Frequency Servo Controller

Description

The CX-065B is a frequency servo system motor control oriented monolithic integrated circuit that has been designed to suit for applications with a floppy disk drive, tape recorder, and turntable.

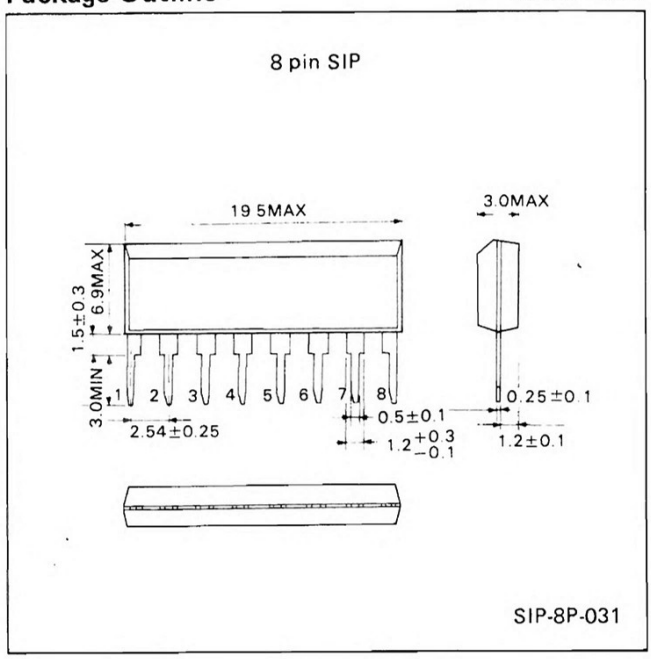
This integrated circuit has been configured of a waveform shaping circuit, sawtooth wave generating circuit, comparator, smoothing circuit, DC amplifier, and power supply.

Features

- Less externally connected parts
- Resists power supply voltage fluctuations well.
- Exhibits good servo characteristics.

Package Outline

Unit: mm



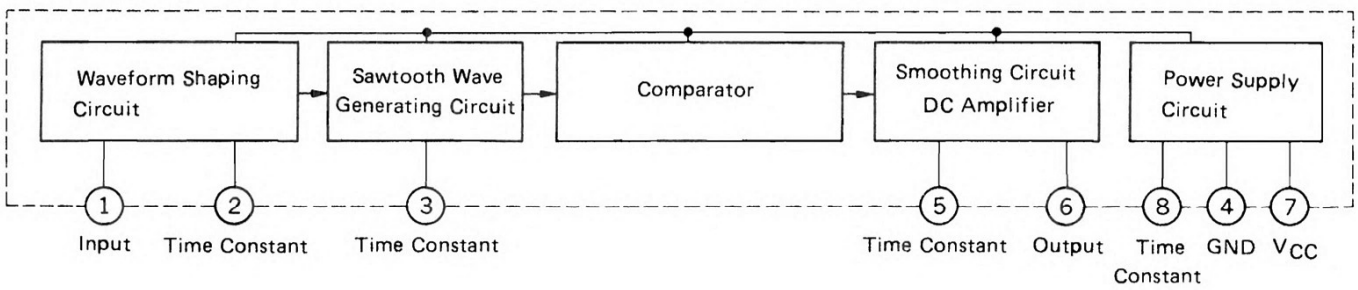
Structure

Bipolar Silicon Monolithic IC

Absolute Maximum Ratings (Ta=25°C)

• Supply voltage	V_{CC}	17	V
• Input voltage	V_i	−2.0, 4	V
• Operating temperature	Topr	−10 to +60	°C
• Storage temperature	Tstg	−40 to +125	°C
• Allowable power dissipation	P_D	600	mW

