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.

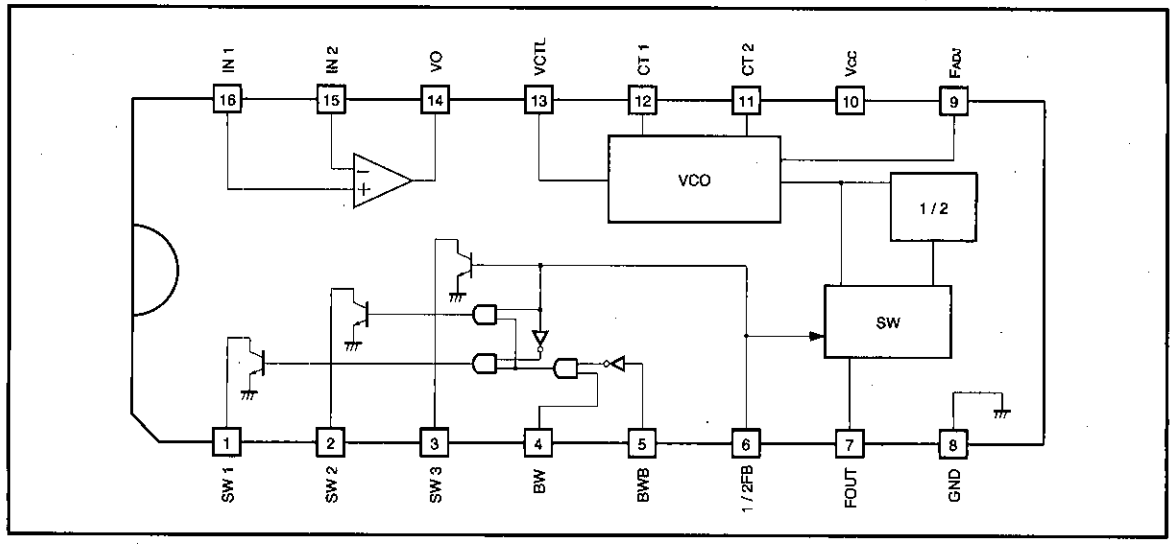
●Applications

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℃)

Parameter	Symbol	Limits	Unit
Power supply voltage	$V_{CC\ Max.}$	7.0	V
Power dissipation	Pd	500*	mW
Operating temperature	Topr	−20~70	℃
Storage temperature	Tstg	−55~125	℃

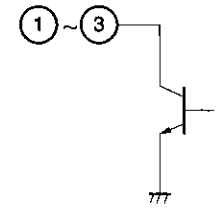
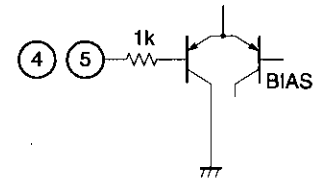
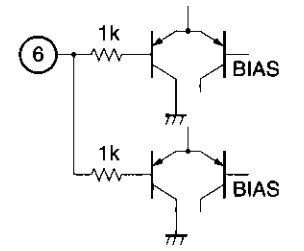
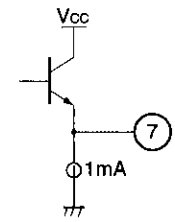
* When mounted to a 50 × 50 × 1.6 mm glass epoxy board.
Reduced by 5 mW for each increase in Ta of 1℃ over 25℃.

●Recommended operating conditions (Ta=25℃)

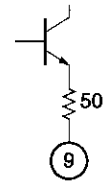
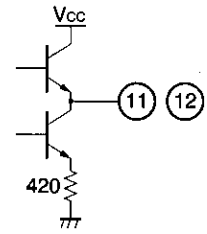
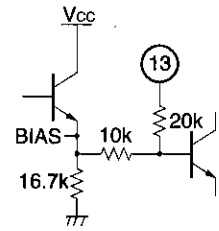
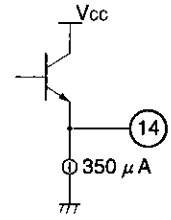
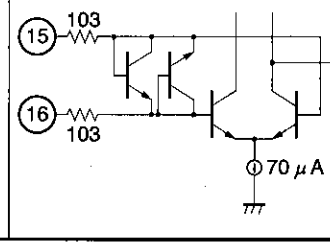
Parameter	Symbol	Min.	Typ.	Max.	Unit
Recommended power supply	V_{CC}	4.5	—	5.5	V

◎Not designed for radiation resistance.

