NEC ELECTRON DEVICE

BIPOLAR ANALOG INTEGRATED CIRCUIT
μPC1043C

MOTOR CONTROL CIRCUIT
SILICON MONOLITHIC BIPOLAR INTEGRATED CIRCUIT

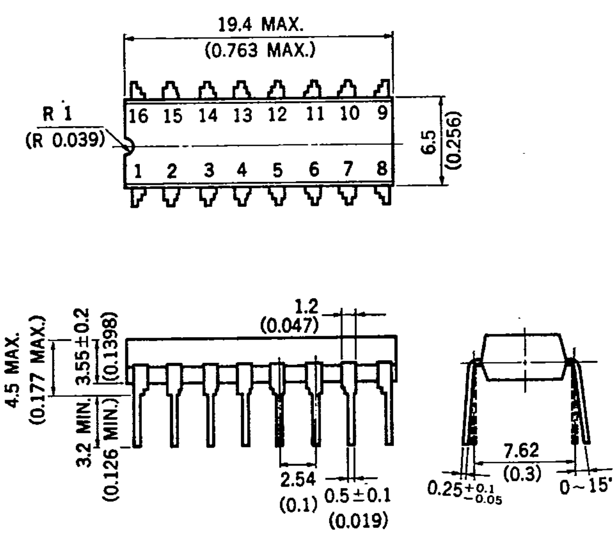
The μPC1043C is a silicon monolithic integrated circuit developed by NEC for Frequency Generator DC Motor speed control of Hi-Fi player and VTR etc.
The package is 16-Pin plastic Dual In-Line Package.

FEATURES

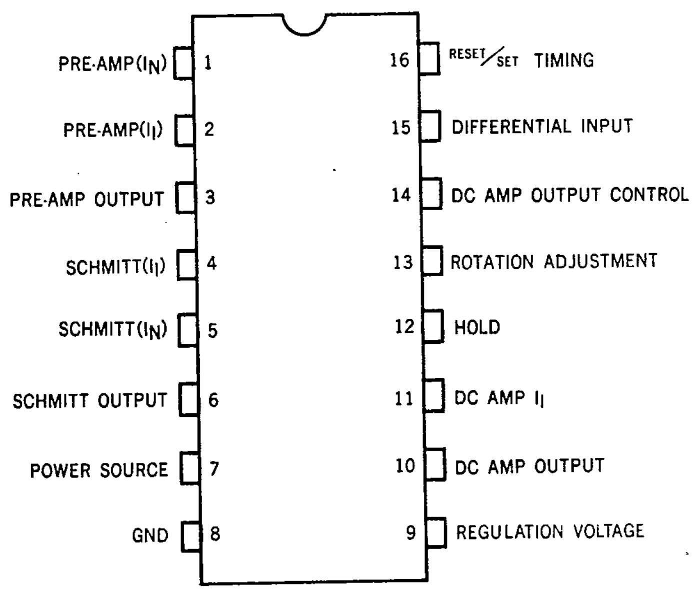
- Operating at wide range supply voltage.
  (V_{CC} = 9 to 28 V)
- Available for wide range FG. Servomotor.
  (f = 20 to 3 000 Hz
  v_{in} = 1 to 2 000 $mV_{p\text{-}p}$)
- Applicable for any kind of motors by choising the external power transistor.

PACKAGE DIMENSIONS

in millimeters (inches)

