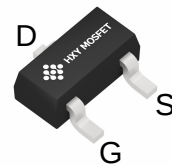




## Description

The SM2314SRL 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

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

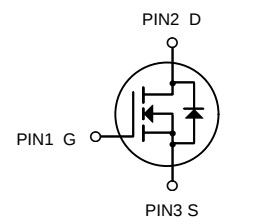
$R_{DS(ON)} < 27m\Omega$  @  $V_{GS}=4.5V$

## Application

Battery protection

Load switch

Uninterruptible power supply



N-Channel MOSFET

## Package Marking and Ordering Information

| Product ID | Pack   | Brand      | Qty(PCS) |
|------------|--------|------------|----------|
| SM2314SRL  | 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                             |                     | 20         | V             |
| $V_{GS}$        | Gate-Source Voltage                              |                     | $\pm 12$   | V             |
| $I_D$           | Continuous Drain Current                         | $T_A = 25^{\circ}C$ | 6          | A             |
|                 |                                                  | $T_A = 70^{\circ}C$ | 3.6        |               |
| $I_{DM}$        | Drain Current-Pulsed (Note 1)                    |                     | 15         | A             |
| $P_D$           | Maximum Power Dissipation                        |                     | 1.25       | 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) |                     | 100        | $^{\circ}C/W$ |



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

| Parameter                                 | Symbol       | Condition                                              | Min | Typ  | Max       | Unit       |
|-------------------------------------------|--------------|--------------------------------------------------------|-----|------|-----------|------------|
| Drain-Source Breakdown Voltage            | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                              | 20  | 22.5 | -         | V          |
| Zero Gate Voltage Drain Current           | $I_{DSS}$    | $V_{DS}=20V, V_{GS}=0V$                                | -   | -    | 1         | $\mu A$    |
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 12V, V_{DS}=0V$                            | -   | -    | $\pm 100$ | nA         |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                          | 0.5 | 0.65 | 1.0       | V          |
| Drain-Source On-State Resistance          | $R_{DS(on)}$ | $V_{GS}=4.5V, I_D=4.0 A$                               | -   | 22   | 27        | m $\Omega$ |
|                                           |              | $V_{GS}=2.5V, I_D=4.5A$                                | -   | 28   | 40        | m $\Omega$ |
| Forward Transconductance                  | $g_{FS}$     | $V_{DS}=10V, I_D=4A$                                   | -   | 10   | -         | S          |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=8V, V_{GS}=0V,$<br>$F=1.0MHz$                  | -   | 500  | -         | PF         |
| Output Capacitance                        | $C_{oss}$    |                                                        | -   | 295  | -         | PF         |
| Reverse Transfer Capacitance              | $C_{rss}$    |                                                        | -   | 96   | -         | PF         |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DD}=10V, I_D=1A$<br>$V_{GS}=4.5V, R_{GEN}=6\Omega$ | -   | 11   | -         | nS         |
| Turn-on Rise Time                         | $t_r$        |                                                        | -   | 30   | -         | nS         |
| Turn-Off Delay Time                       | $t_{d(off)}$ |                                                        | -   | 35   | -         | nS         |
| Turn-Off Fall Time                        | $t_f$        |                                                        | -   | 10   | -         | nS         |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=10V, I_D=3A, V_{GS}=4.5V$                      | -   | 10   | 15        | nC         |
| Gate-Source Charge                        | $Q_{gs}$     |                                                        | -   | 2.3  | -         | nC         |
| Gate-Drain Charge                         | $Q_{gd}$     |                                                        | -   | 2.9  | -         | nC         |
| Diode Forward Voltage <sup>(Note 3)</sup> | $V_{SD}$     | $V_{GS}=0V, I_S=1A$                                    | -   | -    | 1.2       | V          |
| Diode Forward Current <sup>(Note 2)</sup> | $I_S$        |                                                        | -   | -    | 4.5       | 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

