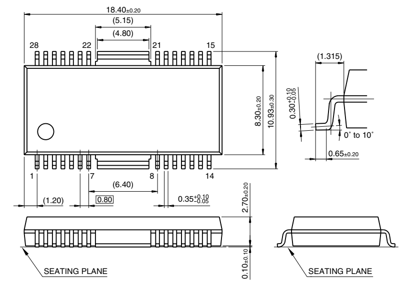
New

Stepping Motor Drive IC AN8495SB

■ Overview

AN8495SB is a stepping-motor-driving IC, created by using a D-MOS process, and provides a maximum output of 30V at 1.5A. By the PWM drive and 2-bit constant-current-chopping-drive method, the winding 1-2 phase drive is possible.

Unit:mm



HSOP042-P-0400

■ Features

- ● 4-phase input (W1-2 phase excitation)
- ● 2-bit current level switching.
- ● Built-in noise canceler.
- ● Built-in phase-change thru-current protection function.
- ● Built-in flywheel diode

■ Applications

● Printer ● FAX ● PPC

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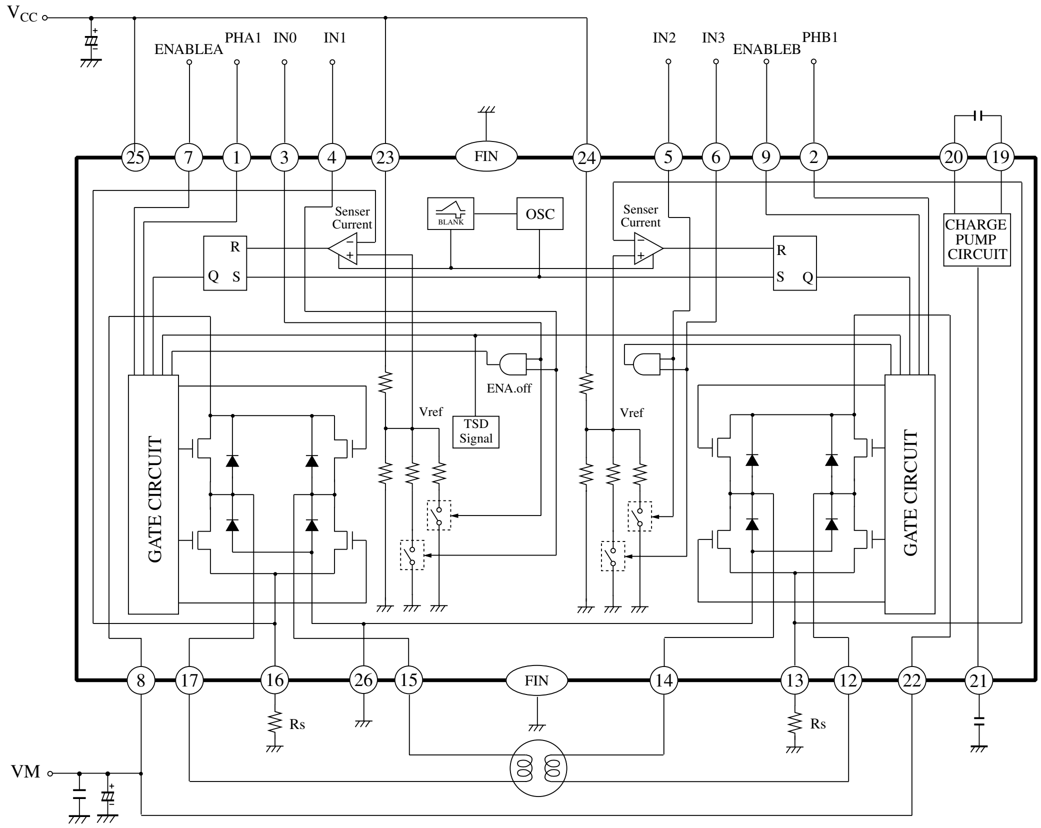
■ Block Diagram



* A voltage is applied externally to Terminals PHA1, PHB1, IN0 to 3, ENABLEA, ENABLEB, VREFA and VREFV, and may cause an overcurrent.
To protect the device from overcurrent, insert an overcurrent protective resistor (1KΩ or over).

