

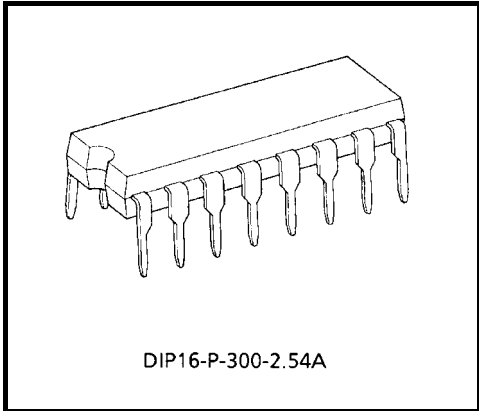
TA8415P

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.

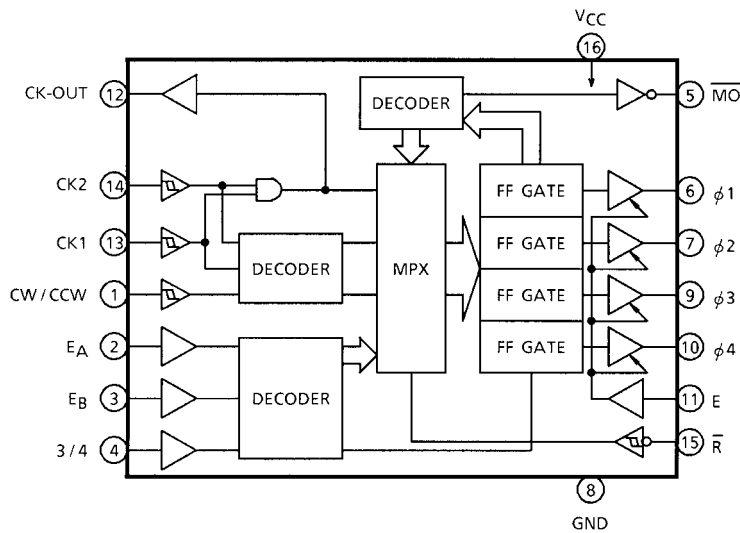
FEATURES

- 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: 1.11 g (Typ.)

BLOCK DIAGRAM



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

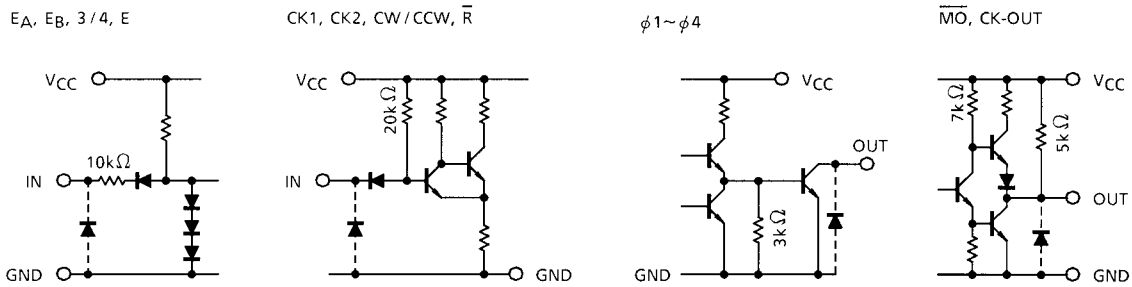
CK1	CK2	CW / CCW	FUNCTION
	H	L	CW
	L	L	Inhibit
H		L	CCW
L		L	Inhibit
	H	H	CCW
	L	H	Inhibit
H		H	CW
L		H	Inhibit

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.

