Evaluation Board for Single & Multi-Channel Synchronous Voltage-to-Frequency Converters

EVAL-AD7741EB/EVAL-AD7742EB

FEATURES

Full-Featured Evaluation Board for the AD7741 & AD7742
Stand-alone Operation
On-Board Voltage Reference and Crystal Oscillator
Various Linking Options

INTRODUCTION

This Technical Note describes the evaluation board for the AD7741/AD7742. The AD7741/AD7742 are a new generation of synchronous Voltage-to-Frequency Converters (VFC's). The AD7741 is a single ended version in a small 8-pin DIP/SOIC package and the AD7742 is a multi-channel version in a 16-pin DIP/SOIC package. Full data on the AD7741/AD7742 is available in the AD7741/AD7742 data sheets available from Analog Devices and should be consulted in conjunction with this Technical Note when using the Evaluation Board.

On-board components include an AD780 which is a pin programmable +2.5V or +3V ultra high precision bandgap reference and a 4.9152 MHz crystal. There are various link options which are explained in detail on page 2.

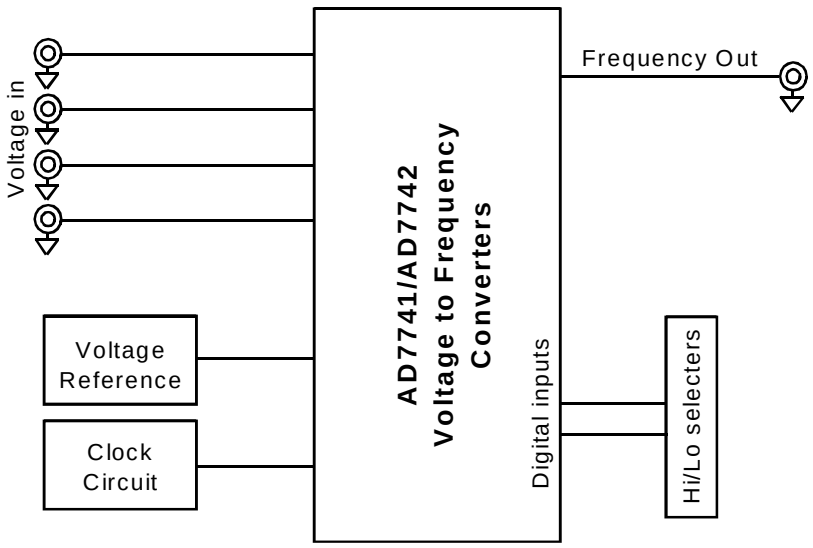
Interfacing to this board is through SMB sockets. Connections to the input voltage and the output frequency must be made via these SMB connectors. The reference voltage and the clock can also be supplied via the relevant SMB connectors or alternatively they can be supplied by the on-board reference and clock circuits.

OPERATING THE AD7741/AD7742 EVALUATION BOARD

Power Supplies

When using the board an external +5V supply must be provided via the terminal block, J1. +5V must be connected to the +5V input to supply the AD7741/AD7742 V_{DD} pins and the AD780 voltage references. 0V must be connected to the 0V input which is tied to the ground plane on the board. The supply is decoupled to ground with a 47µF tantalum and a 0.1µF multilayer ceramic capacitor close to the input terminal, J1. The supply pins of the AD7741/AD7742 and the references are also decoupled to ground with a 10µF tantalum and a 0.1µF multilayer ceramic capacitor.

FUNCTIONAL BLOCK DIAGRAM



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LINK AND SWITCH OPTIONS

There are 15 link options which must be set for the required operating setup before using the evaluation board. The functions of these options are outlined below.

AD7741 EVALUATION

Link No.	Function.
LK1	This link option is used to determine the source of the reference voltage for the AD7741. When this link is removed the AD7741 internal reference is used. When this link is in position "A" a 2.5V reference is supplied by the on-board AD780. When this link is in position "B" an external reference can be provided via the external SMB socket, J2.
LK2	This link option selects the source of the CLKIN input for the AD7741. When this link is in position "A" an external clock must be provided via the external SMB socket, J3. When this link is in position "B" a 4.9152MHz clock signal is supplied from the on-board clock circuit.
LK3	This link is in series with the VIN input for the AD7741. It may be removed if the user wants to add external signal conditioning on this line.
LK4	This link option is used to place the AD7741 in its power-down mode. When this link is in position "A" the $\overline{PD}$ pin is tied high thus placing the AD7741 in its normal mode. When this link is in position "B" the $\overline{PD}$ pin is tied low thus placing the AD7741 in its power-down mode.

