

HIC for 5-Phase Stepping Motor

PMM5310



Outline

PMM5310 is a single packaged all-in-one type power hybrid IC of the power bridge circuit elements to drive 5-phase stepping motor with the controller IC to control excitation mode. This HIC has been developed for the purpose to further simplify the usage of 5-phase stepping motor, and can configure a micro step driver device for a 5-phase stepping motor.

Characteristics

- High speed and high torque rotation by 5-phase pentagon system.
- Constant voltage and constant current PWM driving system (excited by others).
- Power voltage (driving power) : $V_{CC1}=18\sim 42V$
- High output current : 2.7A max. (current peak value/phase)
- Reduced heat generation by using MOSFET for the power drive element.
- The all-in-one packaging reduces considerable number of parts around peripheral circuits.

Maximum rating ($T_C = 25^\circ C$)

Item	Symbol	Conditions	Rated value	Unit
Power voltage-1	$V_{CC1 \max}$	Without signal (23pin terminal)	42	V
Power voltage-2	$V_{CC2 \max}$	Without signal (21pin terminal)	7	V
Phase current	$I_{O \max}$	Operating at 12rpm or more	2.7	A
Loss-1	$PD_{\max 1}$	Single FET for phase switching, $T_C=25^\circ C$	12.5	W
Loss-2	$PD_{\max 2}$	Single FET for phase switching, $T_C=25^\circ C$	8.5	W
Operating temperature on PCB	T_C	No-condensing at a low temperature	0~85	$^\circ C$
Temperature at joint	$T_J \max$	—————	150	$^\circ C$
Storage temperature	T_{stg}	—————	-40~ +125	$^\circ C$

Recommended operation condition ($T_a = 25^\circ C$)

Item	Symbol	Condition	Rated value	Unit
Power voltage-1	V_{CC1}	With signal (23pin terminal)	18~40	V
Power voltage-2	V_{CC2}	With signal (21pin terminal)	5.0±5%	V
Output current	$I_{O \max}$	Operating at 12rpm or more	2.2	A
Phase driver withstand voltage	V_{BSS}	$I_C=10mA(T_C=25^\circ C)$	60	V

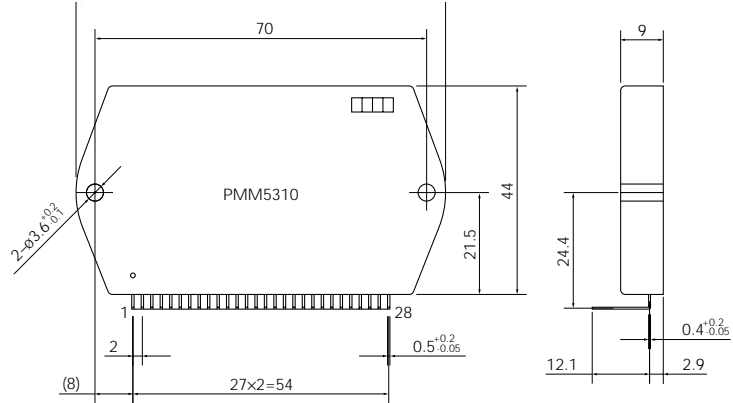
Selecting number of micro step divisions

s_sel13~0	0000	0001	0010	0011	0101	0110	0111	1000	1001	1010
Number of divisions for basic step angle	1	2	2.5	4	5	8	10	20	40	80

● When setting the number of divisions to other than shown above, the number shall be fixed at 80.

Dimensions (Unit: mm)

