

# Voltage Controlled Oscillator

## BA7082F

The BA7082F is an analog voltage controlled oscillator (VCO) developed for PLL oscillator circuits for CD-ROM drives, and for other products requiring internal reference oscillator circuits. The BA7082F contains not only a VCO, but also the other function blocks required by CD-ROM drives : a 1/2 frequency divider, sensitivity adjuster amplifier and three sensitivity switches. The high maximum oscillation frequency of 60MHz and superior temperature characteristics and power supply variation combine to make this a high-precision, highly stable oscillator circuit.

### ●Applications

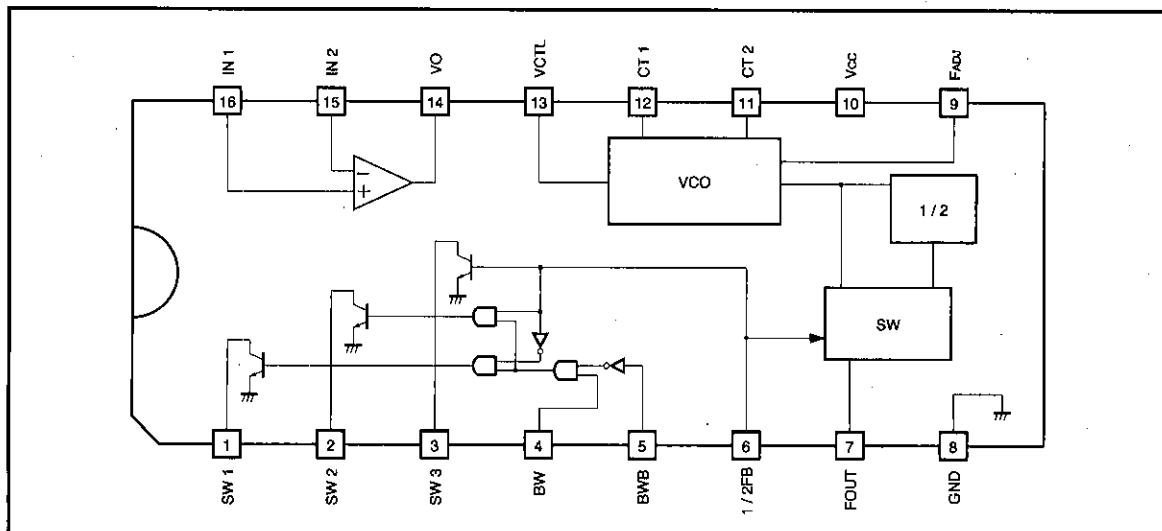
PLL oscillator circuit for CD-ROM drive

Any other applications requiring an internal reference oscillator circuit

### ●Features

- 1) Center frequency can be set with an external constant.
- 2) Internal sensitivity adjuster amplifier makes it possible to set the frequency control sensitivity with an external constant.
- 3) Internal 1/2 frequency divider for switchable output.
- 4)  $f_0$  adjuster pin.
- 5) Three internal control sensitivity switches.

### ●Block diagram



## ● Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V <sub>CC Max.</sub>	7.0	V
Power dissipation	P <sub>d</sub>	500*	mW
Operating temperature	T <sub>opr</sub>	-20~70	°C
Storage temperature	T <sub>stg</sub>	-55~125	°C

\* When mounted to a 50 × 50 × 1.6 mm glass epoxy board.  
Reduced by 5 mW for each increase in Ta of 1°C over 25°C.

## ● Recommended operating conditions (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Recommended power supply	V <sub>CC</sub>	4.5	—	5.5	V

Ⓞ Not designed for radiation resistance.


