Evaluation Board for AWT6722, Low Quiescent Current, Low Input Voltage Boost Converter

FEATURES

- Input voltage: 0.75V to 5V
- Output voltage: 3.3V
- Up to 95% Efficiency at Typical Operating Conditions
- 550mA Switching Current Limit
- Low IQ, 5.5μA No-load Input Current
- Ultra-Low 0.1μA Shutdown Current
- Feedback Voltage 500mV
- Protections
  - Input Under Voltage Lockout
  - Output Overvoltage Protection
  - Over-Temperature Protection

GENERAL DESCRIPTION

The AWT6722 evaluation board is a complete solution that allows users to evaluate the operation and performance of the AWT6722 boost converter. The AWT6722 is an adjustable output voltage device that can be programmed between 1.8V and 5V. The output voltage of this Evaluation Board is set to 3.3V. The ambient temperature operating range is −40°C to +85°C.

The AWT6722 operates from an input voltage range of 0.75V to 5V with a very low operating quiescent current. This capability provides a power-supply solution for products powered by either a single-cell, two-cell, or three-cell alkaline, NiCd or NiMH, or one-cell Li-Ion or Li-polymer battery.

Full details on the AWT6722 boost converter are provided in the AWT6722 Data Sheet.

EVALUATION BOARD

Figure 1. Evaluation Board

TABLE OF CONTENTS

ELECTRICAL SPECIFICATIONS

Table 1. AWT6722 EVB Electrical Specifications

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Input Voltage	V_{IN}	Operating	0.75	1.2	3.3	V
No-load Input Current	I	Operating		5.5		μA
Quiescent Current (VIN)	I_Q	V_{EN}=V_{IN}=1.2V, V_{OUT} = 3.3V, Non-switching		2.95	5	μA
Quiescent Current (VOUT)				0.2	1.5	μA
OUTPUT CHARACTERISTICS						
Output Voltage	V_{OUT}			3.3		V
Maximum Output Current	I_{OUT}	V_{IN}=1.2V, V_{OUT} is ready		80		mA
		V_{IN}=2.4V, V_{OUT} is ready		200		mA
SYSTEM CHARACTERISTICS						
Load Efficiency	EFE	V_{IN}=1.2V, I_{OUT}=20mA		85.2		%
	EFE	V_{IN}=2.4V, I_{OUT}=20mA		93.6		%
Operating temperature			−40		85	°C
Junction temperature	T_J		−40		125	°C

USING THE EVALUATION BOARD

BENCH SETUP

The AWT6722 evaluation board is supplied fully assembled and tested. Before applying power to the evaluation board, follow the procedures in this section.

Jumper J5 (Enable)

Use one of the following methods to enable or to disable the boost converter:

- To enable the boost converter, short the middle pin of J2, EN, to the ON.
- To disable the boost converter, short the middle pin of J2, EN, to the OFF.

Input Power Source

Connect the positive terminal of the power source to J1 (VIN), and negative terminal of the power source to J2 (GND) of the evaluation board.

Output Load

Before connecting the load, ensure that the board is turned off. Connect an electronic load or resistor to set the load current. Connect the positive terminal of the load to J3 (VOUT) of the evaluation board and connect the negative terminal of the load to J4 (GND).

Input and Output Voltmeter

To measure the input voltage, connect the positive terminal of the voltmeter to TP1 (VIN_SENSE) and the negative terminal to TP6 (GND_SENSE). Likewise, to measure the output voltage, connect the positive terminal of the voltmeter to TP3 (VOUT_SENSE) and the negative terminal to TP5 (GND_SENSE). (See Figure 2)

Figure 2. Bench Setup

Powering Up

When the power source and load are connected to the evaluation board, it can be powered for operation.

Follow the produces to turn on the board:

1. Make sure that the power source voltage is >0.75V and <3.3V.
2. Make sure that the EN is high and monitor the output voltage.
3. Turn on the load, check that it is drawing the proper load current, and verify that the output voltage maintains its regulation.

TEST PROCEDURE AND RESULT

Start up

1. Follow the BENCH SETUP.
2. Set DC Electronic load to 0A.
3. Set V_{IN}=1.2V on DC Power Supply and Observe the switching waveform with an oscilloscope.
4. Set DC Electronic load to 50mA.
5. Turn on the DC Power Supply

The measured start up waveform at 50mA condition is shown in Figure 3.

