



# SYH113

## High Efficiency, 500kHz, 3A, 18V Input Synchronous Step Down Regulator

### General Description

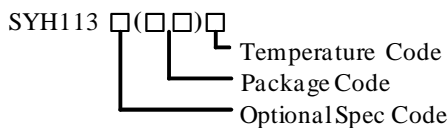
The SYH113 is a high efficiency 500 kHz synchronous step-down DC-DC converter capable of delivering 3A current. The SYH113 operates over a wide input voltage range from 4.5V to 18V and integrates main switch and synchronous switch with very low  $R_{DS(ON)}$  to minimize the conduction loss.

Low output voltage ripple and small external inductor and capacitor sizes are achieved with 500 kHz switching frequency. It adopts the instant PWM architecture to achieve fast transient responses for high step down applications

### Features

- low  $R_{DS(ON)}$  for internal switches (top/bottom): 80m $\Omega$ /40m $\Omega$
- 4.5-18V input voltage range
- 3A output current capability
- 500 kHz switching frequency
- Instant PWM architecture to achieve fast transient responses.
- Cycle-by-cycle peak current limitation
- Internal softstart limits the inrush current
- $\pm 1.5\%$  0.6V reference
- TSOT23-6 package

### Ordering Information



Temperature Range: -40°C to 85°C

Ordering Number	Package type	Note
SYH113ADC	TSOT23-6	--

### Applications

- Set Top Box
- Portable TV
- Access Point Router
- DSL Modem
- LCD TV

### Typical Applications

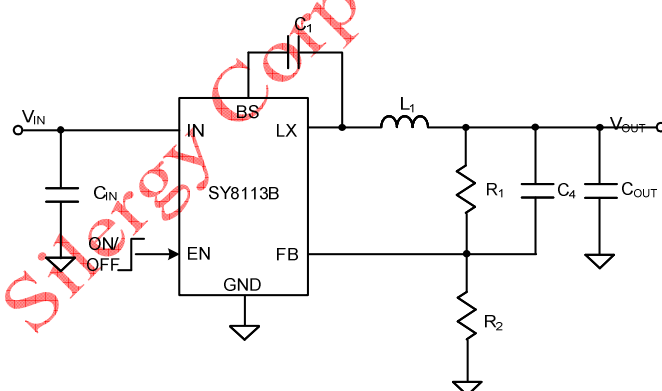


Figure 1. Schematic Diagram

Efficiency vs. Load Current

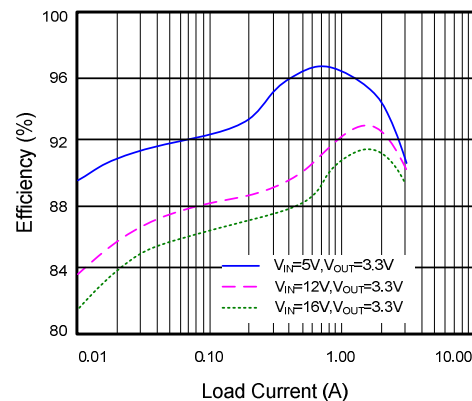
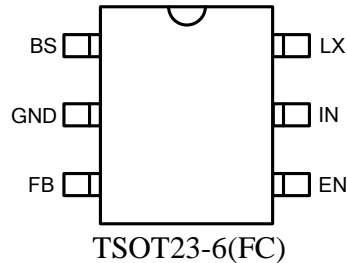


Figure 2. Efficiency Figure

**Pinout** (top view)


Top Mark: WCxyz, (Device code: WC, *x=year code*, *y=week code*, *z=lot number code*)

Pin Name	Pin Number	Pin Description
BS	1	Boot-Strap Pin. Supply high side gate driver. Decouple this pin to LX pin with 0.1uF ceramic cap.
GND	2	Ground pin
FB	3	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: $V_{out}=0.6*(1+R1/R2)$
EN	4	Enable control. Pull high to turn on. Do not float.
IN	5	Input pin. Decouple this pin to GND pin with at least 1uF ceramic cap
LX	6	Inductor pin. Connect this pin to the switching node of inductor