Block Diagram

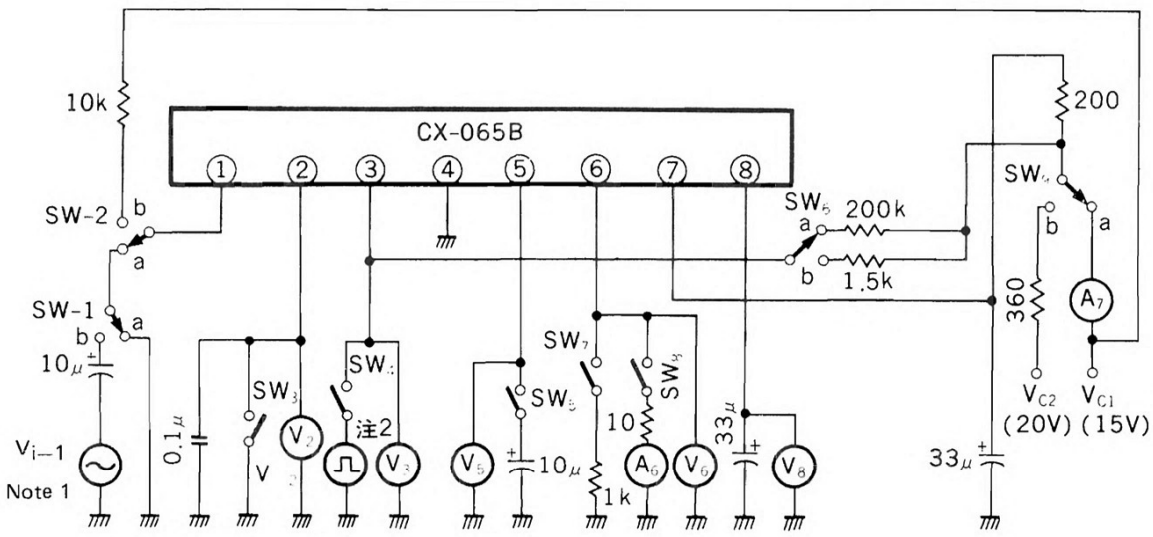


Electrical Characteristics

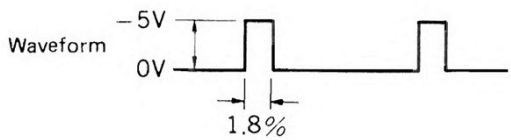
(Ta=25°C, See the Test Circuit and Conditions.)

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Circuit Current	I_D	V_C=15V, 437Hz Input, Pulse Input	4.0	7.0	10.0	mA
Stabilized Voltage	V_8	V_C=15V, 437Hz Input, sin, 1Vp-p	4.55	4.80	5.00	V
Pin 5 Output Voltage	V_5	V_C=15V, No-signal Input	10.3	11.2	12.0	V
(N) Comparator Reference Voltage	V_{ref}	V_C=15V, No-signal Input	1.76	1.88	2.00	V
Pin 3 Voltage-1	$V_{3\text{-}1}$	V_C=15V, No-signal Input		40	70	mV
Pin 3 Voltage-2	$V_{3\text{-}2}$	V_C=15V, No-signal Input		1.0	5.0	mV
Gain Voltage-1	$V_{g\text{-}1}$	V_C=15V, Pulse input at 437Hz	2.5	2.8	3.1	V
Gain Voltage-2	$V_{g\text{-}2}$	V_C=20V, Pulse input at 437Hz	2.5	2.9	3.2	V
Saturation Voltage-1	$V_{sat\text{-}1}$	V_C=15V, No-signal Input		130	200	mV
Saturation Voltage-2	$V_{sat\text{-}2}$	V_C=15V, No-signal Input		140	200	mV
Output Pin Voltage	V_{out}	V_C=15V, Pulse input 437Hz	1.00	1.60	2.50	V
Maximum Output current	I_{out}	V_C=15V, Pulse input 437Hz	10	15	20	mA
Output Potential Difference	ΔV	$\Delta V=(V_{g\text{-}1})-(V_{out})$	1.00	1.30	1.60	V
Output Pulse Width	PW	V_C=15V, 437Hz Input, sin, 1Vp-p	100	150	200	μs