■ Pin Description

Pin No.	Function		Pin No.	Function	
1	PHA1	A phase changeover terminal	16	RCSA	A phase current detector
2	PHB1	B phase changeover terminal	17	AOUT1	Motor drive A phase output 1
3	IN0	A phase output torque control 1	18	N.C	—
4	IN1	A phase output torque control 2	19	BC1	Capacitor for charge pump circuit 1
5	IN2	B phase output torque control 1	20	BC2	Capacitor for charge pump circuit 2
6	IN3	B phase output torque control 2	21	VPUMP	Charge pump circuit output
7	ENABLEA	A phase start/stop signal input	22	VM2	Supply terminal for Motor 2
8	VM1	Supply terminal for Motor 1	23	VREFA	A phase torque ref. voltage input
9	ENABLEB	B phase start/stop signal input	24	VREFB	B phase torque ref. voltage input
10	N.C	—	25	VCC	Supply terminal
11	N.C	—	26	GND	Signal GND
12	BOUT2	Motor drive B phase output 2	27	N.C	—
13	RCSB	B phase current detector	28	N.C	—
14	BOUT1	Motor drive B phase output 1	FIN	GND	Signal GND
15	AOUT2	Motor drive A phase output 2			

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit	Note
Storage temperature	T_{stg}	-55 to +150	°C	1
Operating ambient temperature	T_{opr}	-20 to +70	°C	1
Supply voltage	V_{CC}	7.0	V	
Supply current	I_{CC}	30	mA	
Power dissipation	P_D	1.04	W	2
Motor supply voltage	V_{M1}/V_{M2}	30	V	Pin=8,22
Output voltage	V_{OUT}	30	V	Pin=12,14 15,17
Motor drive current	I_{OUT}	±1.5	A	
Flyhoile diode current	I_f	1.5	A	
Charge pump circuit voltage	V_{PUMP}	40	V	Pin=21

Note 1) Ta=25°C except storage temperature and operating ambient temperature.

Note 2) Power dissipation shows the value of only package at Ta=70°C.

■ Recommended Operating Range

Operating supply voltage range	V_{CC}	4.75 V to 5.25 V
	V_M	18.0 V to 28.0 V

■ Electrical Characteristics (Ta = 25 °C ± 2 °C, V_{CC} =5.0 V, V_M = 24 V)

Parameter	Symbol	Condition	min	typ	max	Unit
Power block						
Output saturation voltage H	V_{OH}	I = -1.0 A	V_M-0.75	V_M-0.5	—	V
Output saturation voltage L	V_{OL}	I = 1.0 A	—	0.65	0.98	V
Flywheel diode forward voltage	V_{DI}	I = 1.0 A	0.5	1.0	1.5	V
Output leak current 1	I_{LEAK1}	V_{OUT} = 30 V, V_{RCS} = 0 V	—	10	50	µA
Circuit current						
Supply current (2-circuit ON)	I_{CC}	ENABLEA=ENABLEB= 0 V	—	5	9.5	mA
I/O block						
IN "H" input voltage	V_{INH}		2.0	—	V_{CC}	V
IN "L" input voltage	V_{INL}		GND	—	0.6	V
IN "H" input current	I_{INH}	V_{IN} = 5 V	-10	0	10	µA
IN "L" input current	I_{INL}	V_{IN} = 0 V	-80	-40	-20	µA
PHA1,PHB1 "H" input voltage	$V_{PHAH/PHBH}$		2.0	—	V_{CC}	V
PHA1,PHB1 "L" input voltage	$V_{PHAL/PHBL}$		GND	—	0.6	V
PHA1,PHB1 "H" input current	$I_{PHAH/PHBH}$	PHA1 = PHB1 = 5 V	-10	0	10	µA
PHA1,PHB1 "L" input current	$I_{PHAL/PHBL}$	PHA1 = PHB1 = 0 V	-150	-100	-50	µA

