AN2705
Application note

TSH173 triple video buffer with filter for SD video evaluation board user guidelines

Introduction

This application note describes the TSH173 evaluation board, designed to help you evaluate the TSH173 triple video buffer.

This document includes:

- A short description of the TSH173 video buffer, including the internal block diagram
- A description of the evaluation board and all of its components
- The layout of the evaluation board

About the TSH173

The TSH173 is a single supply triple video buffer featuring an internal gain of 6dB and an internal low pass filter of 8.2MHz cut-off frequency for each channel to fit with Standard Definition requirements for video line interfaces.

Figure 1. TSH173 evaluation board

Main features of the TSH173

- 4.5V to 5.5V single supply operation
- R-G-B, Y-Pb-Pr, Y-C-CVBS driving
- 3 channels with 6dB gain buffer
- 3 video reconstruction filters for SD
- 3 internal input DC level shifter
- No input capacitor required
- Very low harmonic distortion
- Each output can drive AC- or DC-coupled 150Ω loads
- Tested on 5V power supply

1 TSH173 description

Figure 2. TSH173 internal block diagram

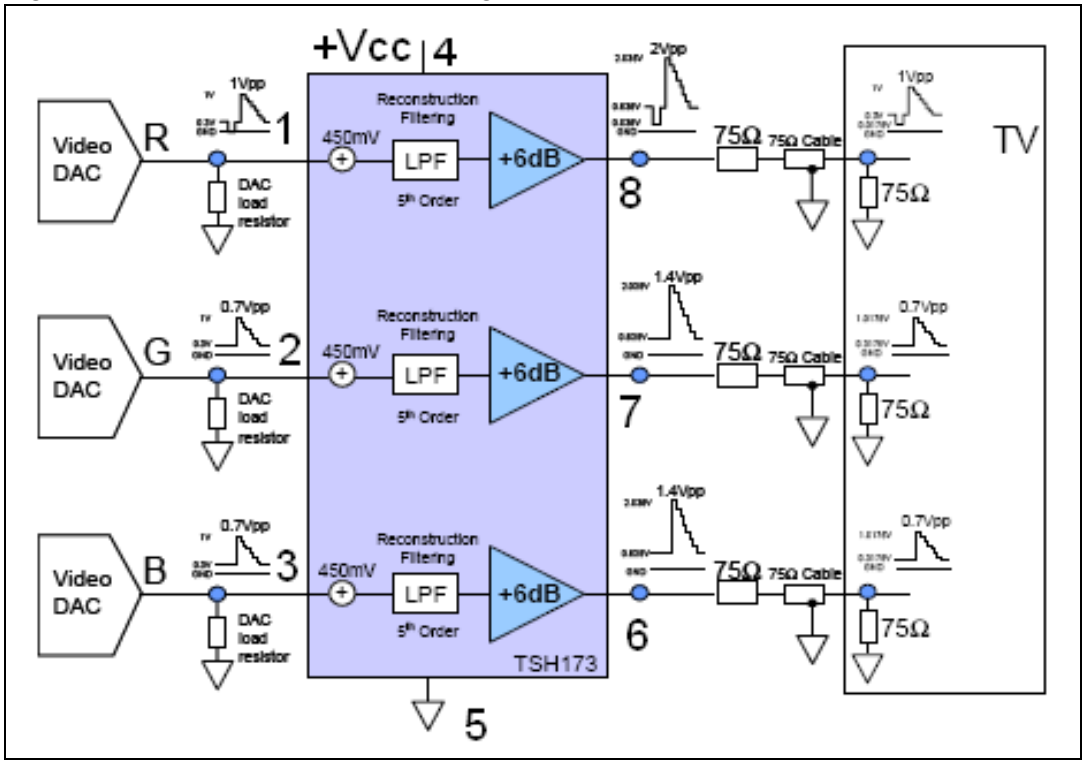


Table 1. Pin description

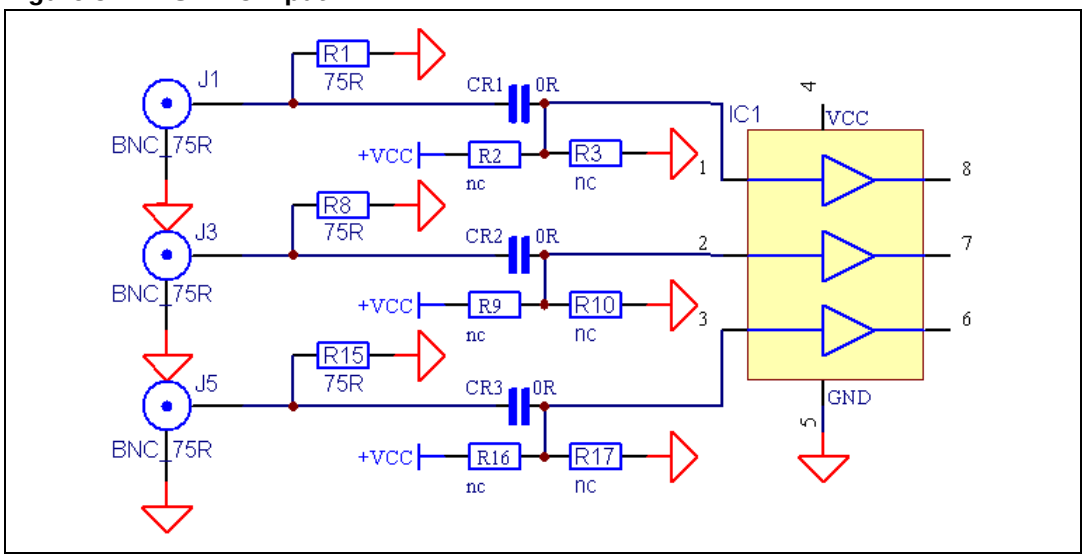
Name	Pin number	Description
IN1, IN2, IN3	1, 2, 3	Input pins
OUT1, OUT2, OUT3	8, 7, 6	Output pins
+VCC	4	Positive supply
GND	5	Ground

2 Evaluation board description

This board is designed to be tested with a 75Ω generator and 75Ω measurement tool.

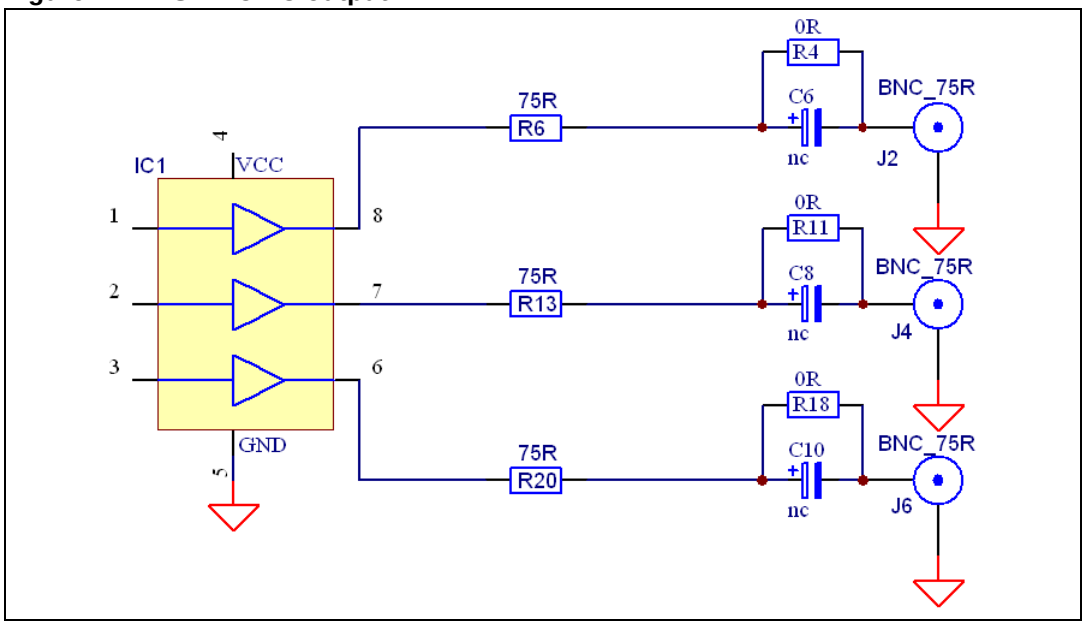
Input signal must be between 0V and 1.4V so that it is not clamped. Otherwise, you must replace the zero ohm resistor by a 100nF capacitor in CR1, CR2, and CR3, and add a resistor bridge to polarize the input signal at the right level as shown in *Figure 3*. Resistor bridge footprints are located on the back of the PCB.