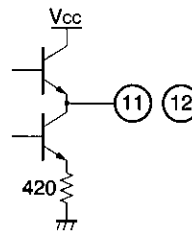
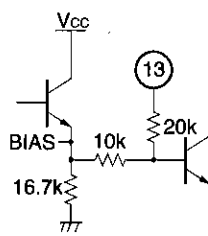
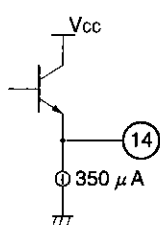
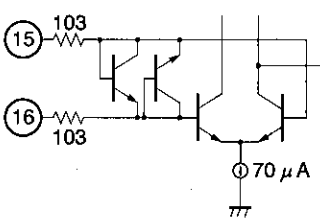
VCO for CD-ROM

For CDs/CD-ROMs

## ● Pin descriptions

Pin No.	Pin name	IN	OUT	Standard potential	Internal equivalent circuit	Function
1	SW1		○	L 0.1V		Collector-open output Logic output pin for control sensitivity adjustment
2	SW2			OPEN 5V		
3	SW3					
4	BW	○		-		Logic input pin for control sensitivity adjustment [0~2V] "L" [3~5V] "H"
5	BWB					
6	1/2FB					
7	FOUT	○	3.6V		VCO output pin	

## ● Pin descriptions

Pin No.	Pin name	IN	OUT	Standard potential	Internal equivalent circuit	Function
8	GND	—	—	0V	GND	GND pin
9	F <sub>ADJ</sub>	—	—	2.5V		to adjustment pin Current and to adjusted with attached resistor (R <sub>ADJ</sub> ). A low value for R <sub>ADJ</sub> raises the oscillation frequency. (However, R <sub>ADJ</sub> must be set higher than 22 kΩ.)
10	V <sub>CC</sub>	—	—	5.0V	V <sub>CC</sub>	V <sub>CC</sub> pin
11	CT2	—	—	1.9V		VCO oscillation capacitor pin Attach a capacitor between CT1 and CT2. A low value for the capacitor raises the oscillation frequency.
12	CT1	—	—			
13	VCTL	○	—	2.5V		VCO control pin Normally shorted along with VO (pin 14).
14	VO	—	○	2.5V		Sensitivity adjustment amplifier output pin Adjust the gain with an external constant.
15	IN2	○	—	2.5V		Sensitivity adjustment amplifier input pin IN1: Forward input IN2: Reverse input
16	IN1					

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## ●Electrical characteristics (unless otherwise noted, Ta=25°C, Vcc=5V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Circuit current	I <sub>CC</sub>	9	14.5	20	mA	No load
OP-AMP. output, D range	V <sub>D</sub>	2.0	3.4	—	V <sub>P-P</sub>	f <sub>IN</sub> = 100 kHz, tertiary component = -35 dB
VCO control voltage	V <sub>CTL</sub>	1.5	2.5	3.5	V	
Control sensitivity	G <sub>CTL</sub>	1.1	1.55	2.0	MHz / V	f <sub>o</sub> = 17 MHz
V <sub>CTL</sub> input impedance	Z <sub>I-CTL</sub>	20	33	45	kΩ	
Adjustment sensitivity	G <sub>ADJ</sub>	4.8	6.4	8.0	MHz / 20kΩ	R <sub>ADJ</sub> =27kΩ ~47kΩ C <sub>T</sub> =33pF
Free-running frequency	f <sub>o</sub>	14.4	18	21.6	MHz	R <sub>ADJ</sub> = 33 kΩ, C <sub>T</sub> = 33 pF, socket
Maximum oscillation frequency	f <sub>Max.</sub>	60	—	—	MHz	R <sub>ADJ</sub> =22kΩ C <sub>T</sub> =5pF
Frequency power supply variation	Δf <sub>v</sub>	—	0.7	5.0	% / V	V <sub>CTL</sub> = 1/2 V <sub>CC</sub> when V <sub>CC</sub> = 5±0.5 V, f = 17 MHz
Oscillation output	V <sub>OUT</sub>	0.7	1.1	1.5	V <sub>P-P</sub>	Load = 5.1 kΩ output
Input voltage, HIGH	V <sub>IH</sub>	3.0	—	—	V	BW, BWB, 1 / 2FB
Input voltage, LOW	V <sub>IL</sub>	—	—	2.0	V	BW, BWB, 1 / 2FB
Input current, HIGH	I <sub>IH</sub>	—	0	3	μA	BW, BWB, 1 / 2FB
Leak current, LOW	I <sub>IL</sub>	—	1	5	μA	BW, BWB, 1 / 2FB
Output voltage, LOW	V <sub>OL</sub>	—	—	0.5	V	I <sub>O</sub> = 1 mA, SW1, SW2, SW3

