EV153

Evaluation Board for the AAT2847 Four-Channel Backlight Driver with Dual LDOs

Introduction

The AAT2847 is a highly integrated power solution for single cell Li-Ion/Polymer based liquid crystal display (LCD) display applications. It includes a four channel light emitting diode (LED) backlight driver and two integrated 200mA low dropout voltage regulators (LDOs) as additional power supplies for display and camera related chipsets.

The backlight driver in the AAT2847 is a low noise tri-mode DC/DC charge pump converter. Each of the four channels of the backlight driver is capable of delivering up to 20mA of bias current for white LEDs. The white LED (WLED) backlight bias current matching is 1%, which helps provide uniform display brightness.

Skyworks' AS^{2}Cwire™ (Advanced Simple Serial Control) serial digital interface is used to enable, disable, and set the current for each backlight LED channel. Each LED channel has sixteen available current level settings in three separate current scales, plus four available current level settings on a low level current scale.

Each LED channel is equipped with built-in short circuit protection and auto disable functionality. A low shutdown current feature disconnects the load from the input and reduces quiescent current to less than 1µA.

The AAT2847 is available in the thermally enhanced 20-pin 3x4x0.75mm TQFN package.

Getting Started

To apply power to the board, connect the supply by shorting the ON prong to the other prongs in the J1 header. After shorting the ON prong, the red LED7 should illuminate which indicates that power is connected to the AAT2847 and microcontroller (MCU). To allow the MCU to interact with the AAT2847, connect/short the ON prong to the other prongs in the J4 header. Also to enable LDOA, connect/short the ON prong to the middle prong on the J2 header. Conversely to enable LDOB, connect/short the ON prong to the middle prong on the J3 header.

The user interface is provided by three buttons. The buttons are DATA, LIGHT, and SW. The modes of operation are detailed in Table 1. Each button handles a particular function: LIGHT turns on/off the D1-D4 LEDs, DATA increments the data register value of the targeted address, SW increments the target address of the AS^{2}Cwire interface, and LIGHT+DATA+SW resets the MCU and turns off the AAT2847.

When the DATA button is pressed and not released, the MCU will incrementally auto-cycle through the available values of the data register for the target address after a short delay. For a detailed device functionality description, regarding address functionality and available data register values, please consult the AAT2847 data sheet.

<table>
<tr><th>Button(s) Pressed/Released</th><th colspan="3">Description</th></tr>
<tr><td>LIGHT</td><td colspan="3">Turns on/off D1-D4 LEDs</td></tr>
<tr><td>DATA</td><td colspan="3">Increments [cycles through when not released] data of targeted address (previously pressed/released SW button): see “SW”</td></tr>
<tr><td rowspan="6">SW</td><td colspan="3">Increments the target address [default (address 0)]:</td></tr>
<tr><td>Button Press/Release</td><td>Address</td><td>Decription</td></tr>
<tr><td>1st</td><td>3</td><td>Max Current Scale</td></tr>
<tr><td>2nd</td><td>4</td><td>Low Current Scale</td></tr>
<tr><td>3rd</td><td>5</td><td>Independent LED Control</td></tr>
<tr><td>4th, repeat</td><td>0</td><td>D1-D4 Current Control</td></tr>
<tr><td>LIGHT+DATA+SW</td><td colspan="3">Reset. EN/SET is held logic low</td></tr>
</table>

Table 1: User Interface Functionality.

