Application Report
SNLA097A–August 2007–Revised May 2013

Migrating from the LM1881 to the LMH1980

ABSTRACT

The LMH1980 is a SD/HD/PC video sync separator intended to replace the LM1881 sync separator in consumer, security and surveillance, and industrial video applications where high-definition compatibility is needed. This application report discusses the LMH1980's advantages over the LM1881 and considerations for designing the LMH1980 into current LM1881 sockets. In broadcast and professional video systems where timing jitter is a critical system parameter, another sync separator, the LMH1981, offers the best jitter performance while supporting all SD and HD analog video standards.

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1 Advantages of the LMH1980[1]

The LMH1980 offers several advantages over the LM1881, including:

- Lower operating supply of 3.3 V
- Wide temperature range of −40°C to +85°C
- Auto-detection of the input video format using a fixed-value resistor biasing architecture
- Support for HD tri-level sync separation
- HSync output and HD detect flag output
- Smaller package

2 Improved Operating Range

The LM1881 required a supply voltage from 5 V to 12 V, whereas, the LMH1980 operates with a supply voltage as low as 3.3 V. This allows the LMH1980 to be used in applications where a lower supply voltage between 3.3 V to 5 V is available. Additionally, the improved operating temperature range makes it better suited for applications where reliability is needed at cold temperatures as low as −40°C.

3 Video Auto-Detection and Formats

The LMH1980 accepts an analog video input with either bi-level sync or tri-level sync and automatically detects the video format, thus eliminating the need for external R_{SET} adjustment required by the older LM1881 to support different line rates. Only a fixed 10 kΩ 1% external resistor is needed to sustain the internal biasing architecture of the LMH1980, which adapts to the input line rate without physical or electrical intervention. The outputs are accurate after a sufficient start-up time is met, typically within one to two fields of video.

The LMH1980 supports sync separation for analog CVBS, Y (luma) from Y/C and YP_BP_R, and G (sync on green) from GBR/RGsB, as specified in the following video standards.

- Composite Video (CVBS) and S-Video (Y/C)
  - SMPTE 170M (NTSC), ITU-R BT.470 (PAL)
- Component Video (YP_BP_R/GBR)
  - SDTV: SMPTE 125M, SMPTE 267M, ITU-R BT.601(480I, 576I)
  - EDTV: ITU-R BT.1358 (480P, 576P)
  - HDTV: SMPTE 296M (720P), SMPTE 274M (1080I/P), SMPTE RP 211 (1080PsF)
- PC Graphics (RGsB)
  - VESA Monitor Timing Standards and Guidelines Version 1.0, Revision 0.8
- Non-Standard Video
  - Composite NTSC and PAL (or Component 480I and 576I) without vertical serration and equalization pulses

4 Additional Outputs

The LMH1980 provides a true horizontal sync signal (HSync), which was not available in the LM1881. Unlike the composite sync signal of the LM1881, the HSync signal can be directly input to a phased-locked loop (PLL) to generate a synchronous line-locked clock without the complication of managing double frequency serration pulses in the vertical interval (PLL coast mode).

The LMH1980 also features an HD detect flag that outputs a logic low signal when a valid HD video input with tri-level sync is detected; otherwise, it outputs logic high. This can be useful in multiple format applications where the external chroma low-pass filter needs to be disabled when an HD video signal is applied; otherwise, the chroma filter can distort the HD tri-level sync pulses, which may lead to increased output propagation delay and jitter. An implementation of a switch-controlled chroma filter is shown and described in the *LMH1980 Auto-Detecting SD/HD/PC Video Sync Separator Data Sheet* (SNLS263).