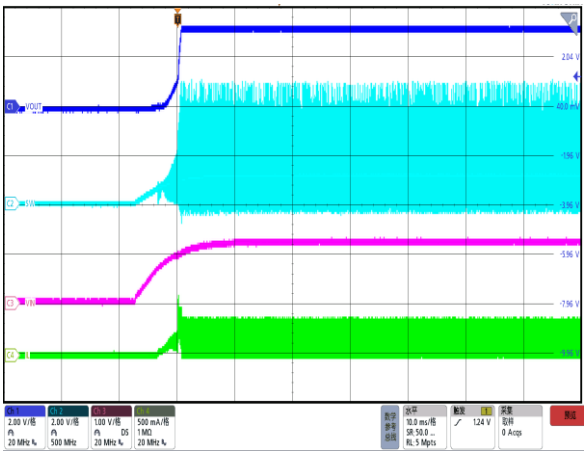

Figure 3. Power On by VIN, VIN=1.2V, VOUT=3.3V, IOUT=50mA

Measuring No-load Input Current (NOTES)

1. Powering up the Board.
2. Make sure the Output pin is not connected to DC Electronic load or voltmeter.
3. Measure the Input Current from DC Power Supply into the VIN pin.

Figure 4. Measuring No-load Input Current

Measuring Quiescent Current (NOTES)

1. Set the middle pin of Jumper J5, EN, to the ON.
2. Make sure the inductor (L1) is removed from the Board.
3. Set the V_{IN}=1.2V.
4. Set the V_{OUT}=3.3V.
5. Set the V_{FB}=0.6V.
6. Measure the current at VIN pin as Quiescent Current (VIN) and the current at VOUT pin as Quiescent Current (VOUT).

Measuring Shutdown Current

1. Set the middle pin of Jumper J5, EN, to the OFF.
2. Set the V_{OUT}=3.4V (> VOUT=3.3V).
3. Set the V_{IN}=1.2V on DC Power Supply.
4. Measure the Shutdown Current from DC Power Supply into the VIN pin.

Measuring Efficiency

The Efficiency is measured by comparing the input power with the output power.

$$\eta = \frac{V_{OUT} \times I_{OUT}}{V_{IN} \times I_{IN}}$$

Make sure the input is measured by the TP1(VIN_SENSE) to TP6 (GND_SENSE) and output voltage is measured by the TP3 (VOUT_SENSE) to TP5 (GND_SENSE).

Measuring Output Voltage Ripple

To observe the output voltage ripple, place the oscilloscope probe across the output capacitor with the probe ground lead connected to the negative capacitor terminal and the probe tip placed at the positive capacitor terminal. Set the oscilloscope to ac, 20mV/division, 2us/division time base, and 20MHz bandwidth.

Figure 5 shows a way to measure the output ripple properly.

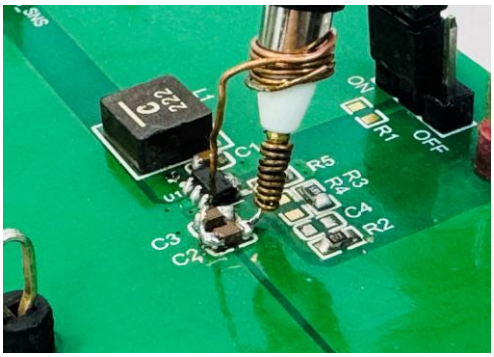

Figure 5. Measuring the Output Voltage Ripple

MODIFYING THE BOARD

To modify the AWT6722 evaluation board configuration, replace the appropriate passive components on the board.

Changing the Output Voltages

The Output Voltage setpoints can be changed by replacing the R3 and R5 resistor with the resistor values shown in the Table 2.

Table 2. Recommended Resistor Values for Common Output Voltages

V_{OUT}(V)	R_3(kΩ)	R_5(kΩ)
2.2	3400	1000
3.3	5600	1000
5	9000	1000

The recommended value for R5 is in the range of 1MΩ for low I_Q performance. Use the following equation to calculate resistor value of resistor R3,

$$R3 = \frac{(V_{OUT} - V_{FB}) \times R5}{V_{FB}}$$

where:

R5=1MΩ.

