

High Efficiency, 200kHz, 100V Input, 0.6A Asynchronous Step Down Regulator

General Description

SY8511 is a high efficiency, current mode adaptive constant off time controlled asynchronous step-down DC/DC converter capable of delivering 0.6A output current. The SY8511 operates over a wide input voltage range from 4.5V to 100V and integrates main switch with very low $R_{DS(ON)}$ to minimize the conduction loss.

Ordering Information

SY8511 □(□)□□
 □ Temperature Code
 □ Package Code
 □ Optional Spec Code

Ordering Number	Package Type	Note
SY8511ADC	TSOT23-6	

Features

- Low $R_{DS(ON)}$ for Internal N-channel Power FET: 1Ω
- 4.5-100V Input Voltage Range
- 0.6A Output Current Capability
- 200kHz Pseudo Constant Switching Frequency
- Internal Soft-start Limits the Inrush Current
- Hic-cup Mode Output Short Circuit Protection
- EN ON/OFF Control with Accurate Threshold
- Cycle by Cycle Peak Current Limit
- $0.6V \pm 1\%$ Reference Voltage
- TSOT23-6 Package

Applications

- Non-isolated Telecommunication Buck Regulator
- Secondary High Voltage Post Regulator
- Automotive Systems
- Electric Bicycle

Typical Application

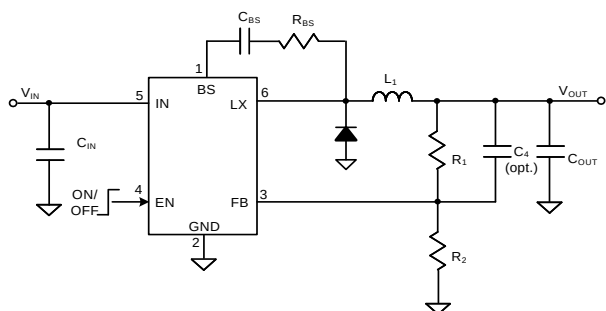


Figure1. Schematic Diagram

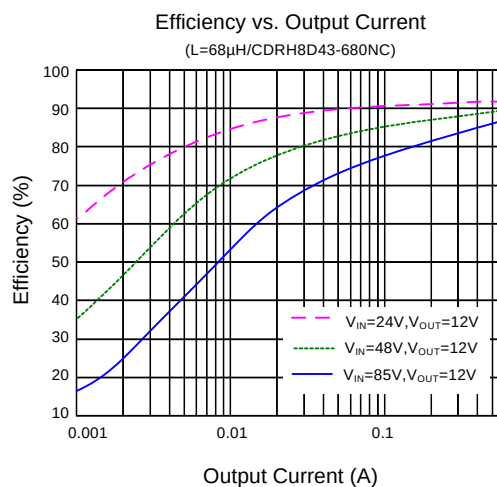
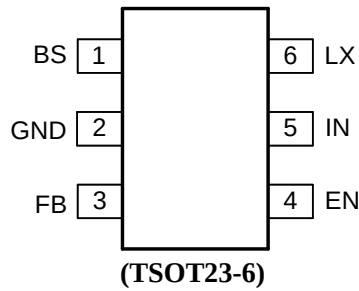


Figure2. Efficiency vs. Output Current

Pinout (top view)



Top Mark: fKxyz (device code: fK, 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. Connect a 0.1μF ceramic capacitor in series with a10Ω resistor between the BS and the LX pin.
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: $V_{OUT}=0.6 \times (1+R1/R2)$.
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 a 1μF ceramic capacitor.
LX	6	Inductor pin. Connect this pin to the switching node of the inductor.

