TELEFUNKEN Semiconductors

USER MANUAL

1 MHz Boost Regulator / White LED Driver
TF4601A Evaluation Board

Features

- **Low cost, highly efficient, white LED driver**
- **Wide input voltage range: 2.5V to 5.5V**
- **Compact 1" x 1" reference layout (Full main board size is 2.5" x 2.25")**
- **Double 0.1" headers for VIN, LED+, LED-, and GND connections**
- **Easily modifiable for TF4602 evaluation**

Description

The TF4601AEVK is an evaluation board designed for demonstration of all features and performance of the TF4601A. The TF4601A is a monolithic asynchronous boost regulator / WLED driver featuring integrated 500 mΩ MOSFETs capable of driving up to 10 WLEDs in series or up to 13 parallel strings of 3 WLEDs. The board operates over a wide 2.5V to 5.5V input voltage range while providing constant 20 mA current ideal for driving a 1x10 WLEDs.

The TF4601AEVK consists of a board (2.5" x 2.75") featuring all converter components and 10 WLEDs. The board features 0.1" headers for easy connection to instrumentation and / or system prototypes. Its compact reference layout may easily be integrated into the prototype layouts.

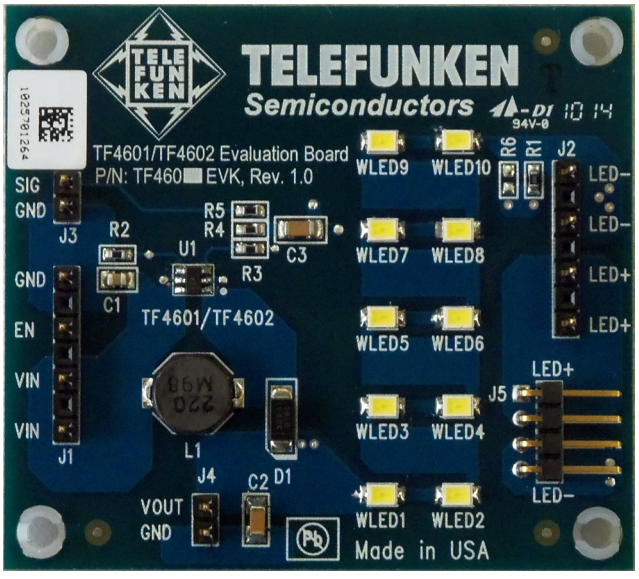
Applications

- Cellular Phones
- Digital Cameras
- PDAs, Smart Phones, MP3 Players, OLEDs
- Portable Instruments

