

## DESCRIPTION

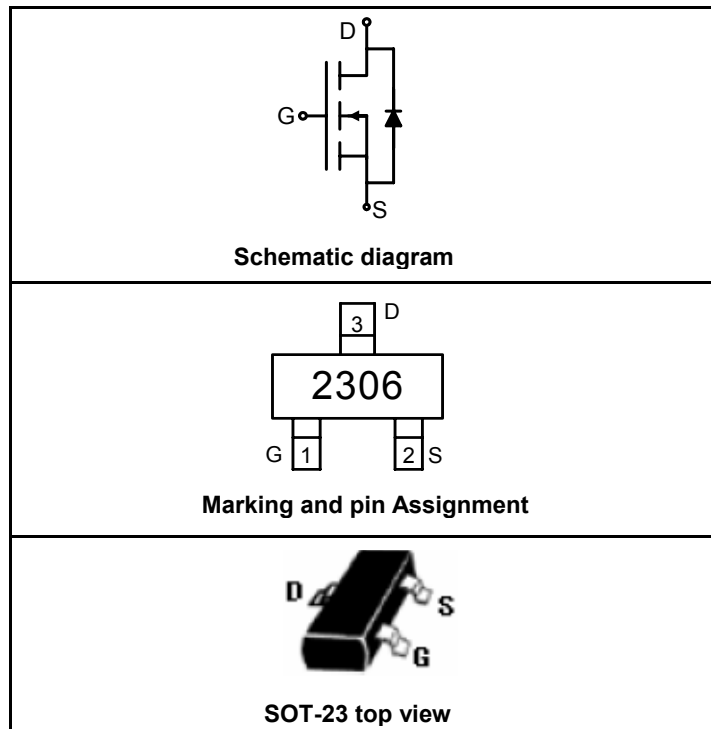
The SSF2306 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V.

## GENERAL FEATURES

- $V_{DS} = 30V, I_D = 5A$   
 $R_{DS(ON)} < 50m\Omega @ V_{GS}=2.5V$   
 $R_{DS(ON)} < 35m\Omega @ V_{GS}=4.5V$   
 $R_{DS(ON)} < 30m\Omega @ V_{GS}=10V$
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

## Application

- Battery protection
- Load switch
- Power management



## PACKAGE MARKING AND ORDERING INFORMATION

| Device Marking | Device  | Device Package | Reel Size | Tape width | Quantity   |
|----------------|---------|----------------|-----------|------------|------------|
| 2306           | SSF2306 | SOT-23         | Ø180mm    | 8 mm       | 3000 units |

## ABSOLUTE MAXIMUM RATINGS(TA=25°C unless otherwise noted)

| Parameter   | Symbol         | Limit      | Unit |
|---|----------------|------------|------|
| Drain-Source Voltage                              | $V_{DS}$       | 30         | V    |
| Gate-Source Voltage                               | $V_{GS}$       | ±12        | V    |
| Drain Current-Continuous@ Current-Pulsed (Note 1) | $I_D$          | 5          | A    |
|   | $I_{DM}$       | 20         | A    |
| Maximum Power Dissipation                         | $P_D$          | 1.38       | W    |
| Operating Junction and Storage Temperature Range  | $T_J, T_{STG}$ | -55 To 150 | °C   |

## THERMAL CHARACTERISTICS

|  |                 |    |      |
|--|-----------------|----|------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 90 | °C/W |
|--|-----------------|----|------|

## ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)

| Parameter                       | Symbol     | Condition                   | Min | Typ | Max  | Unit |
|---------------------------------|------------|-----------------------------|-----|-----|------|------|
| <b>OFF CHARACTERISTICS</b>      |            |                             |     |     |      |      |
| Drain-Source Breakdown Voltage  | $BV_{DSS}$ | $V_{GS}=0V, I_D=250\mu A$   | 30  |     |      | V    |
| Zero Gate Voltage Drain Current | $I_{DSS}$  | $V_{DS}=30V, V_{GS}=0V$     |     |     | 1    | µA   |
| Gate-Body Leakage Current       | $I_{GSS}$  | $V_{GS}=\pm 12V, V_{DS}=0V$ |     |     | ±100 | nA   |

