

Description

The ACE517 is a CMOS based White/Blue LED driver with stand-alone capability. The driver is primarily designed for LED backlighting of LCE display powered by Li-ion battery with its high efficiency, low standby current and wide range of input supply voltage, the ACE517 is suitable for applications such as portable device display and keypad backlighting.

In portable application, three or four-channel LED solutions are popular, ACE517 has three LED channels with a SOT-23-6 package. ACE517 has four LED channels with a MSOP-8 package.

Features

- No external component required
- PWM dimming control available
- Low noise and EMI
- LED sink current of 20mA
- Independent current sink circuit for each LED output
- Versatile supply voltage range
- Low standby current
- High accuracy current match on each channel

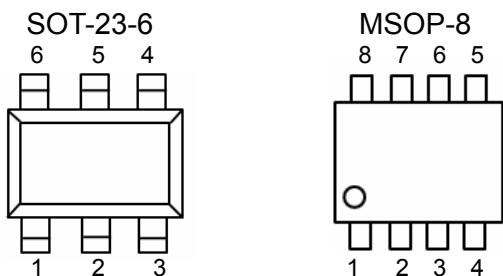
Application

- Small Size Color LEC Backlights Driver
- Mobile Phone, Portable Device Keypad Backlights Driver

Absolute Maximum Ratings

Parameter	Max	Unit
Supply voltage	-0.3 to 7	V
Voltage of LEDn, EN pin	-0.3 to 7	V
Maximum Junction Temperature	125	°C
Operating Ambient Temperature Range	-40 to 85	°C
Storage Temperature Range	-40 to 150	°C

Packaging Type

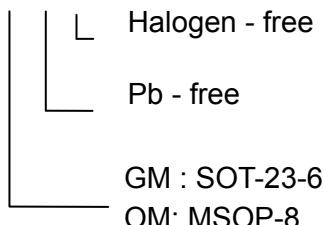


Pin	SOT-23-6	MSOP-8	Function
Vin	1	3	
Vss	2	1.4	Power Supply
EN	3	2	Chip enable pin. High level activates the chip. Connect the pin to Vcc if not used, do not leave this pin floating
LED1	6	8	RGB or WLED cathode connection pin
LED2	5	7	
LED3	4	6	
LED4		5	
GND			Analog ground. In ACE517, for good LED current match, it is recommended that the two GND pins should be tied together by external copper.