Function Block

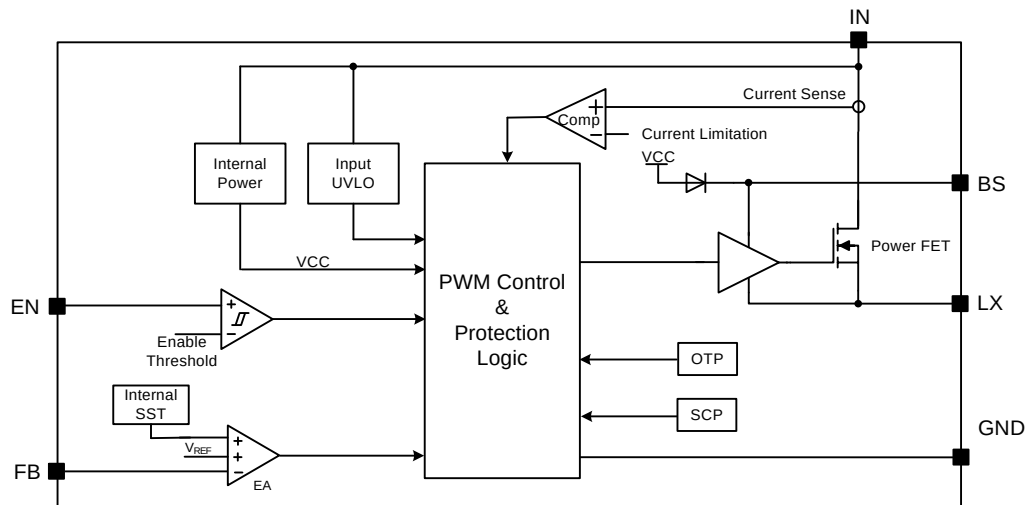


Figure3. Block Diagram

Absolute Maximum Ratings (Note 1)

Supply Input Voltage	-0.3V to 100V
BS-LX Voltage	-0.3V to 6V
FB, EN, LX Voltage	-0.3V to $V_{IN} + 0.3V$
Power Dissipation, P_D @ $T_A = 25^\circ C$ TSOT23-6	1W
Package Thermal Resistance (Note 2)	
θ_{JA}	100°C/W
θ_{JC}	25°C/W
Junction Temperature Range	-40°C to 150°C
Lead Temperature (Soldering, 10 sec.)	260°C
Storage Temperature Range	-65°C to 150°C
Dynamic LX Voltage in 10ns Duration	$IN+3V$ to GND-5V

Recommended Operating Conditions (Note 3)

Supply Input Voltage	4.5V to 100V
Junction Temperature Range	-40°C to 125°C
Ambient Temperature Range	-40°C to 85°C

Electrical Characteristics

($V_{IN} = 48V$, $V_{OUT} = 12V$, $L = 6.8\mu H$, $C_{OUT} = 10\mu F$, $T_A = 25^\circ C$, $I_{OUT} = 0.1A$, unless otherwise specified.)

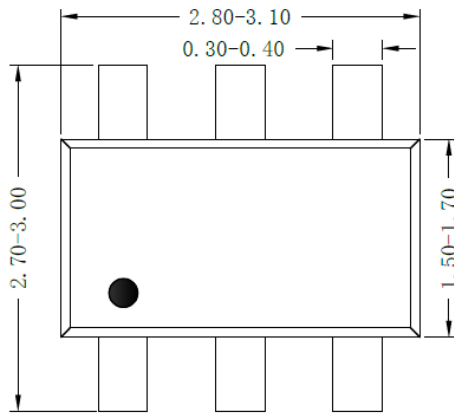
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage Range	V_{IN}		4.5		100	V
Quiescent Current	I_Q	$I_{OUT}=0$, $V_{FB}=V_{REF}\times 105\%$		100		μA
Shutdown Current	I_{SHDN}	$EN=0$		9	20	μA
Feedback Reference Voltage	V_{REF}		0.594	0.6	0.606	V
FB Input Current	I_{FB}	$V_{FB}=V_{IN}$	-50		50	nA
Power FET RON	$R_{DS(ON)1}$			1		Ω
Power FET Peak Current Limit	$I_{LIM,TOP}$		0.9		1.3	A
EN Rising Threshold	V_{ENH}		1.14	1.2	1.26	V
EN Falling Threshold	V_{ENL}		0.94	1	1.06	V
Input UVLO Threshold	V_{UVLO}				4.5	V
Input UVLO Hysteresis	$V_{UVLO,HYS}$			110		mV
Switching Frequency	F_{SW}			200		kHz
Switching Frequency Accuracy	$F_{SW,ACC}$		-20		20	% F_{SW}
Min ON Time	$t_{ON,MIN}$			80		ns
Min Off Time	$t_{OFF,MIN}$			80		ns
Soft-start Time	t_{SS}			800		μs
Thermal Shutdown Temperature	T_{SD}			150		$^\circ C$
Thermal Shutdown Hysteresis	T_{HYS}			15		$^\circ C$

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.

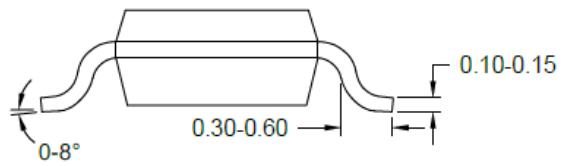
Note 2: θ_{JA} is measured in the natural convection at $T_A = 25^\circ C$ on a two-layer Silergy Evaluation Board.

