

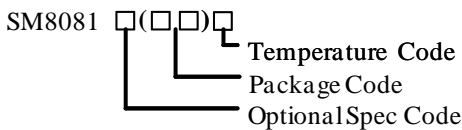
High Efficiency, 1.5MHz, 1.2A Synchronous Step Down Regulator

General Description

SM8081T is a high efficiency 1.5MHz synchronous step down DC/DC regulator capable of delivering up to 1.2A output current. It can operate over a wide input voltage range from 2.5V to 5.5V and capable to endure 6.5V transient voltage. The device integrates main switch and synchronous switch with very low $R_{DS(ON)}$ to minimize the conduction loss.

The low output voltage ripple, the small external inductor and the capacitor sizes are achieved with 1.5MHz switching frequency.

Ordering Information



| Ordering Number | Package type | Note |
|-----------------|--------------|------|
| SM8081TAAC | SOT23-5 | -- |

Features

- 2.5V to 5.5V Input Voltage Range, with 6.5V Transient Input Capability
- 70 μ A Low Quiescent Current
- Low $R_{DS(ON)}$ for Internal Switches (Top/Bottom) 260m Ω /170m Ω
- High Switching Frequency 1.5MHz Minimizes the External Components
- Internal Soft-start Limits the Inrush Current
- 100% Dropout Operation
- Reliable Short Circuit Protection
- Output Auto Discharge Function
- RoHS Compliant and Halogen Free
- Compact Package: SOT23-5

Applications

- Set Top Box
- USB Dongle
- Media Player
- Smart phone

Typical Applications

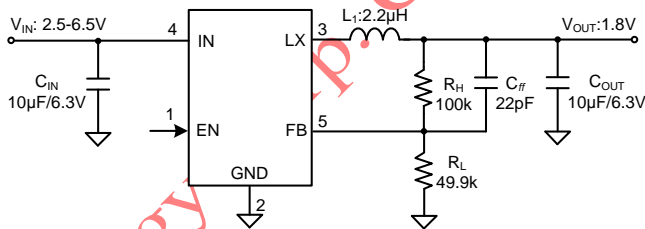


Figure1. Schematic Diagram

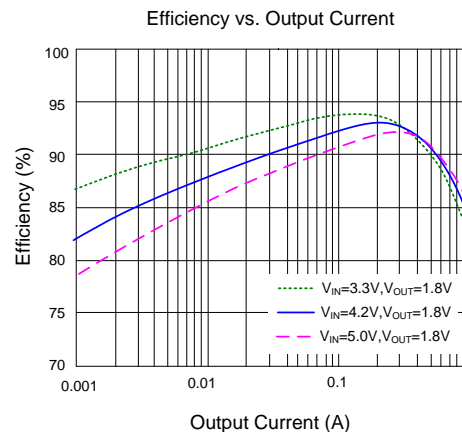
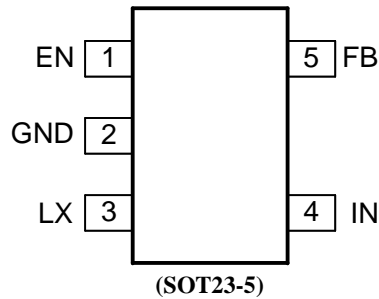


Figure2. Efficiency vs. Output Current

Pinout (Top View)



Top Mark: J9xyz (device code: J9 x=year code, y=week code, z= lot number code)

| Pin Name | Pin Number | Pin Description |
|----------|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EN | 1 | Enable control. Pull high to turn on. Do not leave it floating. |
| GND | 2 | Ground pin. |
| LX | 3 | Inductor pin. Connect this pin to the switching node of the inductor. |
| IN | 4 | Input pin. Decouple this pin to the GND pin with at least a 10 μF ceramic capacitor. |
| FB | 5 | Output feedback pin. Connect this pin to the center point of the output resistor divider (as shown in Figure 1) to program the output voltage: $V_{\text{OUT}}=0.6 \times (1+R_{\text{H}}/R_{\text{L}})$. |