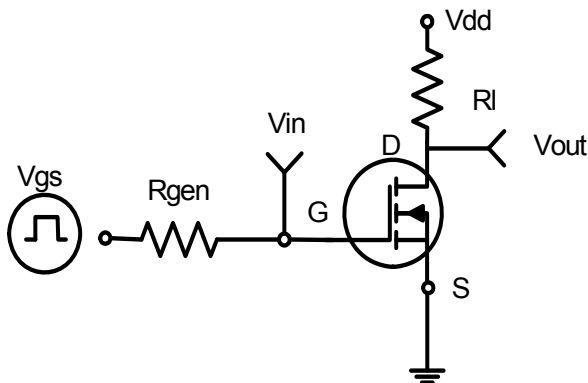


Figure 1: Switching Test Circuit

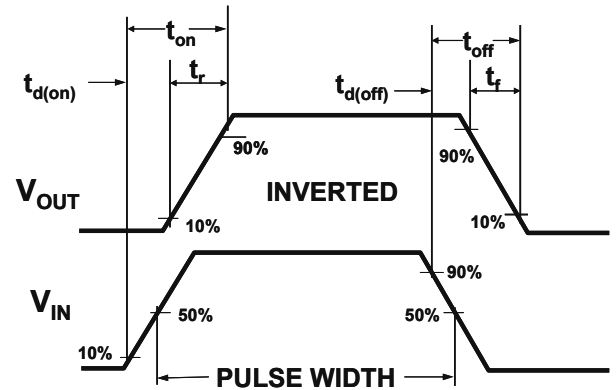


Figure 2: Switching Waveforms

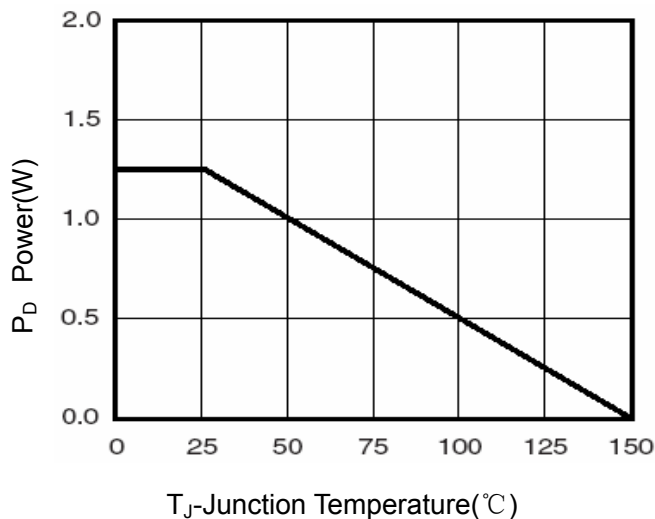


Figure 3 Power Dissipation

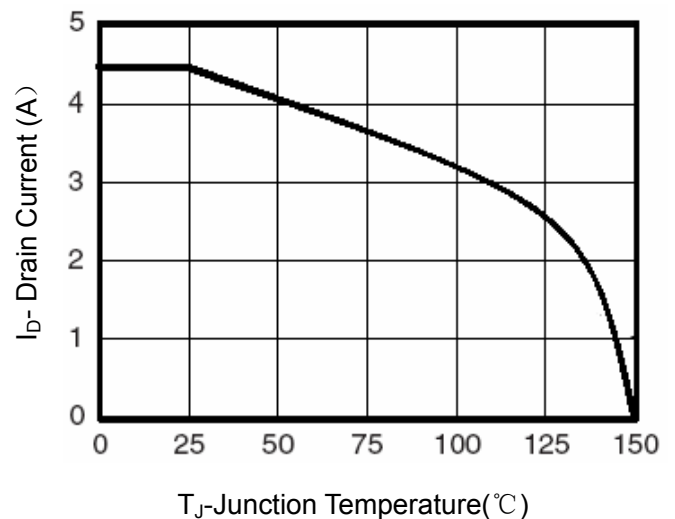


Figure 4 Drain Current

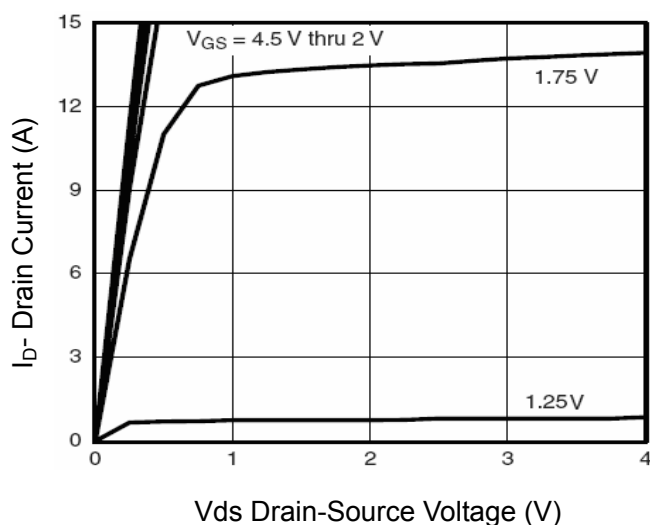


