

# No-adjustment Sync Separator Monolithic IC MM1109

## Outline

This IC is the same as MM1108, a no-adjustment sync separator IC, with the addition of a composite sync output pin.

## Features

1. Low current consumption 4.4mA typ.
2. Open collector output
3. Built-in 3V regulator handles power supply ripple
4. Built-in capacitor for vertical sync separation
5. Time from vertical sync signal to H. SYNC output re-sync reduced (relative to LVA519)
6. Supports both PAL and NTSC formats
7. Sync separation level can be adjusted with external constants
8. Includes a composite sync output pin

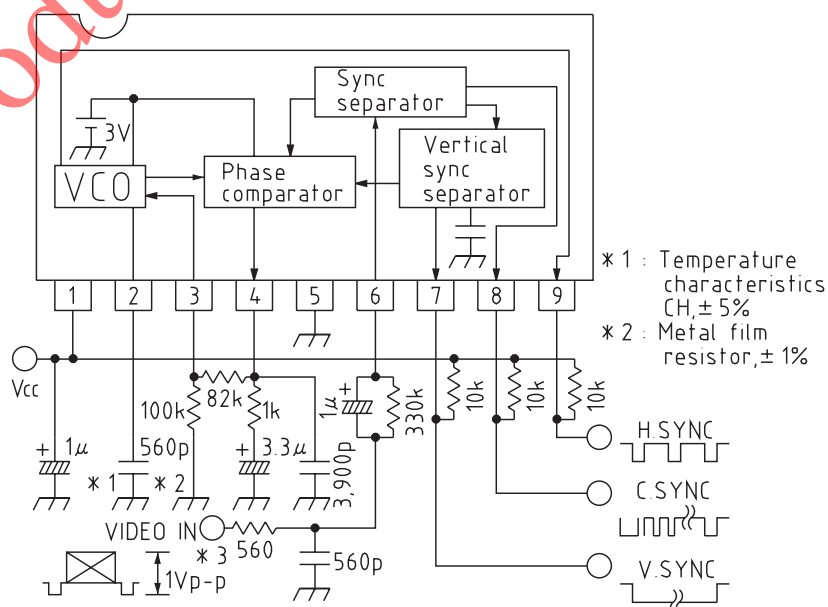
## Package

SIP-9B (MM1109XS)

## Applications

1. TVs
2. VCRs
3. VCRs with camera

## Equivalent Circuit Diagram



Pin Description

| Pin no. | Pin name        | Internal equivalent circuit diagram | Function  |
|---------|-----------------|-------------------------------------|---|
| 1       | V <sub>CC</sub> |                                     | Power supply voltage pin. Impresses 5V.   |
| 2       | SC              |                                     | V <sub>CC</sub> integration pin<br>Free run frequency determined by external capacitor between Pin 2 and GND, and external resistor between Pin 3 and GND.  |
| 3       | V <sub>CO</sub> |                                     | V <sub>CO</sub> input pin<br>Pin 4 output is input via external loop filter.  |
| 4       | LPF             |                                     | Phase comparator output pin.  |
| 5       | GND             |                                     | GND   |
| 6       | V <sub>IN</sub> |                                     | Signal input pin<br>Inputs video signal.  |
| 7       | V.SYNC          |                                     | V. SYNC output pin<br>Outputs vertical sync signal separated from input video signal.   |
| 8       | C.SYNC          |                                     | C. SYNC output pin<br>Outputs composite signal separated from input video signal.   |
| 9       | H.SYNC          |                                     | H. SYNC output pin<br>Outputs horizontal sync signal synchronized to input video signal, except for vertical feedback interval. For no signal, outputs free run frequency horizontal sync signal. |

**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>     | -20~+75  | °C    |
| Power supply voltage  | V <sub>CC</sub> max. | 7        | V     |
| Allowable loss        | P <sub>d</sub>       | 1100     | mW    |

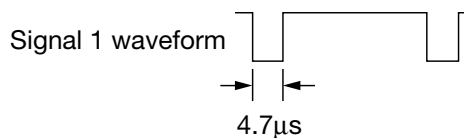
**Electrical Characteristics** (Except where noted otherwise, Ta=25°C, V<sub>CC</sub>=5.0V, SW1=a, SW2=a)

