

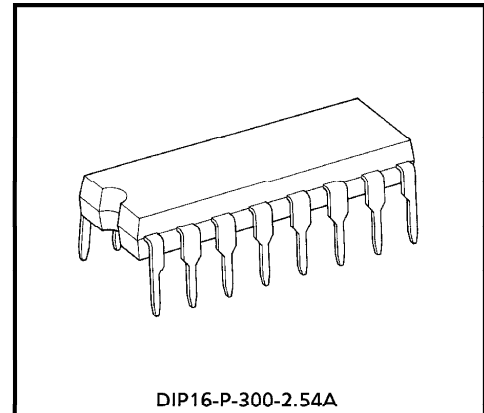
TA8415P

STEPPING MOTOR CONTROLLER / DRIVER

The TA8415P is general purpose unipolar stepping motor controller/driver, applicable to 3/4 phase motors and 1, 1-2, 2 phase excitation drive by initial setting of control terminals.

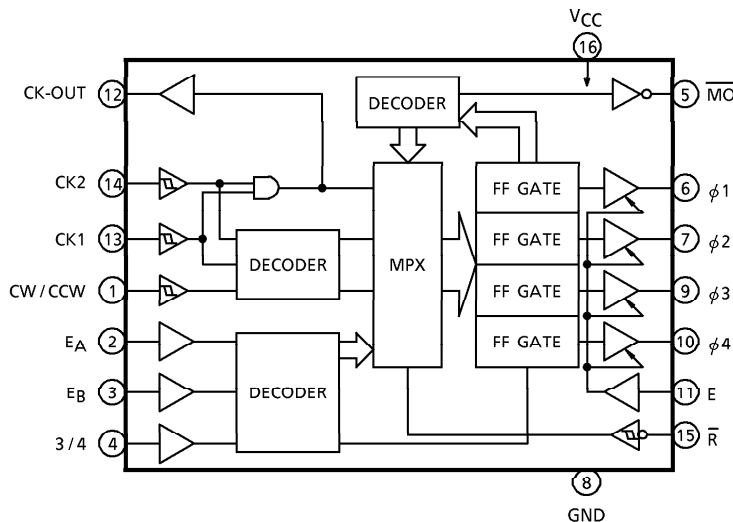
FEATURES

- 1 chip stepping motor controller / driver.
- 3 or 4 phase and 1, 1-2, 2 phase excitation drive are available.
- CW/CCW rotation and 1 clock or 2 clock drive are available.
- Hysteresis is provided with clock, CW/CCW, reset inputs for noise protection.
- Output enable, initial detect are available.
- Output current up to 400mA (MAX.)



Weight : 1.11g (Typ.)

BLOCK DIAGRAM



961001EBA2

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PIN FUNCTION

PIN No.	SYMBOL	PIN NAME	FUNCTIONAL DESCRIPTION	
1	CW / CCW	Clock Wise / Counter Clock Wise	Direction Control Input Function Table A	
2	E _A	Excitation A	Phase Excitation Mode Input	Truth Table B
3	E _B	Excitation B		
4	3 / 4	3 Phases / 4 Phases	Phase Control Input	
5	\overline{MO}	Monitor Out	$\overline{MO} = "L"$ at Initial State	
6	$\phi 1$	$\phi 1$ Out	$\phi 1$ Output	
7	$\phi 2$	$\phi 2$ Out	$\phi 2$ Output	
8	GND	GND	GND	
9	$\phi 3$	$\phi 3$ Out	$\phi 3$ Output	
10	$\phi 4$	$\phi 4$ Out	$\phi 4$ Output	
11	E	Output Enable	Outputs are Enable at E = "H"	
12	CK-OUT	Clock-Out	Clock Output	
13	CK1	Clock I _n -1	Clock Input 1	Truth Table A
14	CK2	Clock I _n -2	Clock Input 2	
15	\overline{R}	Reset	Reset Input	
16	V _{CC}	V _{CC}	V _{CC}	

