

## DESCRIPTION

The XZ5121 Series is a fixed frequency, constant current step-up DC/DC converter ideal for driving LEDs used in backlighting applications on cellular phones, PDAs and digital cameras etc. Output voltage of up to 17.5V can be derived, and from a 3.2V input four white Led's cab be driven in series or alternatively, using a 2.5V input, a network of two parallel legs with three in each may be driven.

Luminance of the LED's is controlled by changing the duty cycle of a PWM signal applied to the CE pin.

In addition, an internal MOSFET with an  $R_{ds-on}$  of  $2\Omega$  is used. Allow profile and small board area solution can be achieved using a chip coil and an ultra small ceramic output capacitor (CL) of 0.22uF.

## FEATURES

- I input voltage range : 2.5V—6V
- I Output voltage range : up to 17.5V externally set-up reference voltage  $0.2V \pm 5\%$
- I Oscillation frequency :  $1.0MHz \pm 20\%$
- I On resistance :  $2.0\Omega$
- I Efficiency : 88%(When driving 3 white LEDs in series  $V_{IN}=3.6V$   $I_{LED}=20mA$ )
- I Control : PWM control
- I Stand-by Current :  $I_{STB}=1.0uA(MAX)$
- I Load capacitor : 0.22uF,ceramic
- I Lx limit Current : 300mA

## APPLICATIONS

- I For White LED Drivers
- I Mobil phones, PHS
- I PDAs
- I Digital still cameras

## PACKAGE

SOT23—6

## BLOCK DIAGRAM

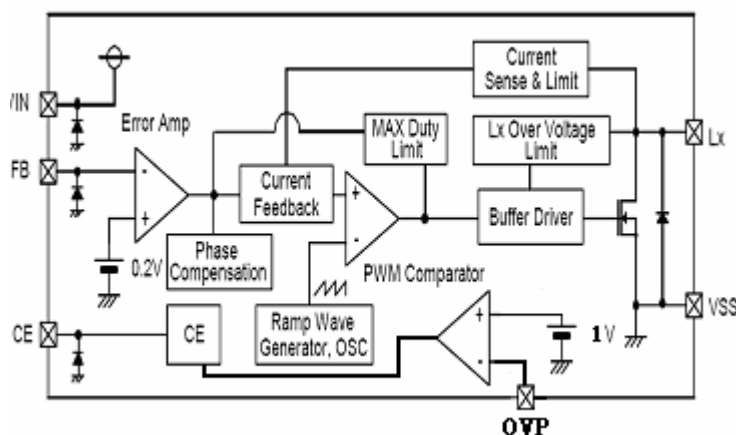


Figure 1

### ■ ABSOLUTE MAXIMUM RATINGS

| Item                        | Symbol | Absolute maximum ratings | Unit |
|-----------------------------|--------|--------------------------|------|
| VIN Pin Voltage             | VIN    | VSS-0.3~VSS+7            | V    |
| OUT Pin Voltage             | VOUT   | VSS-0.3~VSS+7            |      |
| LX Pin Voltage              | VLX    | VSS-0.3~VSS+22           |      |
| FB Pin Voltage              | Vfb    | VSS-0.3~VSS+7            | V    |
| CE Pin Voltage              | Vce    | VSS-0.3~VSS+7            | V    |
| OVP Pin Voltage             | Vovp   | VSS-0.3~VSS+22           |      |
| LX Pin Current              | ILX    | 1000                     | mA   |
| Power Dissipation           | PD     | S0T23-6                  | mW   |
|                             |        |                          |      |
| Operating Temperature range | Topr   | -40~+85                  | °C   |
| Storage Temperature range   | Tstg   | -55~+125                 |      |

**Caution** The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

### ■ Electrical Characteristics

(Ta=25°C, except specify)

| Item                       | Symbol | Condition          | Min.      | Typ. | Max.      | Unit | Circuits |
|----------------------------|--------|--------------------|-----------|------|-----------|------|----------|
| FB Control Voltage(*1)     | VFB    | -                  | Vfbt*0.95 | Vfbt | Vfbt*1.05 | V    | 1        |
| Output Voltage range       | VOUT   | -                  | VIN       | -    | 17.5      |      |          |
| Lx Operating Voltage range | VLX    |                    | -         | -    | 20.0      |      |          |
| Operating Voltage range    | VIN    |                    | 2.5       | -    | 6         |      |          |
| Stand-by Current           | ISTB   | VCE=0V、VLX=5V      | —         |      | 1         | μA   | 3        |
| Supply Current 1           | IDD1   |                    |           | 550  |           | μA   | 2        |
| Supply Current 2           | IDD2   | VIN=VLX、VFB=0.4V   | —         | 65   |           |      | 3        |
| Oscillation Frequency      | FOSC   |                    | 0.8       | 1.0  | 1.2       | MHz  | 2        |
| Maximum Duty Cycle         | MAXDTY | VCONT=0.4V         | 86        | 92   | 98        | %    | 2        |
| Efficiency                 | EFFI   | VIN=3.6V; RLED=20Ω | —         | 88   | —         | %    | 1        |