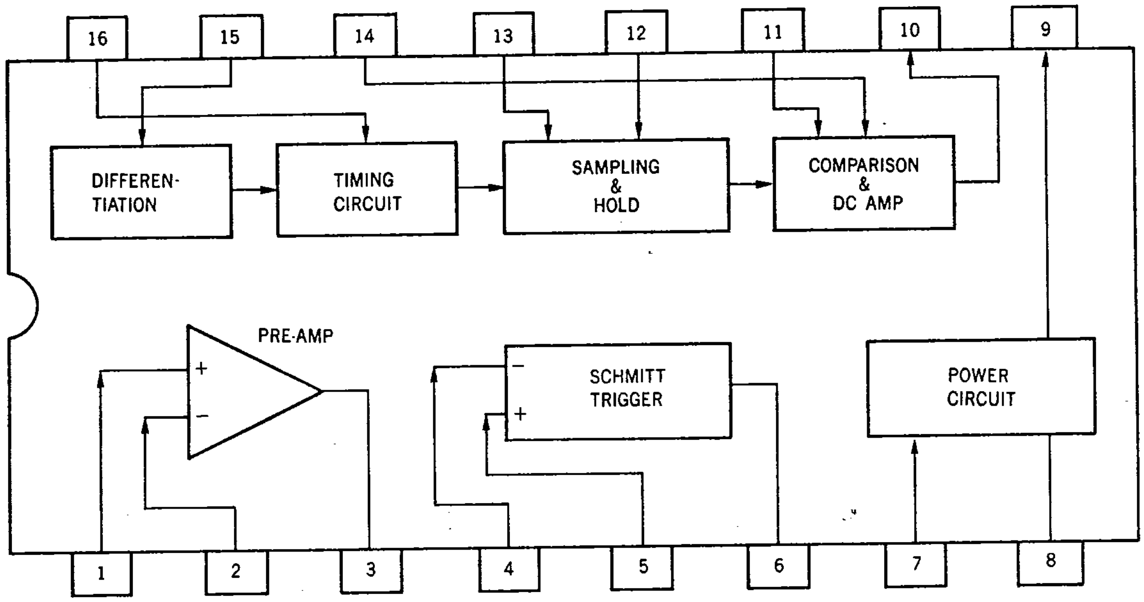


CONNECTION DIAGRAM (Top View)



Nippon Electric Co.,Ltd.

BLOCK DIAGRAM (Top View)



ABSOLUTE MAXIMUM RATINGS ($T_a = 25\ ^\circ C$)

Supply Voltage	V_{CC}	15*	V
Circuit Current	I_{CC}	100	mA
Power Dissipation (Ta = 75 °C)	P_D	350	mW
Operating Temperature Range	T_{opt}	−20 to +75	°C
Storage Temperature Range	T_{stg}	−40 to +125	°C

* Power source directly applied to No. 7 pin.

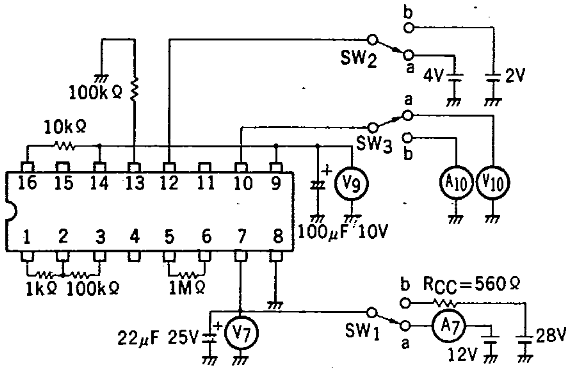
RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage (R_{CC} = 0)	V_{CC1}	9	12	15	V
Supply Voltage (R_{CC} = 560 Ω)	V_{CC2}	19	24	28	V
FG Frequency	f_{ref}	20		3000	Hz
PRE-AMP Voltage Gain	A_v	20		60	dB
Threshold Voltage	V_{TH}	±20		±200	mV
Operating Temperature Range	T_{opt}	−20		+60	°C

ELECTRICAL CHARACTERISTICS (V_{CC} = 12 V, T_a = 25 °C)

