

## High Efficiency, 300kHz, 36V Input, 1.2A Asynchronous Step Down Regulator

### General Description

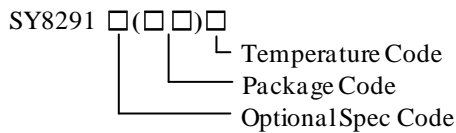
The SY8291F is a high efficiency 300kHz, adaptive constant OFF time controlled asynchronous step-down DC/DC regulator capable of delivering 1.2A output current respectively. The SY8291F can operate over a wide input voltage range from 9V to 36V and integrates the main switch with very low  $R_{DS(ON)}$  to minimize the conduction loss.

Low output voltage ripple and small external inductor and capacitor sizes are achieved with 300kHz switching frequency.

### Features

- 9-36V Input Voltage Range
- Low  $R_{DS(ON)}$  for Internal N-channel Power FET: 180 m $\Omega$
- 300kHz Switching Frequency
- Adaptive Constant OFF Time Control
- Internal Soft-start Limits the Inrush Current
- 2% 0.81V Reference
- RoHS Compliant and Halogen Free
- Compact Package: SOT23-6

### Ordering Information



| Ordering Number | Package type | Note |
|-----------------|--------------|------|
| SY8291FABC      | SOT23-6      | --   |

### Applications

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

### Typical Applications

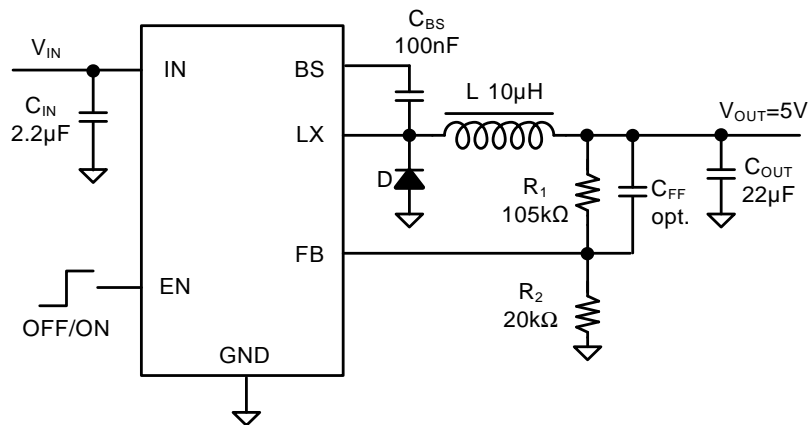
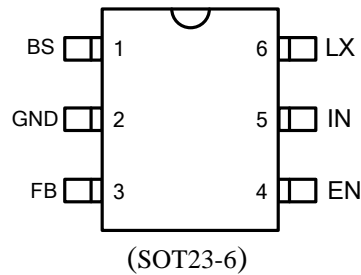


Figure1. Schematic Diagram

## Pinout (top view)



Top Mark: qRxyz (Device code: qR, 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 the LX pin with a 0.1μF ceramic capacitor.   |
| 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:<br>$V_{OUT}=0.81 \times (1+R_1/R_2)$ |
| EN       | 4          | Enable control. Pull high or leave this pin floating to turn on the IC, pull low to turn off the IC.  |
| IN       | 5          | Input pin. Decouple this pin to the GND pin with at least a 2.2μF ceramic capacitor.  |
| LX       | 6          | Inductor pin. Connect this pin to the switching node of the inductor.   |

## Absolute Maximum Ratings (Note 1)

|   |                          |
|---|--------------------------|
| Supply Input Voltage                                    | -0.3V to 40V             |
| EN Voltage  | -0.3V to $V_{IN}+0.6V$   |
| FB, BS-LX Voltage                                       | -0.3V to 3.6V            |
| LX Voltage  | -0.7V to $V_{IN} + 0.6V$ |
| Power Dissipation, $P_D$ @ $T_A = 25^\circ C$ , SOT23-6 | 0.6W                     |
| Package Thermal Resistance (Note 2)                     |                          |
| $\theta_{JA}$   | 170°C/W                  |
| $\theta_{JC}$   | 130°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 20ns Duration                     | $IN+3V$ to $GND-5V$      |

## Recommended Operating Conditions (Note 3)

|                            |                |
|----------------------------|----------------|
| Supply Input Voltage       | 9V to 36V      |
| Junction Temperature Range | -40°C to 125°C |

