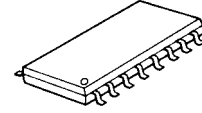


## SYNCHRONOUS SEPARATION WITH AFC

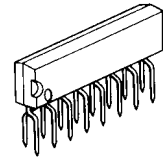
### ■ GENERAL DESCRIPTION

The **NJM2229** has functions of getting the horizontal and vertical synchronous signal from the composite video signal by the synchronous separation circuit. Also the **NJM2229** has a detective terminal of the input signal through the synchronous circuit.

### ■ PACKAGE OUTLINE



NJM2229M



NJM2229S

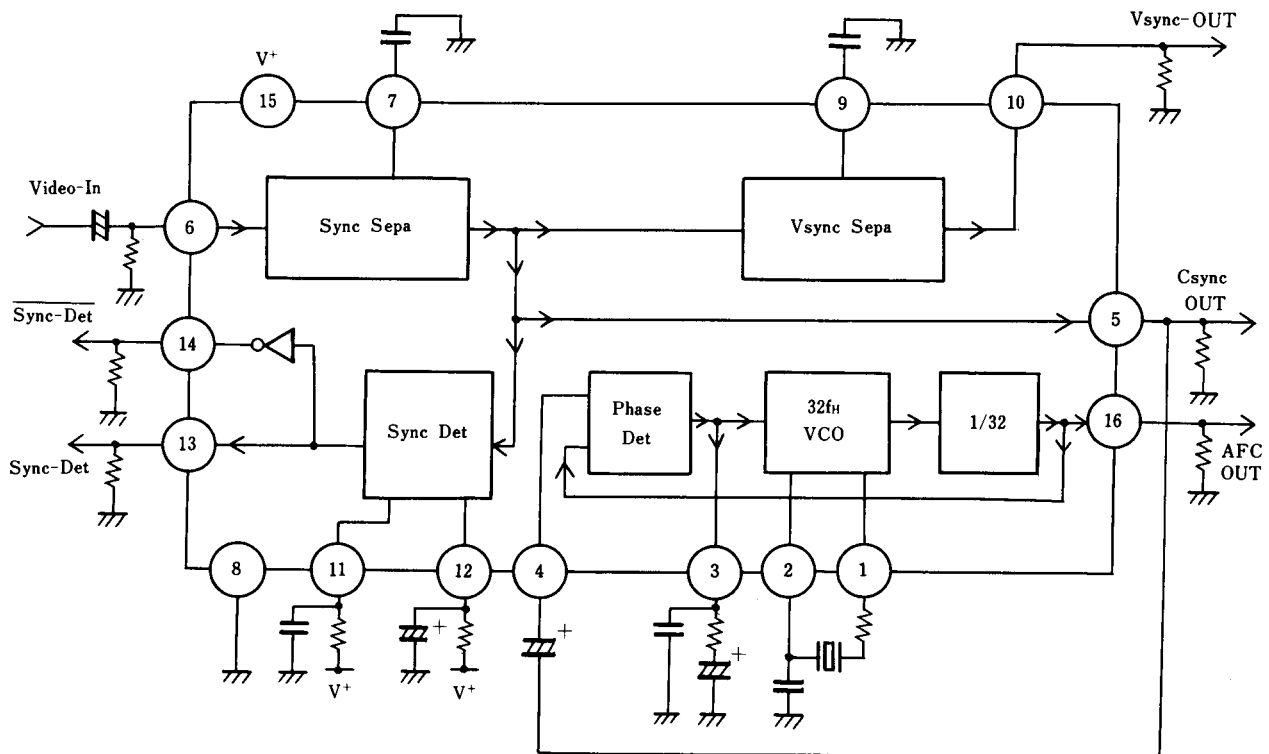
### ■ FEATURES

- Operating Voltage (+4.7V to +5.3V)
- Internal AFC circuit(Horizontal sync.signal)
- No adjustment of free run frequency.
- Internal detective circuit of sync.signal.
- Package Outline DMP16, ZIP-16
- Bipolar Technology

