



# SY8201

## High Efficiency Fast Response, 1A, 27V Input Synchronous Step Down Regulator *Preliminary Specification*

### General Description

SY8201 develops high efficiency synchronous step-down DC-DC converter capable of delivering 1A . SY8201 operates over a wide input voltage range from 4.5V to 27V and integrate main switch and synchronous switch with very low  $R_{DS(ON)}$  to minimize the conduction loss.

SY8201 adopts the instant PWM architecture to achieve fast transient responses for high step down applications and high efficiency at light loads. In addition, it operates at pseudo-constant frequency of 500 kHz under heavy load conditions to minimize the size of inductor and capacitor.

### Ordering Information

SY8201□(□□)□  
 □ Temperature Code  
 □ Package Code  
 □ Optional Spec Code

Temperature Range: -40°C to 85°C

| Ordering Number | Package type | Note |
|-----------------|--------------|------|
| SY8201ABC       | SOT23-6      | --   |

### Features

- Low  $R_{DS(ON)}$  for internal switches (top/bottom):350/150 mΩ
- 4.5-27V input voltage range
- Instant PWM architecture to achieve fast transient responses Internal softstart limits the inrush current
- 2% 0.6V reference
- RoHS Compliant and Halogen Free
- Compact package: SOT23-6

### Applications

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

### Typical Applications

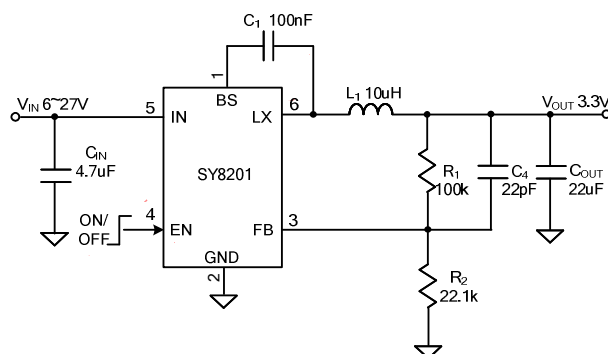


Figure 1. Schematic Diagram

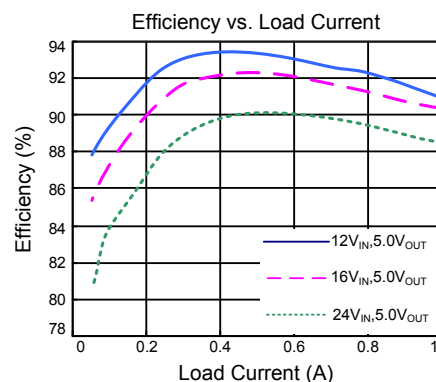
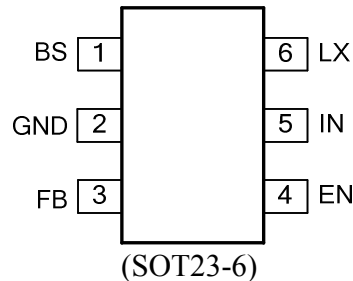


Figure 2. Efficiency vs Load Current

## Pinout (top view)



Top Mark: ENxyz, (Device code: EN, 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<br>$V_{out}=0.6*(1+R1/R2)$ |
| 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                                   | 30V             |
| LX, EN Voltage                                         | $V_{IN} + 0.3V$ |
| FB, BS-LX Voltage                                      | 4V              |
| Power Dissipation, $P_D$ @ $T_A = 25^\circ C$ SOT23-6, | 0.6W            |
| Package Thermal Resistance (Note 2)                    |                 |
| $\theta_{JA}$                                          | 250°C/W         |
| $\theta_{JC}$                                          | 130°C/W         |
| Junction Temperature Range                             | 150°C           |
| Lead Temperature (Soldering, 10 sec.)                  | 260°C           |
| Storage Temperature Range                              | -65°C to 150°C  |
| Dynamic LX voltage in 50ns duration                    | IN+3V to GND-4V |