TRUTH TABLE A

CK1	CK2	CW / CCW	FUNCTION
	H	L	CW
	L	L	Inhibit
H		L	CCW
L		L	Inhibit
	H	H	CCW
	L	H	Inhibit
H		H	CW
L		H	Inhibit

TRUTH TABLE B

E _A	E _B	3 / 4 (Note)	FUNCTION	
L	L	L	4 Phases	1 Phase Excitation
H	L	L		2 Phase Excitation
L	H	L		1-2 Phase Excitation
H	H	L	Test Mode $\phi 1 \sim \phi 4$ ON	
L	L	H	3 Phases	1 Phase Excitation
H	L	H		2 Phase Excitation
L	H	H		1-2 Phase Excitation
H	H	H	Test Mode $\phi 1 \sim \phi 4$ ON	

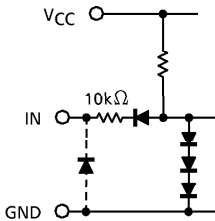
(Note) Conversion of Phase Excitation Mode must be made after the Reset Mode is established.

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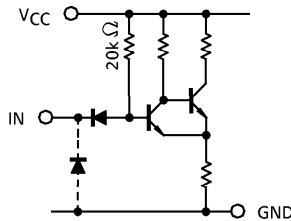
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SCHEMATIC OF INPUTS AND OUTPUTS

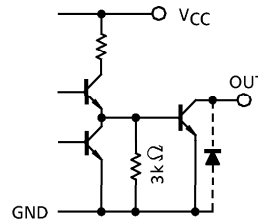
$E_A, E_B, 3/4, E$



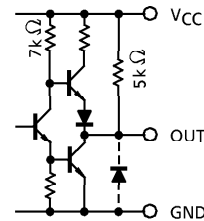
$CK1, CK2, CW/CCW, \bar{R}$



$\phi 1 \sim \phi 4$



$\bar{MO}, CK\text{-OUT}$



MAXIMUM RATINGS (Ta = 25°C Unless otherwise noted)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{CC}	- 0.3~7.0	V
Output Sustaining Voltage	V _{CE (SUS)} ϕ	- 0.3~28	V
Output Current (ϕn)	I _{OUT} ϕ	400	mA
Output Current ($\bar{MO}, CK\text{-OUT}$)	I _{OUT} \bar{MO} CK-OUT	10	mA
Input Voltage	V _{IN}	- 0.3~V _{CC} + 0.3	V
Input Current	I _{IN}	± 1	mA
Power Dissipation	P _D	1.2	W
Operating Temperature	T _{opr}	- 30~85	°C
Storage Temperature	T _{stg}	- 55~150	°C

RECOMMENDED OPERATING CONDITIONS (Ta = - 30~85°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V _{CC}	—	4.5	5.0	5.5	V
Output Sustaining Voltage	V _{CE (SUS)} ϕ	—	0	—	26	V
Output Current ϕn	"L" Level I _{OUT} ϕ	—	—	—	200	mA
Output Current MO, CK-OUT	"H" Level I _{OH}	—	—	—	- 0.4	mA
	"L" Level I _{OL}	—	—	—	8	
Input Voltage	V _{IN}	—	0	—	V _{CC}	V
Clock Frequency	f _{CLOCK}	—	0	—	100	kHz
Power Dissipation	P _D	—	—	—	0.6	W

