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April 1st, 2010
Renesas Electronics Corporation

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BIPOLAR ANALOG INTEGRATED CIRCUIT

μ PC1246C

PREDRIVER FOR 3-PHASES DC BRUSHLESS MOTOR

DESCRIPTION

The μ PC1246C is silicon monolithic integrated circuit developed for predriver for 3 phases DC brushless motor.

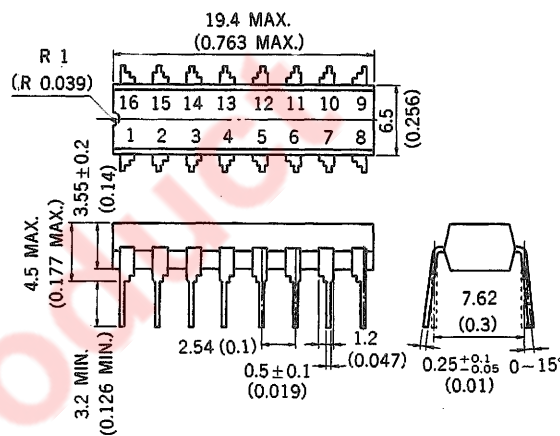
It includes comparators, current switch, rotatory direction switch and drivers in 1 chip. It inputs from hall elements.

FEATURES

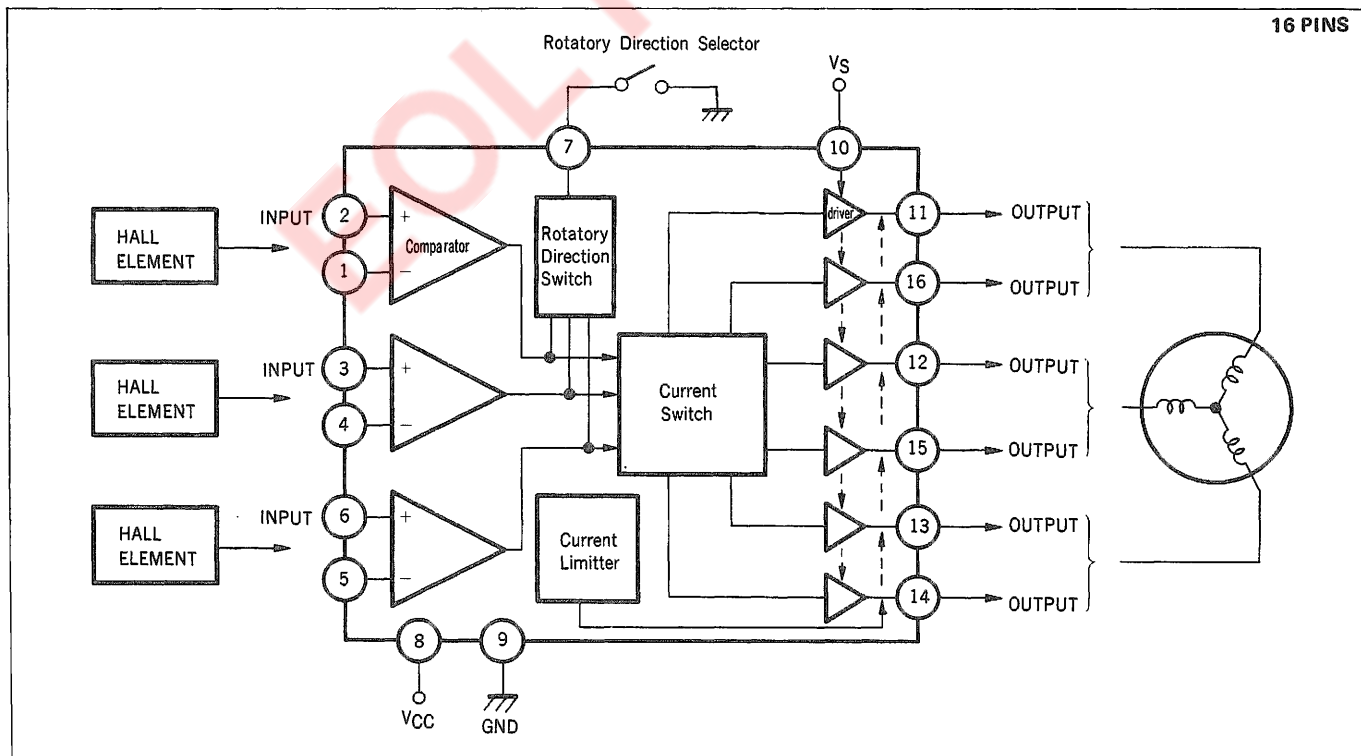
- Current switch.
- Forward/Reverse function.
- Small input/output phase error. $-5 \sim 5$ deg.
- Low current consumption. $I_{CC} = 4.5$ mA TYP.

