TELEFUNKEN
Semiconductors

USER MANUAL

TF6002 Evaluation Kit for 2A, 26V Synchronous Rectified Step-Down Converter

Features

- **2A, 3.3V output**
- **Wide input voltage range: 4.5V to 26V**
- **High full load and light load efficiency**
- **Compact 1" x 1" reference layout (Full board size is 2" x 1.75")**
- **Double 0.1" headers for IN, OUT and GND connections**
- **25V rated output capacitors for easy transition to higher output voltages**
- **Test point TP1 for accurate output ripple measurements**
- **Easily modified for TF6001 or TF6003 evaluation**

Description

The TF6002EVK is an evaluation board designed for demonstration of all features and performance of the TF6002. The TF6002 is a monolithic synchronous buck regulator featuring integrated 130 mΩ MOSFETs that provide continuous 2A output load current. The board operates over a wide 4.5V to 26V input voltage range while providing 3.3V fixed output voltage with very low output ripple.

The TF6002EVK is a compact 2" x 1.75" double-sided PCB capable of delivering power to the load with low noise and high efficiency. 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

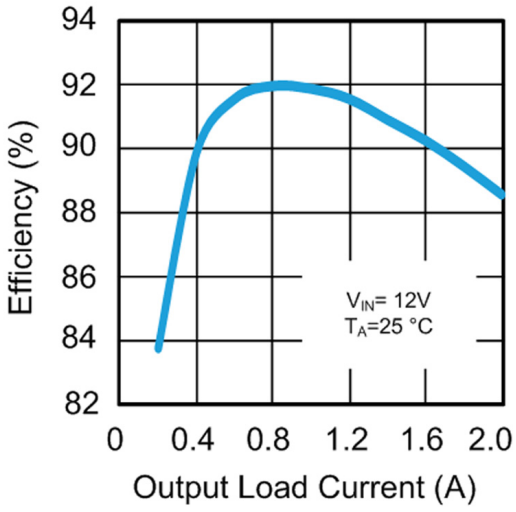
- High-Density Point-of-Load Regulators
- Distributed Power Systems
- Notebook and Netbook Computers
- Power Supplies for FPGAs, DSP Blocks and ASICs
- Set-Top Boxes
- xDSL Modems

Ordering Information

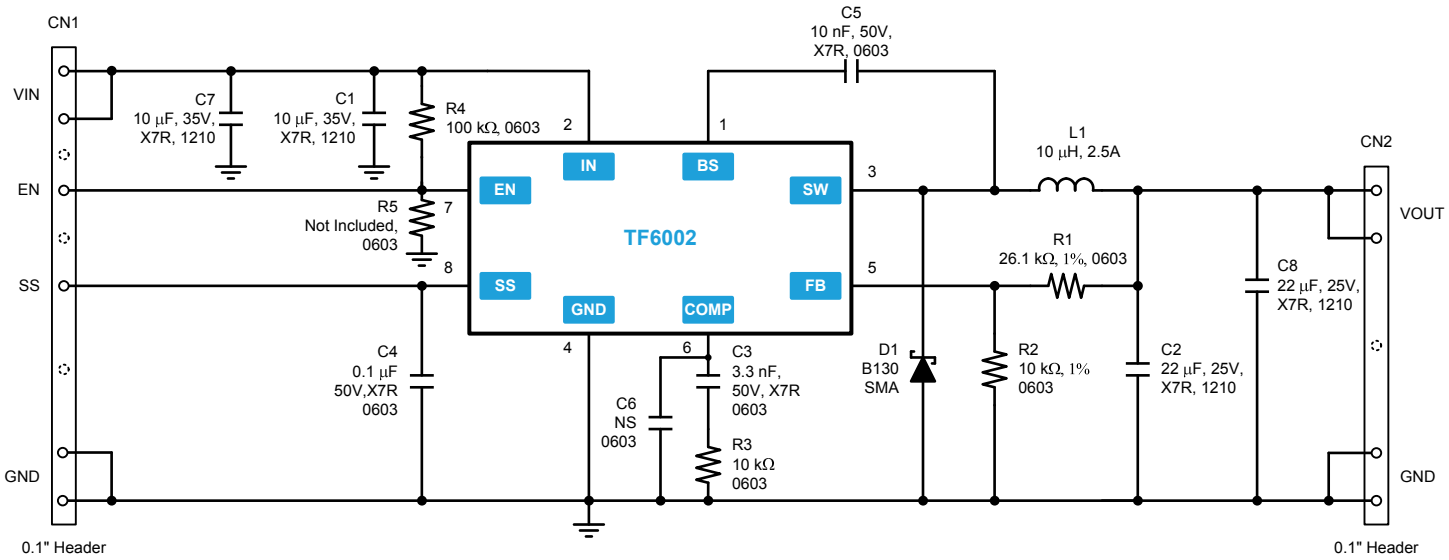
PART NUMBER	MAIN IC (U1) PART NUMBER
TF6002EVK	TF6002-TAU