Block Diagram

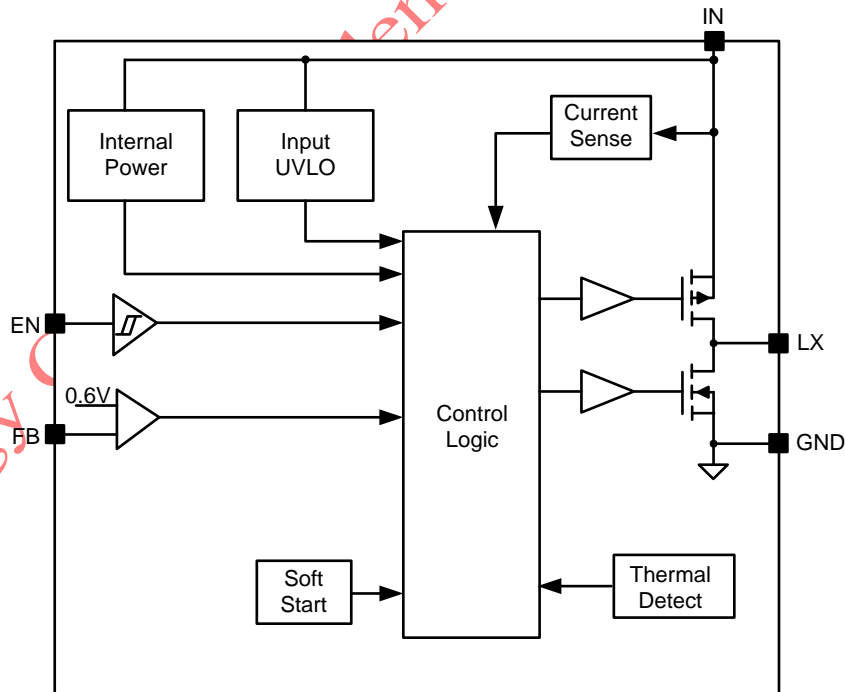


Figure2. Block Diagram



Absolute Maximum Ratings (Note 1)

| | |
|-------------------------------------------------------------|-----------------------------------------------|
| Supply Input Voltage | 6.5V |
| EN, FB Voltage | $V_{IN} + 0.6V$ |
| LX Voltage | -0.3V ^(*1) to 6.0V ^(*2) |
| Power Dissipation, P_D @ $T_A = 25\text{ }^\circ\text{C}$ | 0.77W |
| Package Thermal Resistance (Note 2) | |
| θ_{JA} | 130 $^\circ\text{C/W}$ |
| θ_{JC} | 28 $^\circ\text{C/W}$ |
| Junction Temperature Range | -40 $^\circ\text{C}$ to 150 $^\circ\text{C}$ |
| Lead Temperature (Soldering, 10 sec.) | 260 $^\circ\text{C}$ |
| Storage Temperature Range | -65 $^\circ\text{C}$ to 150 $^\circ\text{C}$ |

(*1) LX Voltage Tested down to -3V<40ns
(*2) LX Voltage Tested up to +7V<40ns

Recommended Operating Conditions (Note 3)

| | |
|----------------------------|----------------------------------------------|
| Supply Input Voltage | 2.5V to 5.5V |
| Junction Temperature Range | -40 $^\circ\text{C}$ to 125 $^\circ\text{C}$ |
| Ambient Temperature Range | -40 $^\circ\text{C}$ to 85 $^\circ\text{C}$ |



Electrical Characteristics

($V_{IN} = 5V$, $V_{OUT} = 1.8V$, $L = 2.2\mu H$, $C_{OUT} = 10\mu F$, $T_A = 25^\circ C$, unless otherwise specified)

