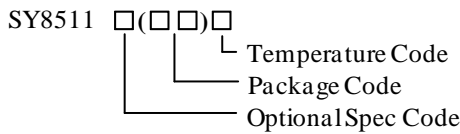


High Efficiency, 200kHz, 100V Input, 0.6A Asynchronous Step Down Regulator

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



| 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

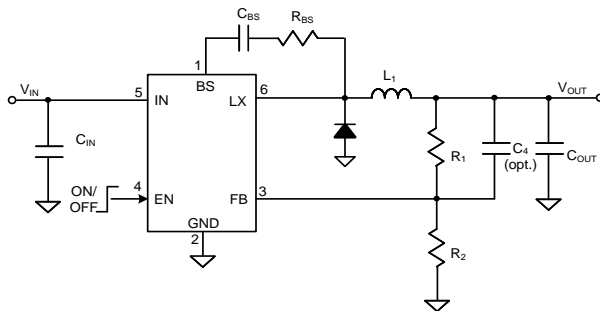


Figure1. Schematic Diagram

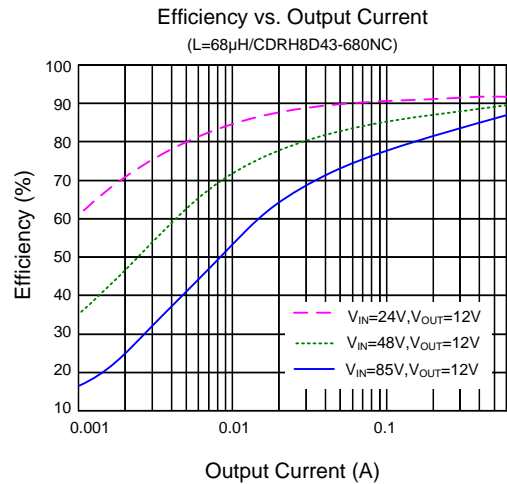
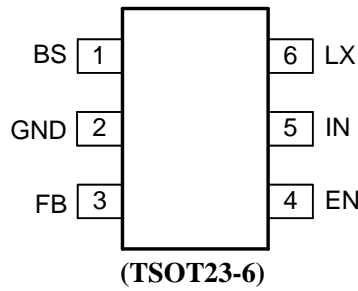


Figure2. Efficiency vs. Output Current

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

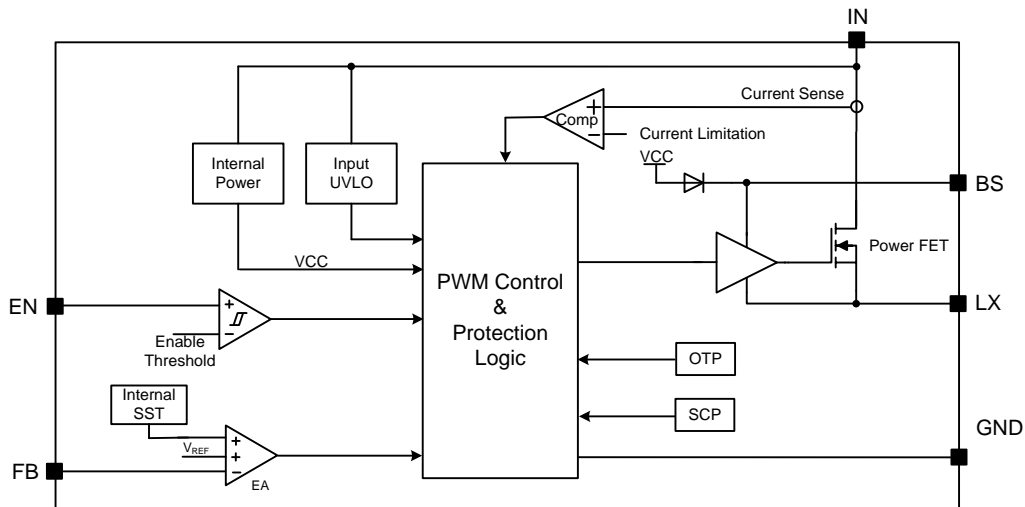


Figure3. Block Diagram

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.)

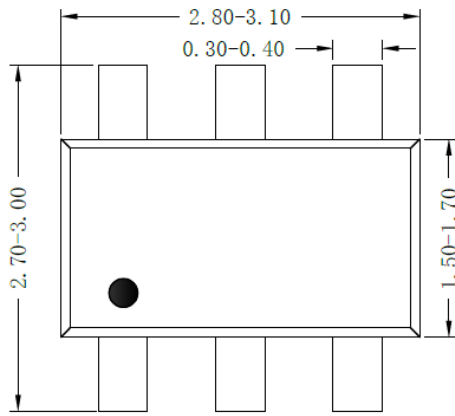
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|------------------------------|-----------------|--|-------|-----|-------|------------|
| Input Voltage Range | V_{IN} | | 4.5 | | 100 | V |
| Quiescent Current | I_Q | $I_{OUT}=0$, $V_{FB}=V_{REF}\times 105\%$ | | 100 | | μA |
| Shutdown 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.

