SLA7060M/SLA7061M/SLA7062M 1-2 Phase to 4W 1-2 Phase Excitation Support, Built-in Sequencer

■Features

- Main supply voltage V_{BB}: 46V (max), 10 to 44V recommended
- Logic supply voltage V_{DD}: 3.0 to 5.5V support
- Lineup of output current I_O: 1A, 2A, 3A (maximum set current)
- Supporting the clock-input-method micro-step drive (built-in sequencer)
- 1-2 phase excitation to 4W 1-2 phase excitation support
- Self-excitation PWM current control method
- Built-in synchronous chopping function to prevent the audible motor noise in the hold state
- ZIP type 21-Pin mold package (SLA package)

■Absolute Maximum Ratings

(T_a=25°C)

Parameter	Symbol	Ratings			Unit
		SLA7060M	SLA7061M	SLA7062M	
Motor Supply Voltage	V_M	46			V
Driver Supply Voltage	V_{BB}	46			V
Logic Supply Voltage	V_{DD}	7			V
Output Current	I_O	1.0	2.0	3.0	A
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 to +2 (tw > 1μs)			V
Power Dissipation	P_D	3.5 (Without Heatsink)			W
Junction Temperature	T_j	+150			°C
Operating Ambient Temperature	T_a	–20 to +85			°C
Storage Temperature	T_{stg}	–30 to +150			°C

■Recommended Operating Conditions

Parameter	Symbol	Ratings		Unit	Remarks
		min.	max.		
Motor Supply Voltage	V_M		44	V	
Driver Supply Voltage	V_{BB}	10	44	V	
Logic Supply Voltage	V_{DD}	3.0	5.5	V	The V_{DD} surge voltage should be 0.5V or lower.
REF Input Voltage	V_{REF}	0.1	1.0	V	The control current precision is degraded at 0.1V or lower.
Case Temperature	T_C		90	°C	Temperature at Pin-11 Lead (Without heatsink)

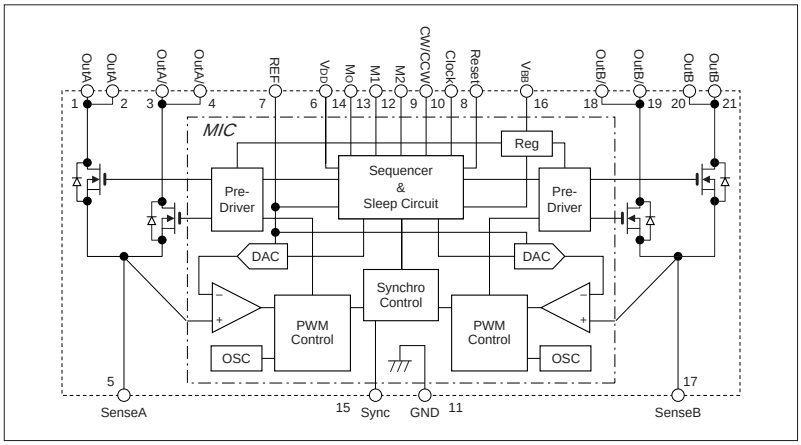
■Electrical Characteristics

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

Parameter	Symbol	SLA7060M			SLA7061M			SLA7062M			Unit
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	
Main Supply Current	I_{BB}			15			15			15	mA
	Conditions	In operation			In operation			In operation			
	I_{BBS}			100			100			100	μA
	Conditions	Sleep mode			Sleep mode			Sleep mode			
Logic Supply Current	I_{DD}			4			4			4	mA
Output MOSFET Breakdown Voltage	$V_{(BR)DS}$	100			100			100			V
	Conditions	V_{BB}=44V, I_D=1mA			V_{BB}=44V, I_D=1mA			V_{BB}=44V, I_D=1mA			
Output MOSFET ON Resistance	$R_{DS(ON)}$		0.7			0.25			0.18		Ω
	Conditions	I_D=1A			I_D=2A			I_D=3A			
Output MOSFET Diode Forward Voltage	V_F		0.85			0.95			0.95		V
	Conditions	I_F=1A			I_F=2A			I_F=3A			
Maximum Clock Frequency	f_{clk}	250			250			250			kHz
	Conditions	When Clock Duty = 50%			When Clock Duty = 50%			When Clock Duty = 50%			
Logic Input Voltage	V_{IL}			V_{DD}·0.25			V_{DD}·0.25			V_{DD}·0.25	V
	V_{IH}	V_{DD}·0.75			V_{DD}·0.75			V_{DD}·0.75			
Logic Input Current	I_{IL}		±1			±1			±1		μA
	I_{IH}		±1			±1			±1		
	Conditions	Clock, Reset, CW/CCW, Sync			Clock, Reset, CW/CCW, Sync			Clock, Reset, CW/CCW, Sync			
	I_{ILM}		–50			–50			–50		
	I_{IH}		±1			±1			±1		
	Conditions	M1, M2			M1, M2			M1, M2			
REF Input Voltage	V_{REF}	0		1.5	0		1.5	0		1.5	V
	Conditions	Normal-operation current control			Normal-operation current control			Normal-operation current control			
	V_{REFS}	2		V_{DD}	2		V_{DD}	2		V_{DD}	
	Conditions	Output OFF (sleep)			Output OFF (sleep)			Output OFF (sleep)			
REF Input Current	I_{REF}		±10			±10			±10		μA
Mo Output Voltage	V_{MoL}			1.25			1.25			1.25	V
	Conditions	I_{MOL}=1.5mA			I_{MOL}=1.5mA			I_{MOL}=1.5mA			
	V_{MoH}	V_{DD}–1.25			V_{DD}–1.25			V_{DD}–1.25			
	Conditions	I_{MOH}=–1.5mA			I_{MOH}=–1.5mA			I_{MOH}=–1.5mA			
Mo Output Current	I_{MoL}			3			3			3	mA
	I_{MoH}	–3			–3			–3			
Sense Terminal Inflow Current	I_{SENSE}		±10			±10			±10		μA
Sense Voltage	V_{SENSE}	0.95	1.00	1.05	0.95	1.00	1.05	0.95	1.00	1.05	V
	Conditions	When V_{REF} = 1V in Mode F			When V_{REF} = 1V in Mode F			When V_{REF} = 1V in Mode F			
Step Reference Current Ratio	Mode F		100			100			100		%
	Mode E		98.1			98.1			98.1		
	Mode D		95.7			95.7			95.7		
	Mode C		92.4			92.4			92.4		
	Mode B		88.2			88.2			88.2		
	Mode A		83.1			83.1			83.1		
	Mode 9		77.3			77.3			77.3		
	Mode 8		70.7			70.7			70.7		
	Mode 7		63.4			63.4			63.4		
	Mode 6		55.5			55.5			55.5		
	Mode 5		47.1			47.1			47.1		
	Mode 4		38.2			38.2			38.2		
	Mode 3		29			29			29		
	Mode 2		19.5			19.5			19.5		
	Mode 1		9.8			9.8			9.8		
	Conditions	V_{REF}≒V_{SENSE}=100%, V_{REF}=0.1 to 1.0V			V_{REF}≒V_{SENSE}=100%, V_{REF}=0.1 to 1.0V			V_{REF}≒V_{SENSE}=100%, V_{REF}=0.1 to 1.0V			
Switching Time	T_{ONC}		2.0			2.0			2.0		μs
	Conditions	Clock→OutON			Clock→OutON			Clock→OutON			
	T_{OFFC}		1.5			1.5			1.5		
	Conditions	Clock→OutOFF			Clock→OutOFF			Clock→OutOFF			
PWM Minimum ON Time	$T_{ON(min)}$		1.8			1.8			1.8		μs
	Conditions	Mode 1 to F			Mode 1 to F			Mode 1 to F			
Chopping OFF Time	t_{OFF1}		12			12			12		μs
	Conditions	Mode 8 to F			Mode 8 to F			Mode 8 to F			
	t_{OFF2}		9			9			9		μs
	Conditions	Mode 4 to 7			Mode 4 to 7			Mode 4 to 7			
	t_{OFF3}		7			7			7		
	Conditions	Mode 1 to 3			Mode 1 to 3			Mode 1 to 3			

