

LMH6586 User's Guide

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1. Introduction

The LMH6586 evaluation board is designed by Texas Instruments to demonstrate the performance of the LMH6586 32x16 video Crosspoint switch. The board provides BNC connectors for 1/2 of the inputs and outputs (VIN0 - VIN31 (16 inputs), and OUT0 - OUT16 (8+1 outputs), even numbered channels only), potentiometers to adjust the clamp reference voltage and the sync detect threshold voltage. On-board jumpers allow the user to control the gain setting for the LMH6586 and to define logic inputs for device reset, power save and device address.

2. Setup

A USB Interface board (supplied), plugs into the evaluation board providing a graphical user interface (GUI) with a PC to program the LMH6586's internal registers via I²C protocol. Figure 1 shows the connections between the PC, USB Interface board, and LMH6586 EVAL board. Figure 2 is the drawing for the harness that connects the LMH6586 EVAL board to the USB Interface board.

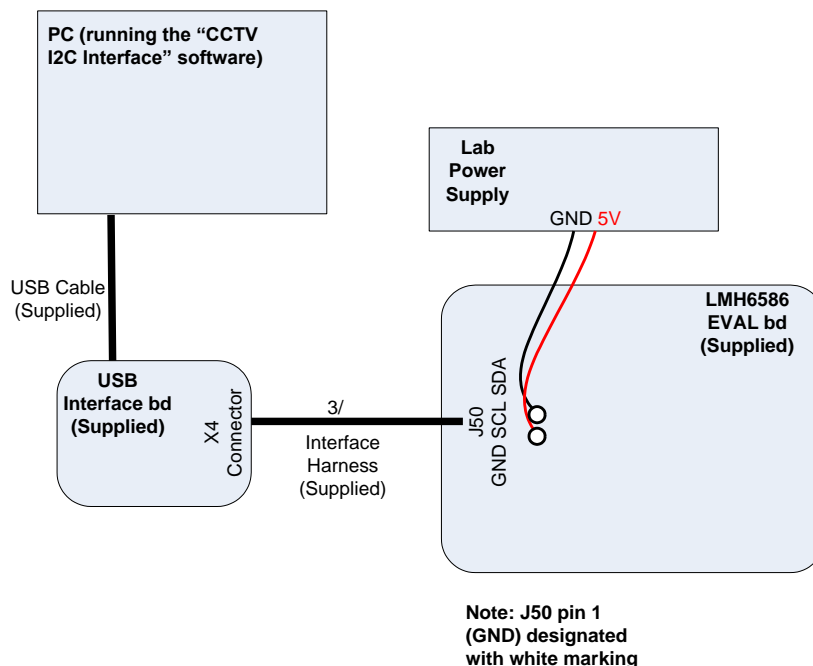


Figure 1: LMH6586 EVAL Board Connection Block Diagram

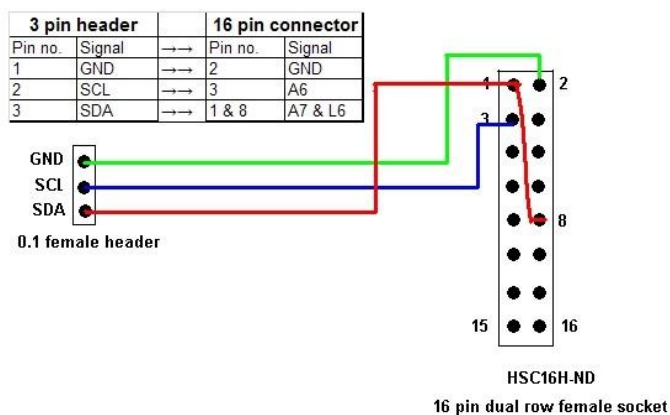


Figure 2: LMH6586 Interface Harness

Power Supplies

The evaluation board requires a 5V power supply (0.5A capability or higher) and a ground connection to power the device.

Video Inputs and Outputs

The evaluation board is populated with 16 BNC connectors for 1/2 the 32 inputs from VIN0 – VIN31 and 8 BNC connectors for 1/2 the 16 outputs from OUT0 – OUT15. There is an additional BNC connector coming from OUT16 of the LMH6586 which can be given to an external sync separator such as the LMH1980.