PACKAGE DIMENSIONS

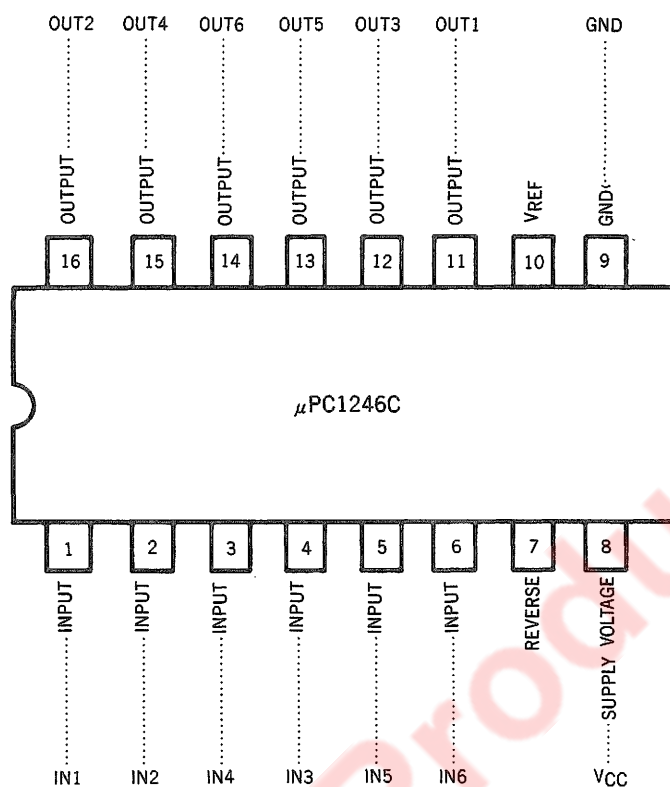
in millimeters (inches)



BLOCK DIAGRAM



CONNECTION DIAGRAM (Top View)

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

Supply Voltage	V_{CC}	18	V
Input Voltage to Differential Amp.	V_{ID}	5	V
Common Mode Input Voltage	V_{ICM}	0.3 to V_{CC}	V
Terminal Voltage to V_{REF}	V_{REF}	0 to V_{CC}	V
Reverse Terminal Voltage	V_{REV}	0 to V_{CC}	V
Power Dissipation	P_D $T_a = 70^\circ\text{C}$	390	mW
Operating Temperature	T_{opt}	-10 to 70	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to 125	$^\circ\text{C}$

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	9	12	15	V
Common Mode Input Voltage	V_{ICM}	1.5		$V_{CC}-1.5$	V
V_S -Output Current	V_S-I_O	Ref. Fig. 1 ~ 3 Within Area of Oblique Lines			

ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$, $V_{CC} = 12\text{ V}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Circuit Current	I_{CC}	2	4.5	7.5	mA	$V_{REF} = 0$
Input/Output Characteristics		-5	0	5	deg	
Input Offset Voltage	V_{OFF}	-4.2	0	4.2	mV	$V_{ICM} = 1.5$ to 10.5 V
Input Bias Current	I_B	—	50	600	nA	$V_{ICM} = 6\text{ V}$
Propagation Delay Time	T_{pd}	—	3	—	μs	$V_I = 5\text{ mV}$, $V_{REF} = 10\text{ V}$, $V_O = 9\text{ V}$
Output Voltage H (11, 12, 13 PIN)	V_{OH}	8.9	9.3	9.6	V	$V_{REF} = 10\text{ V}$, $R_L = 470\ \Omega$
Output Voltage L (14, 15, 16 PIN)	V_{OL}	8.2	8.6	9.0	V	$V_{REF} = 8\text{ V}$, $R_L = 470\ \Omega$
Output Leak Current	I_S	—	—	5	μA	Ref. PAGE 6, 8

