



## MM5321 TV camera sync generator

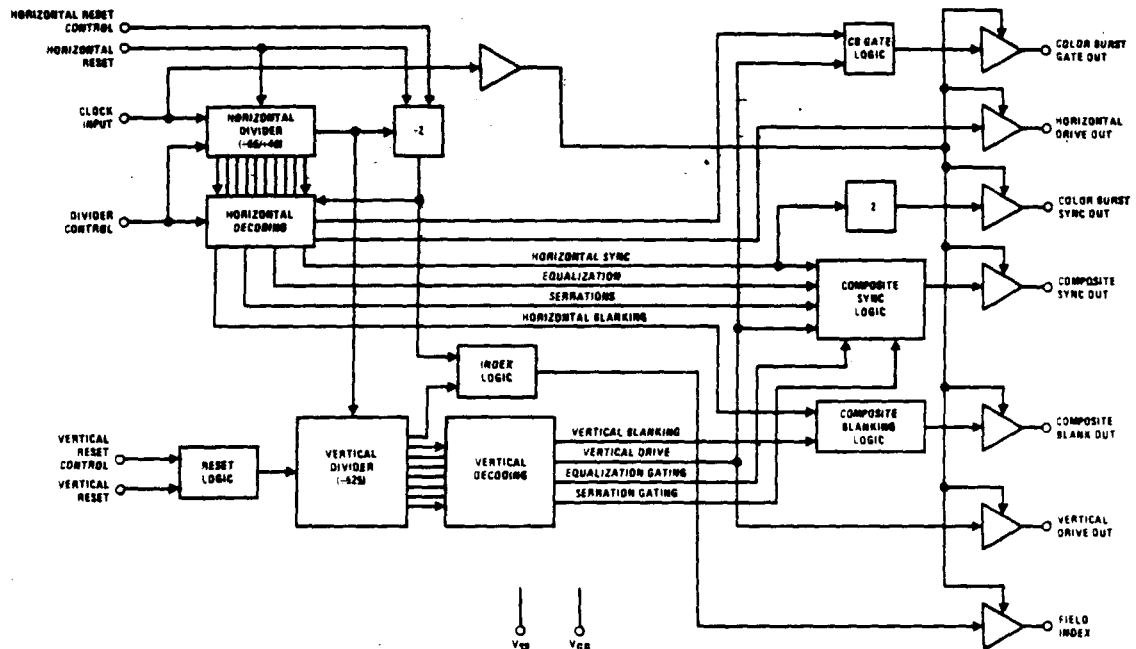
### general description

The MM5321 TV camera sync generator is a MOS, P-channel enhancement mode, LSI chip designed to supply the basic sync functions for either color or monochrome 525 line/60 Hz interlaced camera and video recorder applications. Required power supplies are +5V and -12V, or any other combination resulting in  $V_{SS} = 17V$ . All inputs and outputs are TTL compatible without the use of external components. Military and commercial temperature ranges are available.

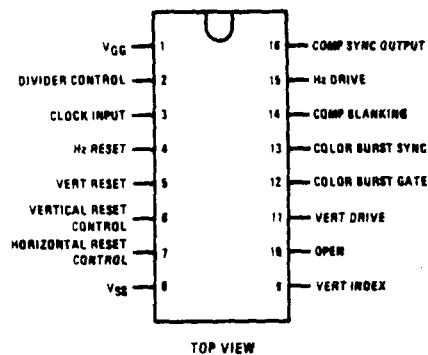
### features

- Multi-function gen lock input provides flexible control of multiple camera installations
- 16-lead dual-in-line package
- Conventional +5V, -12V power supplies
- Uses 2.04545 MHz or 1.260 MHz input reference
- Field indexing provided for VTR applications
- Color burst gate and sync allow stable color operation

### logic and connection diagrams



Dual-In-Line Package



TOP VIEW

Order Number MM5321N  
See Package 19

## absolute maximum ratings

Voltage at Any Pin	$V_{SS} + 0.3$ to $V_{SS} - 22$
Operating Temperature	$0^{\circ}\text{C}$ to $+70^{\circ}\text{C}$
Storage Temperature	$-65^{\circ}\text{C}$ to $+150^{\circ}\text{C}$
Lead Temperature (Soldering, 10 seconds)	$300^{\circ}\text{C}$

## dc electrical characteristics

$T_A$  within operating temperature range  $V_{SS} = 5V \pm 5\%$ ,  $V_{GG} = -12V \pm 5\%$ , unless otherwise stated.