Electrical Characteristics Test Circuit

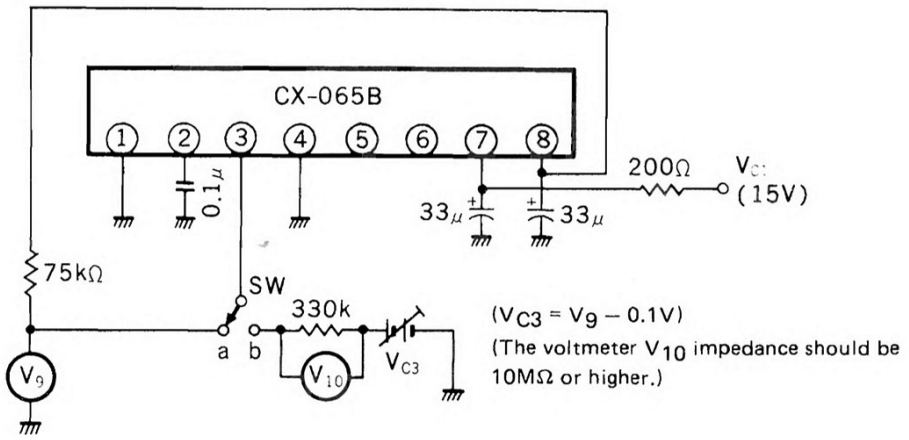


Note 1) $V_{i\text{-}1}$ f=437Hz, Waveform: Sin, CW, Rg=600Ω, Output Level=1.0Vp-p (R_L=1.3kΩ)
2) $V_{i\text{-}2}$ f=437Hz, Duty=1.8%, Polarity=(+), Rg OFF=4.7k, Rg ON=0Ω



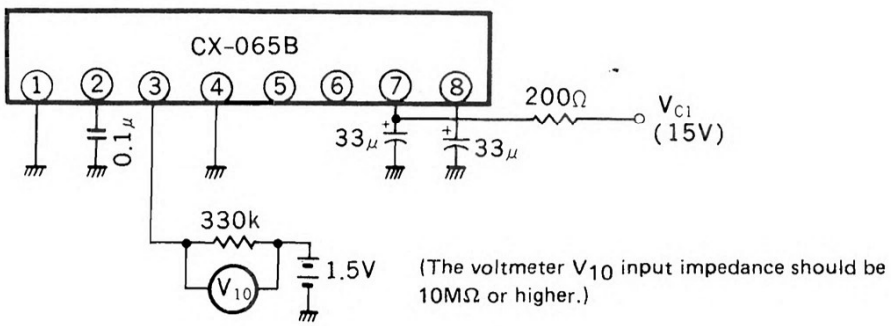
V3-1 Test Circuit

With reference to the circuit diagram below, measure voltage (V9) with SW(a), and after setting V_{C3} to the reduced voltage of 100 mV, measure voltage (V10) by switching to SW(b), to make a GO/NG decision.



V3-2 Test Circuit

With reference to the circuit diagram below, measure voltage at (V10) to make a GO/NG decision.