## Recommended Operating Conditions (Note 3)

|                            |                |
|----------------------------|----------------|
| Supply Input Voltage       | 4.5V to 27V    |
| Junction Temperature Range | -40°C to 125°C |
| Ambient Temperature Range  | -40°C to 85°C  |

## Electrical Characteristics

( $V_{IN} = 12V$ ,  $V_{OUT} = 1.2V$ ,  $L = 2.2\mu H$ ,  $C_{OUT} = 10\mu F$ ,  $T_A = 25^\circ C$ ,  $I_{OUT} = 1A$  unless otherwise specified)

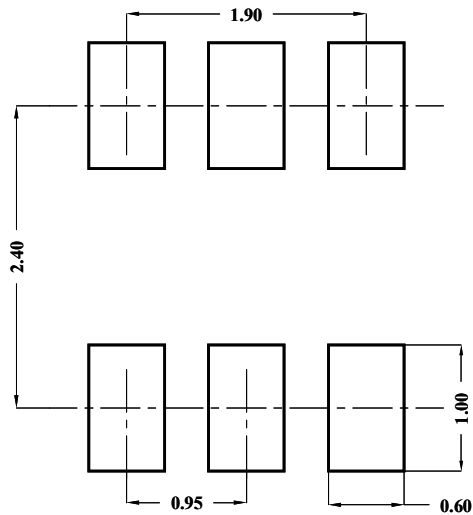
| Parameter                       | Symbol        | Test Conditions                                  | Min   | Typ  | Max   | Unit       |
|---------------------------------|---------------|--------------------------------------------------|-------|------|-------|------------|
| Input Voltage Range             | $V_{IN}$      |                                                  | 4.5   |      | 27    | V          |
| Quiescent Current               | $I_Q$         | $I_{OUT}=0$ , $V_{FB}=V_{REF}\times 105\%$       |       | 400  |       | $\mu A$    |
| Shutdown Current                | $I_{SHDN}$    | EN=0                                             |       | 5    | 10    | $\mu A$    |
| Feedback Reference Voltage      | $V_{REF}$     |                                                  | 0.588 | 0.6  | 0.612 |            |
| FB Input Current                | $I_{FB}$      | $V_{FB}=V_{IN}$                                  | -50   |      | 50    | nA         |
| Top FET RON                     | $R_{DS(ON)1}$ |                                                  |       | 0.35 |       | $\Omega$   |
| Bottom FET RON                  | $R_{DS(ON)2}$ |                                                  |       | 0.15 |       | $\Omega$   |
| Bottom FET Valley Current Limit | $I_{LIM}$     |                                                  | 1.5   |      |       | 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                 | $V_{HYS}$     |                                                  |       | 0.4  |       | V          |
| On Time                         | $T_{ON}$      | $V_{IN} = 12V$ , $V_{OUT}=1.2V$ , $I_{OUT} = 1A$ |       | 200  |       | ns         |
| Min ON Time                     |               |                                                  |       | 50   |       | ns         |
| Min Off Time                    |               |                                                  |       | 100  |       | ns         |
| Thermal Shutdown Temperature    | $T_{SD}$      |                                                  |       | 150  |       | $^\circ C$ |
| Thermal Shutdown Hysteresis     | $T_{HYS}$     |                                                  |       | 15   |       | $^\circ C$ |

**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.

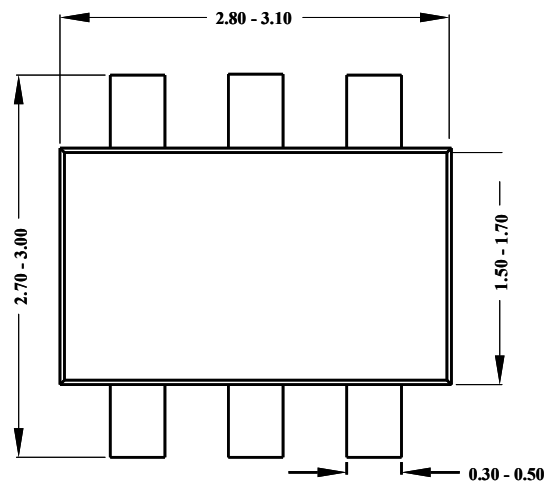
**Note 2:**  $\theta_{JA}$  is measured in the natural convection at  $T_A = 25^\circ C$  on a low effective single layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard. Pin 2 of SOT23-6 packages is the case position for  $\theta_{JC}$  measurement. Test condition: Device 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.

