

**SOT-23 Plastic-Encapsulate MOSFETS**
**FS2310L** N-Channel MOSFET

| $V_{(BR)DSS}$ | $R_{DS(on)MAX}$ | $I_D$ |
|---------------|-----------------|-------|
| 60V           | 100 mΩ@10V      | 3A    |
|               | 110 mΩ@4.5V     |       |


**DESCRIPTION**

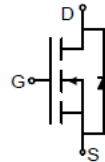
The FS2310L uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltage as low as 2.5V. This device is suitable for use as a battery protection or in other switching application.

**FEATURE**

- High power and current handling capability
- Lead free product is acquired
- Surface mount package

**APPLICATION**

- Battery Switch
- DC/DC Converter

**Equivalent Circuit**

**Maximum ratings ( $T_a=25^\circ\text{C}$  unless otherwise noted)**

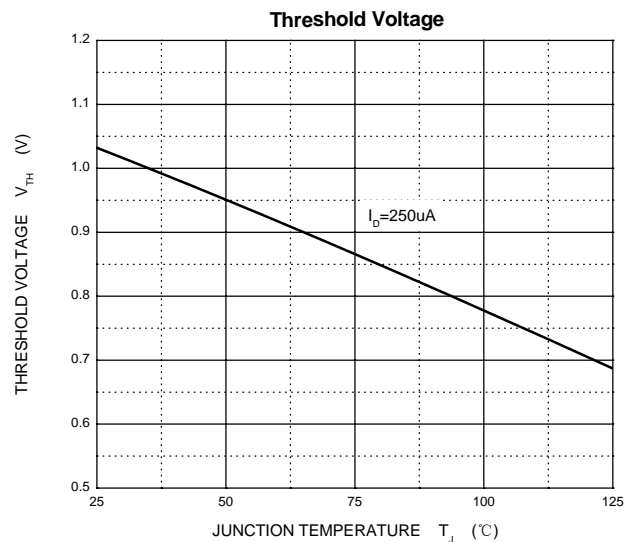
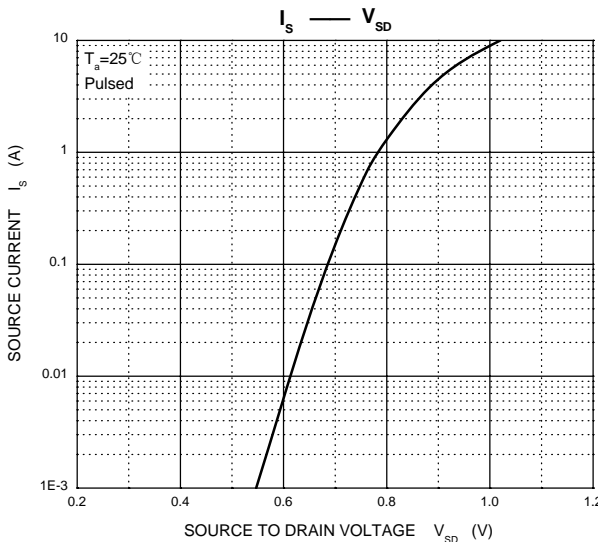
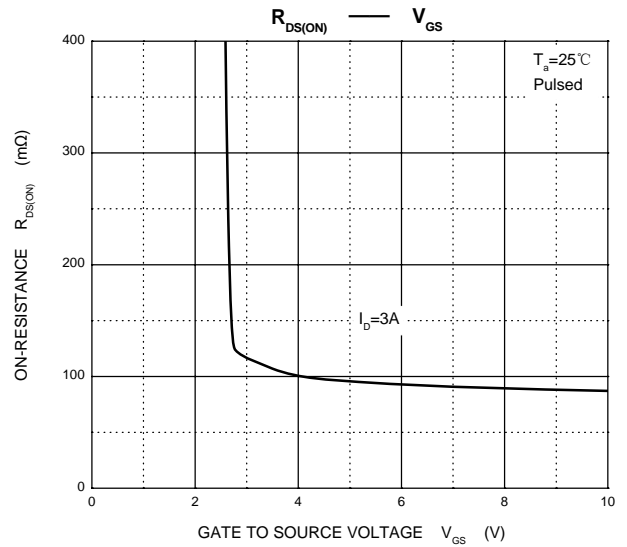
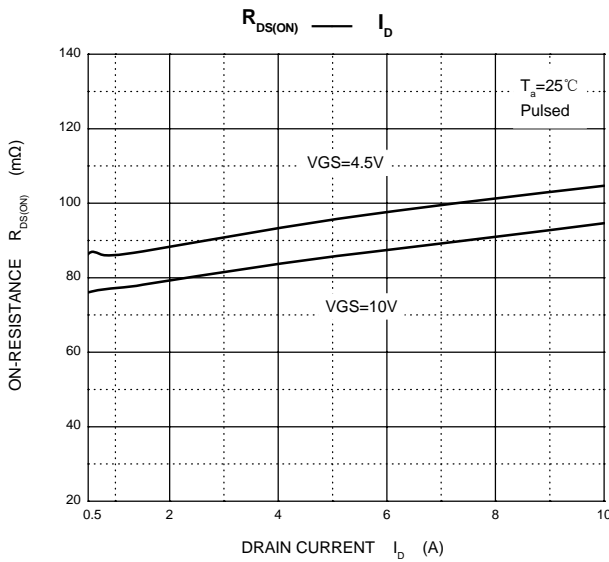
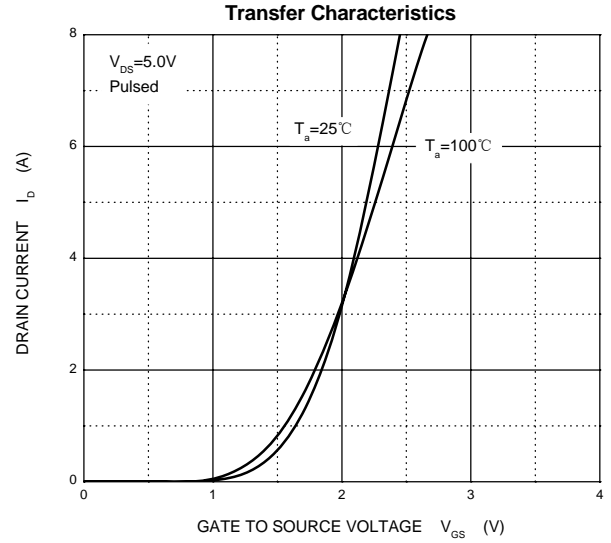
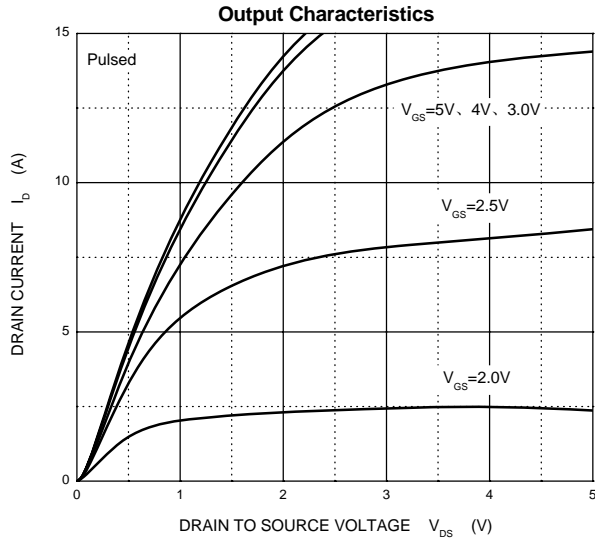
| Parameter  | Symbol          | Value    | Unit               |
|--|-----------------|----------|--------------------|
| Drain-Source Voltage                                 | $V_{DS}$        | 60       | V                  |
| Gate-Source Voltage                                  | $V_{GS}$        | $\pm 20$ | V                  |
| Continuous Drain Current                             | $I_D$           | 3        | A                  |
| Pulsed Drain Current (note 1)                        | $I_{DM}$        | 10       | A                  |
| Power Dissipation                                    | $P_D$           | 0.35     | W                  |
| Thermal Resistance from Junction to Ambient (note 2) | $R_{\theta JA}$ | 357      | $^\circ\text{C/W}$ |
| Operation Junction and Storage Temperature Range     | $T_J, T_{STG}$  | -55~+150 | $^\circ\text{C}$   |

