

# Sync Separator with AFC Monolithic IC LVA519

## Outline

This is a sync separator IC with AFC. Stable operation even in a weak electric field is made possible with the built-in AFC circuit. A regulator also is built in, providing stable operation relative to power supply and temperature fluctuations.

## Features

1. Supports AFC (horizontal sync signal)
2. AFC OFF function
3. Horizontal and vertical sync signal output pins
4. Power supply voltage 4.7V~5.3V

## Package

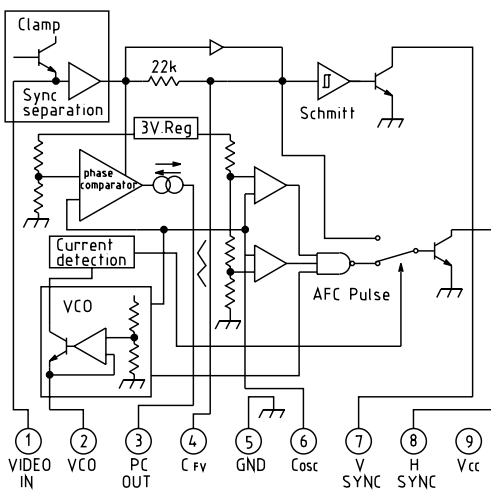
- SIP-9A (LVA519S)
- SOP-14A (LVA519F)

## Applications

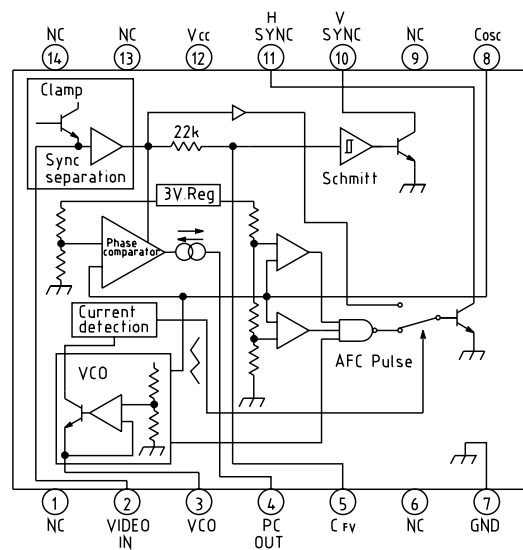
1. TV
2. VCR
3. Other video equipment

## Equivalent Circuit Diagram

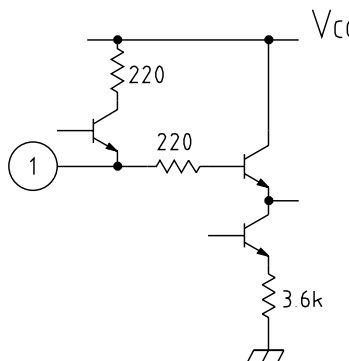
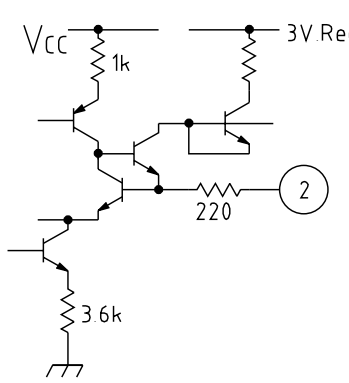
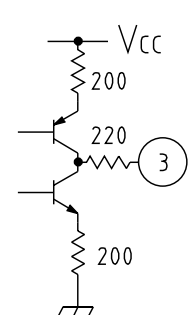
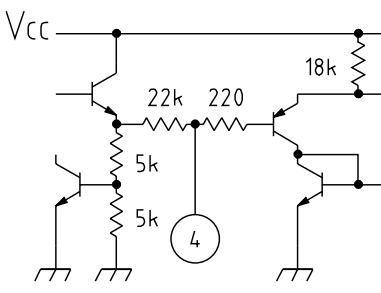
■ SIP-9A