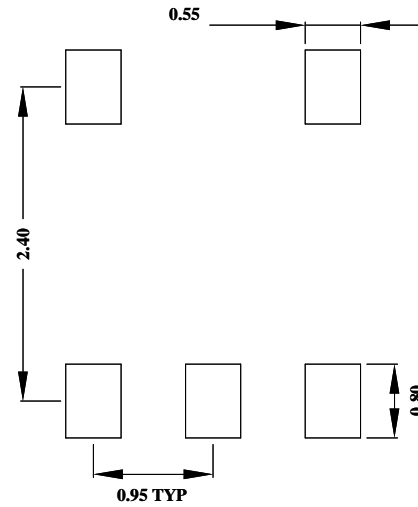
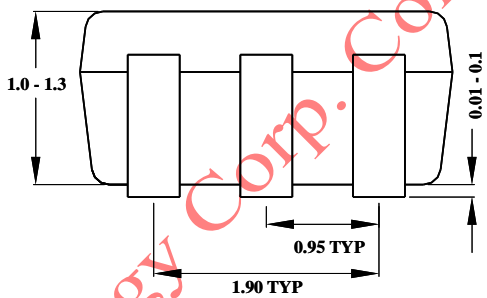
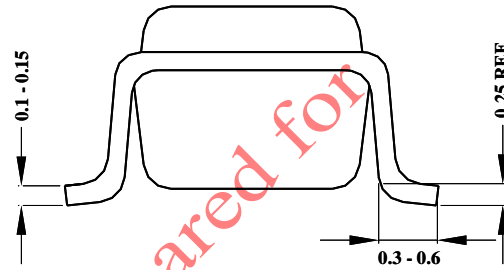
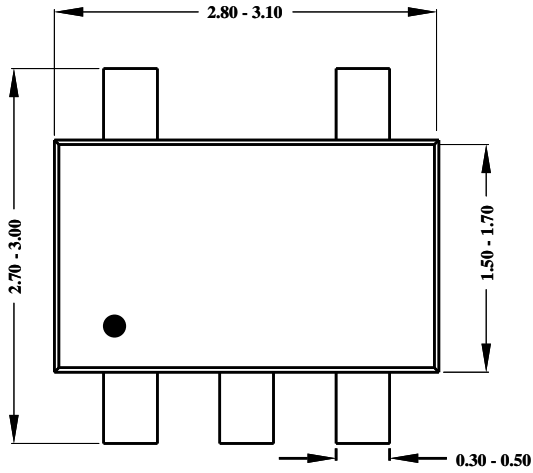
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|------------------------------|----------------|------------------------------------|-----|-----|-----|------------|
| Input Voltage Range | V_{IN} | | 2.5 | | 5.5 | V |
| Input UVLO Threshold | V_{UVLO} | | | | 2.5 | V |
| Input UVLO Hysteresis | V_{HYS} | | | 150 | | mV |
| Quiescent Current | I_Q | $V_{FB} = V_{REF} \times 105\%$ | | 70 | 100 | μA |
| Shutdown Current | I_{SHDN} | $V_{EN} = 0V$ | | 0.1 | 1 | μA |
| Feedback Reference Voltage | V_{REF} | $I_{OUT} = 0.5A$, CCM | 588 | 600 | 612 | mV |
| LX Node Discharge Resistance | R_{DIS} | | | 50 | | Ω |
| Top FET R_{ON} | $R_{DS(ON)1}$ | | | 260 | | m Ω |
| Bottom FET R_{ON} | $R_{DS(ON)2}$ | | | 170 | | m Ω |
| EN Input Voltage High | $V_{EN,H}$ | | 1.2 | | | V |
| EN Input Voltage Low | $V_{EN,L}$ | | | | 0.4 | V |
| Min ON Time | $t_{ON,MIN}$ | | | 60 | | ns |
| Maximum Duty Cycle | D_{MAX} | | 100 | | | % |
| Turn On Delay | $t_{ON,DLY}$ | from EN high to LX start switching | | 300 | | μs |
| Soft-start Time | t_{SS} | V_{OUT} from 0% to 100% | | 700 | | μs |
| Switching Frequency | f_{SW} | $I_{OUT} = 0.5A$, CCM | | 1.5 | | MHz |
| Top FET Current Limit | $I_{LMT, TOP}$ | | 1.5 | | 2.5 | A |
| Thermal Shutdown Temperature | T_{SD} | | | 160 | | $^\circ C$ |
| Thermal Shutdown Hysteresis | T_{HYS} | | | 20 | | $^\circ C$ |

Note 1: Stresses beyond the “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Note 2: θ_{JA} of SM8081T is measured in the natural convection at $T_A = 25^\circ C$ on a 2OZ two-layer Silergy evaluation board. Pin 3 is the case position for θ_{JC} measurement.