### ■ RECOMMENDED OPERATING CONDITION

- Operating Voltage 4.75 to 5.3V

### ■ BLOCK DIAGRAM



# NJM2229

## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

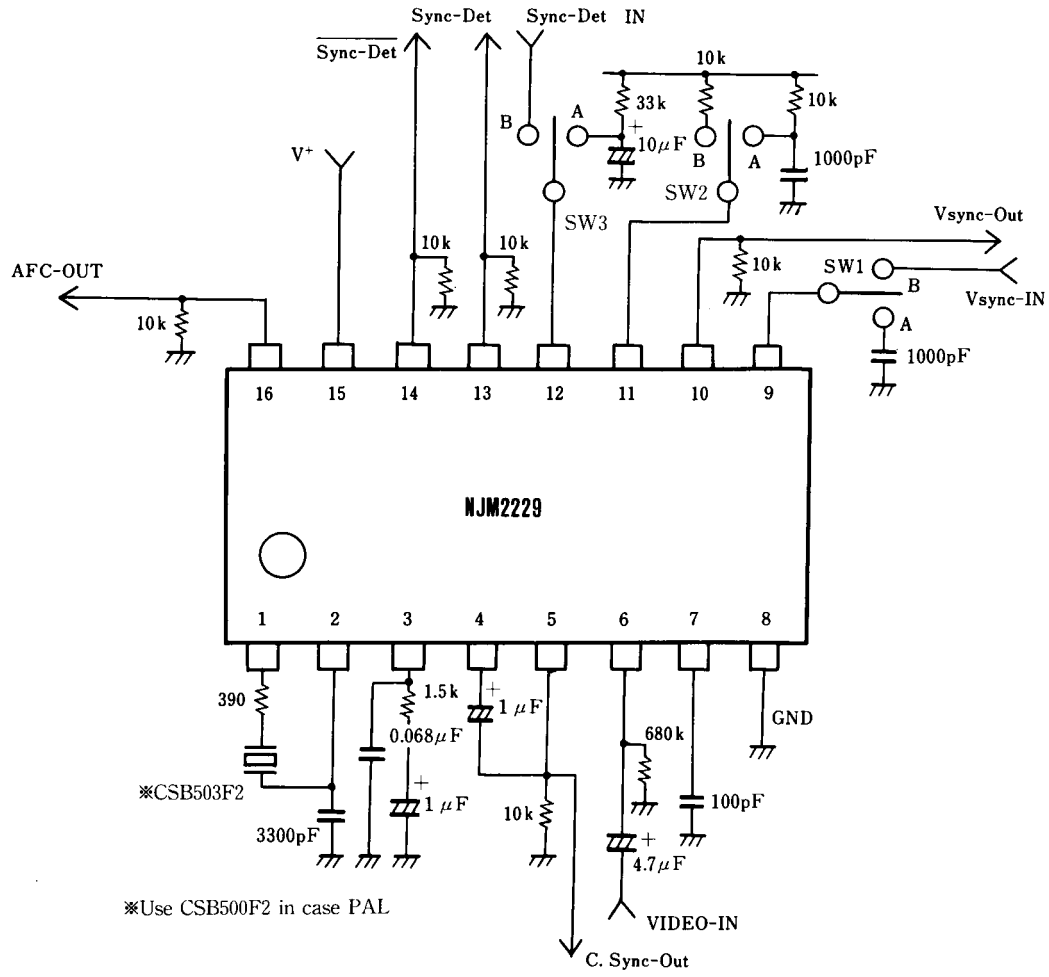
PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sup>+</sup>	7	V
Power Dissipation	P <sub>D</sub>	500	mW
Operating Temperature Range	T <sub>opr</sub>	-20 to +75	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +125	°C

## ■ ELECTRICAL CHARACTERISTICS

(Ta=25°C, V<sup>+</sup>=5V)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Operating Current	I <sub>CC</sub>	-	20	26	mA
AFC Free-run Frequency	f <sub>OH</sub>	15.534	15.734	15.934	KHz
AFC Pulse width	T <sub>HD</sub>	3.7	3.9	4.1	μs
AFC Delay	T <sub>HA</sub>	0.7	1.7	2.7	μs
AFC Lock Range	Δf <sub>HL</sub>	+600 -900	+700 -1000	- -	Hz
AFC Capture Range	Δf <sub>HP</sub>	+400 -700	+600 -900	- -	Hz
AFC Output Voltage High	V <sub>HAH</sub>	4.0	4.2	-	V
AFC Output Voltage Low	V <sub>HAL</sub>	-	0	0.1	V
Sync. Signal Detection Level	V <sub>HDS</sub>	0.11	0.14	0.17	V
Sync. Signal Detection Delay time	V <sub>HDC</sub>	0	0.57	1.5	μs
Sync. Signal Detection Output voltage High	V <sub>HDH</sub>	4.0	4.2	-	V
Sync. Signal Detection Output voltage Low	V <sub>HDL</sub>	-	0	0.1	V
V <sub>SYNC</sub> Threshold Voltage High	V <sub>DSH</sub>	2.4	2.5	2.6	V
V <sub>SYNC</sub> Threshold Voltage Low	V <sub>DSL</sub>	1.4	1.5	1.6	V
V <sub>SYNC</sub> Output voltage High	V <sub>DH</sub>	4.0	4.2	-	V
V <sub>SYNC</sub> Output voltage Low	V <sub>DL</sub>	-	0	0.1	V
V <sub>SYNC</sub> Pulse Width	T <sub>VD</sub>	212	272	332	μs
V <sub>SYNC</sub> Delay Time	T <sub>VDT</sub>	9.6	12.3	15	μs
Sync. Detection Lock Voltage High	V <sub>LH</sub>	2.53	2.68	2.83	V
Sync. Detection Lock Voltage Low	V <sub>LL</sub>	1.25	1.40	1.55	V
Sync. Detection Capture High	V <sub>CH</sub>	2.07	2.22	2.37	V
Sync. Detection Capture Low	V <sub>CL</sub>	1.57	1.72	1.87	V
Sync. Detection Output voltage High	V <sub>DEH</sub>	4.0	4.2	-	V
Sync. Detection Output voltage Low	V <sub>DEL</sub>	-	0	0.1	V
Sync. Detection Output voltage High	V <sub>DEH</sub>	4.0	4.2	-	V
Sync. Detection Output voltage Low	V <sub>DEL</sub>	-	0	0.1	V

