AL3159 Evaluation Module

HIGH EFFICIENCY CHARGE PUMP WHITE LED DRIVER

Device Features

- V_{IN} Range: 2.7V to 5.5V
- Up to 93% Max Power Efficiency
- 1% Current Matching Accuracy Between Channels
- Three Simple Logic Decoding LED On/Off Control Inputs
- Low Transition Threshold Voltage Typical 150 mV
- Dual-Mode 1x and 2x Charge Pump
- Drives up to 9 Configurable Channels of LEDs
- 1.2 MHz Constant Switching Frequency
- V_{OUT} short circuit and Thermal Protections
- Soft Start for Reducing Inrush Current
- Under Voltage Lockout Protection
- I_Q <1μA in Shutdown
- Thermally-Enhanced QFN3030-20 Package: Available in "Green" Molding Compound (No Br, Sb)
- Lead Free Finish/ RoHS Compliant

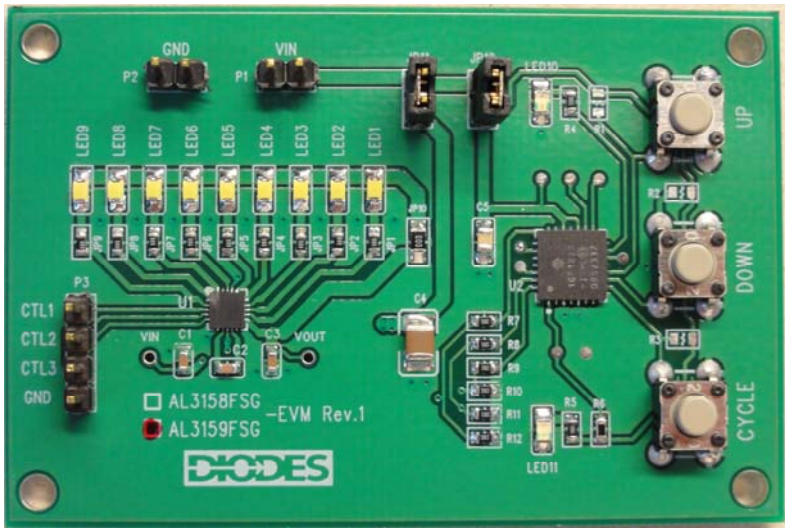
Description

The AL3159 is a low noise, constant frequency charge pump DC/DC converter that uses a dual-mode load switch (1x), and (2x) conversion for white LED applications. The AL3159 is capable of driving three groups of three LED channels at 20mA from a 2.7V to 5.5V input. The current sinks may be operated using three simple logic control inputs individually or in parallel for driving higher current LEDs. Low external part counts (one 1μF flying capacitor and two 2.2μF capacitors at V_{IN} and V_{OUT}) make this part ideally suited for small, battery-powered applications.