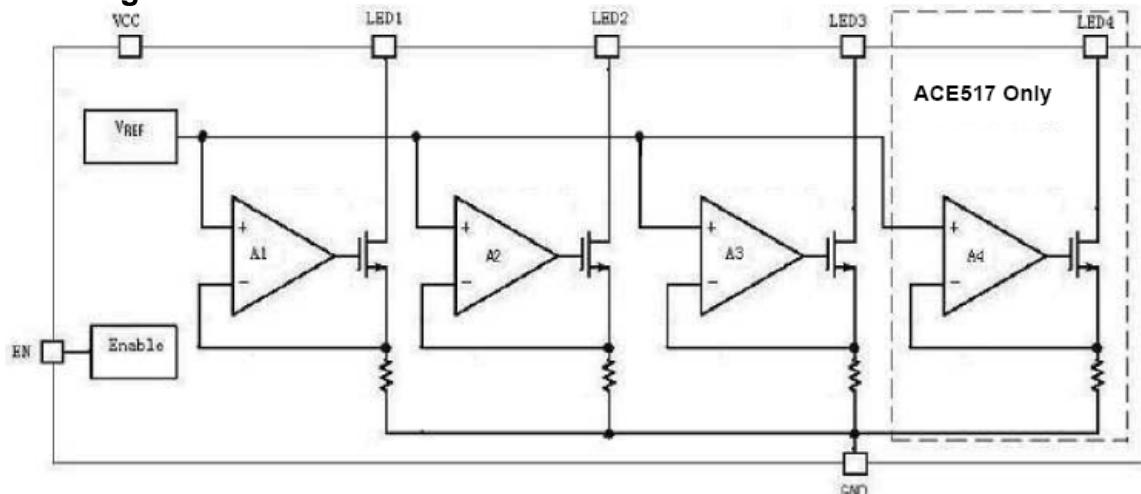
Ordering information

Selection Guide

ACE517 XX + H



Block Diagram



Recommended Work Conditions

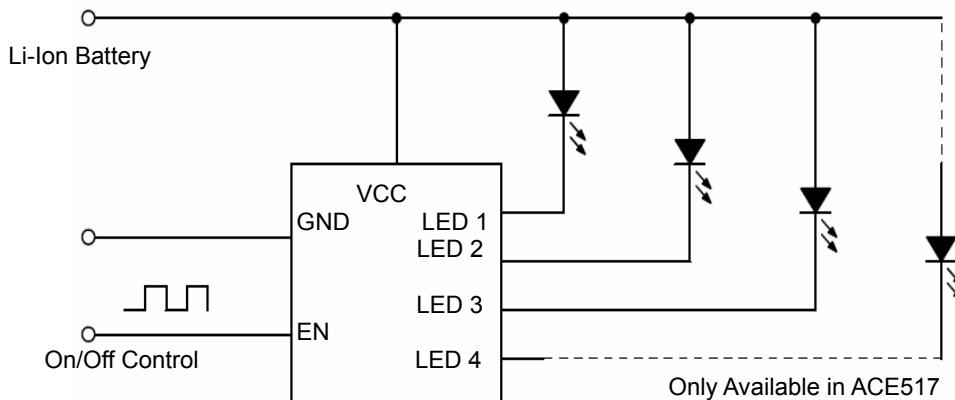
Item	Min	Recommended	Max	Unit
Supply Voltage Range	2.7		6	V
Output sink current on each channel			25	mA
Operating Temperature	-25		85	°C

Electrical Characteristics

$V_{DD}=3.7V, T_A=25^{\circ}C$, No Load, Input: $V_{IH}=3.7V$, $V_{IL}=GND$. (Unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
EN Pin "Low" Logic	V_{IL}				0.4	V
EN Pin "High" Logic	V_{IH}		1.7			V
EN Pin "Low" Input Current	I_{IL}		-1			uA
EN Pin "High" Logic Current	I_{IH}				1	uA
LEDn Dropout Voltage	V_{LEDL}		100			mV
LEDn Sink Current	I_{LED}		19	20	21	mA
LEDn Sink Current Deviation	ΔI_{LEDn}				+/-3	%
Quiescent Current	I_Q	$VEN="1"$	250	400		uA
Standby Supply Current	I_{STBY}	$VEN="0"$	0.5			uA

Typical Application Circuit

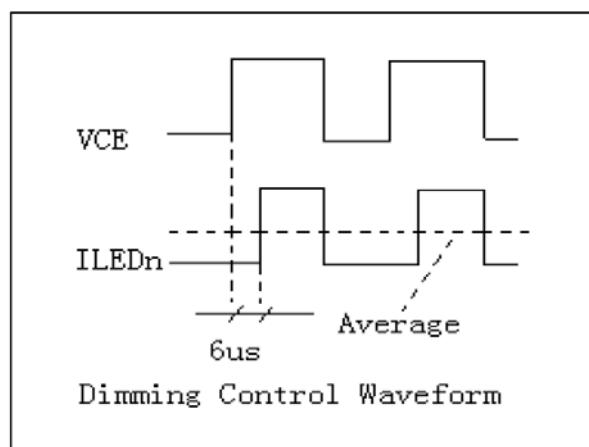


Detailed Description

ACE517 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.

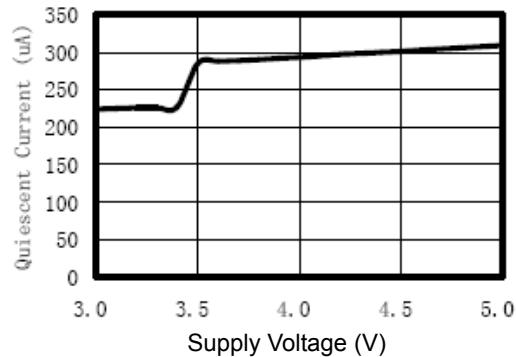
Due to its uniquely designed current regulator, ACE517 offer low output dropout and provide superior efficiency performance over standard inductive boost type and capacitive charge pump type LED driver. The EN pin controls the on/off state of the device. A high level state turns on the device and a low 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 ACE517 LEDn pin. Hence, in order to normally modulate the output of LEDn in every cycle, the width of dimming signal applied CE 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.