## ●Logic truth table

Input			Output		
4pin BW	5pin BWB	6pin 1 / 2FB	1pin SW1	2pin SW2	3pin SW3
0	0	0	—	—	—
0	0	1	—	—	L
0	1	0	—	—	—
0	1	1	—	—	L
1	0	0	L	—	—
1	0	1	—	L	L
1	1	0	—	—	—
1	1	1	—	—	L

Note:  
 Input 1: HIGH  
 Input 0: LOW  
 Output L: ON  
 Output -: OPEN

● Measurement circuit

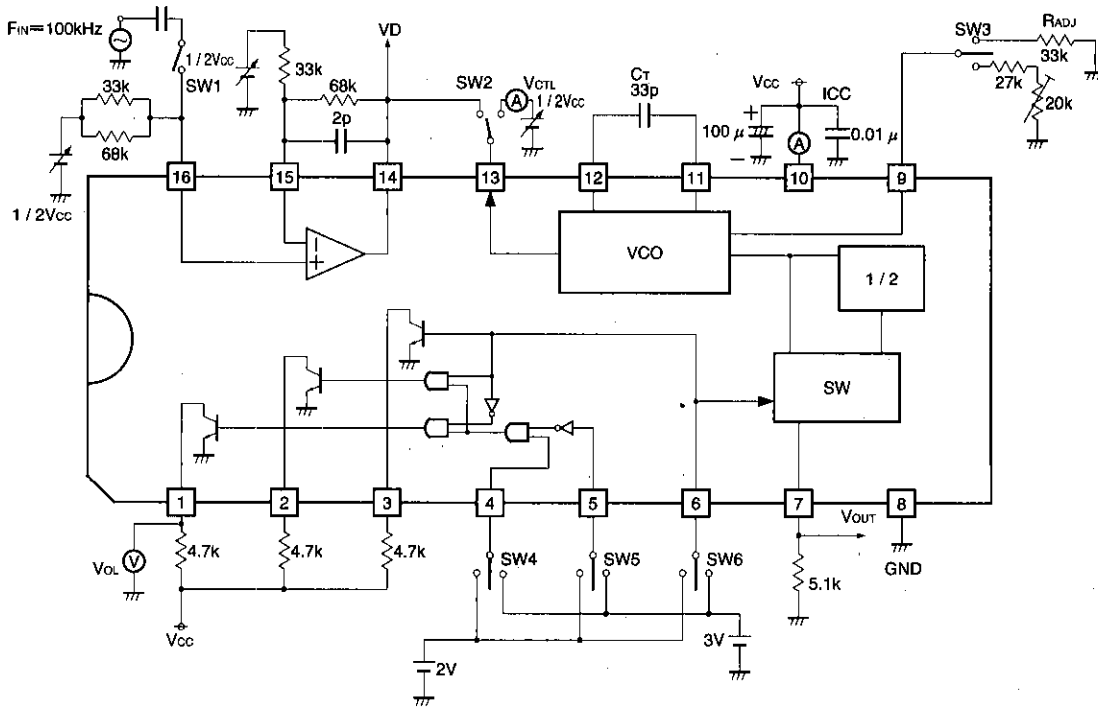


Fig. 1

VCO for CD-ROM

For CDs/CD-ROMs

● Application example

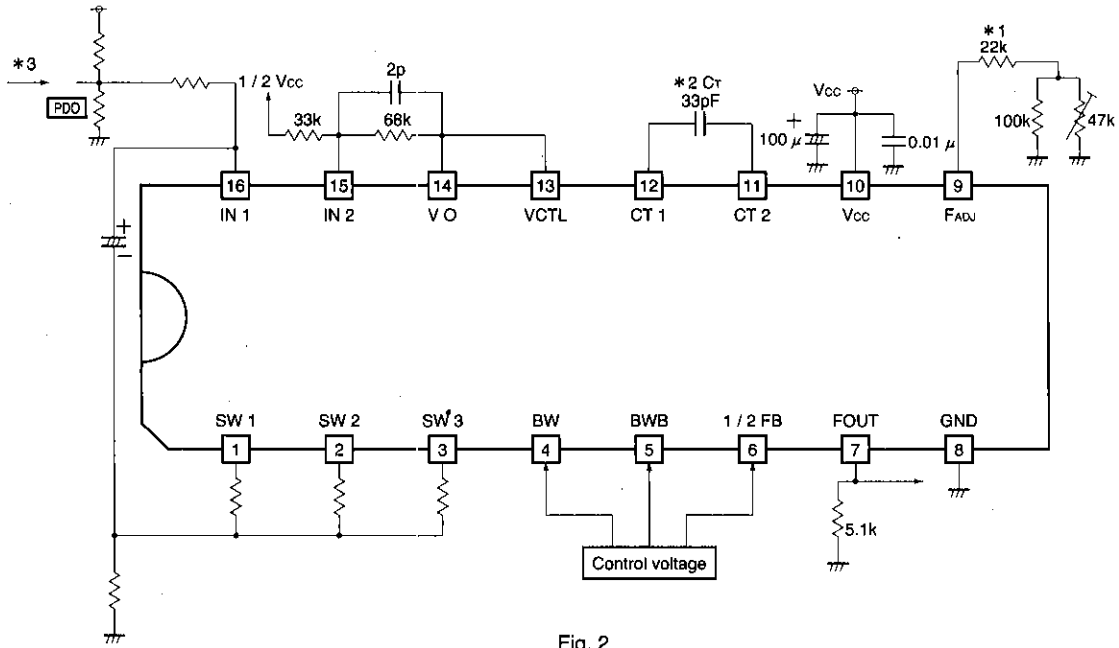


Fig. 2

Notes:

- \*1. R<sub>ADJ</sub> must always remain below 22 kΩ.
