

## WS3620 Single Channel LED Constant Current Driver

### Features

- Output current adjustable
- Inter-chip output current deviation  $< \pm 4\%$
- Over temperature protection
- Sharing PCB board with LED lamps
- Excellence EMI performance
- Simple circuit and low cost

### Applications

- T5/T8 LED tubers
- LED street lighting
- LED bulb lamp, LED ceiling lamp

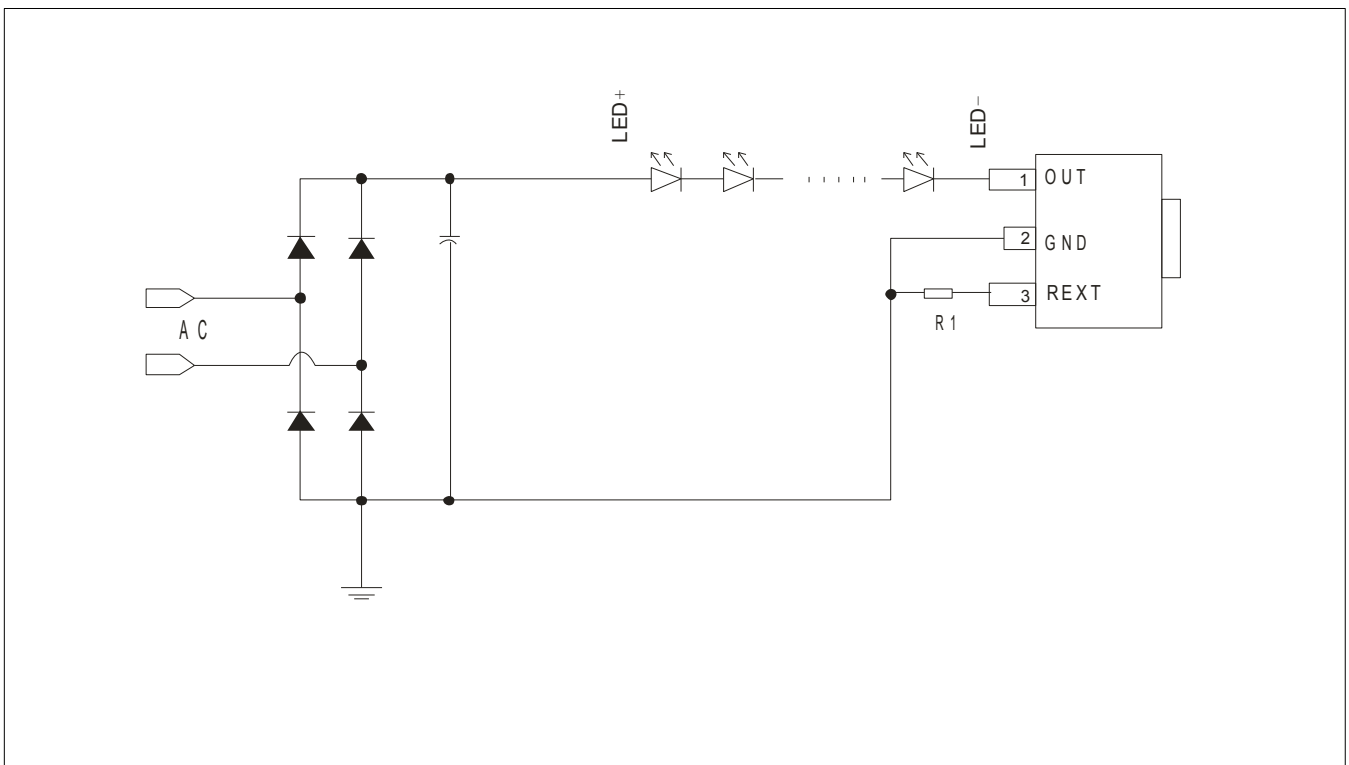
### General Description

WS3620 is a single channel LED constant current driver which integrates patented constant current setting and control technology. The output current designed by external REXT is 5mA~60mA and it is invariant to output voltage change, which has better constant current performance.

It is a low cost circuit with simple circuit and less external components.

