

***Evaluation Board for the AAT3103
Low-Cost Three-Channel Charge-Pump LED Driver***

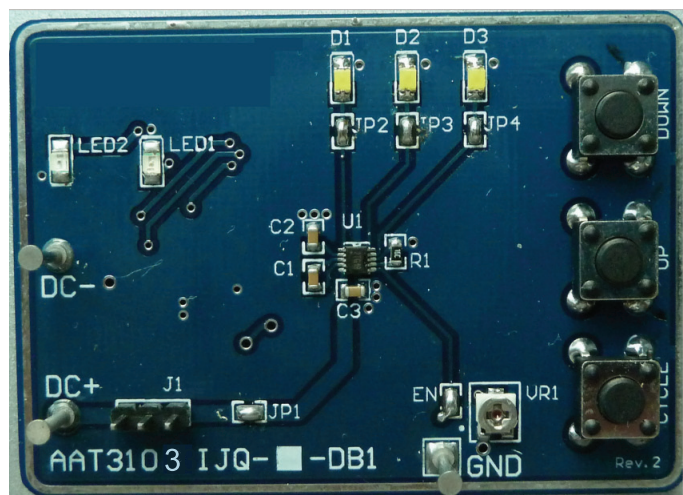
Introduction

The AAT3103 EVAL board demonstrates the functionality of the AAT3103 and its application as a white LED driver. The AAT3103 is a charge-pump based, current-source white LED driver capable of driving LEDs up to 30mA each. The AAT3103 drives one to three WLEDs. The AAT3103 automatically switches between 1x mode and 2x mode to maintain the highest efficiency and optimal LED current accuracy and matching over a wide input voltage range (2.7V ~ 5.5V).

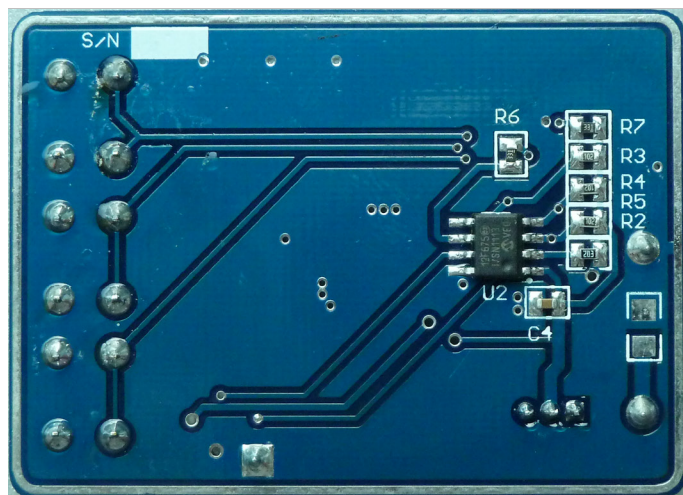
The AAT3103-1/-2 are programmable with Skyworks S²Cwire™ (Simple Serial Control) serial interface. The LED constant current levels are set with 16 steps in the AAT3103-1, and 8 steps in the AAT3103-2. The AAT3103-4 uses a PWM interface to control LED current by modulation of the PWM signal duty cycle.

This document describes the evaluation board and its accompanying user interface. A brief "Getting Started" section is also included to help the user quickly begin operating the evaluation board. A schematic of the complete circuit appears in Figure 2; Figure 5 and Figure 6 depict the actual board layout. For additional information, please consult the AAT3103 product datasheet.

Board Picture



(a) Top Side



(b) Bottom Side

Figure 1: AAT3103 Evaluation Board Pictures.

