SGS-THOMSON MICROELECTRONICS

APPLICATION NOTE

SAMPLES AND HOLD USING TSH94 STANDBY MODE

by G. AUGUSTONI

INTRODUCTION

The TSH94 is a quad low power video operational amplifier with two operators having an independent standby mode. This standby mode decreases the consumption of the corresponding operator and puts its output in high impedance state. It is coupled here with a TSH151, a single MOS input video operational amplifier. This note shows how to use these features to build a simple sample and hold circuit. It allows sampling speed up to 2MHz and hold time of 1s with less than 5mV drift with a 4.7nF tank capacitor.

DESCRIPTION

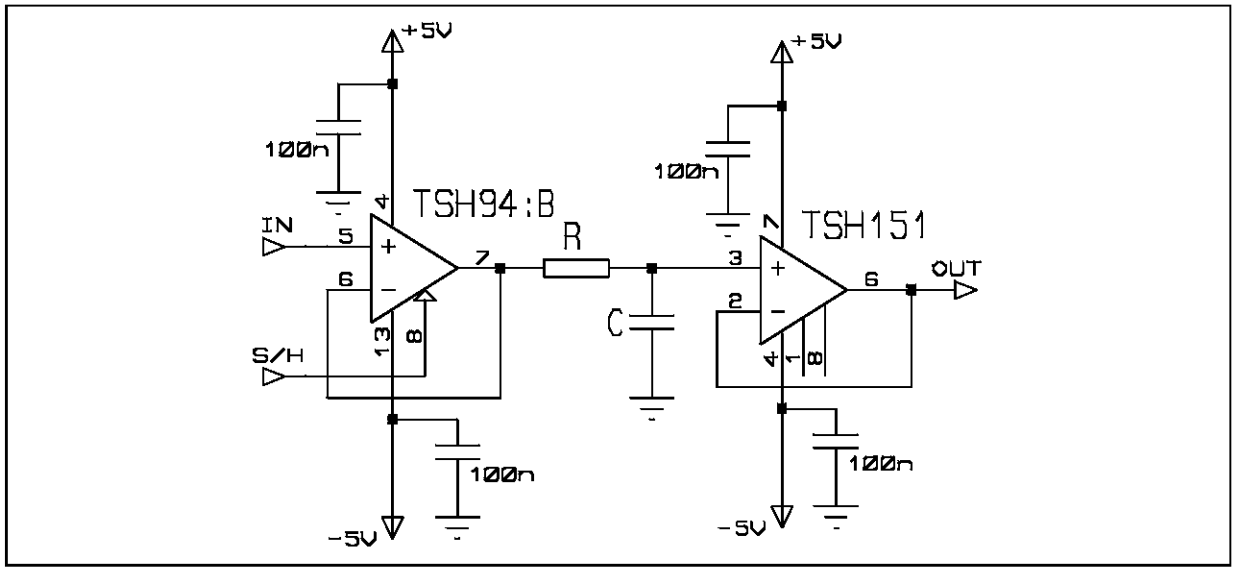
The TSH94 in follower drives a tank capacitor and goes in high impedance state on logic threshold signal on standby pin. The output voltage then remains at the capacitor charge level. It is followed with a high impedance buffer to allow voltage reading without discharging the capacitor.

The only external components required are a resistor, the sampling capacitor and the decoupling capacitors.

C is the tank capacitor that must remain charged at constant voltage between two samples. The accuracy and the bandwidth depend on its value.

As the input current of the TSH151 is 2pA typ. and the leakage current of the TSH94 output and inverting input in standby mode is less than 20pA, it is possible to reach long hold time with small capacitor size.

Figure 1 : Electrical Schematic



R resistor is used to prevent the TSH94 from oscillating when using large C capacitor. A 10Ω value allows to drive any capacitor without oscillating.

SPECIAL PRECAUTIONS

At standby turn on, output voltage shift of a constant voltage before going in high Z state due to internal different switching speed of positive and negative supply. It can be attenuated using a larger C capacitor, but maximum bandwidth and rise time are then decreased.

Following table shows typical results with different C capacitor values.

C	-3dB BW	Verror	Vdrift	tr 1V
65pF	100MHz	160mV	0.5V/s	7ns
4.7nF	4MHz	25mV	3mV/s	100ns
68nF	350KHz	2mV	0.3mV/s	1.5µs

Figure 2 shows input and output signals with a 30KHz, 300mVpp sine wave sampled at 100KHz with C=68nF and R=10Ω.

Figure 2 : Input and Output