高效率、低噪声、PFM升压型 DC/DC转换器

UM1661 *SOT23-6*

描述

UM1661是PFM 升压型DC/DC转换器，能够恒定电流驱动白光LED，来为手机、PDA和其他手持设备提供背光。该器件支持白光LED串联，确保LED电流一致，从而实现均匀亮度。使能引脚可反复输入脉冲，以调节LED亮度。其工作频率范围500kHz至2MHz，允许采用更小的电容和电感。故障状态保护采用逐周期电流限制技术，用于检测最大电感电流并实现过电压保护。0.2V的低基准电压最大限度地减少了电流检测电阻器上的功率损耗。

该转换器的工作电压范围为2V至6V，在使用3V输入电压的4-LED应用中，能提供最大200mA的输出电流。该器件的静态电流低至120uA。所有这些特性使UM1661适用于由单节电池供电的便携式设备。

应用

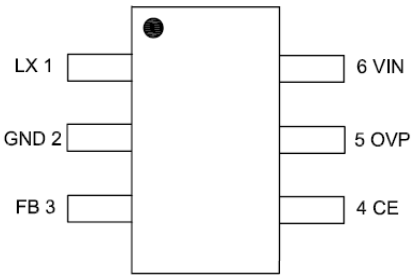
- 紧凑型背光模块
- LED 电源
- 恒流源

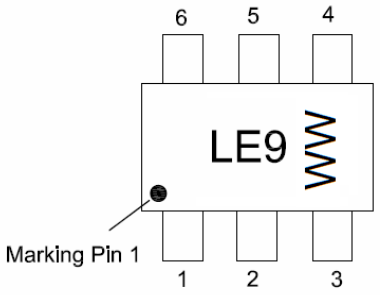
特性

- 最高 24V 输出电压
- 宽工作电压范围：2V 至 6V
- 最大 2MHz 工作频率
- PWM 调光控制
- 关机电流 <1μA
- 逐周期电流限制
- 低电流检测阈值：200mV
- 24V 输出过压保护
- 紧凑型 SOT23-6 封装

引脚配置

顶部视图





WW: Week Code
UM1661
SOT23-6

订购信息

芯片型号	封装类型	丝印编码	发货数量
UM1661	SOT23-6	LE9	3000pcs/7Inch Tape & Reel

Pin Description

Pin Number	Symbol	Function
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

Absolute Maximum Ratings

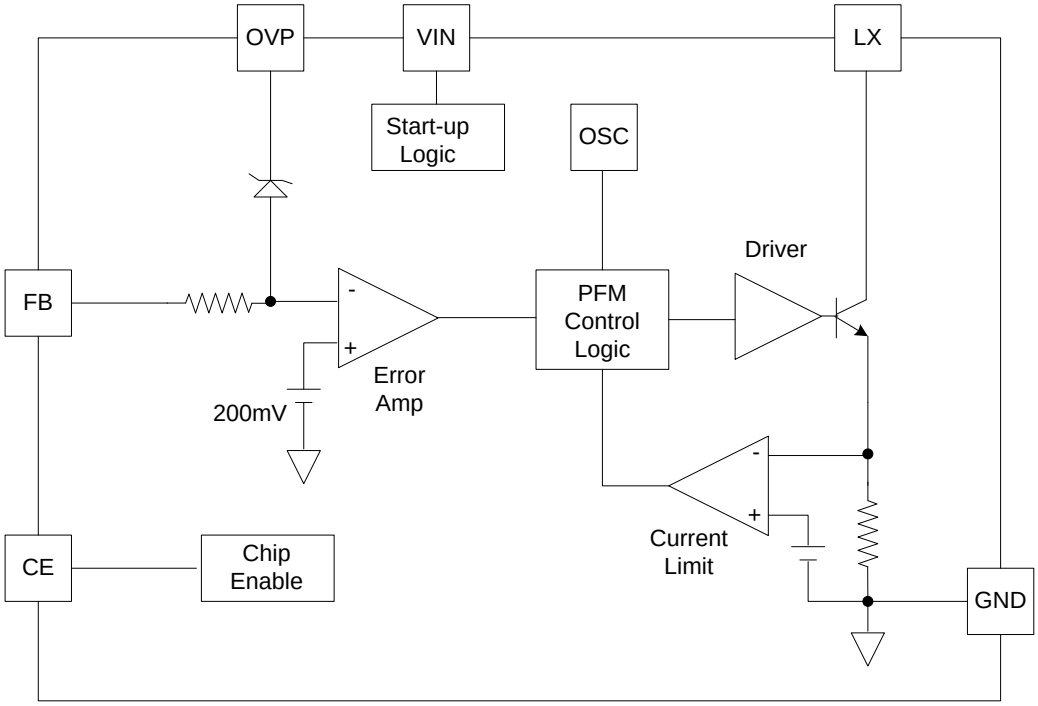
Symbol	Parameter	Value	Unit
V_{IN}	Supply Voltage on VIN	-0.3 to +8.0	V
V_{CE}	Voltages on Pin CE	-0.3 to V_{IN}+0.3	V
I_{LX}	LX Pin Output Current	1.6	A
V_{LX}	LX Pin Voltage	24	V
P_D	Continuous Power Dissipation	250	mW
T_A	Operating Ambient Temperature	-40 to +85	℃
T_J	Operating Junction Temperature	+125	℃
T_{STG}	Storage Temperature Range	-40 to +150	℃
T_L	Maximum Lead Temperature for Soldering 10 Seconds	+260	℃