- \*2. Adjust by altering the board.
- \*3. The input AC amplitude must not exceed 1 V<sub>p-p</sub>.

●Electrical characteristic curves

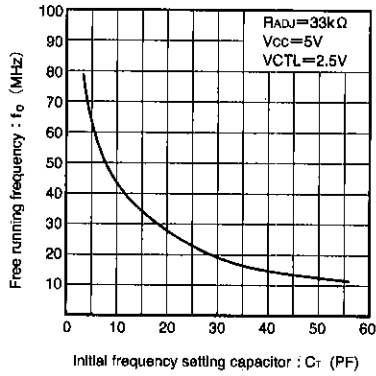


Fig. 3 Frequency setting capacitor characteristics

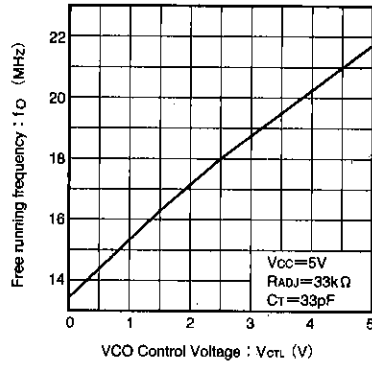
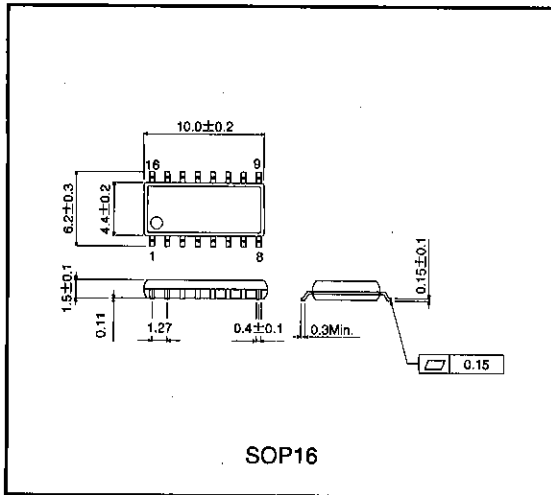


Fig. 4 Frequency vs. control voltage characteristics

●External dimensions (Units: mm)



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