

High Efficiency 5.5V, 3A continuous, 1MHz Synchronous Step Down Regulator

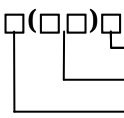
General Description

The SY8003E is high-efficiency, high frequency synchronous step-down DC-DC regulator IC capable of delivering up to 3A output current. The SY8003E operates over a wide input voltage range from 2.7V 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.

SY8003E integrates reliable short circuit and over-voltage protection.

Ordering Information

SY8003  Temperature Code
Package Code
Optional Spec Code

Ordering Number	Package type	Note ^①
SY8003EDFC	DFN2x2-8	

Features

- Low $R_{DS(ON)}$ for internal switches (top/bottom): 110m Ω /80m Ω
- 3A continuous load current capability
- 2.7-5.5V input voltage range
- 1MHz high switching frequency minimizes the external components
- Internal soft-start limits the inrush current
- Hic-cup mode protection
- Reliable over-voltage protection: No latch off protection
- 100% dropout operation
- Forced PWM mode operation only
- RoHS Compliant and Halogen Free
- Compact package: DFN2X2-8.

Applications

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

Typical Applications

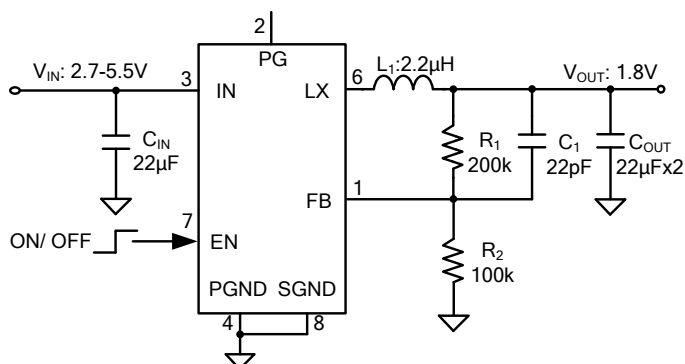


Figure 1. Schematic diagram

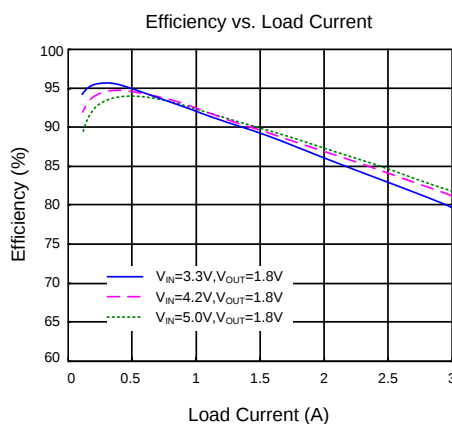
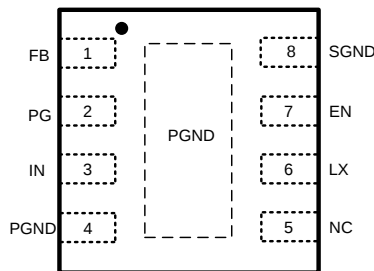


Figure 2. Efficiency vs. Load Current

Pinout (top view)