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Schematic

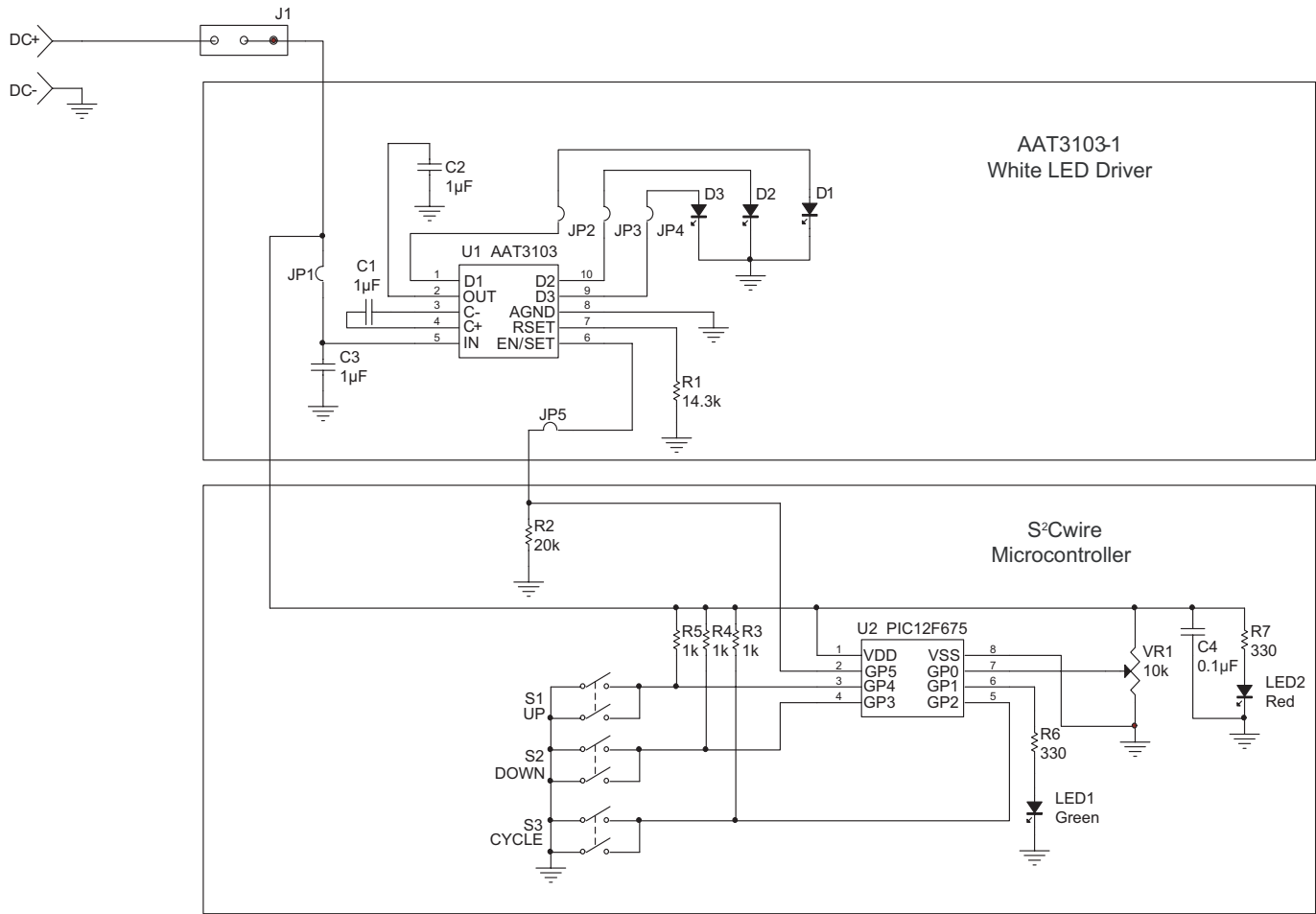


Figure 2: AAT3103-1/-2/-4 Evaluation Board Schematic.

Getting Started

The board has two terminals labeled DC- and DC+ for the input power supply connections. A jumper is inline with the supply bus for connecting/disconnecting power (J1) to MCU. To apply power to the board, set the J1 jumper to the left; the red LED2 should illuminate, indicating that power has been connected to the board. Short line jumper is to connect the AAT3103 power IN into the power line. The green LED1 should flash once when the interface line has a change (S²C signal written or PWM signal duty change). For operation with the accompanying microcontroller and user interface, ensure that the jumper EN is connected. The user interface is provided by three buttons: CYCLE, UP and DOWN. To AAT3103-1/-2, the three buttons are used to transfer S²C signal; to AAT3103-4, the three buttons are used to transfer PWM signal. VR1 is used to change the PWM frequency from 1.6kHz to 14kHz. Only when any one of the three buttons is pressed, the changed PWM frequency is valid.

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CYCLE, UP and DOWN Button Usage in AAT3103-1/-2

The modes of operation are detailed in Table 1. Each button controls a particular function. The WLED current value is shown in Figure 3.

- Up button: The Up button increments the number of EN edges according to Table 1. By holding down the Up button for more than 1.5 seconds, the microcontroller enters auto-increment mode.
- Down button: The Down button decrements the number of EN edges according to Table 1. By holding down the Down button for more than 1.5 seconds, the microcontroller enters auto-decrement mode.
- Cycle button: The Cycle button toggles on/off auto-cycling. The UP button increments to the next number of EN/SET edges.
- Cycle + Up + Down button: Enable line is pulled low. All WLEDs are turned off.