|                      |       |                   |      |      |      |          |   |
|----------------------|-------|-------------------|------|------|------|----------|---|
| Current Limit        | ILIM  | VIN=3.6           |      | 300  |      | mA       | 4 |
| LX Overvoltage Limit | LXOVL |                   | 18.0 | 19.0 |      | V        | 2 |
| LX On Resistance     |       | VIN=3.6V、VLX=0.4V |      | 2.0  |      | $\Omega$ | 2 |
| LX Leak Current      | ILXL  |                   |      | 0    | 1    | $\mu$ A  | 3 |
| CE 'H' Voltage       | VCEH  |                   | 0.65 |      |      | V        | 2 |
| CE 'L' Voltage       | VCEL  |                   |      |      | 0.2  | V        | 2 |
| CE 'H' Current       | ICEH  | VIN=VLX、VFB=0.4V  |      |      | 0.1  | $\mu$ A  | 3 |
| CE 'L' Current       | ICEL  | VIN=VLX、VFB=0.4V  |      |      | -0.1 | $\mu$ A  | 3 |
| FB 'H' Current       | ICEH  | VIN=VLX、VFB=0.4V  |      |      | 0.1  | $\mu$ A  | 3 |
| FB 'L' Current       | ICEL  | VIN=VLX、VFB=0.4V  |      |      | -0.1 | $\mu$ A  | 3 |

(\*1) Vfbt may take between 0.01V-1.49V certain value, now a major center value 0.01V, 0.2V, 0.23V, 0.25V;

## ■ TEST CIRCUITS

Circuit ①

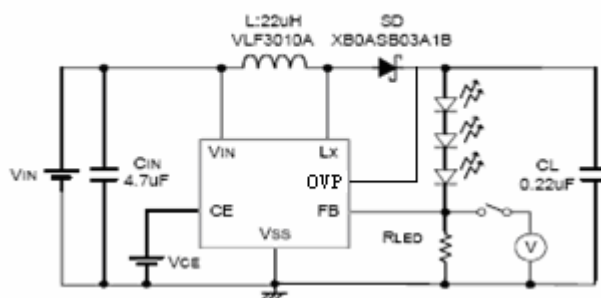


Figure 2

Circuit ②

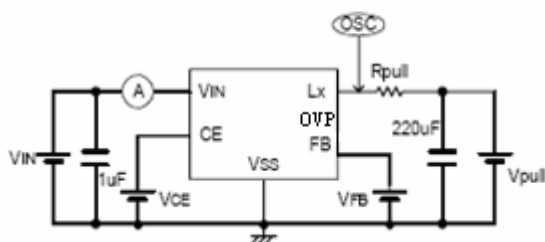


Figure 3

Circuit ②

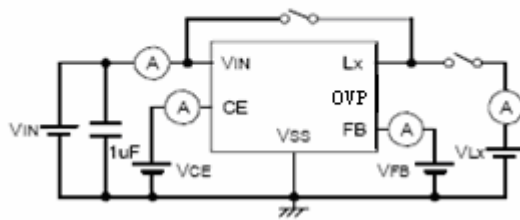


Figure 4

Circuit ④

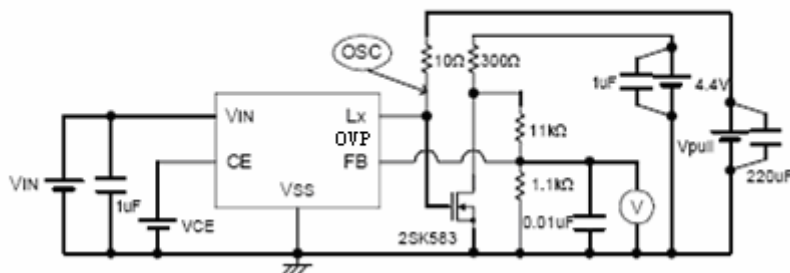


Figure 5

**Caution** the value of the resistance named RLED:  $RLED = VFB / ILED$ ; VFB is the voltage of the FB pin; ILED is the current of LED and equal to 20mA usually;