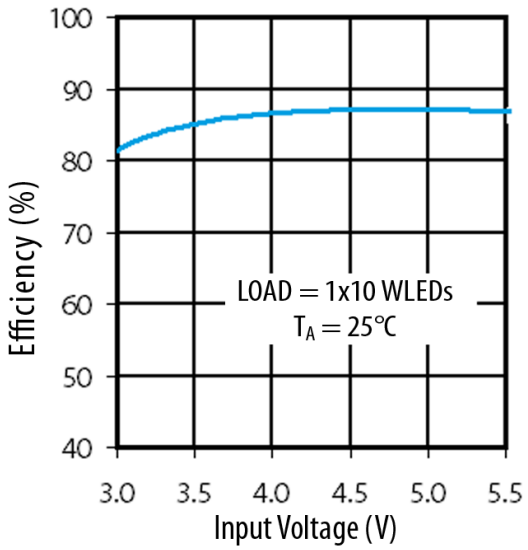
Ordering Information

PART NUMBER	MAIN IC (U1) PART NUMBER
TF4601AEVK	TF4601A45-UTP

Evaluation Board Photo



Typical Efficiency



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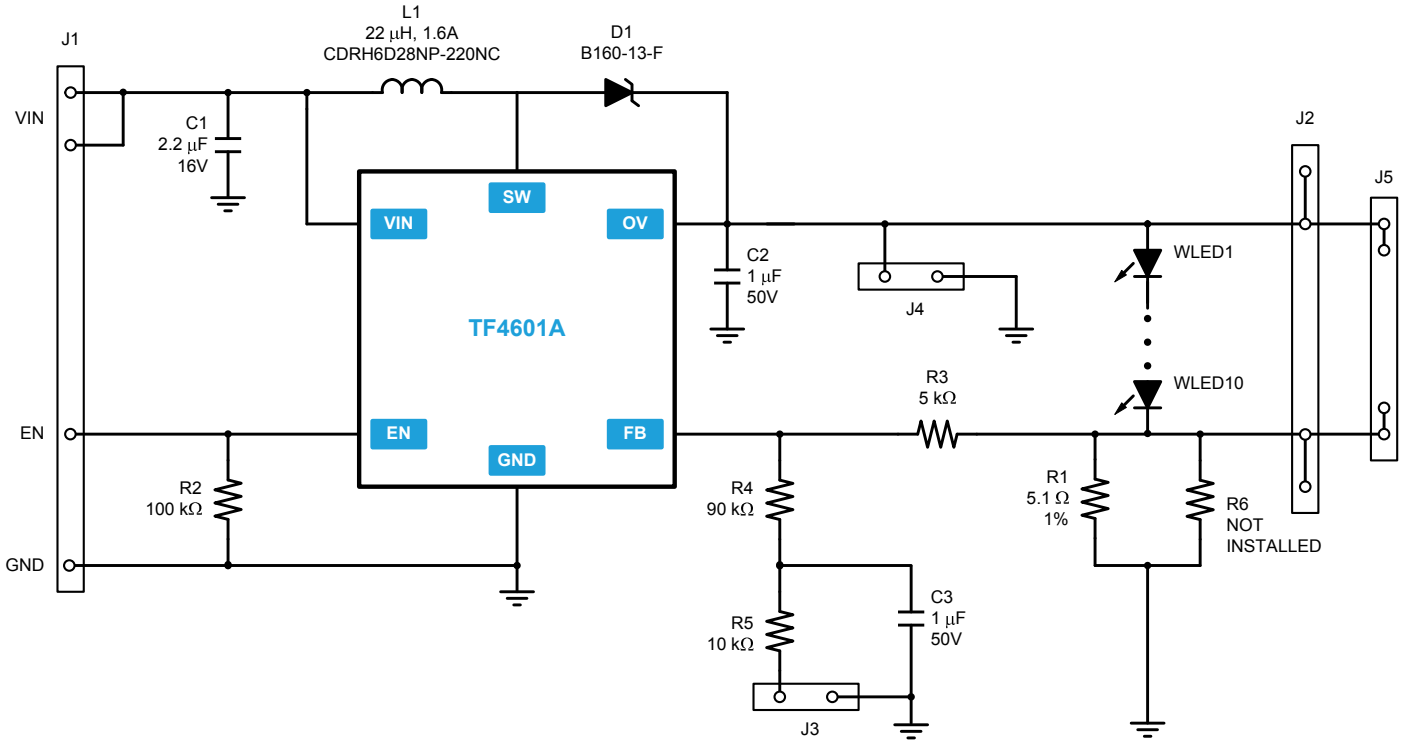
Evaluation Board Schematic



Bill of Materials

Qty	Ref	Value	Description	Package	Manufacturer	Part Number
2	J1, J2		7 position, 4-pin, 0.1" header		Samtec	TSW-204-07-G-S
2	J3, J4		2 position, 2-pin, 0.1" header		Samtec	TSW-102-07-G-S
1	J5		R/A, Male, 4-pin, 0.1" header		Samtec	TSW-104-08-G-S-RA
1	C1	2.2 µF	25V, X7R, ceramic capacitor	0805	Kemet	C0805C225K4RAC
2	C2, C3	1.0 µF	50V, X7R, ceramic capacitor	1206	Kemet	C1206F105K5RAC
1	D1		60V, 1A schottky diode	SOD-123	Diodes	B160-13-F
1	L1	22 µH	1.6 A power inductor	8 mm x 8 mm	Sumida	CDRH8D28NP-220N
1	R1	5.1 Ω	0.1W, 1% thick film resistor	0603	Vishay / Dale	CRCW06035R10FKEA
1	R2	100 kΩ	0.1W, thick film resistor	0603	Panasonic	ERJ-3EKF1003
1	R3	5 kΩ	0.1W, thick film resistor	0603	Panasonic	ERJ-3EKF5111
1	R4	90 kΩ	0.1W, thick film resistor	0603	Panasonic	ERJ-3EKF9092
1	R5	10 kΩ	0.1W, thick film resistor	0603	Panasonic	ERJ-3EKF1002
1	R6		Not installed			
1	U1		WLED Driver	TSOT23-6	Telefunken	TF4601A45-UTP
10	WLED1-10		White LED	1208	Rohm	SML013WBDW1