## Electrical Characteristics

( $V_{IN} = 12V$ ,  $V_{OUT} = 5V$ ,  $L = 10\mu H$ ,  $C_{OUT} = 22\mu F$ ,  $T_A = 25^\circ C$ ,  $I_{OUT} = 0.5A$  unless otherwise specified)

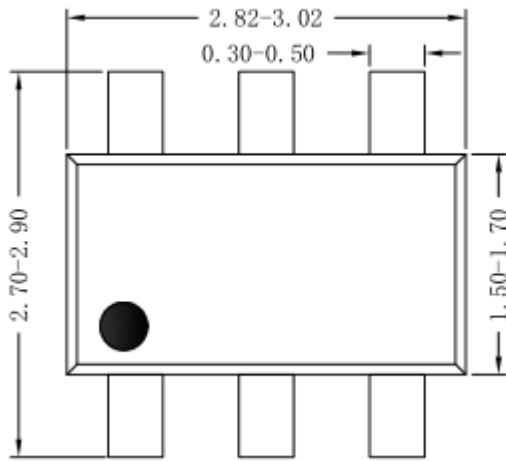
| Parameter                            | Symbol          | Test Conditions                                 | Min   | Typ  | Max   | Unit       |
|--------------------------------------|-----------------|---|-------|------|-------|------------|
| Input Voltage Range                  | $V_{IN}$        |   | 9     |      | 36    | V          |
| Input UVLO Threshold                 | $V_{UVLO}$      | Rising  | 7.5   | 8    | 8.5   | V          |
| Input UVLO Threshold                 |                 | Falling   | 5.5   | 6    | 6.5   | V          |
| Input UVLO Hysteresis                | $V_{UVLO\_HYS}$ |   |       | 2    |       | V          |
| Quiescent Current                    | $I_Q$           | $I_{OUT} = 0$ , $V_{FB} = V_{REF} \times 105\%$ |       | 160  |       | $\mu A$    |
| Shutdown Current                     | $I_{SHDN}$      | EN=0  |       |      | 10    | $\mu A$    |
| Feedback Reference Voltage           | $V_{REF}$       |   | 0.794 | 0.81 | 0.826 | V          |
| FB Input Current                     | $I_{FB}$        | $V_{FB} = 3V$                                   | -50   |      | 50    | nA         |
| Power FET RON                        | $R_{DS(ON)1}$   |   |       | 180  |       | m $\Omega$ |
| Power FET Current Limit              | $I_{LIM}$       | $V_{FB} = V_{REF} \times 98\%$                  | 1.5   |      | 2.2   | A          |
| EN Rising Threshold                  | $V_{ENH}$       |   | 1.5   |      |       | V          |
| EN Falling Threshold                 | $V_{ENL}$       |   |       |      | 0.4   | V          |
| Minimum OFF Time                     | $t_{OFF}$       |   |       |      | 100   | ns         |
| Minimum ON Time                      | $t_{OFF}$       |   |       |      | 100   | ns         |
| Soft-start Time                      | $t_{SS}$        |   |       | 650  |       | $\mu s$    |
| Oscillator Frequency                 | $f_{OSC}$       |   | 240   | 300  | 360   | kHz        |
| Thermal Shutdown Temperature         | $T_{SD}$        |   |       | 150  |       | $^\circ C$ |
| Thermal Shutdown Recovery Hysteresis | $T_{HYS}$       |   |       | 50   |       | $^\circ C$ |

**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.

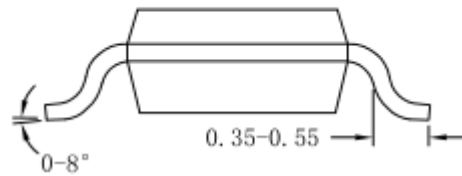
**Note 2:**  $\theta_{JA}$  is measured in the natural convection at  $T_A = 25^\circ C$  on a low effective single layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard.