## ■ TYPICAL APPLICATION CIRCUIT

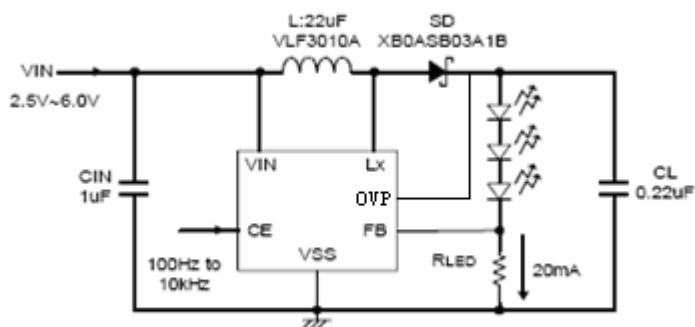
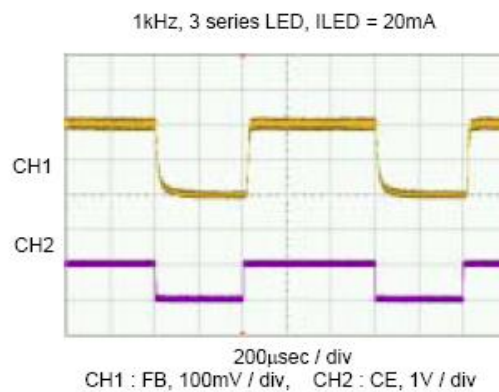
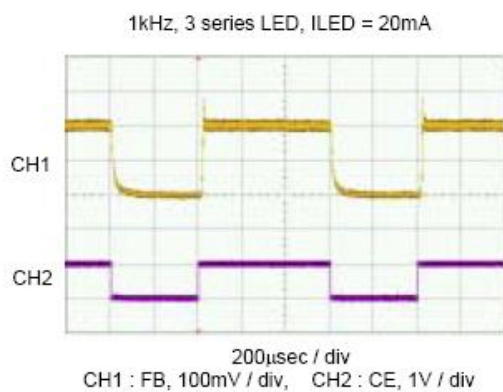
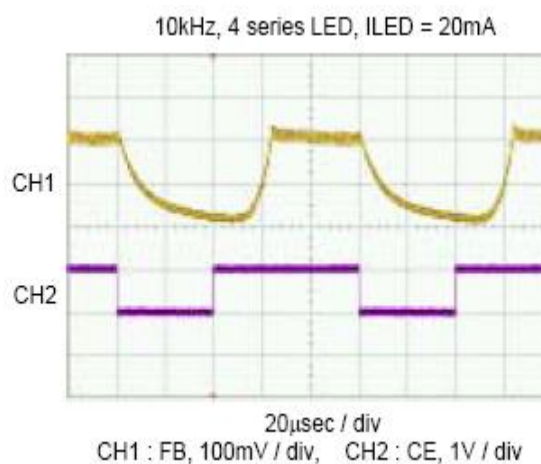


图 6

**Caution** the value of the resistance named RLED:  $RLED = VFB / ILED$ ; VFB is the voltage of the FB pin; ILED is the current of LED and equal to 20mA usually;

## ■ TYPICAL PERFORMANCE CHARACTERISTICS



## ■ Pin Configuration



SOT23-6 (TOP VIEW)

## ■ Pin Assignment

| Pin Number | Pin Name | Function             |
|------------|----------|----------------------|
| 1          | LX       | SWITCH               |
| 2          | VSS      | Ground               |
| 3          | FB       | Voltage Feedback     |
| 4          | CE       | Chip Enable          |
| 5          | OVP      | Over voltage protect |
| 6          | VIN      | Power Input          |

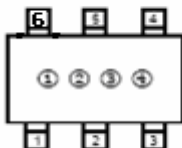
## ■ ORDERING INFORMATION

XZ5121①②③④⑤⑥

| Item  | Symbol  | Function                                                                |
|-------|---------|-------------------------------------------------------------------------|
| ①     | B       | Denotes Lx Overvoltage Limit: Yes<br>Denotes Oscillation Frequency:1MHZ |
| ② ③ ④ | 010-149 | Denotes FB Voltage<br>eg : ② =0 ③ =2 ④ =0 0.20V<br>② =1 ③ =2 ④ =3 1.23V |
| ⑤     | M       | Denotes Package Type : SOT23-6                                          |
| ⑥     | R       | Embossed Tape :Standard Feed                                            |
|       | L       | Embossed Tape :Reverse Feed                                             |