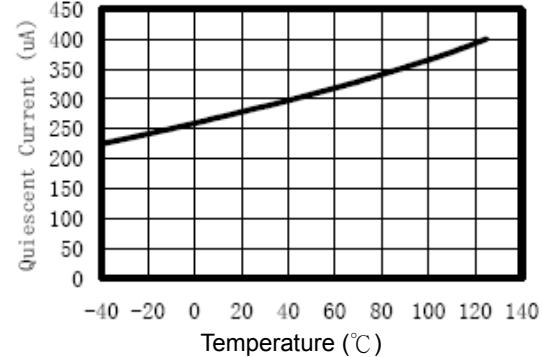


Typical Performance Characteristics

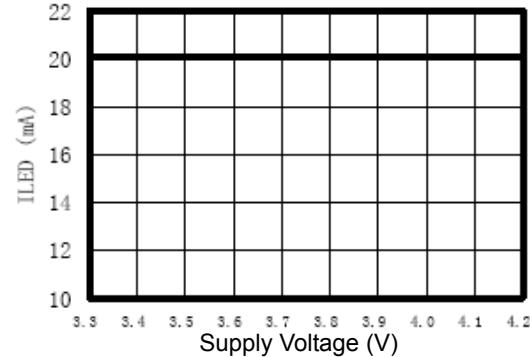
Quiescent Current Supply Current ($T_A=25^\circ\text{C}$)



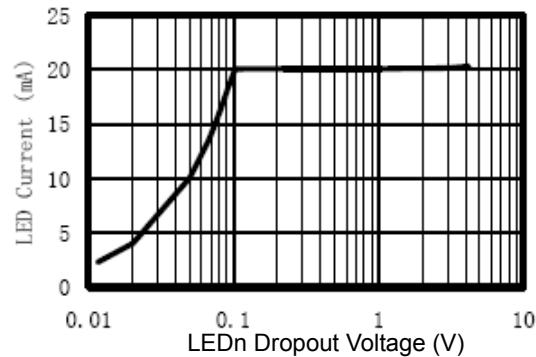
Quiescent Current vs. Temperature ($V_{in}=3.7\text{V}$)



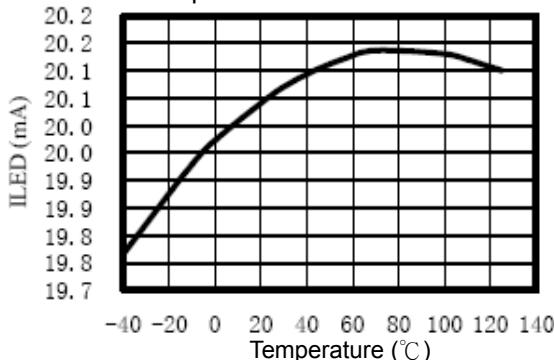
I_{LED} vs. Supply Voltage ($V_{in}=3.7\text{V}$, $V_f=3.2\text{V}$)



I_{LED} vs LEDn Dropout Voltage ($V_{in}=3.7\text{V}$)