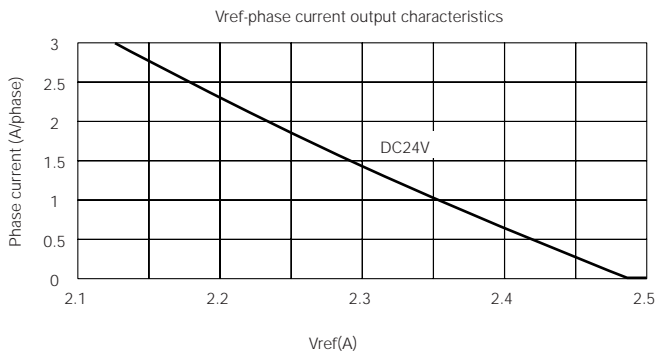
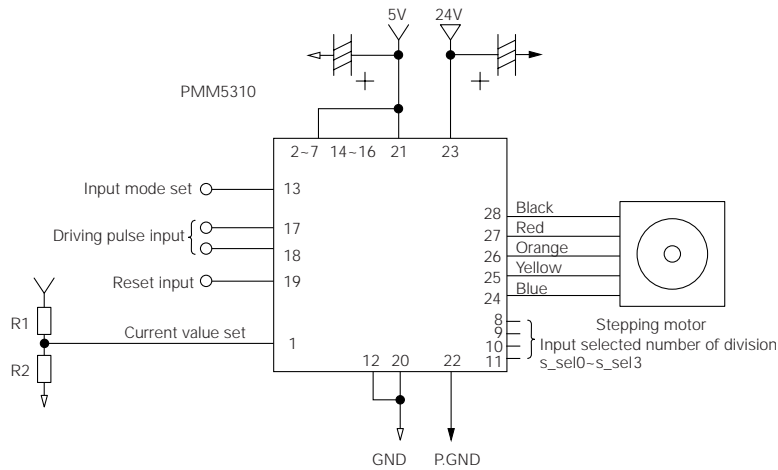
Pin No.	Name or code	Functions
1.	Vref	Voltage input for motor current set
2.	Reserved terminal	(Fixed at high)
3.	Reserved terminal	(Fixed at high)
4.	Reserved terminal	(Fixed at high)
5.	Reserved terminal	(Fixed at high)
6.	Reserved terminal	(Fixed at high)
7.	Reserved terminal	(Fixed at high)
8.	s_sel0	Set number of divisions
9.	s_sel1	Set number of divisions
10.	s_sel2	Set number of divisions
11.	s_sel3	Set number of divisions
12.	Reserved terminal	(Fixed at low)
13.	mode_1	Input mode set
14.	Reserved terminal	(Fixed at high)
15.	Reserved terminal	(Fixed at high)
16.	Reserved terminal	(Fixed at high)
17.	ccw_ud	Pulse command input
18.	cw_ck	Pulse command input
19.	zreset	System reset
20.	SG	Grounding VCC2
21.	Vcc2	Power input for control system (+5V)
22.	P.GND	Power grounding VCC1
23.	Vcc1	Power input for power system (+24V)
24.	E	Motor output
25.	D	Motor output
26.	C	Motor output
27.	B	Motor output
28.	A	Motor output



Electrical characteristics (T_C = 25°C, VCC1 = 24V, VCC2 = 5V)

Item	Symbol	Condition	Rating			Unit
			Min.	Standard	Max.	
Output saturation voltage-1	V _{SAT-1}	I _O =1A, FET1~5		0.5	0.9	V
Output saturation voltage-2	V _{SAT-2}	I _O =1A, FET6~10		0.3	0.7	V
Forward voltage of FET diode	V _f	I _f =1.0A		1.1	1.8	V
Oscillation frequency	F _c	—		25	—	kHz
"H" level input voltage	V _{IH}	V _{in} =VCC2, 2~19pin	4.0	—	—	V
"L" level input voltage	V _{IL}	V _{in} =0V, 2~19pin	—	—	1.0	
"H" level input current	I _{IH}	V _{in} =VCC2, 2~19pin	—	—	10	μA
"L" level input current	I _{IL}	V _{in} =0V, 2~19pin	20	—	100	μA
Pull-up resistor	R _{UP}	2~19pin	60	120	240	kΩ
VCC1 current consumption	I _{CC1}	zreset=L, 23pin terminal	—	16.5	30	mA
VCC2 current consumption	I _{CC2}	zreset=L, 21pin terminal	—	30	45	mA
Vref voltage range	V _{ref}	1pin terminal	0.5		VCC2x1/2	V
Output lead current	I _{OL}	zreset=L, 24-28pin terminals			1	mA

Example applicable circuit



- Make common for the logic system VCC2 grounding (GDN) and the driving power system VCC1 grounding (P.GND) on the minus side of the electrolytic condenser.
- Select the fixed numbers R1 and R2 referring to the Vref-phase current output characteristics.
- The value shown in the graph was measured during operation of 103H7522-7051. The Vref voltage differs according to the combined motor, power voltage and pattern status of PCB. For protection of the motor and hybrid IC, actual motor current may have to be measured under the using conditions. measured under the using conditions.