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

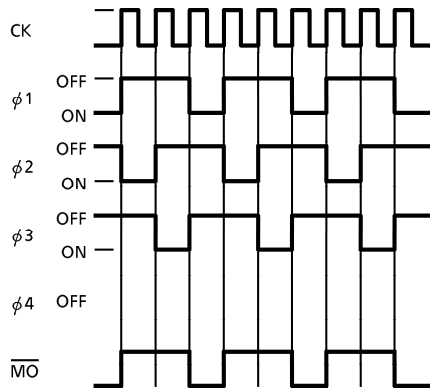
CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Voltage	"H" Level	V _{IH}	—	—	2.0	—	—	V
	"L" Level	V _{IL}	—	—	—	—	0.8	
Input Current	"H" Level	I _{IH}	—	V _{CC} = 5.5V, V _{IH} = 5.5V	—	—	10	μA
	"L" Level	I _{IL}	—	V _{CC} = 5.5V, V _{IL} = 0.4V	—	—	-0.4	mA
Hysteresis		ΔV _T	—	—	—	150	—	mV
Supply Current		I _{CC}	—	—	—	—	100	mA
Output Leakage Current φ _n		I _{OHφ}	—	V _{CC} = 5.5V, V _{OUT} = 26V	—	—	100	μA
Output Voltage	"H" Level	M _O CK-OUT	—	V _{CC} = 4.5V, I _{OH} = -0.4mA	2.4	—	—	V
				V _{CC} = 5.0V, I _{OH} = -10μA	4.0	—	—	
	"L" Level	M _O CK-OUT	—	V _{CC} = 4.5V, I _{OL} = 8mA	—	—	0.4	
		φ _n		V _{OUTφ}	—	V _{CC} = 4.5V, I _{OUT} = 400mA t = 100ms	—	
			—	V _{CC} = 4.5V, I _{OUT} = 200mA t = 100ms	—	—	0.6	

SWITCHING CHARACTERISTICS (Ta = 25°C)

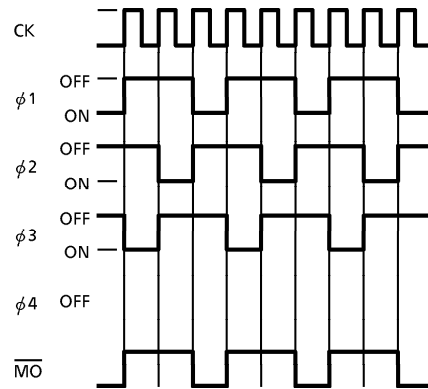
CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Propagation Delay Time	"H" Level	CK-φ _n	—	—	—	2.0	—	μs
		CK-CK-OUT			—	1.0	—	
		CK-M _O			—	2.8	—	
		E-φ _n			—	1.0	—	
		R-φ _n			—	2.0	—	
	"L" Level	CK-φ _n	—	—	—	1.4	—	
		CK-CK-OUT			—	0.7	—	
		CK-M _O			—	2.1	—	
		E-φ _n			—	1.2	—	
		R-φ _n			—	1.0	—	
	R-M _O	—	2.0	—				
Maximum Clock Frequency		f _{max}	—	—	—	250	—	kHz
Set Up Time CK, CW/CCW		t _{set-up}	—	—	—	0.1	—	
Hold Time CK, CW/CCW		t _{hold}	—	—	—	0.1	—	
Minimum Clock Pulse Width		t _w (CK)	—	—	—	1.0	—	
Minimum Reset Pulse Width		t _w (R)	—	—	—	1.0	—	
Maximum Clock Rise Time		t _r (CK)	—	—	—	10	—	