AD7742 EVALUATION

Link No.	Function.
LK5	This link option selects the source of the CLKIN input for the AD7742. When this link is in position "A" a 4.9152MHz clock signal is supplied from the on-board clock circuit. When this link is in position "B" an external clock must be provided via the external SMB socket, J7.
LK6	This link option is used to determine the source of the reference voltage for the AD7742. When this link is in position "A" an external reference must be provided via the external SMB socket, J6. When this link is in position "B" a 2.5V reference is supplied by the on-board AD780. When this link is in position "C" the AD7742 internal reference is used.
LK7	This link is in series with the VIN1 input for the AD7742. It may be removed if the user wants to add external signal conditioning on this line.
LK8	This link is in series with the VIN2 input for the AD7742. It may be removed if the user wants to add external signal conditioning on this line.
LK9	This link is in series with the VIN3 input for the AD7742. It may be removed if the user wants to add external signal conditioning on this line.
LK10	This link is in series with the VIN4 input for the AD7742. It may be removed if the user wants to add external signal conditioning on this line.
LK11	This link is used in conjunction with LK12 to select one of 4 possible input channels. When this link is in position "A" the A1 pin is tied to +5V. When this link is in position "B" the A1 pin is tied to 0V.
LK12	This link is used in conjunction with LK11 to select one of 4 possible input channels. When this link is in position "A" the A0 pin is tied to +5V. When this link is in position "B" the A0 pin is tied to 0V.
LK13	This link option is used to select unipolar or bipolar mode for the AD7742. In position A, the UNI/$\overline{BIP}$ pin is tied high, placing the part in unipolar mode. In position B, the UNI/$\overline{BIP}$ pin is tied LOW, placing the part in bipolar mode.
LK14	This link option is used to set th gain of the AD7742. In position A, the GAIN pin is tied high, selecting a gain of X2. In position B, the GAIN pin is tied LOW, selecting a gain of X1.
LK15	This link option is used to place the AD7742 in its power-down mode. When this link is in position "A" the $\overline{PD}$ pin is tied high thus placing the AD7742 in its normal mode. When this link is in position "B" the $\overline{PD}$ pin is tied low thus placing the AD7742 in its power-down mode.

SET-UP CONDITIONS

Care should be taken before applying power and signals to the evaluation board to ensure that all link positions are set as per the required operating mode. Table I shows the position in which all the links are set when the evaluation board is packaged.

Table I. Initial Link and Switch Positions

Link No.	Position	Function.
LK1	A	AD7741 reference supplied from on board reference circuit.
LK2	B	AD7741 clock supplied from on board clock circuit.
LK3	IN	J4 connected to AD7741 VIN pin.
LK4	A	AD7741 $\overline{PD}$ pin is tied high, placing the part in its normal operating mode.
LK5	A	AD7742 clock supplied from on board clock circuit.
LK6	B	AD7742 reference supplied from on board reference circuit.
LK7	IN	J8 connected to AD7742 VIN1 pin.
LK8	IN	J9 connected to AD7742 VIN2 pin.
LK9	IN	J10 connected to AD7742 VIN3 pin.
LK10	IN	J11 connected to AD7742 VIN4 pin.
LK11	A	AD7742 A1 pin is tied to +5V.
LK12	A	AD7742 A0 pin is tied to +5V.
LK13	A	AD7742 set for unipolar operation
LK14	B	Gain on the AD7742 is set to X1
LK15	A	AD7742 $\overline{PD}$ pin is tied high, placing the part in its normal operating mode.

SOCKETS

There are twelve connectors relevant to the operation of the AD7741/AD7742 on this evaluation board. The function of these connectors is outlined in Table II.

