

5-Phase Stepping Motor Drive IC for Universal Controller PMM8714PT

勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

Outline

"PMM8714PT" is a Bi-CMOS monolithic IC to be used for controlling 5-phase stepping motor.

This IC has been developed for the purpose to further simplify the usage of 5-phase stepping motor. When combined only with the switching elements or a power hybrid IC, this IC can configure a driver device for a 5-phase stepping motor.

Characteristics

- Universal controller : Selection is possible from the following three different excitation modes.
4EX/4-5EX/5EX
- Power voltage: : $V_{CC}=4V\sim 16V$
- High output current: : 20mA min(source)
- High noise margin : Schmitt trigger circuit is integrated for the all input terminals
- two kinds of pulse input : double input system (CW, CCW input mode), single input system (CK,U/D input mode)
- Power-down functions : Makes all the output to "L" level.
- Reset functions : Shifts excitation status to the phase origin.
- Excitation mode preservation functions : Phase output does not change even when excitation mode is switched as follows: 4EX_4-5EX_5EX.
- Phase origin monitor : Outputs at the "H" level at the time of phase origin (the output in reset mode).
- Determination monitor for excitation status : Outputs monitor signal for the status of controller.
- Input pulse monitor : Outputs monitor signal for V_{CC} input pulse.

Maximum Rating ($T_a = 25^{\circ}\text{C}$)

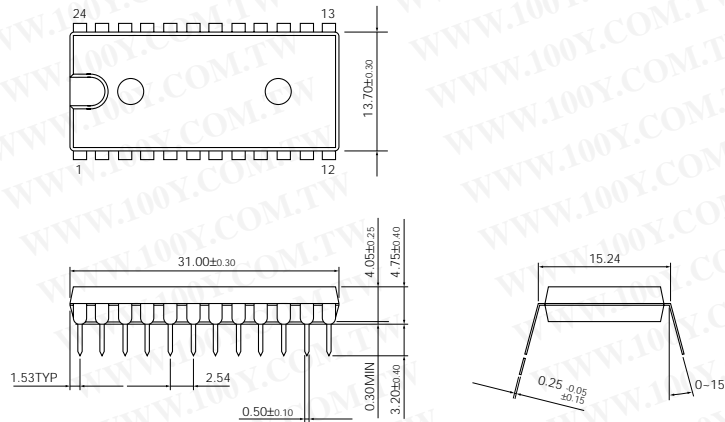
Item	Symbol	Rating	Unit
Power voltage	V_{CC}	-0.5~20	V
Output current I_{OH}	"H" level	$I_{OH\ \phi}$	-30
	"L" level	$I_{OL\ \phi}$	2
Output current I_{OH}	"H" level	I_{OH}	-50
	"L" level	I_{OL}	2
Co,Em,Zo			mA
Input voltage	V_{IN}	-0.5~ V_{CC}	V
Input current	I_{IN}	± 1	mA
Tolerated loss	P_D	1000	mW
Operating temperature	T_{opr}	-20~85	$^{\circ}\text{C}$
Storage temperature	T_{stg}	-55~150	$^{\circ}\text{C}$

Recommended Operating Conditions ($T_a = -30$ to 85°C)

Item	Symbol	Rating			Unit
		Min.	Standard	Max.	
Power voltage	V_{CC}	4	—	16	V
Output current I_{OH}	"H" level	$I_{OH\ \phi}$	—	-10	mA
	"L" level	$I_{OL\ \phi}$	—	1.6	
Output current I_{OH}	"H" level	I_{OH}	—	-40	μA
	"L" level	I_{OL}	—	1.6	mA
Co,Em,Zo					
Input voltage	V_{IN}	0	—	V_{CC}	V
Clock frequency	—	0	—	250	kHz

Dimensions (unit: mm)

Pin No.	Name	Function
1.	Cu	Input pulse UP clock input
2.	Cd	Input pulse DOWN clock input
3.	Ck	Input pulse clock input
4.	U/D	Alters rotation direction
5.	Ea	Input to switch excitation mode
6.	Eb	Input to switch excitation mode
7.	Ec	Input to switch excitation mode
8.	Pd	Power down input
9.	Zo	Phase origin monitor output
10.	Co	Input pulse monitor output
11.	EM	Excitation monitor output
12.	GND	0V
13.	R	Reset input
14.	ø E	ø E output
15.	ø D	ø D output
16.	ø C	ø C output
17.	ø B	ø B output
18.	ø A	ø A output
19.	ø E	ø E output
20.	ø D	ø D output
21.	ø C	ø C output
22.	ø B	ø B output
23.	ø A	ø A output
24.	Vcc	4-16V



勝特力材料 886-3-5753170
勝特力电子(上海) 86-21-54151736
勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

Electrical characteristics

Direct Current Characteristics (Ta=25°C)

