

### TSH103 triple video buffer with filter for SD video evaluation board user guidelines

## Introduction

This application note describes the TSH103 evaluation board, designed to help you evaluate the TSH103 triple video buffer.

This document includes:

- A short description of the TSH103 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 TSH103

The TSH103 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. TSH103 evaluation board**



## Main features of the TSH103

- 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 TSH103 description

Figure 2. TSH103 internal block diagram

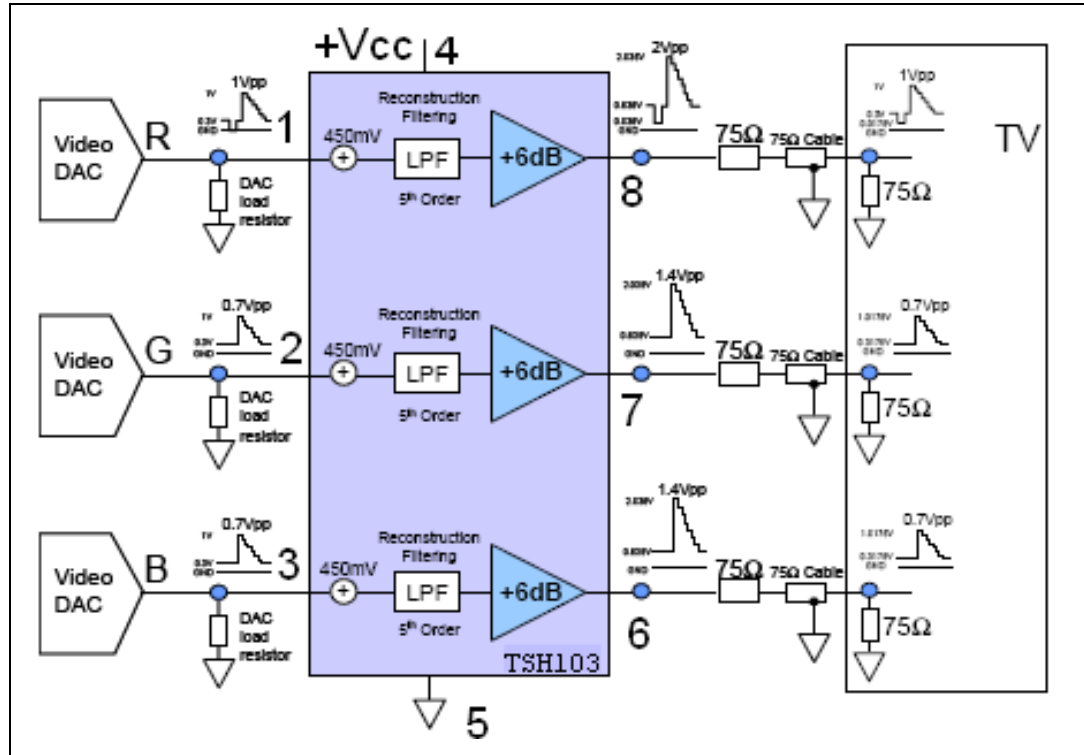


Table 1. Pin description

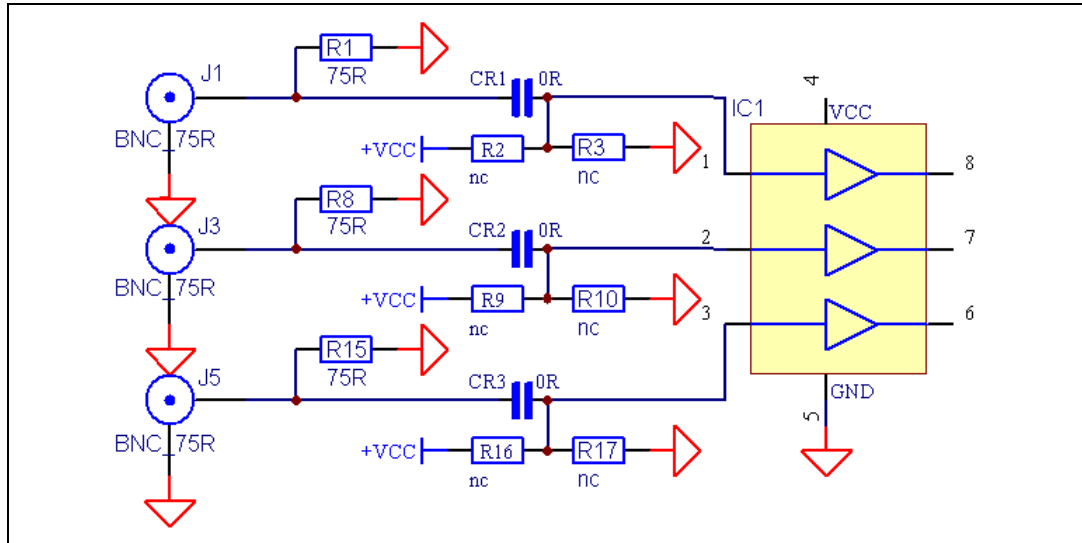
Name	Pin number	Description
IN1, IN2, IN3	1, 2, 3	Input pins
