SSC2215GSB

3W High Power White LED Driver

- **Features**

VIN	VFB	Frequency	Efficiency
0.9~6V	95mV	1MHz	90%

  - LED current tolerance 5%;
  - Low Start-Up Voltage at 0.9V;
  - Low Threshold Voltage at 0.75V;
  - Over Temperature Protection;
  - Over Voltage Protection.

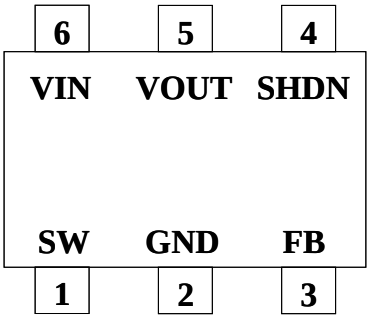
- **General Description**

The SSC2215 is a set-up DC-DC converter that delivers a regulated output current. The SSC2215 is designed for the use of driving loads up to 1A from a two-cell alkaline battery. The LED current can be programmed by the external current sense resistor(Rs). The device can provide high efficiency even at heavy load for the internal NMOS and low power dissipation during the shutdown mode. The SSC2215 is available in SOT-23-6L.

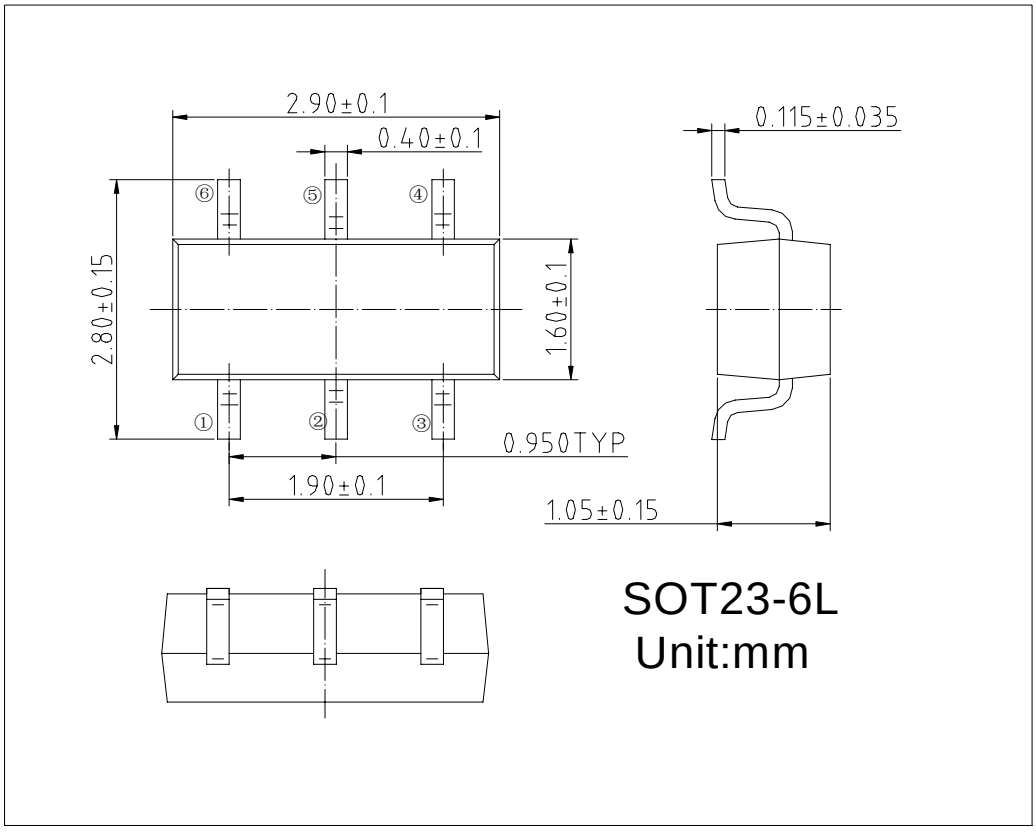
- **Applications**
  - WLED driver
  - Constant Current Source