Figure 3. TSH173 input



The TSH173 output can be AC coupled by a 220nF capacitor to minimize the DC component on the line. To do this, you must remove the R4, R11, and R18 zero ohm resistors and solder a 220µF capacitor on C6, C8, and C10 footprints as shown in *Figure 4*.

Figure 4. TSH173 AC output

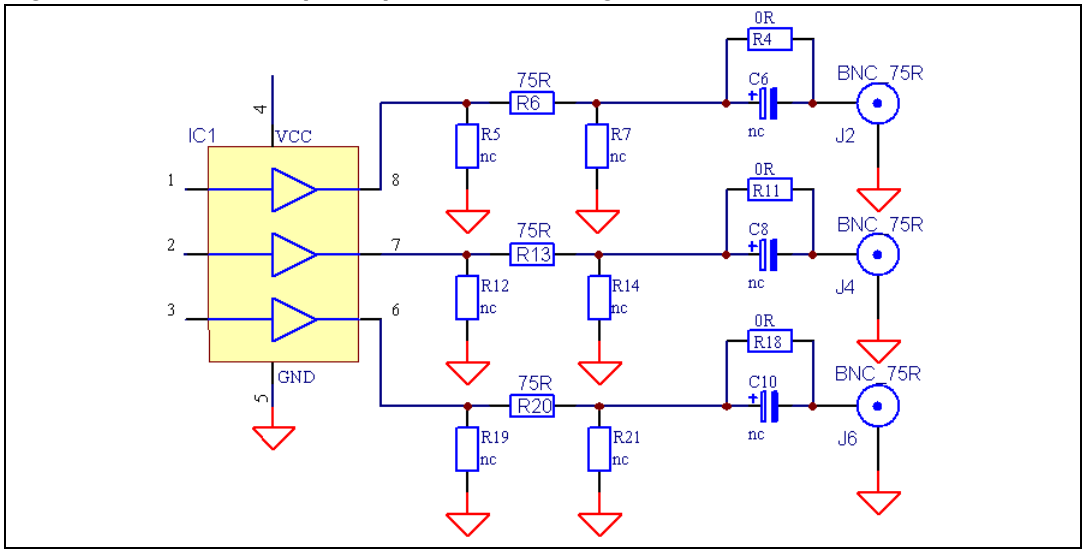


If you connect a system with an input impedance other than 75Ω to the PCB output, a Π resistor footprint on the board allows you to match impedances.

For example: you connect a scope with a 50Ω output impedance. To match impedances, you must add the following resistors: R5=2.2kΩ, R6=130Ω, R7=82Ω

The output can be AC or DC connected with this configuration.

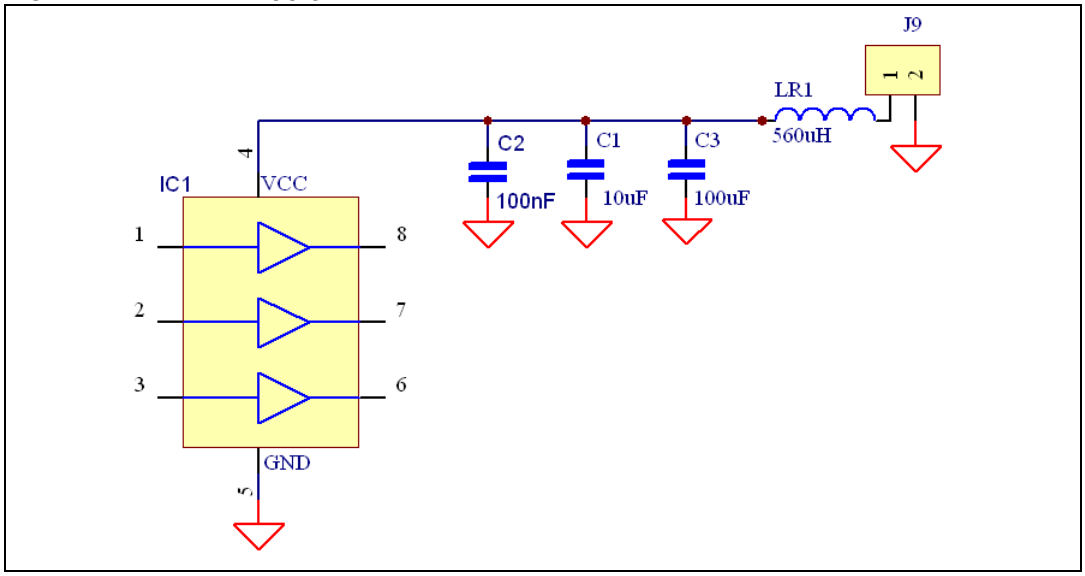
Figure 5. TSH173 output impedance matching