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

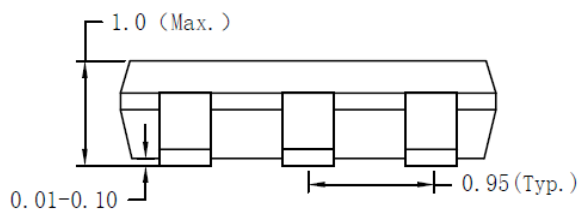
TSOT23-6 Package Outline & PCB Layout



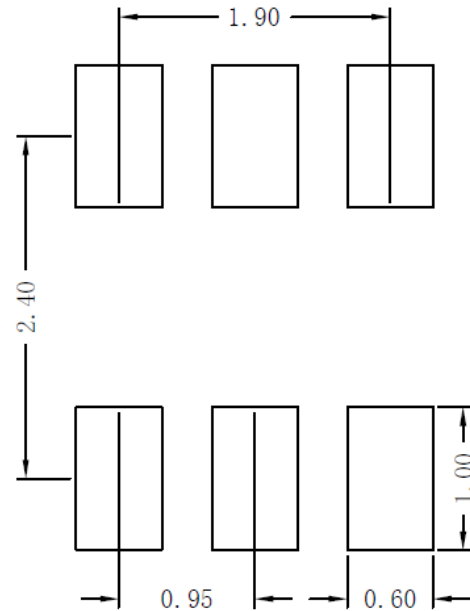
Top view



Side view



Front view



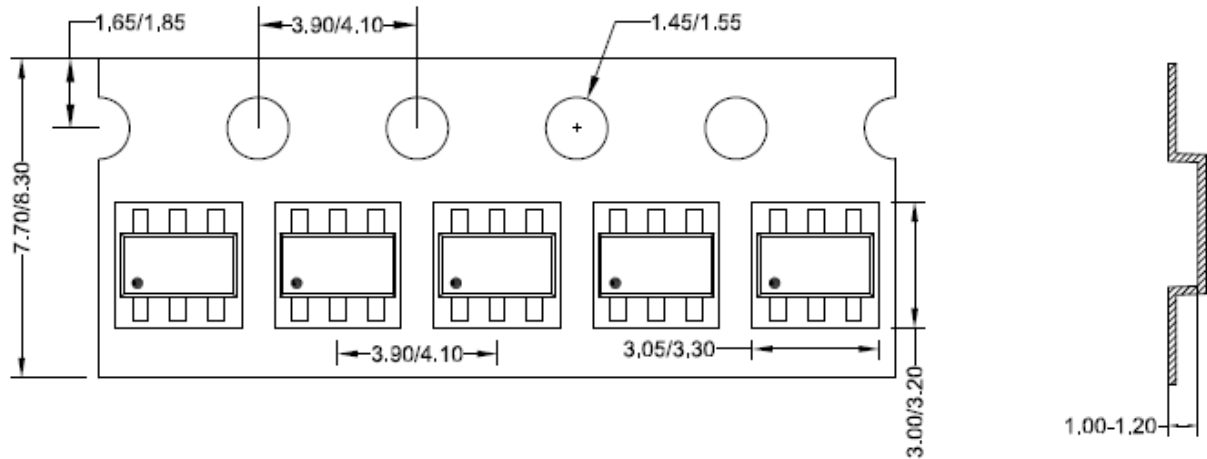
Recommended Pad Layout

Notes: All dimension in millimeter and exclude mold flash & metal burr.

Taping & Reel Specification

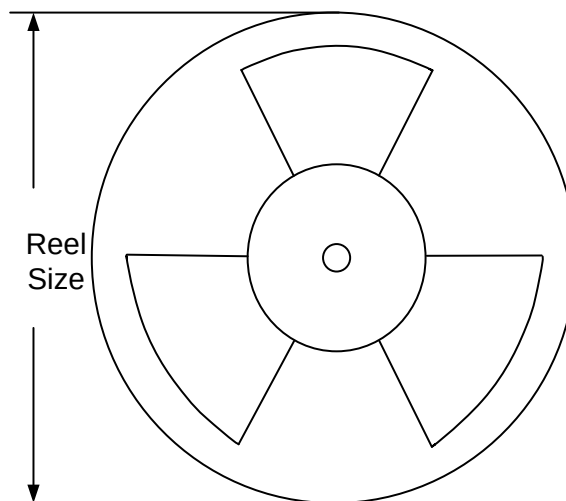
1. Taping orientation

TSOT23-6



Feeding direction →

2. Carrier Tape & Reel specification for packages



Package types	Tape width (mm)	Pocket pitch(mm)	Reel size (Inch)	Trailer length(mm)	Leader length (mm)	Qty per reel
TSOT23-6	8	4	7"	400	160	3000

3. Others: NA