

# MN3870S

## NTSC-Compatible CCD Comb Filter with Built-in 1 H Video Signal Delay Element

### ■ Overview

The MN3870S is a  $4 f_{SC}$  CMOS CCD comb filter with a built-in  $4 f_{SC}$  CMOS CCD signal delay element for video signal processing applications.

It contains such components as a fourfold-frequency circuit, a shift register clock driver, a CCD analog shift register switchable between 911, 1 and 908 / 906 stages, and a resampling output amplifier.

It samples the input using the supplied clock signal with a frequency of four times the color signal subcarrier frequency (3.58 MHz) and subtracts between the 911- and 1-stage CCD output signals to produce the color signal comb characteristics for the NTSC system.

It also uses this fourfold frequency to drive a 908- or 906-stage CCD and samples the input to produce, after adding in the attached filter delay, a delay of 1 H (the horizontal scan period) when the SW pin is left open.

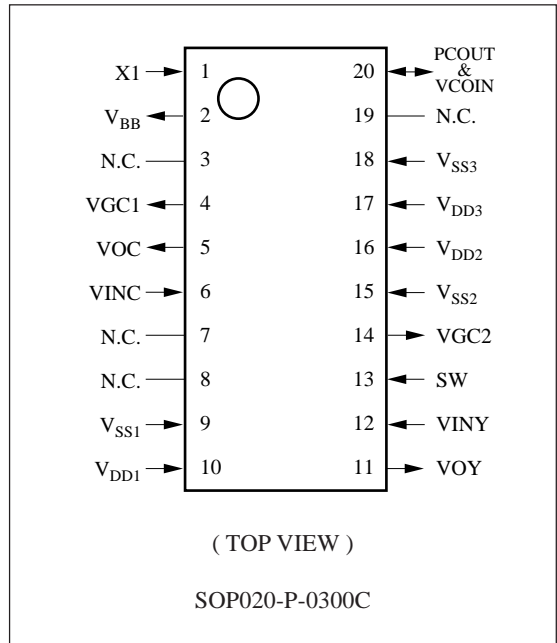
### ■ Features

- Single 5.0 V power supply
- Low power consumption based on CMOS process
- Low EMI levels from clock during driving
- True comb filter produced by the subtraction of the through signal and the 1 H delay signal

