## 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 Rds-on of 2Ω 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

- input voltage range : 2.5V—6V
- Output voltage range : up to 17.5V externally set-up reference voltage 0.2V±5%
- Oscillation frequency : 1.0MHZ±20% :
- On resistance : 2.0Ω
- Efficiency : 88%(When driving 3 white LEDs in series VIN=3.6V ILED=20mA)
- Control : PWM control
- Stand-by Current : ISTB=1.0uA(MAX)
- Load capacitor : 0.22uF,ceramic
- Lx limit Current :300mA

## APPLICATIONS

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

## PACKAGE

SOT23—6

## BLOCK DIAGRAM

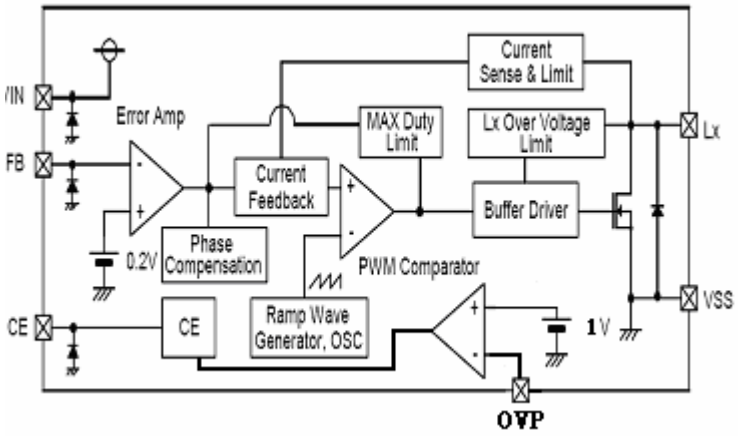



Figure 1

## ■ 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 | SOT23-6 | 250 | mW |
| | | | | |
| Operating Temperature range | Topr | | -40～＋85 | ℃ |
| 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 | Condtion | 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 | | Ω | 2 |
| LX Leak Current | ILXL | | | 0 | 1 | μA | 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 | μA | 3 |
| CE 'L' Current | ICEL | VIN=VLX、VFB=0.4V | | | -0.1 | μA | 3 |
| FB 'H' Current | ICEH | VIN=VLX、VFB=0.4V | | | 0.1 | μA | 3 |
| FB 'L' Current | ICEL | VIN=VLX、VFB=0.4V | | | -0.1 | μA | 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