■ SOP-14A



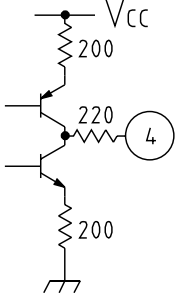
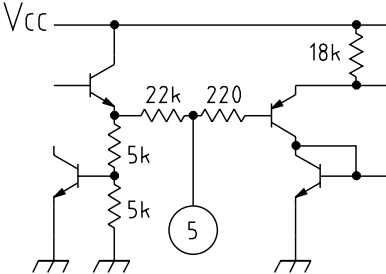
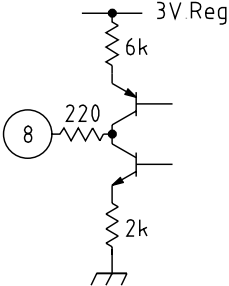
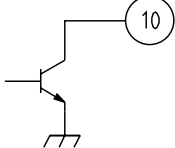
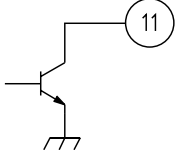
**Pin Description** (LVA519S)

Pin no.	Pin name	Function	Internal equivalent circuit diagram
1	VIDEO IN	Video signal input	
2	Vco	Free run frequency setting	
3	PC OUT	Phase comparison output	
4	CFU	Integrates composite signal and inputs to vertical sync playback circuit	

5	GND	GND	
6	Cosc	Free run frequency oscillation circuit	
7	V <sub>SYNC</sub>	Vertical sync signal output	
8	H <sub>SYNC</sub>	Horizontal sync signal output	
9	V <sub>CC</sub>	Power supply	

**Pin Description** (LVA519F)

Pin no.	Pin name	Function	Internal equivalent circuit diagram
1		NC	
2	VIDEO IN	Video signal input	
3	V <sub>CO</sub>	Free run frequency setting	

4	PC OUT	Phase comparison output	
5	CFU	Integrates composite signal and inputs to vertical sync playback circuit	
6		NC	
7	GND	GND	
8	Cosc	Free run frequency oscillation circuit	
9		NC	
10	V <sub>SYNC</sub>	Vertical sync signal output	
11	H <sub>SYNC</sub>	Horizontal sync signal output	
12	V <sub>CC</sub>	Power supply	
13		NC	
14		NC	

**Absolute Maximum Ratings** (Ta=25°C)

Item	Symbol	Ratings	Units
Storage temperature	T <sub>STG</sub>	-40~+125	°C
Operating temperature	T <sub>OPR</sub>	-2~+75	°C
Power supply voltage	V <sub>CC max.</sub>	7	V
Allowable loss	P <sub>d</sub>	470 (SIP-9A) 350 (SOP-14A)	mW

**Recommended Operating Conditions** (Ta=25°C)

Item	Symbol	Min.	Typ.	Max.	Units
Recommended power supply voltage range	V <sub>CC</sub>	4.7	5.0	5.3	V
Recommended input signal voltage	V <sub>IN</sub>	0.8	2.0	3.2	V <sub>P-P</sub>