TIMING CHART
3 PHASES METHOD

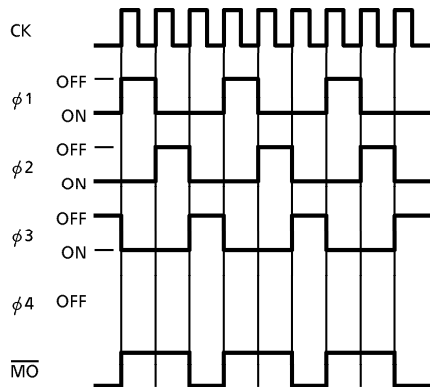
1 PHASE EXCITATION CW



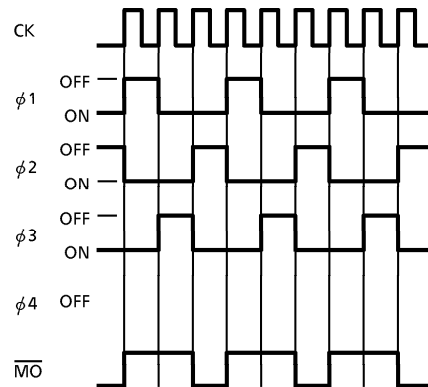
1 PHASE EXCITATION CCW



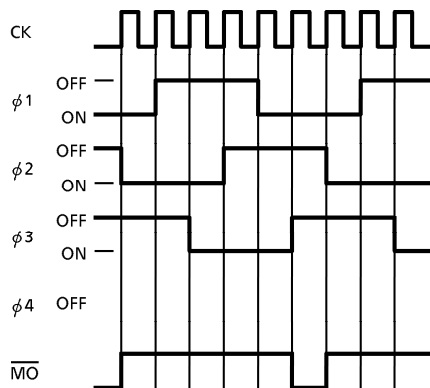
2 PHASE EXCITATION CW



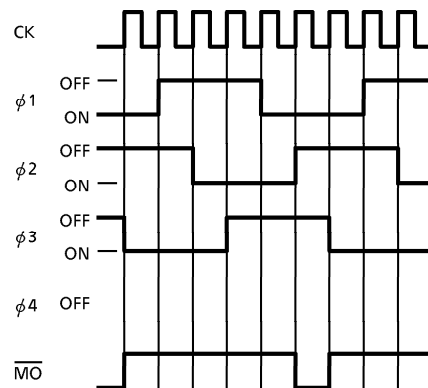
2 PHASE EXCITATION CCW



1-2 PHASE EXCITATION CW

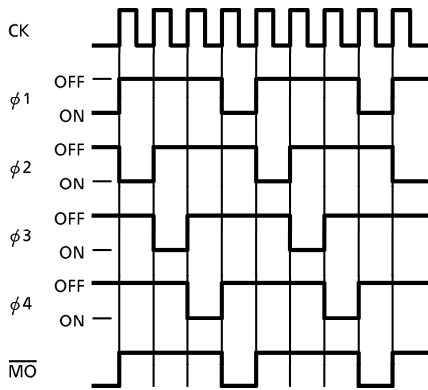


1-2 PHASE EXCITATION CCW