Schematic

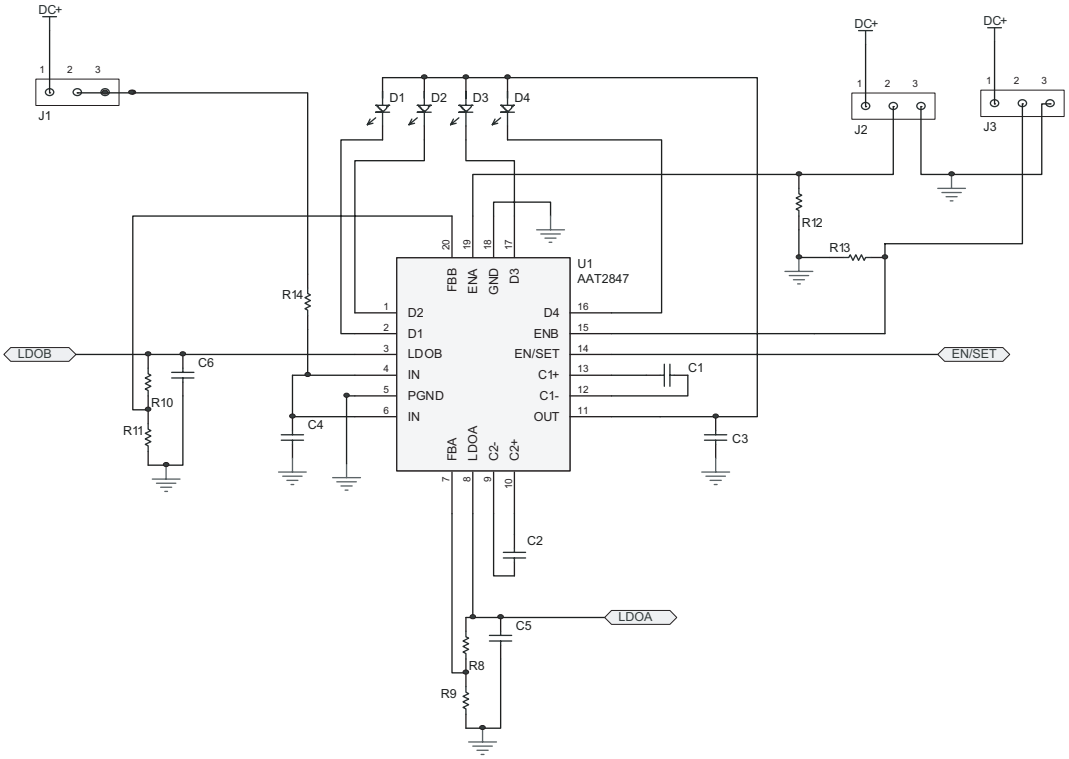

Figure 1: AAT2847 Section Schematic of the Evaluation Board.

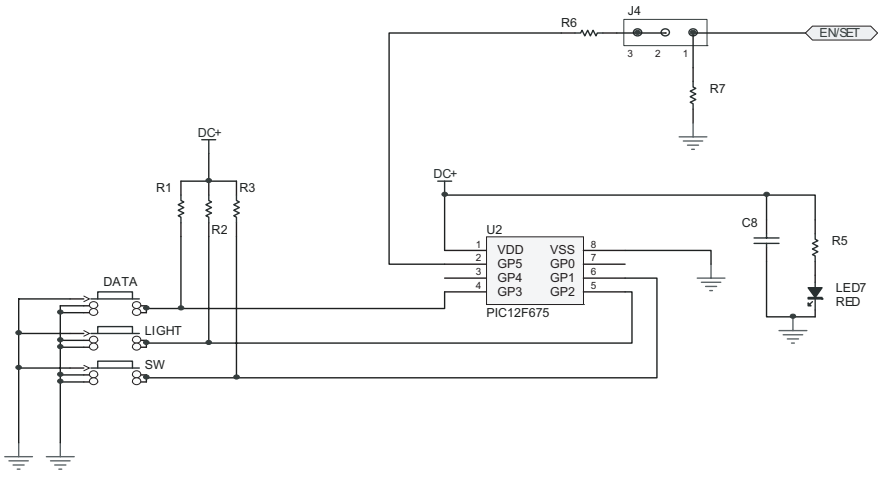

Figure 2: PIC12F675 Section Schematic of the Evaluation Board.

Bill of Materials (BOM)

Component	Part Number	Description	Manufacturer
U1	AAT2847-QI/QG	4-Channel Backlight Driver with Fixed Output Voltage Dual LDOs	Skyworks
U2	PIC12F675	Microcontroller	Microchip
C1-C3, C8	0603ZD105K	1µF, ≥10V, X5R or X7R	AVX
	C1608X5R1E105K		TDK
	GRM188R61C105K		Murata
C4	C1608X5R1A475K	4.7µF, ≥10V, X5R or X7R	TDK
	LMK107BJ475K		Taiyo Yuden
C5, C6	0603ZD225K	2.2µF, ≥10V, X5R or X7R	AVX
	C1608X5R1C225K		TDK
	GRM188R61A225K		Murata
D1-D4	LW M67C	White LED	Osram
LED7	CMD15-21SRC	Red LED; 1206	CML Innovative Tech, Inc
R1-R3	CRCW06031001F	1kΩ, 1%, 1/10W, 0603	Vishay
R4	N/A	N/A	N/A
R5	CRCW0603330RF	330Ω, 1%, 1/10W, 0603	Vishay
R6	CRCW06030000F	0Ω, 1%, 1/10W, 0603	Vishay
R7	CRCW06031003F	100kΩ, 1%, 1/10W, 0603	Vishay
R8-R11	Open	N/A	N/A
R12-R13	CRCW06031002F	10kΩ, 1%, 1/10W, 0603	Vishay
R14	CRCW120650000F	0Ω, 1%, 1/4W, 1206	Vishay
DATA, LIGHT, SW	PTS645TL50	Switch Tact, SPST, 5MM	ITT Industries
J1-J4	PRPN401PAEN	Connecting Header, 2mm	Sullins Electronics

Table 2: AAT2847-QI/QG Component Listing.

