MIC2841A/3A Evaluation Board

High Efficiency Linear WLED Driver with DAM™ and Ultra Fast PWM™ Control

General Description

The MIC2841A and MIC2843A are high efficiency linear White LED (WLED) drivers designed to drive WLEDs directly from the battery. This greatly extends the battery life for portable display backlighting, keypad backlighting, and camera flash applications in mobile devices. The MIC2841A maintains constant current for up to four WLEDs while the MIC2843A drives up to six WLEDs. Both products feature a typical dropout of 40mV at 20mA. This allows the WLEDs to be driven directly from the battery eliminating switching noise and losses present with the use of boost circuitry.

The MIC2841A/3A features Dynamic Average Matching™ (DAM™) which is specifically designed to provide optimum matching across all WLEDs. All channels are matched better than ±1.5% typical, ensuring uniform display illumination under all conditions. Brightness is controlled through an Ultra Fast PWM™ interface which can operate from less than 1% to 100% duty cycle.

The MIC2841A/3A is available in the 10-pin 2mm x 2mm Thin MLF® leadless package with a junction temperature range of -40°C to +125°C.

Requirements

The MIC2841A/3A evaluation board requires an input power supply that is able to deliver at least 150mA at a voltage within the range of 3.0V to 5.5V.

Precautions

The MIC2841A/3A evaluation board is tailored for a Li-Ion range input supply voltage. It should not exceed 6V on the input. The evaluation board does not have reverse polarity protection. Applying a negative voltage to the V_{IN} terminal may damage the device.

Getting Started

1. **Connect an external supply to V_{IN}**. Apply the desired input voltage to the V_{IN} (J1) and ground terminal (J2) of the evaluation board, paying careful attention to polarity and supply voltage ($3.0V \le V_{IN} \le 5.5V$). An ammeter may be placed between the input supply and the V_{IN} terminal to the evaluation board. Ensure that the supply voltage is monitored at the V_{IN} terminal. The ammeter and/or power lead resistance can reduce the voltage supplied to the input.
2. **Enable/Disable the MIC2841A/3A**. The END pin is equivalent to the enable pin for the linear drivers on the MIC2841A/3A. Pull the END pin high (≥1.2) to turn on the WLEDs at full brightness (100% duty cycle). The END pin can also be used for dimming using a PWM signal and changing its duty cycle. Refer to the Ultra Fast PWM™ Dimming Interface section in the datasheet. It can also be used for dimming using a PWM signal. Pulling the END low for more than 24ms puts the MIC2841A/3A into a low Iq sleep mode. The END pin cannot be left floating; a floating enable pin may cause an indeterminate state on the outputs. A pull down resistor of 200kΩ is placed from J5 (END) to ground to ensure that the WLEDs are off when there is no signal during the END pin.
3. **The peak current of the linear drivers is set by R_{SET} resistor**. The average LED current can be calculated by the equation below:

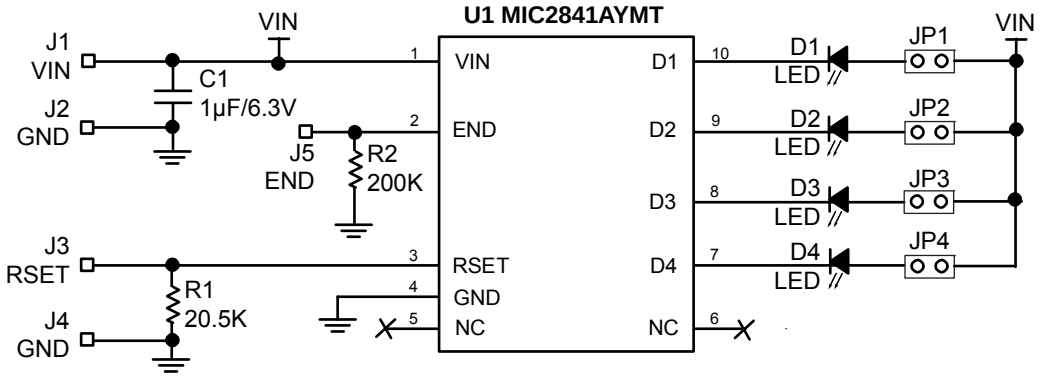
   $$I_{LED}\,(mA) = 410 * D / R_{SET}\,(k\Omega)$$

   D is the duty cycle of the LED current during PWM dimming. The evaluation board is provided with R_{SET} set to 20.5KΩ, which sets the current of the linear drivers to 20mA per channel.
4. **Measuring WLED current**. The evaluation board is provided with jumpers (JP1 thru JP6) to easily disconnect each WLED from the battery voltage. To measure individual WLED current, simply remove the jumper and either insert an ammeter or add a wire across the jumper terminals for measurements with a current probe. Keep in mind that a series ammeter will add a small voltage drop, so the voltage at the WLED terminal should be used when making dropout measurements with a series ammeter.