Fig. 1 OUTPUT CURRENT vs. SERVO VOLTAGE

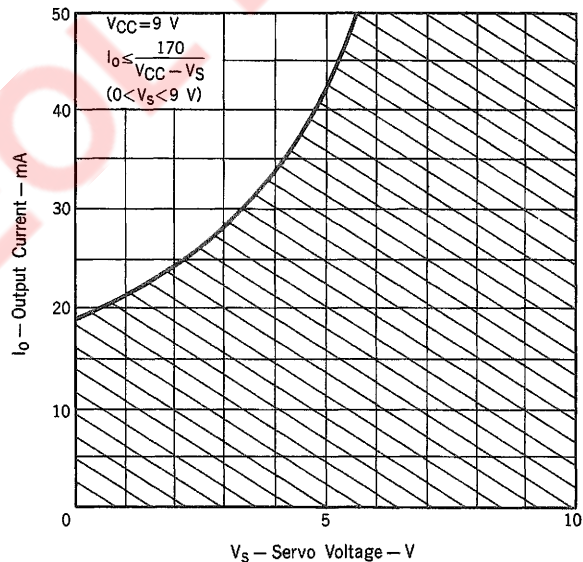


Fig. 2 OUTPUT CURRENT vs. SERVO VOLTAGE

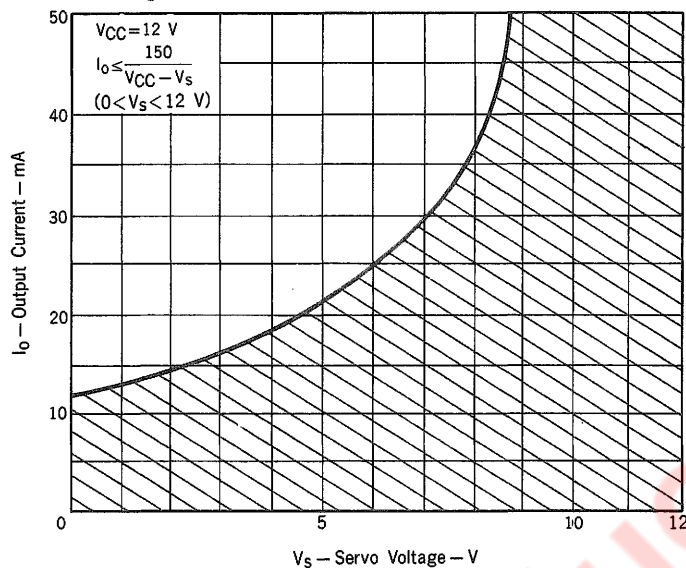
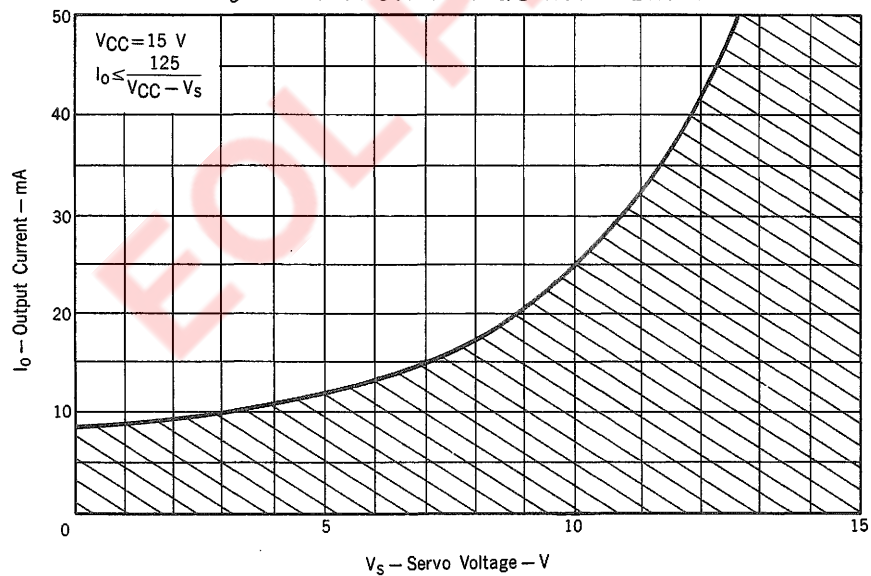
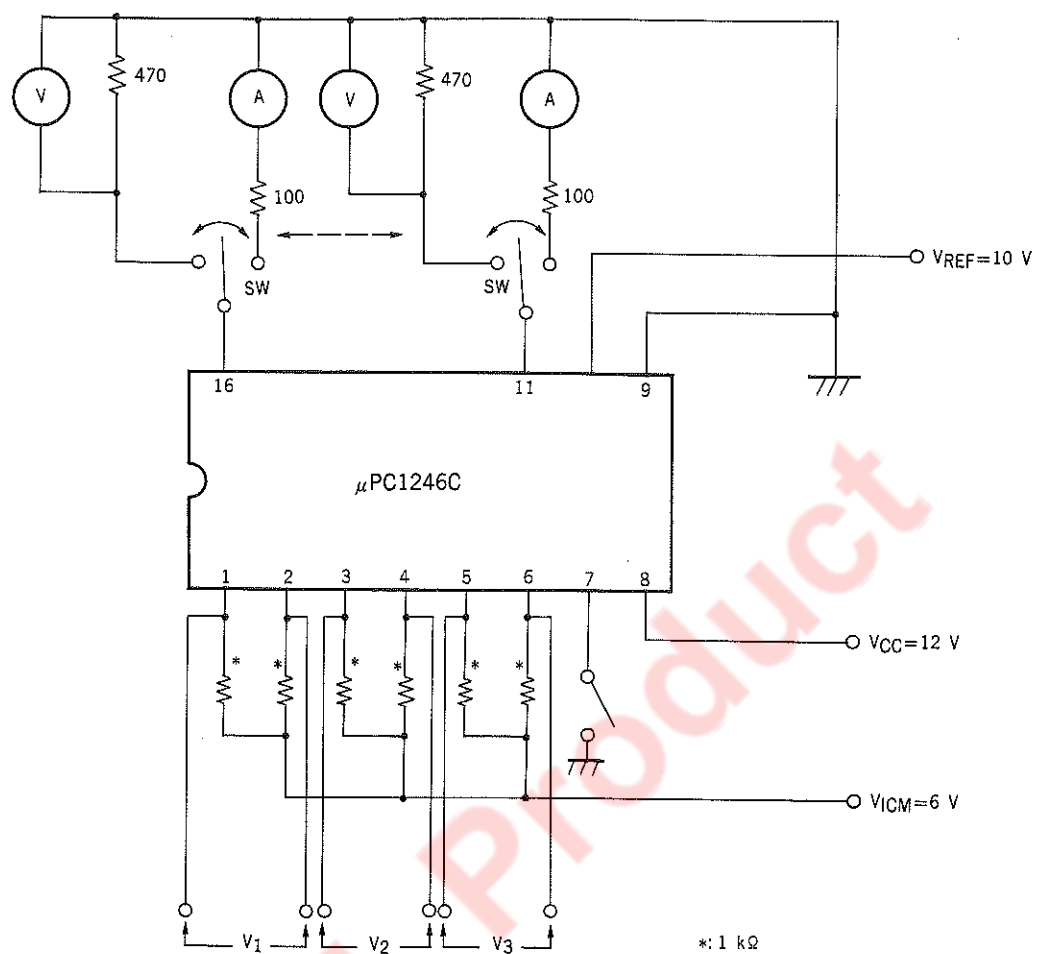