Electrical Characteristics

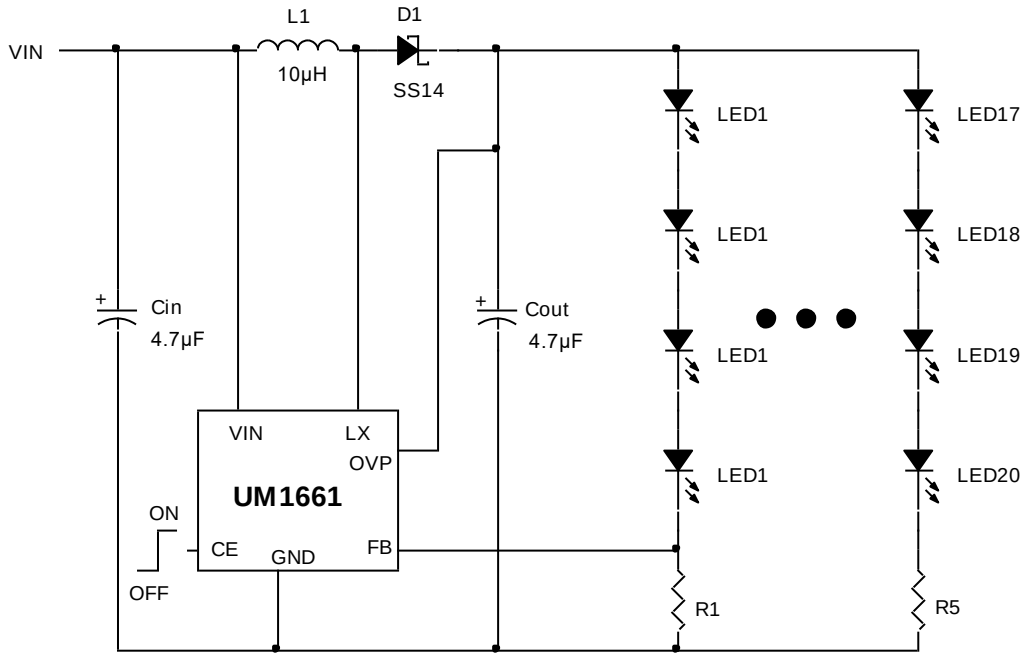
(V_{IN}=3.0V, V_{CE}=3.0V, T_A=25℃, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Input Voltage Range		2.0		6.0	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	μA
		V_{CE}=0V		0.4	1.0	
F_{OSC_MAX}	Maximum Switching Frequency	V_{FB}=0V		2		MHz
I_{Limit}	Switching Current Limit			1.6		A
V_{CESAT}	Switching V_{CESAT}	I_{LX}=300mA		260		mV
I_{LX}	Switching Pin Leak Current	V_{LX}=5V		0.11		μA
V_{CEH}	CE Voltage High	CE=0V to 3V	1.5			V
V_{CEL}	CE Voltage Low	CE=3V to 0V			0.4	V
I_{CE}	CE pin Bias Current			18		μA
V_{OVP}	Over Voltage Protection			24		V