**Absolute Maximum Ratings** (Note 1)

Supply Input Voltage	-----	19V
Enable Voltage	-----	$V_{IN} + 0.3V$
FB Voltage	-----	4V
Power Dissipation, PD @ TA = 25°C, TSOT23-6 (FC)	-----	1W
Package Thermal Resistance (Note 2)		
$\theta_{JA}$	-----	100°C /W
$\theta_{JC}$	-----	11.2°C /W
Junction Temperature Range	-----	150°C
Lead Temperature (Soldering, 10 sec.)	-----	260°C
Storage Temperature Range	-----	-65°C to 150°C

**Recommended Operating Conditions** (Note 3)

Supply Input Voltage	-----	4.5V to 18V
Junction Temperature Range	-----	-40°C to 125°C
Ambient Temperature Range	-----	-40°C to 85°C



**Electrical Characteristics**

( $V_{IN} = 12V$ ,  $V_{OUT} = 1.2V$ ,  $L = 2.2\mu H$ ,  $C_{OUT} = 47\mu F$ ,  $T_A = 25^\circ C$ ,  $I_{OUT} = 1A$  unless otherwise specified)

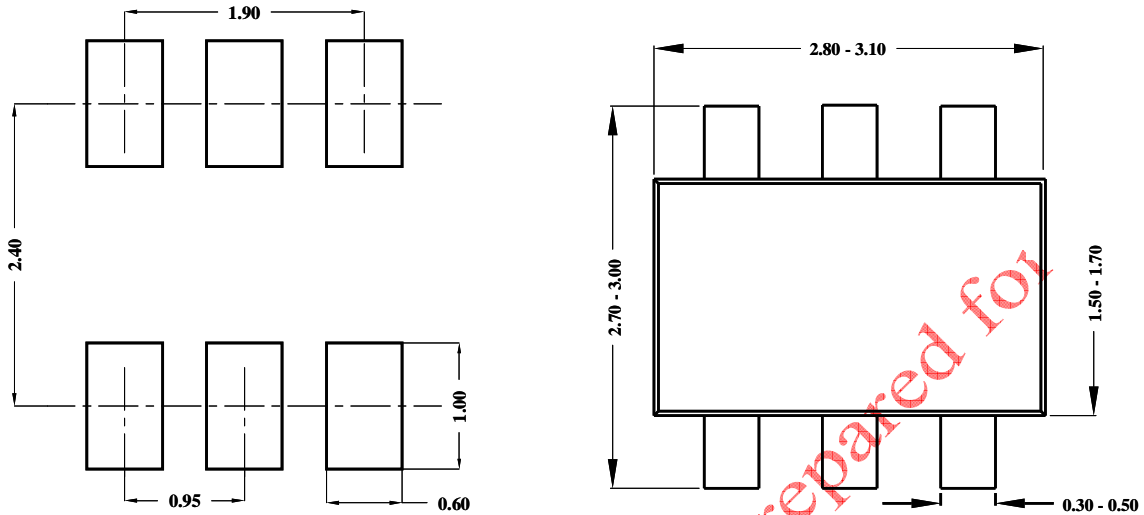
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	$V_{IN}$		4.5		18	V
Quiescent Current	$I_Q$	$I_{OUT}=0, V_{FB}=V_{REF}*105\%$		100		$\mu A$
Shutdown Current	$I_{SHDN}$	$EN=0$		5	10	$\mu A$
Feedback Reference Voltage	$V_{REF}$		0.591	0.6	0.609	V
FB Input Current	$I_{FB}$	$V_{FB}=3.3V$	-50		50	nA
Top FET RON	$R_{DS(ON)1}$			80	90	m $\Omega$
Bottom FET RON	$R_{DS(ON)2}$			40	50	m $\Omega$
Top FET Peak Current Limit	$I_{LIM, TOP}$				6	A
Bottom FET Valley Current Limit	$I_{LIM}$		3		4.25	A
EN Rising Threshold	$V_{ENH}$		1.5			V
EN Falling Threshold	$V_{ENL}$				0.4	V
Input UVLO Threshold	$V_{UVLO}$				4.5	V
UVLO Hysteresis	$V_{HYS}$			0.3		V
Min ON Time			50	80	120	ns
Min OFF Time			140	170	220	ns
Switching Frequency				500		kHz
Soft-start Time	$t_{SS}$			800		$\mu S$
Thermal Shutdown Temperature	$T_{SD}$			150		$^\circ C$
Thermal Shutdown Hysteresis	$T_{HYS}$			15		$^\circ C$