SCHEMATIC

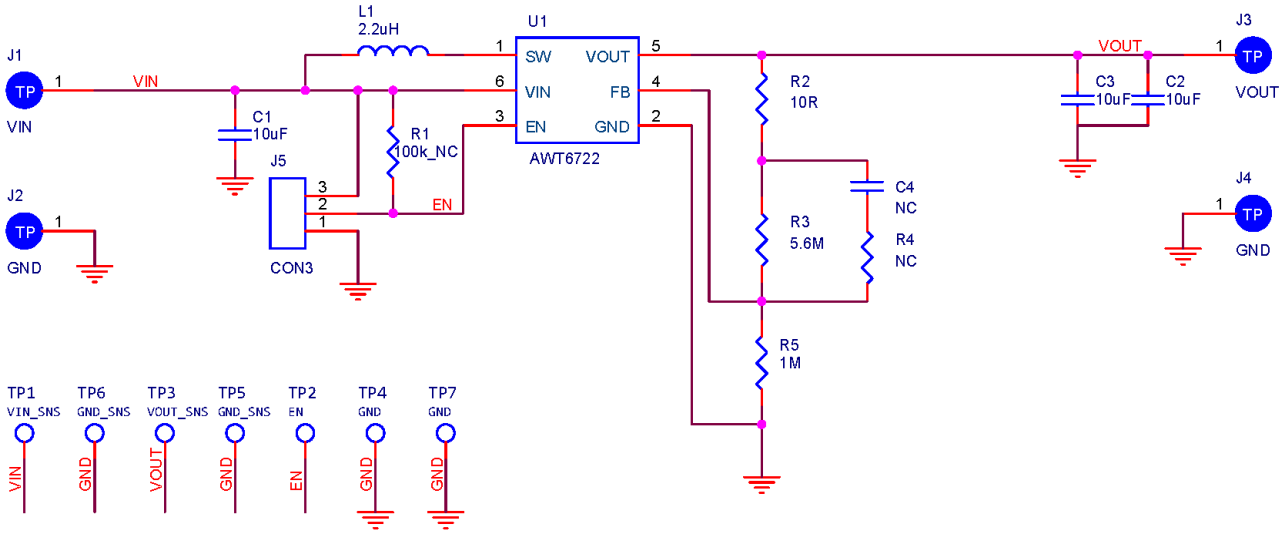

Figure 6. Schematic

PCB LAYOUT

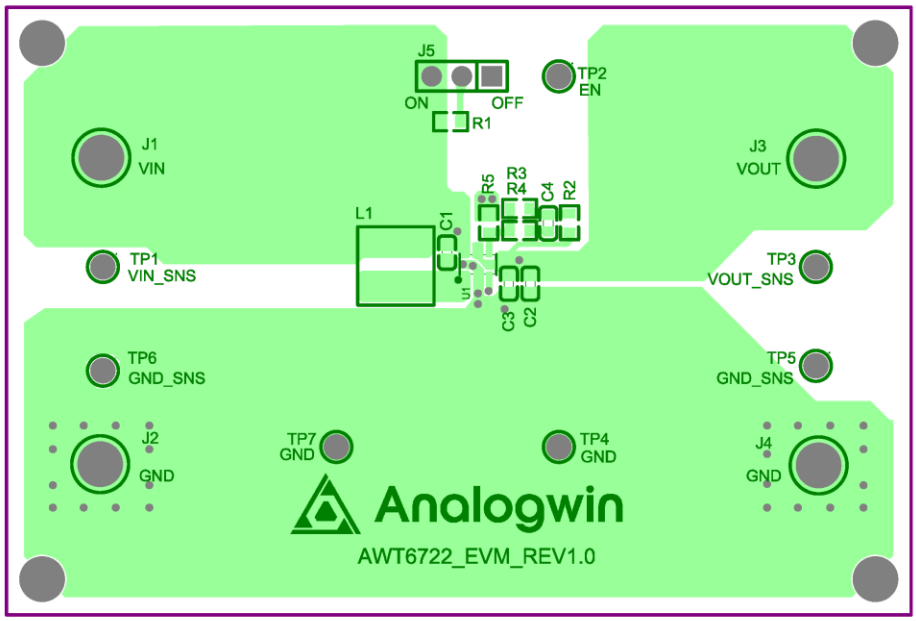

Figure 7. EVM TOP Layer

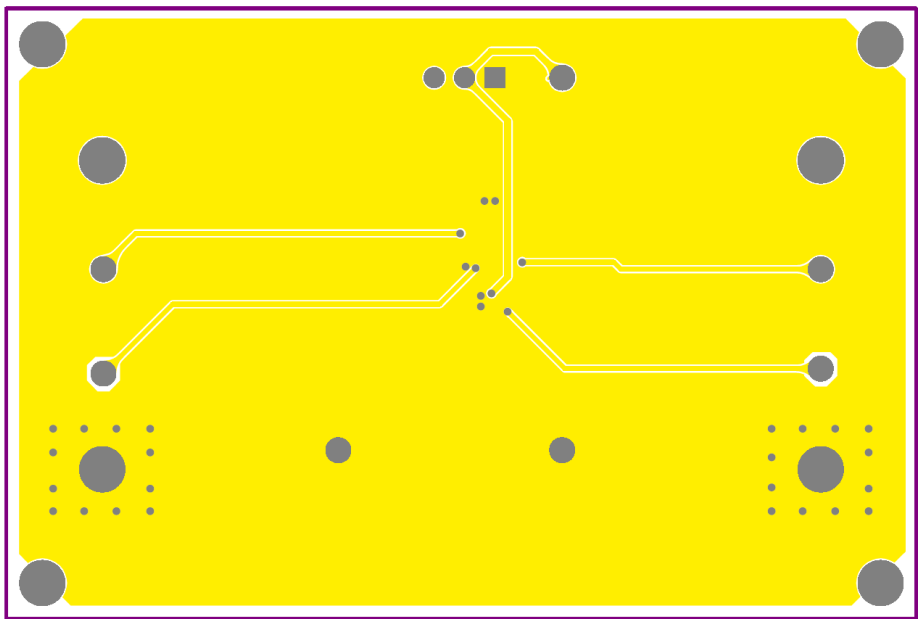

Figure 8. EVM BOTTOM Layer

BILL OF MATERIALS

Table 3.

Ref Designator	Qty	Description	Part Number
C1, C2, C3	3	CAP, 10uF ±10% 10V, X5R, 0603	CGA0603X5R106K100JT
C4	1	NC	–
L1	1	Inductor, 2.2uH ±20% DCR 13.2mΩ, 9.2A	XAL5030-222MEC
R1	1	NC, RES, 100kΩ ±1%, 100mW, 0603	0603WAF1003T5E
R2	1	RES, 10Ω ±1%, 100mW, 0603	0603WAF100JT5E
R3	1	RES, 5.6MΩ ±1%, 100mW, 0603	0603WAF5604T5E
R4	1	NC	–
R5	1	RES, 1MΩ ±1%, 100mW, 0603	0603WAF1004T5E
J1, J2, J3, J4	4	Terminal, Turret, TH, Double, 1502-2	Keystone, 1502-2
J5	1	Jumper 2.54 mm pitch, 2-way, SIP3	PZ254V-11-03P
TP1, TP2, TP3	3	Test point, RED	RH-5010
TP4, TP5, TP6, TP7	4	Test point, BLACK	RH-5011
U1	1	0.75V, 5.5μA synchronous, boost converter, SOT23-6	AWT6722/Analogwin

NOTES

QUIESCENT CURRENT

Quiescent Current is defined as the current drawn by the AWT6722 from both V_{IN} and V_{OUT} in non-switching but enabled condition. “Non-switching” means that the power switches in the AWT6722 are closed. “Enabled” means that the AWT6722 is turned on via its EN pin and is not in a UVLO or other shutdown condition.

NO-LOAD INPUT CURRENT

No-load input current is defined as the current drawn by the AWT6722 in switching condition to keep the output regulated. Connecting either an electronic load or a voltmeter to the output will affect the measurement of this current.

REVISION HISTORY

Version	Date	Descriptions
Rev. 1.0	11/2025	Initial version
Rev. 1.1	12/2025	Updated the Table 1. AWT6722 EVB Electrical Specifications. Added the Measuring No-load Input Current in section Test Procedure and Result. Updated the Measuring Quiescent Current in section Test Procedure and Result. Added section Notes.