PARAMETER	CONDITIONS	MIN	MAX	UNITS
<b>Input Levels</b>				
$V_{IH}$	Logical High Level	$V_{SS}-1.5$	$V_{SS}+0.3$	V
$V_{IL}$	Logical Low Level	$V_{SS}-18$	$V_{SS}-4.2$	V
<b>Input Leakage</b>				
	$V_{IN} = -10V$ , $T_A = 25^{\circ}\text{C}$ , All Other Pins GND		0.5	$\mu\text{A}$
<b>Input Capacitance</b>				
	$V_{IN} = 0V$ , $f = 1\text{ MHz}$ , All Other Pins GND, (Note 1)		6	pF
<b>Clock Input Leakage</b>				
	$V_{IN} = -10V$ , $T_A = 25^{\circ}\text{C}$ , All Other Pins GND		0.5	$\mu\text{A}$
<b>Clock Input Capacitance</b>				
	$V_{IN} = 0V$ , $f = 1\text{ MHz}$ , All Other Pins GND, (Note 1)		6	pF
<b>Output Levels</b>				
$V_{OH}$	Logical High Level	2.4	$V_{SS}$	V
$V_{OL}$	Logical Low Level		0.4	V
<b>Power Supply Current</b>				
$I_{GG}$	$T_A = 25^{\circ}\text{C}$ , $V_{GG} = -12V$ , $\phi_{PW} = 235\text{ ns}$ , $V_{SS} = 5V$ , Input Clock Frequency = 2.04545 MHz	$V_{SS}-12.5$	36	mA

## ac electrical characteristics

$T_A$  within operating temperature range  $V_{SS} = 5V \pm 5\%$ ,  $V_{GG} = -12V \pm 5\%$ , unless otherwise stated.

PARAMETER	CONDITIONS	MIN	MAX	UNITS
$\phi_{PW}$	Input Clock Pulse Width	190	280	ns
	Input Clock Frequency = 2.04545 MHz, $\phi_{tr}$ , $\phi_{tf} = 20\text{ ns}$			
	Input Clock Frequency = 1.26 MHz, $\phi_{tr} = \phi_{tf} = 20\text{ ns}$	300	570	ns
	Horizontal Reset Pulse Width	500	800	ns
	Within 400 ns after the Falling Edge of Master Clock, (Figure 5) Rise and Fall Time = 20 ns			
$t_{pd}$	Output Propagation Delay			
$V_{OH}$	Logical High Level		750	ns
$V_{OL}$	Logical Low Level		750	ns
	Capacitance at the Output = 15 pF (Figure 5)			

Note 1: Capacitance is guaranteed by periodic testing.

## functional description

### EXTERNAL CONTROL LEVELS

Horizontal Reset occurs for Logic "0." This resets the horizontal counter to a state shown in *Figures 2 and 3*.

Vertical Reset occurs for Logic "0." This resets the vertical counter to a state determined by reset control input as shown below:

VERTICAL RESET CONTROL INPUT	PERMITS THE VERTICAL COUNTER TO RESET TO THE:
$V_{IH}$ ( $V_{SS}$ )	0th count
$V_{IL}$ ( $V_{GG}$ )	11th count

HORIZONTAL RESET CONTROL INPUT	RESETS THE HORIZONTAL DIVIDER TO:
$V_{IH}$	Beginning of line
$V_{IL}$	Center of line

Logic "0" =  $V_{IL}$

Logic "1" =  $V_{IH}$

Divide select input =  $V_{IL}$  ( $V_{GG}$ ) for master clock frequency of 1.26 MHz.