The inputs to the LMH6586 are AC coupled through a 0.01uF capacitor. Since the inputs are AC coupled, the CLAMP EN jumper (*JP4*) should be shorted to enable the clamp voltage for DC restoration. The LMH6586 can accept input video signals in the range of 0V to 1.5V. The input circuit for each input is shown below.

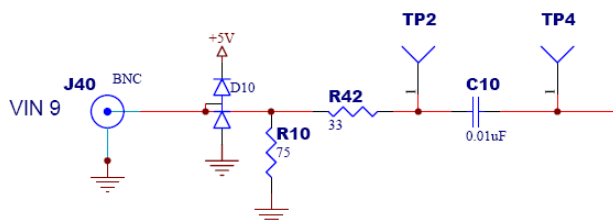


Figure 3: Input Circuit Schematic

Note: Protection diode D10 not installed but can be added for extra protection in case of overvoltage

The LMH6586 can provide output signals in the range of 0V to 3V depending on the gain setting determined by the GAIN jumper (*JP3*). The output circuit for each output is shown below.

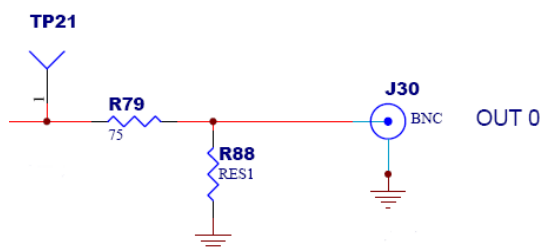


Figure 4: Output Circuit Schematic

Setup

Jumper Settings

JUMPER	POSITION	FUNCTION
JP1	OPEN	DVDD not connected to +5V
	SHORTED	DVDD connected to external +5V supply
JP2	OPEN	LMH6586 is active
	SHORTED	LMH6586 is in power save mode
JP3	OPEN	LMH6586 gain is set to 1V/V
	SHORTED	LMH6586 gain is set to 2V/V
JP4	OPEN	Clamp is disabled
	SHORTED	Clamp is enabled
JP5	OPEN	LMH6586 is active
	SHORTED	LMH6586 is reset

Table 1: Jumper Settings

JP7 (ADDR SEL 1)	JP6 (ADDR SEL 0)	FUNCTION
OPEN	OPEN	Device address set to 00
OPEN	SHORTED	Device address set to 01
SHORTED	OPEN	Device address set to 10
SHORTED	SHORTED	Device address set to 11

Table 2: Device Address Jumper Settings

Clamp Enable Feature

When jumper JP4 is shorted, the clamp enable feature of the LMH6586 is enabled. Since the inputs to the LMH6586 are AC coupled, DC restoration is required. This is accomplished using the clamp enable feature. The clamp enable feature clamps the sync tip of the input signal to the set level. The clamp voltage is set at the VCLAMP pin (*PIN 66*) using potentiometer *R73*. The clamp voltage can be measured at *TP36*. For optimum performance the clamp voltage should be fixed at 0.3V.

The clamp enable circuit is shown below.

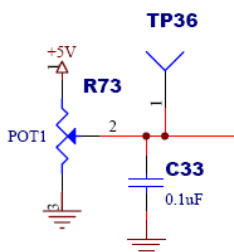


Figure 5: Clamp Enable Circuit

Video Detect

The LMH6586 can be setup to detect the presence or absence of video on each input by setting the appropriate bits in the video detect enable register and the video detect invert register for the respective inputs. The video detect threshold can be adjusted to eight different levels with a 3 bit programmable register. Each of the 32 video input channels can be configured individually to detect video or the loss of video using the accompanying software provided. The software is also used to set up the appropriate video detect threshold level.

The default video detect level at power on is blacker than black. So at power On, the video detect level should be adjusted to a suitable value.

Sync Detect

The LMH6586 can be setup to detect the loss of sync by setting the appropriate bits in the sync detect enable register for the respective inputs. The sync detect threshold level is adjusted using the potentiometer *R120* connected to the SSR pin (*PIN 65*). The sync detect threshold voltage can be measured at *TP84*. For optimum performance the sync detect threshold voltage should be adjusted to 0.35V.

The sync detect threshold circuit is shown below.