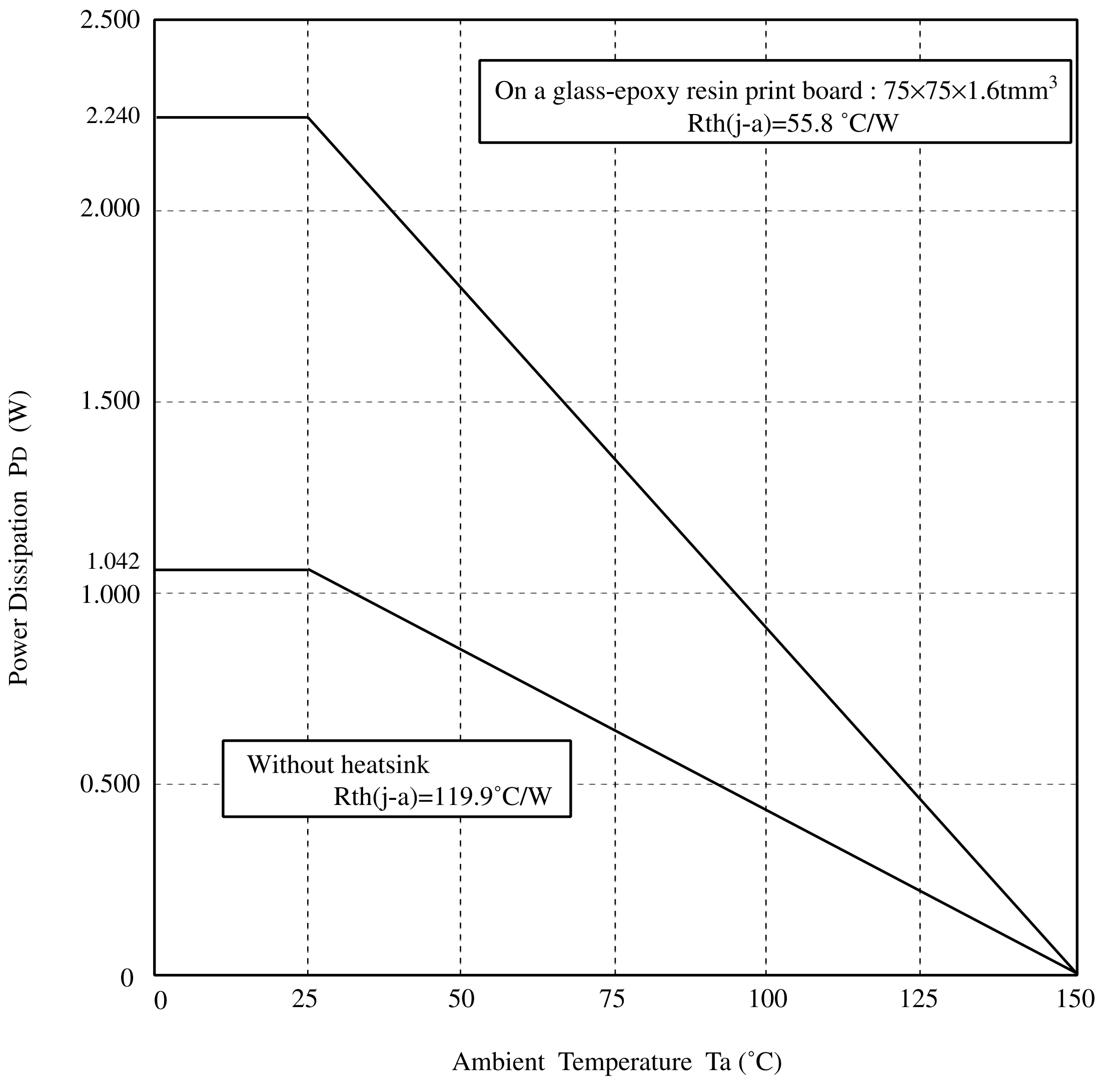
■ Electrical Characteristics (Ta = 25 °C ± 2 °C, V_{CC} = 5.0 V, V_M = 24 V)

