SY8031

High Efficiency 2.25MHz, 1.2A Synchronous Step Down Regulator Preliminary Design Spec

General Description

The SY8031 is a high-efficiency 2.25MHz synchronous step-down DC-DC converter capable of delivering 1.2A output current. SY8031 operates over a wide input voltage range from 2.5V to 5.5V and integrates main switch and synchronous switch with very low $R_{DS(ON)}$ to minimize the conduction loss.

Ordering Information

SY8031□(□□)□

- Temerature Code: C: 0°C~85°C
- Package Code: AA:SOT23-5
- Spec Code

Features

- low Rds(on) for internal switches (top/bottom):
  - SY8031L: 300mΩ/200 mΩ, 0.6A
  - SY8031: 200mΩ/150 mΩ, 1.2A continuous,2A peak
- 2.5-5.5V input voltage range
- 2.25MHz switching frequency
- 100uA quescient current
- Internal softstart limits the inrush current
- 1.5% 0.6V reference
- 100% dropout operation
- Compact package: SOT23-5

Applications

- WiFi Card
- Set Top Box
- GPS
- Toy

Typical Applications

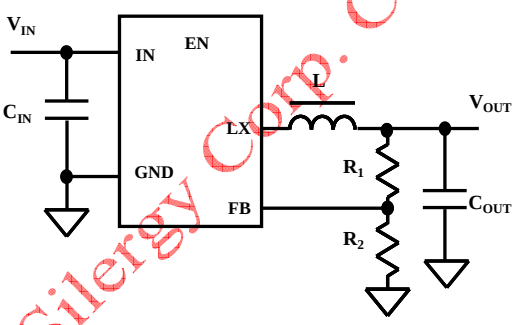


Figure 1. Schematic Diagram

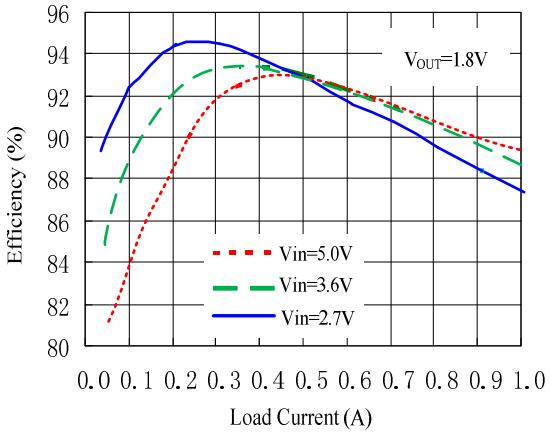
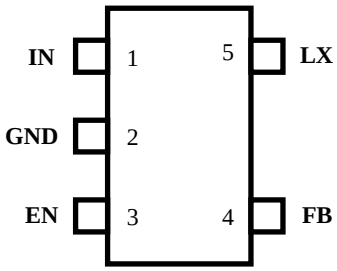


Figure 2. Efficiency vs Load Current

Pinout



SOT23-5 (SY8031)

Pin Name	SOT23-5	Pin Description
EN	3	Enable control. Pull high to turn on. Do not float.
GND	2	Ground pin
LX	5	Inductor pin. Connect this pin to the switching node of inductor
IN	1	Input pin. Decouple this pin to GND pin with at least 1uF ceramic cap
FB	4	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: Vout=0.6*(1+R1/R2)

Absolute Maximum Ratings (Note 1)

Supply Input Voltage ---------- 6V
All Other Pins ---------- V_{IN} + 0.6V
Power Dissipation, P_D @ T_A = 25°C SOT-23-5 ---------- 0.4W
Package Thermal Resistance (Note 2)
SOT-23-5, θ_{JA} ---------- 250°C/W
SOT-23-5, θ_{JC} ---------- 130°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

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Recommended Operating Conditions (Note 3)

EN, IN, FB pins ---------- 2.5V to 5.5V
LX pin ---------- 2.5V to 6V
Junction Temperature Range ---------- -40°C to 125°C
Ambient Temperature Range ---------- -40°C to 85°C

Electrical Characteristics

(V_{IN} = 3.6V, V_{OUT} = 2.5V, L = 2.2uH, C_{OUT} = 10uF, T_A = 25°C, I_{MAX} = 1A unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	VIN		2.5		5.5	V
Quiescent Current	I_Q	$I_{OUT=0}$, VFB=VREF+5%		100	200	μA
Shutdown Current	I_{SHDN}	EN=0		0.1	1	μA
Feedback Reference Voltage	VREF		0.591	0.6	0.609	V
FB Input Current	IFB	VFB=VIN	-50		50	nA
PFET RON	RDS(ON),P	SY8031L		0.3		Ω
		SY8031		0.2		Ω
NFET RON	RDS(ON),N	SY8031L		0.2		Ω
		SY8031		0.15		Ω
PFET Current Limit	ISW	SY8031L, Iout=0.6Amax	0.84			A
		SY8031D, Iout=1.2Amax	2			A
EN rising threshold	VENH		1.26			V
EN falling threshold	VENL				0.4	V
Input UVLO threshold	V_{UVLO}	IOUT=100mA	2	2.25	2.5	MHz
UVLO hysteresis	V_{HYS}			50		ns
Oscillator Frequency	F_{OSC}		100			%
Min ON Time				150		°C
Max Duty Cycle						
Thermal Shutdown Temperature	T_{SD}					

Note 1: Stresses listed as the above "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 for extended periods may remain possibility to 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. Pin 2 of SOT23-5 package is the case position for qJC measurement.

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