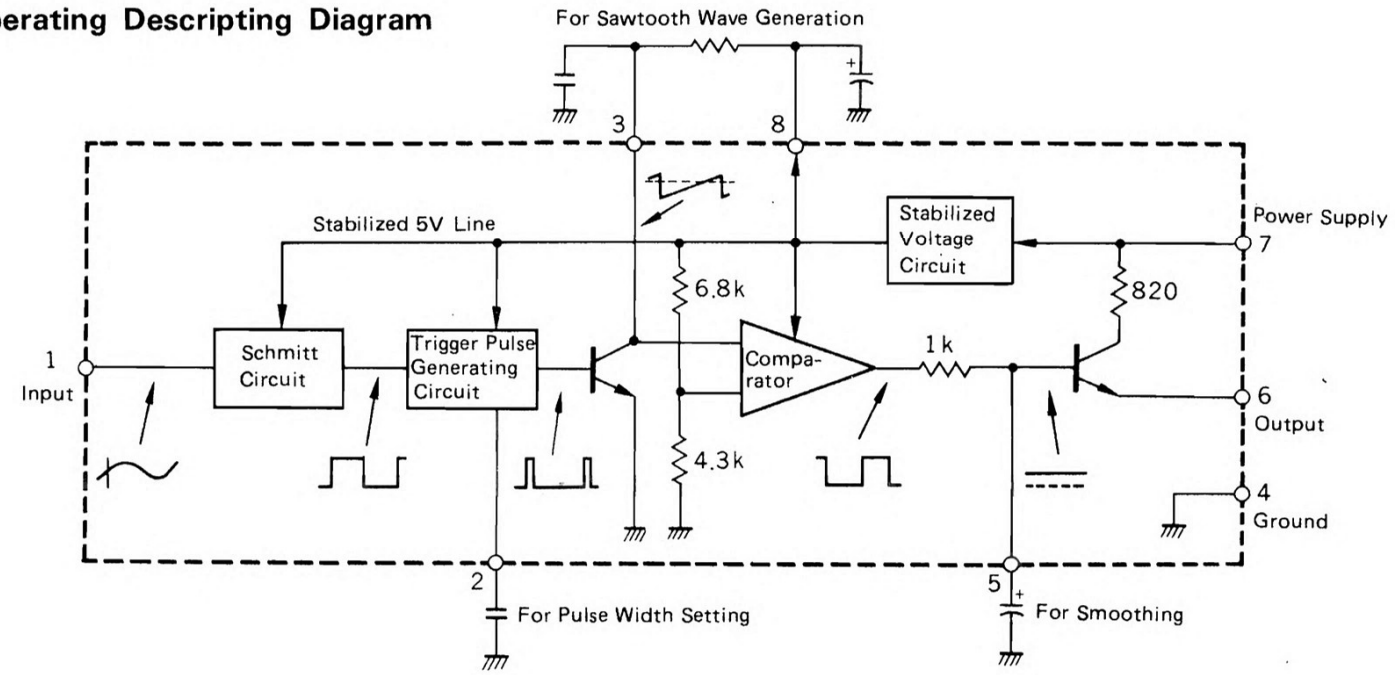


List of Test Conditions

Item	Symbol	SW Condition*									Input Signal[Note]	Test Condition	Test Point
		SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8	SW-9			
Circuit Current	I_D	a	a	OFF	ON	ON	a	OFF	OFF	a	V_{i-2}		A_7
Stabilized Voltage	V_8	b	a	OFF	OFF	OFF	a	OFF	OFF	a	V_{i-1}		V_8
Pin 5 Output Voltage	V_5	a	a	OFF	OFF	OFF	a	OFF	OFF	a	No signal		V_5
Comparator Reference Voltage	V_{ref}	a	a	OFF	OFF	OFF	a	OFF	OFF	a	No signal		V_3
Gain Voltage-1	V_{g-1}	a	a	OFF	ON	ON	a	OFF	OFF	a	V_{i-2}		V_5
Gain Voltage-2	V_{g-2}	a	a	OFF	ON	ON	a	OFF	OFF	b	V_{i-2}		V_5
Saturation Voltage-1	V_{sat-1}	b	b	ON	OFF	OFF	b	OFF	OFF	a	No Signal		V_3
Saturation Voltage-2	V_{sat-2}	a	a	OFF	OFF	OFF	a	OFF	OFF	a	No Signal		V_2
Output Pin Voltage	V_{out}	a	a	OFF	ON	ON	a	ON	OFF	a	V_{i-2}		V_6
Maximum Output current	I_{out}	a	a	OFF	ON	ON	a	OFF	ON	a	V_{i-2}		A_6
Output Potential Difference	ΔV											$V=V_{g1}-V_{out}$	
Output Pulse Width	PW	b	a	OFF	OFF	OFF	a	OFF	OFF	a	V_{i-1}	Output Signal PW 5V 0V	V_5

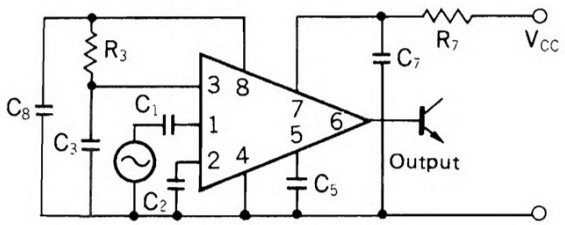
Note) * With regard to input signals V_{i-1} and V_{i-2}, refer to Notes 1 and 2 in the Test circuit.