Parameter	Symbol	Condition	min	typ	max	Unit
I/O block (continue)						
ENABLEA,ENABLEB "H" input voltage	$V_{ENABLEAH}$ $V_{ENABLEBH}$		2.0	—	V_{CC}	V
ENABLEA,ENABLEB "L" input voltage	$V_{ENABLEAL}$ $V_{ENABLEBL}$		GND	—	0.6	V
ENABLEA,ENABLEB "H" input current	$I_{ENABLEAH}$ $I_{ENABLEBH}$	ENABLEA = ENABLEB = 5 V	-10	0	10	μA
ENABLEA,ENABLEB "L" input current	$I_{ENABLEAL}$ $I_{ENABLEBL}$	ENABLEA = ENABLEB = 0 V	-15	-2	15	μA
Control block						
Input bias current	$I_{REFA/REFB}$	V_{REFA} = V_{REFB} = 5 V	67	90	150	μA
PWM frequency	f_{PWM}		50.2	67	83.8	kHz
Pulse blanking time	T_B	V_{REFA} = V_{REFB} = 0 V	1.0	2.0	3.0	μs
Comparator threshold H(100%)	VT_H	IN0=IN1=0 V,IN2=IN3=0 V	0.479	0.503	0.528	V
Comparator threshold C(67%)	VT_C	IN0=5V,IN1=0V,IN2=5V,IN3=0V	0.305	0.330	0.356	V
Comparator threshold L(33%)	VT_L	IN0=0V,IN1=5V,IN2=0V,IN3=5V	0.151	0.167	0.185	V

■ Electrical Characteristics (Reference Data for Designing)

Parameter	Symbol	Condition	min	typ	max	Unit
Output block						
Output slew rate 1	VT_r	Rise time	—	240	—	V/μs
Output slew rate 2	VT_f	Fall time	—	-240	—	V/μs
Dead time	T_D		—	1.5	—	μs
Thermal shutdown						
Thermal shutdown temperature	TSD_{on}		—	150	—	°C
Thermal shutdown hysteresis	ΔTSD		—	36	—	°C