Evaluation Board Photo

Typical Efficiency



Evaluation Board Schematic



Bill of Materials

Qty	Ref	Value	Description	Package	Manufacturer	Part Number
2	CN1		9 position, 6-pin, 0.1" header		Samtec	TSW-109-07-G-S
2	CN2		5 position, 4-pin, 0.1" header		Samtec	TSW-105-07-G-S
1	C1	10 µF	35V, X7R, 20%, ceramic capacitor	1210	Kemet	GMK325AB7106MM-T
1	C2	22 µF	25V, X7R, 10%, ceramic capacitor	1210	Kemet	GRM32ER71E226KE15L
1	C3	3.3 nF	50V, X7R, ceramic capacitor	0603	Kemet	C0603C332K5RACTU
1	C4	0.1 µF	50V, X7R, ceramic capacitor	0603	Murata	GCM188R71H104KA57D
1	C5	10 nF	50V, X7R, ceramic capacitor	0805	AVX	08055C103JAT2A
0	C6	NS	Not installed	0603		
1	C7	10 µF	35V, X7R, 20%,	1210		CCS-1210-106x50-10
1	C8	22 µF	25V, X7R, 10%,	1210		CCS-1210-226x25-10
1	D1		30V, 1A schottky diode	SMA	Diodes	B130-13-F
1	L1	10 µH	2.5A power inductor	8.3 mm x 8.3 mm	Sumida	2.5A, CDRH8D38-100NB
						ALT1: Bourns SRU1038-100Y
						ALT2: TDK VLF10040T-100M3R1
1	R1	26.1 kΩ	0.1W, 1% thick film resistor	0603	Bourns	CR0603-FX-2612ELF
1	R2	10 kΩ	0.1W, 1% thick film resistor	0603	Bourns	CR0603-FX-1002ELF
1	R3	10 kΩ	0.1W, 5% thick film resistor	0603	Vishay	RCS-0603-1002x1-10
1	R4	100 kΩ	0.1W, thick film resistor	0603	Bourns	CR0603-FX-1003ELF
0	R5	NS	Not installed	0603		
1	U1		2A Step Down Converter	SOIC-8(N)	Telefunken	TF6002-TAU

