

High Efficiency Low Noise PFM Step-up DC/DC Converter

DESCRIPTION

The BL8545 PFM step-up Converter drives white LEDs with a constant current to provide backlight in cell phones, PDAs, and other hand-held devices. It features allowing series connection of the white LEDs so that the LED currents are identical for uniform brightness. An enable input can be pulsed repeatedly to adjust LEDs brightness. The fast 500KHz to 2MHz operation frequency allows for smaller capacitor and inductor. Fault condition protection uses cycle-by cycle current limiting to sense maximum inductor current and over-voltage protection. The 0.2V low reference voltage minimized the power loss across the current sense resistor.

The converter can operate from 2V to 6V, and capable of delivering maximum 200mA output current at 4-LEDs application with 3V input voltage. Quiescent current drawn from power source is as low as 120uA. All of these features make BL8545 be suitable for the portable devices, which are supplied by a single battery.

BL8545 is available in SOT23-6 package that is PB free.

FEATURES

- Up to 24V Output Voltage
- Wide Operation Range: 2V to 6V
- Maximum 2MHz Operating Frequency
- PWM Dimming Control
- Shutdown Current <1uA
- Current Limit Cycle-by-Cycle
- Low Current Sense Threshold: 200mV
- 24V Over Output Voltage Protection
- Compact SOT23-6 Package

APPLICATIONS

- Compact Back Light Module
- Power Source for LED
- Constant Current Source

TYPICAL APPLICATION

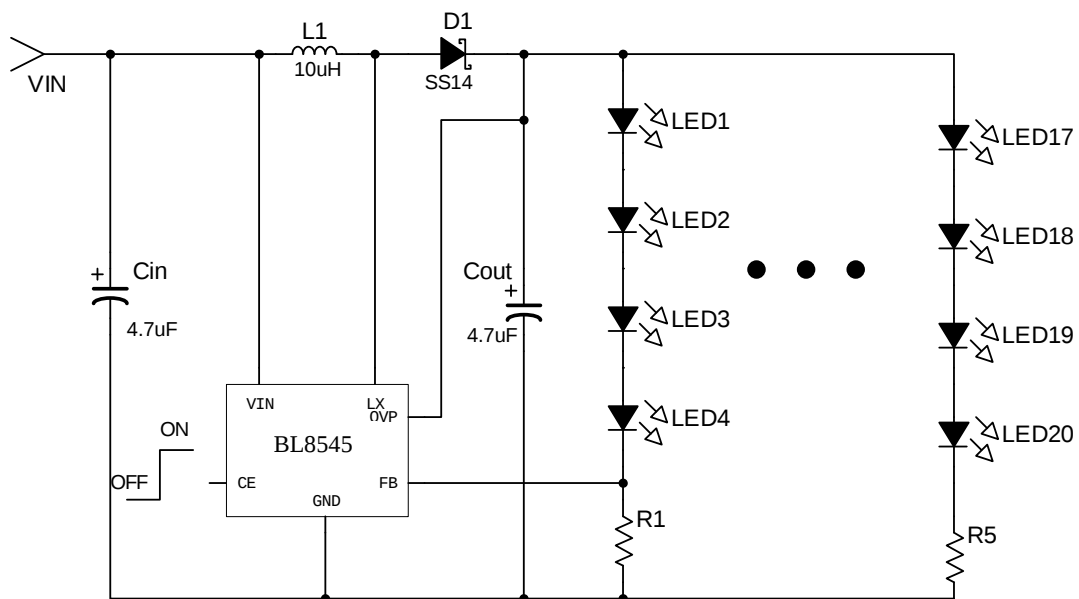
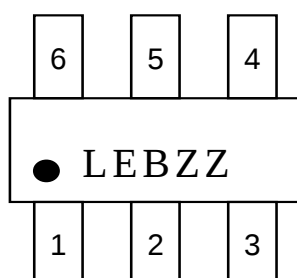


