AN-1618 LMH1980 Evaluation Board Instruction Manual

1 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 printed circuit board (PCB) layout design.

2 Power Supply

The board can be powered using a clean supply voltage, between 3.3 V and 5.0 V, 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.

3 Video Input

A clean, 75 Ω video source can be connected to the board via the video input BNC (J3), which is terminated with a 75 Ω 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.

4 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 SD bi-level sync input signal (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 Figure 1 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).

5 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.

6 Board Schematic

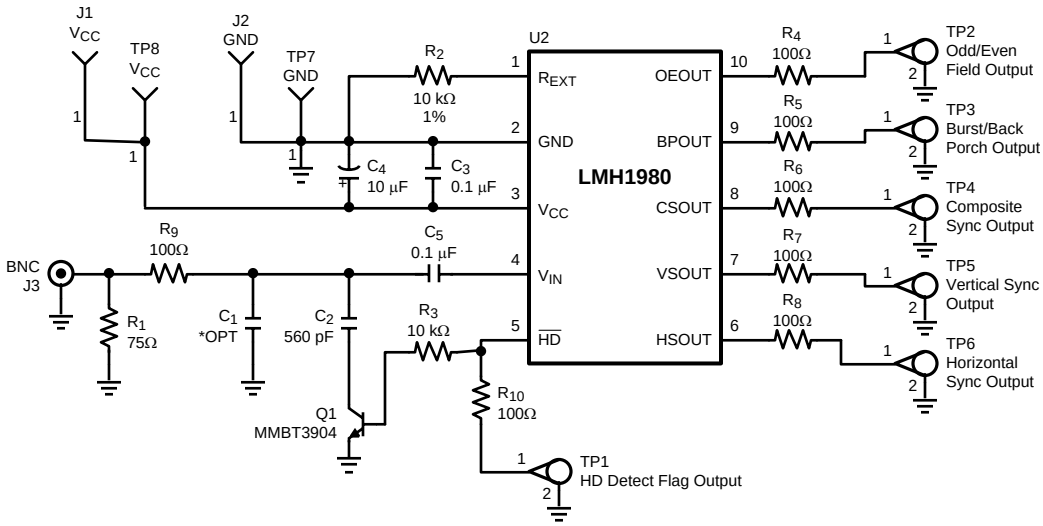

Figure 1. LMH1980 Eval Board 870013153–200 Rev A

7 Board Layout

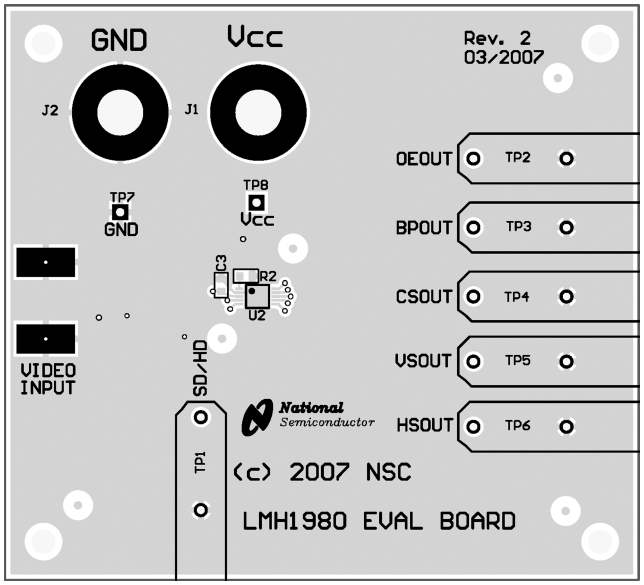

Figure 2. Top Side

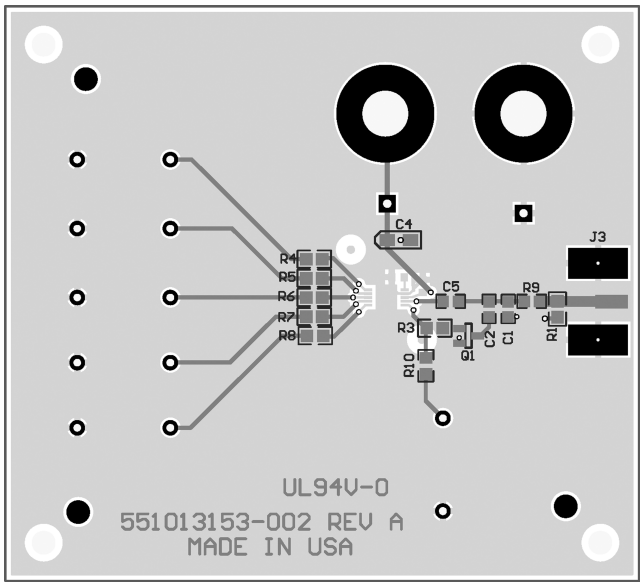

Figure 3. Bottom Side

8 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

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