- **Pin configuration**

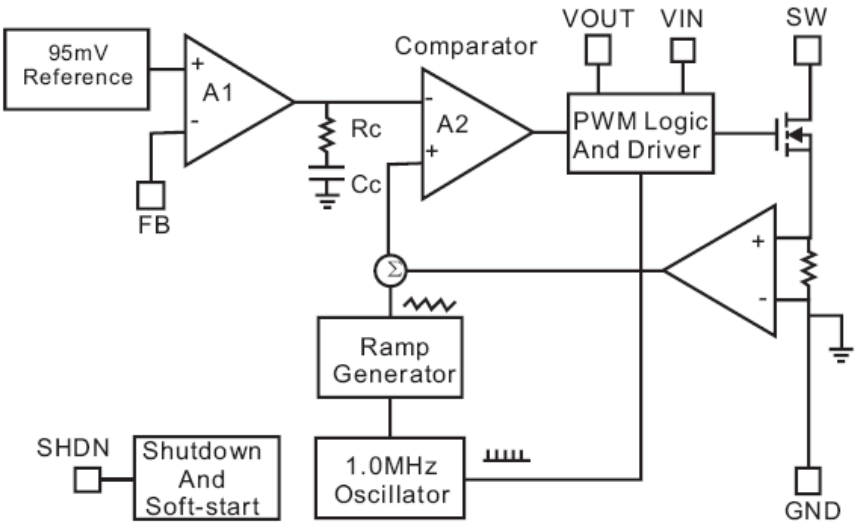
Top View



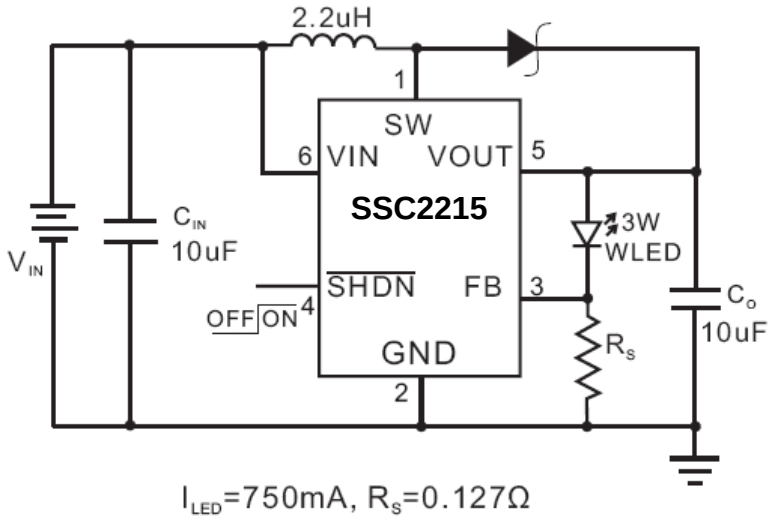
- **Package Information**



- **Functional Block Diagram**



- **Typical Application Circuit**



I_{LED}=750mA, R_S=0.127Ω

- **Absolute Maximum Ratings** @T_A = 25°C unless otherwise noted

Parameter	Symbol	Ratings	Unit
IN Voltage	V_{IN}	-0.3~6	V
SW Voltage	V_{OUT}	-0.3~6	V
Shut-down and Feed-back Voltage	SHDN/FB	-0.3~6	V
Continuous Power Dissipation	P_D	650	mW
Operating Junction Temperature	T_{OPR}	-40 to +85	℃
Storage Temperature Range	T_{STG}	-65 to +150	℃

- **Electrical Characteristics**

T =25℃ , V =2.4V, I_{LED}=750mA, V_{SHDN} = V_{IN} , L=2.2uH, C =10uF, C_O =10uF, unless otherwise noted.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Voltage	V_{IN}		0.9	--	V_F-0.2 (note 1)	V
Feedback Voltage	V_{FB}		90	95	100	mV
Start-up Voltage	V_{START}	V_{IN}=0→3V, I_{LED}=270mA	--	0.9	--	V
Hold Voltage	V_{HOLD}	V_{IN}=3→0V, I_{LED} 750→200mA	--	2	5	mA
Oscillator Frequency	F_{OSC}		0.85	1	1.15	MHz
SHDN Input High	V_{SH}	V_{IN}=1.8V	1	--	--	V
SHDN Input Low	V_{SL}	V_{IN}=1.8V	--	--	0.4	V
Over Temperature Shutdown	OTP		--	150	--	℃
Over Temperautre Hysteresis	OTH		--	15	--	℃
Maximum Output Current Range	I_{MAX}		750	--	--	mA
Quiescent Current	I_Q	I_{LED}=0mA, V_O=3.4V, Device Switching at 1MHz	--	1	3	mA
Shutdown Current	I_{SD}	Shutdown Mode	--	--	1	uA
On Resistance	R_{DSON}	V_{OUT}=3.4V	--	100	--	mR
Crrent Limit	I_{LM}	V_{OUT}=3.4V	2	--	--	A
Efficiency	η	I_{LED}=750mA	--	90	--	%

Notes:

