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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

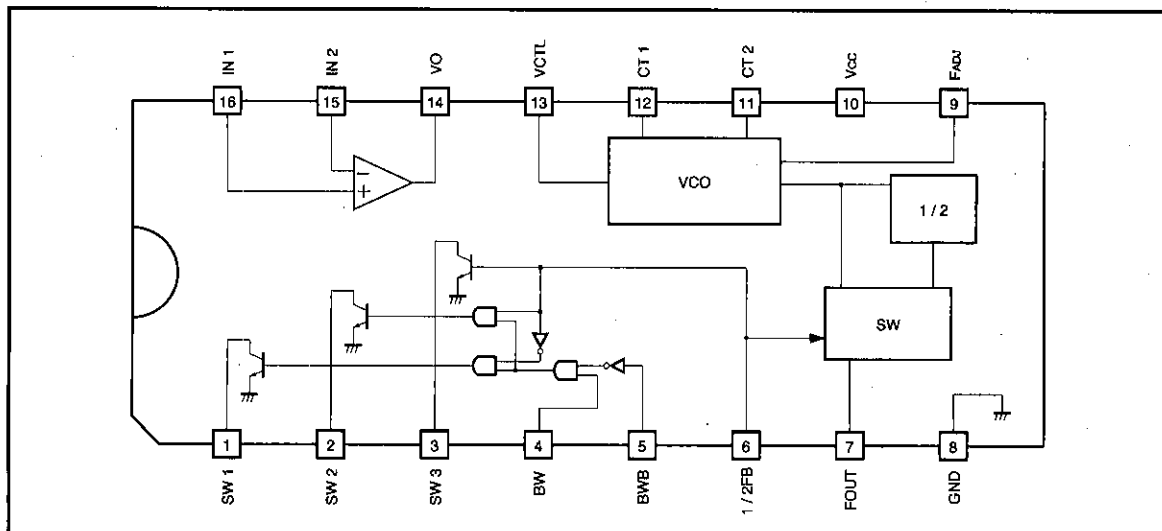
PLL oscillator circuit for CD-ROM drive

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 _{CC Max.}	7.0	V
Power dissipation	P _d	500*	mW
Operating temperature	T _{opr}	-20~70	°C
Storage temperature	T _{stg}	-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)

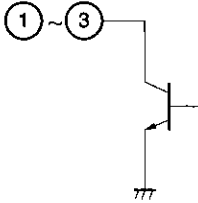
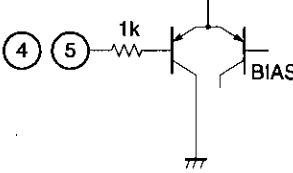
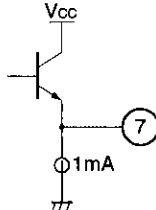
Parameter	Symbol	Min.	Typ.	Max.	Unit
Recommended power supply	V _{CC}	4.5	—	5.5	V

Ⓞ Not designed for radiation resistance.


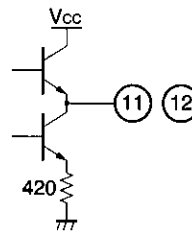
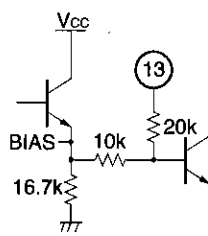
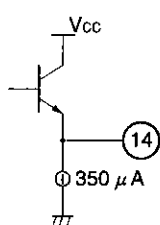
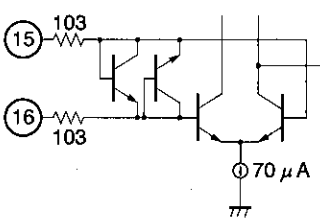
VCO for CD-ROM

