



# SY8133

## High Efficiency 400KHz, 3A, 16V Input Synchronous Step Down Regulator *Preliminary SPECIFICATION*

### General Description

The SY8133 is a high efficiency 400 KHz synchronous step-down DC-DC converters capable of delivering 3A output current. SY8133 operates over a wide input voltage range from 4V to 15V and integrate main switch and synchronous switch with very low Rds(on) to minimize the conduction loss.

Low output voltage ripple and small external inductor and capacitor sizes are achieved with 400KHz switching frequency.

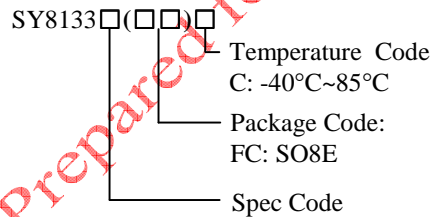
### Applications

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

### Features

- low Rds(on) for internal switches (top/bottom) 120/80 mΩ,
- 4-15V input voltage range
- 400KHz switching frequency
- Internal softstart limits the inrush current
- 2% 0.6V reference
- RoHS Compliant and Halogen Free
- Compact package: SO8 with exposed paddle

### Ordering Information



### Typical Applications

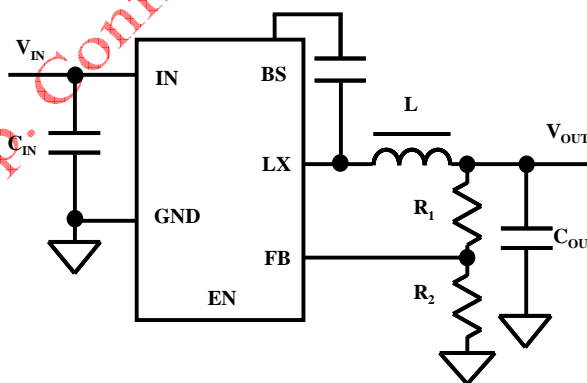
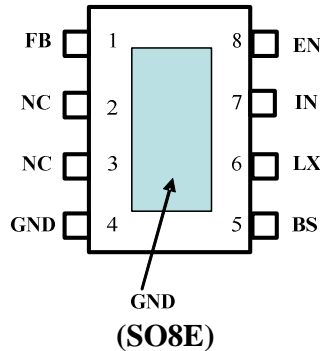


Figure 1

**Pinout** (top view)


**Top Mark:** AAWxyz (device code: AAW, x=year code, y=week code, z=lot number code)

| Pin Name | Pin Number | Pin Description  |
|----------|------------|--|
| BS       | 5          | Boot-Strap Pin. Supply high side gate driver. Decouple this pin to LX pin with 0.1uF ceramic cap.  |
| IN       | 7          | 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   |
| GND      | 4          | Ground pin   |
| FB       | 1          | 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: $V_{out}=0.6*(1+R1/R2)$ |
| EN       | 8          | Enable control. Pull high to turn on. Do not float.  |
| NC       | 2,3        | No connection.   |

**Absolute Maximum Ratings** (Note 1)

|  |       |                                |
|--|-------|--------------------------------|
| Supply Input Voltage                               | ----- | 16V                            |
| Enable, FB Voltage                                 | ----- | $V_{IN} + 0.6V$                |
| Power Dissipation, $P_D$ @ $T_A = 25^\circ C$ SO8E | ----- | 1.2W                           |
| Package Thermal Resistance (Note 2)                |       |                                |
| $\theta_{JA}$                                      | ----- | $50^\circ C/W$                 |
| $\theta_{JC}$                                      | ----- | $10^\circ C/W$                 |
| Junction Temperature Range                         | ----- | $150^\circ C$                  |
| Lead Temperature (Soldering, 10 sec.)              | ----- | $260^\circ C$                  |
| Storage Temperature Range                          | ----- | $-65^\circ C$ to $150^\circ C$ |
| ESD Susceptibility (Note 2)                        |       |                                |
| HBM (Human Body Mode)                              | ----- | 2kV                            |
| MM (Machine Mode)                                  | ----- | 200V                           |

**Recommended Operating Conditions** (Note 3)

|                            |       |                                |
|----------------------------|-------|--------------------------------|
| Supply Input Voltage       | ----- | 4V to 15V                      |
| Junction Temperature Range | ----- | $-40^\circ C$ to $125^\circ C$ |
| Ambient Temperature Range  | ----- | $-40^\circ C$ to $85^\circ C$  |



## Electrical Characteristics

(VIN = 12V, VOUT = 2.5V, L = 2.2uH, COUT = 10uF, TA = 25°C, IOU = 1A unless otherwise specified)

