



SY8023

High Efficiency 1MHz, Dual 3A Synchronous Step Down Regulator

General Description

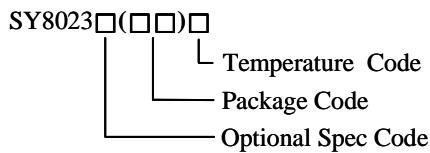
The SY8023 is a high-efficiency 1MHz synchronous step-down DC-DC regulator IC capable of delivering up to 3A output currents. The SY8023 operates over a wide input voltage range from 3V to 5.5V and integrate main switch and synchronous switch with very low $R_{DS(ON)}$ to minimize the conduction loss.

Low output voltage ripple and small external inductor and capacitor sizes are achieved with 1MHz switching frequency.

Features

- Low $R_{DS(ON)}$ for internal switches (top/bottom): 110m Ω /80m Ω
- 3-5.5V input voltage range
- 1MHz switching frequency minimizes the external components
- Internal softstart limits the inrush current
- 100% dropout operation
- RoHS Compliant and Halogen Free
- Compact and thermally enhanced package: SO8E

Ordering Information



| Ordering Number | Package type | Note |
|-----------------|--------------|------|
| SY8023FCC | SO8E | 3A |

Applications

- Net PC
- LCD TV
- Access Point Router
- Mini Notebook PC
- Set Top Box

Typical Applications

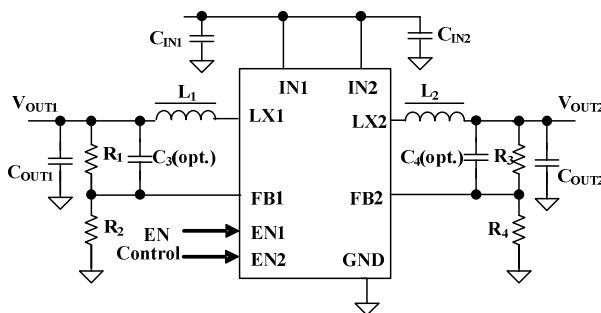


Figure 1

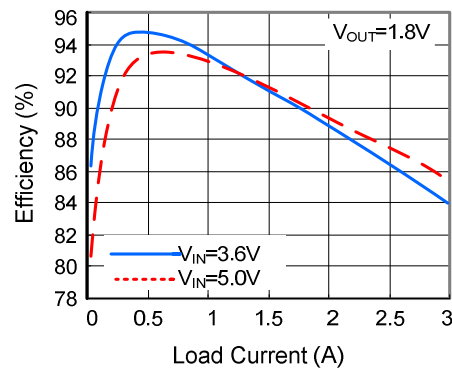
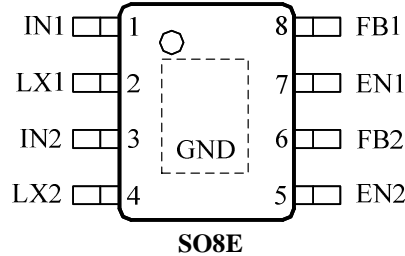


Figure2 Efficiency vs Load Current

Pinout (top view)



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

| Pin Name | Pin Number | Pin Description |
|----------|--------------------|---|
| EN1,2 | 7,5 | Enable control. Pull high to turn on. Do not float. |
| GND | 9 (exposed paddle) | Ground pin. The paddle must be soldered to the ground plane on the PCB. |
| LX1,2 | 2,4 | Inductor pin. Connect this pin to the switching node of inductor |
| IN1,2 | 1,3 | Input pins. Decouple IN1 to GND paddle with at least 10uF ceramic cap. Decouple IN2 to GND paddle with at least 10uF ceramic cap. |
| FB1,2 | 8,6 | 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: $V_{OUT}=0.6*(1+R_1/R_2)$ |

Absolute Maximum Ratings (Note 1)

| | |
|--|-----------------|
| Supply Input Voltage | 6V |
| Enable, FB Voltage | $V_{IN} + 0.6V$ |
| Power Dissipation, P_D @ $T_A = 25^\circ C$ SO8E | 1W |
| Package Thermal Resistance (Note 2) | |
| SO8E, θ_{JA} | 50°C/W |
| SO8E, θ_{JC} | 10°C/W |
| Junction Temperature Range | 150°C |
| Lead Temperature (Soldering, 10 sec.) | 260°C |
| Storage Temperature Range | -65°C to 150°C |
| ESD Susceptibility (Note 2) | |
| HBM (Human Body Mode) | 2kV |
| MM (Machine Mode) | 200V |

Recommended Operating Conditions (Note 3)

| | |
|----------------------------|----------------|
| Supply Input Voltage | 3V to 5.5V |
| Junction Temperature Range | -40°C to 125°C |
| Ambient Temperature Range | -40°C to 85°C |



Electrical Characteristics

($V_{IN} = 5V$, $V_{OUT} = 2.5V$, $L = 2.2\mu H$, $C_{OUT} = 10\mu F$, $T_A = 25^\circ C$ unless otherwise specified)