Function Block Diagram

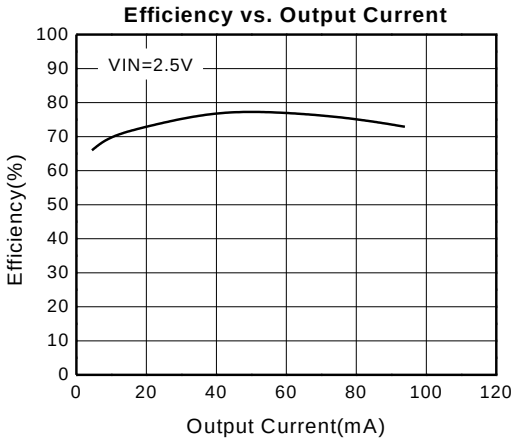


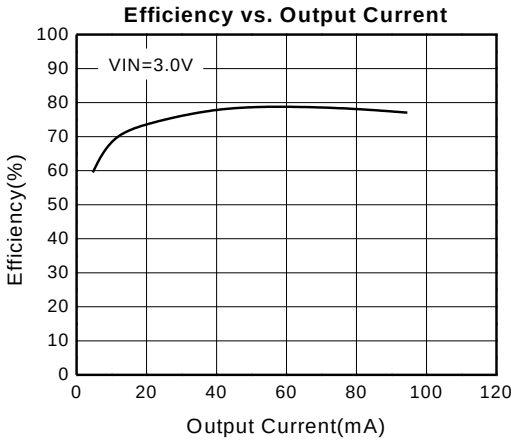
Typical Application Circuit

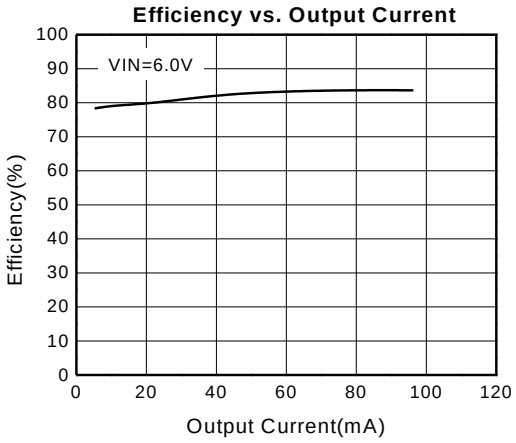


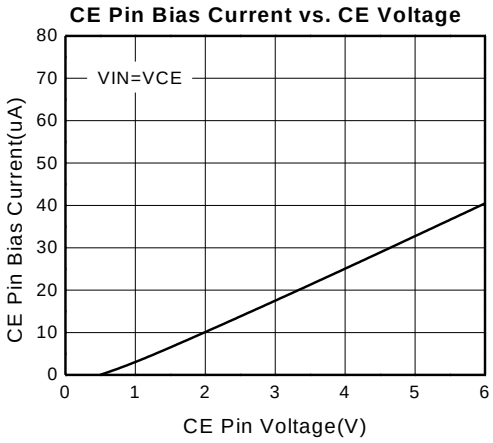
Typical Operating Characteristics

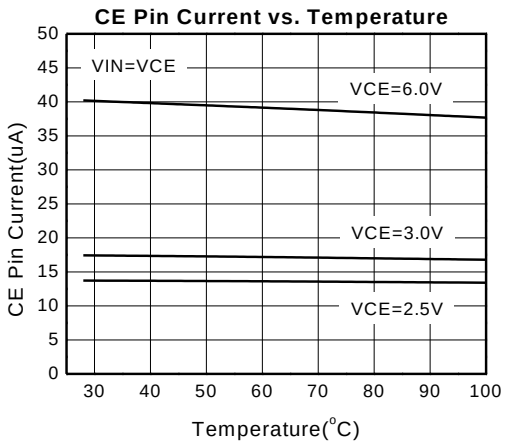
(V_{IN}=3.0V, V_{CE}=3.0V, T_A=25℃, unless otherwise noted)