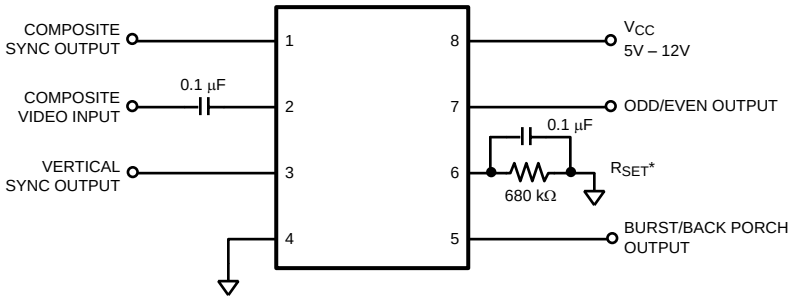
[1] All trademarks are the property of their respective owners.

5 Package and PCB Considerations

The LMH1980 is offered in a space-saving 10-lead MSOP, which reduces the area needed on the PCB. Because of the smaller package and additional outputs of the LMH1980, it is not a drop-in replacement for the LM1881, and the circuit schematic and PCB layout need to be slightly modified. As a comparison, the typical application circuit schematics are shown for the LM1881 and the LMH1980 in Figure 1 and Figure 2, respectively.

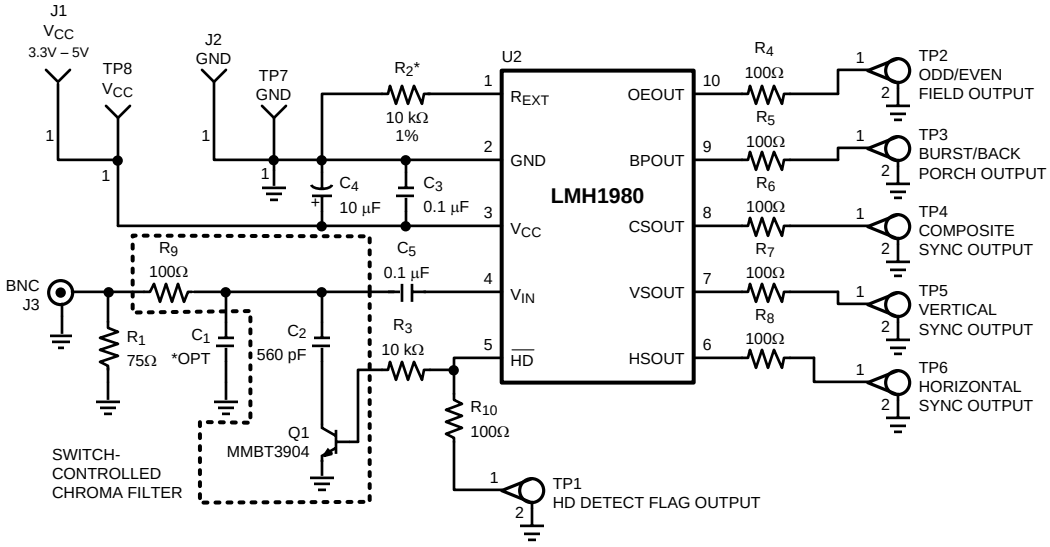
Although omitted from the LM1881 circuit, the LMH1980 circuit shows the recommended supply bypass capacitors, chroma (RC low-pass) filter components, and output protection resistors.

For more information about component placement and trace routing, see the *PCB Layout Considerations* section in the *LMH1980 Auto-Detecting SD/HD/PC Video Sync Separator Data Sheet* (SNLS263) and *AN-1618 LMH1980 Evaluation Board Instruction Manual* (SNLA096).



*R_{SET} VALUE NEEDS TO BE CHANGED TO SUPPORT OTHER VIDEO LINE RATES

Figure 1. LM1881 Typical Application Circuit With R_{SET} = 680 kΩ for Composite Video



*R_2 VALUE IS FIXED AT 10 kΩ 1% FOR ALL SUPPORTED VIDEO LINE RATES

Figure 2. LMH1980 Typical Application Circuit With Switch-Controlled Chroma Filter

6 References

- *LMH1980 Auto-Detecting SD/HD/PC Video Sync Separator Data Sheet* (SNLS263)
- *AN-1618 LMH1980 Evaluation Board Instruction Manual* (SNLA096)

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