■ Package Dissipation



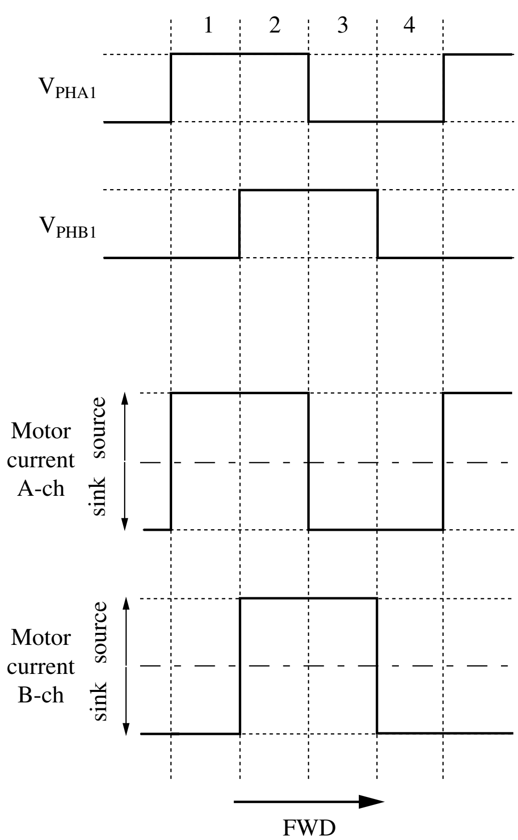
■ Logic Table

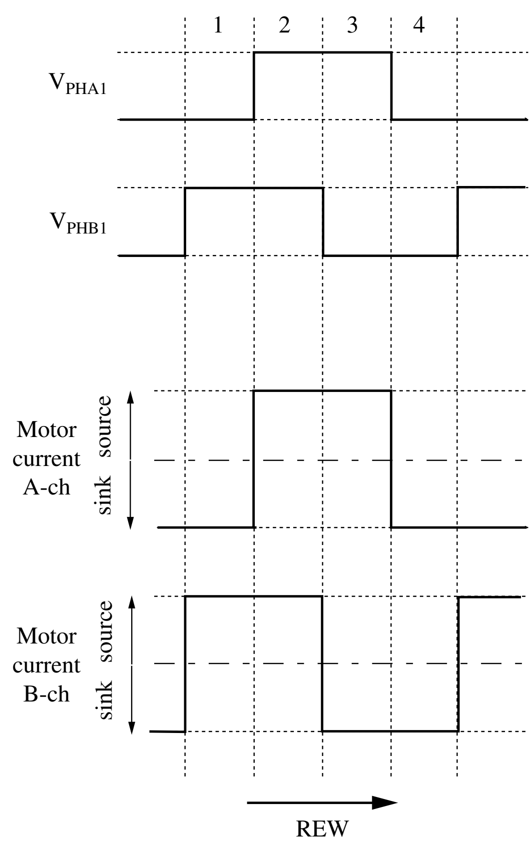
ENABLEA/B	PHA1/PHB1	AOUT1/BOUT1	AOUT2/BOUT2
L	H	H	L
L	L	L	H
H	-	OFF	OFF

IN0/IN2	IN1/IN3	Output current
L	L	Vref/(10 × Rs) = Iout
H	L	Vref/(15 × Rs) = Iout × 2/3
L	H	Vref/(30 × Rs) = Iout × 1/3
H	H	0

■ Full Step (4 step sequence)

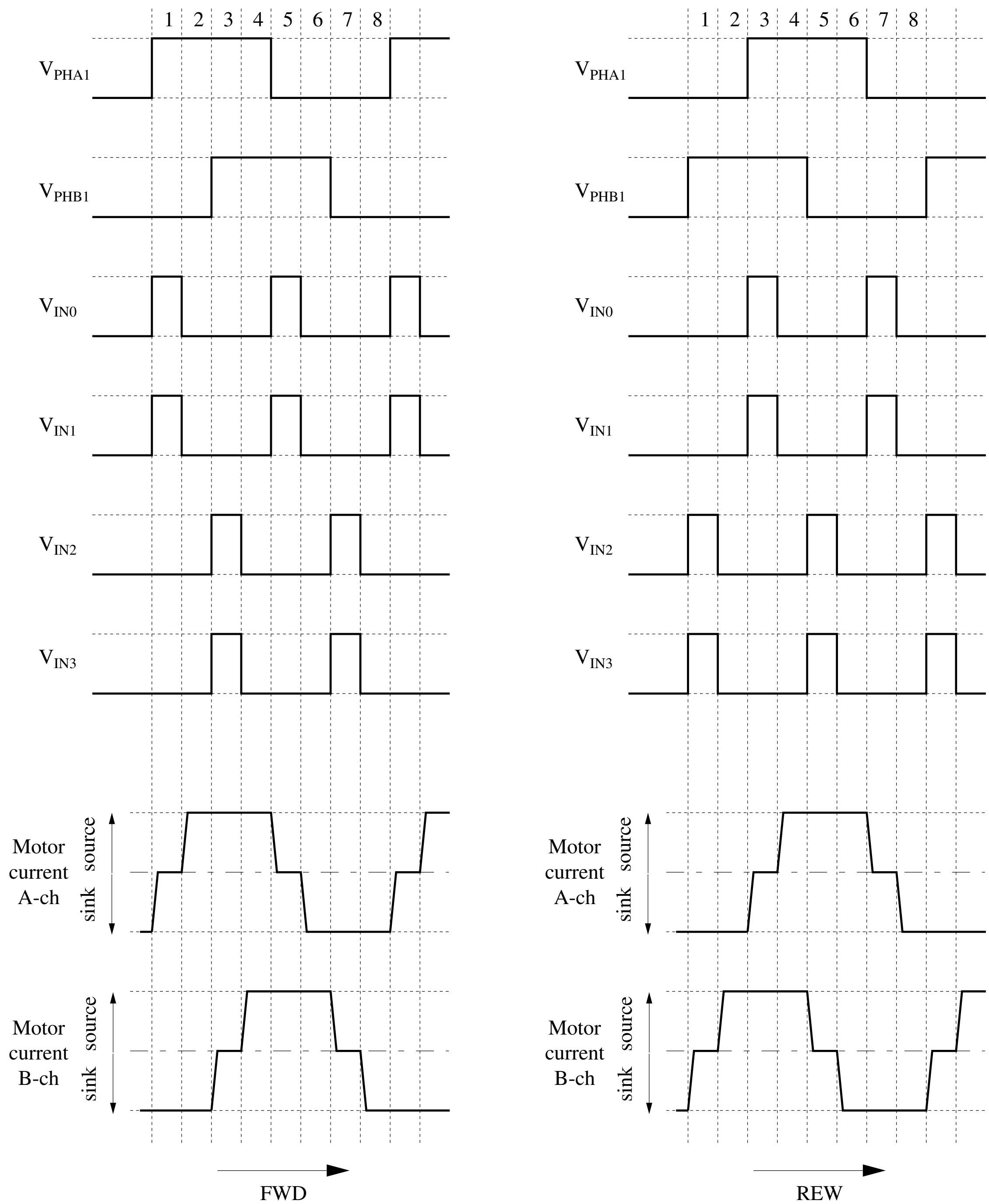
(IN0 to IN3 = const.)