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 _{ADJ}	—	—	2.5V		to adjustment pin Current and to adjusted with attached resistor (R _{ADJ}). A low value for R _{ADJ} raises the oscillation frequency. (However, R _{ADJ} must be set higher than 22 kΩ.)
10	V _{CC}	—	—	5.0V	V _{CC}	V _{CC} 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					

VCO for CD-ROM

For CDs/CD-ROMs

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

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

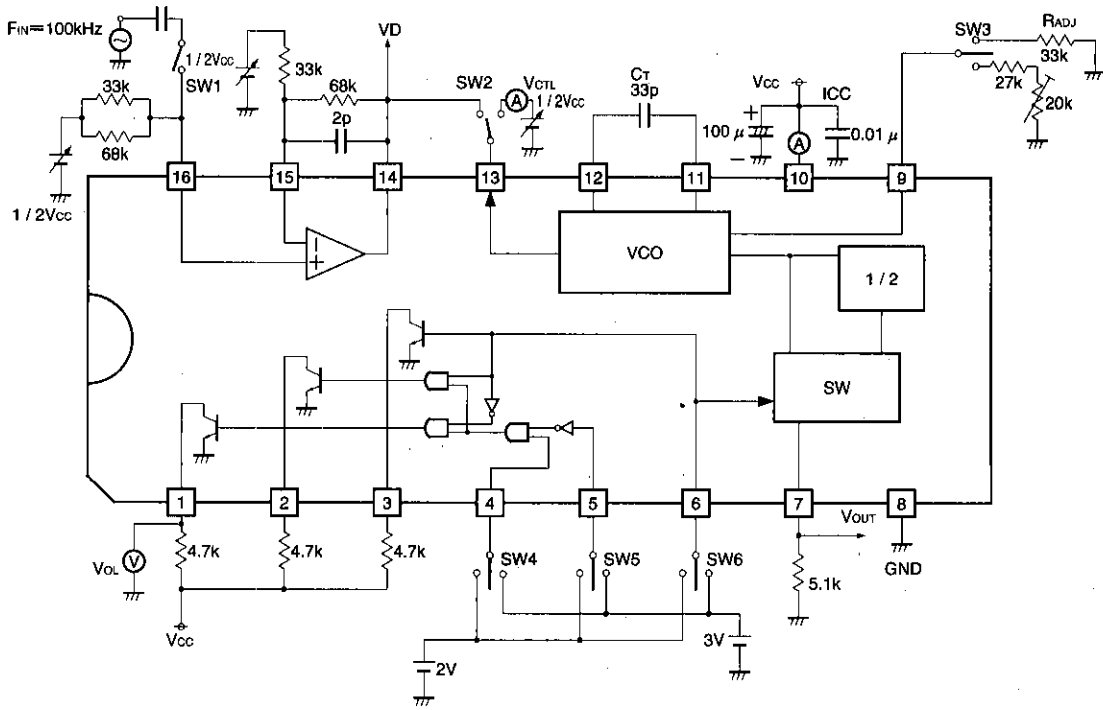


Fig. 1

VCO for CD-ROM

For CDs/CD-ROMs

● Application example