Component	Part Number	Description	Manufacturer
U1	AAT2847-EE	4-Channel Backlight Driver with Adjustable Output Voltage Dual LDOs	Skyworks
U2	PIC12F675	Microcontroller	Microchip
C1-C3, C8	0603ZD105K	1µF, ≥10V, X5R or X7R	AVX
	C1608X5R1E105K		TDK
	GRM188R61C105K		Murata
C4	C1608X5R1A475K	4.7µF, ≥10V, X5R or X7R	TDK
	LMK107BJ475K		Taiyo Yuden
C5, C6	0603ZD225K	2.2µF, ≥10V, X5R or X7R	AVX
	C1608X5R1C225K		TDK
	GRM188R61A225K		Murata
D1-D4	LW M67C	White LED	Osram
LED7	CMD15-21SRC	Red LED; 1206	CML Innovative Tech, Inc
R1-R3	CRCW06031001F	1kΩ, 1%, 1/10W, 0603	Vishay
R4	N/A	N/A	N/A
R5	CRCW0603330RF	330Ω, 1%, 1/10W, 0603	Vishay
R6	CRCW06030000F	0Ω, 1%, 1/10W, 0603	Vishay
R7	CRCW06031003F	100kΩ, 1%, 1/10W, 0603	Vishay
R8	CRCW06036042F	60.4kΩ, 1%, 1/10W, 0603	Vishay
R9, R11	CRCW06031203F	120kΩ, 1%, 1/10W, 0603	Vishay
R10	CRCW06031603F	160kΩ, 1%, 1/10W, 0603	Vishay
R12-R13	CRCW06031002F	10kΩ, 1%, 1/10W, 0603	Vishay
R14	CRCW120650000F	0Ω, 1%, 1/4W, 1206	Vishay
DATA, LIGHT, SW	PTS645TL50	Switch Tact, SPST, 5MM	ITT Industries
J1-J4	PRPN401PAEN	Connecting Header, 2mm	Sullins Electronics

Table 3: AAT2847-EE Component Listing.