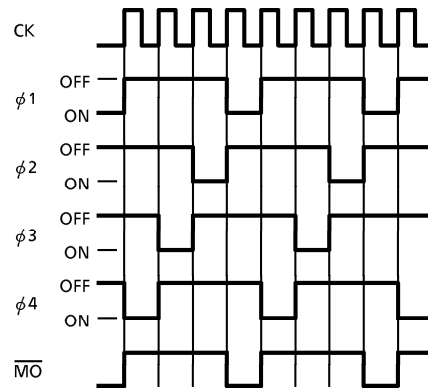


4 PHASES METHOD

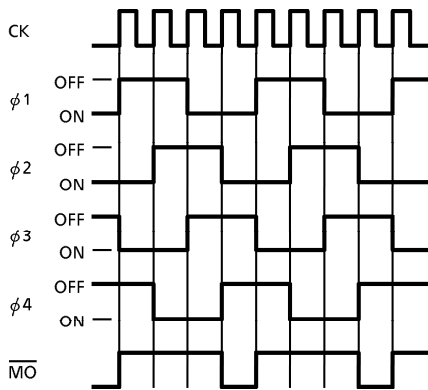
1 PHASE EXCITATION CW



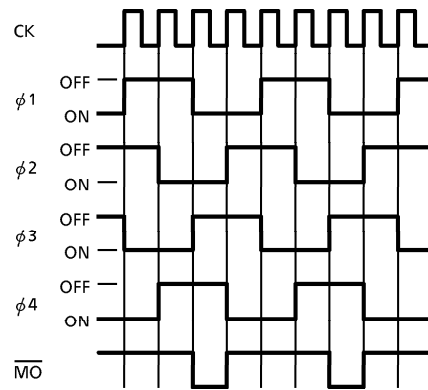
1 PHASE EXCITATION CCW



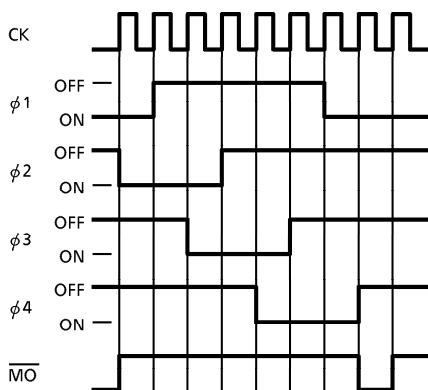
2 PHASE EXCITATION CW



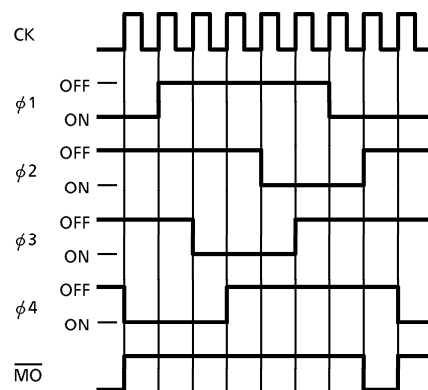
2 PHASE EXCITATION CCW

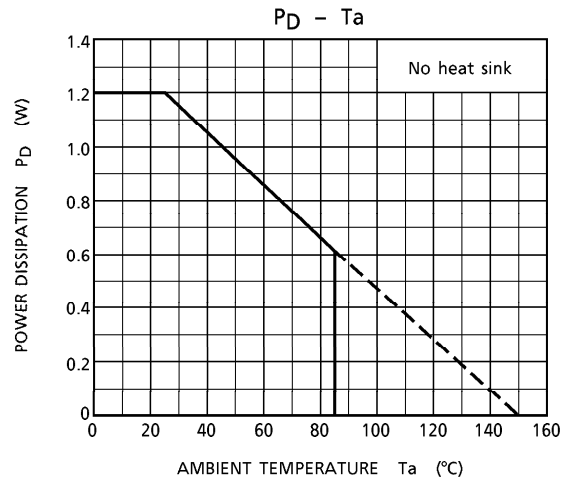
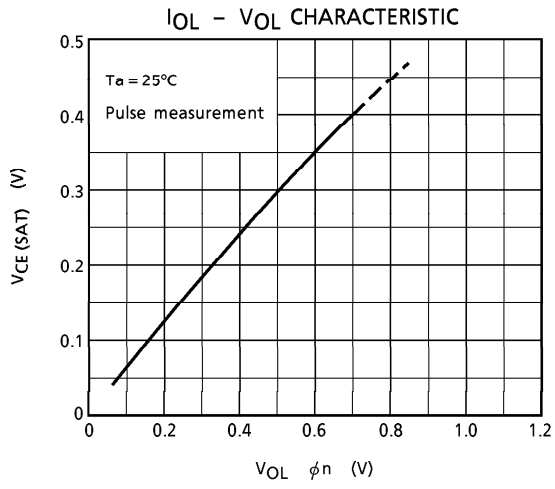


