

## Device Features

- Dual-Mode 1x and 2x Charge Pump
- $V_{IN}$  Range: 2.7V to 5.5V
- Up to 300mA total drive capability: Three 30mA and One 210mA Channels
- Two Simple PWM Dimming Control Inputs
- 1.2 MHz Constant Switching Frequency
- Built-in Short-Circuit and Thermal Protections
- Soft Start for Reducing Inrush Current
- Under Voltage Lockout Protection
- $I_Q < 1\mu A$  in Shutdown
- Thermally-Enhanced QFN3030-12 Package: Available in "Green" Molding Compound (No Br, Sb)
- Lead Free Finish/ RoHS Compliant

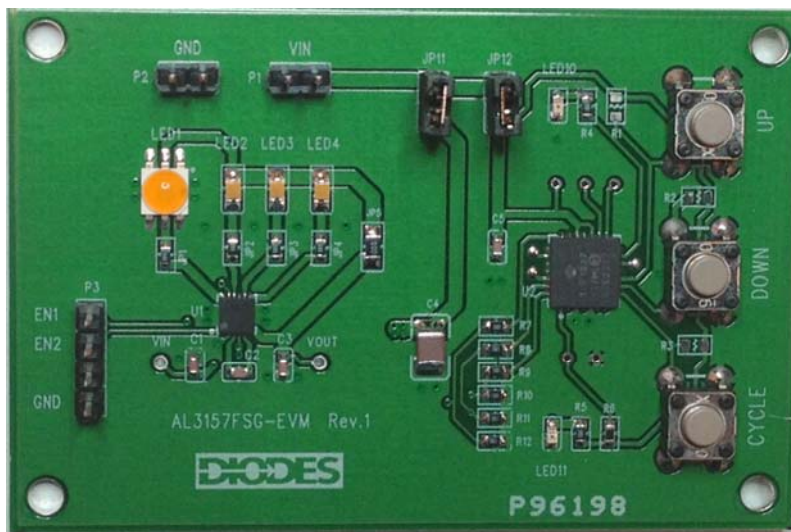
## Description

The AL3157 is a low noise, constant frequency charge pump DC/DC converter that uses a dual-mode load switch (1x) and doubling (2x) conversion for white LED applications. The AL3157 is capable of driving three channels at 30mA for small-screen backlight and an additional channel of up to 210mA for LED flash, all from a 2.7V to 5.5V input. The current sinks may be controlled using two PWM dimming inputs, one for the 30mA channels and one for the 210mA channel. Low external part counts (one  $1\mu F$  flying capacitor and two  $2.2\mu F$  capacitors at  $V_{IN}$  and  $V_{OUT}$ ) make this part ideally suited for small, battery-powered applications.