Evaluation Board Layout

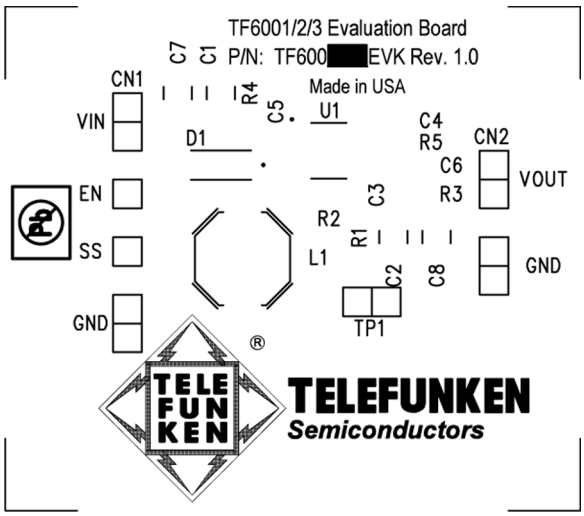


Figure 1. TF6002EVK Top Silkscreen Layer

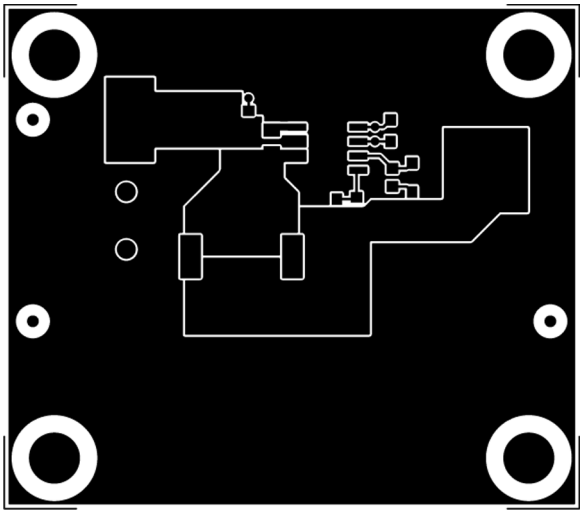


Figure 2. TF6002EVK Top Copper Layer

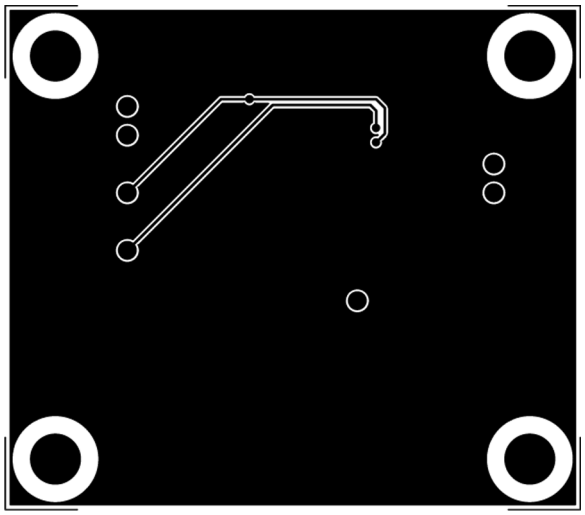


Figure 3. TF6002EVK Bottom Copper Layer

Quick Start Guide

1. Connect load terminals to the VOUT and GND pins of CN2 connector on the TF6002EVK. Keep the resistance of the connection medium (e.g. wire) at very low levels to minimize any ohmic losses.
2. Connect the VIN and GND pins of CN1 connector on the TF6002EVK to the external power supply. The recommended input voltage is between 4.5V and 26V. Applying a voltage that exceeds the absolute maximum rating of the TF6002 VIN pin (28V) may damage the device. Please note that the absolute maximum voltage rating of the EN pin is 6V.
3. Use a voltmeter and / or an oscilloscope with voltage and current probes to check the operation of the TF6002.

TYPICAL PERFORMANCE

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

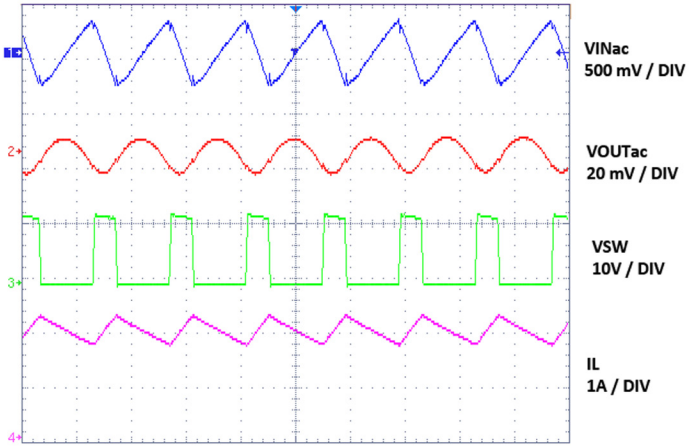


Figure 4. TF6002EVK Typical Operation

The waveforms of Figure 4 represent the TF6002EVK typical steady state operation with the input voltage of 12V and a 2A load.

SETTING THE OUTPUT VOLTAGE

The TF6002EVK output is preset to 3.3V. However, it may easily be adjusted to other common values. By looking at the TF6002EVK schematic, the output voltage depends on the feedback voltage, V_{FB}, and the resistor divider network consisting of R1 and R2, as expressed with the following equation:

$$V_{OUT} = V_{FB} \bullet \frac{R_1 + R_2}{R_2}$$

The R2 resistor value may be as high as 100 kΩ, however 10 kΩ resistor value is typically recommended. Given this and the typical V_{FB} of 0.923V, the R1 resistor may easily be calculated for a desired output voltage. Table 1 exemplifies several standard resistor values needed to achieve desired output voltage. If standard resistor values are not available a parallel combination of two standard resistors may also be used.

V_{OUT} [V]	R1 [kΩ]	R2 [kΩ]
1.2	3.0	10
1.8	9.53	10
2.5	16.9	10
3.3	26.1	10
5	44.2	10
12	121	10

Table 1. Examples of Standard Value Resistors for a Desired Output Voltage

In addition to updating R1 and R2 for a different output voltage, the compensation network (C3, R3) may also require additional updating. Refer to the TF6002 datasheet for calculating optimal components for the compensation network.

Notes

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