1-2 PHASE EXCITATION CW



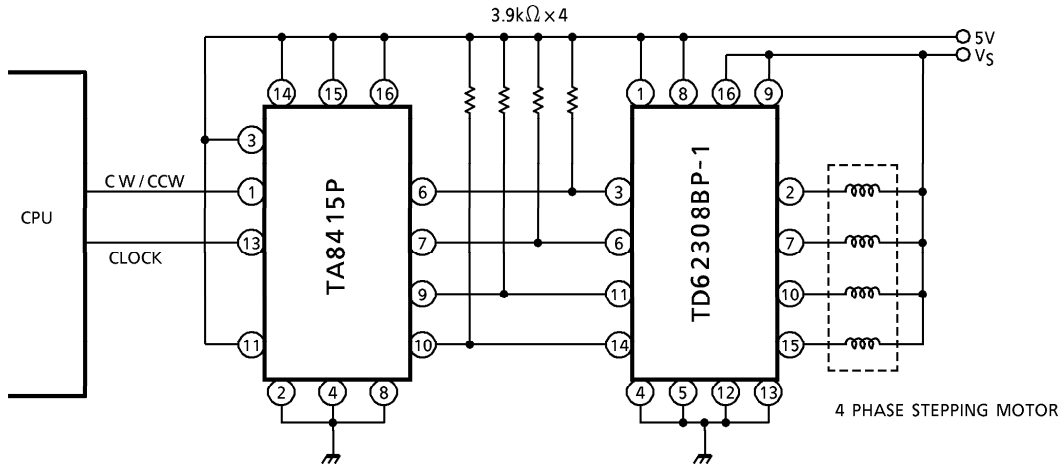
1-2 PHASE EXCITATION CCW





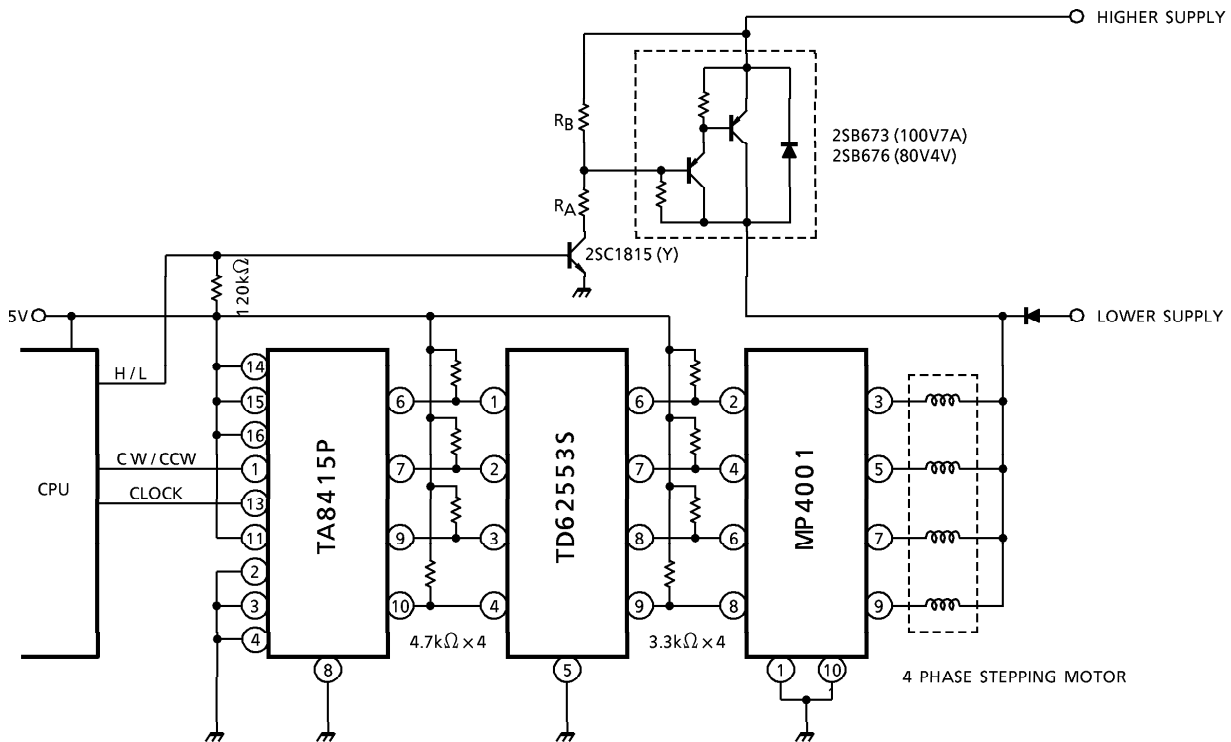
APPLICATION CIRCUIT 1

(TA8415P + TD62308BP 4 phase stepping motor driver circuit)