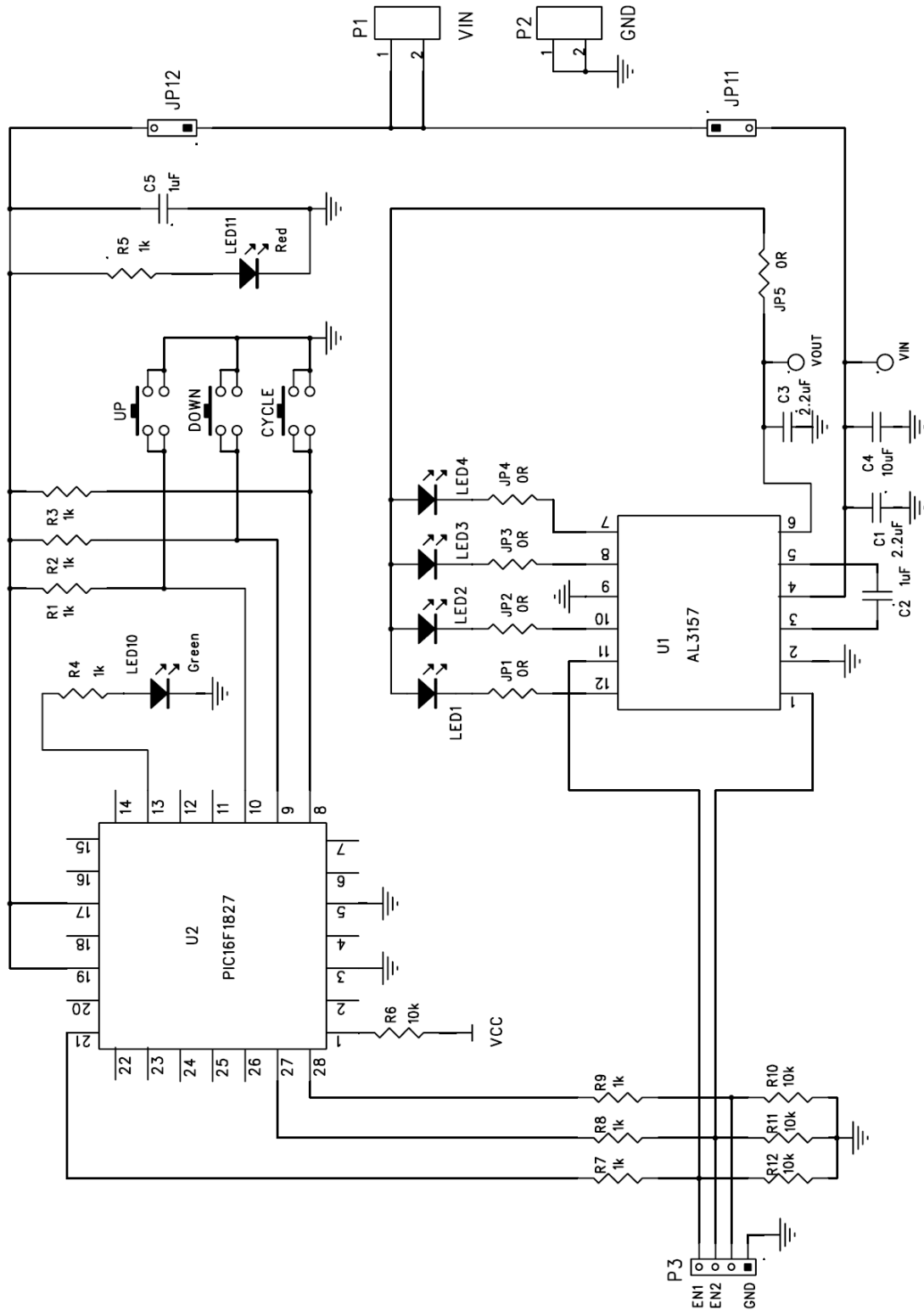
This evaluation board demonstrates the AL3157's ability to control the LED current and perform PWM dimming. The PWM signals are generated by an on-board microcontroller with three push buttons for adjusting current levels.