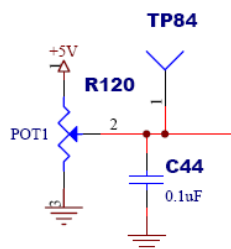


Figure 6: Sync Detect Threshold Circuit

External Video Detect FLAG

When there is a loss of sync or video (or a “*presence*” of video, depending on the setting of the respective bits in the video detect invert register) on any one of the 32 inputs, an external flag (*PIN 75*) is asserted and the two color video detect LED *D34* glows red. Under normal operation *D34* is green.

The video detect flag circuit is shown below.

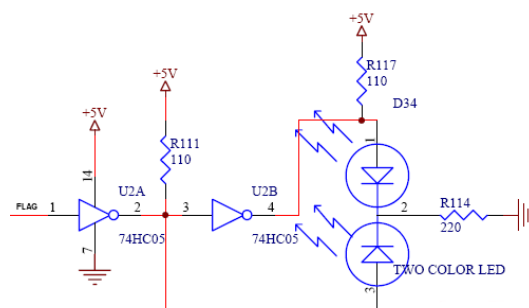


Figure 7: Video Detect FLAG Circuit

Individual Channel Power Save

Each input and each output channel of the LMH6586 can be individually placed in power save mode by programming the appropriate bits in the registers 0x18h – 0x1Bh for the inputs and the registers 0x1Eh – 0x1Fh for the outputs. The accompanying software is used for this programming.