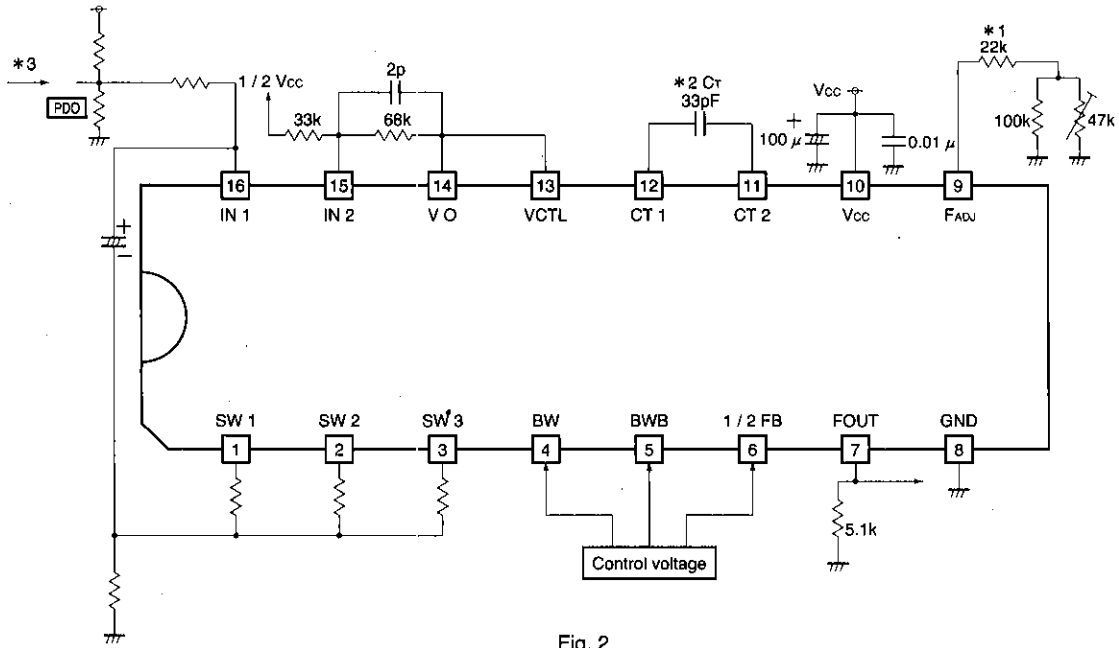


Fig. 2

Notes:

- *1. R_{ADJ} must always remain below 22 kΩ.
- *2. Adjust by altering the board.
- *3. The input AC amplitude must not exceed 1 V_{p-p}.

●Electrical characteristic curves

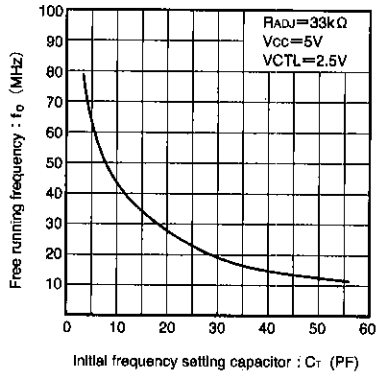


Fig. 3 Frequency setting capacitor characteristics

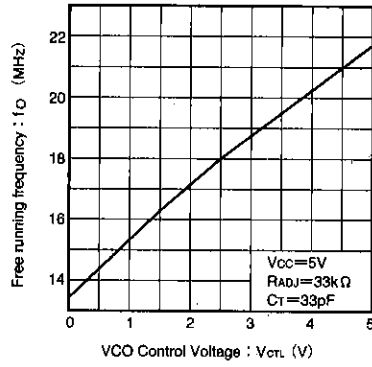
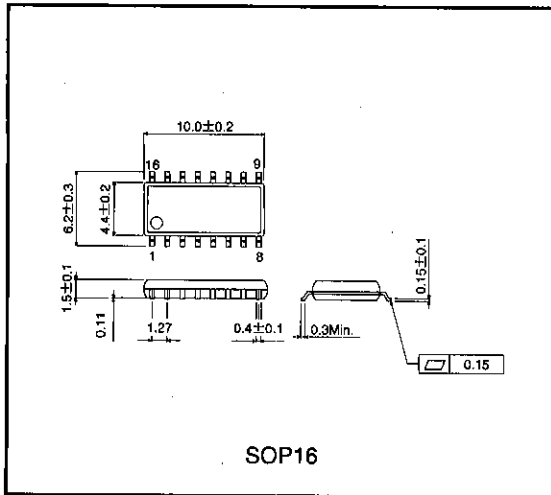


Fig. 4 Frequency vs. control voltage characteristics

●External dimensions (Units: mm)



VCO for CD-ROM

For CDs/CD-ROMs

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