## Ordering Information

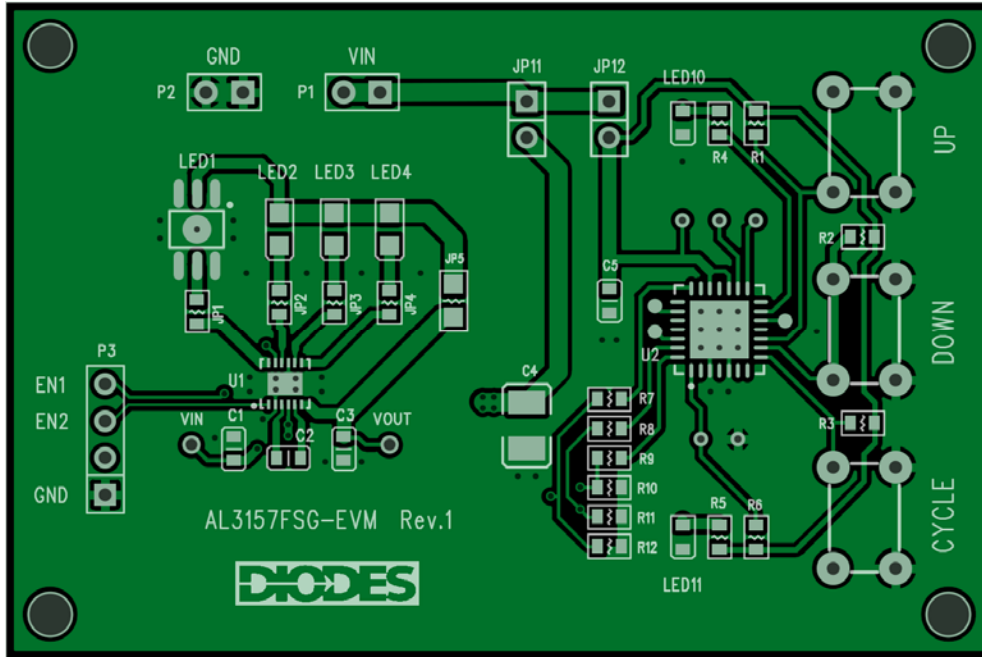
Device	Package Code	Packaging	EVM Part Number
AL3157F	F	DFN3030-12	AL3157FSG-EVM Rev.1



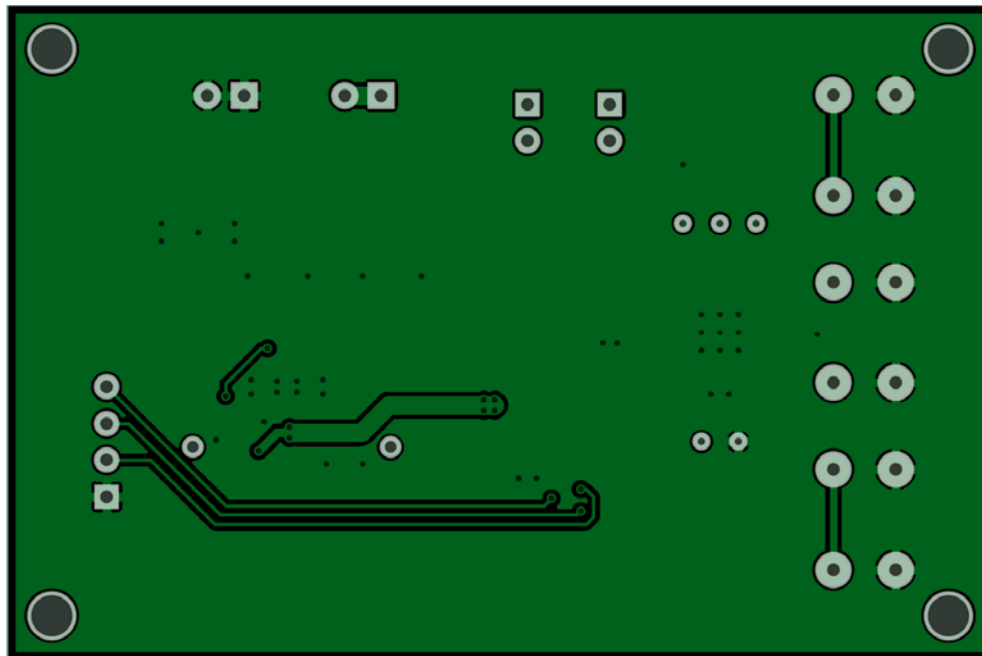
### Schematic



**PCB Layout**



Top Layer Layout of AL3157FSG-EVM Rev.1



Bottom Layer Layout of AL3157FSG-EVM Rev.1

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**Bill of Material**

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**Bill of Material for AL3157FSG-EVM Rev.1**