Divide select input =  $V_{IH}$  ( $V_{SS}$ ) for master clock frequency of 2.04545 MHz.

### INPUTS

The user may select either of two input clock frequencies by properly programming the Divider Control pin. In one case the input frequency is 2.04545 MHz, which is 14.31818 MHz divided by seven. The other is eighty times the horizontal frequency, or 1.26 MHz. The divider control will be programmed by connecting it to  $V_{IH}$  ( $V_{SS}$ ) and  $V_{IL}$  ( $V_{GG}$ ) respectively.

There are separate Vertical and Horizontal Reset inputs which allow directly resetting the appropriate divider(s) by a control pulse generated by external means. Both horizontal and vertical dividers may be reset simultan-

ously by connecting the Vertical and Horizontal Reset pins together and driving them with the same reset signal. Actual resetting of the vertical divider is to either of two states, depending upon the state of the Vertical Reset Control input; to zero, or to the fifth vertical serration pulse (eleven 0.5H time intervals from leading edge of Vertical Blanking). Refer to the reset table. The horizontal divider will always be reset to a position which is 8 input clock pulses from the leading edge of the serration gate in the horizontal timing scheme (*Figures 2 and 3*). The generator is reset to the odd field (field one). The Field Index output pulse occurs once each odd field at the leading edge of Vertical Blanking. It can be used to reset, or "gen-lock," similar sync generator chips by connecting it to their Vertical and Horizontal Reset inputs. The Horizontal Reset Control selects Horizontal Reset to the start or center of a line.

### OUTPUTS

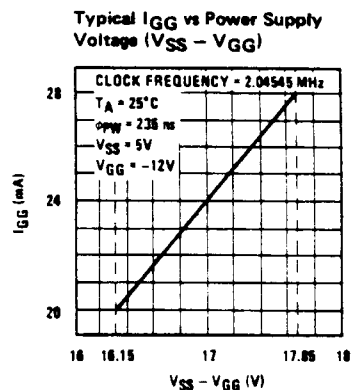
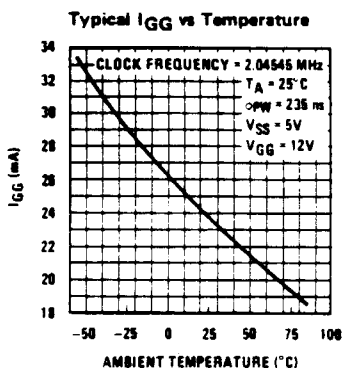
The generator supplies the following standard output functions: Horizontal Drive Out, Vertical Drive Out, Composite Blanking Out, Composite Sync Out and the Color Burst Gate.

In addition, Field Index and Color Burst Sync outputs are provided. The Field Index identifies the odd field, or field one, by occurring for two clock periods at the leading edge of Vertical Blanking in that field. Thus, its rate is 30 Hz. As described above, it can also be used to "gen-lock" other sync generator chips.

The Color Burst Sync output signal occurs at half the horizontal rate with the same timing as the Color Burst Gate output. It may be used to sync the color burst as it will have the same delay characteristics as the other outputs (including, of course, the Color Burst Gate) — the color burst sync is present during the vertical interval.

Differences in phasing between outputs are minimized by the use of identical push-pull output buffers clocked by the internal clock.