SCHEMATIC OF INPUTS AND OUTPUTS



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

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	-0.3~7.0	V
Output Sustaining Voltage	$V_{CE(SUS)}\phi$	-0.3~28	V
Output Current (ϕn)	$I_{OUT\phi}$	400	mA
Output Current (MO, CK-OUT)	$I_{OUT\overline{MO}}$ I_{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 OPERATION CONDITION (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	$V_{CE(SUS)}\phi$	—	0	—	26	V
Output Current ϕn	"L" Level $I_{OUT\phi}$	—	—	—	200	mA
Output Current \overline{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)

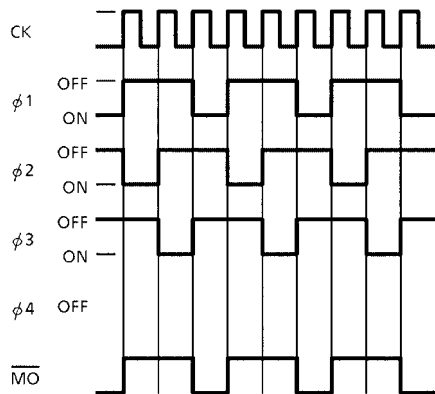
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT	
Input Voltage	"H" Level	V_{IH}	—	—	2.0	—	—	V	
	"L" Level	V_{IL}		—	—	—	0.8		
Input Current	"H" Level	I_{IH}	—	$V_{CC} = 5.5 V, V_{IH} = 5.5 V$	—	—	10	μA	
	"L" Level	I_{IL}		$V_{CC} = 5.5 V, V_{IL} = 0.4 V$	—	—	-0.4	mA	
Hysteresis		ΔV_T	—	—	—	150	—	mV	
Supply Current		I_{CC}	—	—	—	—	100	mA	
Output Leakage Current ϕ_n		$I_{OH\phi}$	—	$V_{CC} = 5.5 V, V_{OUT} = 26 V$	—	—	100	μA	
Output Voltage	"H" Level	\overline{MO} CK-OUT	—	$V_{CC} = 4.5 V, I_{OH} = -0.4 mA$	2.4	—	—	V	
				$V_{CC} = 5.0 V, I_{OH} = -10 \mu A$	4.0	—	—		
	"L" Level	\overline{MO} CK-OUT	—	$V_{CC} = 4.5 V, I_{OL} = 8 mA$	—	—	0.4		
		ϕ_n		$V_{OUT\phi}$	$V_{CC} = 4.5 V, I_{OUT} = 400 mA$ $t = 100 ms$	—	—		1.1
					$V_{CC} = 4.5 V, I_{OUT} = 200 mA$ $t = 100 ms$	—	—		0.6

SWITCHING CHARACTERISTICS (Ta = 25°C)

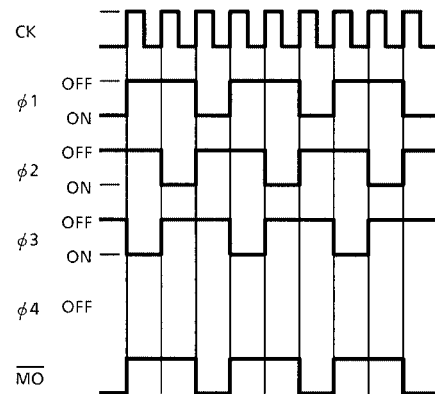
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Propa- gation Delay Time	"H" Level	CK- ϕ_n	—	—	—	2.0	—	μs
		CK-CK-OUT			—	1.0	—	
		CK- \overline{MO}			—	2.8	—	
		E- ϕ_n			—	1.0	—	
		R- ϕ_n			—	2.0	—	
	"L" Level	CK- ϕ_n	—	—	—	1.4	—	
		CK-CK-OUT			—	0.7	—	
		CK- \overline{MO}			—	2.1	—	
		E- ϕ_n			—	1.2	—	
		\overline{R} - ϕ_n			—	1.0	—	
		R- \overline{MO}			—	2.0	—	
	Maximum Clock Frequency		f_{max}	—	—	—	250	
Set Up Time CK, CW / CCW		t_{set-up}	—	—	—	0.1	—	μs
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