Power supply

Correct power supply bypassing is very important for optimizing performance. A 10µF and a 100nF are soldered on the board. This gives good performance. However, you can improve it by adding a 100µF capacitor in C3 and placing a 560µH coil instead of the zero ohm resistor in LR1.

Figure 6. Power supply



3 Schematic diagram and board components

Figure 7. Board components

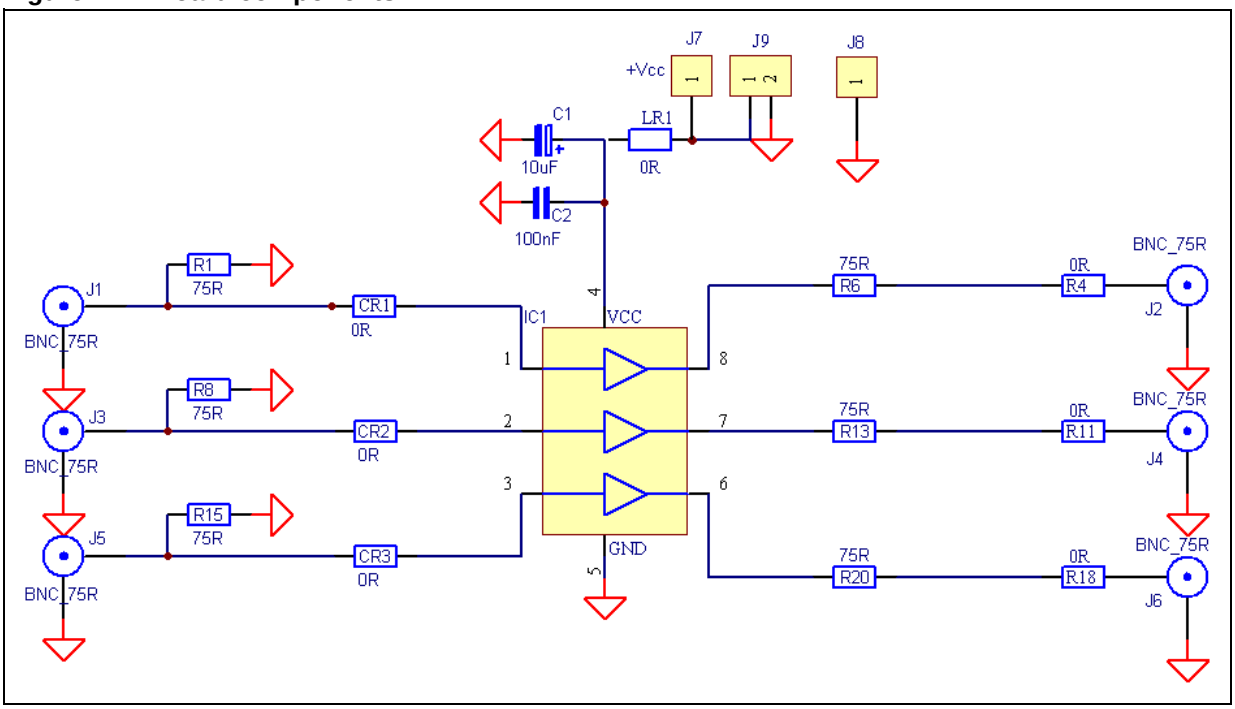


Figure 8. Full layout schematics

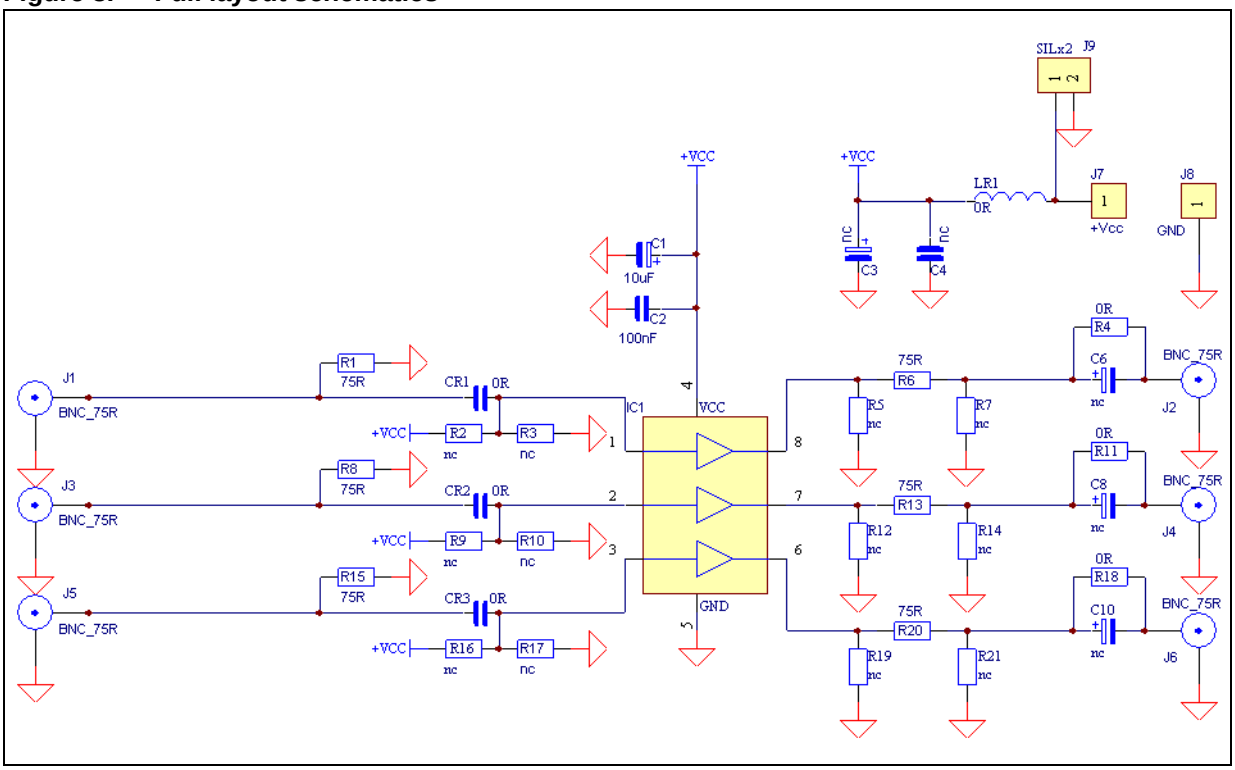


Table 2. List of board components

Part type	Name on board	Footprint	Description
10 µF	C1	1206	Bypass ceramic capacitor on V_{CC}
100 µF	C2	0805	Bypass ceramic capacitor on V_{CC}
	C3	8mm diameter	Bypass chemical capacitor on V_{CC} not connected
	C4	0805	Bypass ceramic capacitor on V_{CC} not connected
0 ohm	CR1, CR2, CR3	0805	Input capacitor replaced by a 0 ohm resistor
	C6,C8,C10		Output capacitor 220µF not connected
TSH173	IC1	SO8	
BNC 75Ω	J1, J3, J5	BNC	Input signal connectors
BNC 75Ω	J2, J4, J6	BNC	Output signal connectors
JACK	J7, J8		Jack 2mm supply connectors
SIL	J9	SIL	SIL supply connector 2.54mm pitch
0 ohm	LR1	1206	Coil replaced by 0 ohm resistor
75Ω	R1, R8, R15	0805	input resistor
75Ω	R6, R13, R20	0805	output resistor
	R2, R3, R9, R10, R16, R17	0805	Bridge resistors not connected
0 ohm	R4, R11, R18	0805	Strap when output is DC coupled
	R5, R7, R12, R14, R19, R21	0805	Optional resistors to adapt output impedance