Fig. 3 OUTPUT CURRENT vs. SERVO VOLTAGE



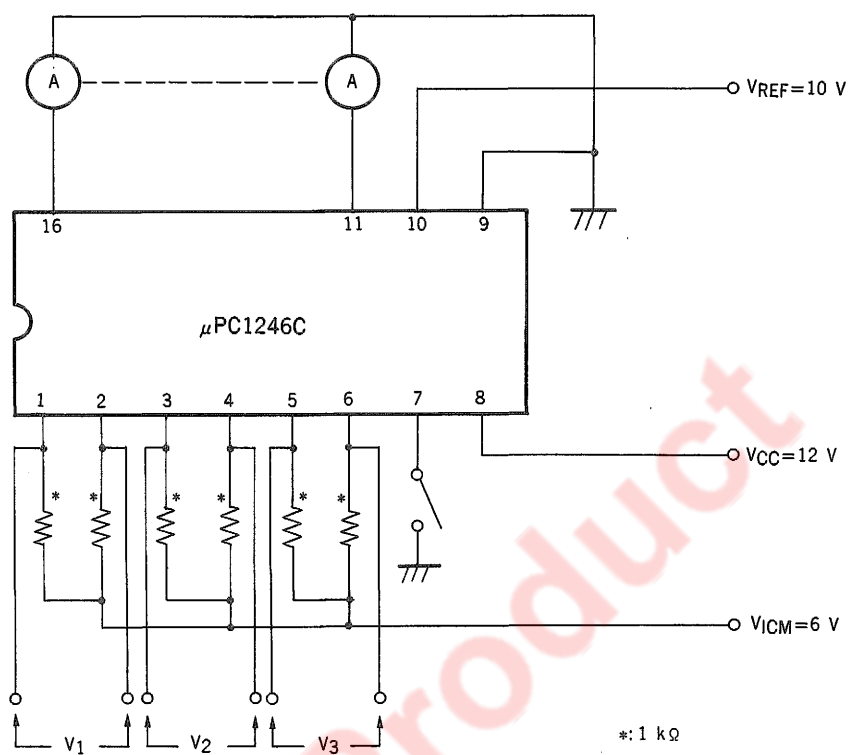
TEST CIRCUIT 1

- INPUT/OUTPUT CHARACTERISTIC
- PROPAGATION DELAY TIME



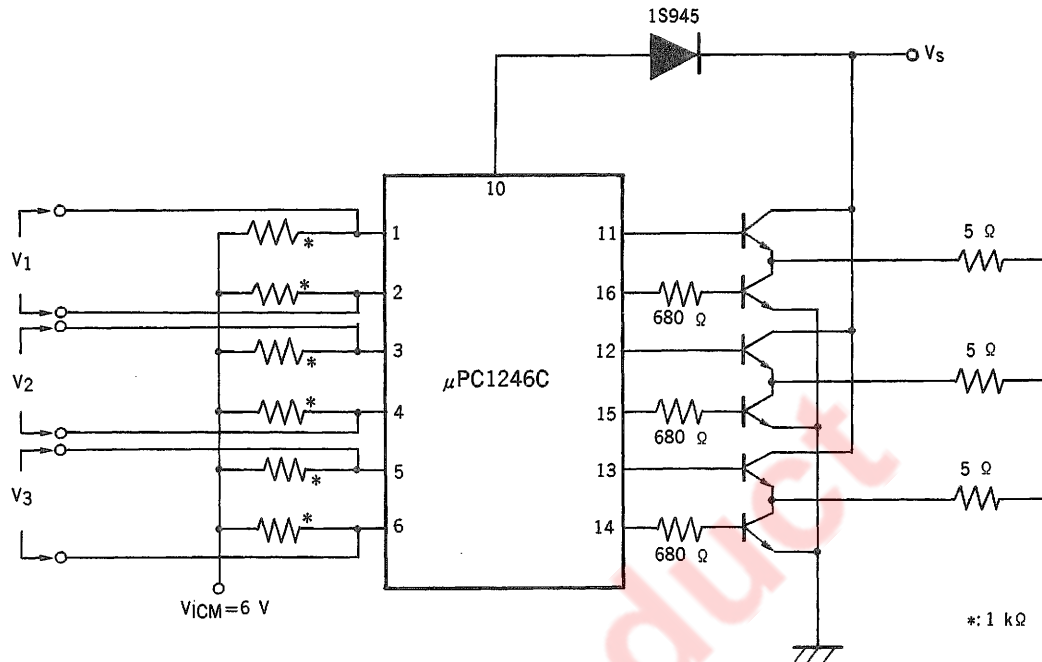
TEST CIRCUIT 2

- OUTPUT LEAKAGE CURRENT I_s

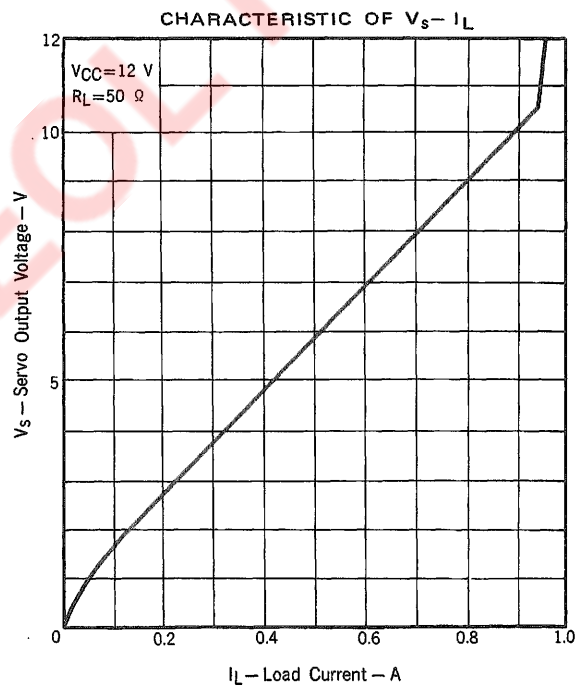


TEST CIRCUIT 3

- CHARACTERISTIC OF
SERVO VOLTAGE (V_s) – LOAD CURRENT (I_L)



Input Condition is as same as TABLE 1. (See PAGE8)



INPUT CONDITION FOR MEASUREMENT

• INPUT/OUTPUT CHARACTERISTIC

TABLE 1		IN CASE OF 7 PIN OPEN			IN CASE OF 7 PIN SHORT		
TERMINAL OF MEASUREMENT	INPUT CONDITION	V ₁	V ₂	V ₃	V ₁	V ₂	V ₃
11		V _L	V _H	/	V _H	V _L	/
12		/	V _L	V _H	/	V _H	V _L
13		V _H	/	V _L	V _L	/	V _H
14		V _L	/	V _H	V _H	/	V _L
