

STEP-UP DC/DC CONVERTER

—BACKLIGHT DRIVER

LN5121 SERIES

■ DESCRIPTION

The LN5121 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 2.5V input three white Led's cab be driven in series. 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 are solutions can be achieved by 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 25V externally set-up reference voltage 0.2V
- 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

- SOT-23-6

■ BLOCK DIAGRAM

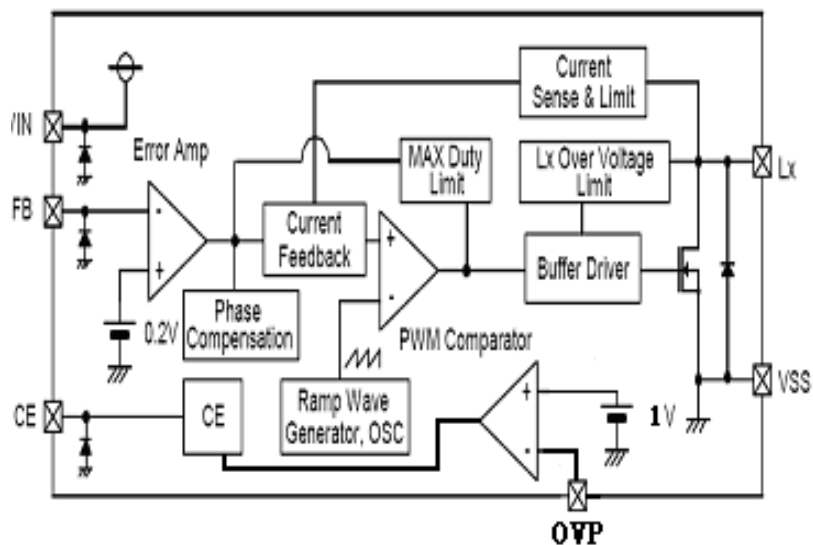


Figure 1

■ ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	ABSOLUTE MAXIMUM RATINGS	UNIT	
VIN Pin Voltage	VIN	$V_{SS}-0.3 \sim V_{SS}+7$	V	
OUT Pin Voltage	VOUT	$V_{SS}-0.3 \sim V_{SS}+7$		
LX Pin Voltage	VLX	$V_{SS}-0.3 \sim V_{SS}+22$		
FB Pin Voltage	Vfb	$V_{SS}-0.3 \sim V_{SS}+7$	V	
CE Pin Voltage	Vce	$V_{SS}-0.3 \sim V_{SS}+7$	V	
OVP Pin Voltage	Vovp	$V_{SS}-0.3 \sim V_{SS}+22$		
LX Pin Current	ILX	1000	mA	
Power Dissipation	PD	SOT23-6	250	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

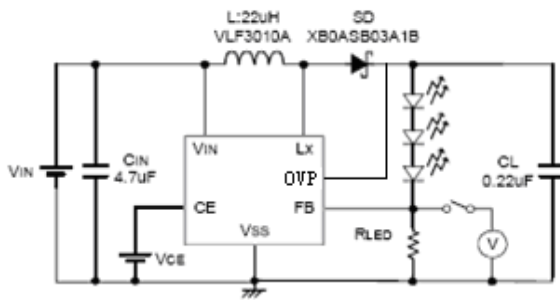
(Ta=25°C, except specify)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Circuits
FB Control Voltage (*1)	VFB	-	0.225	0.250	0.275	V	1
Output Voltage range	VOUT	-	VIN	-	25		
Lx Operating Voltage range	VLX		-	-	25		
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
OVP Overvoltage Limit	OVPVL			25		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

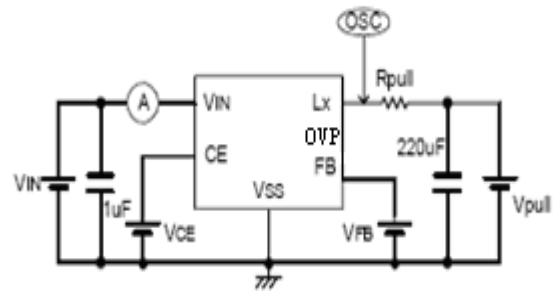
(*1) Vfbt may take between 0.01V-1.49V certain value, now a major center value 0.01V, 0.2V, 0.23V, 0.25V;