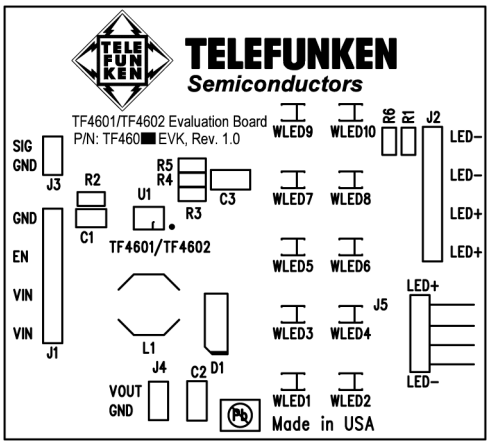


Figure 1. Board Top Silkscreen Layer

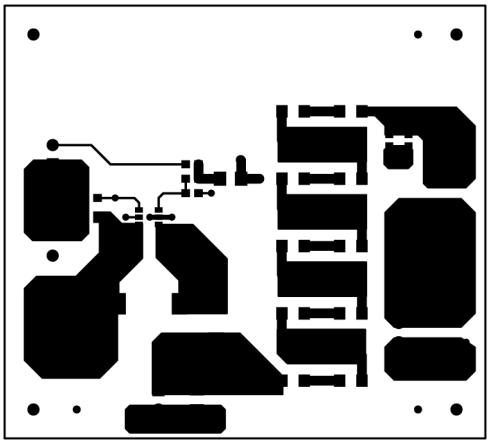


Figure 2. Board Top Copper Layer

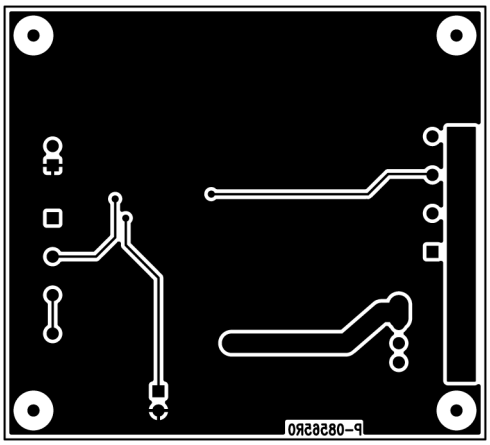


Figure 3. Board Bottom Copper Layer

Quick Start Guide

1. Connect the VIN and GND pins of J1 connector on the TF4601AEVK MAIN board to the external power supply. The recommended input voltage is between 2.5V and 5.5V. Applying a voltage that exceeds the absolute maximum rating of the TF4601A VIN pin (6V) may damage the device.
2. Drive EN pin high to enable the TF4601A.
3. Refer to the product datasheet for different dimming methods.
4. Use a voltmeter and / or an oscilloscope with voltage and current probes to check the operation of the TF4601A.

TYPICAL PERFORMANCE

Figure 4 shows typical steady state operation waveforms measured with a digital storage oscilloscope and current and voltage probes.

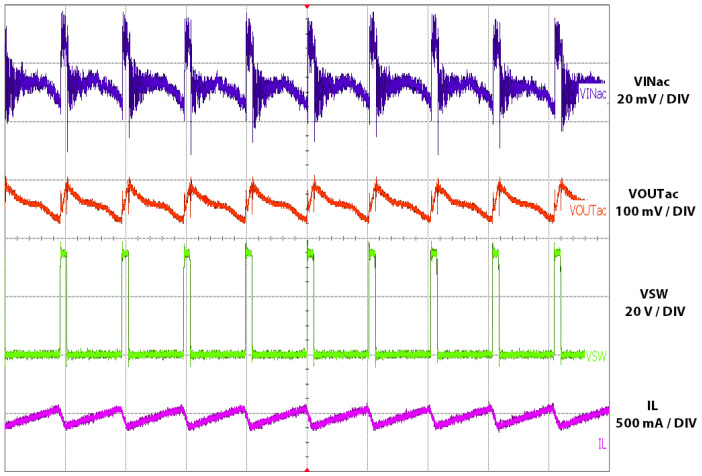


Figure 4. TF4601AEVK Typical Operation

The waveforms of Figure 4 represent the TF4601AEVK typical operation for the input voltage of 3.7V and a string of 10 WLEDs as a load.

SETTING THE OUTPUT VOLTAGE

The TF4601AEVK output current is preset to 20 mA which is optimal for driving one string of 20 mA WLEDs. However, it may easily be adjusted to other common values. Based on the TF4601AEVK schematic, the LED current depends on the reference voltage, V_{REF}, and the resistor, R_{SET} (R1 || R6 on the board), as expressed with the following equation:

$$I_{LED} = \frac{V_{REF}}{R_{SET}}$$

Table 1 exemplifies several standard resistor values needed for a given LED current. If standard resistor values are not available a parallel combination of two standard resistors may also be used to get the desired LED current.

V_{REF} [mV]	I_{LED} [mA]	R_{SET} [Ω]
104	10	10.5
	20	5.23
	100	1.05
	180	1.2 || 1.1
	260	0.4

Table 1. Examples of Standard Value Resistors for a Given LED Current

Notes

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