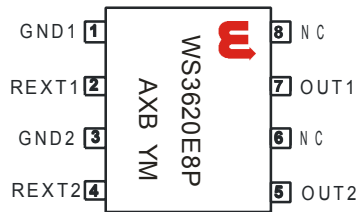
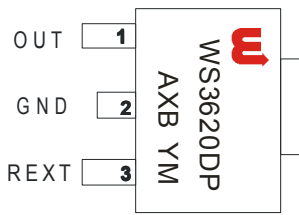
WS3620 TO252 and ESOP-8 Package.

### Typical Application Diagram



**Pin Definition and Device Marking**

WS620 is available in TO252 and ESOP-8 package:

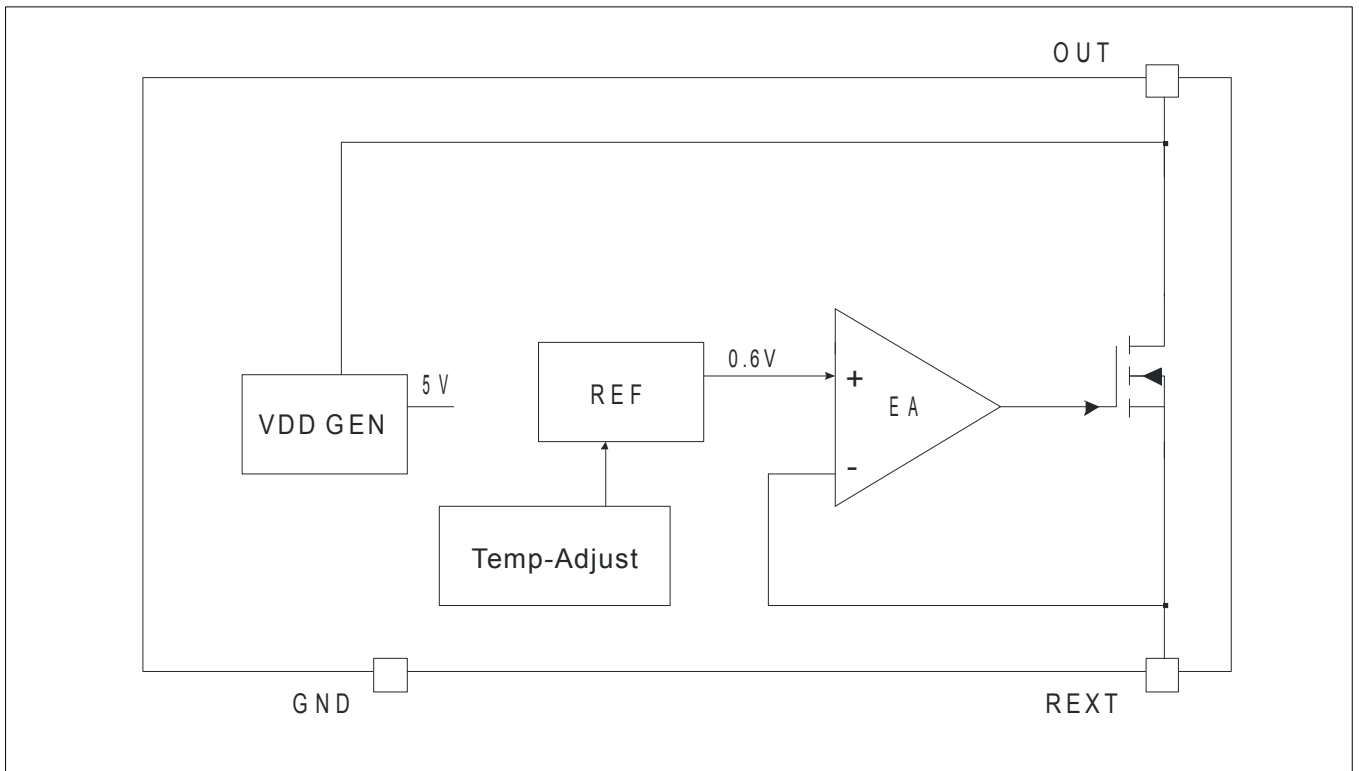


WS3620:  
 A: product code  
 X: Inner code  
 B: region code  
 YM: year code, month code

**Pin Function Description**

Pin Name	Pin Number	Function Description
OUT	1	Power input and constant current output
GND	2	GND
REXT	3	Output current setting port

**Function Block**



### Order Information

Package	IC Marking Information	Purchase Device Name
8-Pin ESOP-8, Pb-free	WS3620E8P	WS3620E8P
2-Pin TO-252, Pb-free	WS3620DP	WS3620DP

### Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
$V_{OUT}$	OUT Voltage	-0.5~250	V
$I_{OUT}$	OUT Current	1~60	mA
$V_{REXT}$	REXT Voltage	-0.5~7	V
$T_J$	Operating junction temperature	150	°C
$T_{STG}$	Storage temperature	-55~150	°C

**Note:** Stresses above those listed under 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 Recommended Operating Conditions section are not implied. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.

