LC1986

6-Channels WLED Linear Driver

DESCRIPTION

The LC1986 is a CMOS based White/Blue LED driver with stand-alone capability. The driver is primarily designed for LED backlighting of LCD display powered by Li-ion battery With its high efficiency, low standby current and wide range of input supply voltage, the LC1986 is suitable for applications such as portable device display and keypad backlighting. There are six identical channels in LC1986, each of which can drive one LED by current rating of 20mA.

LC1986 is available with QFN 3X3-16 package

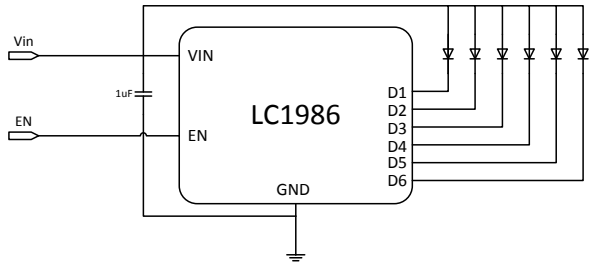
FEATURES

- 6-channels output
- 2.7 to 5.5V input range
- PWM dimming control
- LED sink current of 20mA
- Independent current sink circuit for each LED output
- Low standby current
- High accuracy current match on each channel

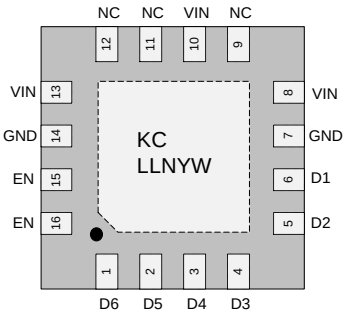
APPLICATIONS

- LCD screen backlights driver
- Mobile phone, portable device keypad backlights driver

TYPICAL APPLICATION

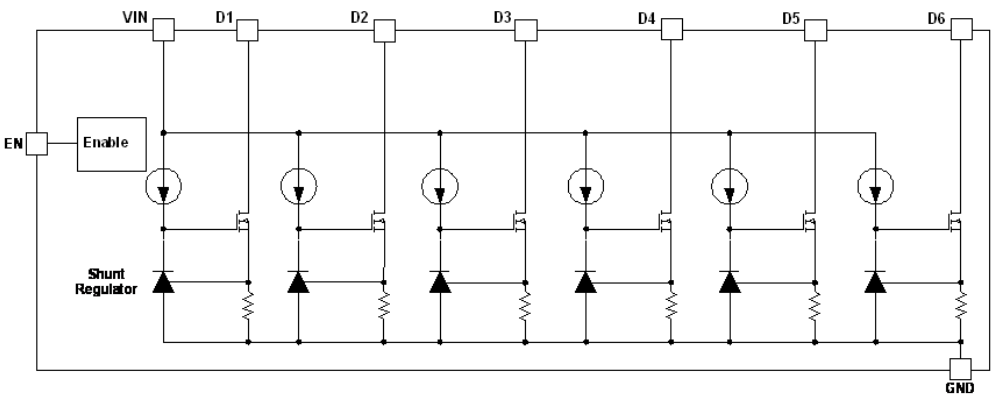


PIN ASSIGNMENT

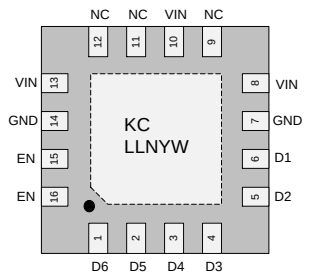


All pins of VIN are connected internally.
All pins of EN are connected internally.
Connecting to one of them is good enough.

BLOCK DIAGRAM



MARKING INFORMATION

Product Classification	LC1986CJKTR
Marking	
KC LLNYW	KC: Product Code LL: LOT No. N: FAB Code Y: Year No. W: Week No.

Top view

ORDERING INFORMATION

LC1986 [1][2][3]

Code	Description
[1]	Temperature&Rohs: C: -40~85°C, Pb Free Rohs Std.
[2]	Package type: JK: QFN 3X3 –16
[3]	Packing type: TR:Tape&Reel (Standard)

PIN DESCRIPTION

Name	Function Description
D1-D6	RGB or WLED Cathode Connection Pin
EN	Chip Enable and Dimming Control. **Pin15 and Pin16 both are EN pins, they are shorted internally, so please don't connect one of them to GND**
VIN	Power Supply
GND	Ground
NC	Not Connected

ABSOLUTE MAXIMUM RATING

Supply voltage	–0.3V to 7V
Voltage of LEDn, EN pin	–0.3V to 7V
Maximum Junction Temperature	125°C
Operating Ambient Temperature Range	–40°C to 85°C
Storage Temperature Range	–40°C to 150°C
Lead Temperature (Soldering, 10 sec)	260°C

Note: Exceed these limits to damage to the device.
Note: Exposure to absolute maximum rating conditions may affect device reliability.