| ON CHARACTERISTICS (Note 3)        |              |  |     |     |      |            |
|------------------------------------|--------------|--|-----|-----|------|------------|
| Gate Threshold Voltage             | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$  | 0.5 |     | 1.2  | V          |
| Drain-Source On-State Resistance   | $R_{DS(ON)}$ | $V_{GS}=2.5V, I_D=2.6A$  |     |     | 50   | m $\Omega$ |
|                                    |              | $V_{GS}=4.5V, I_D=5A$  |     |     | 35   | m $\Omega$ |
|                                    |              | $V_{GS}=10V, I_D=5A$   |     |     | 30   | m $\Omega$ |
| Forward Transconductance           | $g_{FS}$     | $V_{DS}=5V, I_D=5A$  |     | 13  |      | S          |
| DYNAMIC CHARACTERISTICS (Note4)    |              |  |     |     |      |            |
| Input Capacitance                  | $C_{iss}$    | $V_{DS}=25V, V_{GS}=0V,$<br>$F=1.0MHz$                                   |     | 660 | 1050 | PF         |
| Output Capacitance                 | $C_{oss}$    |  |     | 90  |      | PF         |
| Reverse Transfer Capacitance       | $C_{rss}$    |  |     | 70  |      | PF         |
| SWITCHING CHARACTERISTICS (Note 4) |              |  |     |     |      |            |
| Turn-on Delay Time                 | $t_{d(on)}$  | $V_{DS}=15V, I_D=5A$<br>$V_{GS}=10V, R_{GEN}=3.3\Omega$<br>$R_D=3\Omega$ |     | 6   |      | nS         |
| Turn-on Rise Time                  | $t_r$        |  |     | 20  |      | nS         |
| Turn-Off Delay Time                | $t_{d(off)}$ |  |     | 20  |      | nS         |
| Turn-Off Fall Time                 | $t_f$        |  |     | 3   |      | nS         |
| Total Gate Charge                  | $Q_g$        | $V_{DS}=16V, I_D=5A, V_{GS}=4.5V$  |     | 8.5 | 15   | nC         |
| Gate-Source Charge                 | $Q_{gs}$     |  |     | 1.5 |      | nC         |
| Gate-Drain Charge                  | $Q_{gd}$     |  |     | 3.2 |      | nC         |
| DRAIN-SOURCE DIODE CHARACTERISTICS |              |  |     |     |      |            |
| Diode Forward Voltage (Note 3)     | $V_{SD}$     | $V_{GS}=0V, I_S=1.2A$  |     |     | 1.2  | V          |