OUT1, OUT2, OUT3	8, 7, 6	Output pins
+VCC	4	Positive supply
GND	5	Ground

## 2 Evaluation board description

This board is designed to be tested with a  $75\Omega$  generator and  $75\Omega$  measurement tool.

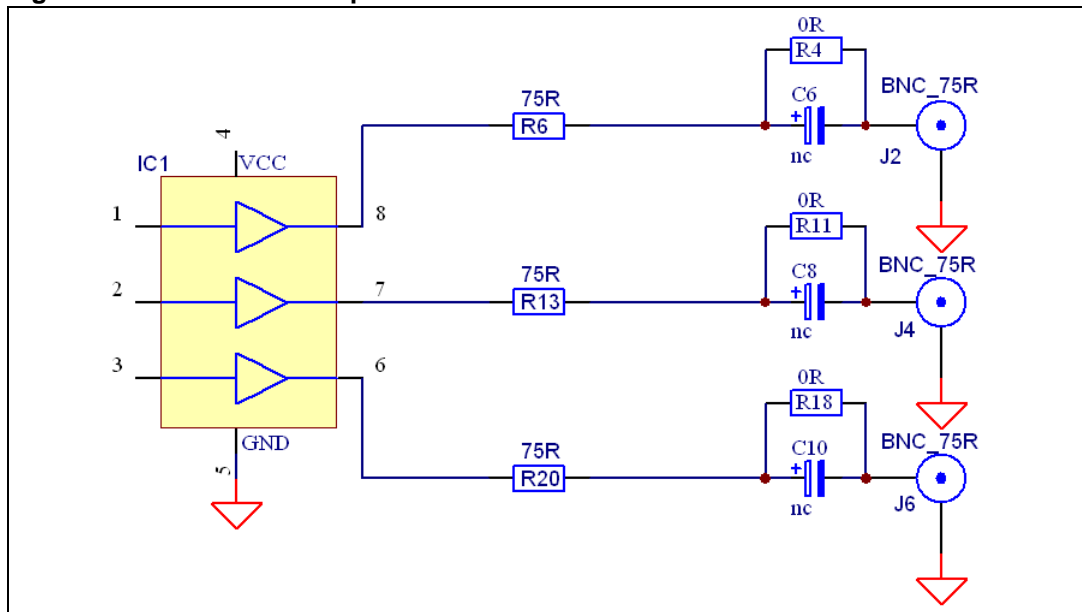
Input signal must be between 0V and 1.4V so that it is not clamped. Otherwise, you must replace the zero ohm resistor by a 100nF capacitor in CR1, CR2, and CR3, and add a resistor bridge to polarize the input signal at the right level as shown in [Figure 3](#). Resistor bridge footprints are located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

**Figure 3. TSH103 input**



The TSH103 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 220 $\mu$ F capacitor on C6, C8, and C10 footprints as shown in [Figure 4](#).