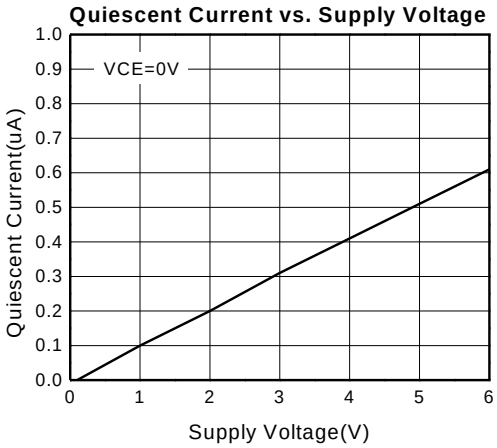






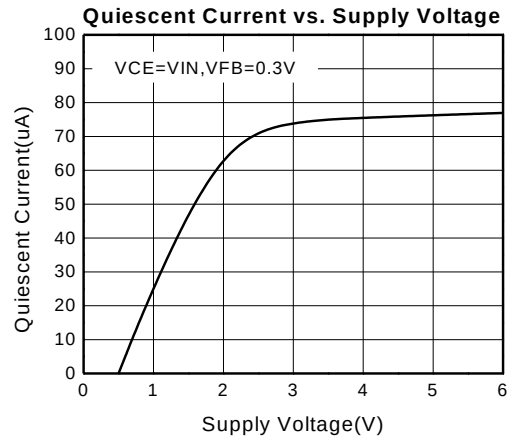


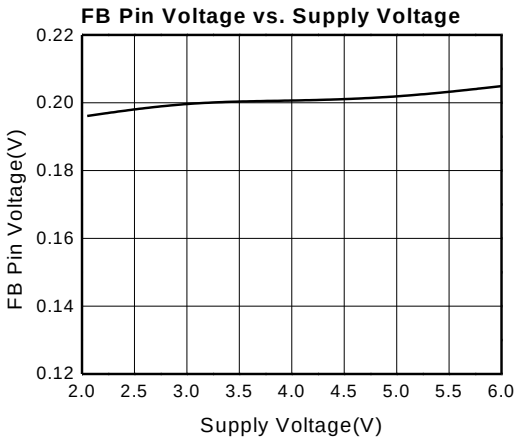


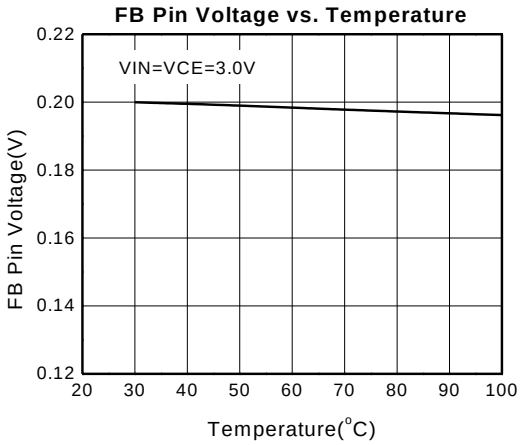


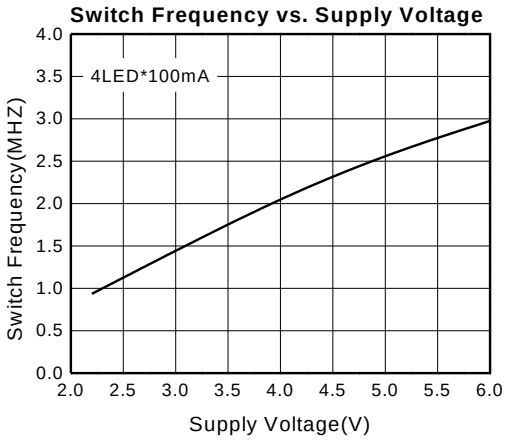
Typical Operating Characteristics (Continued)

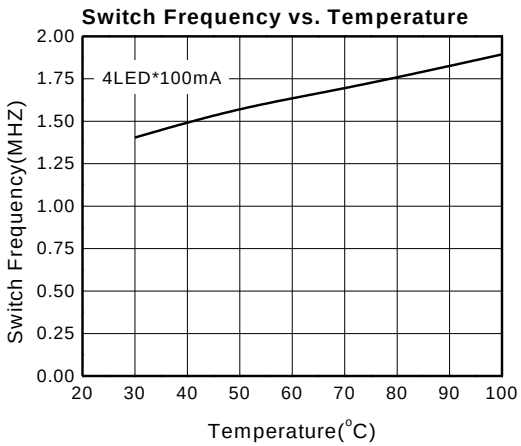
(V_{IN}=3.0V, V_{CE}=3.0V, T_A=25℃, unless otherwise noted)

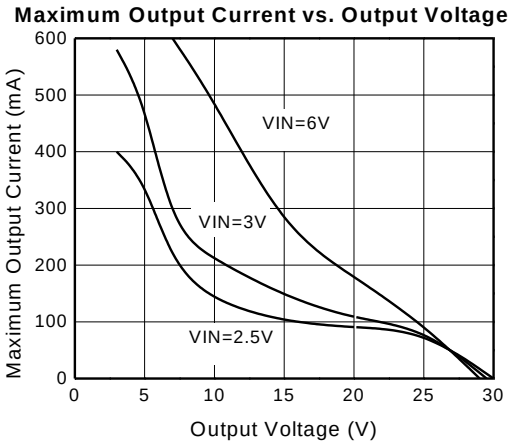












Application Information

LED Current Control

The UM1661 regulates the LED current by setting the current sense resistor (R1) connecting to feedback and ground. The UM1661 feedback voltage (V_{FB}) is 0.20V. The LED current (I_{LED}) can be set by a resistor R1. I_{LED}=0.20/R1. In order to have an accurate LED current, a precision resistor is preferred (1% is recommended).