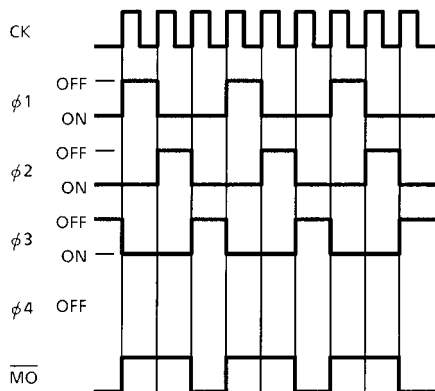
1 PHASE EXCITATION CW



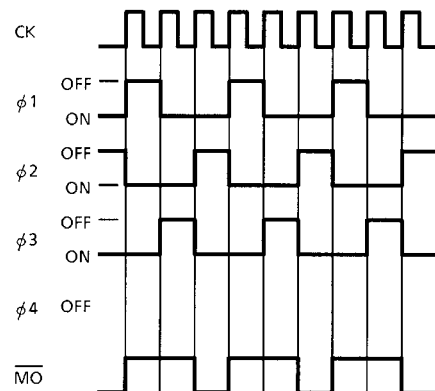
1 PHASE EXCITATION CCW



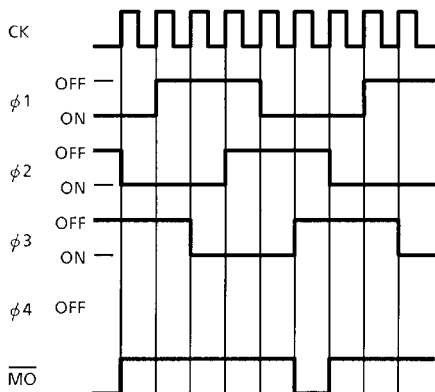
2 PHASE EXCITATION CW



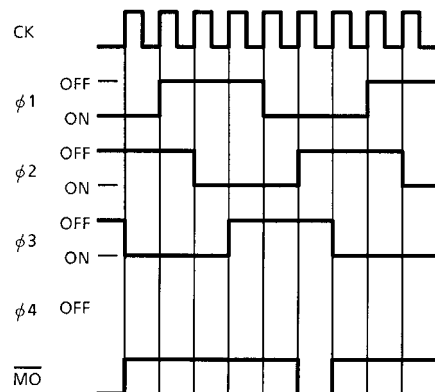
2 PHASE EXCITATION CCW



1-2 PHASE EXCITATION CW

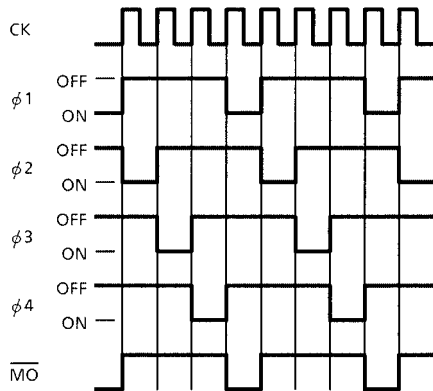


1-2 PHASE EXCITATION CCW

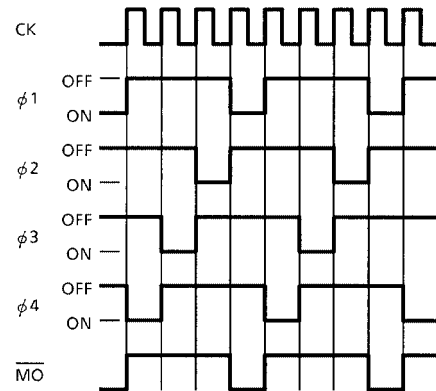