Operating Descripting Diagram



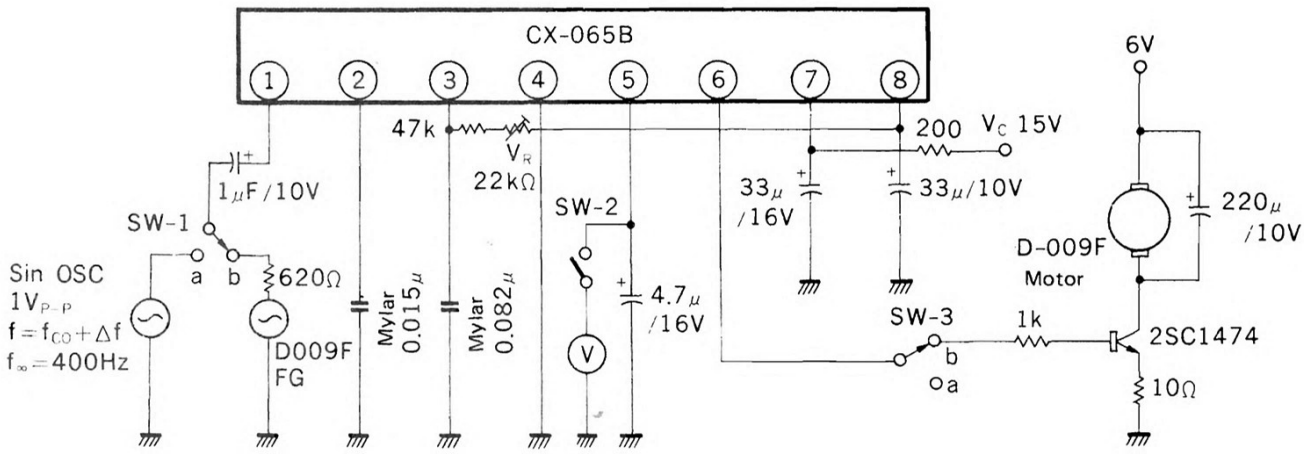
Notes on Application

Circuit



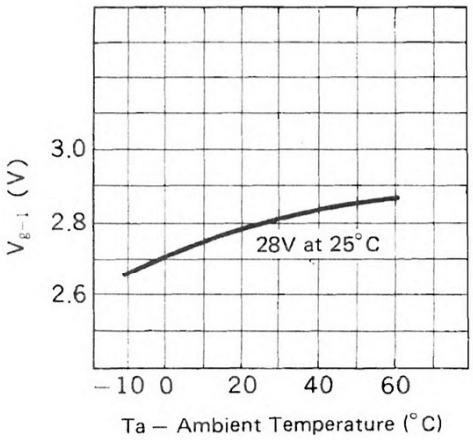
1. Although the input voltage range is from 1 Vp-p to 4.8 Vp-p, the capacitor C_1 may be omitted if the input is at 3 Vp-p or higher.
2. An appropriate output impedance of the tachogenerator is about 1k Ω.
3. Set the sawtooth wave time constant determining R_3 at 10 kΩ≦R_3≧400 kΩ.
   The recommended sawtooth wave time constant determining R_3 range is 20 kΩ≦R_3≦200 kΩ.
4. Guidelines for selecting capacitor C_2 are $C_2=C_3/5$ with a minimum value at $C_2=C_3/10$.
5. C_8 serves parasitic oscillation preventive purposes for the power supply circuit. Under no circumstances should it be omitted.
6. When the power supply rise time is shorter than 100 ms, be sure to add R_7=200Ω on in series with the power supply for the IC protective purposes.
7. The power supply voltage applied at pin 7 may range from 6V to 17V, but when it is below 11V, the pin 8 voltage may fail to be stabilized.
8. Hold the steady output current level at pin 6 below 3 mA.
9. Hold the output current level at pin 8 within ±2 mA (where the negative value signifies an inflow). However, when not employing pin 6 , Current Range From −2 mA to +5mA is permissible.
10. C_5 should be determined in accordance with input (carrier) frequency f_o by taking transfer function H(s) and carrier ripple into consideration.
    Cut-off frequency f_c of the Frequency to Voltage (F-V) converter may be expressed as follows:
    $f_c=7.6/C_5(\mu F)[Hz]$

Application Circuit and F-V Characteristics Test Circuit

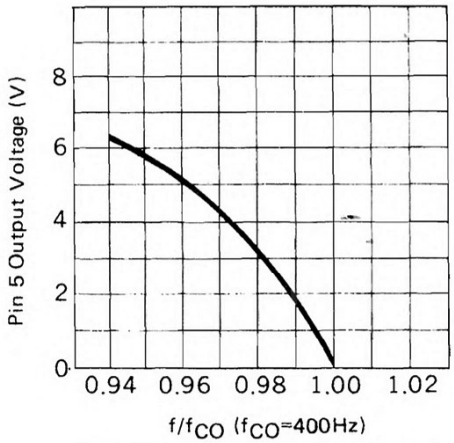


Note) ① With SW1-b, SW2-off, SW3-b: Typical Application Circuit
② With SW1-a, SW2-on, SW-a: F-V Characteristics Test Circuit, where after setting VR to provide 0V at Ⓥ against an f_{CO}=400Hz input, the frequency should be lowered and the Ⓥ measures taken.

Gain Voltage-1 temperature characteristics



Frequency to Voltage characteristics



(By F-V Characteristics Test Circuit)

Allowable power dissipation derating curves