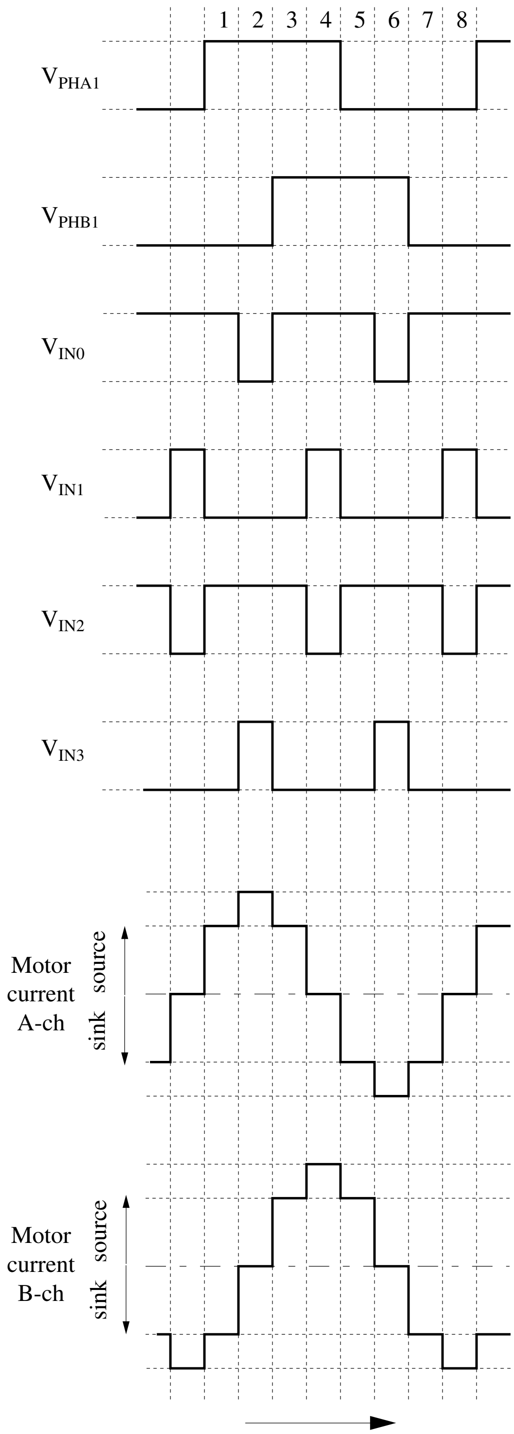


■ Half Step (8 step sequence)