4 PHASES METHOD

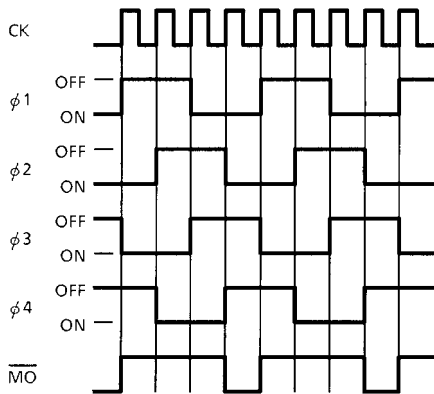
1 PHASE EXCITATION CW



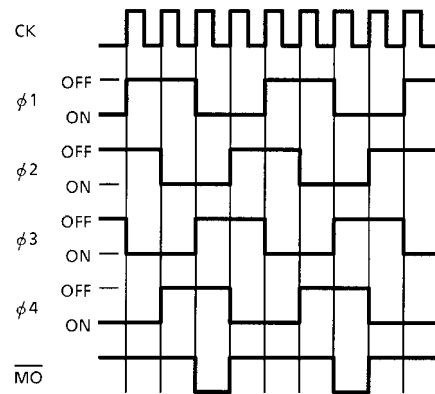
1 PHASE EXCITATION CCW



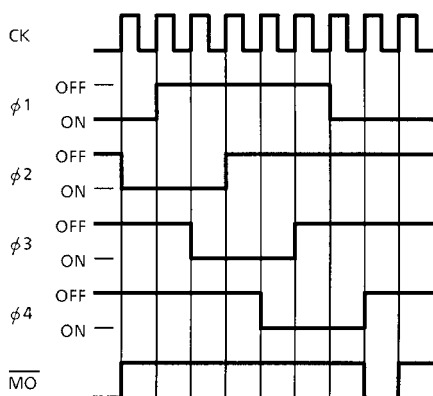
2 PHASE EXCITATION CW



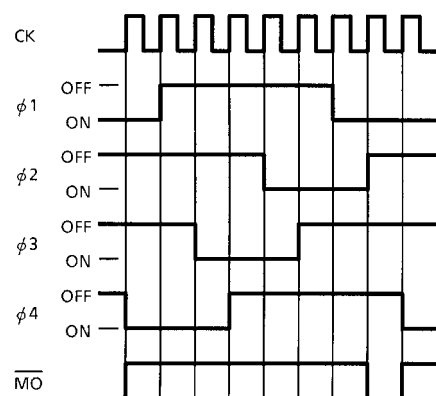
2 PHASE EXCITATION CCW

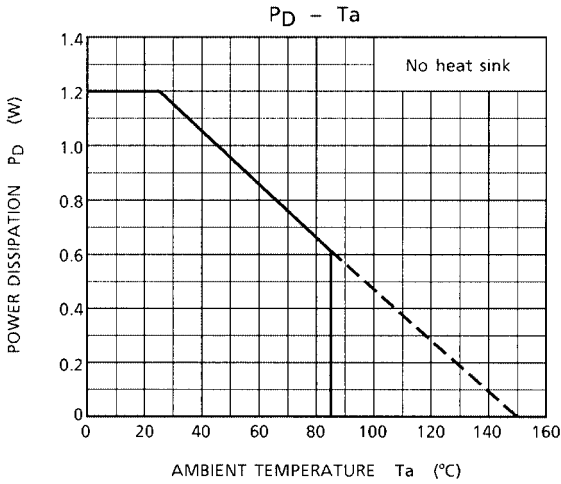
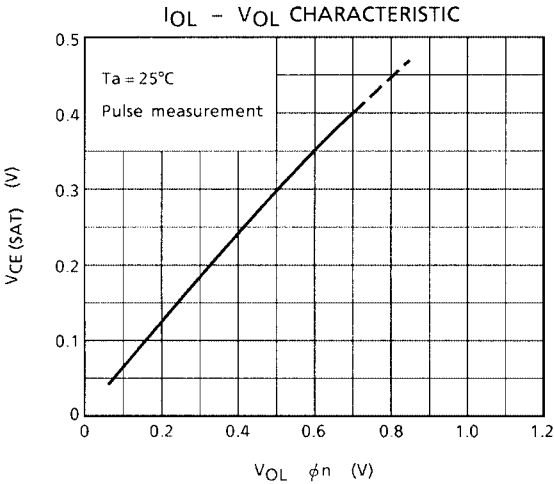