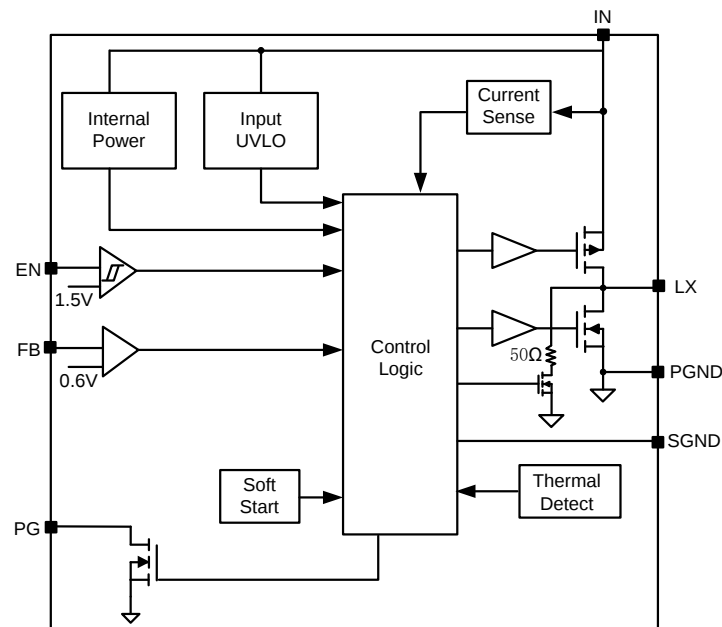


Part Number	Package type	Top Mark ^①
SY8003EDFC	DFN2x2-8	VCxyz

Note ①: x=year code, y=week code, z= lot number code.

Pin Name	Pin Number	Pin Description
EN	7	Enable control. Pull high to turn on. Do not float.
PGND	4/Exposed Paddle	Power ground pin.
SGND	8	Signal ground pin.
LX	6	Inductor pin. Connect this pin to the switching node of inductor.
IN	3	Power input pin. Decouple this pin to GND pin with at least 10μF ceramic cap.
PG	2	Power good indicator (Open drain output). Low if the output < 90% of regulation voltage; High otherwise. Connect a pull-up resistor to the input.
FB	1	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: $V_{out}=0.6*(1+R_1/R_2)$.
NC	5	No connection.

Block Diagram



**Absolute Maximum Ratings** (Note 1)

Supply Input Voltage	-----	-0.3V to 6.0V
Enable, FB Voltage	-----	-0.3V to $V_{IN} + 0.6V$
LX Voltage	-----	-0.3V ^(*1) to 6V ^(*2)
Power Dissipation, PD @ TA = 25°C DFN2x2-8,	-----	1W
Package Thermal Resistance (Note 2)		
θ_{JA}	-----	120°C/W
θ_{JC}	-----	8.2°C/W
Junction Temperature Range	-----	150°C
Lead Temperature (Soldering, 10 sec.)	-----	260°C
Storage Temperature Range	-----	65°C to 150°C
(*1) LX Voltage tested down to -4V<10ns		
(*2) LX Voltage tested up to +7V<50ns		

Recommended Operating Conditions (Note 3)

Supply Input Voltage	-----	2.7V to 5.5V
Junction Temperature Range	-----	-40°C to 125°C
Ambient Temperature Range	-----	-40°C to 85°C



Electrical Characteristics

($V_{IN} = 5V$, $V_{OUT} = 2.5V$, $L = 2.2\mu H$, $C_{OUT} = 22\mu F$, $T_A = 25^\circ C$, unless otherwise specified)

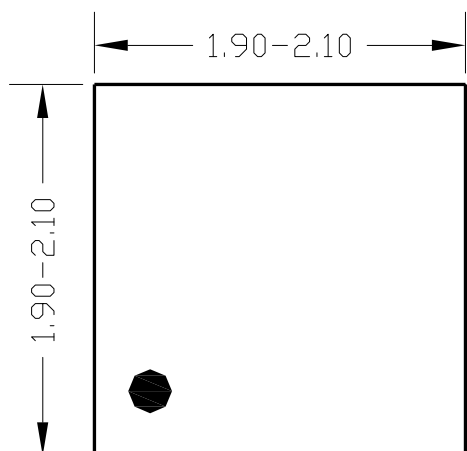
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	V_{IN}		2.7		5.5	V
Shutdown Current	I_{SHDN}	EN=0		0.1	1	μA
Feedback Reference Voltage	V_{REF}		0.588	0.6	0.612	V
PFET RON	$R_{DS(ON),P}$			110		$m\Omega$
NFET RON	$R_{DS(ON),N}$			80		$m\Omega$
PFET Current Limit	I_{LIM}		3.5		4.7	A
EN rising threshold	V_{ENH}		1.5			V
EN falling threshold	V_{ENL}				0.4	V
Input UVLO Threshold	V_{UVLO}	Rising		2.55	2.65	V
UVLO hysteresis	V_{HYS}			0.2		V
Oscillator Frequency	F_{OSC}	$I_{OUT}=500mA$	0.8	1	1.2	MHz
PG High Delay Time				0.1	1	μs
PG Rising Threshold				90		$\%V_{REF}$
PG Under-voltage Threshold				90		$\%V_{REF}$
PG Under-voltage Delay Time				20		μs
PG Over-voltage Threshold			115	120	125	$\%V_{REF}$
Over-voltage Protection Threshold			115	120	125	$\%V_{REF}$
Over-voltage Deglitch Timeout	T_{OV}		10	20	30	μs
Short Circuit Protection Delay Time	$T_{DELAY-SC}$			20		μs
Min ON Time				75		ns
Max Duty Cycle			100			%
Soft Start Time	t_{SS}			1.2		ms
Output Discharge Switch On Resistance	R_{DISCH}			50		Ω
Thermal Shutdown Temperature	T_{SD}			150		$^\circ C$