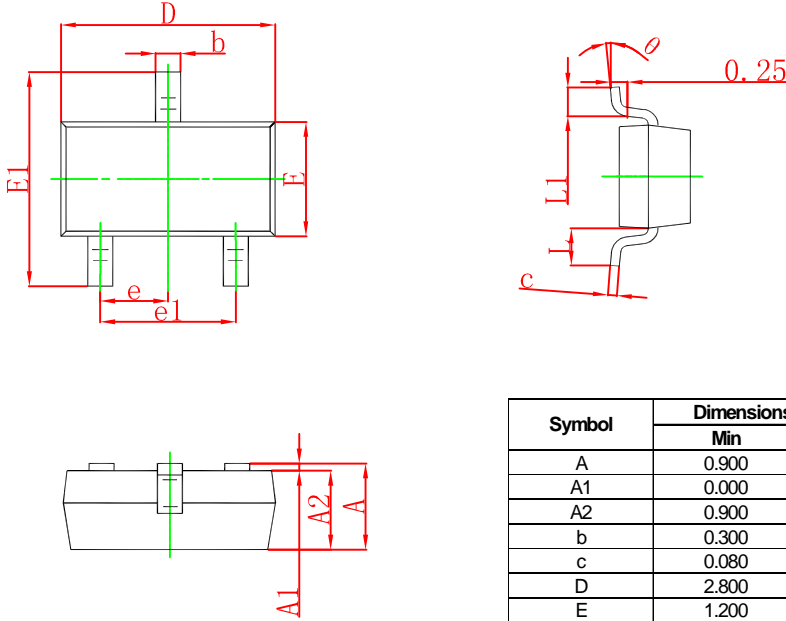
**SOT-23 Plastic-Encapsulate MOSFETS** $T_a=25^{\circ}\text{C}$  unless otherwise specified