Figure1. BL8545 Typical Application Circuit

PIN CONFIGURATION



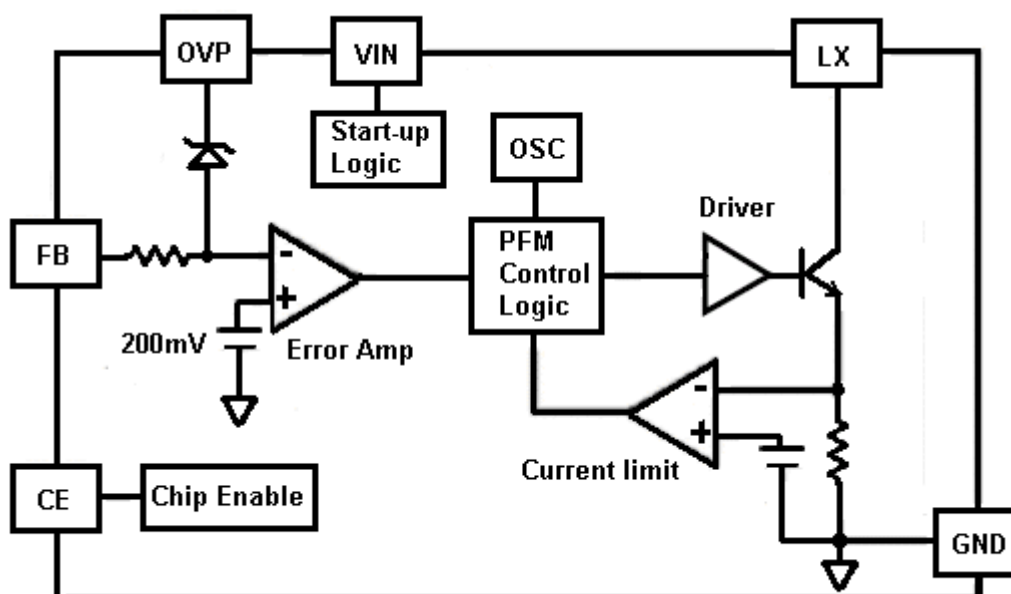
SOT23-6
(Top View)

LE: Product Code
B: FAB Code
ZZ: Date Code

PIN DESCRIPTION

Pin No.	Symbol	Description
1	LX	Switching Pin
2	GND	Ground Pin
3	FB	Pin for Feedback Voltage
4	CE	Chip Enable Pin (Active with "H")
5	OVP	Over Voltage Protection
6	VIN	Power Supply Pin

BLOCK DIAGRAM



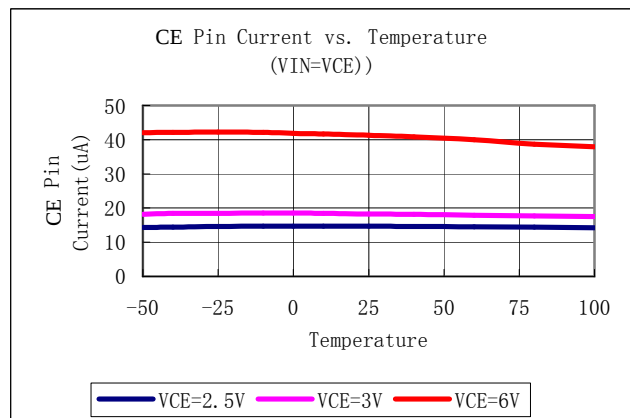
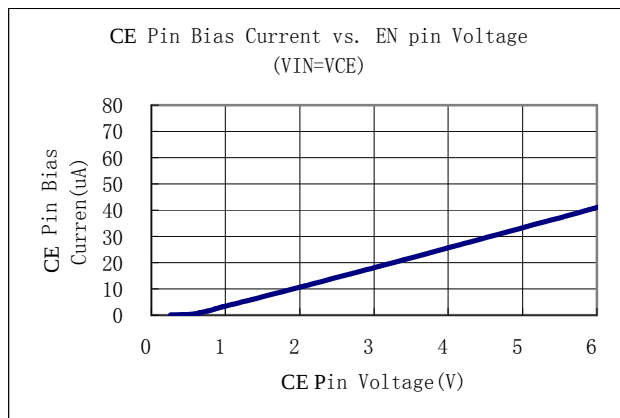
ABSOLUTE MAXIMUM RATING

Parameter		Value
Max Input Voltage		-0.3V to 8V
CE Pin Voltage		-0.3V to (Vin+0.3V)
Lx Pin Output Current		1.6A
Lx Pin Voltage		24V
Operating Junction Temperature (T _J)		125°C
Ambient Temperature (T _A)		-40°C to 85°C
Power Dissipation	SOT-23-6	250mW
Storage Temperature (T _s)		-40°C to 150°C
Lead Temperature & Time		260°C, 10Sec

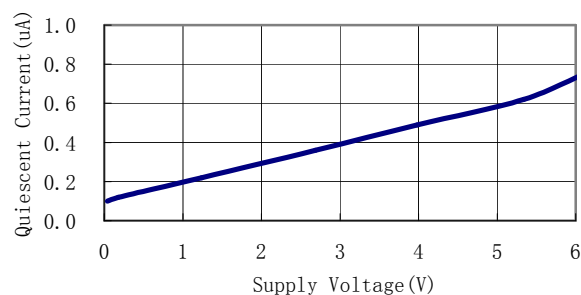
ELECTRICAL CHARACTERISTICS

(T_a=25°C, V_{IN}=3V, V_{CE}=3V, unless otherwise noted)