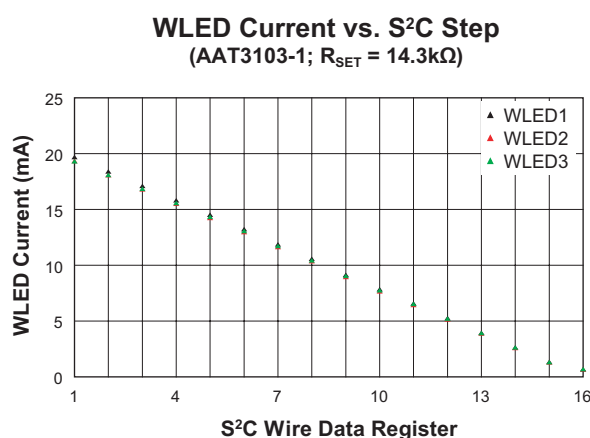


Figure 3: Programming the AAT3103-1 LED Current with R_{SET} = 14.3k Ω .

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CYCLE, UP and DOWN Button Usage in AAT3103-4

The modes of operation are detailed in Table 2. Each button controls a particular function. The WLED current value is shown in Figure 4.

- Up button: The Up button increments the duty of the PWM signal by 5% based on current duty. By holding down the Up button for more than 1.5 seconds, the microcontroller enters auto-increment mode.
- Down button: The Down button decrements the duty of the PWM signal by 5% based on current duty. By holding down the Down button for more than 1.5 seconds, the microcontroller enters auto-decrement mode.
- Cycle button: When cycle button is pressed, the duty of PWM signal will increment or decrement the duty by 5% step. MCU will set the duty up or down cycle based on the current duty value and latest duty up or down status. The auto duty changing range is from 10% to 100%.
- Cycle + Up + Down button: Enable line is pulled low. All WLEDs are turned off.

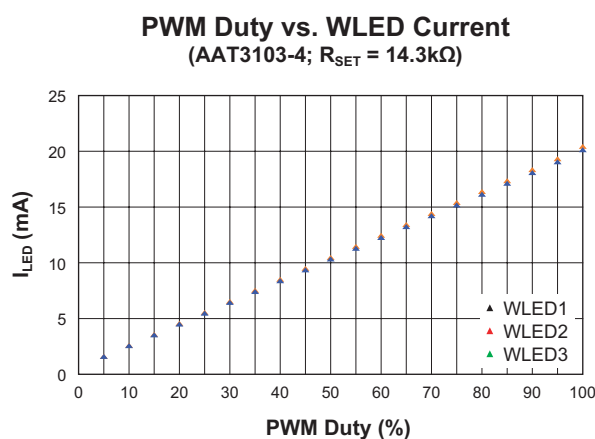


Figure 4: Programming the AAT3103-4 LED Current with $R_{SET} = 14.3k\Omega$.

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User Interface Functionality

Button(s) Pushed	Description
Up	[Push/Release once] Increment the number of EN edges. Toggles through the available brightness level settings for the backlighting section. [Holding 1.5 sec.+] Auto-increment through the settings.
Down	[Push/Release once] Decrement the number of EN/SET edges. Toggles through the available dimming level settings for the backlighting section. [Holding 1.5 sec.+] Auto-decrement through the settings.
Cycle	[Push/Release once] Toggle on/off auto-cycling. Auto-increments EN/SET edges and cycles through the available brightness level settings.
Cycle + Up + Down	Reset. Enable line is pulled low.

Table 1: AAT3103-1/-2 User Interface Functions.

Button(s) Pushed	Description
Up	[Push/Release once] Increment the duty of the PWM signal by 5%. [Holding 1.5 sec.+] Auto-increment the duty from 10% to 100% by 5% step.
Down	[Push/Release once] Decrement the duty of the PWM signal by 5%. [Holding 1.5 sec.+] Auto-decrement through the settings.
Cycle	[Push/Release once] Auto-cycling. The duty changing range from 10% to 100% with 5% step.
Cycle + Up + Down	Reset. Enable line is pulled low.

Table 2: AAT3103-4 User Interface Functions.

