LMH1980 Evaluation Board Instruction Manual

National Semiconductor
Application Note 1618
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General Description

The LMH1980 Evaluation Board can be used to test the LMH1980 Auto-Detecting SD/HD/PC Video Sync Separator and as a reference for PCB layout design.

Power Supply

The board can be powered using a clean supply voltage, between 3.3V and 5.0V, connected to V_{CC} (J1) and GND (J2) via banana jacks. The LMH1980 supply voltage should be regulated within ±10% variation of the voltage range and should not be shared directly with other digital circuitry.

Video Input

A clean, 75Ω video source can be connected to the board via the video input BNC (J3), which is terminated with a 75Ω load resistor on the board. Because the input can accept either SD or HD video inputs, a switch-controlled chroma filter, consisting of R_9 and C_2, is provided on the board. If a PC video input is used, C_2 should be removed to disable the chroma filter.

Input Filtering

When an HD tri-level sync input signal is applied, the $\overline{HD}$ flag (pin 5) will output logic low (following a brief delay for auto format detection) and Q1 will turn off, disabling the SD video chroma filter. When an $\overline{SD}$ bi-level sync input signal (e.g.: NTSC/PAL) is applied, $\overline{HD}$ will output logic high and Q1 will turn on, enabling the chroma filter. When enabled, this low-pass filter will attenuate any chroma subcarrier amplitude extending near the sync pulse so it does not interfere with sync separation. The filter will also improve the input signal-to-noise ratio. The filter cutoff frequency (f_{CO}), set by R_9 and C_2, can be changed depending on the attenuation needed for the SD video signal. Keep in mind that as f_{CO} decreases, the LMH1980 output propagation delays increase, which will affect the timing relationship between the sync and video signals.

Important: If f_{CO} is set too low and HD video is applied, the filter can severely roll off and attenuate the input's high-bandwidth tri-level sync pulses such that the LMH1980 cannot detect a valid HD input signal. If the LMH1980 cannot detect a valid HD input, then the $\overline{HD}$ flag will never change from logic high to low and the switch-controlled filter will never be disabled via Q1. In other words, f_{CO} should not be set so low that the filter impairs the LMH1980's ability to detect a valid HD input. The values of R_9 and C_2 shown in the schematic give f_{CO} = 2.79 MHz (about -4 dB at 3.58 MHz NTSC subcarrier frequency) and does not impair auto format detection.

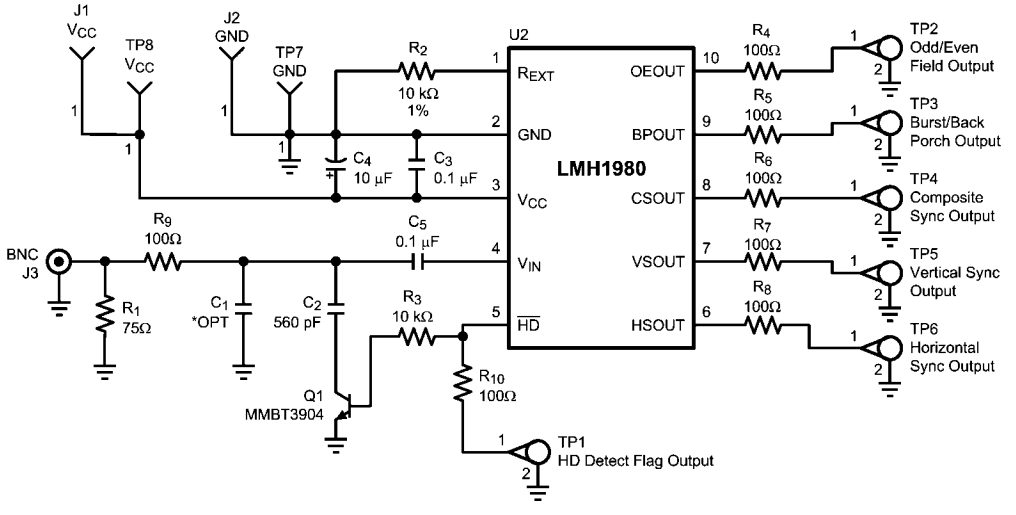
If a PC video input is to be used, C_2 should be removed to disable chroma filtering. This is necessary because $\overline{HD}$ will output logic high (as in the SD video input case) and enable the filter. A chroma filter could severely band-limit a high-bandwidth PC video signal, which could roll-off and attenuate the sync pulses such that the LMH1980 cannot detect a valid input signal.