15		/	V _H	V _L	/	V _L	V _H
16		V _H	V _L	/	V _L	V _H	/

INPUT LEVEL

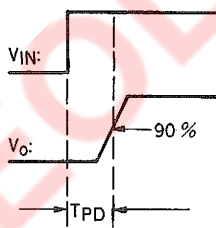
$$5 \text{ mV} \leq V_H \leq 50 \text{ mV} \quad \text{OR} \quad -50 \text{ mV} \leq V_L \leq 5 \text{ mV}$$

• PROPAGATION DELAY TIME

TABLE 2		IN CASE OF 7 PIN OPEN			IN CASE OF 7 PIN SHORT		
TERMINAL OF MEASUREMENT	INPUT CONDITION	V ₁	V ₂	V ₃	V ₁	V ₂	V ₃
11		V _{IN}	V _L	/	V _L	V _{IN}	/
12		/	V _{IN}	V _L	/	V _L	V _{IN}
13		V _L	/	V _{IN}	V _{IN}	/	V _L
14		V _{IN}	/	V _L	V _L	/	V _{IN}
15		/	V _L	V _{IN}	/	V _{IN}	V _L
16		V _L	V _{IN}	/	V _{IN}	V _L	/

INPUT LEVEL

$$V_{IN} = 5 \text{ mV}, f \leq 10 \text{ kHz}, \text{Duty } 50 \% \text{ PULSE WAVE } -50 \text{ mV} \leq V_L < -5 \text{ mV}$$