| Parameter                                 | Symbol        | Test Condition   | Min | Typ  | Max       | Unit      |
|---|---------------|--|-----|------|-----------|-----------|
| <b>STATIC CHARACTERISTICS</b>             |               |  |     |      |           |           |
| Drain-source breakdown voltage            | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$                                    | 60  |      |           | V         |
| Zero gate voltage drain current           | $I_{DSS}$     | $V_{DS} = 60V, V_{GS} = 0V$                                      |     |      | 1         | $\mu A$   |
| Gate-body leakage current                 | $I_{GSS}$     | $V_{GS} = \pm 20V, V_{DS} = 0V$                                  |     |      | $\pm 100$ | nA        |
| Gate threshold voltage (note 3)           | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu A$                                | 1.0 | 1.5  | 2.2       | V         |
| Drain-source on-resistance (note 3)       | $R_{DS(on)}$  | $V_{GS} = 10V, I_D = 3A$   |     | 85   | 100       | $m\Omega$ |
|   |               | $V_{GS} = 4.5V, I_D = 2A$  |     | 94   | 110       | $m\Omega$ |
| Forward transconductance (note 3)         | $g_{FS}$      | $V_{DS} = 15V, I_D = 2A$   | 1.4 |      |           | S         |
| Diode forward voltage (note 3)            | $V_{SD}$      | $I_S = 3A, V_{GS} = 0V$  |     |      | 1.2       | V         |
| <b>DYNAMIC CHARACTERISTICS (note 4)</b>   |               |  |     |      |           |           |
| Input Capacitance                         | $C_{iss}$     | $V_{DS} = 30V, V_{GS} = 0V, f = 1MHz$                            |     | 247  |           | pF        |
| Output Capacitance                        | $C_{oss}$     |  |     | 34   |           | pF        |
| Reverse Transfer Capacitance              | $C_{rss}$     |  |     | 19.5 |           | pF        |
| <b>SWITCHING CHARACTERISTICS (note 4)</b> |               |  |     |      |           |           |
| Turn-on delay time                        | $t_{d(on)}$   | $V_{GS} = 10V, V_{DD} = 30V,$<br>$I_D = 1.5A, R_{GEN} = 1\Omega$ |     | 6    |           | ns        |
| Turn-on rise time                         | $t_r$         |  |     | 15   |           | ns        |
| Turn-off delay time                       | $t_{d(off)}$  |  |     | 15   |           | ns        |
| Turn-off fall time                        | $t_f$         |  |     | 10   |           | ns        |
| Total Gate Charge                         | $Q_g$         | $V_{DS} = 30V, V_{GS} = 4.5V, I_D = 3A$                          |     | 6    |           | nC        |
| Gate-Source Charge                        | $Q_{gs}$      |  |     | 1    |           | nC        |
| Gate-Drain Charge                         | $Q_{gd}$      |  |     | 1.3  |           | nC        |

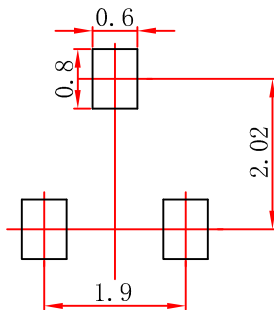
**Notes :**

1. Repetitive rating : Pulse width limited by junction temperature.
2. Surface mounted on FR4 board ,  $t \leq 10s$ .
3. Pulse Test : Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 0.5\%$ .
4. Guaranteed by design, not subject to producing.

**SOT-23 Plastic-Encapsulate MOSFETS**
**Typical Characteristics**


**SOT-23 Plastic-Encapsulate MOSFETS**
**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°    |

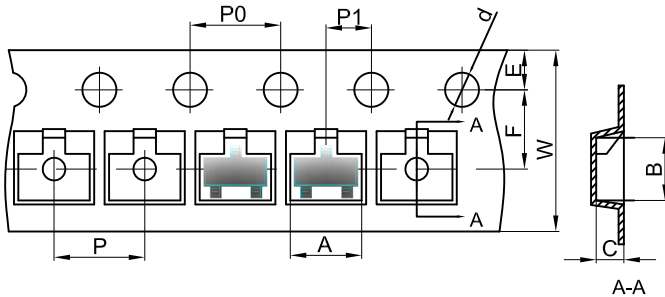
**SOT-23 Suggested Pad Layout**


- Note:
1. Controlling dimension: in millimeters.
  2. General tolerance:  $\pm 0.05\text{mm}$ .
  3. The pad layout is for reference purposes only.

