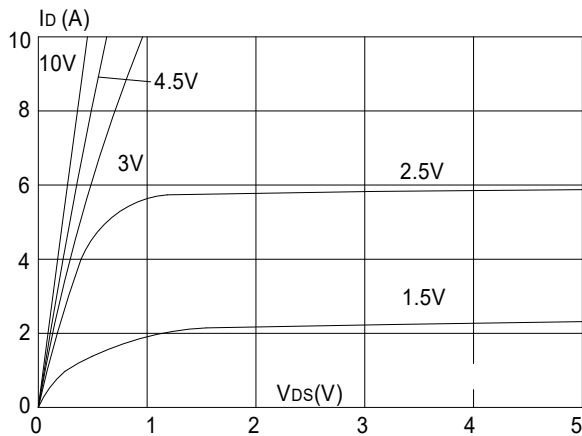
Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$

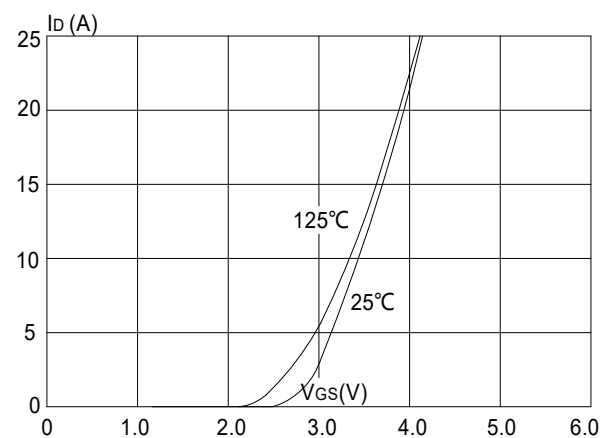


## Typical Characteristics

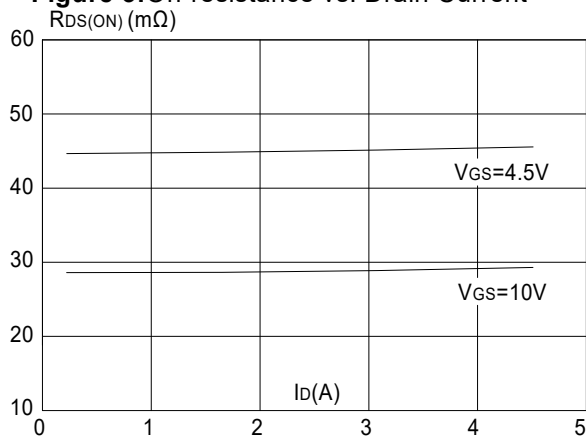
**Figure1: Output Characteristics**



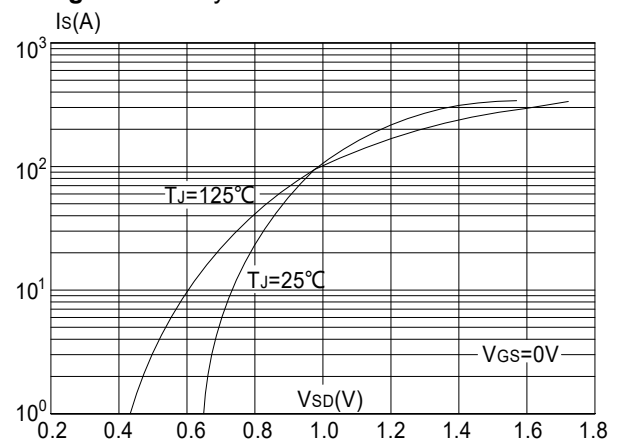
**Figure 2: Typical Transfer Characteristics**



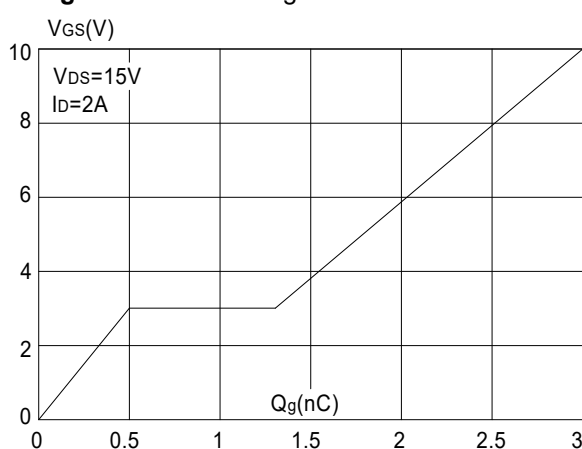
**Figure 3: On-resistance vs. Drain Current**



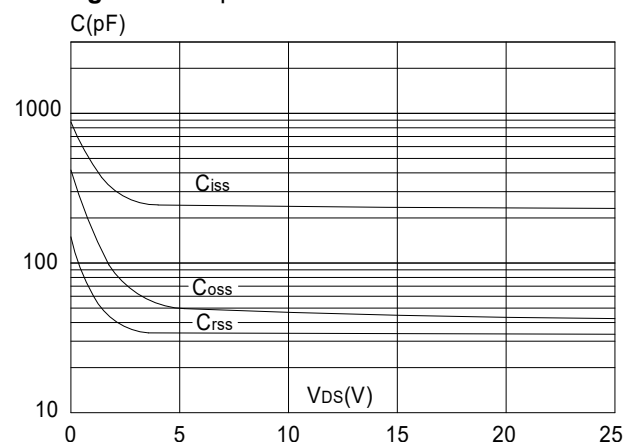
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**