3. Board Layout

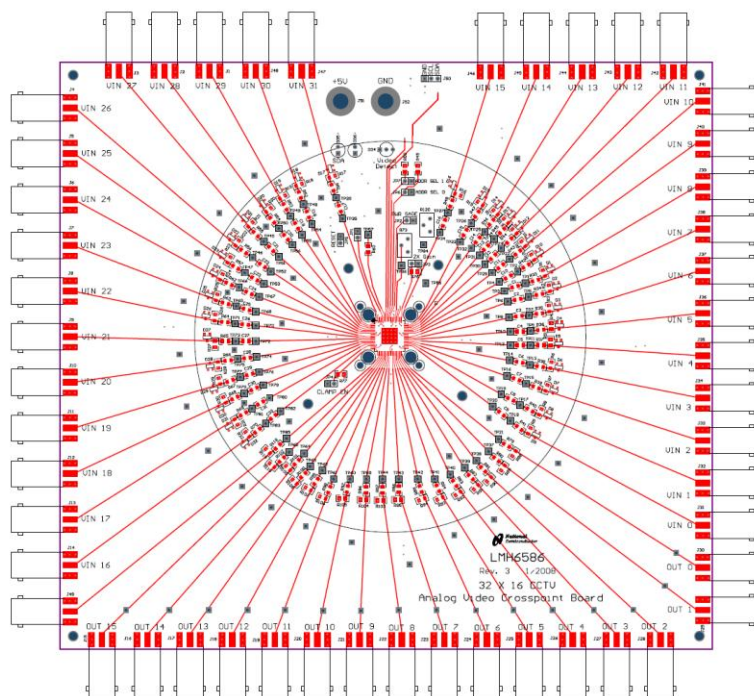


Figure 8: LMH6586 Layout Top Layer

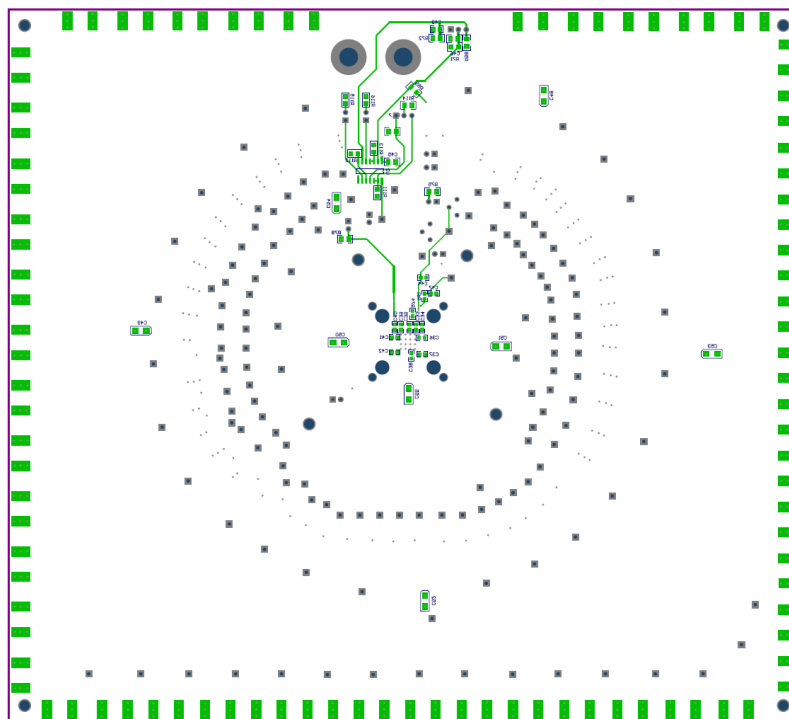


Figure 9: LMH6586 Board Layout Bottom Layer

Schematic

4. Schematic and Bill of Materials (BOM)

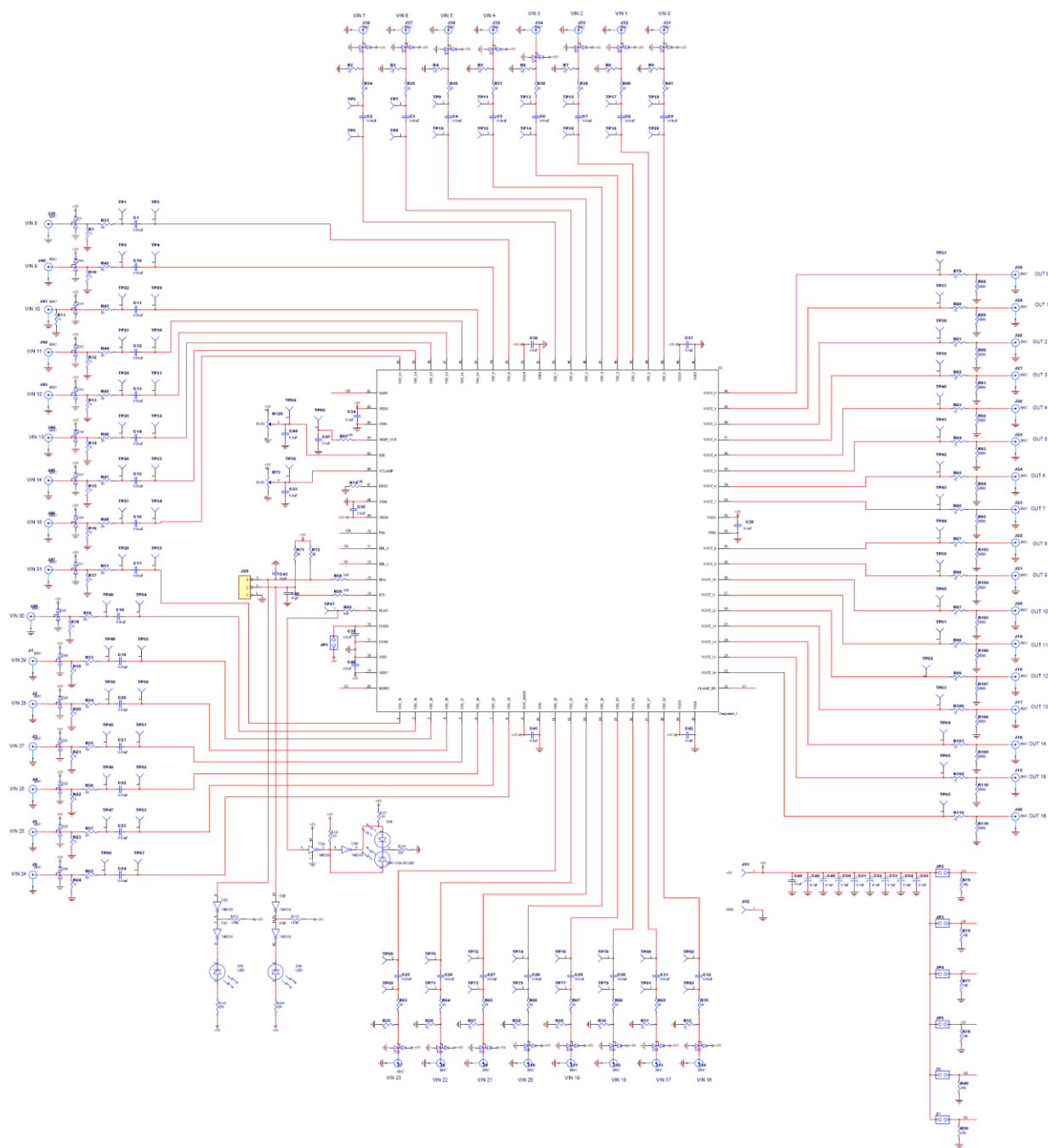


Figure 10: LMH6586 Board Schematic

Notes:

1. R77 is 1kohm.
2. Not all Input / Output BNC's shown are installed.
3. Input protection diodes D1-D32 (MMBD4148SE) not installed.

Part Type	Part Designator	QTY	PART #
2 pin header	JP1-JP7	7	WM6502-ND
2 pin shorting shunt	JP1-JP7	7	A26227-ND
BANANA Jack	J51, J52	2	575-8K-ND
CAPACITOR, 100nF, X7R, 25V, 0805	C45	1	PCC1828CT-ND
CAPACITOR, 100nF, X7R, 25V, 0603	C33-42, C44, C47	12	PCC2277CT-ND
CAPACITOR, 10nF, X7R, 25V, 0603	C1-C32	32	PCC1763CT-ND
RESISTOR, 2K, 1%, 0805	R71, R72	2	P2.00KCCT-ND
CAPACITOR, 4.7uF, TANT, SIZE A	C48-C55	8	495-2197-1-ND
RESISTOR, 10K, 1%, 0603	R74	1	RHM10.0KHCT-ND
RESISTOR, 10K, 1%, 0805	R49, R50, R75, R76, R78	5	P10.0KCCT-ND
RESISTOR, 33ohm, 1%, 0805	R33-R48, R51-R57, R62-R70	32	P33.0CCT-ND
RESISTOR, 1K, 1%, 0805	R77	1	P1.00KCCT-ND
CAPACITOR, 47pF, NPO, 50V, 0805	C43, C46	2	PCC470CGCT-ND
74HC05	U2	1	296-1190-5-ND
RESISTOR, 75, 1%, 0805	R1-R32, R79-R87, R96-R102, R118	49	P75.0CCT-ND
RESISTOR, 100, 1%, 0603	R61	1	P100HCT-ND
RESISTOR, 100, 1%, 0805	R58-R60	3	P100CCT-ND
RESISTOR, 110, 1%, 0805	R111, R117	2	P110CCT-ND
RESISTOR, 110K, 1%, 0805	R112, R113	2	P110KCCT-ND