**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.

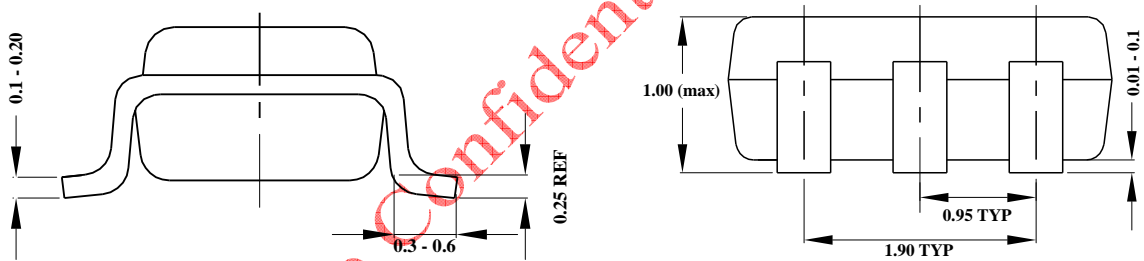
**Note 2:**  $\theta_{JA}$  is measured in the natural convection at  $T_A = 25^\circ C$  on a low effective 4-layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard. Pin2 of TSOT23-6 packages is the case position for  $\theta_{JC}$  measurement.

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

## TSOT23-6L (FC) Package outline & PCB layout



### Recommended Pad Layout

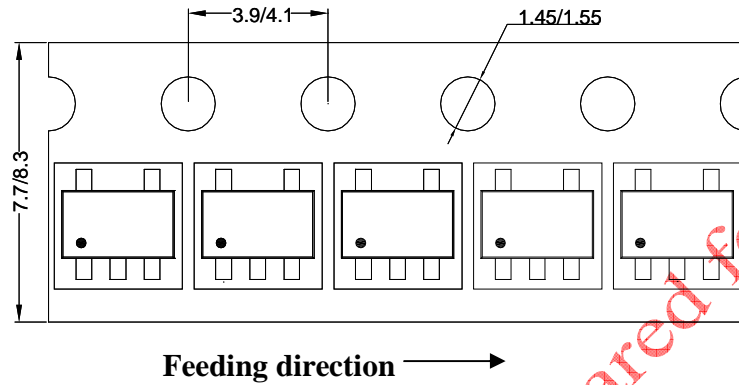


**Notes:** All dimension in MM  
 All dimension don't not include mold flash & metal burr

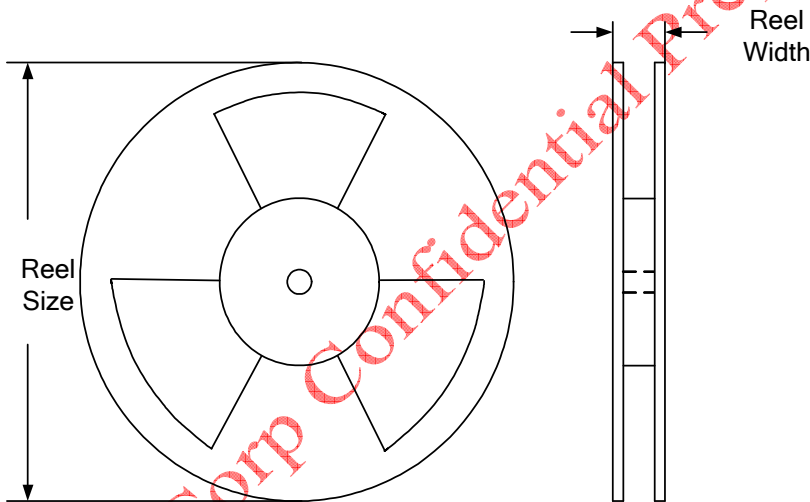
### Taping & Reel Specification

1. Taping orientation

TSOT23-6



2. Carrier Tape & Reel specification for packages



Package types	Tape width (mm)	Pocket pitch(mm)	Reel size (Inch)	Reel width(mm)	Trailer length(mm)	Leader length (mm)	Qty per reel
SOT23-6	8	4	7"	8.4	280	160	3000

3. Others: NA