



**High Efficiency 1.5MHz, 1.2A  
Synchronous Step Down LED Driver  
Preliminary Spec**

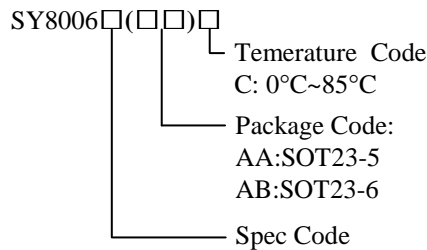
**General Description**

The SY8006 is a high-efficiency 1.5MHz synchronous step-down LED driver capable of delivering 1.2A output current. SY8006 operates over a wide input voltage range from 2.5V to 5.5V and integrate main switch and synchronous switch with very low  $R_{DS(ON)}$  to minimize the conduction loss. It also features a 100mV feedback voltage for high efficiency operation.

**Features**

- low  $R_{ds(on)}$  for internal switches (top/bottom): 200m $\Omega$ /150 m $\Omega$
- 2.5-5.5V input voltage range
- 1.5MHz switching frequency
- Internal softstart limits the inrush current
- 5% 100mV reference
- 100% dropout operation
- SY8006P: LED current OK indicator output
- Compact package: SOT23-5 (SY8006), SOT23-6 (SY8006P)

**Ordering Information**



**Applications**

- Security System
- Camcorder
- Digital Camera
- Emergency lighting
- Portable Lamp

**Typical Applications**

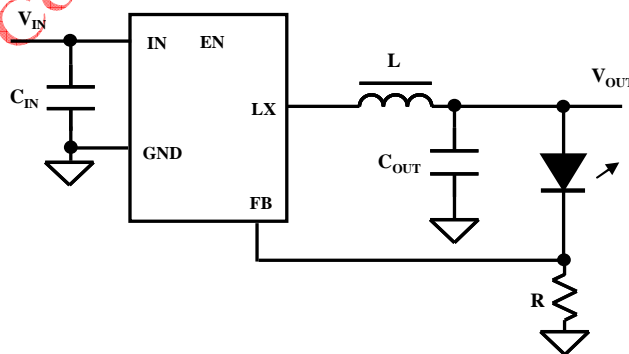
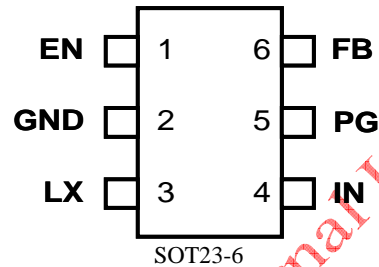
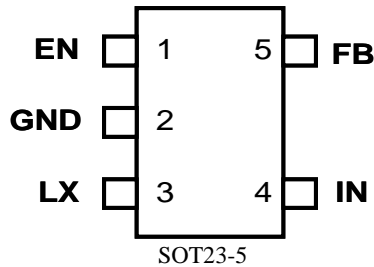


Figure 1

### Pinout (top view)



### Pin Description

| Pin Name | SY8006 SOT23-5 | SY8006P SOT23-6 | Pin Description   |
|----------|----------------|-----------------|---|
| EN       | 1              | 1               | Enable control. Pull high to turn on. Do not float.   |
| GND      | 2              | 2               | Ground pin  |
| LX       | 3              | 3               | Inductor pin. Connect this pin to the switching node of inductor  |
| IN       | 4              | 4               | Input pin. Decouple this pin to GND pin with at least 1uF ceramic cap   |
| FB       | 5              | 6               | Output Feedback Pin. Connect this pin to the cathode of the LED and insert the current sense resistor R2 from this point to ground. $I_{LED}=0.1V/R2$ |
| PG       | N/A            | 5               | LED Current OK Indicator. If LED current is below 90% of regulation level, PG is low; open drain otherwise.   |

### Absolute Maximum Ratings (Note 1)

|  |                 |
|--|-----------------|
| Supply Input Voltage                                     | 6V              |
| All Other Pins   | $V_{IN} + 0.6V$ |
| Power Dissipation, $P_D$ @ $T_A = 25^\circ C$ SOT-23-5/6 | 0.4W            |
| Package Thermal Resistance (Note 2)                      |                 |
| SOT-23, $\theta_{JA}$                                    | 250°C/W         |
| SOT-23, $\theta_{JC}$                                    | 130°C/W         |
| Junction Temperature Range                               | 150°C           |
| Lead Temperature (Soldering, 10 sec.)                    | 260°C           |
| Storage Temperature Range                                | -65°C to 150°C  |
| ESD Susceptibility (Note 2)                              |                 |
| HBM (Human Body Mode)                                    | 2kV             |
| MM (Machine Mode)  | 200V            |

### Recommended Operating Conditions (Note 3)

|                            |                |
|----------------------------|----------------|
| IN pins                    | 2.5V to 5.5V   |
| LX pin                     | 2.5V to 6V     |
| FB, EN pin                 | 0 to 5.5V      |
| Junction Temperature Range | -40°C to 125°C |
| Ambient Temperature Range  | -40°C to 85°C  |

**Electrical Characteristics**

( $V_{IN} = 3.6V$ ,  $I_{LED} = 0.3A$ ,  $R_{LED} = 60\Omega$ ,  $L = 2.2\mu H$ ,  $C_{OUT} = 10\mu F$ ,  $T_A = 25^\circ C$ ,  $I_{MAX} = 1A$  unless otherwise specified)

| Parameter                    | Symbol                | Test Conditions  | Min  | Typ  | Max  | Unit |
|------------------------------|-----------------------|--|------|------|------|------|
| Input Voltage Range          | VIN                   |  | 2.5  |      | 5.5  | V    |
| Quiescent Current            | I <sub>Q</sub>        | I <sub>OUT</sub> =0, V <sub>FB</sub> =V <sub>REF</sub> +5% |      | 100  | 200  | μA   |
| Shutdown Current             | I <sub>SHDN</sub>     | EN=0   |      | 0.1  | 1    | μA   |
| Feedback Reference Voltage   | V <sub>REF</sub>      |  | 0.09 | 0.1  | 0.11 | V    |
| FB Input Current             | I <sub>FB</sub>       | V <sub>FB</sub> =V <sub>IN</sub>                           | -50  |      | 50   | nA   |
| PFET RON                     | R <sub>DS(ON),P</sub> |  |      | 0.2  |      | Ω    |
| NFET RON                     | R <sub>DS(ON),N</sub> |  |      | 0.15 |      | Ω    |
| PFET Current Limit           | I <sub>SW</sub>       |  | 2.4  |      |      | A    |
| EN rising threshold          | V <sub>ENH</sub>      |  | 1.5  |      |      | V    |
| EN falling threshold         | V <sub>ENL</sub>      |  |      |      | 0.4  | V    |
| Input UVLO threshold         | V <sub>UVLO</sub>     |  |      |      | 2.4  | V    |
| UVLO hysteresis              | V <sub>HYS</sub>      |  |      | 0.1  |      | V    |
| Oscillator Frequency         | F <sub>OSC</sub>      | I <sub>OUT</sub> =100mA                                    |      | 1.5  |      | MHz  |
| Min ON Time                  |                       |  |      | 50   |      | ns   |
| Max Duty Cycle               |                       |  | 100  |      |      | %    |
| Thermal Shutdown Temperature | T <sub>SD</sub>       |  |      | 150  |      | °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 SSOT23-6 package is the case position for  $\theta_{JC}$  measurement.

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

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