RESISTOR, 220, 1%, 0805	R114-R116	3	P220CCT-ND
EDGE MOUNT BNC	J2, J4, J6, J8, J10, J12, J14, J16, J18, J20, J22, J24, J26, J28, J30, J31, J33, J35, J37, J39, J41, J43, J45, J48, J49	25	1097-1139-ND
LMH6586	U1	1	LMH6586
MMBD4148SE	D1- D32 (not installed)	32	MMBD4148SECT-ND
3 PIN HEADER	J50	1	WM6503-ND
2 PIN HEADER	JP1-JP7	7	WM6502-ND
RED / GREEN LED	D34	1	754-1232-ND
RED LED	D35	1	P559-ND
GREEN LED	D36	1	P560-ND
5K POT	R73, R120	2	3299Y-502LF-ND
NOT STUFFED	R88-R95, R107, R108, R103-R106, R109, R110, R119	N/A	-

Table 3: LMH6586 EVAL Board BOM

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

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- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

~

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(1) Use this product in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,

(2) Use this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or

(3) Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product.

Also, please do not transfer this product, unless you give the same notice above to the transferee.

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Automotive	www.ti.com/automotive
Broadband	www.ti.com/broadband
Digital Control	www.ti.com/digitalcontrol
Military	www.ti.com/military
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Security	www.ti.com/security
Telephony	www.ti.com/telephony
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