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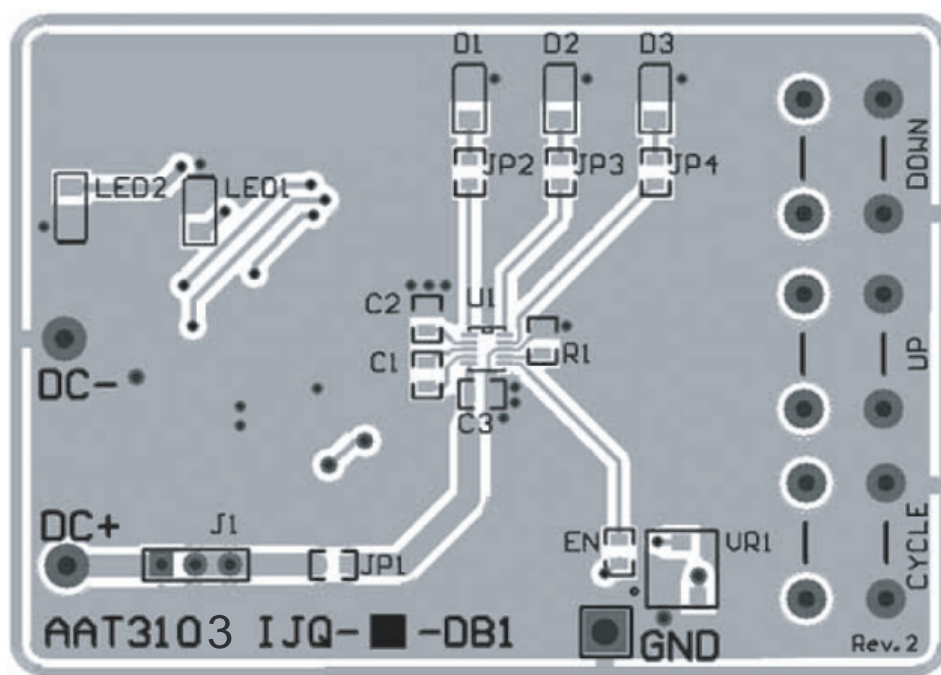
Layout

Figure 5: AAT3103 Evaluation Board Top Layer.

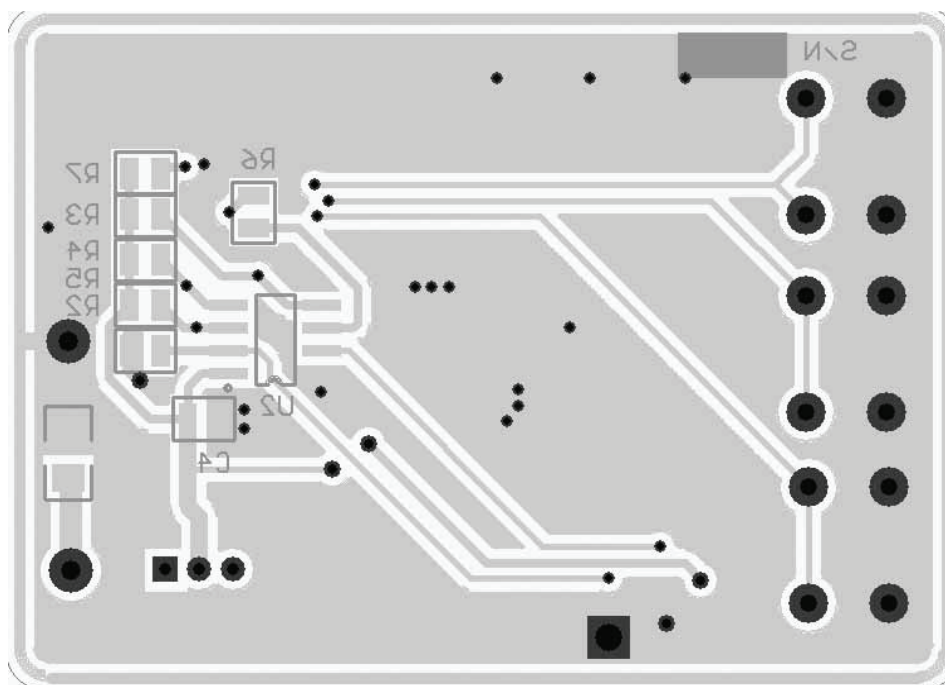


Figure 6: AAT3103 Evaluation Board Bottom Layer.

Evaluation Board for the AAT3103
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AAT3103 EVAL Component Listing

Component	Part Number	Description	Manufacturer
U1	AAT3103	Low-Cost 2-/3-Channel Charge-Pump LED Drivers	Skyworks
U2	PIC12F675	8-Pin FLASH-Based 8-Bit CMOS Microcontrollers	Microchip
C1, C2, C3	GRM188R61A105K	Cap Ceramic 1 μ F 10V X5R 0603 10%	Murata
C4	GRM21BR71E104K	Cap Ceramic 0.1 μ F 25V X7R 0805 10%	Murata
R1	RC0603FR-0714K3L	RES 14.3K Ω 1/10W 1% 0603 SMD	Yageo
R2	RC0603FR-0720KL	RES 20K Ω 1/10W 1% 0603 SMD	Yageo
R3, R4, R5	RC0603FR-071KL	RES 1K Ω 1/10W 1% 0603 SMD	Yageo
R6, R7	RC0603FR-07330RL	RES 330 Ω 1/10W 1% 0603 SMD	Yageo
VR1		Resistors, variable 10K SMD	
D1, D2, D3	RS--0805UW	White LED	Readystar Electronics
LED1		Green LED	
LED2		Red LED	
S1, S2, S3		6 \times 6 \times 4.3 press-button	

Table 3: AAT3103 EVAL Board Component List.

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