**Figure 4. TSH103 AC output**

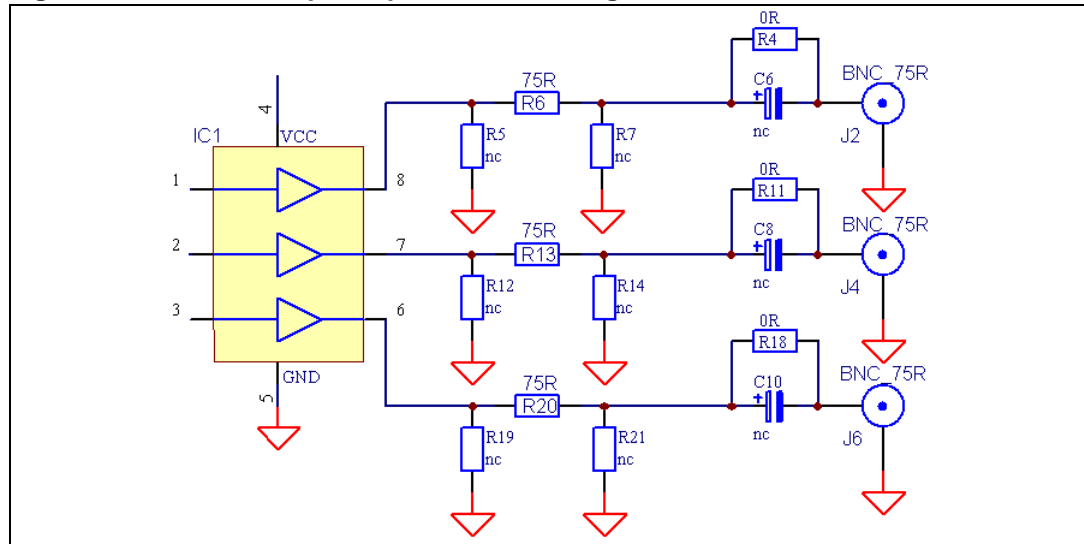


If you connect a system with an input impedance other than 75Ω to the PCB output, a Π resistor footprint on the board allows you to match impedances.

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.

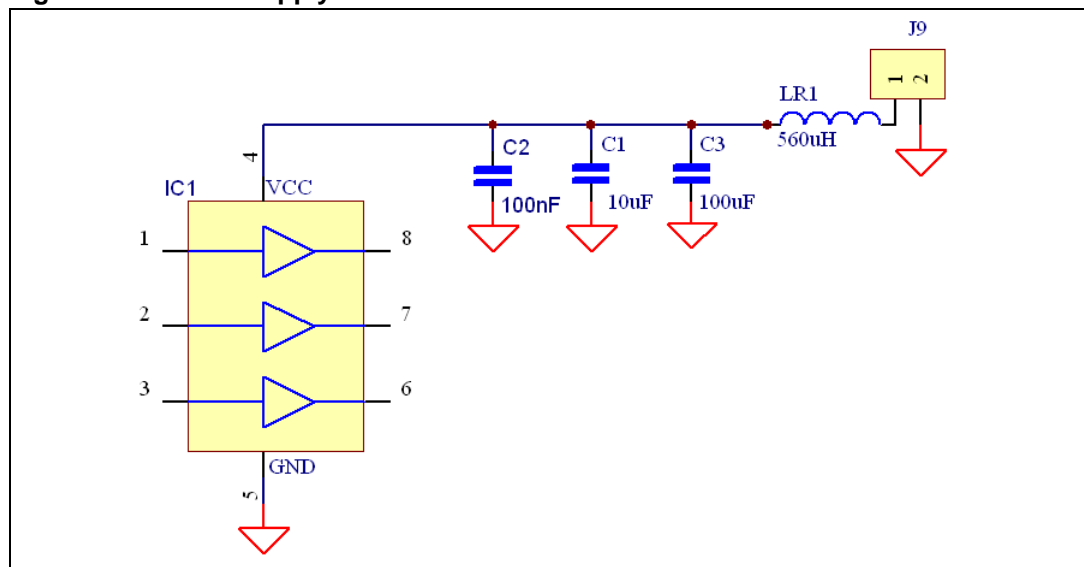
Figure 5. TSH103 output impedance matching



