M52306FP

SYNCHRONIZATION DETECTION

DESCRIPTION

The M52306FP is an integrated circuit designed to detect synchronization in electronic systems, such as VCRs and TVs. It employs the PLL method using an internal oscillation circuit. It can thereby provide electronic systems with high accuracy in synchronization detection.
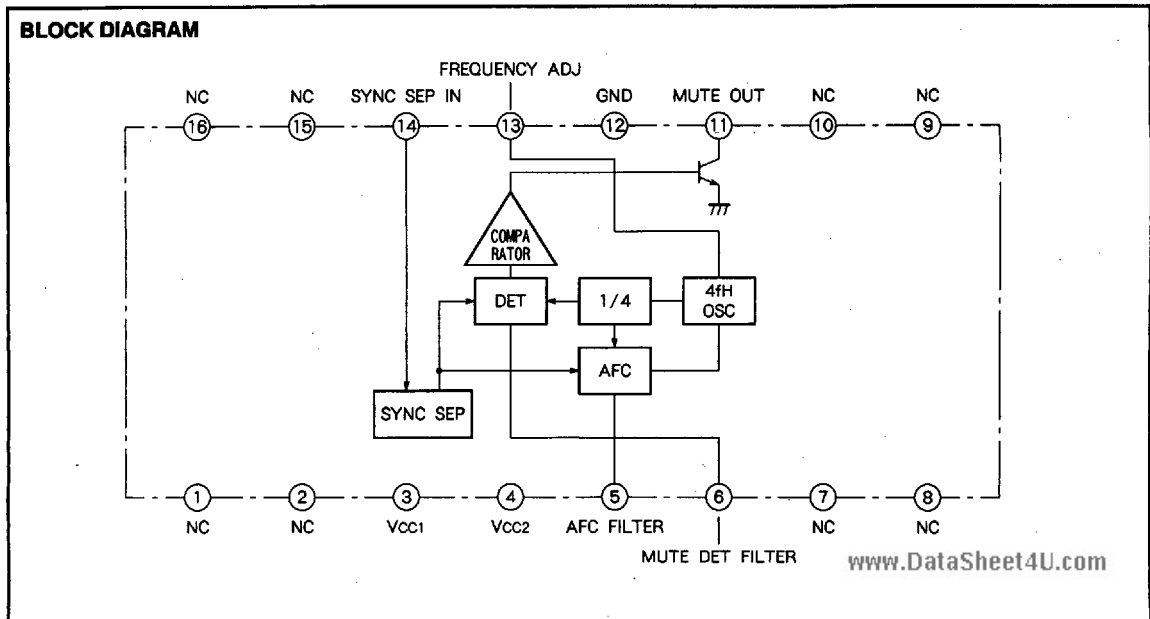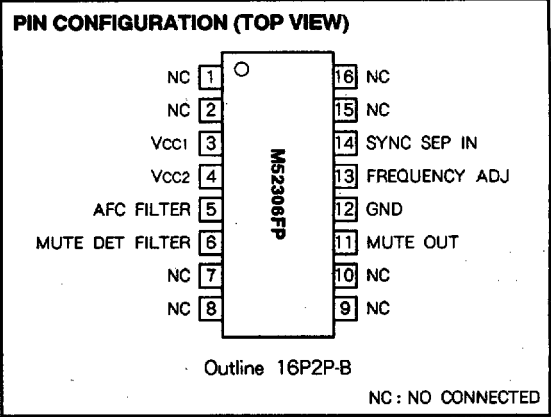
FEATURES

- Internal oscillation frequency is adjustable with additional resistors.
- An IC can operate on the same supply voltage that the VIF IC uses, if it is combined with the M52J06FP.
  (Internal power supply circuit widens the range of operating supply voltage.)

APPLICATION

Sensing TV-station signals in electronic systems, such as TVs and VCRs

RECOMMENDED OPERATING CONDITION

Rated supply voltage ··5V

PIN CONFIGURATION (TOP VIEW)

Pin	Name		Pin	Name
1	NC		16	NC
2	NC		15	NC
3	Vcc1		14	SYNC SEP IN
4	Vcc2		13	FREQUENCY ADJ
5	AFC FILTER		12	GND
6	MUTE DET FILTER		11	MUTE OUT
7	NC		10	NC
8	NC		9	NC

M52306FP

Outline 16P2P-B

NC : NO CONNECTED

BLOCK DIAGRAM

ABSOLUTE MAXIMUM RATINGS (Ta = 25℃)

Symbol	Parameter	Ratings	Unit
V_{CC1}	Supply voltage 1	14	V
V_{CC2}	Supply voltage 2	6	V
P_d	Power dissipation	529	mW
T_{opr}	Operating temperature	− 20~ + 75	℃
T_{stg}	Storage temperature	− 40~ + 125	℃