## ■ TEST CIRCUIT

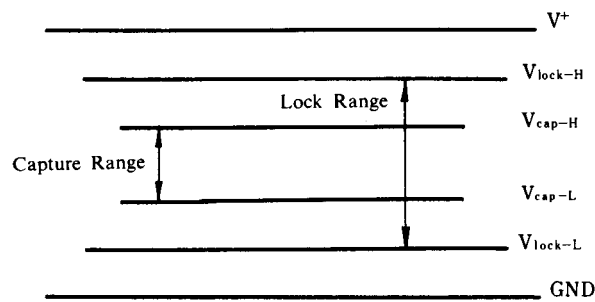
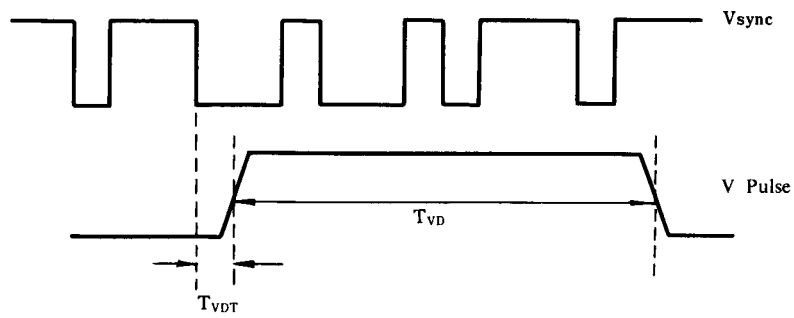
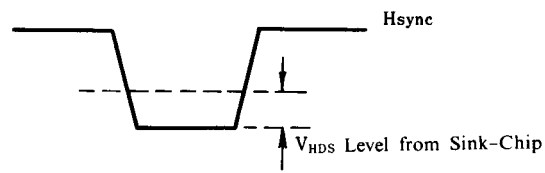
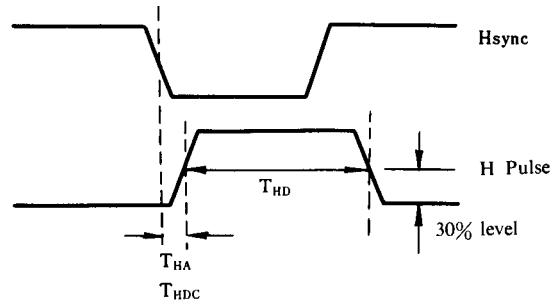