## 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 testing.

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

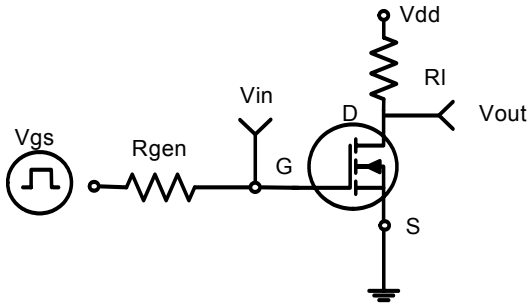


Figure 1: Switching Test Circuit

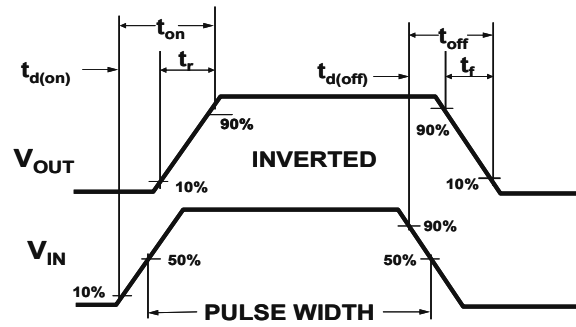


Figure 2: Switching Waveforms

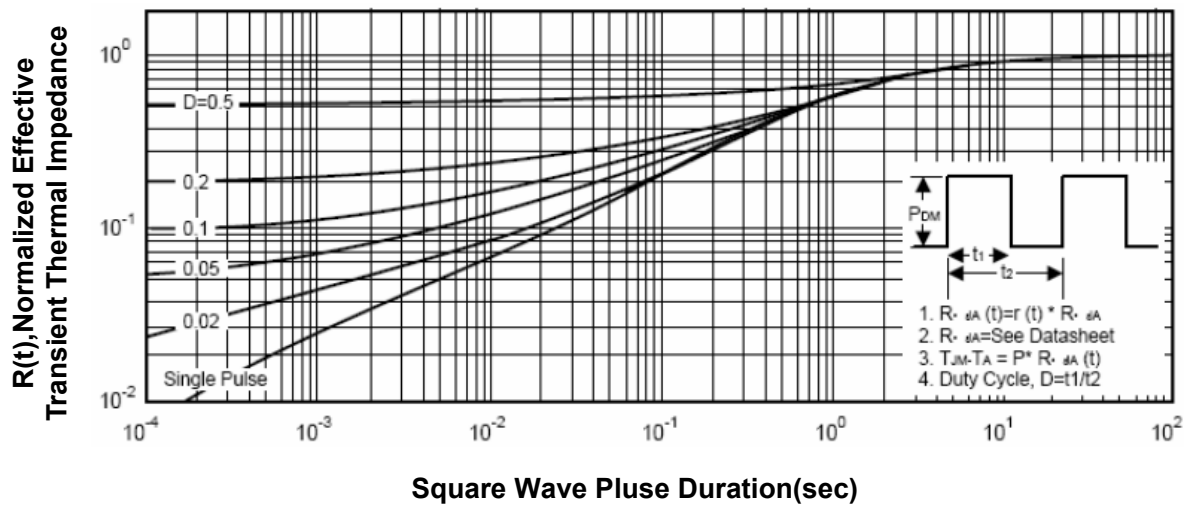
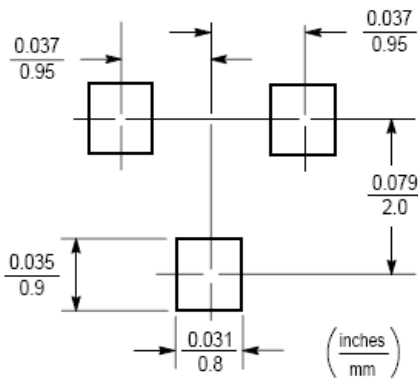
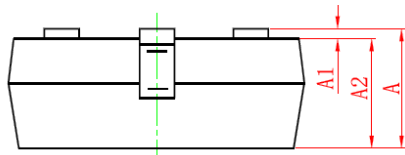
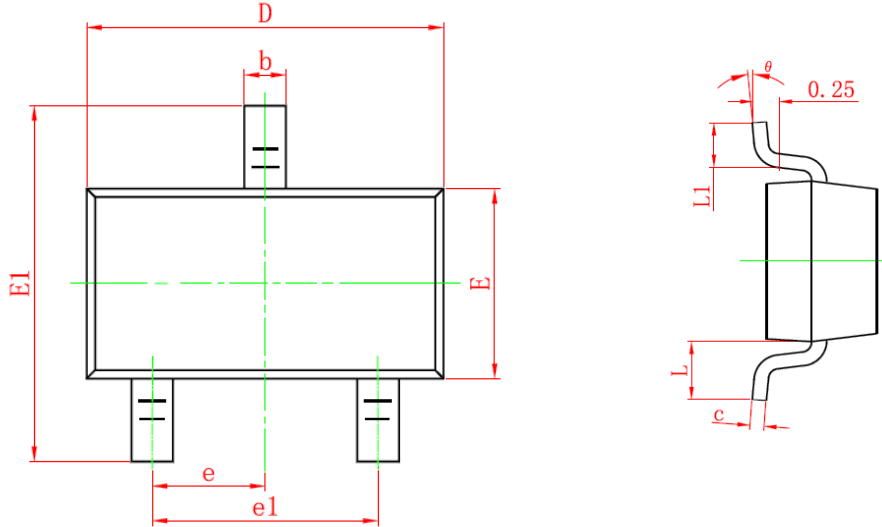


Figure 3: Normalized Maximum Transient Thermal Impedance

## SOT-23 PACKAGE INFORMATION

Dimensions in Millimeters (UNIT:mm)



| Symbol    | Dimensions in Millimeters |              |
|-----------|---------------------------|--------------|
|           | MIN.                      | MAX.         |
| <b>A</b>  | <b>0.900</b>              | <b>1.150</b> |
| <b>A1</b> | <b>0.000</b>              | <b>0.100</b> |
| <b>A2</b> | <b>0.900</b>              | <b>1.050</b> |
| <b>b</b>  | <b>0.300</b>              | <b>0.500</b> |
| <b>c</b>  | <b>0.080</b>              | <b>0.150</b> |
| <b>D</b>  | <b>2.800</b>              | <b>3.000</b> |
| <b>E</b>  | <b>1.200</b>              | <b>1.400</b> |
| <b>E1</b> | <b>2.250</b>              | <b>2.550</b> |
| <b>e</b>  | <b>0.950TYP</b>           |              |
| <b>e1</b> | <b>1.800</b>              | <b>2.000</b> |
| <b>L</b>  | <b>0.550REF</b>           |              |
| <b>L1</b> | <b>0.300</b>              | <b>0.500</b> |
| <b>θ</b>  | <b>0°</b>                 | <b>8°</b>    |

### NOTES

1. All dimensions are in millimeters.
2. Tolerance  $\pm 0.10\text{mm}$  (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

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