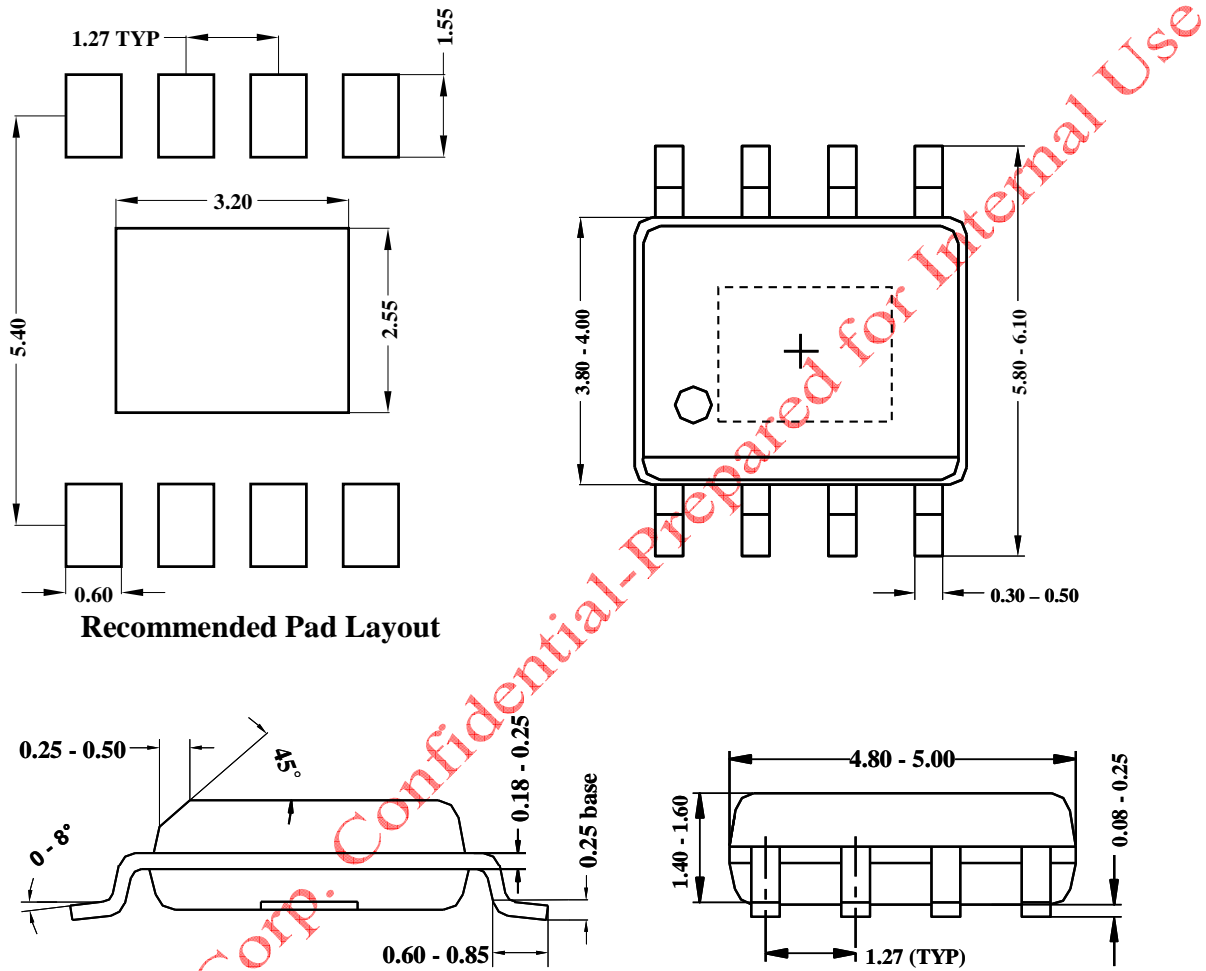
| Parameter                    | Symbol   | Test Conditions    | Min   | Typ  | Max   | Unit |
|------------------------------|----------|--------------------|-------|------|-------|------|
| Input Voltage Range          | VIN      |                    | 4     |      | 15    | V    |
| Quiescent Current            | IQ       | IOU=0, VFB=VREF+5% |       | 200  |       | μA   |
| Shutdown Current             | ISHDN    | EN=0               |       | 1    | 5     | μA   |
| Feedback Reference Voltage   | VREF     |                    | 0.588 | 0.6  | 0.612 | V    |
| FB Input Current             | IFB      | VFB=VIN            | -50   |      | 50    | nA   |
| Top FET RON                  | RDS(ON)1 |                    |       | 0.12 |       | Ω    |
| Bottom FET RON               | RDS(ON)2 |                    |       | 0.08 |       | Ω    |
| Top FET Current Limit        | ILIM     |                    | 4     |      |       | A    |
| EN rising threshold          | VENH     |                    | 1.5   |      |       | V    |
| EN falling threshold         | VENL     |                    |       |      | 0.4   | V    |
| Input UVLO threshold         | VUVLO    |                    |       |      | 3.9   | V    |
| UVLO hysteresis              | VHYS     |                    |       | 0.3  |       | V    |
| Oscillator Frequency         | Fosc     | IOU=200mA          |       | 0.4  |       | MHz  |
| Min ON Time                  |          |                    |       | 50   |       | ns   |
| Max Duty Cycle               |          |                    | 90    |      |       | %    |
| Thermal Shutdown Temperature | TSD      |                    |       | 160  |       | °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 TA = 25°C on a low effective single layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard. Paddle of SO8E packages is the case position for  $\theta_{JC}$  measurement.

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

**SO8E Package outline & PCB layout design**



**Notes: All dimensions are in millimeters.**  
**All dimensions don't include mold flash & metal burr**