ELECTRICAL CHARACTERISTICS (Ta = 25℃)

Symbol	Parameter	Test point	Input	Test conditions				Limits			Unit
				V_{CC1}	V_{CC2}	SW1	SW2	Min.	Typ.	Max.	
I_{CC}	Supply current	A1	f1	5V	−	ON	1	10.4	13	15.6	mA
V2	Voltage at terminal 2	TP1	−	12V	−	OFF	1	4.6	5	5.4	V
V_{AFC}	AFC center voltage	TP2	−	5V	−	ON	2	2.25	2.5	2.75	V
V_{OUT}	Synchronization detection min. voltage	TP3	f1	5V	−	ON	1	−	0.2	0.4	V
f_{PH}	Horizontal pull-in range H	TP3	f2	5V	−	ON	1	1.5	2.5		kHz
f_{PL}	Horizontal pull-in range L	TP3	f2	5V	−	ON	1	1.5	2.5		kHz
μ AFC	AFC sensibility	TP2	f2	5V	−	ON	1	280	350	420	mV/kHz
I_{ss}	Sensible synchronization separation input (Sync Sep IN) current	Is	−	5V	−	ON	3	16	20	24	mA
fo	Free running frequency	TP2	f2	5V	−	ON	1	13.0	16.0	19.0	kHz
V_{TH}	Synchronization detection threshold voltage	TP3	−	5V	−.	ON	2	2.0	2.3	2.6	V

ELECTRICAL CHARACTERISTICS TEST METHOD

Icc
1. Set free-running frequency to f1 frequency level.
2. After confirming that input f1 is synchronized, test electrical characteristics.

fPH
1. Set free-running frequency to 15.734kHz.
2. Set f2 to 15.734kHz for input. Next, increase frequency until it becomes asynchronized. Then decrease asynchronized frequency to synchronous point. Input frequency at this point is defined as fH.
   fPH is obtained using the formula below :
   fPH = fH − 15.734 (kHz)

fPL
1. Set free-running frequency to 15.734kHz.
2. Set f2 to 15.734kHz for input. Next, decrease frequency until it becomes asynchronized. Then, increase asynchronized frequency to synchronous point. Input frequency at this point is defined as fL.
   fPL is obtained using the formula below :
   fPL = fL − 15.734 (kHz)

μ AFC
1. Set free-running frequency to 15.734Hz.
2. When f2 is 16.234kHz, voltage at TP2 is defined as V_L. When f2 is 15.234kHz, voltage at TP2 is defined as V_H.
   μ AFC can be obtained using the formula below :

$$\mu\ AFC = \frac{(V_H - V_L)\quad (mV)}{1 \quad (kHz)}$$

Iss
1. Increase Is at pin⑭ from 0mA.
2. Define current value as Iss when synchronization separation circuit starts.

fo
1. Set variable resistor at pin⑬ to 170kΩ.
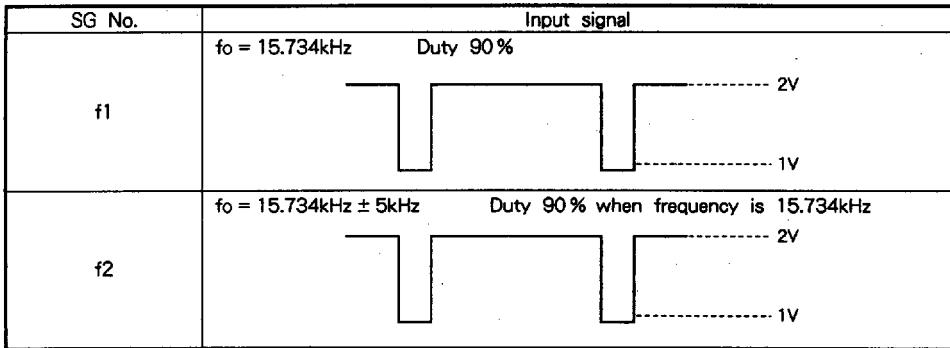2. Input and vary f2. When V_{AFC} appears at TP2, define this input frequency as fo.