RECOMMENDED OPERATING CONDITIONS

Items	MIN	MAX	Unit
Supply Voltage Range	2.7	5.5	V
Operating Temperature	-25	85	°C

ELECTRICAL CHARACTERISTICS

VCC=3.7V, T_a=25°C, No Load, Input: VEN=3.7V. (Unless otherwise noted)						
Symbols	**Parameters**	**Conditions**	**SPEC**			**Unit**
			MIN	TYP	MAX	
V_{IL}	EN Pin "Low" Logic				0.4	V
V_{IH}	EN Pin "High" Logic		1.7			V
I_{IL}	EN Pin "Low" Input Current		-1			uA
I_{IH}	EN Pin "High" Input Current				1	uA
V_{LEDL}	LEDn Dropout Voltage			100		mV
I_{LED}	LEDn Sink Current		18	20	22	mA
I_{LEDn}	LEDn Sink Current Deviation		-5		5	%
I_Q	Quiescent Current			500	800	uA
I_{STBY}	Standby Supply Current	VEN="0"		0.5		uA

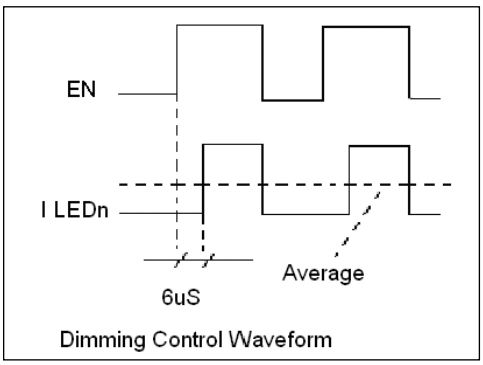
DETAILED DESCRIPTION

LC1986 works with a wide range of supply voltage, from 2.7V to 6V. The forward voltage of commercial white/blue LED is in the range of 2.9V to 3.5V at a current level of 20mA. Proper selection of the LED to match the supply voltage can fully utilize the Li-ion battery. For example, there is 1% ~ 3 % power left in the Li-ion battery when its voltage reaches 3.275V. So a LED with a forward voltage value of 3.2V can use up to 99% of the battery power under normal working condition. When the voltage of the battery drops below 3.2V, the current through the LED (hence the brightness) starts to decrease.

Due to its uniquely designed current regulator, LC1986 offers low output dropout and provide superior efficiency performance over standard Inductive boost type and capacitive charge pump type LED driver.

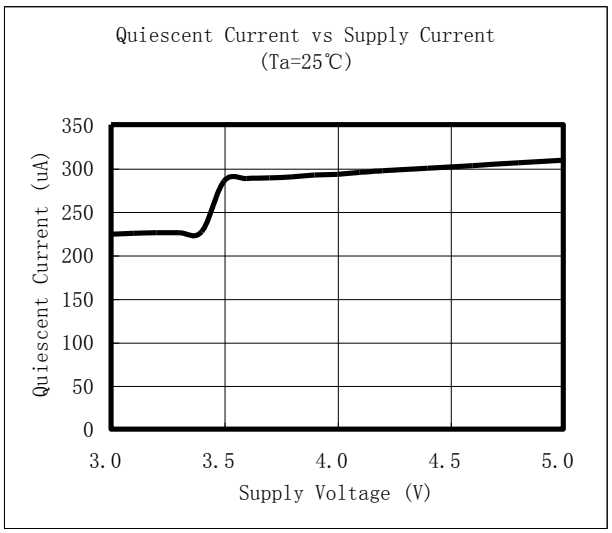
The EN pin controls the on/off state of the device. A high level state turns on the device and a low level turns off the device, results in the low off state current. This pin needs to be terminated since a floating level of the EN pin will cause the instability of the device.