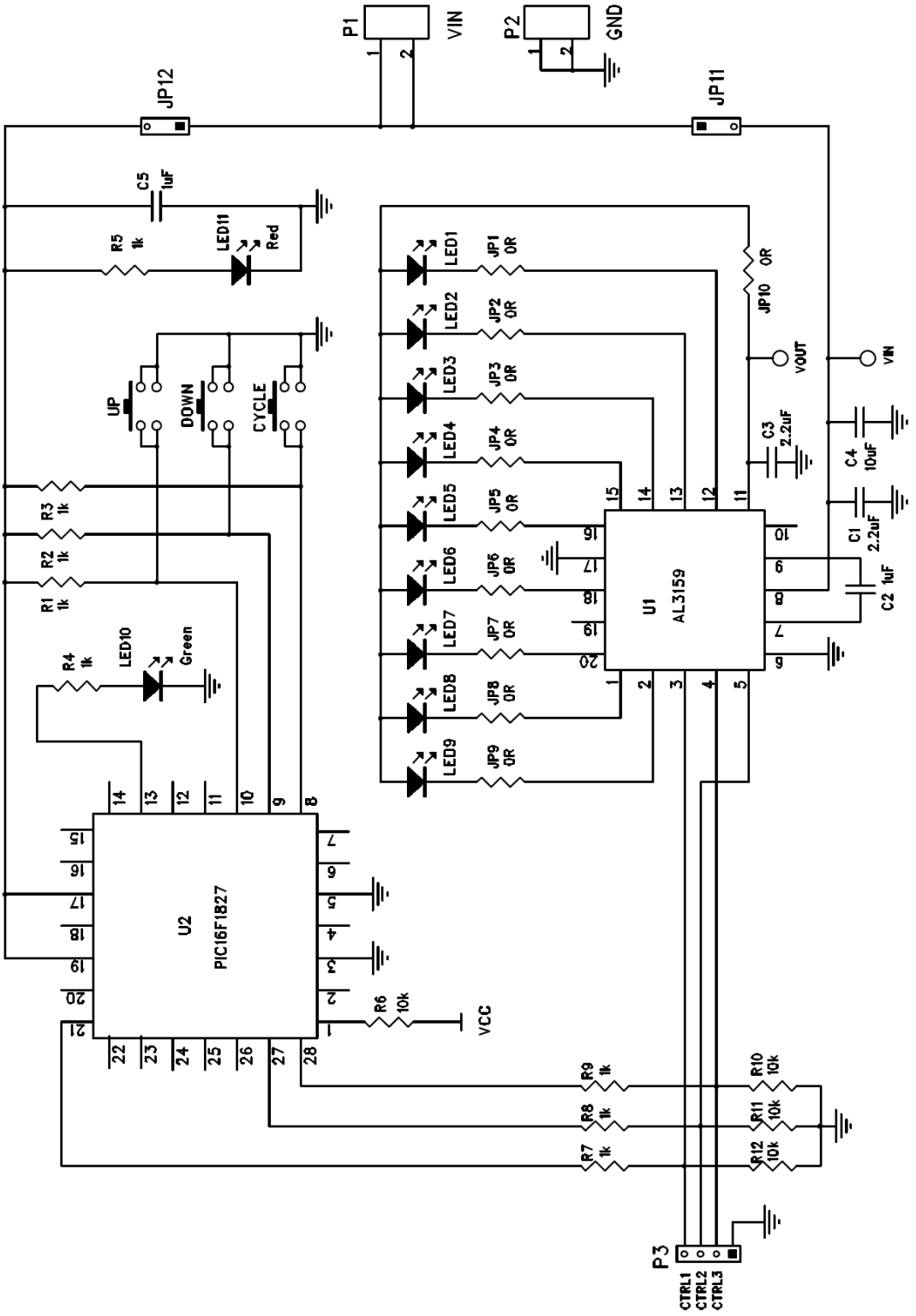
This evaluation board uses the AL3159's three digital inputs to enable and disable the WLED channels. Each input controls three WLEDs. The digital signals are generated by an on-board microcontroller.

Ordering Information

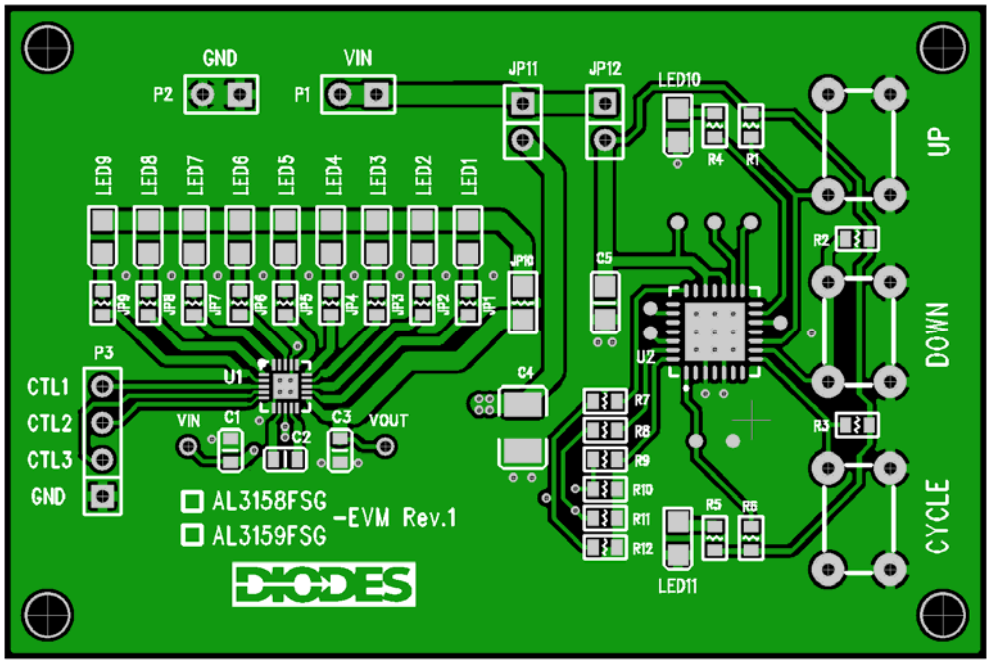
Device	Package Code	Packaging	EVM Part Number
AL3159FSG	FS	DFN3030-20	AL3159FSG-EVM Rev.1