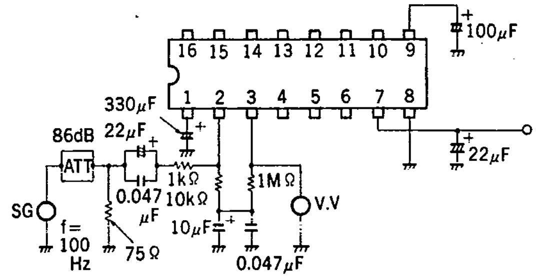
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Circuit Current	I_{CC}	4	7	10	mA	Non-signal input, Output current = 0
Regulation Voltage	V_9	5.1	5.7	6.3	V	Voltage at No. 9 pin
Maximum Output Voltage	$V_{O\ max.}$	3.5	4.25		V	Output Current = 0
Maximum Output Current	$I_{O\ max.}$	8	12	17	mA	Output Voltage = 0
Shunt Regulation Voltage	V_{7ON}	15	16.3	18	V	V_{CC} = 28 V, R_{CC} = 560 Ω
PRE-AMP Voltage Gain	A_{vo}	75	84		dB	f = 100 Hz Test Circuit – 2 S.G. output terminated 700 $mV_{r.m.s.}$
Rotation Temperature Coefficient	ΔN_A		0	0.02	%/ °C	V_{CC} = 28 V, R_{CC} = 560 Ω Ta = –20 to +60 °C Rotation $N_{max.} - N_{min.}$/N (25 °C)/80 °C
Rotation Coefficient Input Voltage	ΔN_V		0	0.02	%/ V	Variation of Rotation at V_{CC} = 19 to 28 V, R_{CC} = 560 Ω
Rotation Drift	ΔN_T		0	0.1	%	Variation of Rotation 10 s to 30 min. after V_{CC} on at V_{CC} = 24 V, R_{CC} = 560 Ω
Output Ripple Voltage	v_o		20	35	mV_{p-p}	Test Circuit – 4
Schmitt Noise Voltage	V_{TN}		0	0.7	V_{p-p}	Test Circuit – 5
ON Resistance	$R_{O48\ ON}$		100	300	Ω	Test Circuit – 6

TEST CIRCUIT－1
(I_{CC}, V_9, $V_{0\ max}$, $I_{0\ max}$, $V_{7\ ON}$)



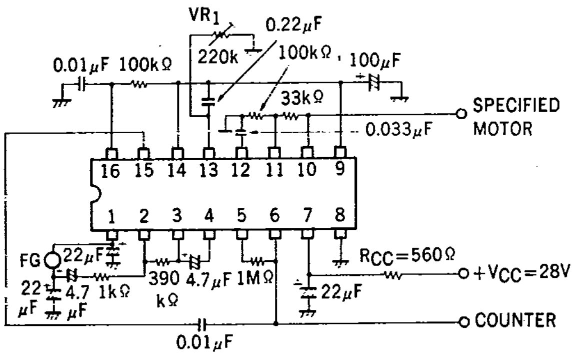
ITEM	SWITCH SW1	SW2	SW3	MEASUREMENT POINT
I_{CC}	a	a	a	A_7
V_9	a	a	a	V_9
$V_{Omax.}$	a	b	a	V_{10}
$I_{Omax.}$	a	b	b	A_{10}
V_{7ON}	b	a	a	V_7

TEST CIRCUIT－2 (A_{VO})



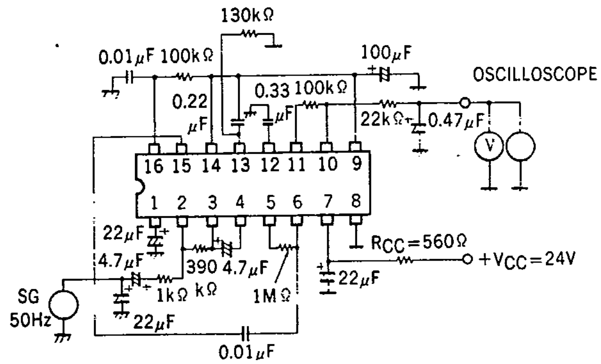
*SG Output Impedance=75 Ω
*ATT Input Output Impedance=75 Ω

TEST CIRCUIT－3 (ΔN_A, ΔN_V, ΔN_T)



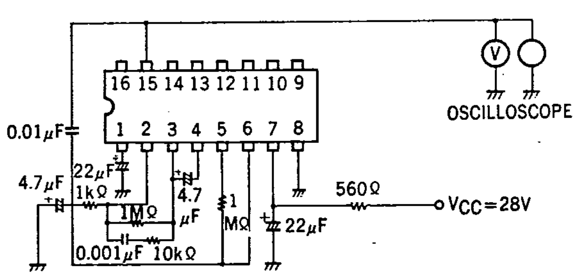
*Adjust VR_1 so that the measured volue by counter becomes 20 ms.