If some high-frequency noise filtering is needed for all video signal inputs, a small capacitor may be optionally placed at C_1. The RC filter formed by R_9 and C_1 is always connected regardless of Q1's switch state. When Q1 is turned on, C_1 and C_2 will be connected in parallel (C_1+C_2).

Test Points

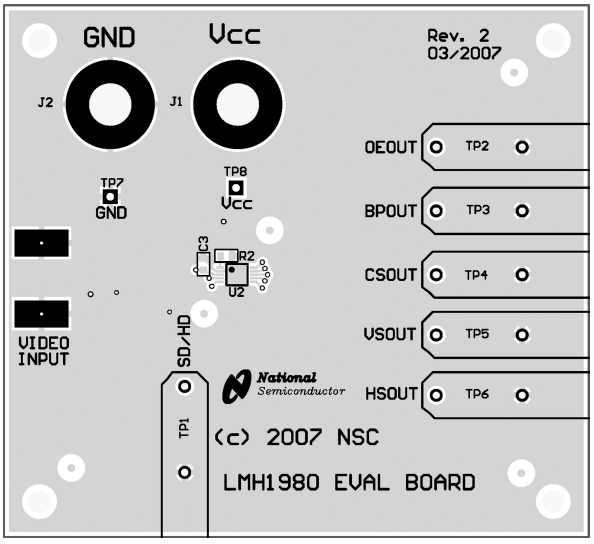
Test points and ground points are provided to measure the input and output signals using 10 MΩ oscilloscope probes with 10 pF load capacitance.

Board Schematic



LMH1980 Eval Board
870013153–200 Rev A

Board Layout



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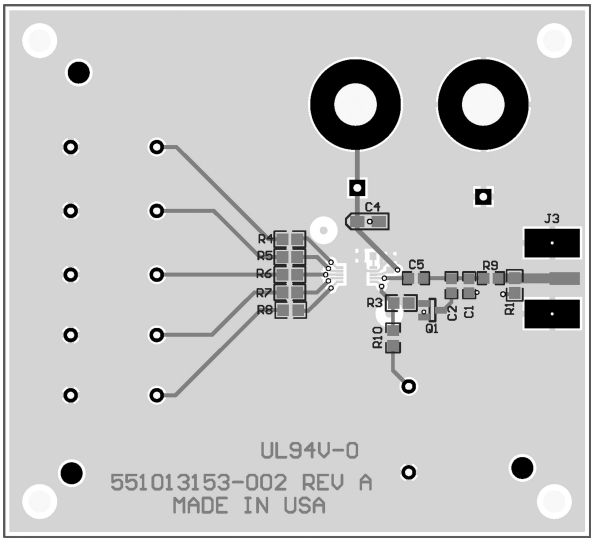
Top Side



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Bottom Side

Bill of Materials

Item	Part Number	Part Description	Qty	Ref Designator	Remark
1	LMH1980		1	U2	
2	MMBT3904	NPN Transistor, SOT-23	1	Q1	
3	Digi-key PCC1762CT-ND	Capacitor Ceramic 0.1 µF, X7R, 0603, 16V	1	C_3	
4	Digi-key PCC1828CT-ND	Capacitor Ceramic 0.1 µF, X7R, 0805, 25V	1	C_5	
5	Digi-key PCC561BNCT-ND	Capacitor Ceramic 560 pF, NPO, 0805, 50V	1	C_2	
6	Digi-key PCC561BNCT-ND	Capacitor Ceramic 560 pF, NPO, 0805, 50V	1	C_4	
7	Digi-key P10.0KHCT-ND	Resistor, 10 kΩ, 1%, 1/10W 0603	1	R_2	Must be 1% or better
8	Digi-key P10.0KCCT-ND	Resistor, 10 kΩ, 1%, 1/8W 0805	1	R_3	
9	Digi-key P75.0CCT-ND	Resistor, 75Ω, 1%, 1/8W 0805	1	R_1	
10	Digi-key P100CCT-ND	Resistor, 100Ω, 1%, 1/8W 0805	7	R_4, R_5, R_6, R_7, R_8, R_9, R_{10}	
11	MOUSER 16BJ381	Banana Jack, Red	1	J1	
12	12 MOUSER 16BJ382	Banana Jack, Black	1	J2	
13	Newark 22C4690	EDGE-MOUNT BNC	1	J3	Trompeter UCBJE20-1
14	Digi-key 5001K-ND	Test Point, Black	1	TP7	
15	Digi-key 5000K-ND	Test Point, Red	1	TP8	
16	Digi-key 5001K-ND, 5004-ND	Test Points, Black and Yellow	6	TP1, TP2, TP3, TP4, TP5, TP6	Use black for GND points

Notes

Notes

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