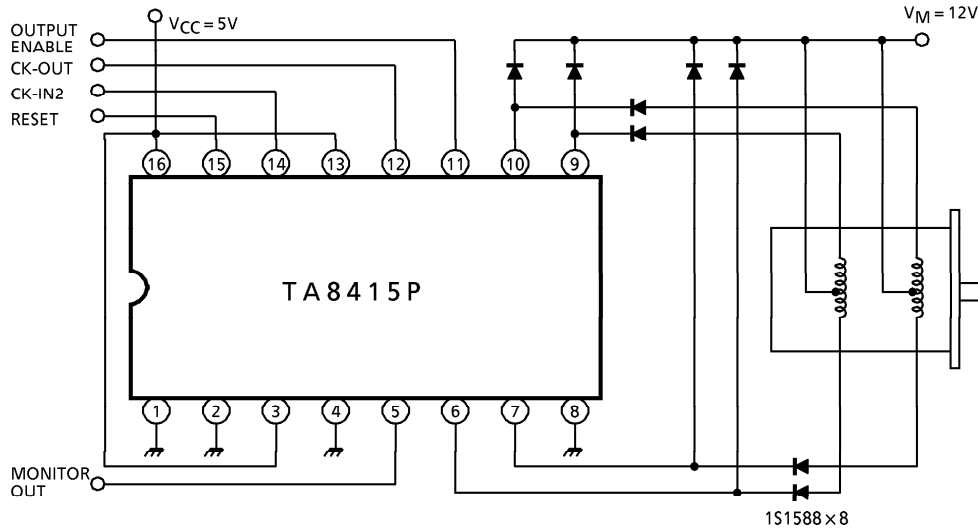
APPLICATION CIRCUIT 2

(TA8415P + TD62553S + MP4001 high efficiency stepping motor driver circuit)



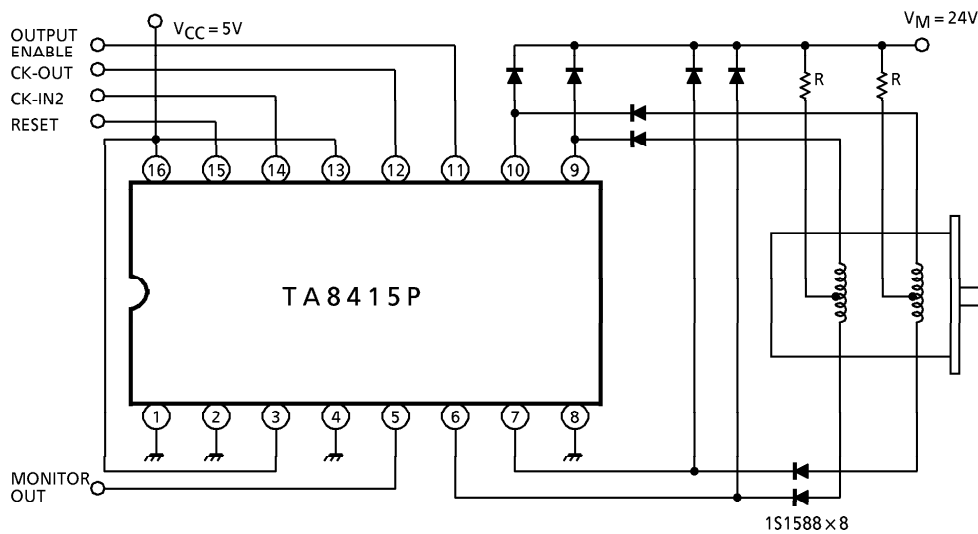
APPLICATION CIRCUIT 3

4 phase motor 1-2 phase excitation drive I .