1-2 PHASE EXCITATION CW

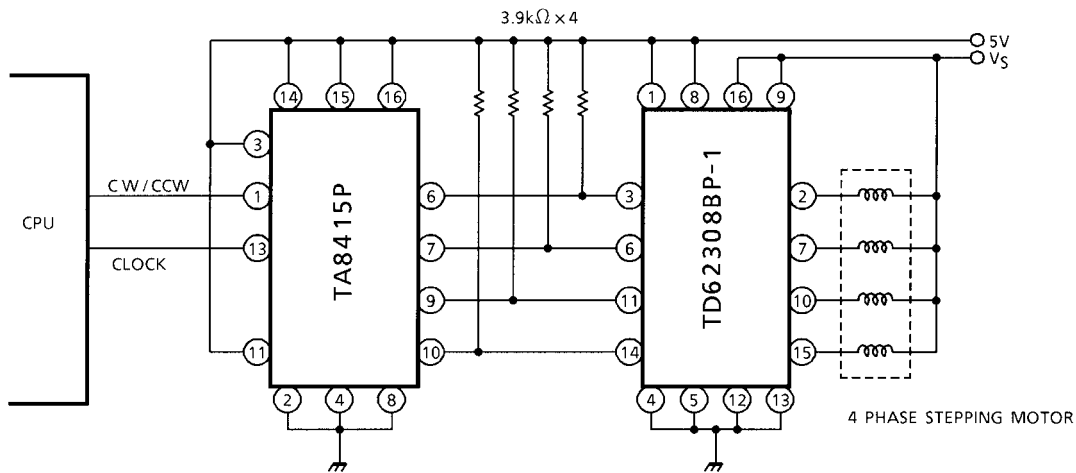


1-2 PHASE EXCITATION CCW

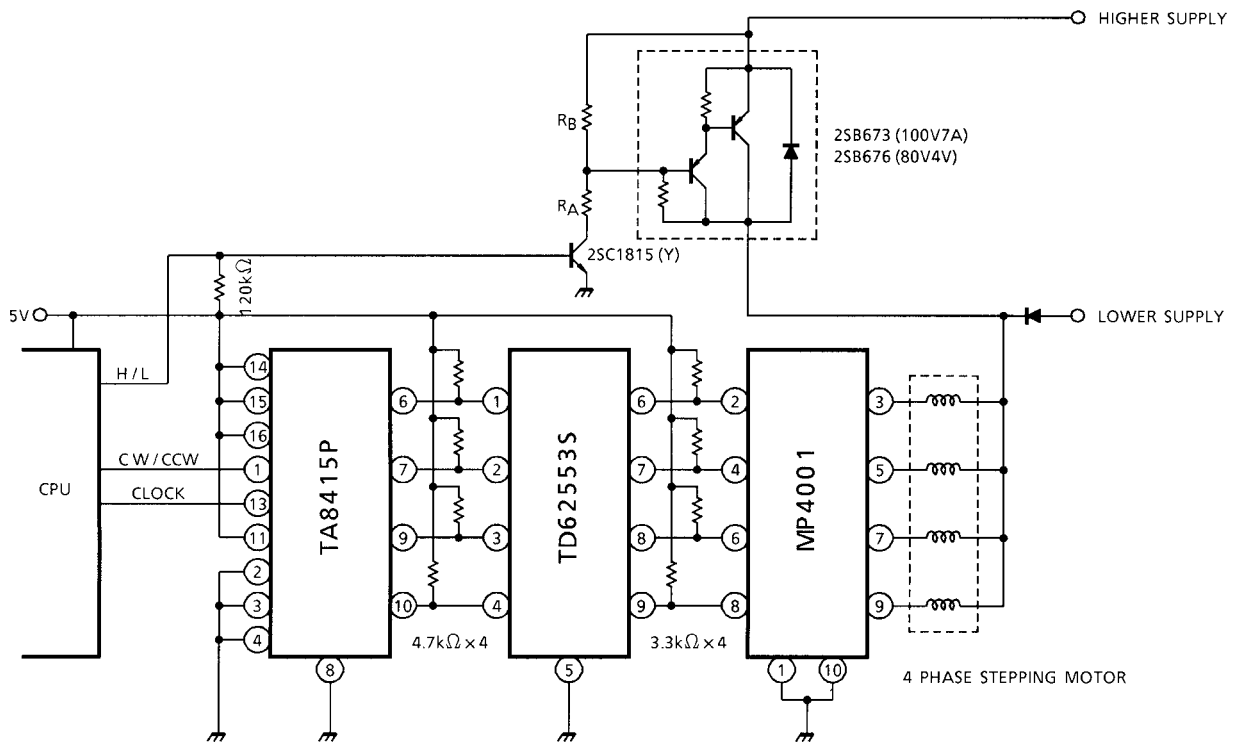




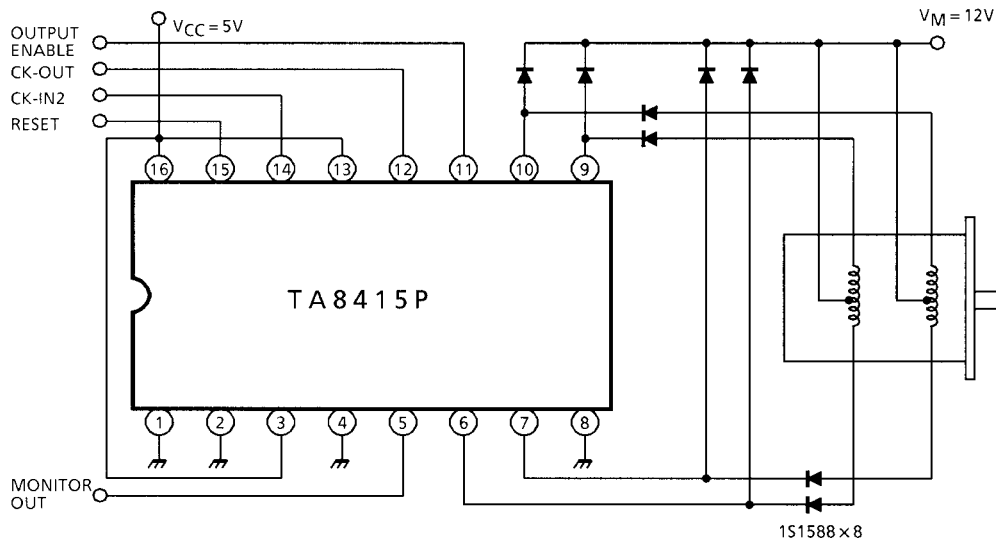
APPLICATION CIRCUIT 1 (TA8415P + TD62308BP 4 phase stepping motor driver circuit)