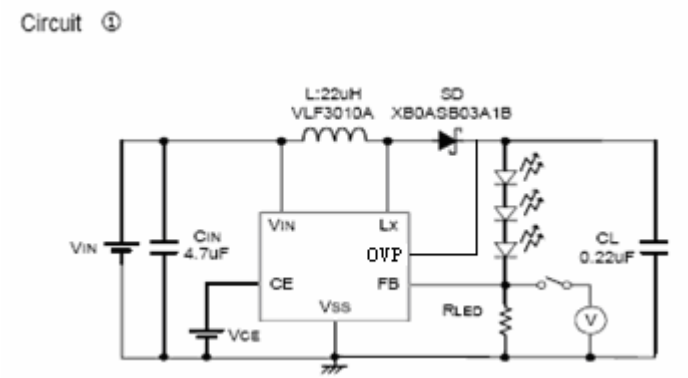



Figure 2

Circuit ②

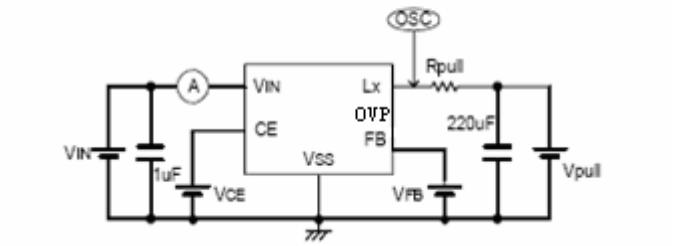



Figure 3

Circuit ③

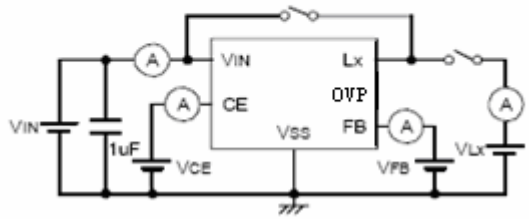



Figure 4

Circuit ④

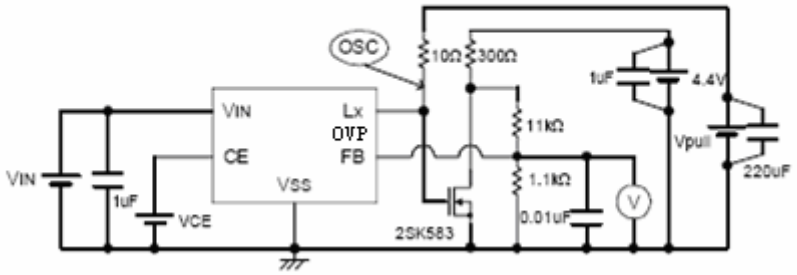



Figure 5

**Caution** the value of the resistance named RLED: RLED=VFB/ILED;VFB is the voltage 0f the FB pin; ILED is the current of LED and equal to 20mA usually;

## ■ TYPICAL APPLICATION CIRCUIT

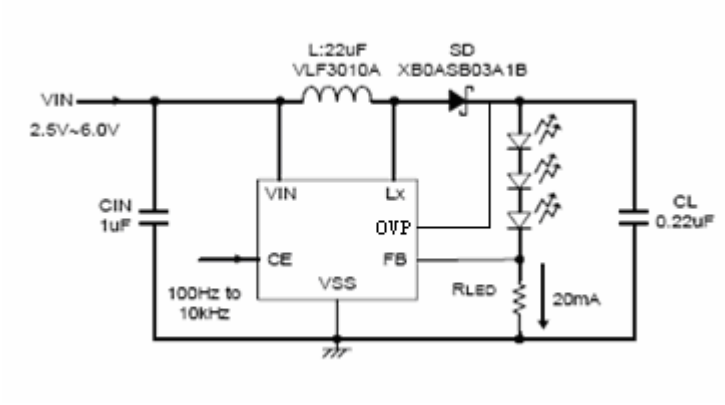
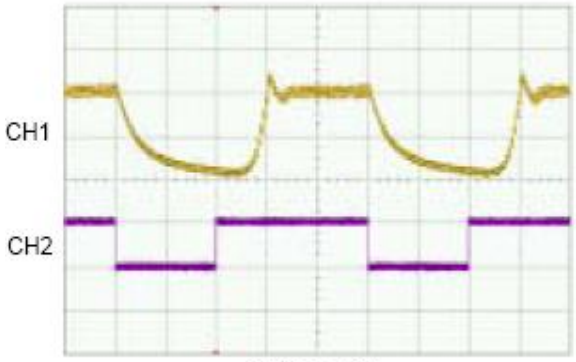



图 6

**Caution** the value of the resistance named RLED: RLED=VFB/ILED;VFB is the voltage 0f the FB pin; ILED is the current of LED and equal to 20mA usually;

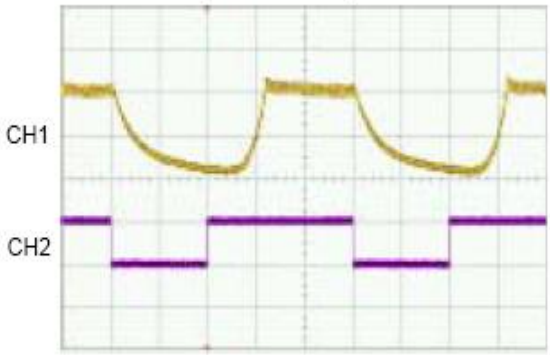
## ■ TYPICAL PERFORMANCE CHARACTERISTICS