TEST CIRCUIT－4 (v_o)

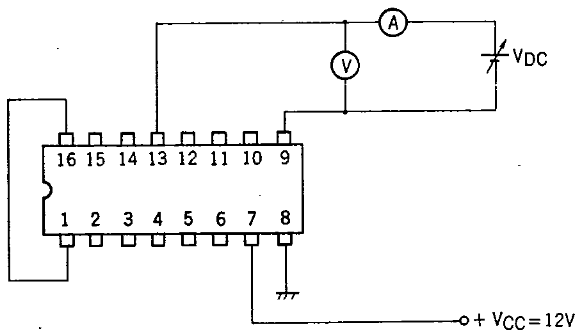


*Adjust SG frequency to obtain 1.4 to 1.5 V DC Voltage on NO. 10 pin, and then measure with oscilloscope.

TEST CIRCUIT－5 (V_{TN})

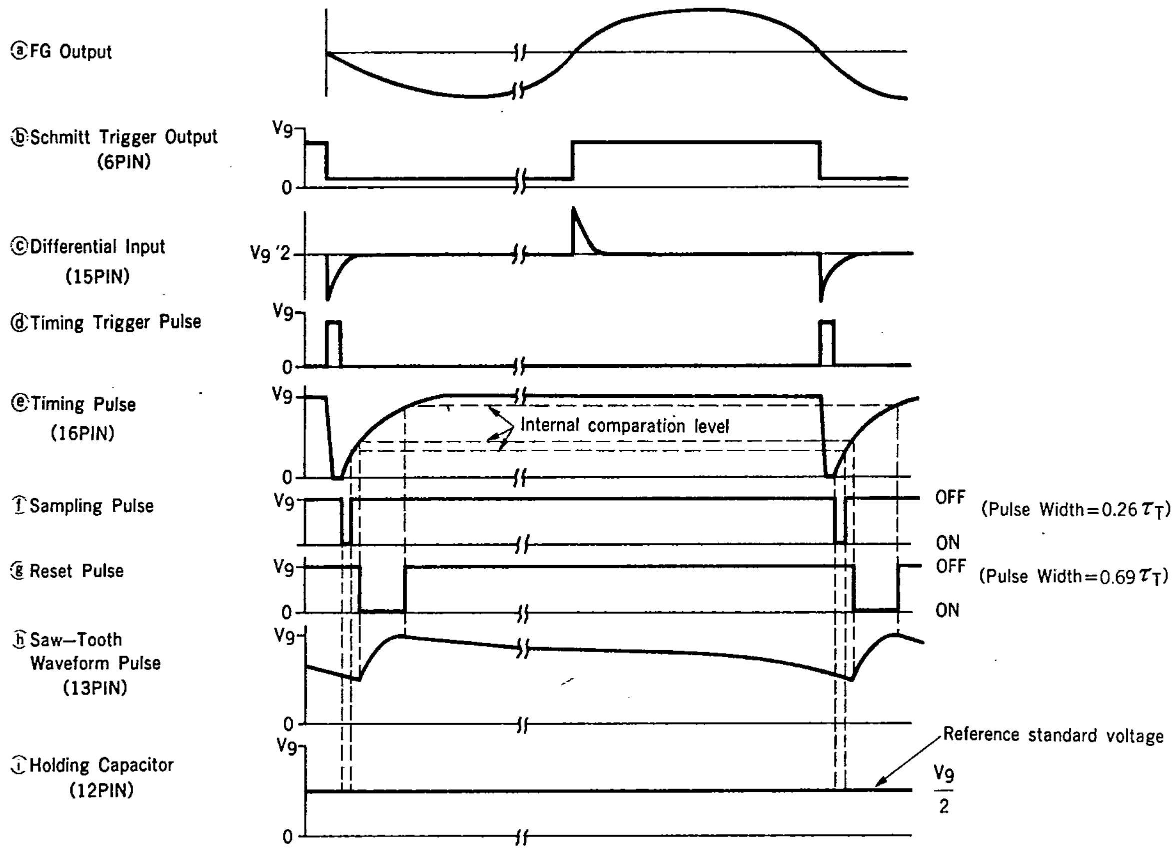


TEST CIRCUIT－6 ($R_{Q48\ ON}$)