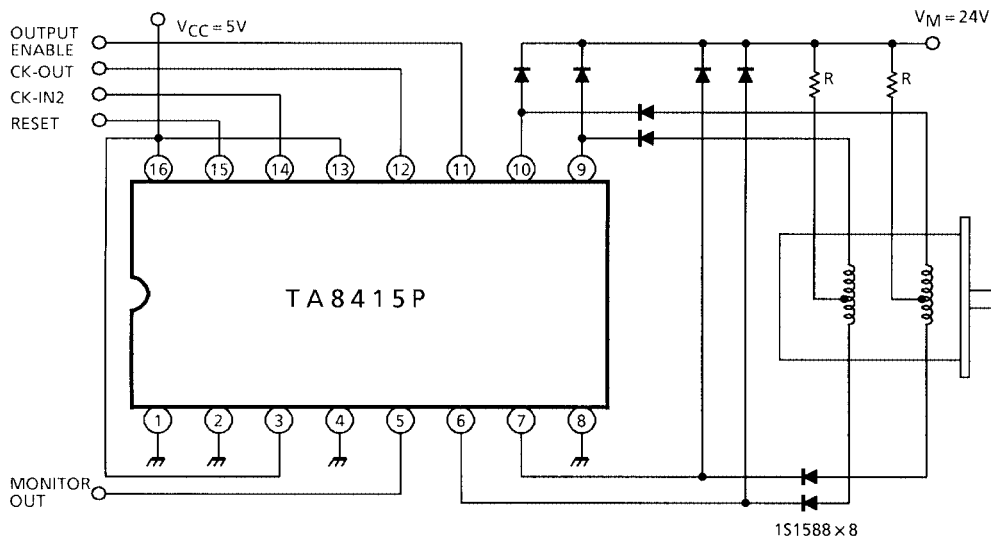
APPLICATION CIRCUIT 2 (TA8415P + TD62553S + MP4001 high efficiency stepping motor driver circuit)



APPLICATION CIRCUIT 3 4 phase motor 1-2 phase excitation drive I.