Figure 5 Output Characteristics

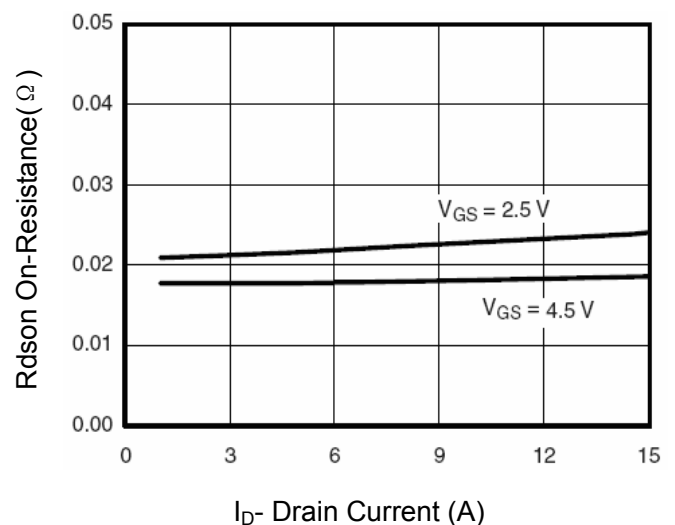


Figure 6 Drain-Source On-Resistance

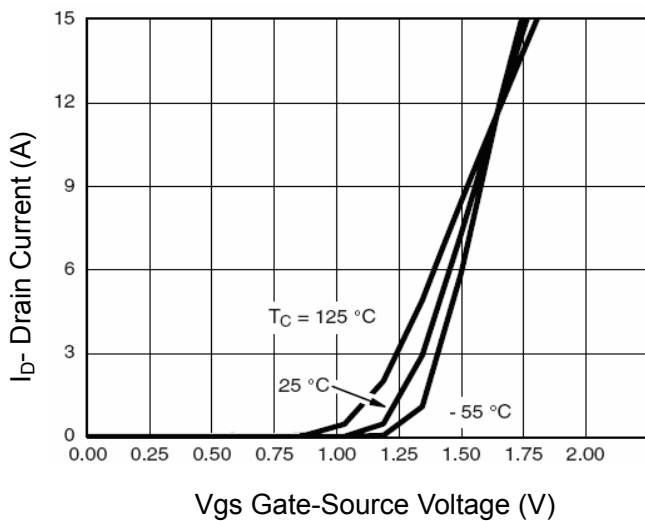


Figure 7 Transfer Characteristics

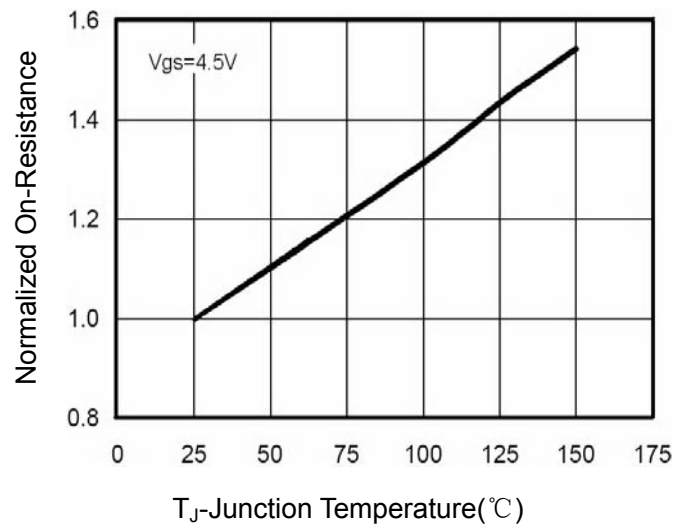


Figure 8 Drain-Source On-Resistance

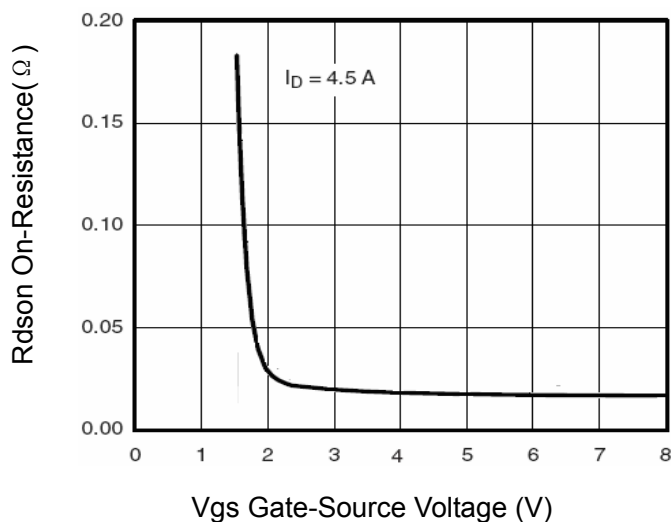


Figure 9 Rdson vs. VGS