Printed Circuit Board

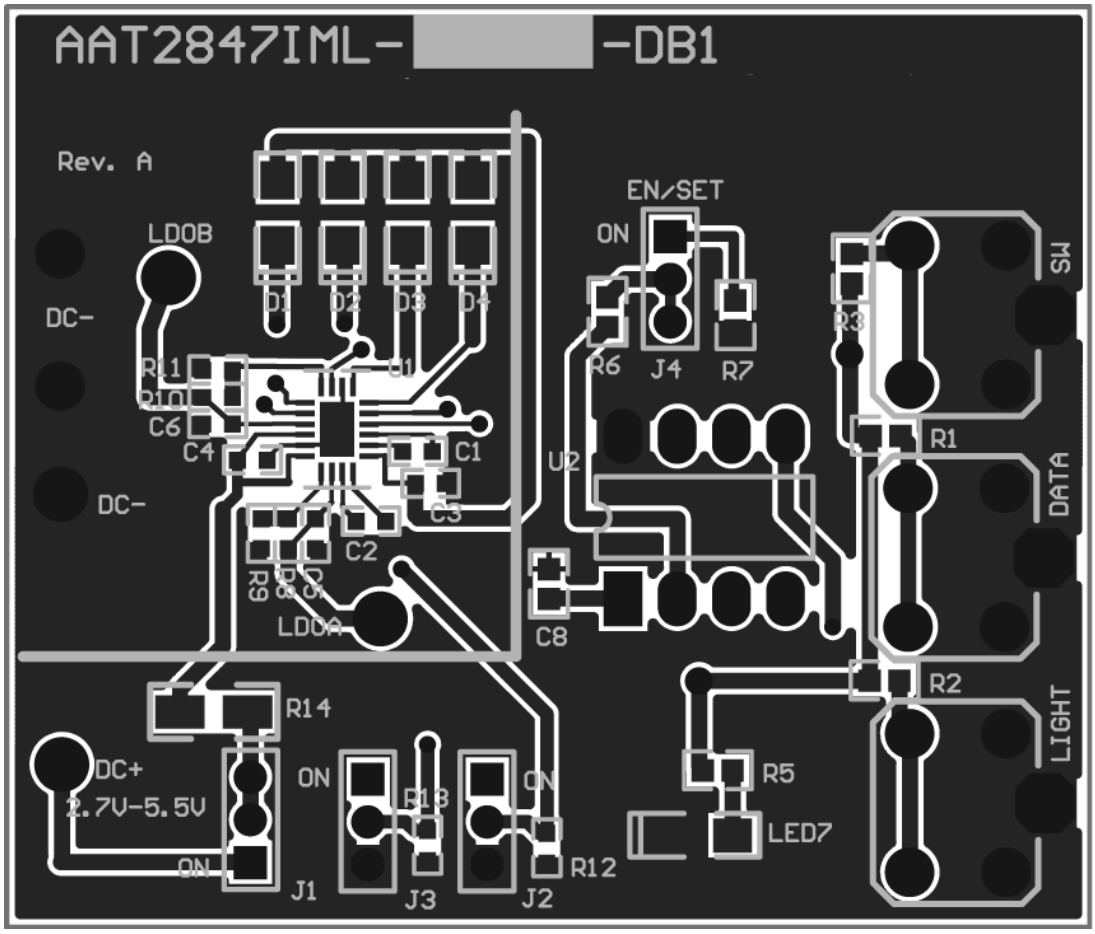

Figure 3: AAT2847 Evaluation Board Top Layer (not to scale)

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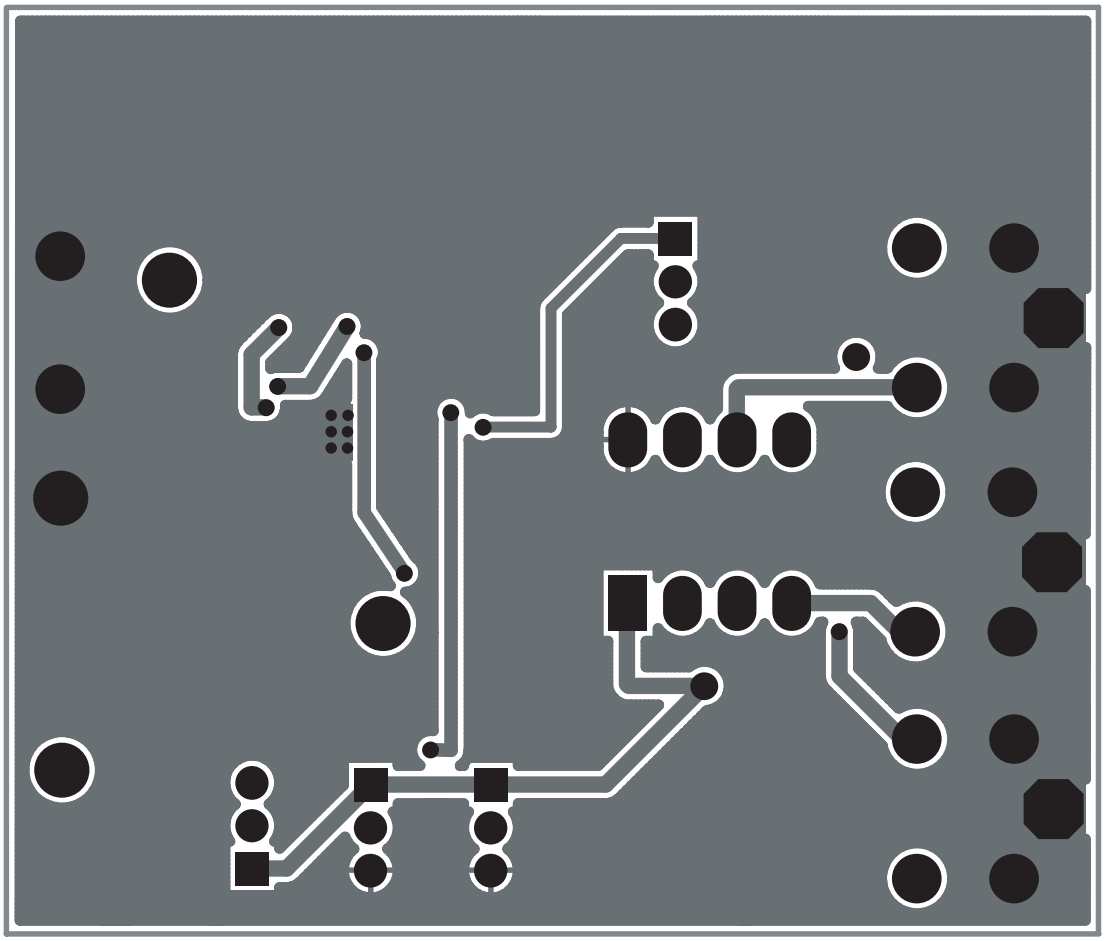

Figure 4: AAT2847 Evaluation Board Bottom Layer (not to scale).