Ordering Information

Part Number	Description
MIC2841AYMT EV	Evaluation board with the Four Channel MIC2841A device
MIC2843AYMT EV	Evaluation board with the Six Channel MIC2843A device

MIC2841A Evaluation Board Schematic



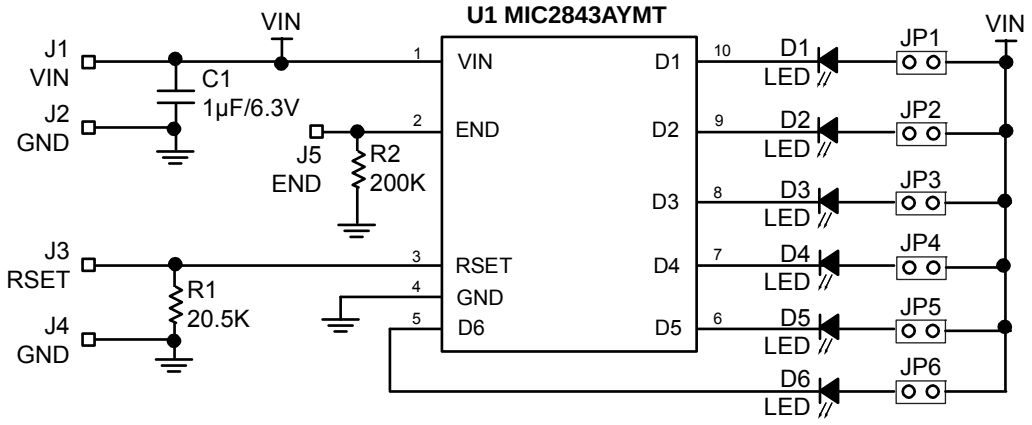
Bill of Materials

Item	Part Number	Manufacturer	Description	Qty.
C1	C1608X5R0J105K	TDK[1]	Ceramic Capacitor, 1µF, 6.3V, X5R, Size 0603	1
	06036D105KAT2A	AVX[2]		
	GRM188R60J105KE19D	Murata[3]		
	VJ0603G105KXYAT	Vishay[4]		
D1 – D4	SWTS1007	Seoul Semiconductor[5]	WLED	6
	99-116UNC	EverLight[6]		
R1	CRCW060320K5F5EA	Vishay[4]	Resistor, 20.5k, 1%, 1/16W, Size 0603	1
R2	CRCW06032003FKEA	Vishay[4]	Resistor, 200k, 1%, 1/16W, Size 0603	1
U1	**MIC2841AYMT**	**Micrel, Inc.[7]**	**High Efficiency 4 Channel Linear WLED Driver with DAM™ and Ultra Fast PWM™ Control**	**1**

Notes:

1. TDK: www.tdk.com
2. AVX: www.avx.com
3. Murata: www.murata.com
4. Vishay: www.vishay.com
5. Seoul Semiconductor: www.seoulsemicon.com
6. EverLight: www.everlight.com
7. **Micrel, Inc.: www.micrel.com**

MIC2843A Evaluation Board Schematic



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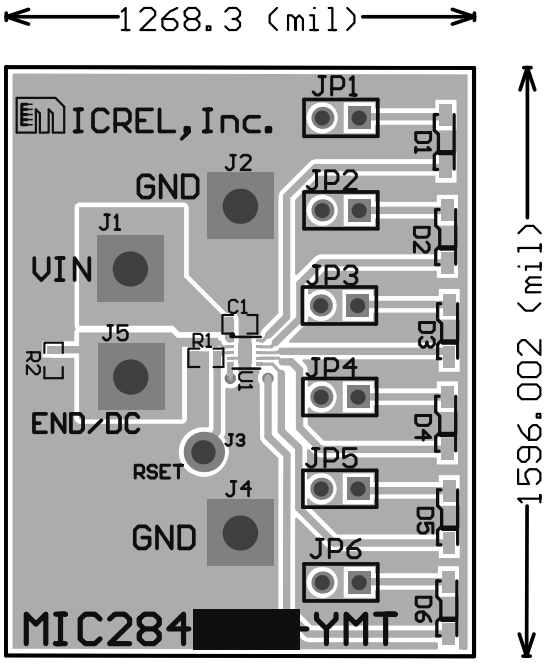
	VJ0603G105KXYAT	Vishay[4]		
D1 – D6	SWTS1007	Seoul Semiconductor[5]	WLED	6
	99-116UNC	EverLight[6]		
R1	CRCW060320K5F5EA	Vishay[4]	Resistor, 20.5k, 1%, 1/16W, Size 0603	1
R2	CRCW06032003FKEA	Vishay[4]	Resistor, 200k, 1%, 1/16W, Size 0603	1
U1	**MIC2843AYMT**	**Micrel, Inc.[7]**	**High Efficiency 6 Channel Linear WLED Driver with DAM™ and Ultra Fast PWM™ Control**	**1**

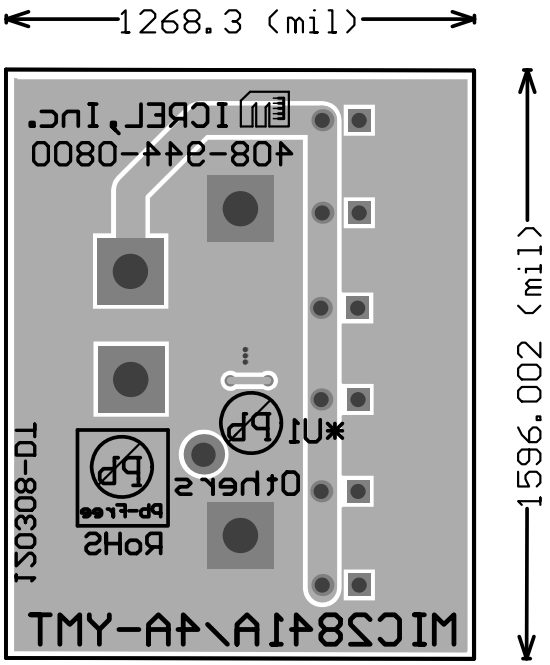
Notes:

1. TDK: www.tdk.com
2. AVX: www.avx.com
3. Murata: www.murata.com
4. Vishay: www.vishay.com
5. Seoul Semiconductor: www.seoulsemicon.com
6. EverLight: www.everlight.com
7. **Micrel, Inc.: www.micrel.com**

PCB Layout Recommendations



Top Layer



Bottom Layer

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