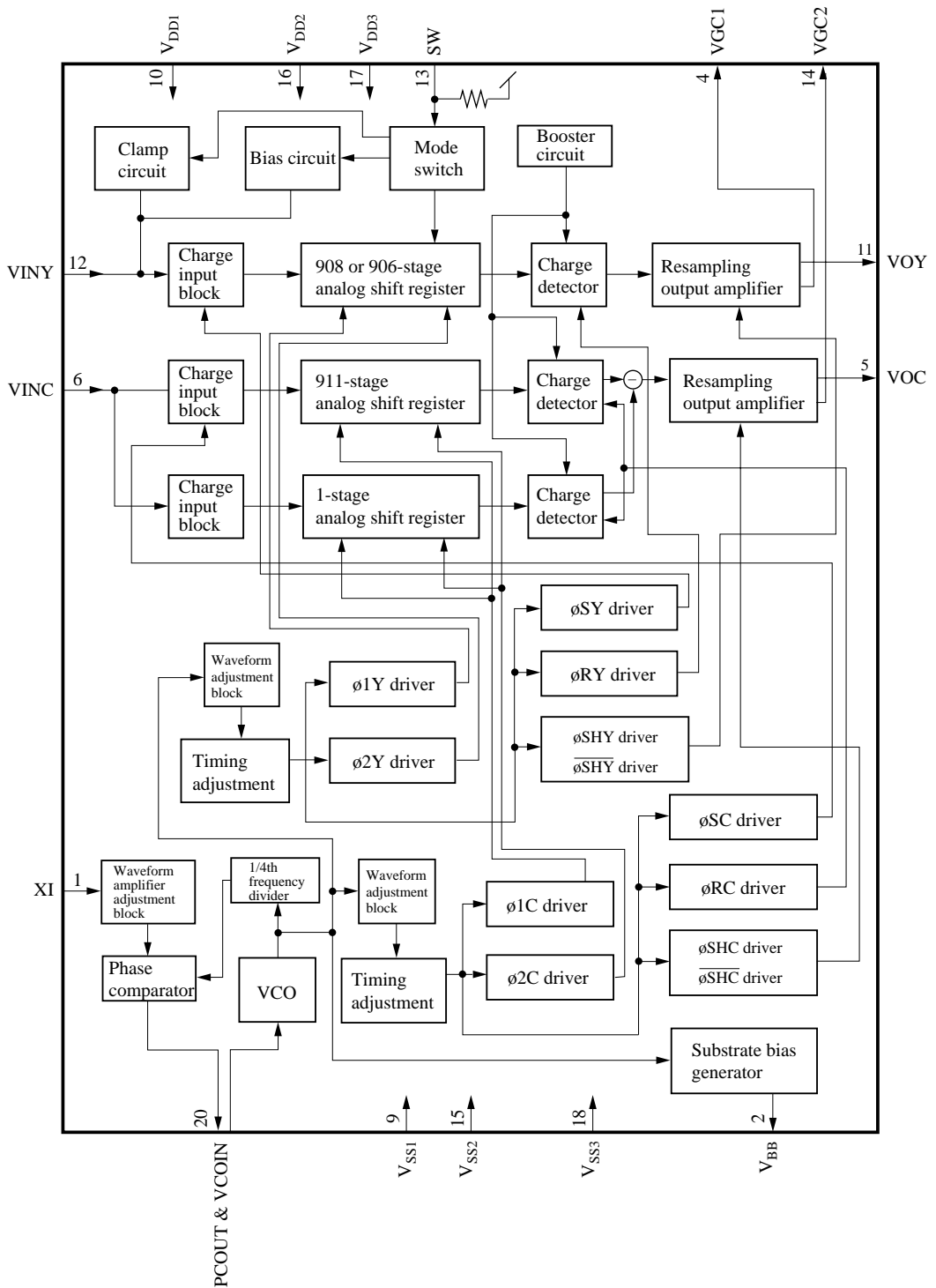
### ■ Applications

- VCRs, Video cameras

### ■ Pin Assignment



■ Block Diagram



### ■ Pin Descriptions

Pin No.	Symbol	Pin Name	Remarks
1	XI	3.58 MHz clock input	
2	V <sub>BB</sub>	Substrate connection	
4	VGC1	Output gate connection (1)	
5	VOC	C signal output	
6	VINC	C signal input	
9	V <sub>SS1</sub>	GND (1)	Ground for analog circuits
10	V <sub>DD1</sub>	Power supply (1)	For analog circuits
11	VOY	Y signal output	
12	VINY	Y signal input	
13	SW	Switch controlling number of stages for Y signal delay	
14	VGC2	Output gate connection (2)	
15	V <sub>SS2</sub>	GND (2)	Ground for digital signals
16	V <sub>DD2</sub>	Power supply (2)	For digital signals
17	V <sub>DD3</sub>	Power supply (3)	For phase-locked loop
18	V <sub>SS3</sub>	GND (3)	Ground for phase-locked loop
20	PCOUT &VCOIN	Phase comparator output and voltage controlled oscillator input	

Note: Leave pin 13 open.

### ■ Operating Conditions

Parameter	Symbol	min	typ	max	Unit
Power supply voltage	$V_{DD}$	4.75	5.00	5.25	V
Input clock frequency	$f_{ck}$		3.579545		MHz
Input clock amplitude (sine wave)	$V_{ck}$	0.25	0.3	1.0	$V_{P-P}$
Ambient temperature	$T_a$	-20		60	°C

### ■ Electrical Characteristics

$V_{DD}=5.0V$ ,  $V_{ck}=0.3V_{P-P}$  (sine wave),  $V_{in}=0.5V_{P-P}$  (sine wave),  $f_{ck}=3.579545MHz$ ,  $f=196.7kHz$ ,  $T_a=25^\circ C$

Parameter	Symbol	Conditions	min	typ	max	Unit
Power supply voltage	$I_{DD}$	Average current		55	80	mA
Insertion gain for VOC pin	IG	$f_{sig}=3.579545MHz$	-9	-5.5	-2	dB
Total harmonic distortion for VOC pin	THD	$f_{sig}=3.26486MHz$		0.5	2.5	%
Signal-to-noise ratio for VOC pin	S/N	3.264 86 MHz output ( $V_{P-P}$ )/ noise output (rms)	48	56		dB
Output impedance for VOC pin	$Z_O$			300	600	$\Omega$
Comb characteristics for VOC pin	Com1	3.571678MHz/3.579545MHz ( $f_{sc}-1/2f_H$ ) / ( $f_{sc}$ )		-35	-25	dB
		3.256993MHz/3.264860MHz ( $f_{sc}-20.5f_H$ ) / ( $f_{sc}-20f_H$ )		-30	-20	dB
	Com2	3.902097MHz/3.894230MHz ( $f_{sc}-20.5f_H$ ) / ( $f_{sc}-20f_H$ )		-30	-20	dB
Clock leak for VOC pin	NC1	3.58-MHz component/main signal in output signal		-50	-40	dB
	NC2	14.32-MHz component/main signal in output signal		-30	-20	dB
Signal bandwidth for VOY pin	BW	-3 dB for 196.7 kHz	2.5	5.5		MHz
Insertion gain for VOY pin	IG	$f_{sig}=196.7kHz$	-1.5	1.5	4.5	dB
Total harmonic distortion for VOY pin	THD	$f_{sig}=196.7MHz$		1	4.5	%
Signal-to-noise ratio for VOY pin	S/N	Signal output (P-P)/noise output (rms)	48	56		dB
Clock leak for VOY pin	NC3	3.58-MHz component/main signal in output signal		-50	-40	dB
	NC4	14.32-MHz component/main signal in output signal		-20	-10	dB
Delay for VOY pin	$\tau_D$			63.46		$\mu s$
Output impedance for VOY pin	$Z_O$			250	500	$\Omega$
Crosstalk	CT	$f_{sig}=196.7kHz$			-32	dB

■ Package Dimensions (Unit:mm)

SOP020-P-0300C