1. V_F - LED Forward Voltage

- **Typical Performance Characteristics**

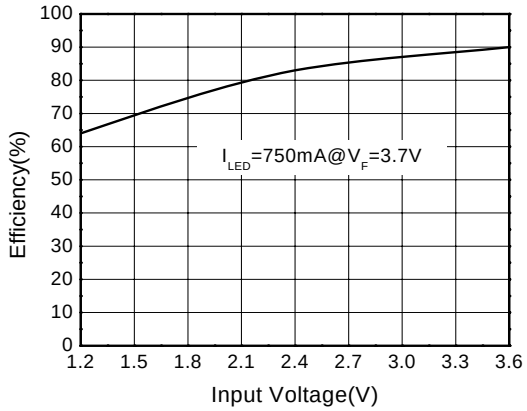


Fig1:Efficiency vs. Input Voltage

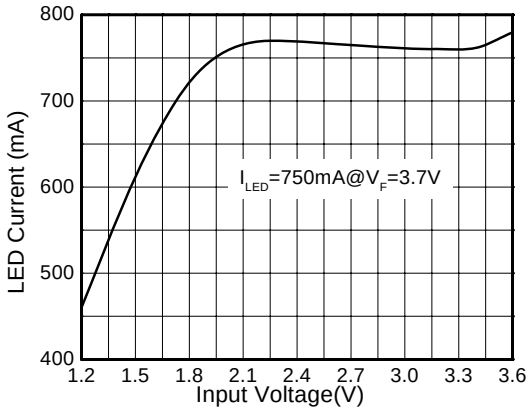


Fig2:LED Current vs. Input Voltage

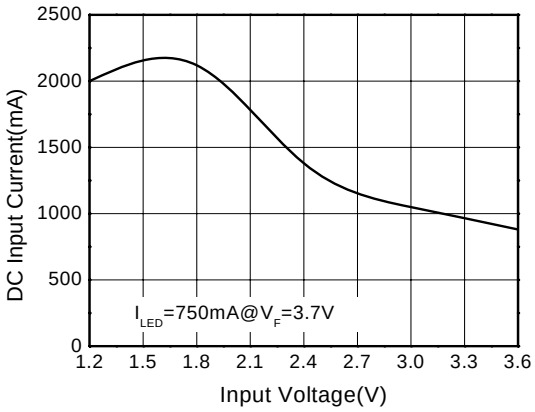


Fig3:DC Input Current vs. Input Voltage

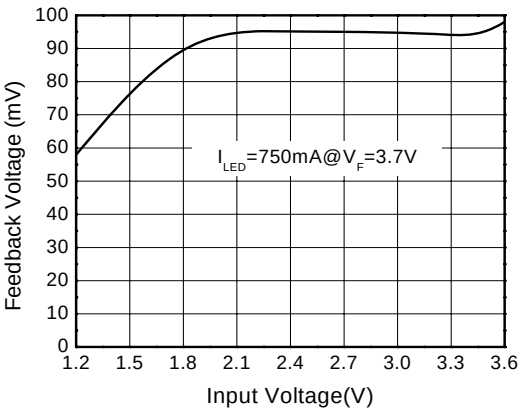


Fig4:Feedback Voltage vs. Input Voltage

Application Information

1. Inductor Selection

The SSC2215 can use small value inductors due to its switching frequency of 1 MHz. The value of inductor will focus in the range of 2.2uH to 4.7uH for most applications. In typical high current white LED applications , it is recommended to use a 4.7uH inductor. The inductor should have low DCR (DC resistance) to minimize the I^2R power loss, and it requires a current rating of 2A to handle the peak inductor current without saturating.

2. Capacitor Selection

An input capacitor is required to reduce the input ripple and noise for proper operation of the SSC2215. For good input decoupling, Low ESR (equivalent series resistance) capacitors should be used at the input. At least 2.2uF input capacitor is recommended for most applications. A minimum output capacitor value of 6.8uF is recommended undernormaloperating conditions, while a 10uF-22uF capacitor may be required for higher power LED current. A reasonable value of the output capacitor depends on the LED current. The ESR of the output capacitor is the important parameter to determine the output voltage ripple of the converter, so low ESR capacitors should be used at the output to reduce the output voltage ripple. The small size of ceramic capacitors is an excellent choice for SSC2215 applications. The X5R and X7R types are preferred because they maintain capacitance over wide voltage and temperature ranges.

3. Diode Selection

It's indispensable to use a Schottky diode rated at 2A with the SSC2215. Using a Schottky diode with a lower forward voltage drop is better to improve the power LED efficiency, and its voltage rating should be greater than the output voltage. I n a p p l i c a t i o n , t h e ON Semiconductor MBRA210LT3G is recommended.

4. LED Current Setting

The LED current is set by the single external Rs resistor connected to the FB pin as shown in the typical application circuit on page 1. The typical FB reference is internally regulated to 95mV. The LED current is 95mV/Rs. It's recommended to use a 1% or better precision resistor for the better LED current accuracy. The for
mula and table 1 for Rs selection are shown as follows:

$$Rs=95mV/I_{LED}$$

Table 1. Rs Resistor Value Selection

Standard Value(R)	I_{LED}(mA)
0.18	528
0.15	633
0.12	792
0.10	950

5. PCB Layout Guidelines

As for all switching power supplies, the layout and components placement of the SSC2215 is an important step in the design; especially at high peak currents and high switching frequencies. The input capacitor and output capacitor should be placed respectively as close as possible to the input pin and output pin of the IC; the inductor and schottky diode should be placed as close as possible to the switch pin by using wide and short traces for the main current path; the current sense resistor should be placed as close as possible between the ground pin and feedback pin.

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