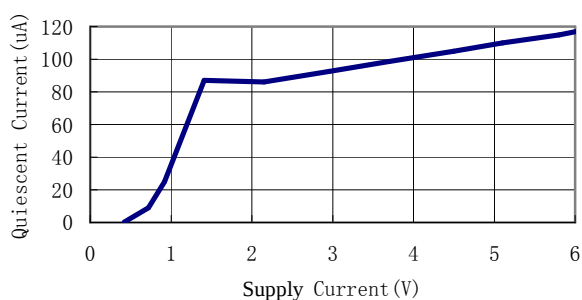
Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
V _{IN}	Operating Input Voltage		2		6	V
V _{FB}	Feedback Voltage		0.190	0.200	0.210	V
I _{FB}	FB Pin Bias Current		10	45	100	nA
I _Q	Quiescent Current	V _{FB} =0.3V		93	120	uA
		V _{CE} =0V		0.4	1.0	uA
FOSC_MAX	Maximum switching Frequency	V _{FB} =0V		2		MHz
I _{Limit}	Switching Current Limit			1.6		A
V _{CESAT}	Switch V _{CESAT}	I _{LX} =300mA		260		mV
I _{LX}	Switching pin Leak Current	V _{LX} =5V		0.11		uA
V _{CEH}	CE Voltage High	V _{CE} =0 to 3V	1.5			V
V _{CEL}	CE Voltage Low	V _{CE} =3 to 0V			0.4	V
I _{CE}	CE Pin Bias Current			18		uA
VOVP	Over Voltage Protection			24		V

TYPICAL PERFORMANCE CHARACTERISTICS

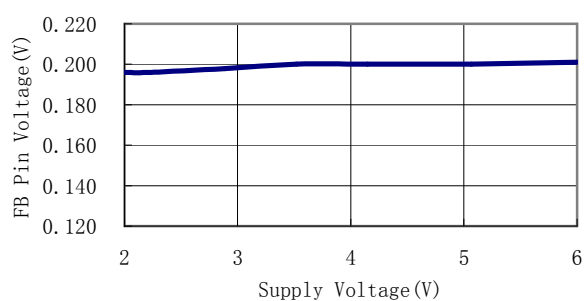
Quiescent Current vs. Supply Voltage
(VCE=0V)



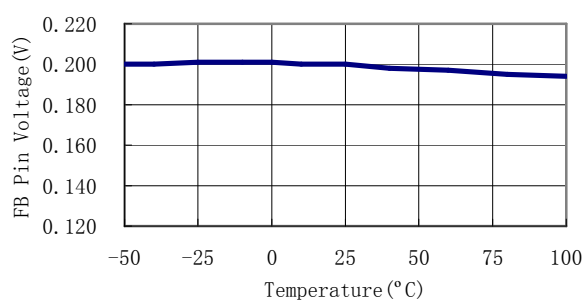
Quiescent Current vs. Supply Voltage
(VCE=VIN, VFB=0.3V)



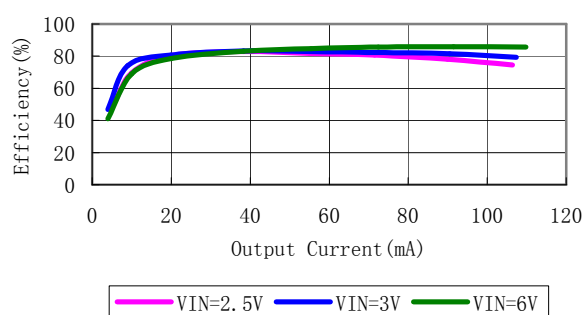
FB Pin Voltage vs. Supply Voltage



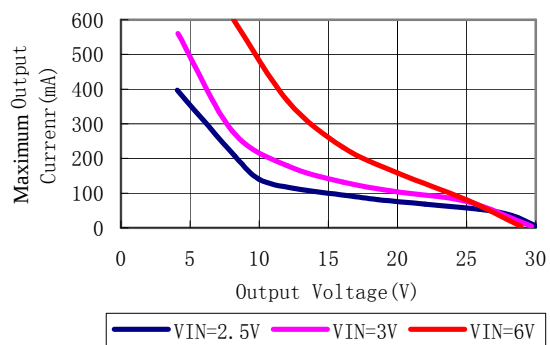
FB Pin Voltage vs. Temperature



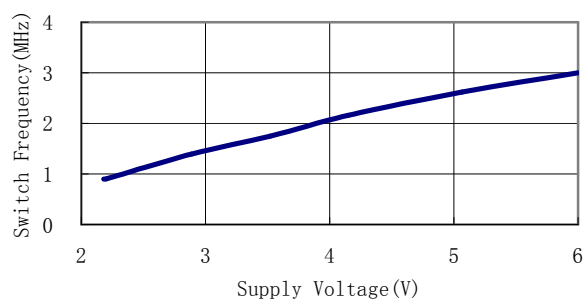
Efficiency vs. Output Current
(4LEDs)