### 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

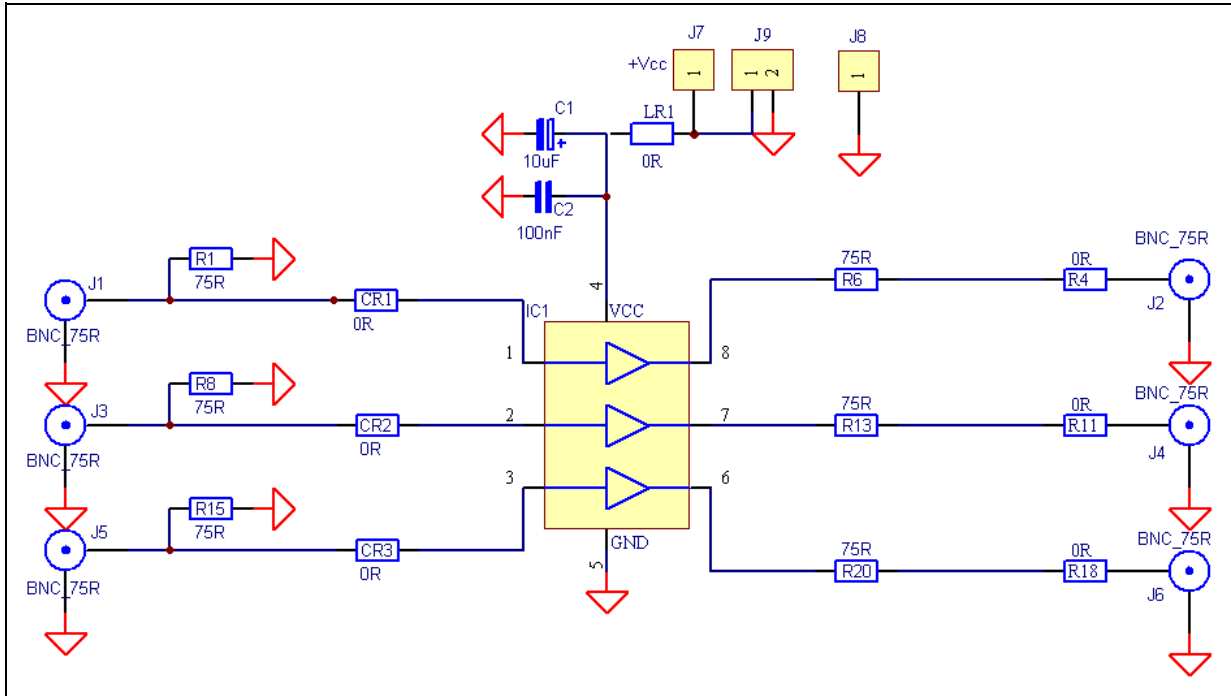
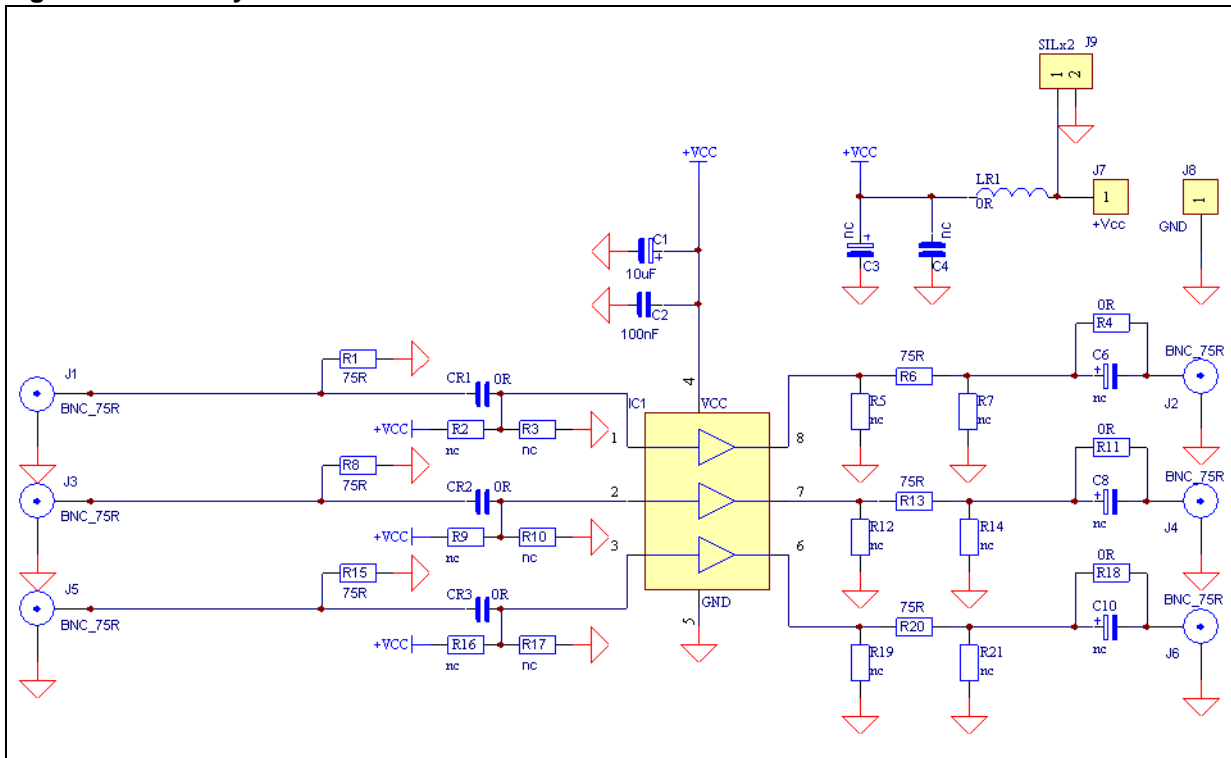