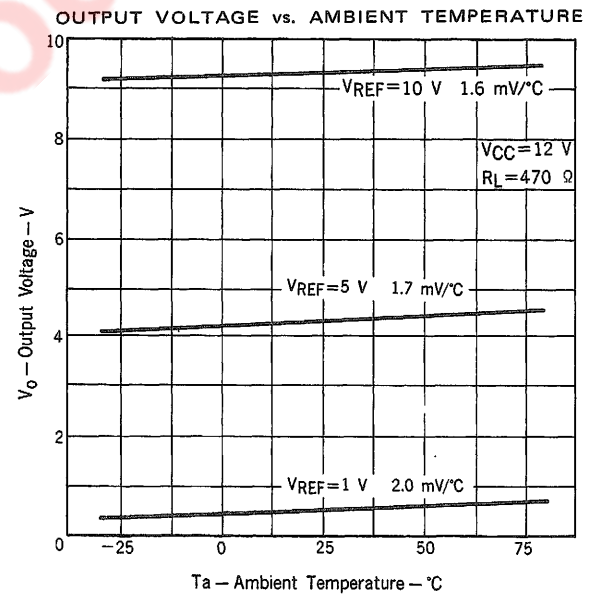
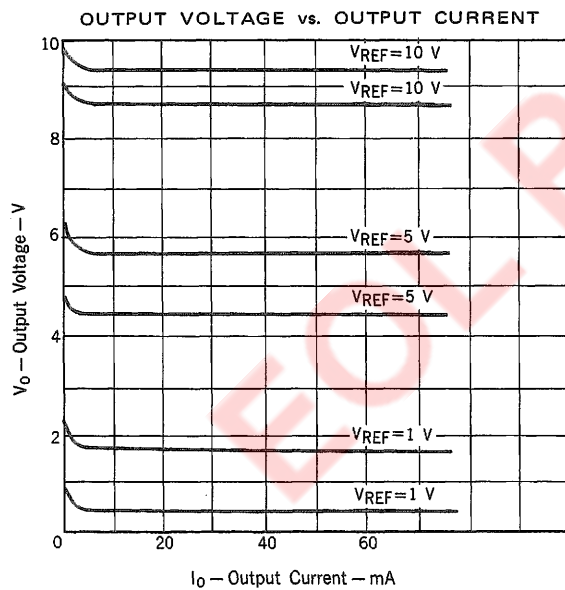
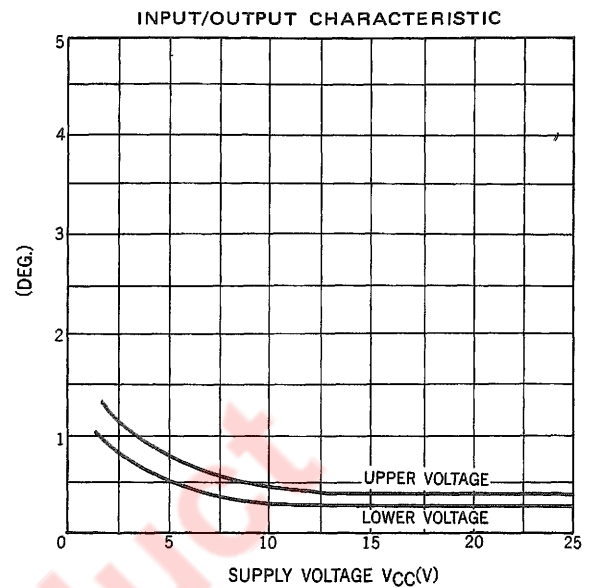
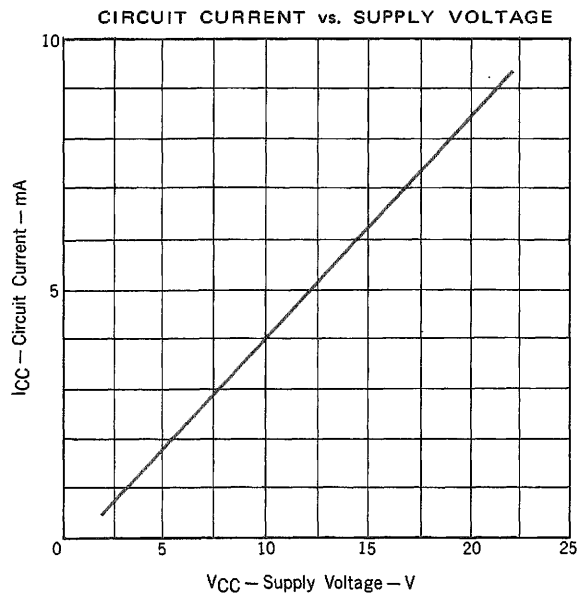
• OUTPUT LEAKAGE CURRENT I_S