4 PCB layout

Figure 9. Top layer

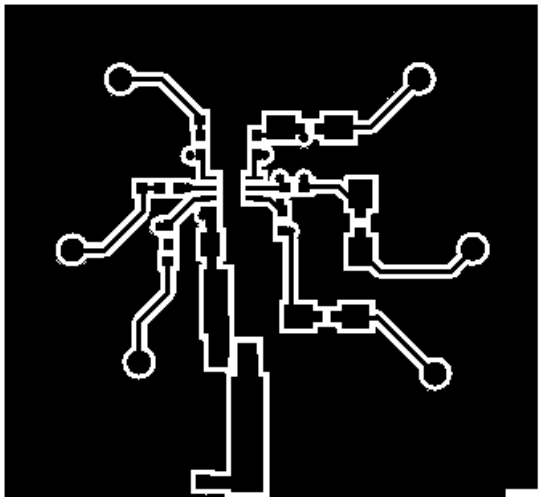


Figure 10. Top layout

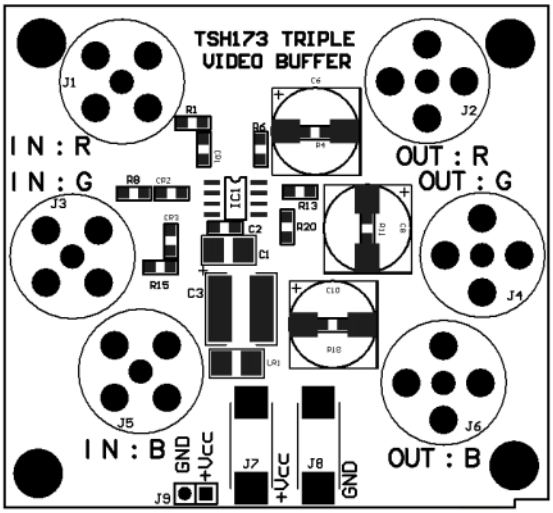


Figure 11. Bottom layer

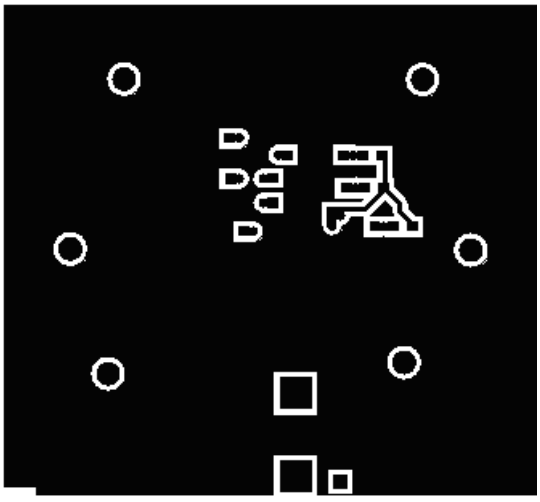
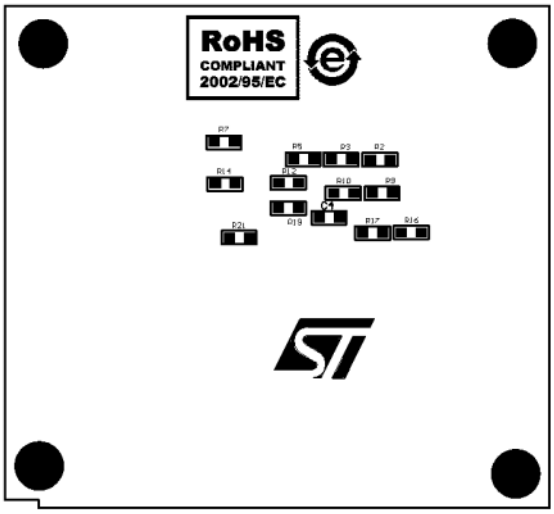


Figure 12. Bottom layout



5 Revision history

Table 3. Document revision history

Date	Revision	Changes
31-Jan-2008	1	Initial release.