■ TEST CIRCUITS

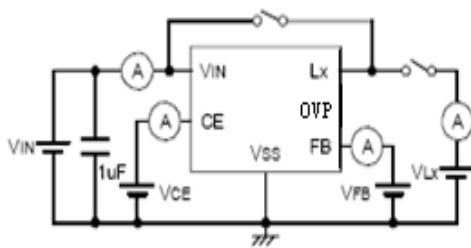
Circuit ①



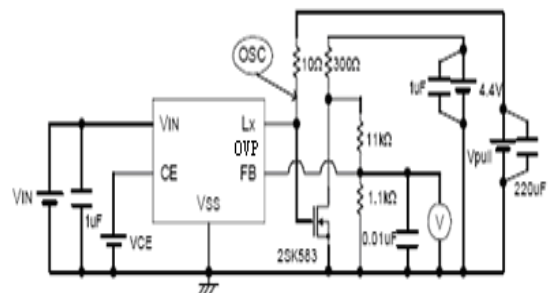
Circuit ②



Circuit ③

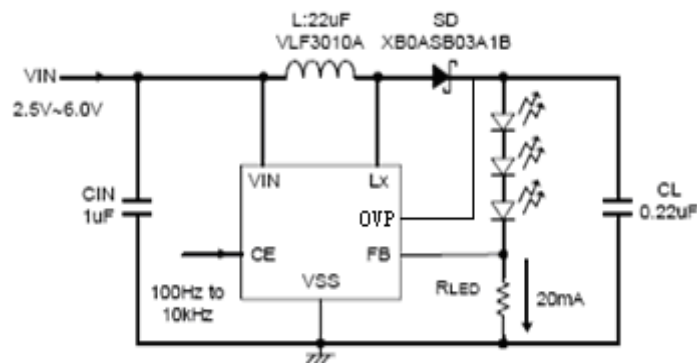


Circuit ④



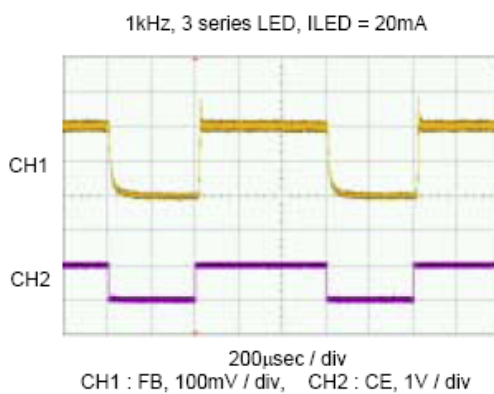
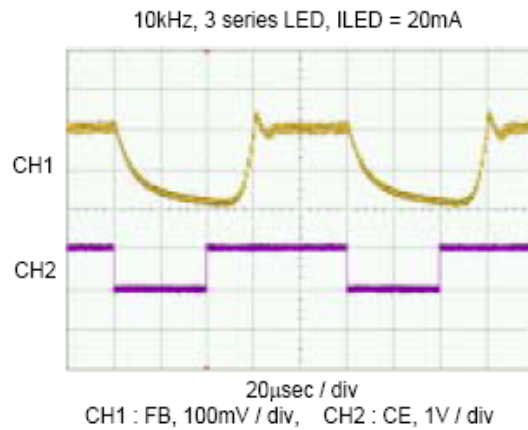
Caution : The value of the resistance named RLED: $R_{LED} = V_{FB} / I_{LED}$; V_{FB} is the voltage of the FB pin; I_{LED} is the current of LED and equal to 20mA usually.

■ TYPICAL APPLICATION CIRCUIT

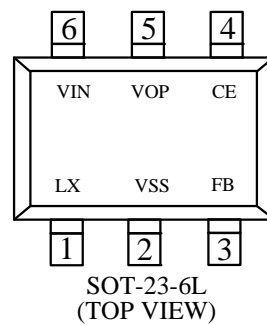


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TYPICAL PERFORMANCE CHARACTERISTICS



PIN CONFIGURATION



Remark: Please contact the Natlinear marketing department for other packages.

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

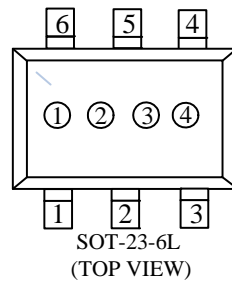
ORDERING INFORMATION

LN5121 ① ② ③ ④ ⑤ ⑥

Item	Symbol	Function
①	B	Denotes Lx Overvoltage Limit: Yes Denotes Oscillation Frequency:1MHZ
② ③ ④	010-149	Denotes FB Voltage e.g: ②=1 ③=2 ④=3 → 1.23V
⑤	M	Denotes Package Type : SOT-23-6
⑥	R	Embossed Tape :Standard Feed
	L	Embossed Tape :Reverse Feed

MARKING

SOT-23-6



① Represents the product name

Symbol	Part Number
Z	LN5121****M*

② Represents the type of regulator

Symbol	Vfb(V)	Part Number
S	0.050-0.195	LN5121B****M*
L	0.20-0.49	LN5121B****M*
H	1.20-1.49	LN5121B****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

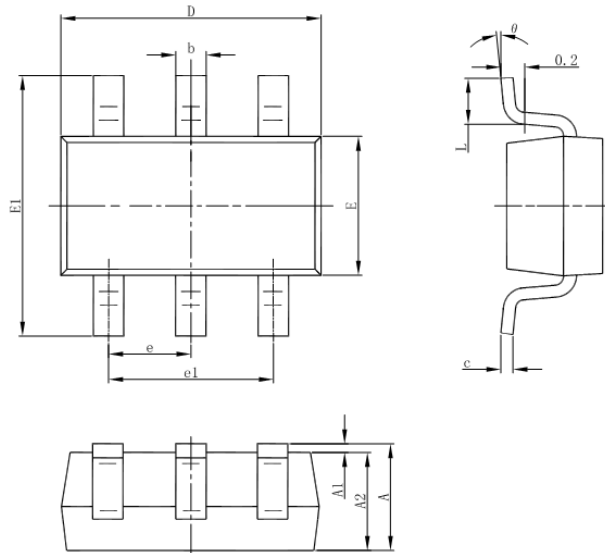
Symbol	Vfb(V)			Symbol	Vfb(V)		
6	0.26	0.080	1.26	P	0.41	0.155	1.41
7	0.27	0.085	1.27	R	0.42	0.160	1.42
8	0.28	0.090	1.28	S	0.43	0.165	1.43
9	0.29	0.095	1.29	T	0.44	0.170	1.44
A	0.30	0.100	1.30	U	0.45	0.175	1.45
B	0.31	0.105	1.31	V	0.46	0.180	1.46
C	0.32	0.110	1.32	X	0.47	0.185	1.47
D	0.33	0.115	1.33	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	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°