APPLICATION CIRCUIT 4 4 phase motor 1-2 phase excitation drive II.

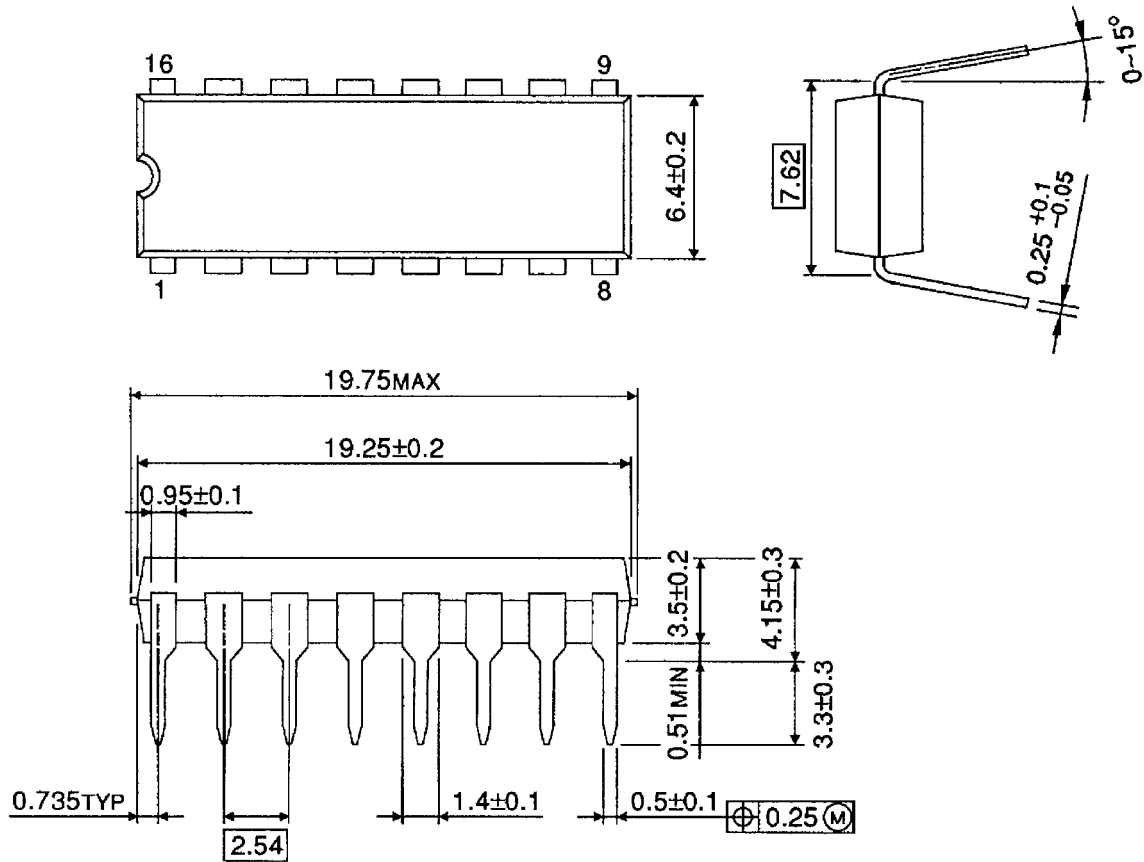


Note: Utmost care is necessary in the design of the output line, power supply and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

PACKAGE DIMENSIONS

DIP16-P-300-2.54A

Unit: mm



Weight: 1.11 g (Typ.)

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