Table II. Socket Functions

Connector	Function
J1	2 pin terminal block, used to supply +5V DC to the board.
J2	SMB connector, can be used to supply external reference to the AD7741.
J3	SMB connector, can be used to supply external clock signal to the AD7741.
J4	SMB connector, used to supply analog input voltage to the AD7741.
J5	SMB connector. The output frequency from the AD7741 is available here.
J6	SMB connector, can be used to supply external reference to the AD7742.
J7	SMB connector, can be used to supply external clock signal to the AD7742.
J8	SMB connector, used to supply analog input voltage to the AD7742 VIN1 pin.
J9	SMB connector, used to supply analog input voltage to the AD7742 VIN2 pin.
J10	SMB connector, used to supply analog input voltage to the AD7742 VIN3 pin.
J11	SMB connector, used to supply analog input voltage to the AD7742 VIN4 pin.
J12	SMB connector. The output frequency from the AD7742 is available here.

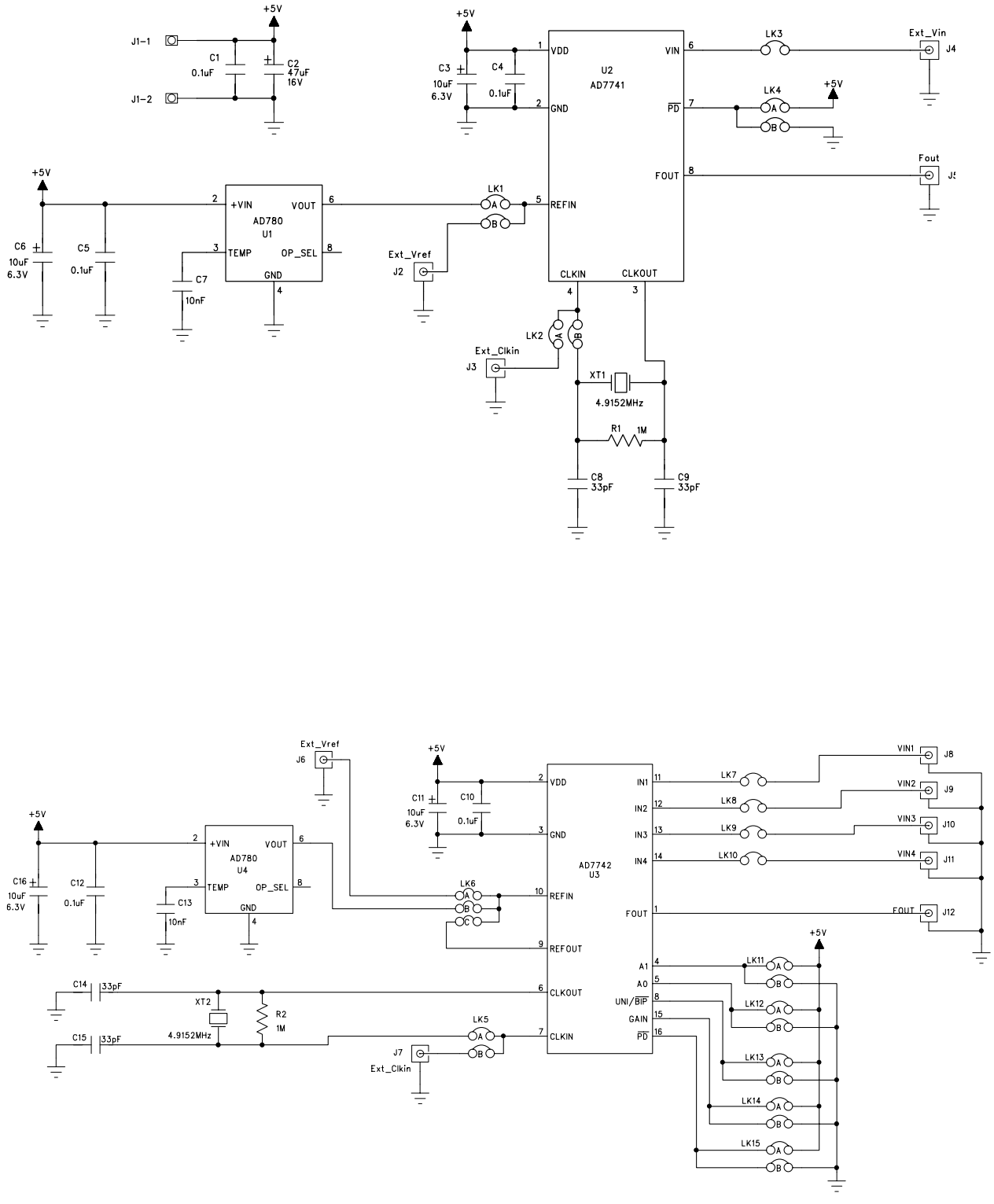

Figure 1. AD7741/42 Evaluation Board Circuit Diagram

Table III. AD77741/42 Evaluation Board Bill Of Materials