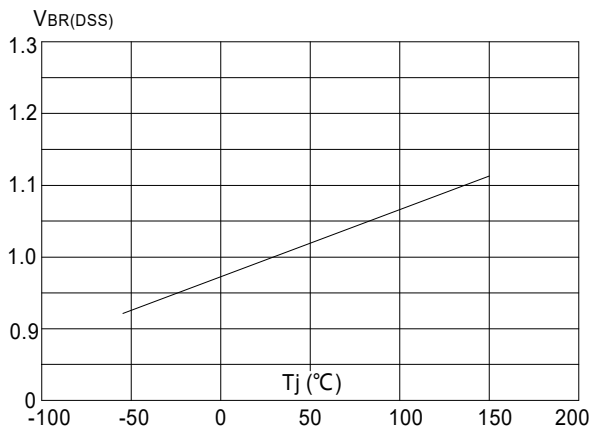


**Figure 6: Capacitance Characteristics**

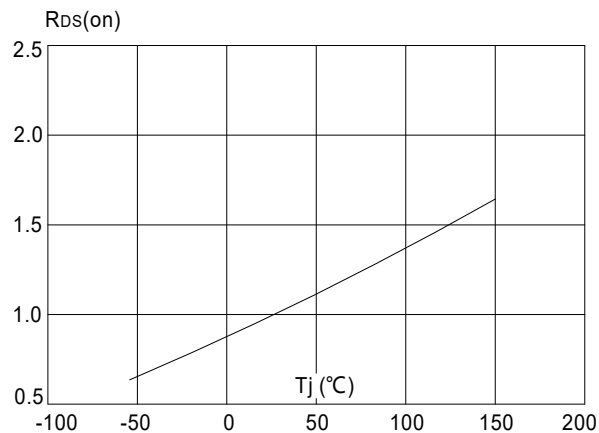




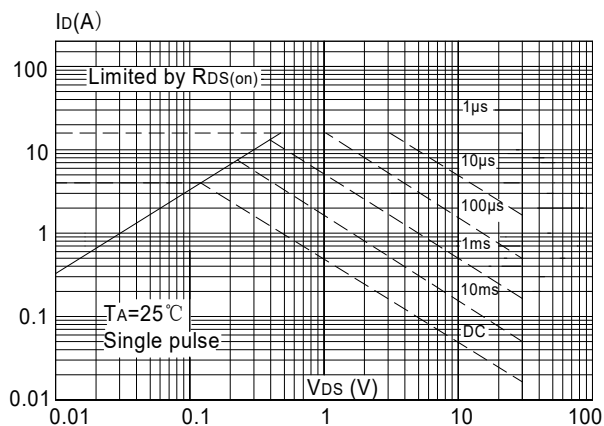
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



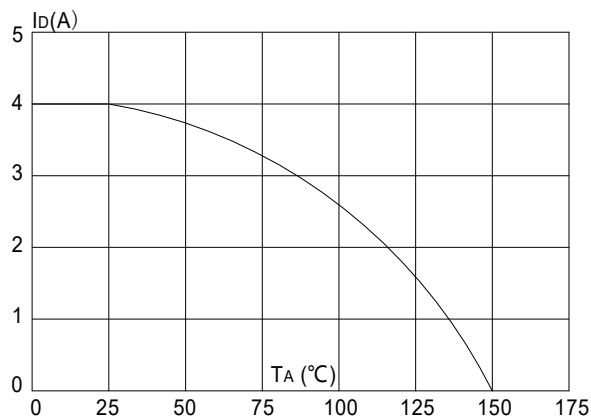
**Figure 8:** Normalized on Resistance vs. Junction Temperature



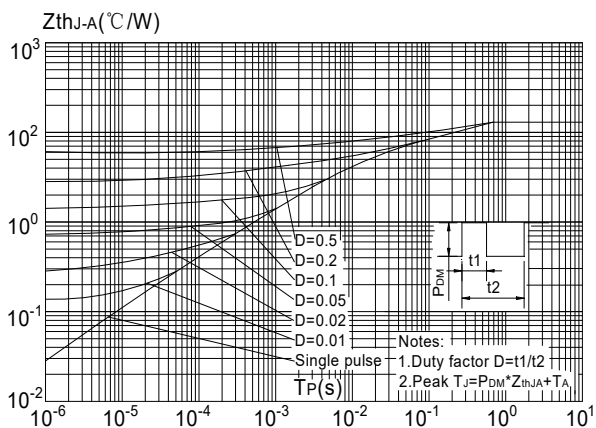
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature

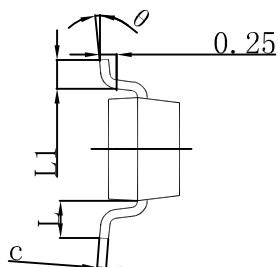


**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient





## 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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