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

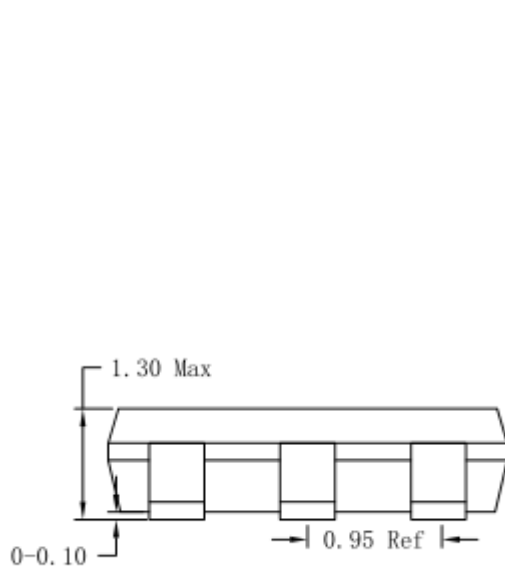
**SOT23-6 Package Outline & PCB Layout Design**



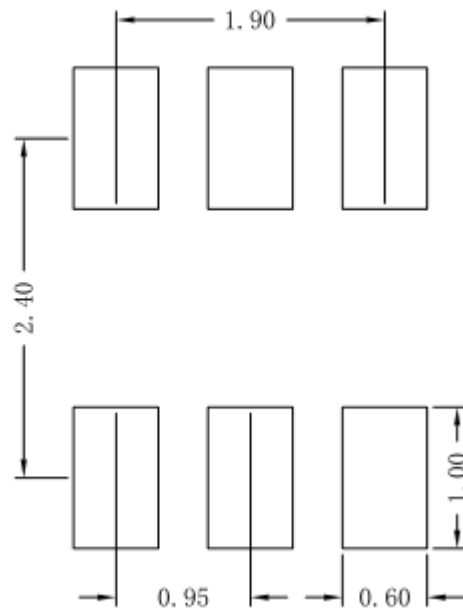
**Top View**



**Side View**



**Side View**

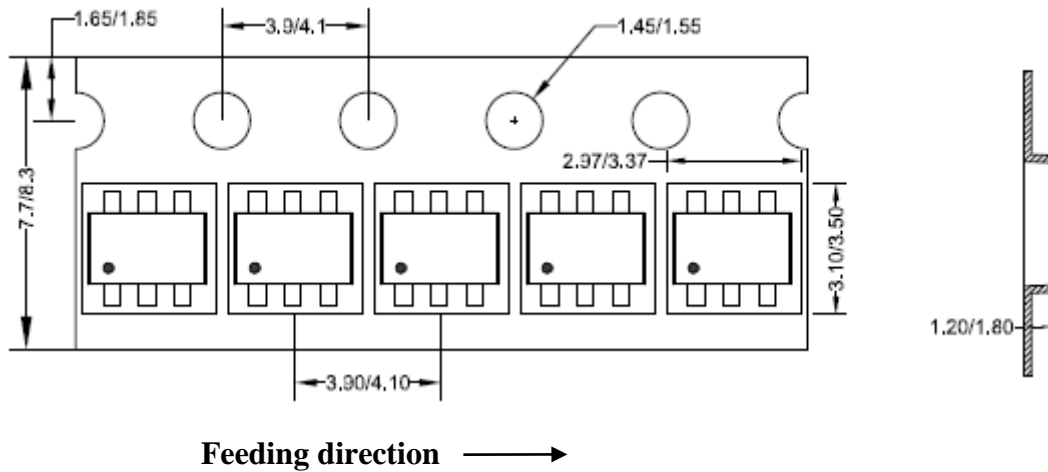


**Recommended Pad Layout**

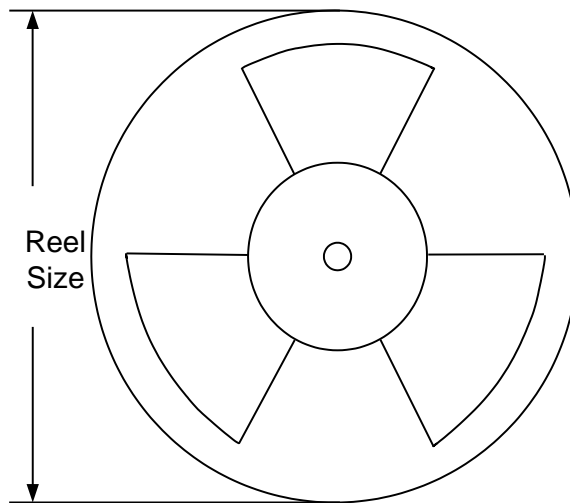
**Notes: All dimension in millimeter and exclude mold flash & metal burr.**

**Taping & Reel Specification**

**1. Taping orientation for package**



**2. Carrier Tape & Reel specification for packages**



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

**3. Others: NA**

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