## typical performance characteristics



switching time waveforms

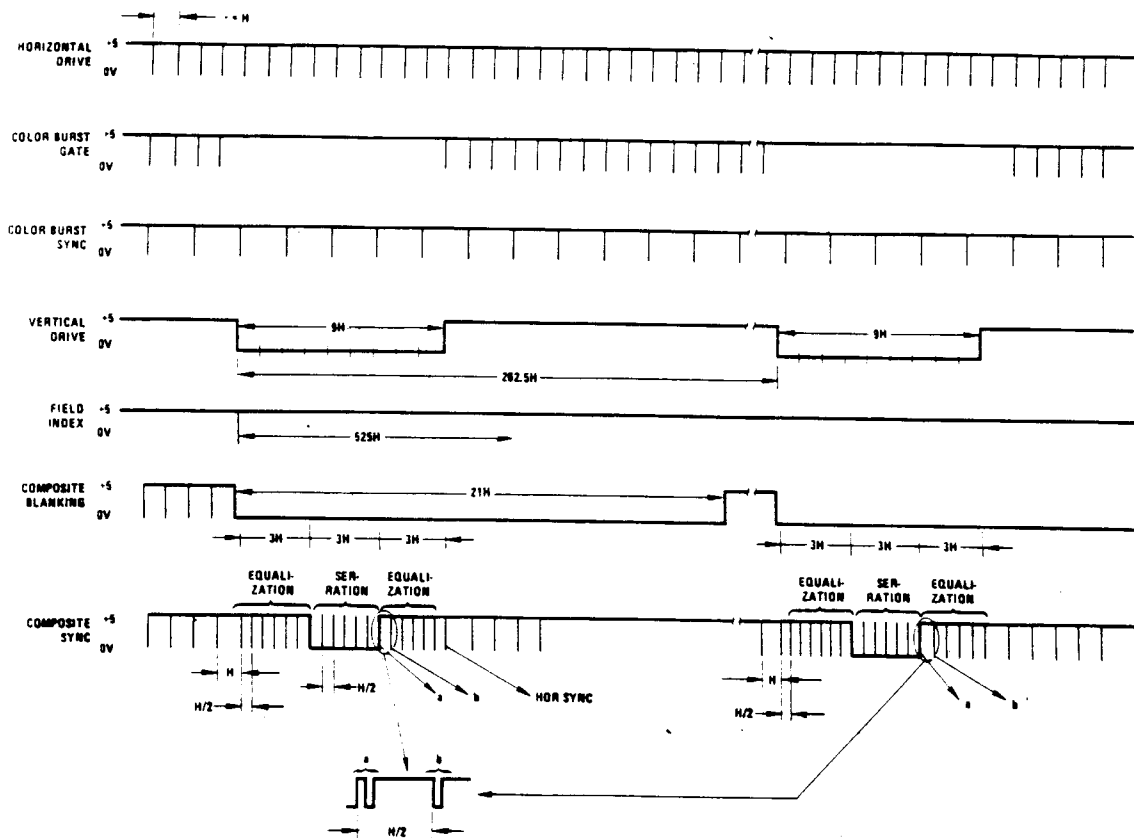


FIGURE 1.

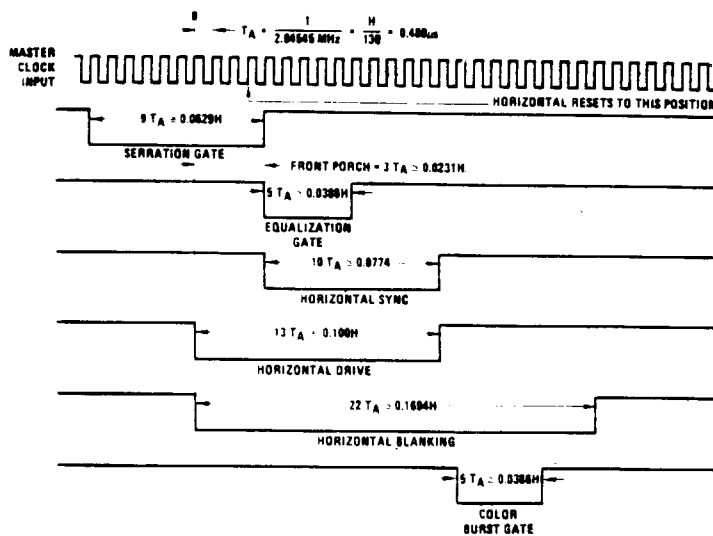


FIGURE 2. Horizontal Timing Master Clock = 2.04545 MHz