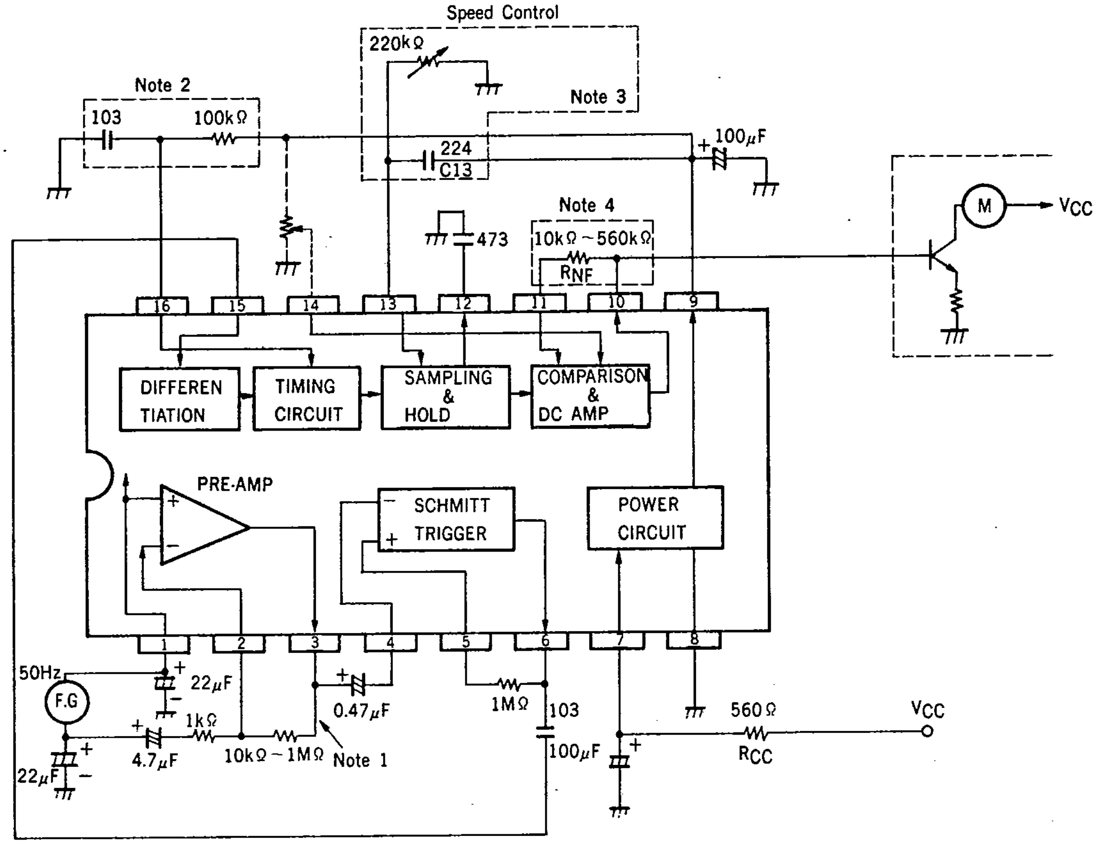


*Adjust V_{DC} to obtain voltage of 1.5 V between NO. 13 and NO. 9 pin, measure current. and calculate by V(1.5 V) A.

μPC1043C TIMING CHART



APPLICATION CIRCUIT



Note 1: Set preamplifier gain so that about 2 $V_{p\text{-}p}$ voltage is obtained here.

Note 2: Setting timing time constant τ_{16} on No. 16 pin.

$$\tau_{16} = \frac{1}{f_{ref}} \times 0.05 \cdots\cdots \text{(5 \% of FG period)}$$

Note 3: Setting time constant τ_{13} on No. 13 pin for waveform generator.

$$\tau_{13} = \frac{1}{f_{ref} \cdot -\ln 0.5} = C_{13} \cdot R_{13}$$

C_{13} can be obtained by the formula.

$$C_{13} \leq \frac{0.69 \cdot \tau 16}{3000}$$

Note 4: DC amplifier gain is determined as shown below.

$$A_v = \frac{R_{NF}}{6.8 \times 10^3}$$

$V_{CC} = 24$ V

Nippon Electric Co.,Ltd.
NEC Building, 33-1, Shiba Gochome, Minato-ku, Tokyo 108, Japan
Tel: Tokyo 454 – 1111
Telex Address: NECTOK J22686
Cable Address: MICROPHONE TOKYO

IC – 1408
JULY – 20 – 82M
Printed in Japan