Note 3: The device is not guaranteed to function outside its operating conditions.

SOT23-5 Package Outline & PCB Layout Design



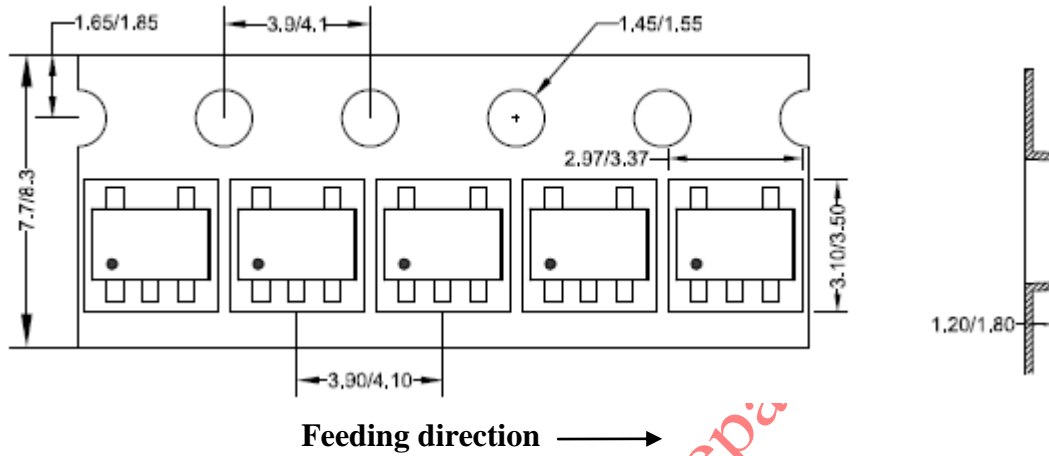
Recommended Pad Layout

Notes: All dimensions are in millimeters.
 All dimensions don't include mold flash & metal burr.

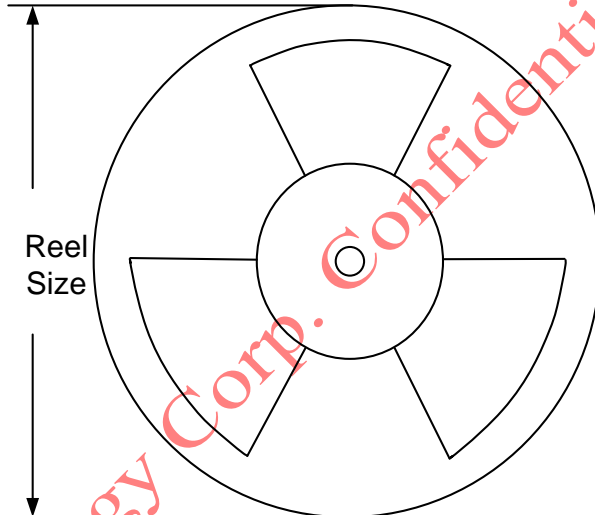
Taping & Reel Specification

1. Taping orientation

SOT23-5



2. Carrier Tape & Reel specification for packages



| Package type | Tape width (mm) | Pocket pitch(mm) | Reel size (Inch) | Trailer length(mm) | Leader length (mm) | Qty per reel |
|--------------|-----------------|------------------|------------------|--------------------|--------------------|--------------|
| SOT23-5 | 8 | 4 | 7" | 280 | 160 | 3000 |

3. Others: NA

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