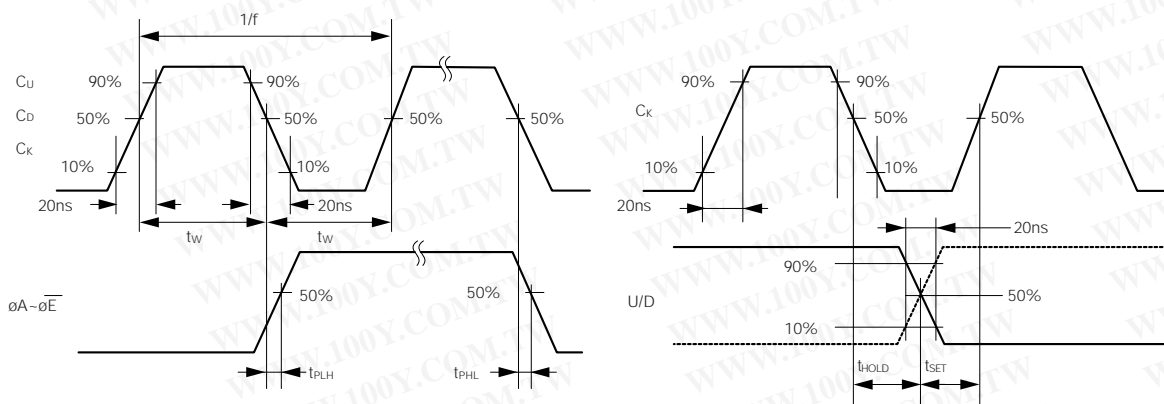
Item	Symbol	VCC [V]	Conditions	Standard Value			Unit
				Min.	Standard	Max.	
Output current ø A-ø E	"H" level	5	Vo = Vcc-2.0	-20	—	—	mA
		10		-20	—	—	
	"L" level	5	Vo = 0.3V	1.6	—	—	
		10		1.6	—	—	
Output voltage Co,EM,Zo	"H" level	5	Io = -40µA	3.6	—	—	V
		10		8.6	—	—	
	"L" level	5	Io = 1.6mA	—	—	0.4	
		10		—	—	0.6	
Input voltage	"H" level	5	—	3.0	2.5	—	V
		10		6.0	5.0	—	
	"L" level	5	—	—	2.0	1.5	
		10		—	4.0	3.0	
Input voltage Cu,Cd,Ck	"H" level	5	Vin = VCC-0.5	—	—	0.4	mA
		10		—	—	0.7	
	"L" level	5	Vin = 0V	—	—	±10	
		10		—	—	±10	
Input voltage U/D,PD,R	"H" level	5	Vin = VCC-0.5	—	—	-100	µA
		10		—	—	-100	
	"L" level	5	Vin = 0V	—	—	-0.4	
		10		—	—	-0.7	
Static current consumption	Icc	5	All terminals open	—	—	25	mA
		10		—	—	35	

Electrical characteristics

Switching Characteristics (Ta=25°C)

Item	Symbol	VCC [V]	Conditions	Standard Value			Unit
				Min.	Standard	Max.	
Max. clock frequency	f _{MAX}	5	-----	250	300	—	kHz
		10		270	350	—	
Min. clock pulse width	t _w	5	-----	—	300	500	ns
		10		—	300	500	
Min. reset pulse width	t _{WR}	5	-----	—	200	500	ns
		10		—	200	500	
Delay time (ø output from clock input)	t _{PHL}	5	-----	—	2500	3500	ns
	t _{PLH}	10		—	2500	3500	
Delay time (Each monitoring from clock input)	t _{PHL}	5	-----	—	3000	4000	ns
	t _{PLH}	10		—	3000	4000	
Preset time	t _{SET}	5	-----	4000	3000	—	ns
		10		4000	3000	—	
Holding time	t _{HOLD}	5	-----	500	0	—	ns
		10		500	0	—	

Switching Characteristics



Function table

Input mode and rotating direction

Input system	Input				Rotation direction
	C _u	C _d	C _k	U/D	
Double input system (CW, CCW)		L	L	L	CW
	L		L	L	CCW
Single input system (CK, U/D)	L	L		H	CW
	L	L		L	CCW

Excitation mode

Energization system	Input				
	R̄	P _D	E _A	E _B	E _C
4 EX	H	H	L	H	L
4-5EX	H	H	L	L	L
5 EX	H	H	H	L	L

勝特力材料 886-3-5753170
勝特力电子(上海) 86-21-54151736
勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

Energization sequence

4EX

Pulse Phase	0 (Reset)	1	2	3	4	5	6	7	8	9	10
ϕA	1	0	0	0	0	0	0	1	1	1	1
ϕB	1	1	0	0	0	0	0	0	1	1	1
ϕC	1	1	1	0	0	0	0	0	0	1	1
ϕD	1	1	1	1	0	0	0	0	0	0	1
ϕE	0	1	1	1	1	0	0	0	0	0	0
$\phi \bar{A}$	0	0	1	1	1	1	0	0	0	0	0
$\phi \bar{B}$	0	0	0	1	1	1	1	0	0	0	0
$\phi \bar{C}$	0	0	0	0	1	1	1	1	0	0	0
$\phi \bar{D}$	0	0	0	0	0	1	1	1	1	0	0
$\phi \bar{E}$	0	0	0	0	0	0	1	1	1	1	0
Z_o	1	0	0	0	0	0	0	0	0	0	1
E_M	0	0	0	0	0	0	0	0	0	0	0
UP	→										
DOWN	←										