APPLICATION CIRCUIT 4

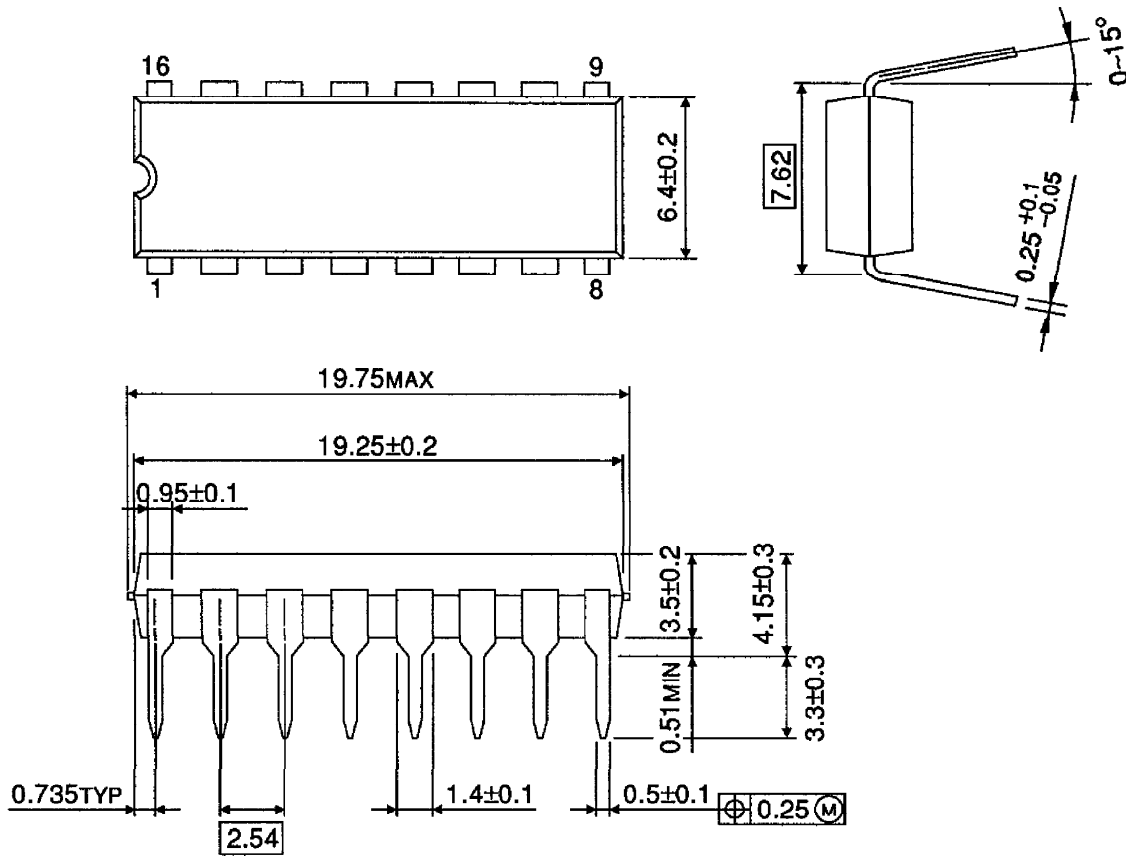
4 phase motor 1-2 phase excitation drive II .



(Note) Utmost care is necessary in the design of the output line, power supply and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

OUTLINE DRAWING
DIP16-P-300-2.54A

Unit : mm



Weight : 1.11g (Typ.)