### Thermal Resistance Parameter

symbol	Description	ESOP8	TO252	Unit
$R_{THJA}$	Thermal resistance	89.2	74.9	°C/W

Note: Chip to be welded on the PCB plate with 200mm<sup>2</sup> copper foil ,thickness of copper foil is 35um.

### Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ , $V_{OUT}=10\text{V}$ if not otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$V_{OUT\_MIN}$	Minumum Voltage of OUT Pin	$I_{OUT}=30\text{mA}$			6.5	V
$V_{OUT\_BV}$	The breakdown voltage of OUT Pin	$I_{OUT}=0$	250			V
$I_{OUT}$	Output current	VCC Rise	5		60	mA
$I_{op}$	Operation Current	$V_{OUT}=10\text{V}$ , REXT floating		0.16	0.25	mA
$V_{REXT}$	REXT voltage	$V_{OUT}=10\text{V}$		0.6		V
$D_{IOUT}$	IOOUT deviation	$I_{OUT}=20\text{mA}$		$\pm 4$		%
$T_{SC}$	Over-temperature Protection point			120		°C

**Function Description**

**Output Current Setting**

Output current can be set by Rext Resistor, the formula is:

$$I_{out} = \frac{V_{REXT}}{R_{ext}} = \frac{0.6}{R_{ext}}$$

**Efficiency Design**

Below shows the application circuit efficiency formula:

$$\eta = \frac{P_{LED}}{P_{IN}} = \frac{n * V_{LED} * I_{LED}}{V_{IN} * I_{LED}} = \frac{n * V_{LED}}{V_{IN}}$$

V<sub>in</sub> is system input power voltage. V<sub>LED</sub> is single LED drop voltage. I<sub>LED</sub> is LED current. It is can be seen that larger quantities of series LED in system brings higher efficiency. In system design, WS3620 output operating voltage is based on application environment so that it optimizes N value.

**LED Series Number Design**

Designing LED series number in the system should consider two aspects below:

output voltage is  $V_{OUT} = V_{in} - n * V_{LED}$ .

(1) To ensure the normal operation, output voltage should be  $V_{OUT} > V_{OUT\_MIN}$ ;

(2) Lower output voltage brings higher system efficiency. Basing on the two points above, WS3620 output voltage range is  $V_{OUT\_MIN} \sim V_{OUT\_MAX}$  and LED series number formula is:

$$\frac{V_{in} - V_{OUT\_MAX}}{V_{LED}} < n < \frac{V_{in} - V_{OUT\_MIN}}{V_{LED}}$$

**Input Capacitor**

The larger capacitance C2 produces smaller voltage ripple to V<sub>in</sub>, and keeps small ripple to SM2082 output voltage. C2 capacitance depends on total operating current from LED tubes: the more current generates the more C2 capacitance (usually 4.7uF/400V~22uF/400V). The formula is shown below:

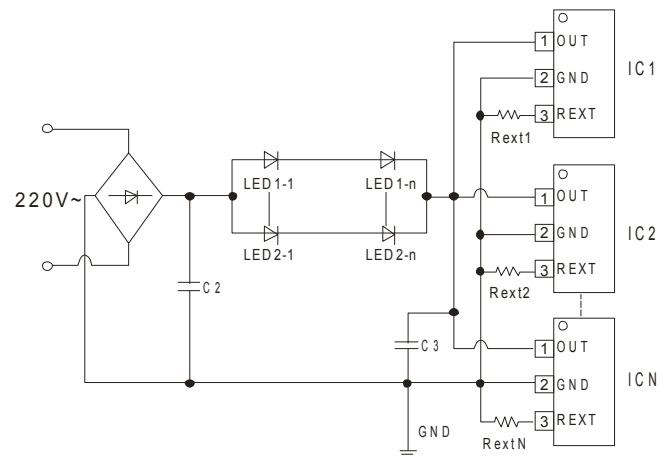
$$C = \frac{t * I_{LED}}{\Delta V}$$

I<sub>LED</sub> is output current, time  $t = 1/4/Fac = 5ms$ ,  $\Delta V$  is output voltage ripple.