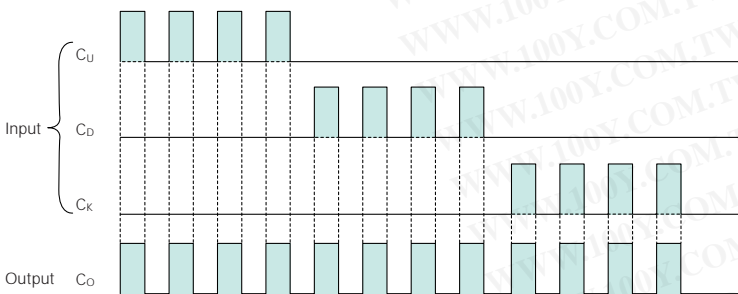
5EX

Pulse Phase	0 (Reset)	1	2	3	4	5	6	7	8	9	10
ϕA	1	1	0	0	0	0	0	1	1	1	1
ϕB	1	1	1	0	0	0	0	0	1	1	1
ϕC	1	1	1	1	0	0	0	0	0	1	1
ϕD	1	1	1	1	1	0	0	0	0	0	1
ϕE	0	1	1	1	1	1	0	0	0	0	0
$\phi \bar{A}$	0	0	1	1	1	1	1	0	0	0	0
$\phi \bar{B}$	0	0	0	1	1	1	1	1	0	0	0
$\phi \bar{C}$	0	0	0	0	1	1	1	1	1	0	0
$\phi \bar{D}$	0	0	0	0	0	1	1	1	1	1	0
$\phi \bar{E}$	1	0	0	0	0	0	1	1	1	1	1
Z_o	1	0	0	0	0	0	0	0	0	0	1
E_M	1	1	1	1	1	1	1	1	1	1	1
UP	→										
DOWN	←										

4-5EX

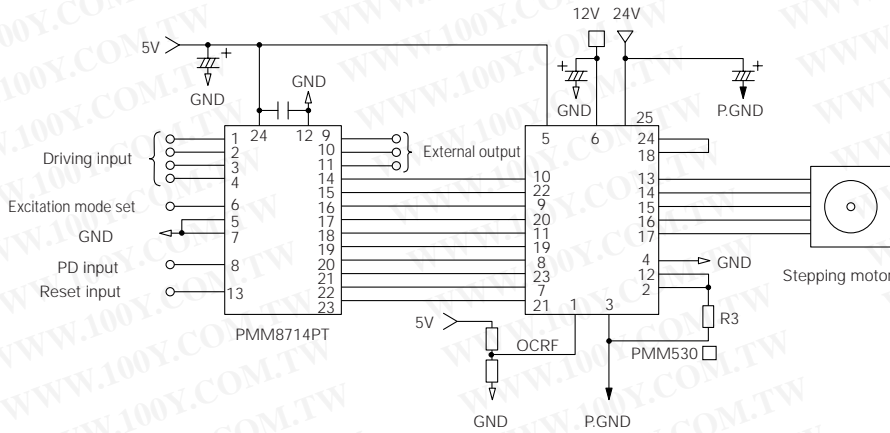
Pulse Phase	0 (Reset)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
ϕA	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
ϕB	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
ϕC	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
ϕD	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1
ϕE	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
$\phi \bar{A}$	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
$\phi \bar{B}$	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
$\phi \bar{C}$	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0
$\phi \bar{D}$	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0
$\phi \bar{E}$	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0
Z_o	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
E_M	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
UP	→																				
DOWN	←																				

Input pulse monitor



勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

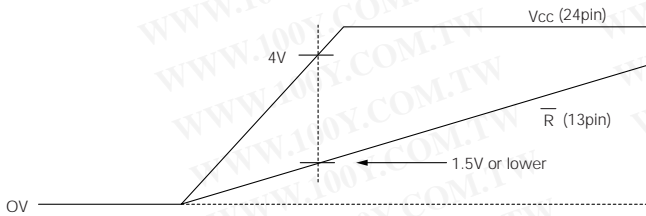
Example application circuit (full step/half step)



Excitation mode set

Pin No.	Terminal symbol	Input level	Motor operation
6	EB	H	Full step
		L	Half step

- When VCC is not stable, such as immediately after the power is on, normal initial reset can not always be performed. In order to perform firm reset, hold R terminal (13pin) at the "L" level until Vcc becomes stable.



- Refer to Page 343 for the specifications of power hybrid IC:PMM530 □.
- Refer to Operation Manual of PMM8714PT for other applications.

勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)