●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					
3	SW3			OPEN 5V		
4	BW			—		Logic input pin for control sensitivity adjustment 〔0~2V〕 "L" 〔3~5V〕 "H"
5	BWB					
6	1 / 2FB	○				Logic input pin for control sensitivity adjustment Switching pin for 1/2 frequency divider Slew at HIGH, output to 1/2 frequency divider at LOW 〔0~2V〕 "L" 〔3~5V〕 "H"
7	FOUT		○	3.6V		VCO output pin

●Pin descriptions

Pin No.	Pin name	IN	OUT	Standarde potential	Internal equivalent circuit	Function
8	GND	—	—	0V	GND	GND pin
9	F_{ADJ}	—	—	2.5V		fo adjustment pin Current and fo 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	Vcc	—	—	5.0V	Vcc	Vcc 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					

●Electrical characteristics (unless otherwise noted, Ta=25℃, V_{CC}=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_{fCTL}	1.1	1.55	2.0	MHz / V	fo = 17 MHz
V_{CTL} input impedance	Z_{I-CTL}	20	33	45	kΩ	
Adjustment sensitivity	G_{fADJ}	4.8	6.4	8.0	MHz / 20kΩ	R_{ADJ}=27kΩ～47kΩ C_T=33pF
Free-running frequency	fo	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	Δfv	—	0.7	5.0	% / V	V_{CTL} = 1/2 Vcc when Vcc = 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	Io = 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