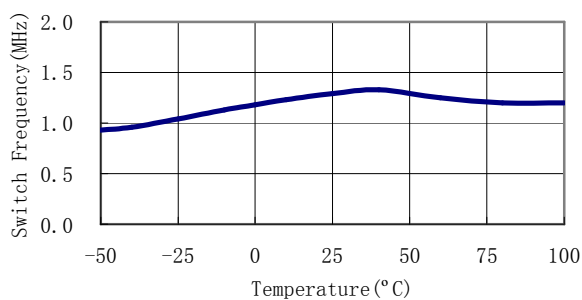
Maximum Output Current vs. Output Voltage



Switch Frequency vs. Supply Voltage
(4LEDs*100mA)



Switch Frequency vs. Temperature
(4LEDs*100mA)



APPLICATION INFORMATION

Dimming Control

1. Using a PWM Signal to CE Pin

When adding the PWM signal to CE pin, the BL8545 is turned on or off by the PWM signal, so the LEDs operate at either zero or full current. The average LED current increase proportionally with the duty cycle of the PWM signal. The frequency range of the PWM signal is from 1 kHz to 300KHz.

2. Using a DC Voltage

From the Figure 2, we can add a DC voltage to FB pin, we adjust the LED current by changing the DC voltage, which control the brightness, DC voltage range is from 0V to 2V.

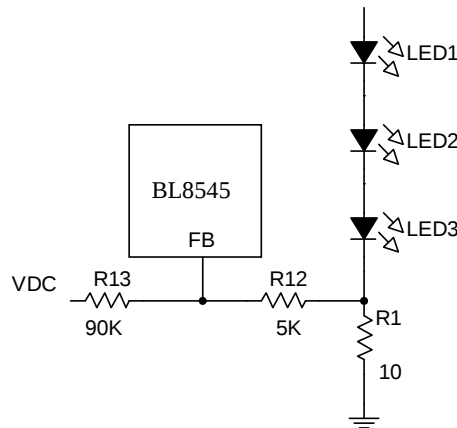


Figure 2. Dimming Control Using a DC Voltage

3. Using a Filtered PWM Signal

The filtered PWM signal can be considered as an adjustable DC voltage. It can be used to replace the variable DC voltage source in dimming control. The circuit is shown in Figure 3.

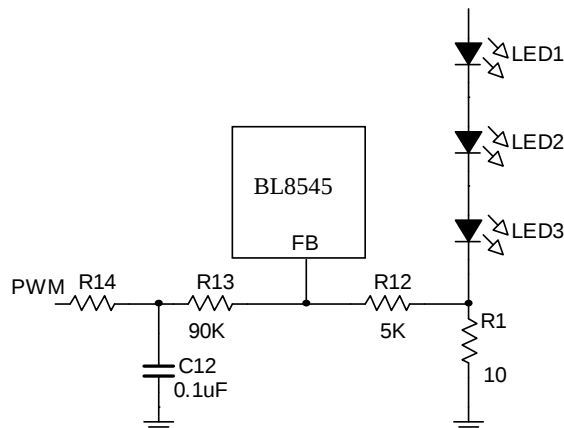


Figure 3. Dimming Control Using a Filtered PWM Signal

PACKAGE INFORMATION

Package Type	SOT-23-6	Number of Devices per reel	3000
Package specification:		Unit: mm	
Technical drawing of the BL8545 package (SOT-23-6) showing dimensions in mm. Top View Dimensions: - Overall Width: 2.9 ± 0.2 - Pin Pitch: 1.9 ± 0.2 - Pin Width: (0.95) - Body Width: $1.6^{+0.2}_{-0.1}$ - Overall Height: 2.8 ± 0.3 - Pin Height: $0.4^{+0.1}_{-0.2}$ Side View Dimensions: - Maximum Height: $1.1^{+0.2}_{-0.1}$ - Pin Width: 0.8 ± 0.1 - Body Width: $0.15^{+0.1}_{-0.05}$ - Pin Length: 0.2 MIN. - Flange Width: $0 \text{ to } 0.1$ Perspective View: Shows the package from an isometric angle.			