**Electrical Characteristics** (Except where noted otherwise, Ta=25°C, V<sub>CC</sub>=5.0V, V<sub>IN</sub>=2.0V<sub>P-P</sub>)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units	
Consumption current	I <sub>d</sub>	Refer to Measuring Circuit		7.0	10	mA	
Horizontal sync output (H)	V <sub>HH</sub>	Refer to Measuring Circuit	4.9	5.0		V	
Horizontal sync output (L)	V <sub>HL</sub>	Refer to Measuring Circuit		0.2	0.4	V	
Vertical sync output (H)	V <sub>VH</sub>	Refer to Measuring Circuit	4.9	5.0		V	
Vertical sync output (L)	V <sub>VL</sub>	Refer to Measuring Circuit		0.2	0.4	V	
Free-running frequency setting range	f <sub>o</sub>	Refer to Measuring Circuit	14.5		17.0	kHz	
Power supply fluctuation of free-running frequency	Δf <sub>o1</sub>	Refer to Measuring Circuit		300		%/V	
Free-running frequency temperature coefficient Capture range	Δf <sub>o2</sub>	Refer to Measuring Circuit		400		ppm/V	
Capture range	f <sub>c</sub>	Refer to Measuring Circuit	1.0	1.3		kHz	
Lock range	f <sub>l</sub>	Refer to Measuring Circuit	1.9	2.5		kHz	
AFC output delay time	t <sub>d</sub>	Refer to Measuring Circuit	0.3	0.7	1.1	μS	
AFC output pulse width	P <sub>w</sub>	Refer to Measuring Circuit	3.5	5.0	6.5	μS	
Schmitt trigger threshold	(H)	V <sub>thH</sub>	Refer to Measuring Circuit	1.9	2.1	2.3	V
	(L)	V <sub>thL</sub>	Refer to Measuring Circuit	1.1	1.3	1.5	V
Sync separation level	V <sub>SEPA</sub>	Refer to Measuring Circuit	80	115	170	mV	
AFC off resistance	R <sub>AFC</sub>	Refer to Measuring Circuit	2.7	4.0	6.0	kΩ	

**Measuring Procedures** (Except where noted otherwise, Ta=25°C, Vcc=5.0V, Vin=2.0Vp-p)

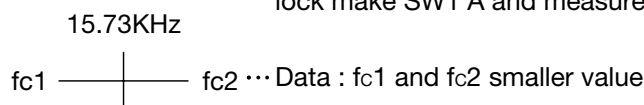
Item	Symbol	Switch state					Measuring Procedures
		S1	S2	S3	S4	S5	
Consumption current	Id	B	B	A	A	A	Connect a DC ammeter to Vcc pin.
Horizontal sync output	(H) V <sub>HH</sub>	B	A	B	B	A	Input standard color bar 2V <sub>P-P</sub> .
	(L) V <sub>HL</sub>	B	A	B	B	A	Measure at TP5
Vertical sync output	(H) V <sub>VH</sub>	B	A	B	B	A	Input standard color bar 2V <sub>P-P</sub> .
	(L) V <sub>VL</sub>	B	A	B	B	A	Measure at TP4.
Free-running frequency setting range	f <sub>o</sub>	A	B	B	B	A	Adjust VR1 and measure frequency at TP5.
Power supply fluctuation of free-running frequency	Δf <sub>o1</sub>	A	B	B	B	A	With f <sub>o</sub> at 15.73kHz, vary Vcc between 4.0V~6.0V and measure at TP5.
Free-running frequency temperature coefficient	Δf <sub>o2</sub>	A	B	B	B	A	With f <sub>o</sub> at 15.73kHz, vary temperature between -20°C and 80°C and measure at TP5.
Capture range	f <sub>c</sub>	B/A	A	B	B	A	Input standard color bar 2V <sub>P-P</sub> and measure at TP1 and TP5. *1
Lock range	f <sub>L</sub>	B/A	A	B	B	A	Input standard color bar 2V <sub>P-P</sub> and measure at TP1 and TP5. *1
AFC output delay time	t <sub>d</sub>	A/B	A	B	B	A	Input standard color bar 2V <sub>P-P</sub> and measure at TP2 and TP5. *2
AFC output pulse width	P <sub>w</sub>	A/B	A	B	B	A	Input standard color bar 2V <sub>P-P</sub> and measure at TP5. *2
Schmitt trigger threshold	(H) V <sub>tHH</sub>	B	A	B	B	A	Measure at TP3 and TP4. *3
	(L) V <sub>tHL</sub>						