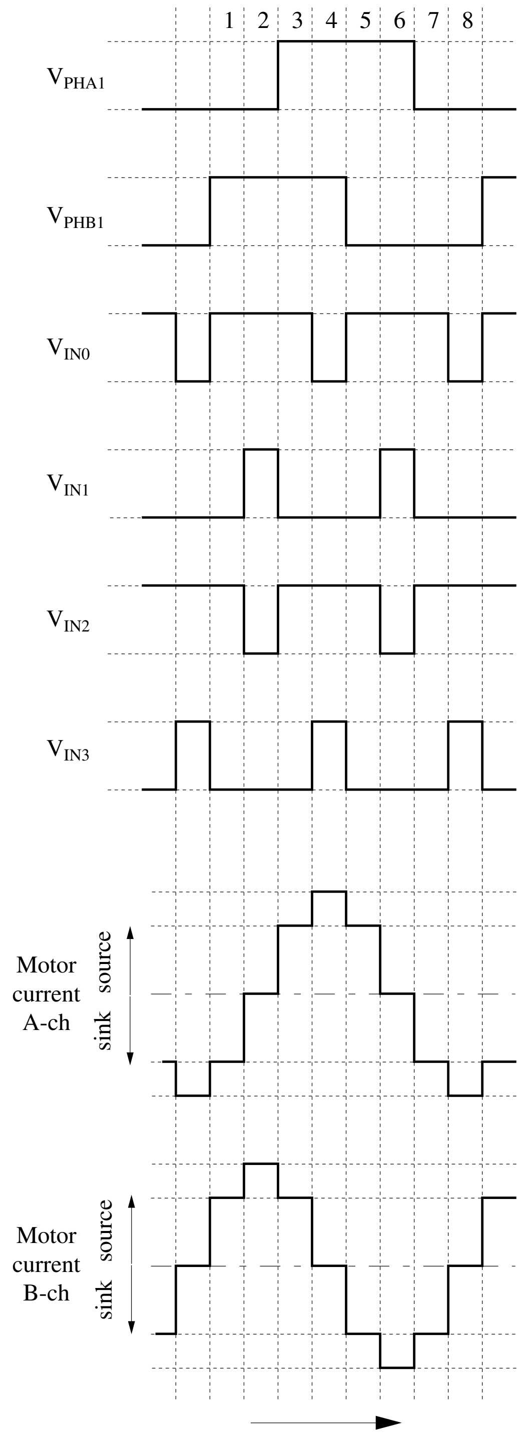
(EX.)



■ 1-2 Phase Excitation (8 step sequence)