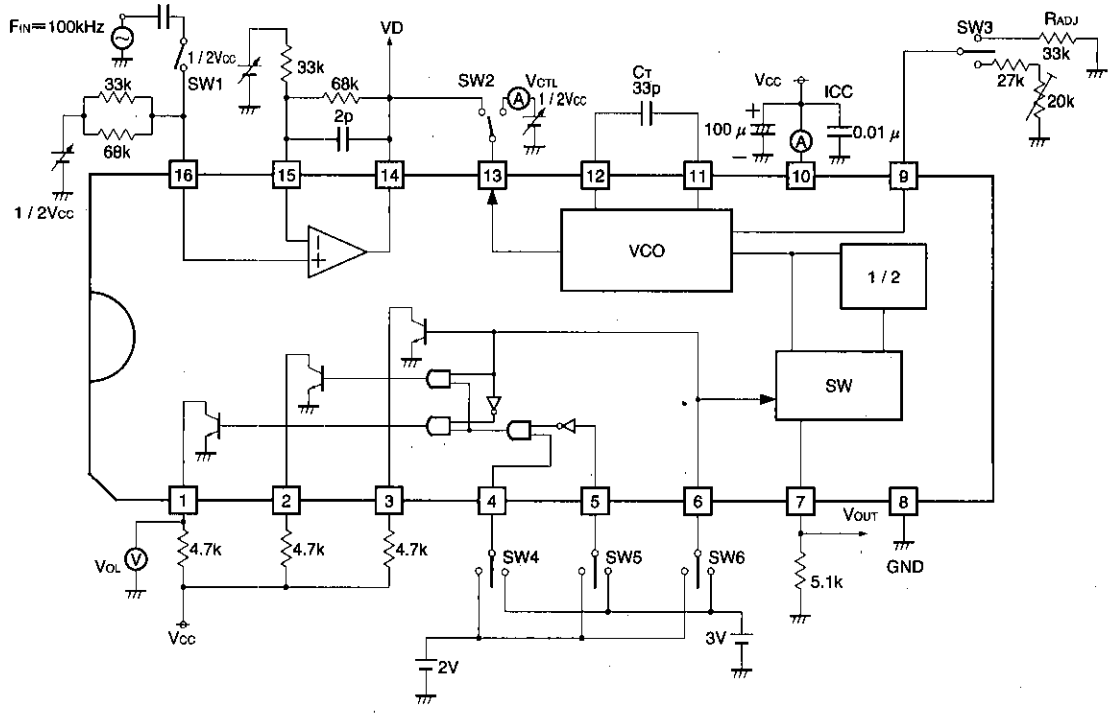


Fig. 1

●Application example

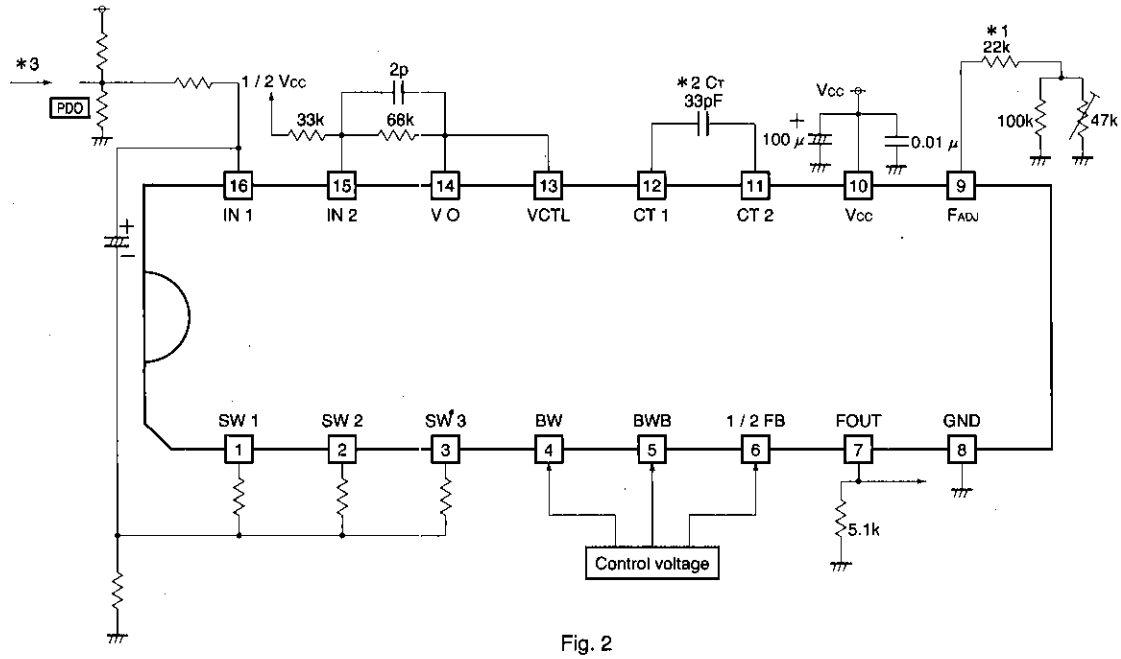


Fig. 2

Notes:
*1. RADJ must always remain below 22 kΩ.
*2. Adjust by altering the board.
*3. The input AC amplitude must not exceed 1 Vp-p.

●Electrical characteristic curves

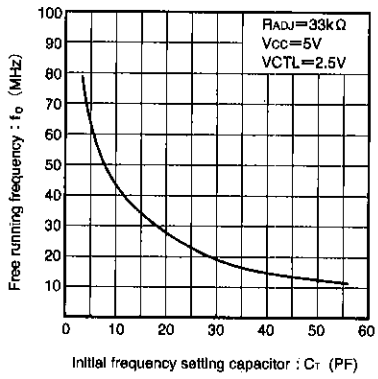


Fig. 3 Frequency setting capacitor characteristics

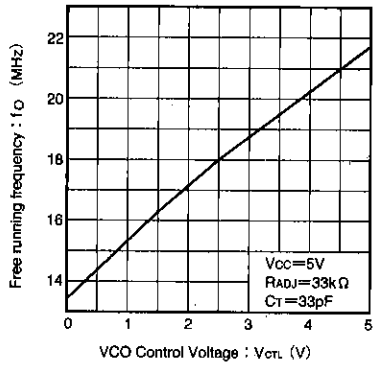
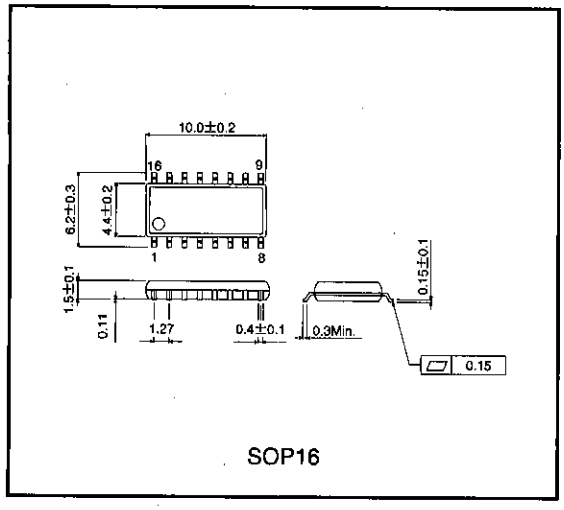


Fig. 4 Frequency vs. control voltage characteristics

●External dimensions (Units: mm)



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