**Measuring Procedures** (Except where noted otherwise, Ta=25°C, Vcc=5.0V, Vin=2.0Vp-p)

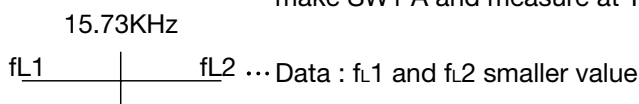
Item	Symbol	Switch state					Measuring Procedures
		S1	S2	S3	S4	S5	
Sync separation level	V <sub>SEPA</sub>	B	A	B	B	A	Raise horizontal sync signal level of input standard color bar 2V <sub>P-P</sub> and measure the level when a signal is output at TP5.
AFC switching resistance	R <sub>AFC</sub>	B	A	B	B	B	With Fo at 15.73kHz, vary I <sub>afc</sub> , and determine according to I <sub>afc</sub> value when TP5 output signal switches to a composite signal, and TP6 voltage V6. R <sub>AFC</sub> =V6/I <sub>A1</sub>

Notes:

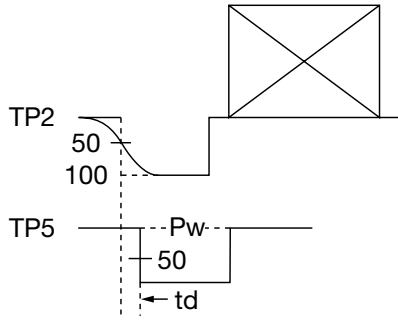
\*1 Capture range (f<sub>c</sub>)..... Vary VR1 between max→min and min→max with SW1, and for each lock make SW1 A and measure at TP5.



Lock range (f<sub>L</sub>)..... With SW1 at B and locked, vary VR1 and when the lock is released, make SW1 A and measure at TP5.



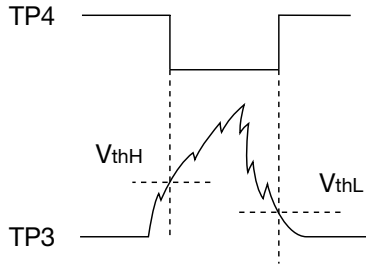
\*2



\* AFC output delay time ( $t_d$ )  
Set SW1 at A and adjust TP5 output to 15.73kHz. Then set SW1 to B and measure  $t_d$  from TP2 and TP5 waveforms. (specified at 50% of sync signal amplitude)

\* AFC output pulse width ( $P_w$ )  
Set SW1 at A and adjust TP5 output to 15.73kHz. Then set SW1 to B and measure  $P_w$  from TP5 waveform. (specified at 50% of sync signal amplitude)