# SOT-23 Plastic-Encapsulate MOSFETS

## SOT-23 Tape and Reel

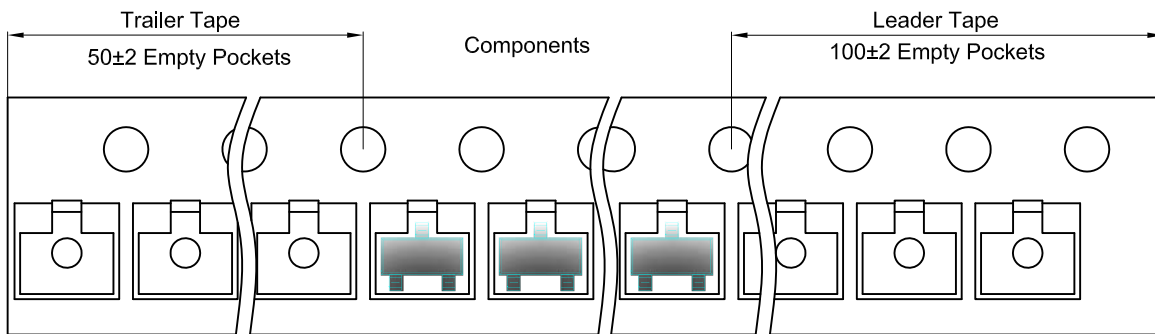
### SOT-23 Embossed Carrier Tape



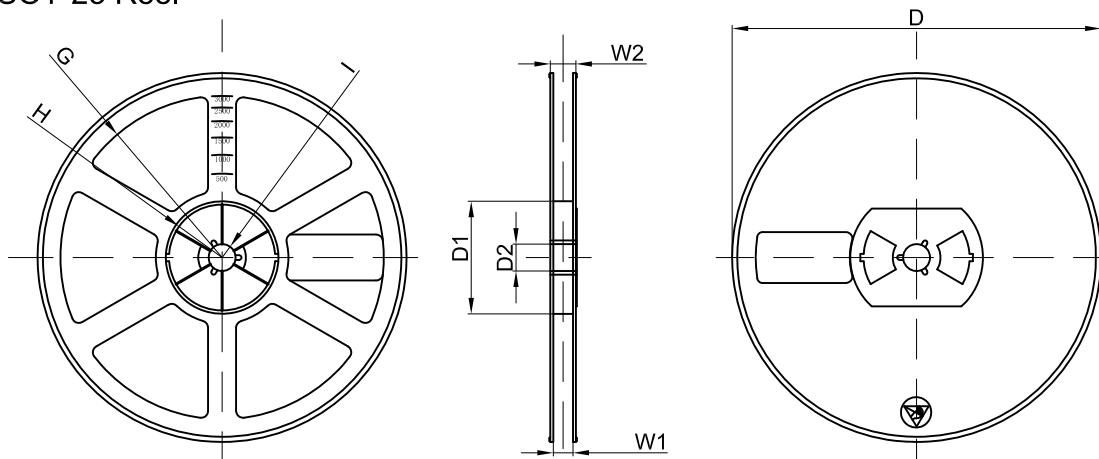
**Packaging Description:**  
 SOT-23 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 17.8cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

| Dimensions are in millimeter |      |      |      |       |      |      |      |      |      |      |
|------------------------------|------|------|------|-------|------|------|------|------|------|------|
| Pkg type                     | A    | B    | C    | d     | E    | F    | P0   | P    | P1   | W    |
| SOT-23                       | 3.15 | 2.77 | 1.22 | Ø1.50 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 8.00 |

### SOT-23 Tape Leader and Trailer



### SOT-23 Reel



| Dimensions are in millimeter |         |       |       |        |        |       |      |       |
|------------------------------|---------|-------|-------|--------|--------|-------|------|-------|
| Reel Option                  | D       | D1    | D2    | G      | H      | I     | W1   | W2    |
| 7"Dia                        | Ø178.00 | 54.40 | 13.00 | R78.00 | R25.60 | R6.50 | 9.50 | 12.30 |

| REEL     | Reel Size | Box       | Box Size(mm) | Carton     | Carton Size(mm) | G.W.(kg) |
|----------|-----------|-----------|--------------|------------|-----------------|----------|
| 3000 pcs | 7 inch    | 45000 pcs | 203×203×195  | 180000 pcs | 438×438×220     |          |