PWM Dimming Control

When adding the PWM signal to CE pin, the UM1661 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 magnitude of the PWM signal should be higher than the maximum enable voltage of EN pin, in order to let the dimming control perform correctly. The recommended frequency range of the PWM signal is from 100Hz to 100 kHz.

Inductor Selection

The recommended value of inductor is 2.2μH to 10μH. Small size and better efficiency are the major concerns for portable device, such as UM1661 used for mobile phone. The inductor should have low core loss at 2MHz and low DCR for better efficiency. To avoid inductor saturation current rating should be considered.

Capacitor Selection

Input and output ceramic capacitors of 4.7μF are recommended for UM1661 applications. For better voltage filtering, ceramic capacitors with low ESR are recommended. X5R and X7R types are suitable because of their wider voltage and temperature ranges.

Diode Selection

Schottky diode is a good choice for UM1661 because of its low forward voltage drop and fast reverses recovery. Using Schottky diode can get better efficiency. The high speed rectification is also a good characteristic of Schottky diode for high switching frequency. Current rating of the diode must meet the root mean square of the peak current and output average current multiplication as following:

$I_{D(RMS)} \approx (I_{OUT} \times I_{PEAK})^{1/2}$

The diode's reverse breakdown voltage should be larger than the output voltage. SS0520 is recommended Schottky diode for rectifier.

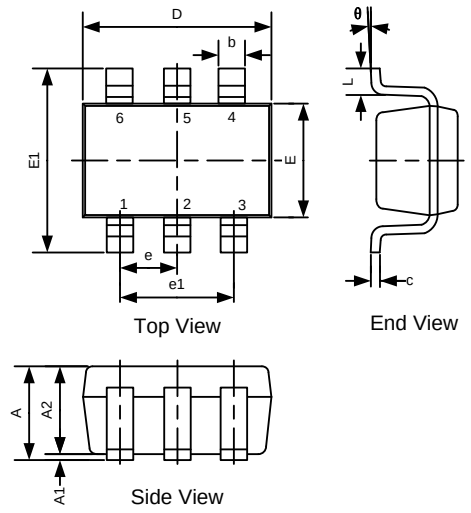
Layout Guide

- A full GND plane without gap break.
- Minimized LX node copper area to reduce EMI.
- Minimized FB node copper area and keep far away from noise sources.

Package Information

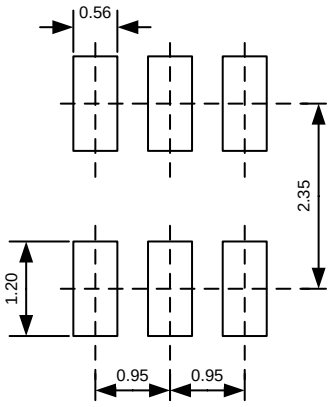
UM1661: SOT23-6

Outline Drawing



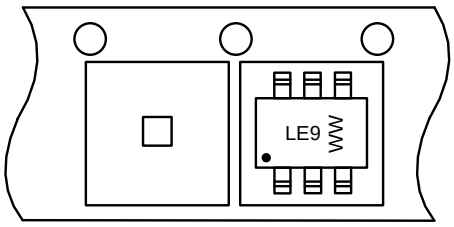
Symbol	DIMENSIONS					
	MILLIMETERS			INCHES		
	Min	Typ	Max	Min	Typ	Max
A	1.013	1.15	1.40	0.040	0.045	0.055
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	1.00	1.10	1.30	0.039	0.043	0.051
b	0.30	-	0.50	0.012	-	0.020
c	0.10	0.15	0.20	0.004	0.006	0.008
D	2.82	-	3.10	0.111	-	0.122
E	1.50	1.60	1.70	0.059	0.063	0.067
E1	2.60	2.80	3.00	0.102	0.110	0.118
e	0.95REF			0.037REF		
e1	1.90REF			0.075REF		
L	0.30	-	0.60	0.012	-	0.024
θ	0°	-	8°	0°	-	8°

Land Pattern



NOTES:
1. Compound dimension: 2.92×1.60;
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



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