

SI-7321M 2-Phase to 4W 1-2 Phase Excitation Support, Built-in Sequencer

Features

- Power supply voltages, VBB: 46 V (max), 10 to 44 V normal operating range
- Logic supply voltages, VDD: 3.0 to 5.5 V
- Output Current Io: 1.5A
- Clock input method (built-in sequencer)
- Self-excitation PWM current control with fixed off time
- Synchronous PWM chopping function prevents motor noise in Hold mode
- Sleep mode for reducing the IC input current in stand-by state
- Selectable blanking time (1.8 μ s or 3.6 μ s)
- Selectable clock input edge (POS or POS/NEG)
- Selectable protection availability
- 44-pin surface-mount

Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Ratings	Unit	Conditions
Motor Supply Voltage	V _M	46	V	
Driver Supply Voltage	V _{BB}	46	V	
Logic Supply Voltage	V _{DD}	6	V	
Output Current	I _O	1.5	A	Current ratio: Mode F
Logic Input Voltage	V _{IN}	−0.3 to V _{DD} +0.3	V	
REF Input Voltage	V _{REF}	−0.3 to V _{DD} +0.3	V	
Sense Voltage	V _{RS}	±2	V	Excluding tw<1 μ s
Power Dissipation	P _D	3.5	W	When Ta = 25°C
Junction Temperature	T _J	+150	°C	
Operating Ambient Temperature	T _a	−20 to +80	°C	
Storage Temperature	T _{stg}	−30 to +150	°C	

∗: Output current value may be limited, depending on the duty ratio, ambient temperature, and heating conditions.

Do not exceed junction temperature of T_J under any circumstances.

Recommended Operating Conditions

Parameter	Symbol	Ratings		Unit	Conditions
		min.	max.		
Motor Supply Voltage	V _M		44	V	
Driver Supply Voltage	V _{BB}		44	V	
Logic Supply Voltage	V _{DD}	3.3	5.5	V	The V _{DD} surge voltage should be 0.5V or lower.
REF Input Voltage	V _{REF}	0.04	1.0	V	When not using protection
			0.5		When using protection
Case Temperature	T _c		85	°C	Temperature at the center of the package

Electrical Characteristics

(V_{DD}=5V, V_{BB}=24V, T_a=25°C, unless otherwise specified)

Parameter	Symbol	Ratings			Unit	Conditions
		min.	typ.	max.		
Driver Supply Current	I _{BB}			15	mA	In operation
	I _{BBS}			100	μ A	Sleep Mode
Logic Supply Current	I _{DD}			5	mA	
Output MOSFET Breakdown Voltage	V _{(BR)DSS}	100			V	V _{BB} =44V, I _D =1mA
Output MOSFET ON Resistance	R _{DS(ON)}		0.25	0.4	Ω	I _D =1.5A
Output MOSFET Diode Forward Voltage	V _F		0.95	1.2	V	I _F =1.5A
Maximum Clock Frequency	F _{clk}	250			kHz	When Duty = 50%
Logic Input Voltage	V _{IL}			0.25V _{DD}	V	
	V _{IH}	0.75V _{DD}				
Logic Input Current	I _{IL}		±1		μ A	
	I _{IH}		±1			
REF Input Voltage	V _{REF}	0.04		1.5	V	When not using protection
		0.04		0.6		When using protection
	V _{REFS}	2		V _{DD}		Sleep1 Mode
REF Input Current	I _{REF}		±10		μ A	V _{REF} =0 to V _{DD}
	V _{IOL}			1.25	V	I _{IOL} =1.25mA
Logic Output Voltage	V _{LOH}	V _{DD} -1.25			V	I _{LOH} =−1.25mA
Logic Output Current	I _{IOL}			1.25	mA	
	I _{LOH}	−1.25			mA	
Sense Voltage	V _{SENSE}		0.2		V	V _{REF} =0.2V, Mode F
Overcurrent Sense Voltage	V _{ocp}	0.65	0.7	0.75	V	against V _{sense}
Step Reference Current Ratio	Mode F		100		%	V _{REF} =0.04V to 1.5V
	Mode E		98.1		%	
	Mode D		95.7		%	
	Mode C		92.4		%	
	Mode B		88.2		%	
	Mode A		83.1		%	
	Mode 9		77.3		%	
	Mode 8		70.7		%	
	Mode 7		63.4		%	
	Mode 6		55.5		%	
	Mode 5		47.1		%	
	Mode 4		38.2		%	
	Mode 3		29.0		%	
	Mode 2		19.5		%	
	Mode 1		9.8		%	
Sleep-Enable Recovery Time	T _{SE}	100			μ S	Sleep1&Sleep2
Switching Time	tp _{don1}		2.0		μ S	Clock → Out ON
			1.5		μ S	Clock → Out OFF
PWM Minimum ON Time	ton(min)		1.8		μ S	B_SEL: L
			3.6		μ S	B_SEL: H
PWM OFF Time	toff1		13		μ S	Mode8 to F
	toff2		9.5		μ S	Mode4 to 7
	toff3		7.5		μ S	Mode1 to 3
Time Not Sensing Load Disconnection	topp	1.5	2	2.5	μ S	Starts when the PWM is turned off.

The direction in which current flows out of the device is regarded as negative.

Pin No.	Symbol	Function
1	Out/A	Phase A output
2	Out/A	Phase A output
3	N.C.	No connection
4	RsA	Connection terminal for phase A sense resistor
5	G/A	Phase A MOSFET gate
6	Gnd1	Device Gnd1
7	E_SEL	Edge selection input
8	P_SEL	Protection use selection input
9	Sync	PWM control signal input
10	CW/CCW	Normal/reverse control input
11	Reset	Internal logic reset input
12	Clock	Step clock input
13	M1	Excitation mode/Sleep 2 setting input
14	M2	
15	M3	
16	B_SEL	Blanking time selection input
17	Gnd1	Device Gnd1
18	G/B	Phase B MOSFET gate
19	RsB	Connection terminal for phase B sense resistor
20	N.C.	No connection
21	Out /B	Phase B output
22	Out /B	Phase B output
23	OutB	Phase B output
24	OutB	Phase B output
25	N.C.	No connection
26	RsB	Connection terminal for phase B sense resistor
27	GB	Phase B MOSFET gate
28	Gnd1	Device Gnd1
29	Gnd2	Device Gnd2
30	Flag	Protection circuit monitor output
31	Mo	2-phase excitation state monitor output
32	VDD	Logic supply
33	Ref/Sleep1	Control current mode/Sleep 1 setting input
34	Gnd3	Device Gnd3
35	N.C.	No connection
36	VBB	Driver supply (motor supply)
37	N.C.	No connection
38	Gnd4	Device Gnd4
39	Gnd1	Device Gnd1
40	GA	Phase A MOSFET gate
41	RsA	Connection terminal for phase A sense resistor
42	N.C.	No connection
43	Out A	Phase A output
44	Out A	Phase A output

(Unit : mm)