10kHz, 3 series LED, ILED = 20mA



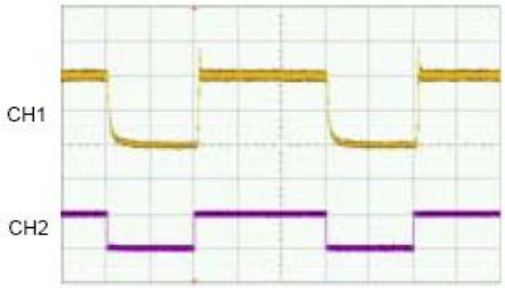

20µsec / div
CH1 : FB, 100mV / div, CH2 : CE, 1V / div

10kHz, 4 series LED, ILED = 20mA



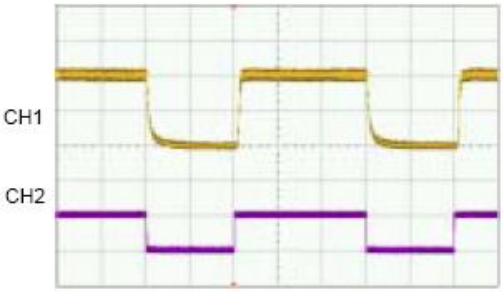

20µsec / div
CH1 : FB, 100mV / div, CH2 : CE, 1V / div

1kHz, 3 series LED, ILED = 20mA



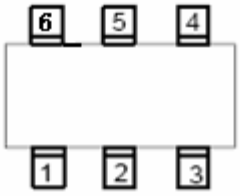

200µsec / div
CH1 : FB, 100mV / div, CH2 : CE, 1V / div

1kHz, 3 series LED, ILED = 20mA




200µsec / div
CH1 : FB, 100mV / div, CH2 : CE, 1V / div

## ■ 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 |

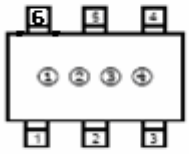
## ■ ORDERING INFORMATION

XZ5121①②③④⑤⑥

| Item | Symbol | Function |
|---|---|---|
| ① | B | Denotes Lx Overvoltage Limit: Yes<br>Denotes Oscillation Frequency:1MHZ |
| ②③④ | 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* |

③Represents the voltage of FB pin

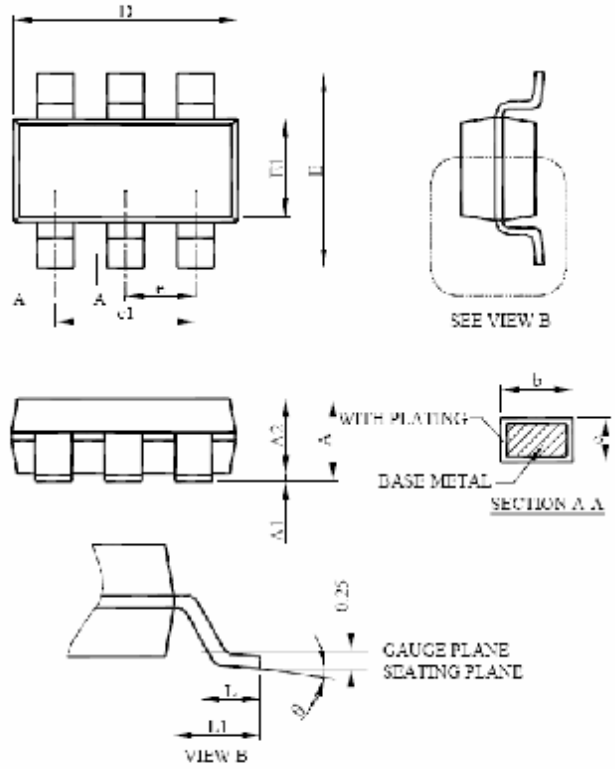
| Symbol | Vfb(V) | | | Symbol | Vfb(V) | | |
|---|---|---|---|---|---|---|---|
| 0 | 0.20 | 0.050 | 1.20 | F | 0.35 | 0.125 | 1.35 |
| 1 | 0.21 | 0.055 | 1.21 | H | 0.36 | 0.130 | 1.36 |
| 2 | 0.22 | 0.060 | 1.22 | K | 0.37 | 0.135 | 1.37 |
| 3 | 0.23 | 0.065 | 1.23 | L | 0.38 | 0.140 | 1.38 |
| 4 | 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-26 | |
|---|---|---|
| | 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 | 3.00 |
| E | 2.60 | 3.00 |
| E1 | 1.50 | 1.70 |
| e | 0.95 BSC | |
| e1 | 1.90 BSC | |
| L | 0.30 | 0.60 |
| L1 | 0.60 REF | |
| θ | 0° | 8° |