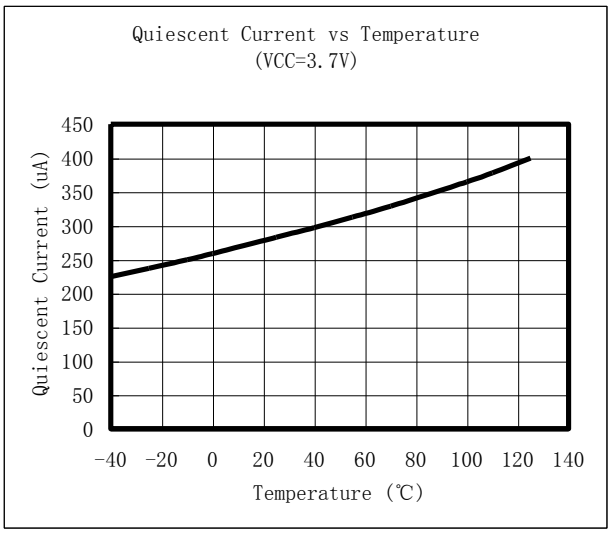
The sink current has a constant value of 20mA. The brightness of the LED can be adjusted by controlling the duty cycle of the LC1986's LEDn output. This can be accomplished by applying a PWM signal to the EN pin. In LC1986, the internal power on sequence presents a delay time of 6us from EN pin to LEDn pin. Hence, in order to modulate the output of LEDn in every cycle normally, the width of dimming signal applied EN pin have to be no less than 6us. For example, when a dimming signal of 20KHz is applied, the minimum range of dimming is about 12%, that is, the average output current on each channel is 2.4mA.

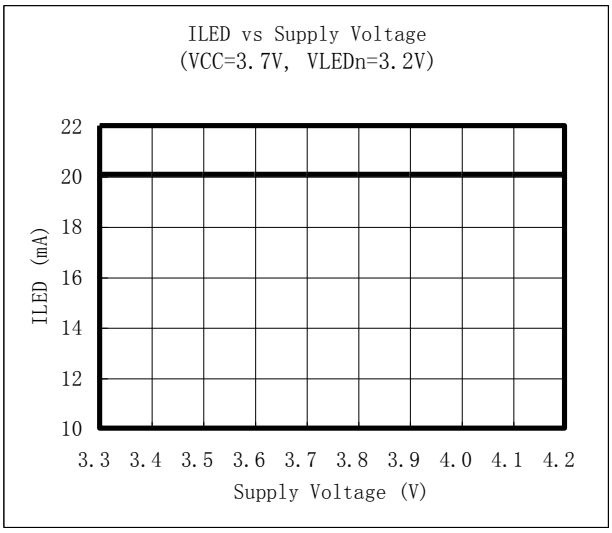


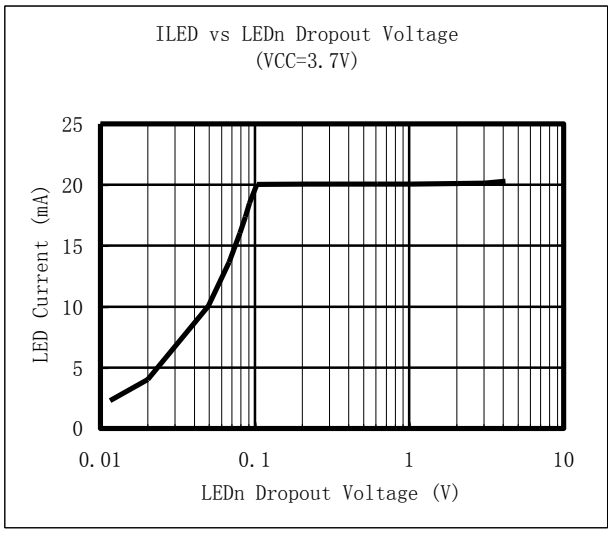
Dimming Control Waveform

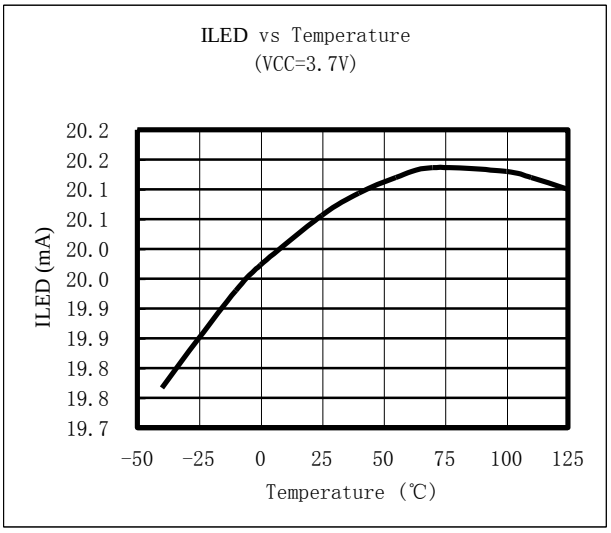
TYPICAL PERFORMANCE CHARACTERISTICS











PACKAGE INFORMATION

Package	QFN3X3-16	Devices per reel	3000	Unit	mm