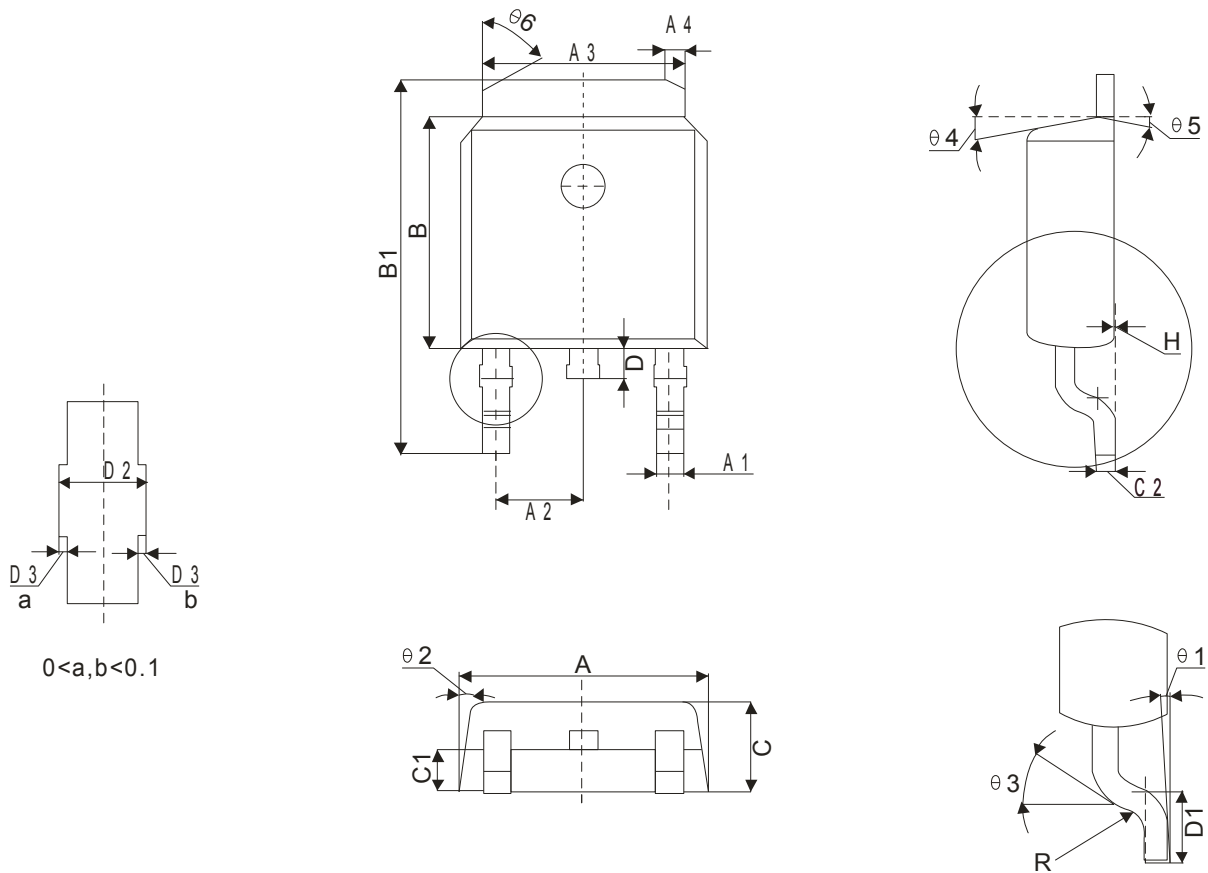
**Increase Output Power**

The quantity of chip is based on the amount of parallel connection groups and lights operating current of LED tubes. In the diagram below, resistor of REXT1~REXT2 can be the same or different.

In IC parallel application, when Rext value is different, the constant current turn-on voltage in the system is the maximum voltage of parallel WS3620.