Figure 8. Full layout schematics



**Table 2. List of board components**

Part type	Name on board	Footprint	Description
10 $\mu$ F	C1	1206	Bypass ceramic capacitor on $V_{CC}$
100 $\mu$ F	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 220 $\mu$ F not connected
TSH103	IC1	SO8	
BNC 75 $\Omega$	J1, J3, J5	BNC	Input signal connectors
BNC 75 $\Omega$	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
75 $\Omega$	R1, R8, R15	0805	input resistor
75 $\Omega$	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

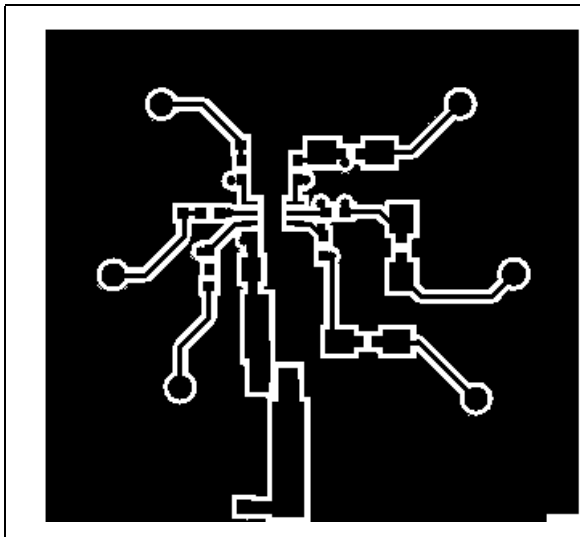


Figure 10. Top layout

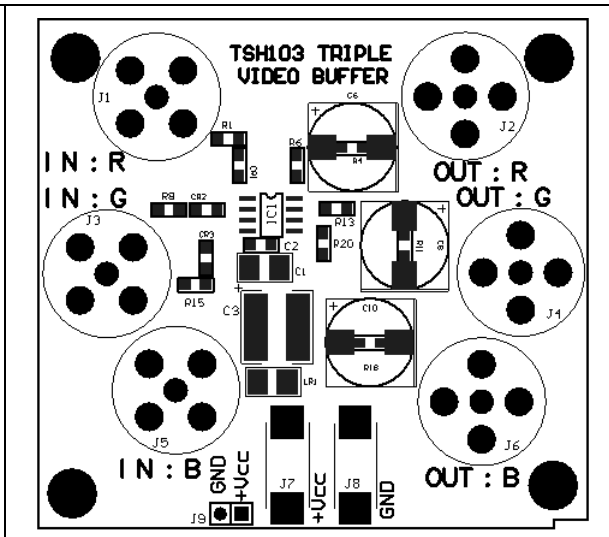


Figure 11. Bottom layer

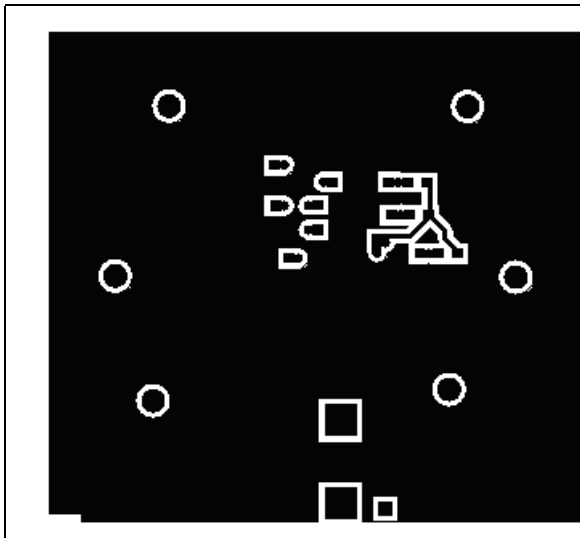
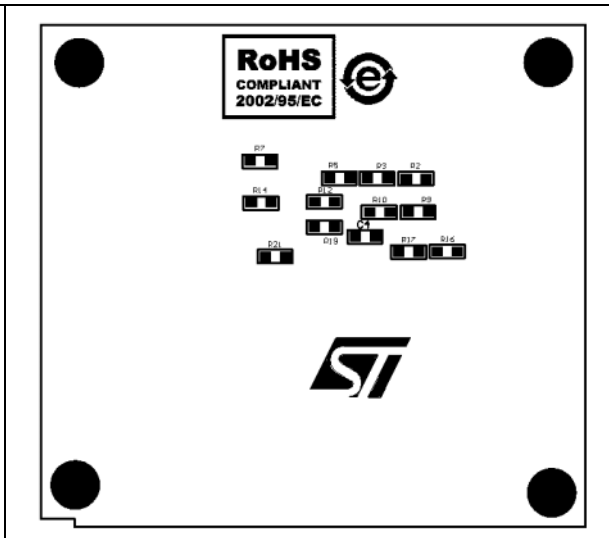


Figure 12. Bottom layout



## 5 Revision history

Table 3. Document revision history

Date	Revision	Changes
4-Feb-2008	1	Initial release.

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