| Item                                      | Symbol            | Measurement circuit | Measurement conditions                                | Min. | Typ. | Max. | Units |
|---|-------------------|---------------------|---|------|------|------|-------|
| Operating power supply voltage            | V <sub>CC</sub>   | V <sub>CC</sub>     |   | 4.5  | 5.0  | 5.5  | V     |
| Consumption current                       | I <sub>d</sub>    | I <sub>d</sub>      | SW1 : b   |      | 4.4  | 7.0  | mA    |
| Minimum sync separation operating current | I <sub>SEPA</sub> | I <sub>IN</sub>     | SW1 : c, VR1 : H→L *1                                 | 15   | 30   | 60   | μA    |
| Free-running frequency                    | f <sub>o</sub>    | TP1                 | SW1 : b   | 14.7 | 15.7 | 16.7 | kHz   |
| Horizontal sync signal acquisition range  | f <sub>CAP</sub>  | TP1                 | V <sub>IN</sub> : signal 1, 15.73kHz<br>SW2 : b *2 *3 | 2.1  | 2.7  |      | kHz   |
| H. sync pulse width                       | t <sub>w1</sub>   | TP1                 | V <sub>IN</sub> : signal 1, 15.73kHz *4               | 4.3  | 4.7  | 5.1  | μs    |
| H. sync delay time                        | t <sub>d1</sub>   | TP1                 | V <sub>IN</sub> : signal 1, 15.73kHz *4               | -0.3 | 0.2  | 0.7  | μs    |
| H. sync output voltage L                  | V <sub>L1</sub>   | TP1                 | V <sub>IN</sub> : signal 1, 15.73kHz *4               |      | 0.2  | 0.4  | V     |
| H. sync output voltage H                  | V <sub>H1</sub>   | TP1                 | V <sub>IN</sub> : signal 1, 15.73kHz *4               | 4.8  | 5.0  |      | V     |
| V. sync pulse width                       | t <sub>w2</sub>   | TP2                 | V <sub>IN</sub> : staircase wave 1V <sub>P-P</sub> *5 | 140  | 200  | 260  | μs    |
| V. sync delay time                        | t <sub>d2</sub>   | TP2                 | V <sub>IN</sub> : staircase wave 1V <sub>P-P</sub> *5 | 6.0  | 10.0 | 20.0 | μs    |
| V. sync output voltage L                  | V <sub>L2</sub>   | TP2                 | V <sub>IN</sub> : staircase wave 1V <sub>P-P</sub> *5 |      | 0.2  | 0.4  | V     |
| V. sync output voltage H                  | V <sub>H2</sub>   | TP2                 | V <sub>IN</sub> : staircase wave 1V <sub>P-P</sub> *5 | 4.8  | 5.0  |      | V     |
| C. sync pulse width                       | t <sub>w3</sub>   | TP3                 | V <sub>IN</sub> : staircase wave 1V <sub>P-P</sub> *6 | 4.0  | 4.4  | 4.8  | μs    |
| C. sync delay time                        | t <sub>d3</sub>   | TP3                 | V <sub>IN</sub> : staircase wave 1V <sub>P-P</sub> *6 | 0.3  | 0.6  | 0.9  | μs    |
| C. sync output voltage L                  | V <sub>L3</sub>   | TP3                 | V <sub>IN</sub> : staircase wave 1V <sub>P-P</sub> *6 |      | 0.2  | 0.4  | V     |
| C. sync output voltage H                  | V <sub>H3</sub>   | TP3                 | V <sub>IN</sub> : staircase wave 1V <sub>P-P</sub> *6 | 4.8  | 5.0  |      | V     |

Notes :

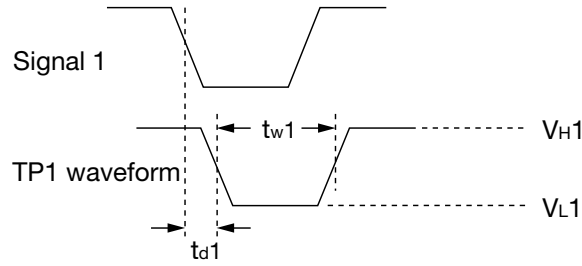
\*1 Minimum sync separation operating current measurement  
Given SW1 : c, change VR1 from high to low, and measure current flowing on I<sub>IN</sub> when TP2 output switches from high to low.

\*2 Signal 1 : Rectangular wave signal with 0.3V amplitude and pulse width 4.7μs

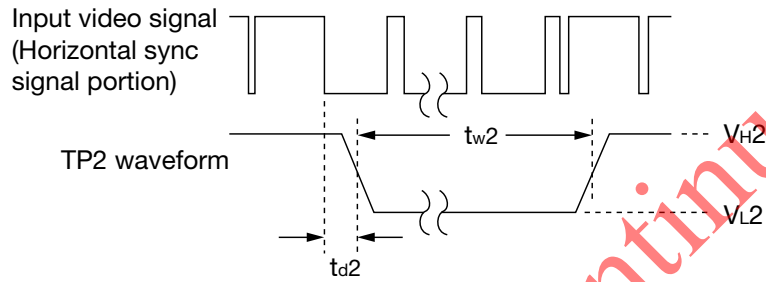


\*3 Measuring horizontal sync signal pull-in range  
Given SW1 : a and SW2 : b, with TP1 waveform not synchronized to signal 1, adjust VR2 so that they are synchronized. Next, switch SW1 to b, and measure TP1 output free run frequency. The horizontal signal pull-in range is the smaller of the measured value and the difference from 15.73kHz.