Item	Qty.	RefDes	PartType	Supplier / no.
1	5	C1 C4 C5 C10 C12	0.1uF Multilayer Ceramic (100V X7R)	FEC 262-547
2	1	C2	47uF 16V Tantalum capacitor	FEC 643-725
3	4	C3 C6 C11 C16	10uF 6.3V Tantalum capacitor	FEC 643-476
4	2	C7 C13	10nF Multilayer Ceramic (50V X7R)	FEC 146-229
5	4	C8 C9 C14 C15	33pF Multilayer Ceramic (100V NPO)	FEC 108-928
6	2	R1 R2	1Mohm 0.25W 1% metal Film resistor	FEC 544-103
7	1	J1	2 Pin Terminal Block	FEC 151-789
8	11	J2 - J12	50R gold PCB mount SMB Jack	FEC 310-682
9	9	LK1-2 LK4-5 LK11-15	0.1" strip header (2x2)	FEC 511-833
10	5	LK3 LK7-10	0.1" strip header (1x2)	FEC 511-83
11	1	LK6	0.1" strip header (3x2)	FEC 511-83
12	2	U1 U4	AD780AN	ADI - Free issue
13	1	U2	AD7741AN	ADI - Free issue
14	1	U3	AD7742AN	ADI - Free issue
15	2	XT1 XT2	4.9152MHz Crystal - HC49 package	FEC 103-882
16	40	U1 U2 U3 U4	Ultra low profile socket pins.	FEC 519-935
17	15	LK1-15	Shorting bar.	FEC 150-410
18	4	Each corner	Rubber Stick-on Feet	FEC 148-922
19	1	EVAL-AD7741/42EB	PCB	

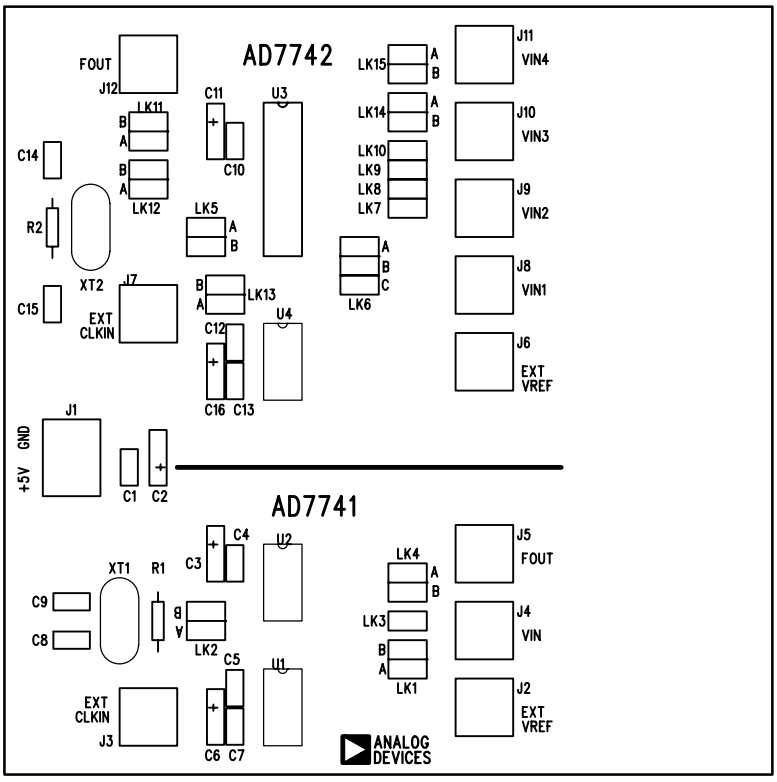

Figure 2. AD7741/42 Evaluation Board Component Placement Drawing.