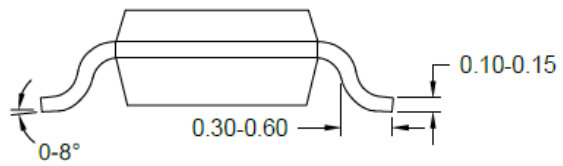
Note 2: θ_{JA} is measured in the natural convection at $T_A = 25^\circ C$ on a two-layer Silergy Evaluation Board.

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

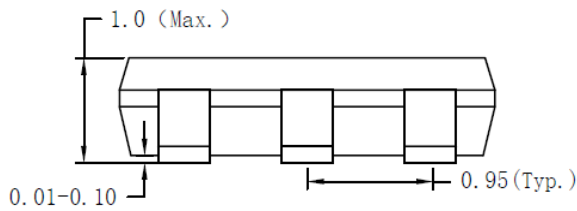
TSOT23-6 Package Outline & PCB Layout



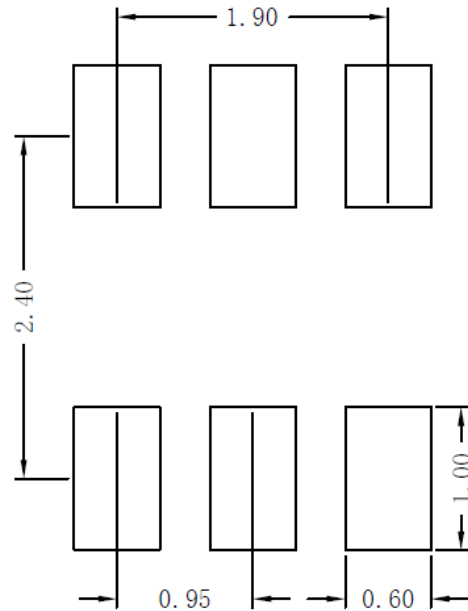
Top view



Side view



Front view



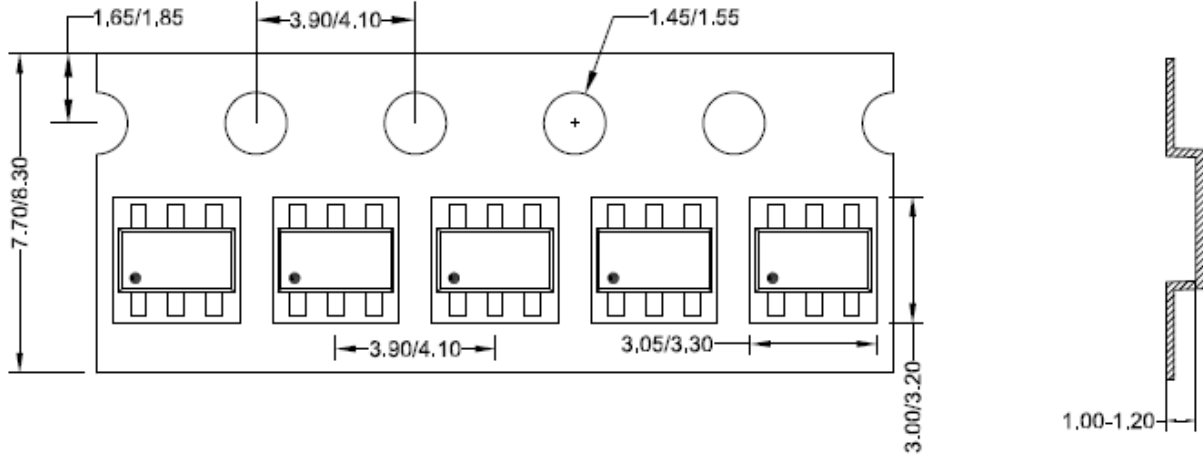
Recommended Pad Layout

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

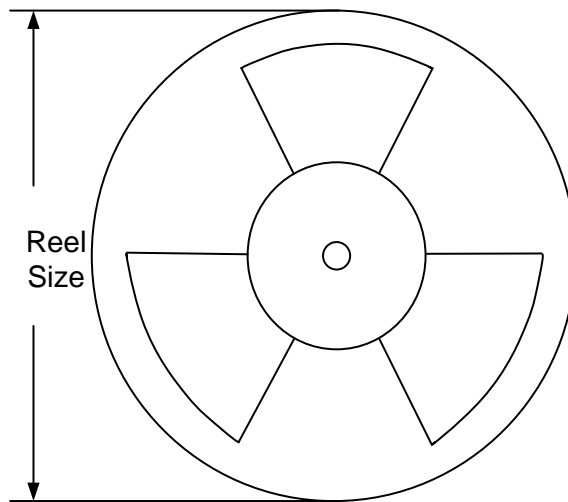
Taping & Reel Specification

1. Taping orientation

TSOT23-6



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