Ref	Count	Size	Mfr	Part Number	Description
C1, C3	2	0603	STD	STD	2.2 $\mu$ F/10V ceramic capacitor
C2, C5	2	0603	STD	STD	1 $\mu$ F/16V ceramic capacitor
C4	1	1210	STD	STD	10 $\mu$ F/10 ceramic capacitor
LED1	1	SOP6		ASMT-JN11-NTV01	Large WLED
LED2-4	3	0805	STD	STD	Small WLED
LED10	1	0603	STD	STD	Green LED
LED11	1	0603	STD	STD	Red LED
JP1-4	4	0603	STD	STD	0 $\Omega$ resistor
JP5	1	0803	STD	STD	0 $\Omega$ resistor
R1-3	1	0603	STD	STD	Not populated
R4-5, 7-9	5	0603	STD	STD	1 k $\Omega$ resistor
R6	1	0603	STD	STD	10 k $\Omega$ resistor
R10-12	3	0603	STD	STD	100 k $\Omega$ resistor
U1	1	DFN3030-12	Diodes	AL3157F	Charge pump WLED driver
U2	1	QFN6060-28	Microchip	PIC16F1827	8-bit microcontroller

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**I/O Terminals and Test Points**

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**Terminals and Jumpers for AL3157FSG-EVM Rev.1**

I/O and Test Points	Description	Comments
P1 (VIN), P2 (GND)	Power Supply and Ground	Connect to input power supply
P3	Control signal monitoring	Use an oscilloscope to monitor the PWM signals
J11	Input Jumper to AL3157	Jumper for connecting $V_{IN}$ to the AL3157
J12	Input Jumper to PWM control	Jumper for connecting $V_{IN}$ PWM controller circuit
VIN, VOUT	Voltage Test Points	Input and output voltage test points

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**Quick Start Guide**

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1. Insert jumper J11 to connect VIN to the AL3157 and J12 to connect VIN to the onboard PWM controller.
2. Connect a +2.7V~+5.5V power supply between VIN (P1) and GND (P2) headers. Turn on the power supply. The red power indicator LED (LED11) will be on.
3. The PWM controller will enter State 1, where two different PWM signals are sent to the AL3157 to set the current levels of the large flash WLED and the three smaller WLEDs. The LEDs will be dimming from bright to dark and from dark to bright..
4. In State 1, the green LED10 will be blinking. Pressing the UP and DOWN buttons will change the rate at which LED10 blinks and also change the dimming rate of all WLEDs.
5. While in State 1, press the CYCLE button to move the PWM controller to the next state, State 2.
6. Upon entering State 2, the large WLED will be auto-dimming and the small WLEDs will keep the brightness before State 2 was entered.
7. In State 2, press the UP or DOWN button to stop auto-dimming of the large WLED. Then use the UP button to manually increase the brightness of the large WLED and DOWN button to decrease it. Press the CYCLE button again to resume auto-dimming of the large WLED.
8. While in State 2 and the large WLED auto-dimming, press the CYCLE button to move the PWM controller to the next state, State 3.
9. Upon entering State 3, the small WLEDs will be auto-dimming and the large WLED will keep the brightness before State 3 was entered.
10. In State 3, press the UP or DOWN button to stop auto-dimming of the small WLEDs. Then use the UP button to manually increase the brightness of the small WLEDs and DOWN button to decrease it. Press the CYCLE button again to resume auto-dimming of the small WLEDs.
11. While in State 3, press the CYCLE button to enter State 4, where auto-dimming stops and all WLEDs keep their previous brightness.
12. Press the CYCLE button while in State 4 will bring the PWM controller back to State 1.
13. Press and hold the CYCLE button at any time will force the PWM controller to enter State 0. In this state, all WLEDs will be turned off. So will the green LED10. Press the CYCLE button in State 0 will change the PWM controller state to State 1 with all WLEDs auto-dimming.

**Table: PWM Controller Machine States**

<b>Controller State</b>	<b>Green LED (LED10)</b>	<b>Description</b>
0	Off	All WLEDs are turned off
1	Flashing	All WLEDs auto-dimming; press UP and DOWN buttons to change dimming rate.
2	On	Set current level for the large WLED, LED1
3	On	Set current level for the small WLEDs, LED2-4
4	On	All WLEDs keep their current levels constant