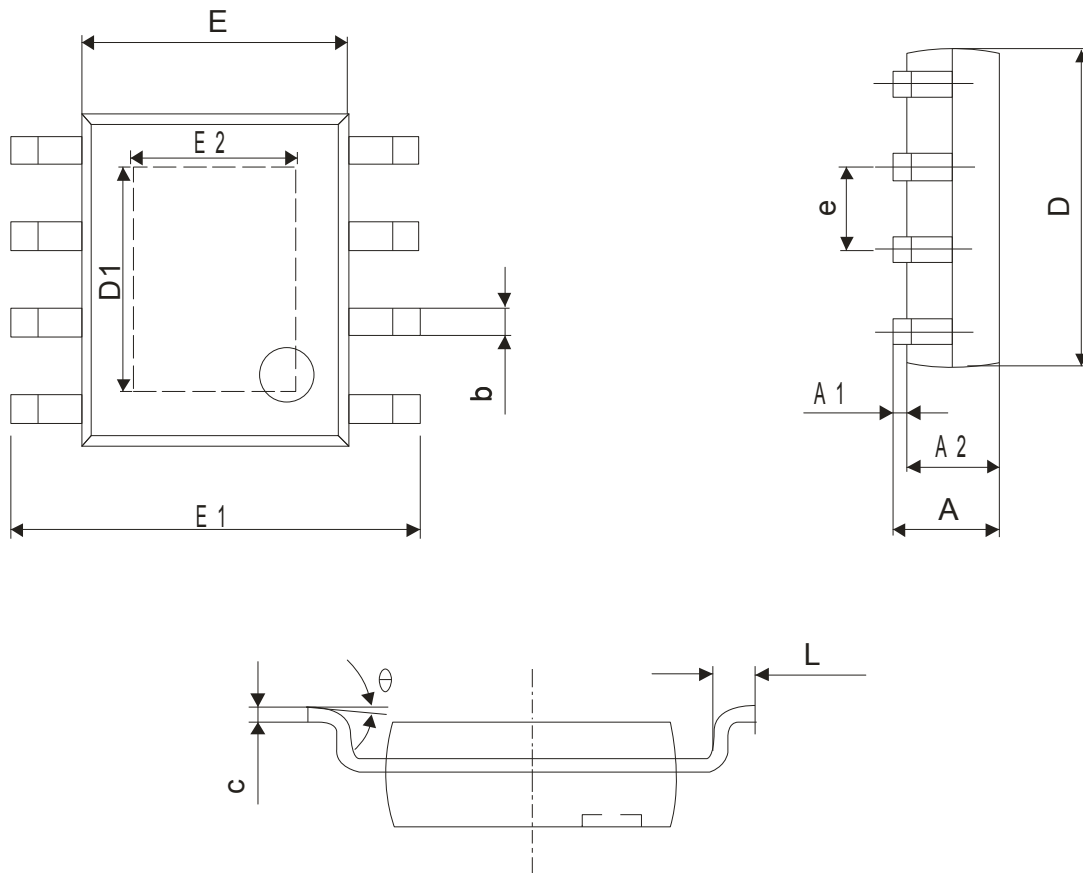


**TO-252 Package Information**



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min.	Max.		Min.	Max.
A	6.50	6.70	D1	1.40	1.60
A1	0.71	0.81	D2	0.81	0.91
A2	2.236	2.336	D3	0.05TYP	
A3	5.284	5.384	H	0.00	0.10
A4	0.75	0.85	R	0.40TYP	
B	6.00	6.20	$\theta 1$	0° -8°	
B1	9.80	10.10	$\theta 2$	8.5°TYP	
C	2.20	2.40	$\theta 3$	25°TYP	
C1	0.967	1.087	$\theta 4$	10°TYP	
C2	0.498	0.518	$\theta 5$	10°TYP	
D	0.70	0.90	$\theta 6$	70°TYP	

**ESOP-8 Package Information**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.050	0.150	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
D1	3.202	3.402	0.126	0.134
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
E2	2.313	2.513	0.091	0.099
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

**NOTE:**

1. We strongly recommend customers check carefully on the trademark when buying our product, if there is any question, please don't be hesitate to contact us.
2. Please do not exceed the absolute maximum ratings of the device when circuit designing.
3. Winsemi Microelectronics Co., Ltd reserved the right to make changes in this specification sheet and is subject to change without prior notice.

**CONTACT:**

Winsemi Microelectronics Co., Ltd.

ADD: Futian District, ShenZhen Tian An Cyber Tech Plaza two East Wing 1002

Post Code : 518040

Tel : +86-755-8250 6288

FAX : +86-755-8250 6299

Web Site : [www.winsemi.com](http://www.winsemi.com)