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.

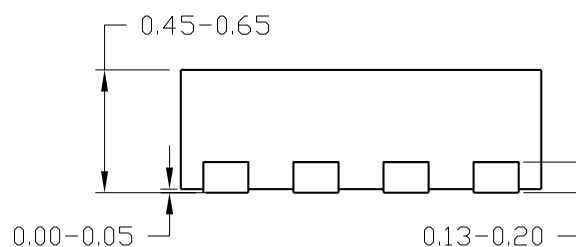
Note 2: Test condition: Device mounted on 2” x 2” FR-4 substrate PCB, 2oz copper, with minimum recommended pad on top layer and thermal vias to bottom layer ground plane.

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

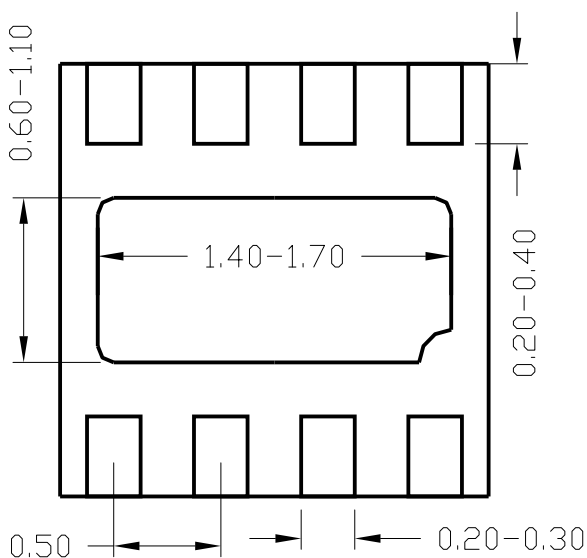
DFN2x2-8 Package Outline



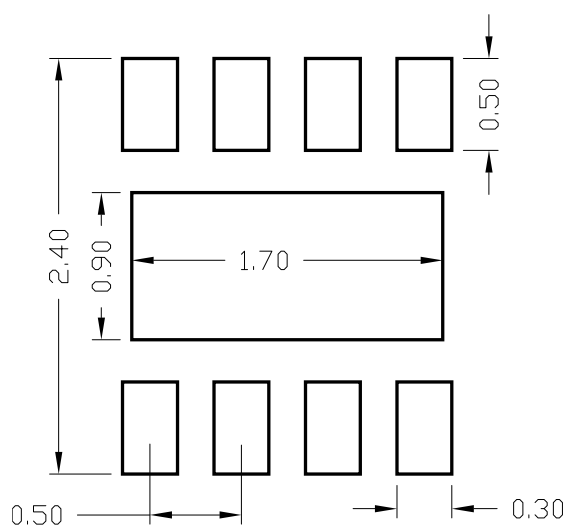
Top View



Side View



Bottom View



PCB Layout (Reference Only)

Notes: **All dimension in MM**
 All dimension don't include mold flash & metal burr