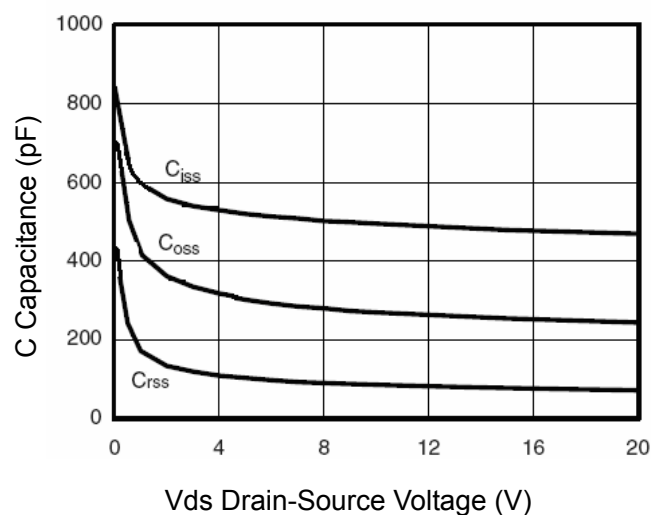


Figure 10 Capacitance vs Vds

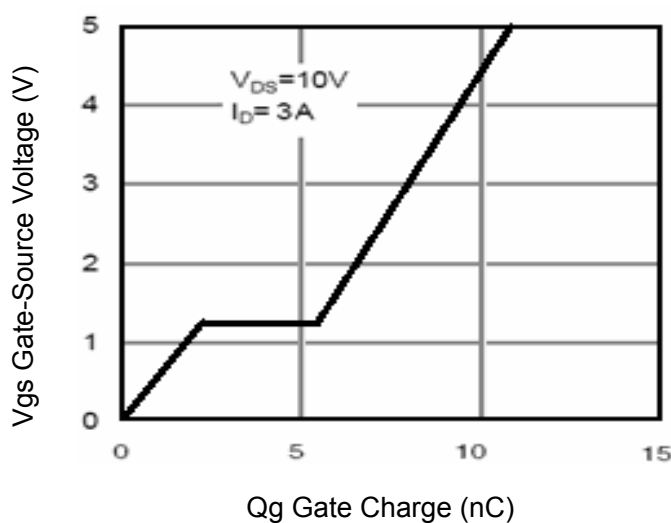


Figure 11 Gate Charge

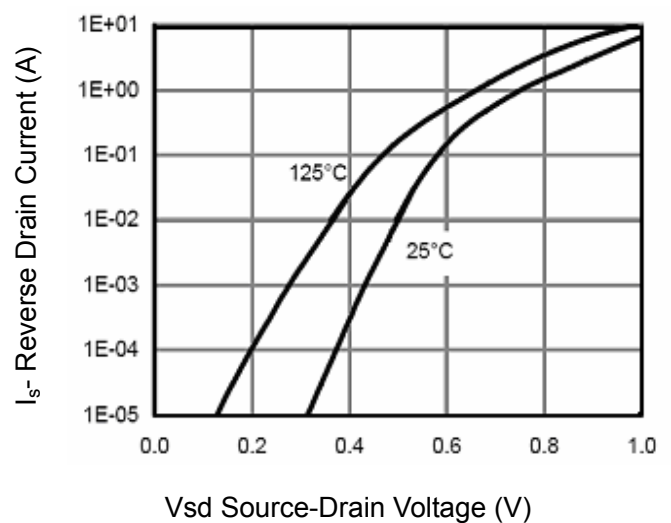


Figure 12 Source- Drain Diode Forward

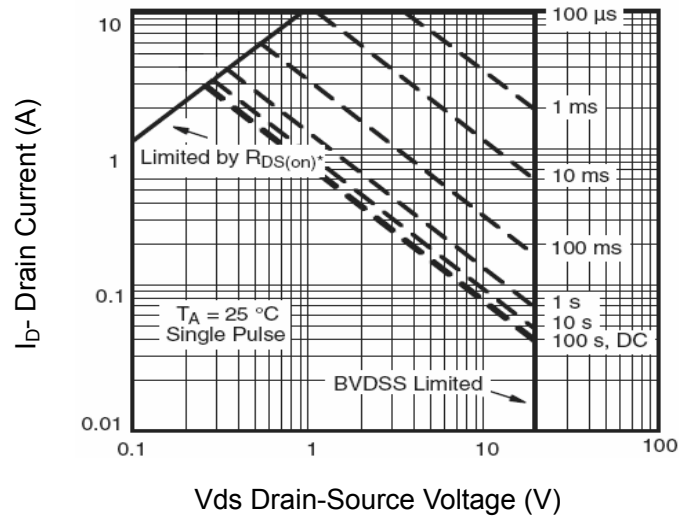


Figure 13 Safe Operation Area

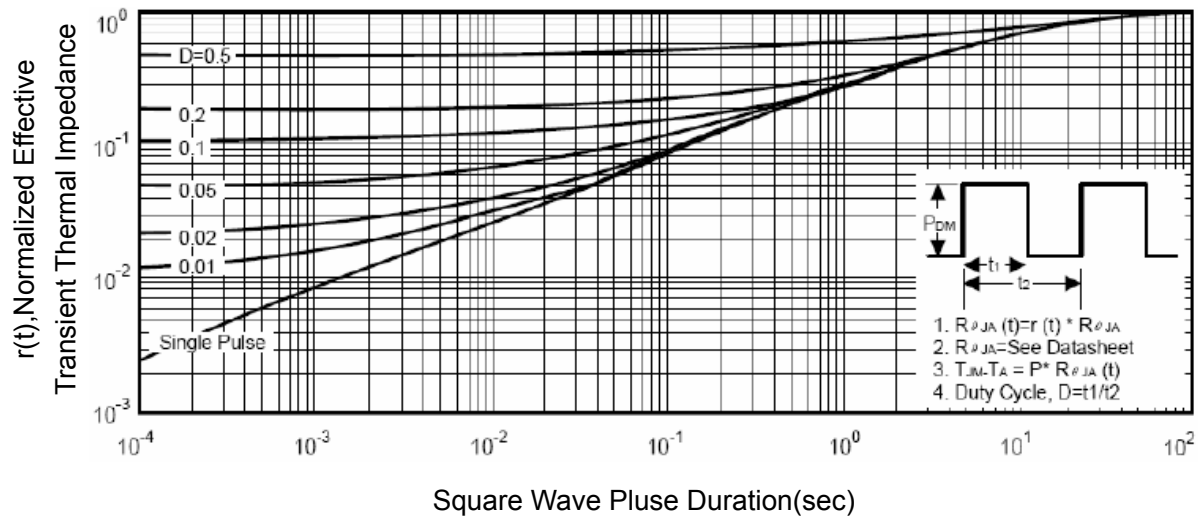
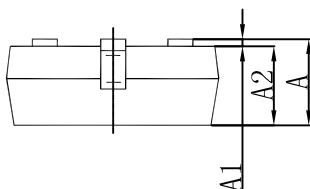
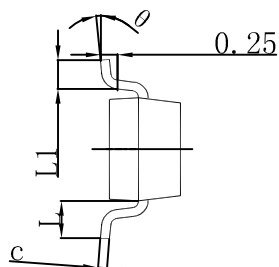
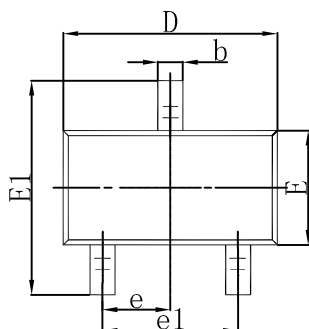


Figure 14 Normalized Maximum Transient Thermal Impedance

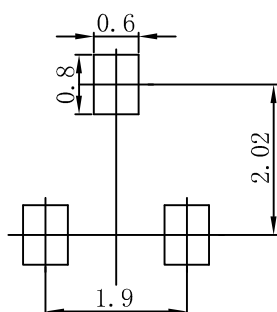


## SOT-23 Package Outline Dimensions



| 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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