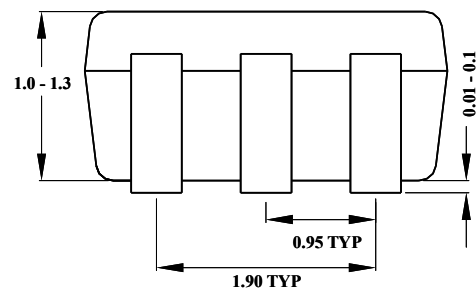
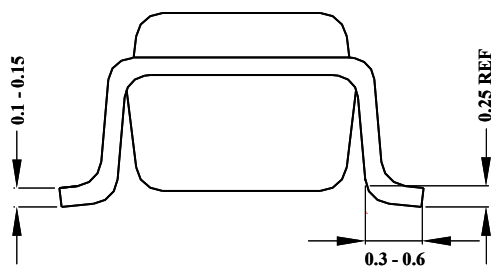
## SOT23-6 Package Outline & PCB layout



**Recommended Pad Layout**



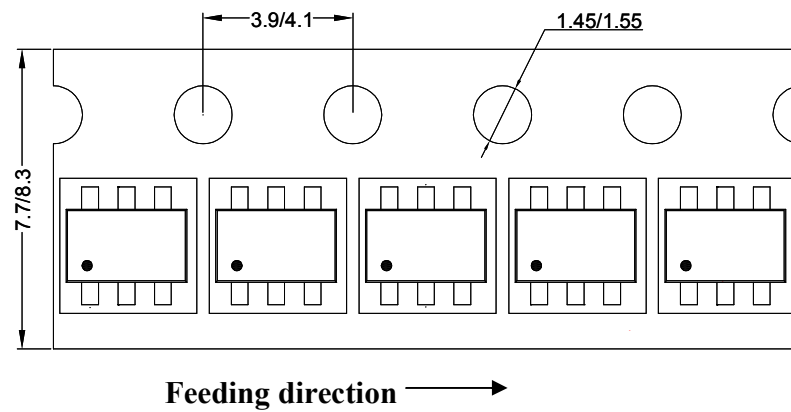
**Top View**



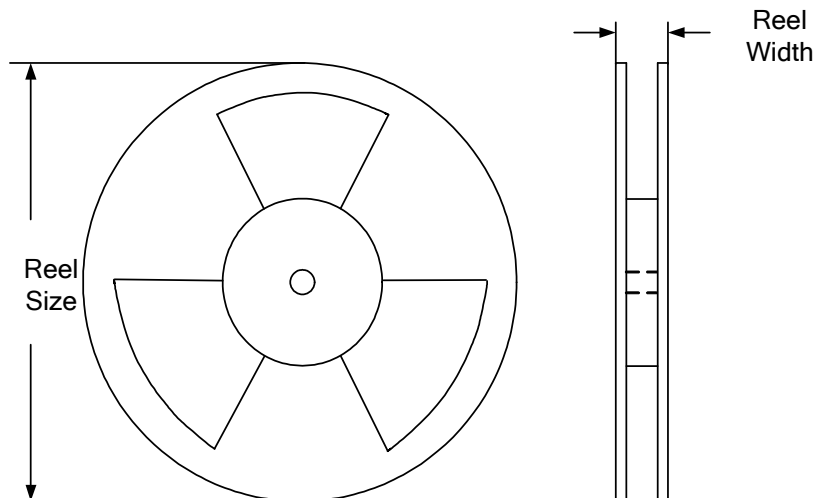
**Notes:** All dimension in MM  
All dimension do not include mold flash & metal burr

## Taping & Reel Specification

### 1. SOT23-6 taping orientation



### 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