# NJM2229

## ■ ELECTRICAL PARAMETER TEST METHOD

Test circuit

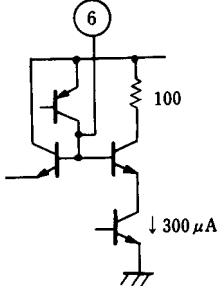
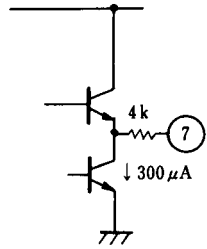
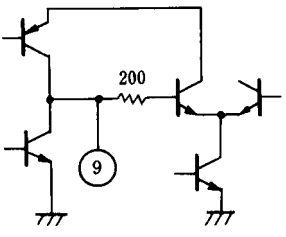
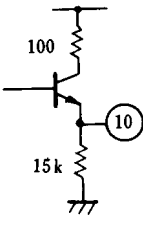
PARAMETER	SW-1	SW-2	SW-3	TEST CONDITION.
Operating Current	A	A	A	No input signal. DC current at Pin 15.
AFC Free-run Frequency	A	A	A	No input signal. Video-IN terminal to GND. Frequency at Pin 16.
AFC pulse Width	A	A	A	No input signal. Output Pulse width at Pin 16. (Note 1)
AFC Output Delay Time	A	A	A	Input 2Vp-p video signal on Video-IN terminal. Delay time between input and AFC output signal. (Note 1)
AFC Lock Range	A	A	A	Operating frequency range of AFC output when the input Pulse signal frequency with 5 μsec pulse width at Video-IN terminal changes.
AFC Capture Range	A	A	A	Frequency range when signal changes from AFC unlock condition to lock.
AFC Output Voltage	A	A	A	Output voltage at Pin 16 in condition of load resistance $R_L=10k\Omega$
Sync. Signal Detection level	A	A	A	Putting 2Vp-p video signal on Video-IN terminal and reducing it to the level that pin5 output waveform is beginning to change. $V_{HDS}$ is the sink-chip level at that point. (Note 2)
Sync. Signal Detection Output Voltage	A	A	A	Output voltage at Pin5 with load resistance $R_L=10k\Omega$ .
Sync. Signal Detection Delay time	A	A	A	2Vp-p video signal at Video-IN terminal. Time difference between input(Pin5) and output(Pin6) waveform.
$V_{SYNC}$ Threshold Voltage High	B	A	A	Gradually increase DC voltage from 2V to 3V at $V_{SYNC-IN}$ terminal. DC input voltage when output voltage at Pin10 changes from Low to High state.
$V_{SYNC}$ Threshold Voltage Low	B	A	A	Gradually decrease DC voltage from 3V to 1V at $V_{SYNC-IN}$ terminal. DC input voltage when output voltage at Pin10 changes from High to Low state.
$V_{SYNC}$ Output Voltage	B	A	A	Output voltage at Pin10 with load resistance $R_L=10k\Omega$
$V_{SYNC}$ Pulse Width	A	A	A	Putting 2Vp-p video signal on Video-IN terminal and measuring output pulse width at Pin10. (Note 3)
$V_{SYNC}$ Delay Time	A	A	A	Putting 2Vp-p video signal on Video-IN terminal Delay time between output at Pin10 and $V_{SYNC}$ at Pin6. (Note 3)
Sync. Detection Lock Voltage High	A	B	B	Increase DC voltage from 2V to 4V put on Sync-Det-IN terminal and measure its DC voltage when output voltage at Pin13 changes from HIGH to Low. (Note 4)
Sync. Detection Lock Voltage Low	A	B	B	Decrease DC voltage from 2V to 1V put on Sync-Det-IN terminal and measure its DC voltage when output voltage at Pin13 changes from HIGH to Low. (Note 4)
Sync. Detection Capture High	A	B	B	Decrease DC voltage from 3V to 1V put on Sync-Det-IN terminal and measure its DC voltage when output voltage at Pin13 changes from Low to HIGH. (Note 4)
Sync. Detection Capture Low	A	B	B	Increase DC voltage from 1V to 2V put on Sync-Det-IN terminal and measure its DC voltage when output voltage at Pin13 changes from Low to HIGH. (Note 4)
Sync. Detection Output Voltage	A	B	B	Output voltage at Pin13 with load resistance $R_L=10k\Omega$ .
Sync. Detection Output Voltage	A	B	B	Output voltage at Pin14 with load resistance $R_L=10k\Omega$ .



# NJM2229

## ■ PIN FUNCTION

PIN NO.	SYMBOL	FUNCTION	INSIDE EQUIVALENT CIRCUIT
1	VCO-OUT	Putting VCO output on ceramic resonator.	
2	VCO-FILTER	Deciding phase of ceramic resonator.	
3	AFC-FILTER	Low pass filter of AFC	
4	AFC-IN	Input terminal of AFC. Putting composite. Synchronous signal on it.	
5	C.SYNC-OUT	Sync. signal Detection output	

PIN NO.	SYMBOL	FUNCTION	INSIDE EQUIVALENT CIRCUIT
6	VIDEO-IN	Input composite video signal.	
7	L. P. F	Low pass filter for chroma signal.	
8	GND	Ground.	
9	SYNC-INTEGR	Integrating composite synchronous signal and putting vertical synchronous reproducing circuit.	
10	VSYNC-OUT	Vertical synchronous output	

# NJM2229

PIN NO.	SYMBOL	FUNCTION	INSIDE EQUIVALENT CIRCUIT
11	M. M-TC	Deciding time constant of M. M. V. (monomulti vibrator)	
12	M. M-INTER	Smoothing M. M. V. output.	
13	SYNCDET-OUT	Signal detective output.	
14	$\overline{\text{SYNCDET}} - \text{OUT}$	Inversed output of Pin13.	
15	V <sup>+</sup>	Power supply.	
16	AFC-OUT	AFC output.	



**[CAUTION]**

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