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): 110mΩ /80mΩ
- 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

SY8023□(□□)□

- Temperature Code
- Package Code
- Optional Spec Code

Ordering Number	Package type	Note
SY8023FCC	SO8E	3A

Applications

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

Typical Applications

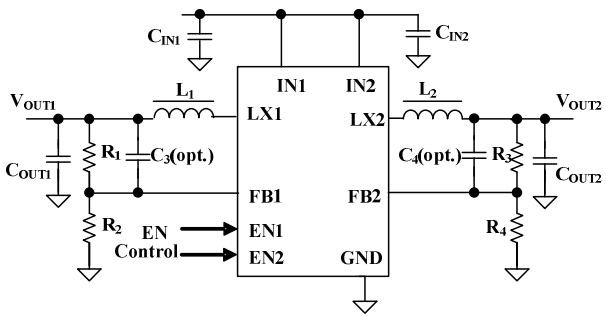


Figure 1

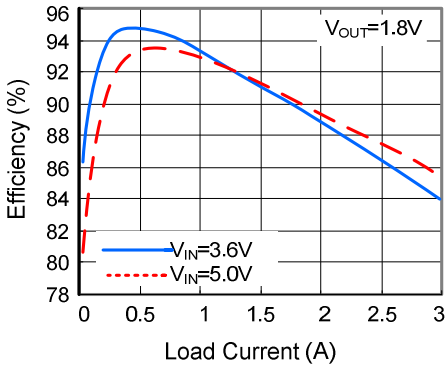
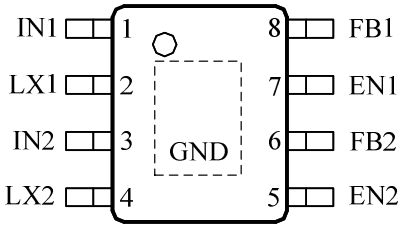


Figure2 Efficiency vs Load Current

Pinout (top view)



SO8E

Top Mark: AAH*xyz* (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°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 = 2.2uH, C_{OUT} = 10uF, T_A = 25°C unless otherwise specified)

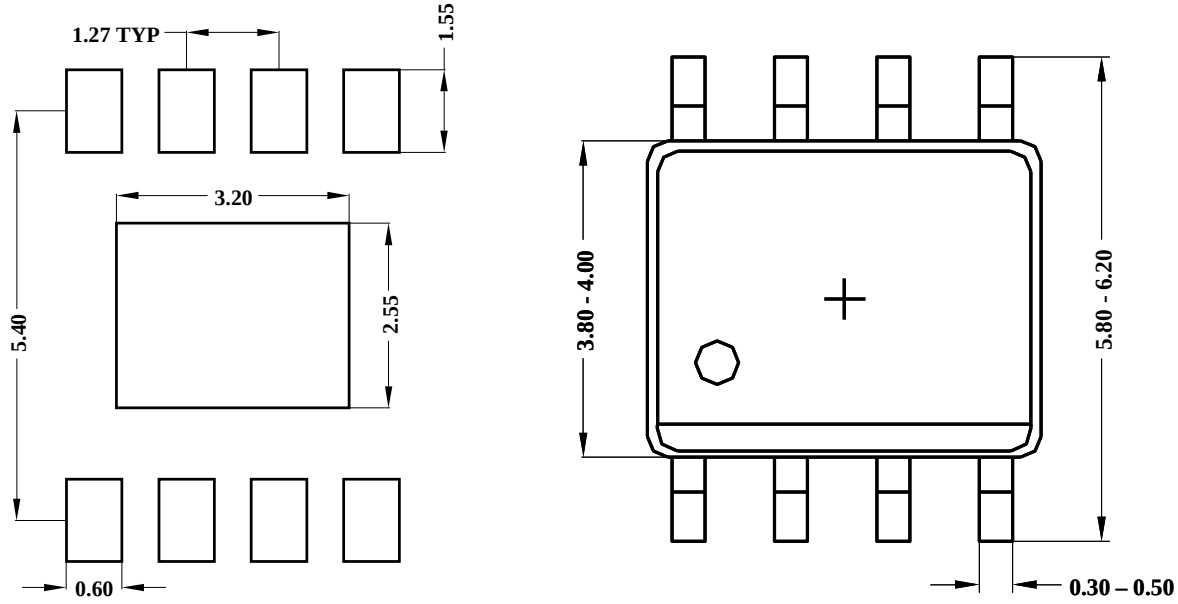
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	V_{IN}		3		5.5	V
Quiescent Current	I_Q	I_{OUT}=0, V_{FB}=V_{REF} · 105%		80		μA
Shutdown Current	I_{SHDN}	EN=0			10	μA
Feedback Reference Voltage	V_{REF}		0.588	0.6	0.612	V
FB Input Current	I_{FB}	V_{FB}=V_{IN}	-50		50	nA
PFET RON	$R_{DS(ON),P}$			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		°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.

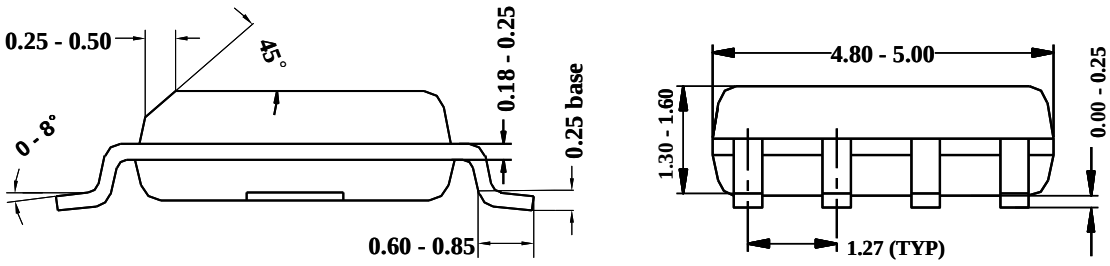
Note 2: θJA is measured in the natural convection at TA = 25°C on a low effective single layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard.

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.