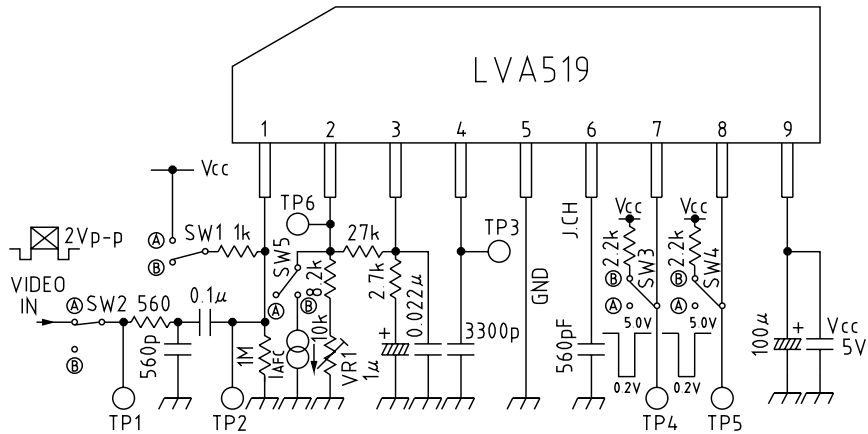
\*3



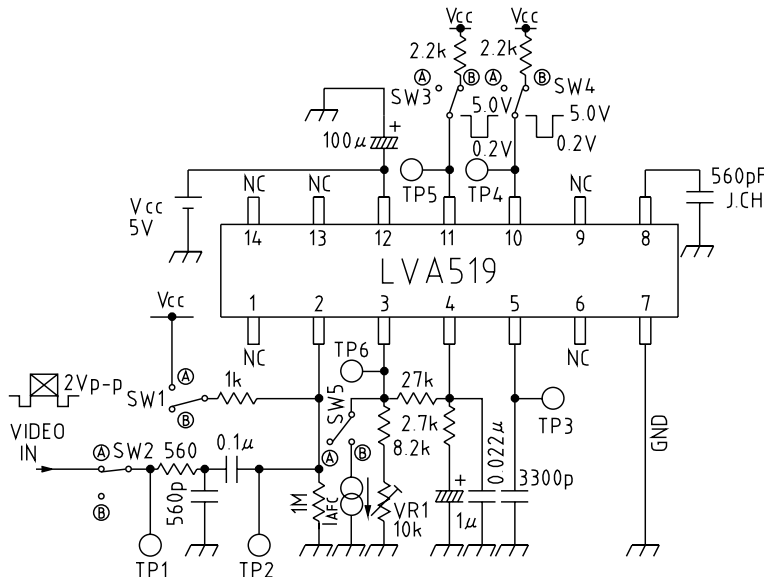
\* Schmitt trigger threshold ( $V_{thH}$ ) ( $V_{thL}$ )  
Measure  $V_{thH}$  and  $V_{thL}$  at TP3 and TP4.

Measuring Circuit

SIP-9A

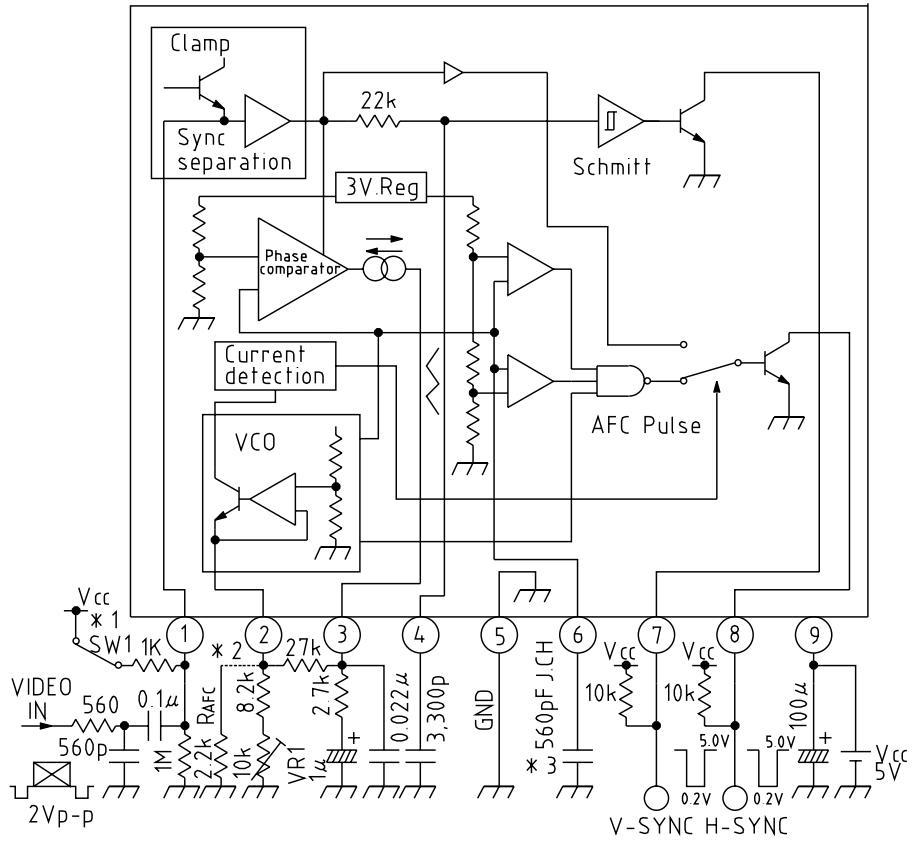


SOP-14A



Application Circuits

SIP-9A



SOP-14A