## ■ MARKING

○ SOT23-6



①Represents the product name

| Symbol | Part Number  |
|--------|--------------|
| Z      | XZ5121****M* |

②Represents the type of regulator

| Symbol | Vfb(V)      | Part Number   |
|--------|-------------|---------------|
| S      | 0.050-0.195 | XZ5121B****M* |
| L      | 0.20-0.49   | XZ5121B****M* |
| H      | 1.20-1.49   | XZ5121B****M* |

③ Represents the voltage of FB pin

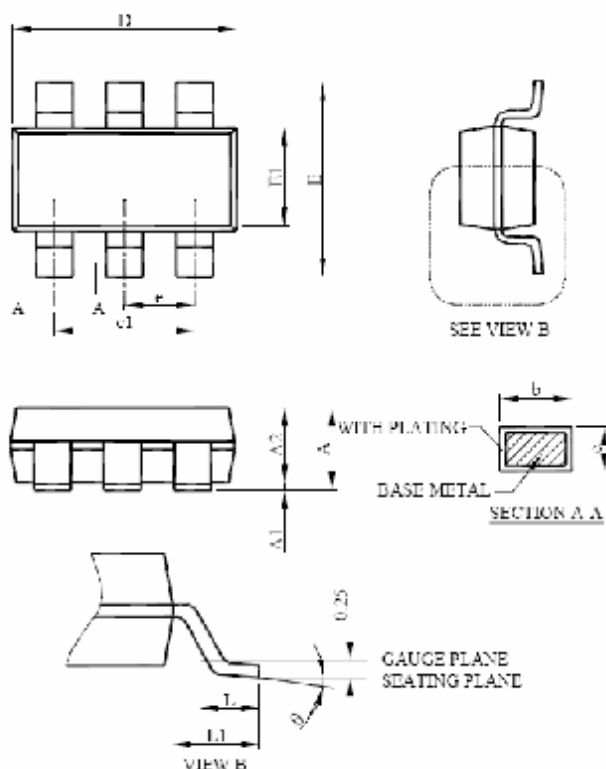
| Symbol | Vfb(V) |       |      | Symbol | Vfb(V) |       |      |
|--------|--------|-------|------|--------|--------|-------|------|
| 0      | 0.20   | 0.050 | 1.20 | F      | 0.35   | 0.125 | 1.35 |
| 1      | 0.21   | 0.055 | 1.21 | H      | 0.36   | 0.130 | 1.36 |
| 2      | 0.22   | 0.060 | 1.22 | K      | 0.37   | 0.135 | 1.37 |
| 3      | 0.23   | 0.065 | 1.23 | L      | 0.38   | 0.140 | 1.38 |
| 4      | 0.24   | 0.070 | 1.24 | M      | 0.39   | 0.145 | 1.39 |
| 5      | 0.25   | 0.075 | 1.25 | N      | 0.40   | 0.150 | 1.40 |
| 6      | 0.26   | 0.080 | 1.26 | P      | 0.41   | 0.155 | 1.41 |
| 7      | 0.27   | 0.085 | 1.27 | R      | 0.42   | 0.160 | 1.42 |
| 8      | 0.28   | 0.090 | 1.28 | S      | 0.43   | 0.165 | 1.43 |
| 9      | 0.29   | 0.095 | 1.29 | T      | 0.44   | 0.170 | 1.44 |
| A      | 0.30   | 0.100 | 1.30 | U      | 0.45   | 0.175 | 1.45 |
| B      | 0.31   | 0.105 | 1.31 | V      | 0.46   | 0.180 | 1.46 |
| C      | 0.32   | 0.110 | 1.32 | X      | 0.47   | 0.185 | 1.47 |
| D      | 0.33   | 0.115 | 1.33 | Y      | 0.48   | 0.190 | 1.48 |
| E      | 0.34   | 0.120 | 1.34 | Z      | 0.49   | 0.195 | 1.49 |

④ Represents the assembly lot no.

0~9 , A~Z , Reverts 0~9 , A~Z repeated (G, I, J, O, Q, W expected)

## ■ PACKAGING INFORMATION

### ● SOT-23-6



| SYMBOL | SOT 23      |      |
|--------|-------------|------|
|        | MILLIMETERS |      |
|        | MIN         | MAX  |
| A      | 0.95        | 1.45 |
| A1     | 0.05        | 0.15 |
| A2     | 0.90        | 1.30 |
| b      | 0.30        | 0.50 |
| c      | 0.08        | 0.22 |
| D      | 2.80        | 5.00 |
| E      | 2.80        | 5.00 |
| e1     | 1.50        | 1.70 |
| e      | 0.80 BSC    |      |
| e1     | 1.90 BSC    |      |
| L      | 0.30        | 0.60 |
| L1     | 0.60 REF    |      |
| B      | 0"          | 8"   |