VTH
1. Apply voltage to TP4, and gradually increase voltage from 0V to threshold voltage.
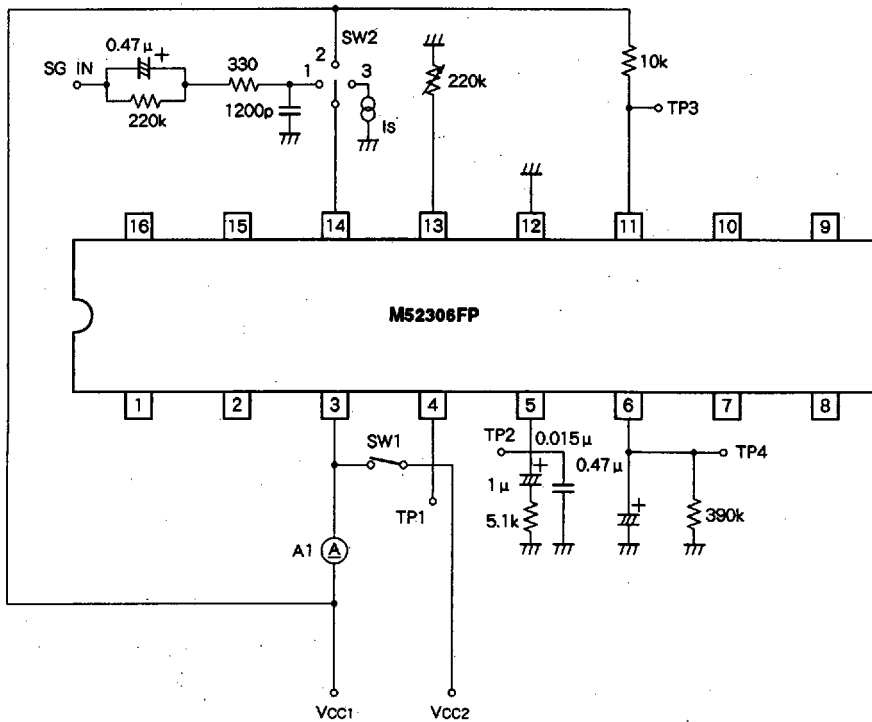2. Voltage applied to TP4 reaches threshold voltage when mute-out voltage at TP3 changes from "H" to "L". Define threshold voltage as V_{TH}.
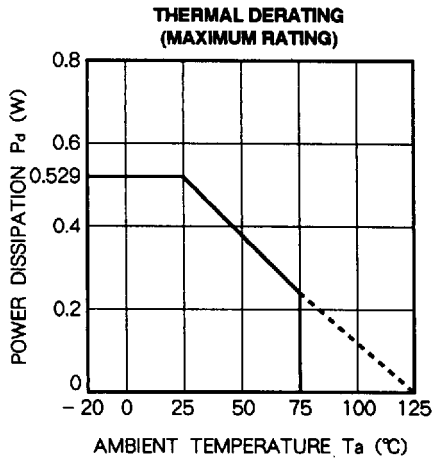
SYNCHRONIZATION DETECTION

INPUT SIGNAL

SG No.	Input signal
f1	fo = 15.734kHz Duty 90% ----- 2V ----- 1V
f2	fo = 15.734kHz ± 5kHz Duty 90% when frequency is 15.734kHz ----- 2V ----- 1V

TEST CIRCUIT

Units Resistance : Ω
       Capacitance : F
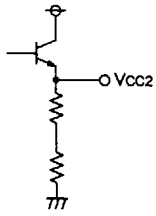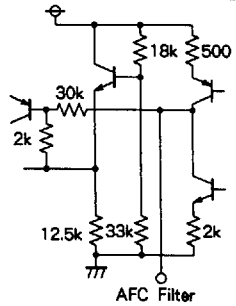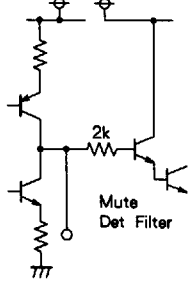
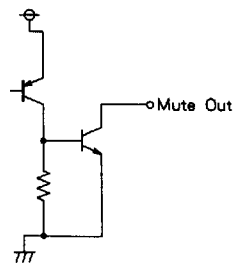**TYPICAL CHARACTERISTICS**

THERMAL DERATING
(MAXIMUM RATING)