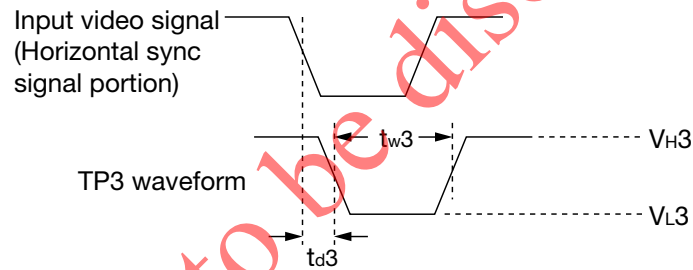
\*4 H. SYNC measurement



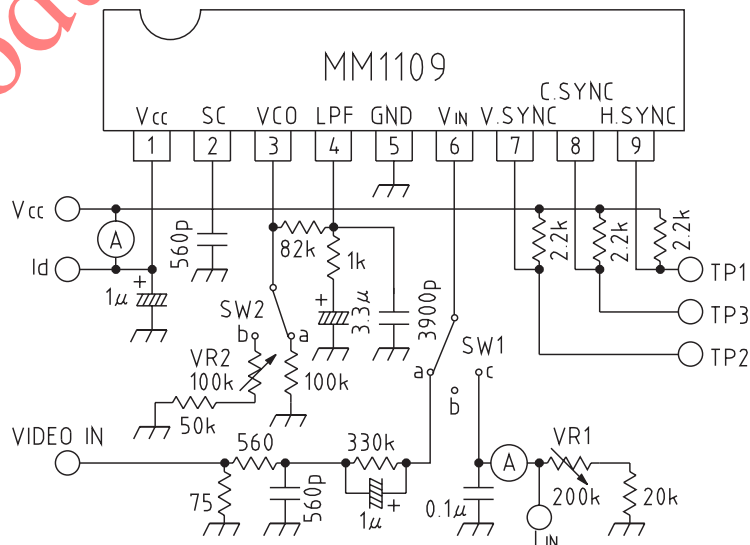
\*5 V. SYNC measurement



\*6 C. SYNC measurement

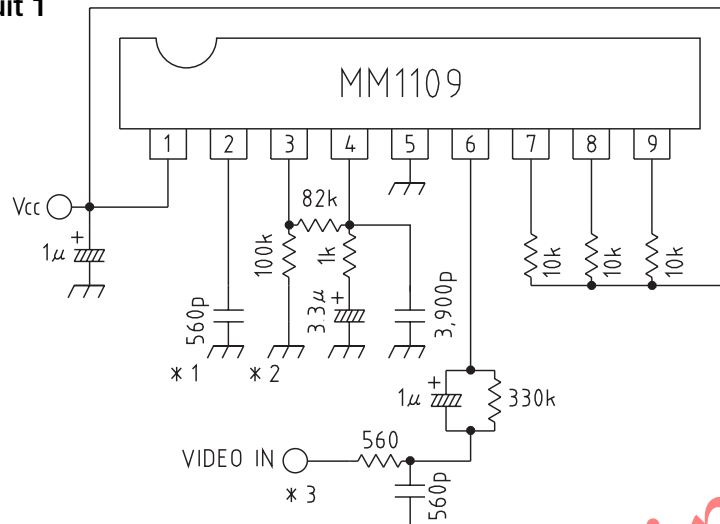


Measuring Circuit



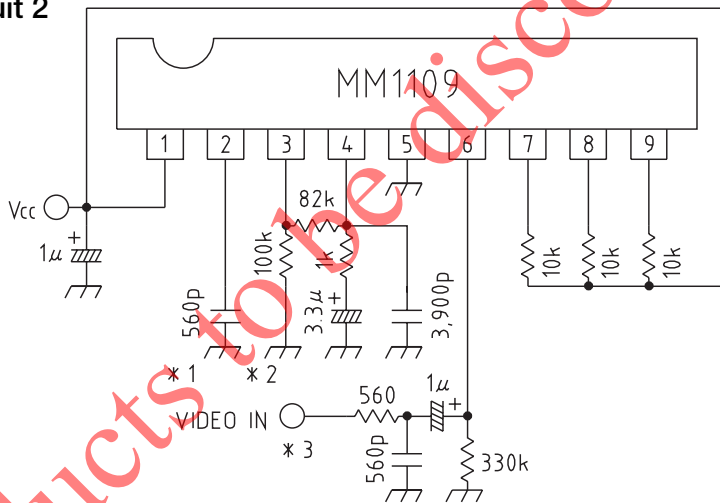
Application Circuits

Application Circuit 1



- Note1 : \* 1 Temperature characteristics CH, ± 5%  
 \* 2 Metal film resistor, ± 1%  
 \* 3 Input signal sync tip must be less than 1V

Application Circuit 2



- Note2 : \* 1 Temperature characteristics CH, ± 5%  
 \* 2 Metal film resistor, ± 1%  
 \* 3 Note 1 \* 3 does not apply.  
 Pin 6 is clamped to approximately 2.5V

Products to be discontinued