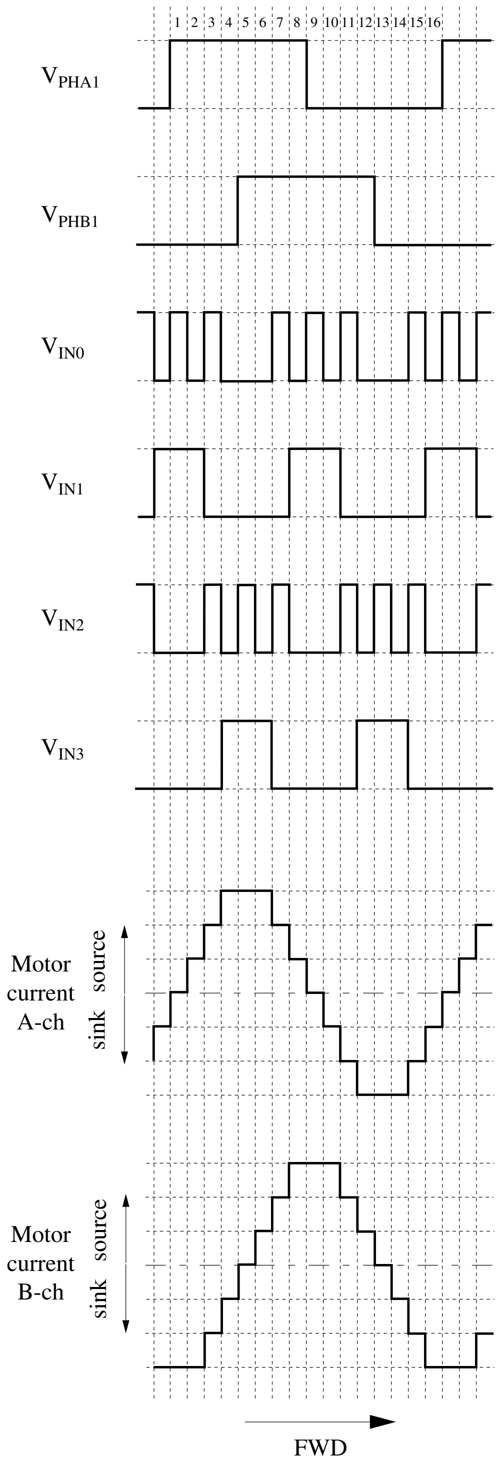


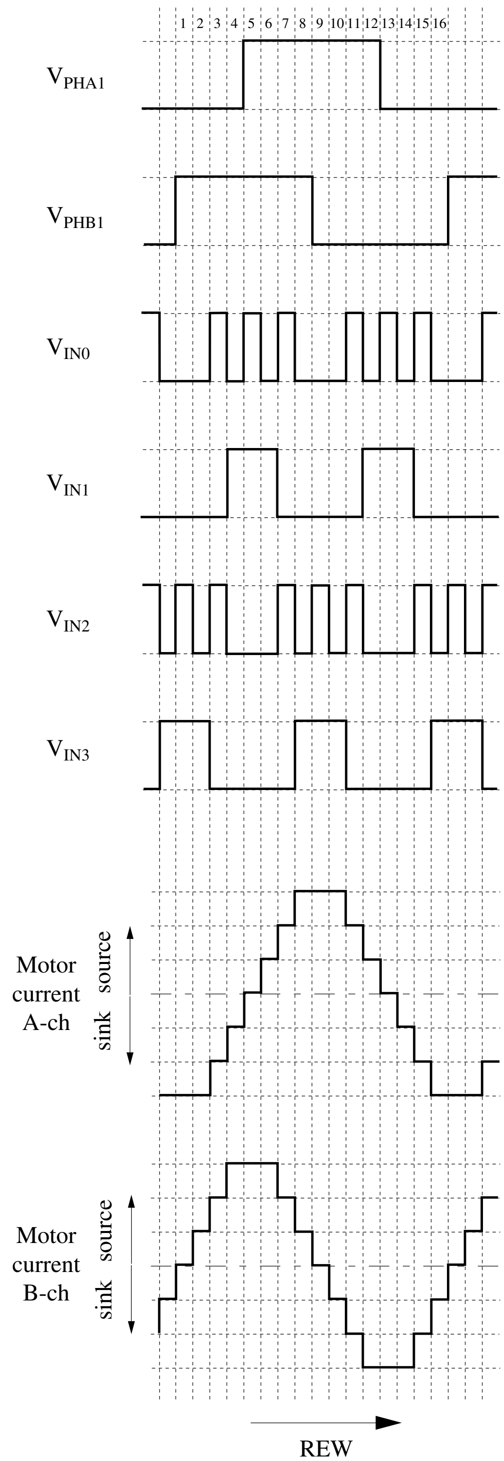
FWD



REW

■ W1-2 Phase Excitation (16 step sequence)





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