APPLICATION EXAMPLE
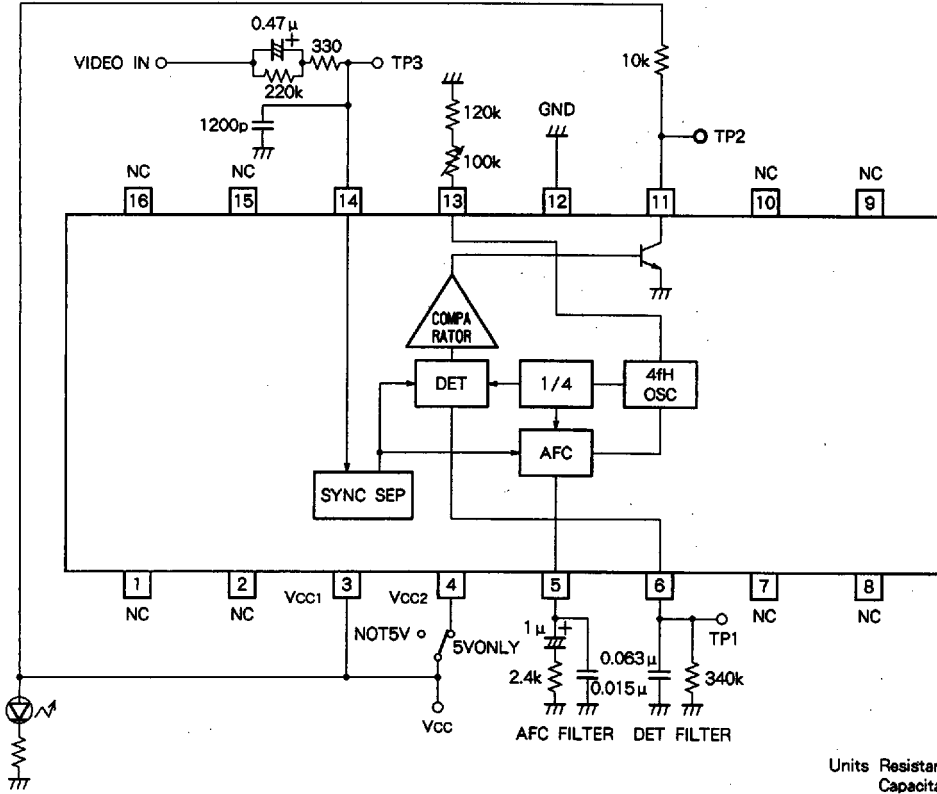
Units Resistance : Ω
Capacitance : F

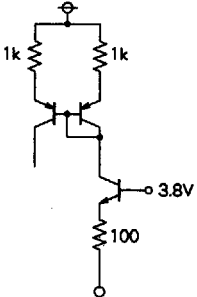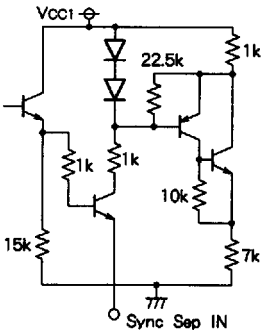## DESCRIPTION OF PIN

Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Function
① ②	NC NC			
③	Vcc1	5(V) 9~12(V)		Apply same voltages that VIF IC uses if combined with the M52306FP.
④	Vcc2	5(V)		When supply voltage of VIF IC is 5V, connect Vcc2 to Vcc1. When supply voltage exceeds 5V, leave this pin unconnected.
⑤	AFC Filter	2.5(V)		● AFC Filter pin Varying resistance of additional resistor enables readjustment of capture range.
⑥	Mute Det Filter	4.5(V) (When locked) 0.2(V) (When unlocked)		Voltage is approx. 4.5V when synchronization is detected ; otherwise, approx. 0.2V
⑦ ⑧ ⑨ ⑩	NC NC NC NC			
⑪	Mute Out	0.2(V) (When locked) Vcc (When unlocked)		When synchronized and asynchronized, outputs "L" and "H", respectively.
⑫	GND	0(V)		

DESCRIPTION OF PIN (cont.)

| Pin No.	Name	Voltage and wave information	Peripheral circuit of pins	Function
⑬	Frequency Adj	3.05(V)		Adjust oscillation frequency by varying resistance of additional variable resistor Vo. 1.
⑭	Sync Sep IN	2.75(V) (Vcc1 = 5V) 6.15(V) (Vcc1 = 9V)		Sync Sep IN is of emitter input type.
⑮	NC			
⑯	NC			

PRECAUTIONS IN USING M52306FP

1. The M52306FP is equipped with two supply voltage pins: Vcc1 and Vcc2. Vcc1 (pin ③) is for both SYNC SEP and 5V power supply stabilizer circuits ; Vcc2 (pin ④) supplies voltage to other blocks.

   When combining this IC with VIF and other ICs of Vcc higher than 5V, apply same Vcc that combined IC uses ; leave Vcc2 pin unconnected. For other blocks internally connected to Vcc2, power is supplied by internal 5V power supply stabilizer circuit. When Vcc of combined IC is 5V, apply 5V to both Vcc1 and Vcc2.
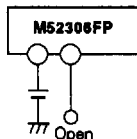
1) When Vcc of combined IC is more than 5V
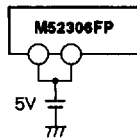
2) When Vcc of combined IC is 5V

2. Setting of free-running frequency
   Measure voltage at pin ⑤ as response to no-input state. Input a signal of the same frequency as the predetermined frequency. Adjust Vo1 at pin ⑬ so that voltage at pin ⑤ becomes the same as response to no-input state.

3. Mute Out (pin ⑪)
   Filter voltage at pin ⑥ is internally input to internal comparator. Output appears at TP2 (pin ⑪). When a station is sensed by detecting station-signal synchronization, output at TP2 becomes "L" ; otherwise, it is "H".