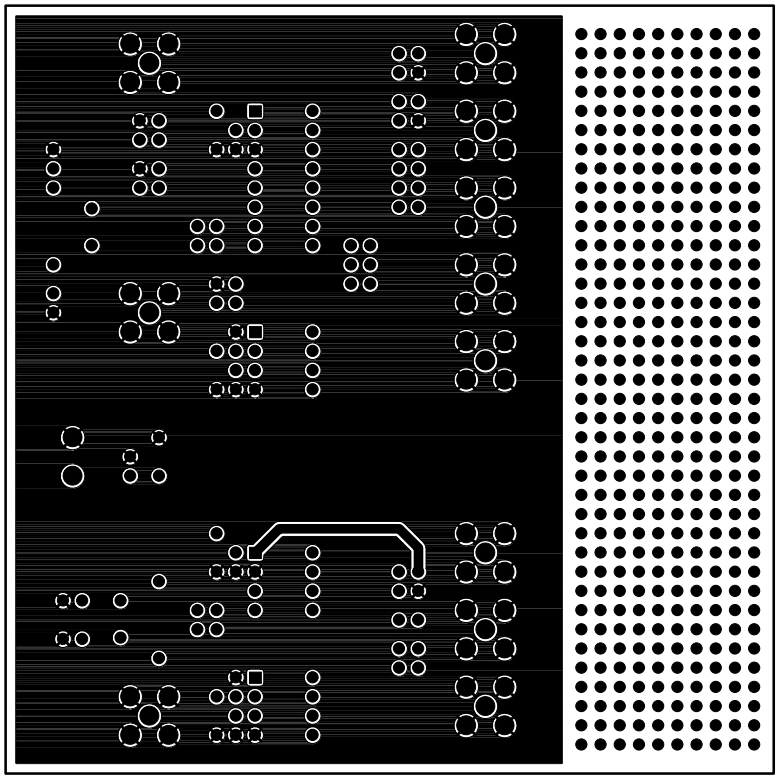

Figure 3. AD7741/42 Evaluation Board Component Side Artwork

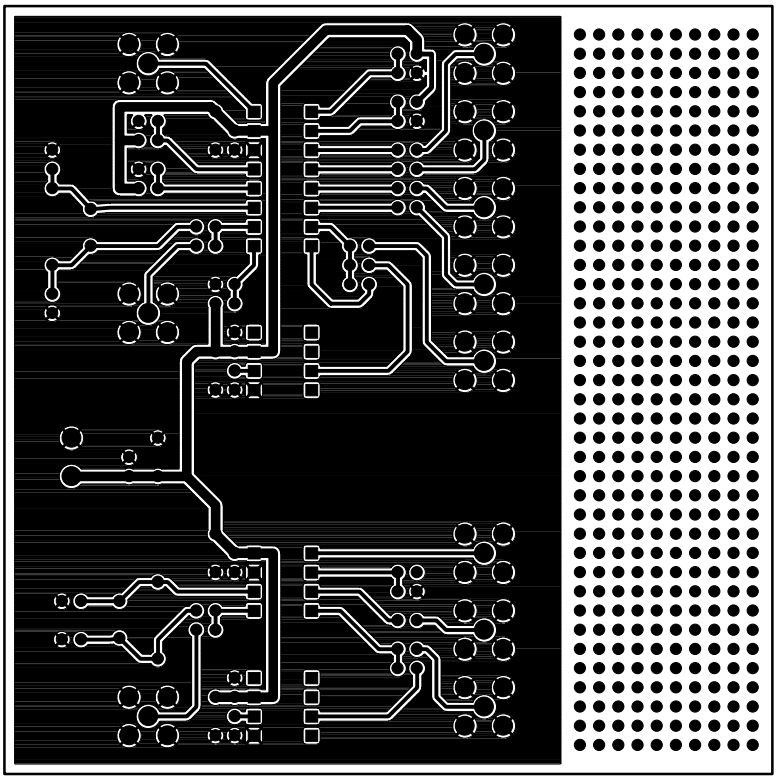

Figure 4. AD7741/42 Evaluation Board Solder Side Artwork