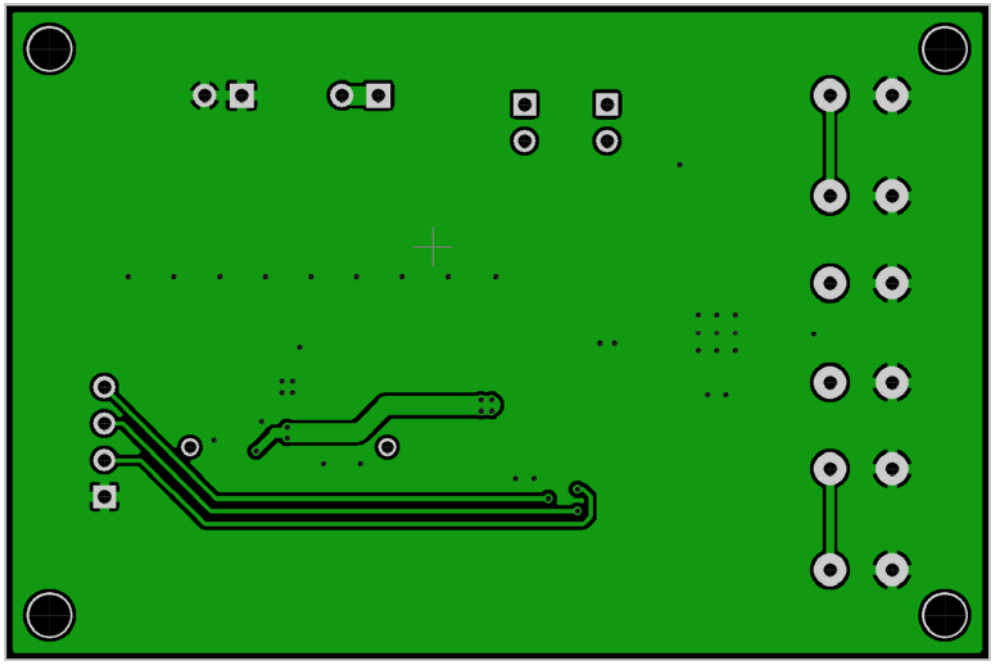
Schematic



PCB Layout



Top Layer Layout of AL3159FSG-EVM Rev.1



Bottom Layer Layout of AL3159FSG-EVM Rev.1

Bill of Material

Bill of Material for AL3159FSG-EVM Rev.1

Ref	Count	Size	Mfr	Part Number	Description
C1, C3	2	0603	STD	STD	2.2 µF/10V ceramic capacitor
C2	1	0603	STD	STD	1 µF/16V ceramic capacitor
C4	1	1210	STD	STD	10 µF/10 ceramic capacitor
C5	1	0805	STD	STD	1 µF/10V ceramic capacitor
LED1-9	9	0805	STD	STD	White LED
LED10	1	0805	STD	STD	Green LED
LED11	1	0805	STD	STD	Red LED
JP1-9	9	0603	STD	STD	0 Ω resistor
JP10	1	0803	STD	STD	0 Ω resistor
R1-3	1	0603	STD	STD	Not populated
R4-5, 7-9	5	0603	STD	STD	1 kΩ resistor
R6	1	0603	STD	STD	10 kΩ resistor
R10-12	3	0603	STD	STD	100 kΩ resistor
U1	1	DFN3030-20	Diodes	AL3159SFG	Charge pump WLED driver
U2	1	QFN6060-28	Microchip	PIC16F1827	8-bit microcontroller

I/O Terminals and Test Points

Terminals and Jumpers for AL3159FSG-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 o'scope to monitor the control signals
J11	Input Jumper to AL3159	Jumper for connecting V_{IN} to the AL3159
J12	Input Jumper to controller	Jumper for connecting V_{IN} controller circuit
VIN, VOUT	Voltage Test Points	Input and output voltage test points

Quick Start Guide

1. Insert jumper J11 to connect V_{IN} to the AL3159 and J12 to connect V_{IN} to the onboard 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) should be on.
3. The controller will enter State 1, where three control signals are sent to the AL3159 to select the combination of WLEDs to be turned on. The controller will auto-scan the WLEDs with eight combinations.
4. In State 1, the green LED (LED10) will be blinking. Pressing the UP and DOWN buttons will change the rate at which the LED10 blinks and also change the scanning rate of the WLEDs.
5. Press the CYCLE button to move the controller to the next state. Every time the controller enters a new state between States 2 and 8, the corresponding LED group will be turned on while the other WLEDs off.
6. Press the CYCLE button while in State 8 will bring the controller back to State 1.
7. Press and hold the CYCLE button at any time will force the controller to enter State 0. In this state, all WLEDs (LED1-9) will be turned off. So will the green LED (LED10). Press the CYCLE button in State 0 will change the controller state to State 1.

Table: Controller Machine States

Controller State	Green LED (LED10)	Description
0	Off	All WLEDs are turned off
1	Flashing	Auto-scanning; UP/DOWN buttons change scanning rate.
2	On	Turn on LED1-2
3	On	Turn on LED3-5
4	On	Turn on LED6-9
5	On	Turn on LED9
6	On	Turn on LED8-6
7	On	Turn on LED5-1
8	On	All WLEDs (LED1-9) are on