INPUT CONDITION FOR MEASUREMENT

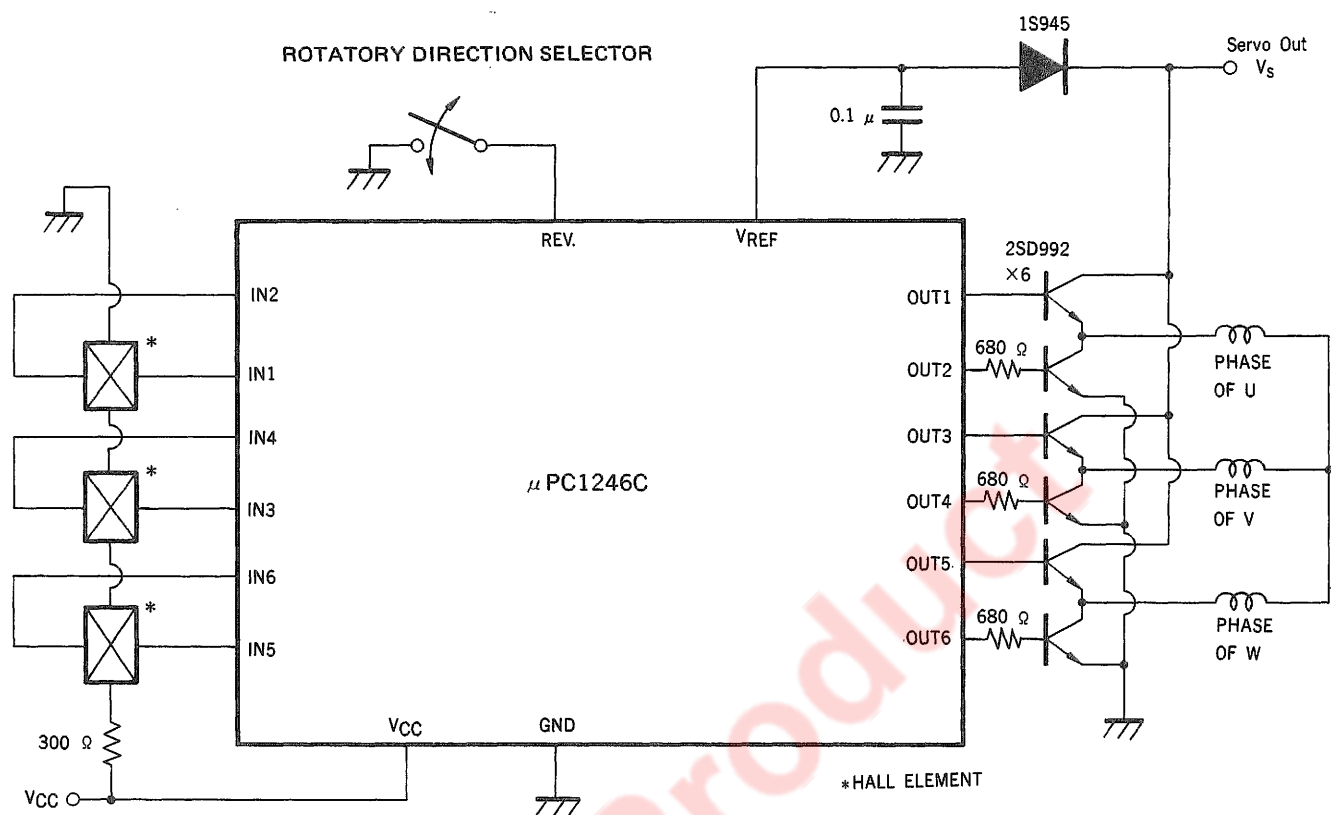
TABLE 3		IN CASE OF 7 PIN OPEN			IN CASE OF 7 PIN SHORT		
TERMINAL OF MEASUREMENT	INPUT CONDITION	V ₁	V ₂	V ₃	V ₁	V ₂	V ₃
11		V _H	V _L	/	V _L	V _H	/
12		/	V _H	V _L	/	V _L	V _H
13		V _L	/	V _H	V _H	/	V _L
14		V _H	/	V _L	V _L	/	V _H
15		/	V _L	V _H	/	V _H	V _L
16		V _L	V _H	/	V _H	V _L	/

INPUT LEVEL

$$-50 \text{ mV} \leq V_L \leq -5 \text{ mV}, 5 \text{ mV} \leq V_H \leq 50 \text{ mV}$$



APPLICATION

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