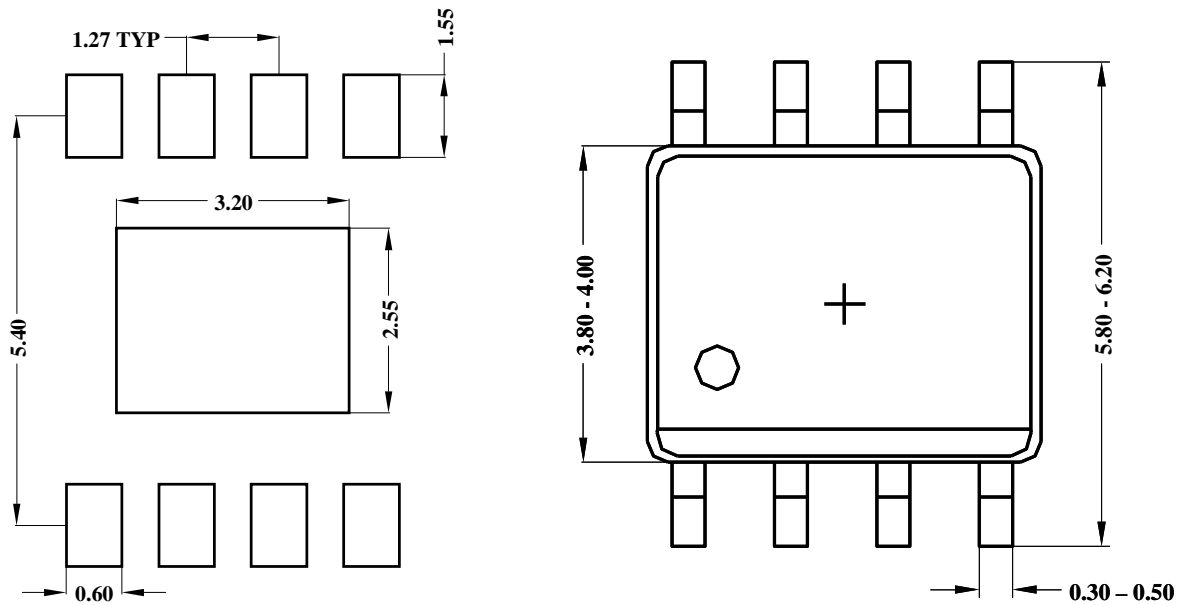
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|------------------------------|----------------|---|-------|------|-------|------------|
| Input Voltage Range | V_{IN} | | 3 | | 5.5 | V |
| Quiescent Current | I_Q | $I_{OUT}=0, V_{FB}=V_{REF} \cdot 105\%$ | | 80 | | μA |
| Shutdown Current | I_{SHDN} | $EN=0$ | | | 10 | μA |
| Feedback Reference Voltage | V_{REF} | | 0.588 | 0.6 | 0.612 | V |
| FB Input Current | I_{FB} | $V_{FB}=V_{IN}$ | -50 | | 50 | nA |
| PFET RON | $R_{DS(ON),P}$ | | | 0.11 | | Ω |
| NFET RON | $R_{DS(ON),N}$ | | | 0.08 | | Ω |
| PFET Current Limit | I_{LIM} | | 3.5 | | | A |
| EN Rising Threshold | V_{ENH} | | 1.5 | | | V |
| EN Falling Threshold | V_{ENL} | | | | 0.4 | V |
| Input UVLO Threshold | V_{UVLO} | | | | 2.9 | V |
| UVLO Hysteresis | V_{HYS} | | | 0.15 | | V |
| Oscillator Frequency | F_{OSC} | $I_{OUT}=100mA$ | | 1 | | MHz |
| Min ON Time | | | | 50 | | ns |
| Max Duty Cycle | | | 100 | | | % |
| Thermal Shutdown Temperature | T_{SD} | | | 150 | | $^\circ C$ |

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

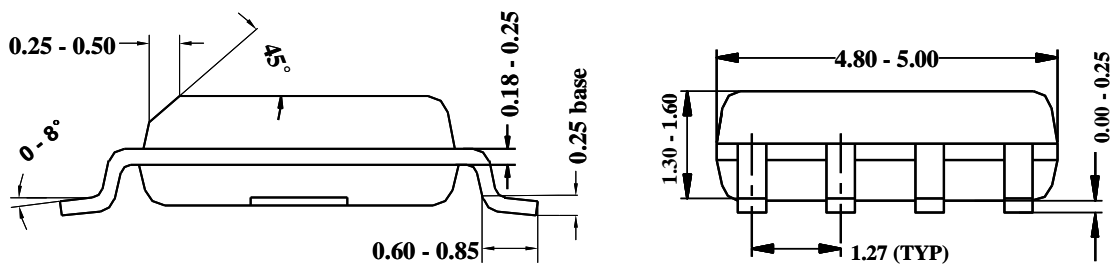
Note 2: θ_{JA} is measured in the natural convection at $T_A = 25^\circ C$ on a low effective single layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard.

Note3. The device is not guaranteed to function outside its operating conditions.

SO8E Package outline & PCB layout design



Recommended Pad Layout



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