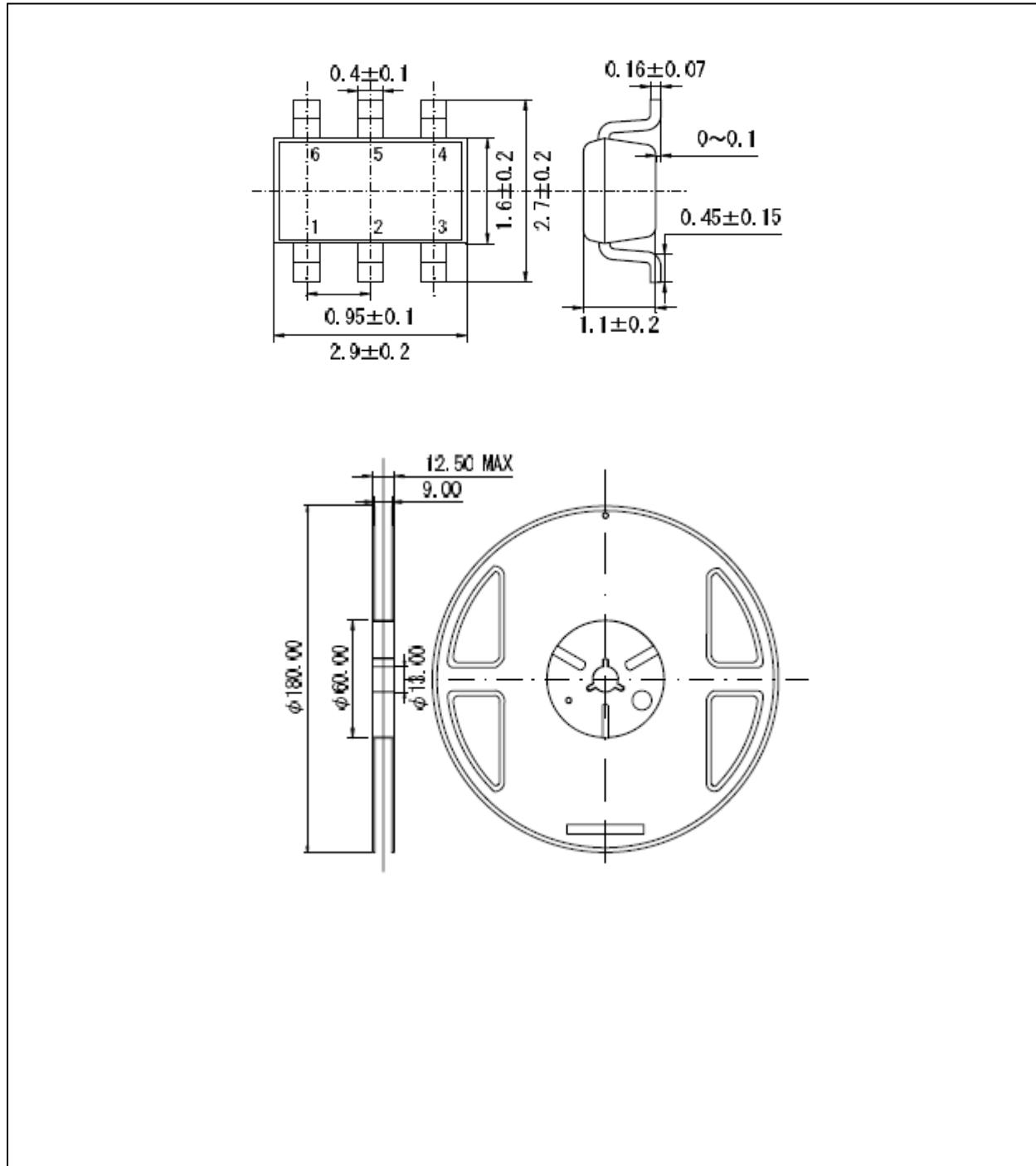


I_{LED} vs. Temperature



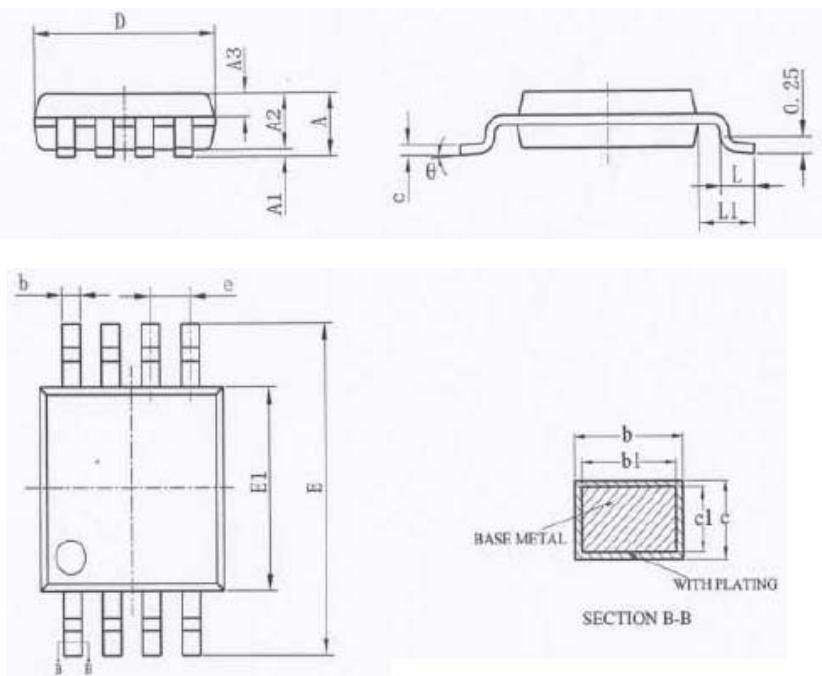
Packing Information

SOT-23-6



Packing Information

MSOP-8



Symbol	Millimeter		
	Min	Nom	Max
A			1.10
A1	0.05		0.15
A2	0.75	0.85	0.95
A3	0.30	0.35	0.40
b	0.29		0.38
b1	0.28	0.30	0.33
c	0.15		0.20
c1	0.14	0.152	0.16
D	2.90	3.00	3.10
E	4.70	4.90	5.10
E1	2.90	3.00	3.10
e	0.65BSC		
L	0.40		0.70
L1	0.95BSC		
θ	0		8°

Notes

ACE does not assume any responsibility for use as critical components in life support devices or systems without the express written approval of the president and general counsel of ACE Electronics Co., LTD. As sued herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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