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

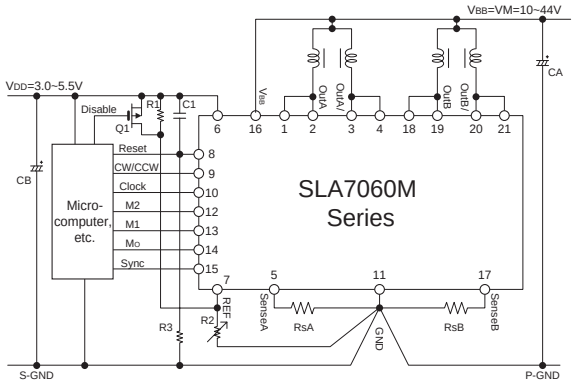
■Internal Block Diagram



■Pin Assignment

Pin No.	Symbol	Function
1	OutA	Phase A output
2		
3	OutA/	Phase $\overline{A}$ output
4		
5	SenseA	Phase A current sense
6	V_{DD}	Logic supply
7	REF	Control current setting & output OFF control input
8	Reset	Internal logic reset input
9	CW/CCW	Normal/reverse control input
10	Clock	Step Clock input
11	GND	Device GND
12	M2	Excitation mode setting input
13	M1	
14	M_O	2-phase excitation state monitor output
15	Sync	PWM control signal input
16	V_{BB}	Driver supply (motor supply)
17	SenseB	Phase B current sense
18	OutB/	Phase $\overline{B}$ output
19		
20	OutB	Phase B output
21		

■Typical Connection Diagram



Component Values (Typical)
Rs=0.1 to 2Ω (Power dissipation should be: $P \fallingdotseq I_O^2 \times Rs$)
R1=10kΩ CA=100μF/50V
R2=5.1kΩ (VR) CB=10μF/10V
R3=10kΩ C1=0.1μF

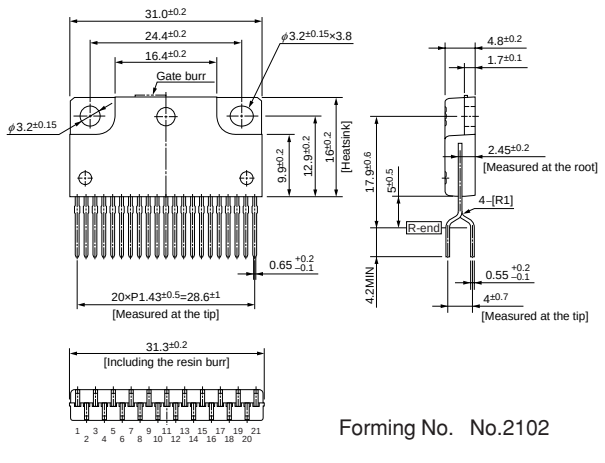
* V_{DD} line noise precaution:
The device may malfunction if the V_{DD} line noise exceeds 0.5V. As a countermeasure, separating the V_{DD} system GND (S-GND) and V_{BB} system GND (P-GND) from the device GND (Pin-11) helps to reduce noise.

* Be sure to connect the unused logic input terminals (CW/CCW, M1, M2, Reset, Sync) to V_{DD} or GND.
Otherwise, the device will malfunction.

* Be sure to open the unused logic output terminal Mo.

■External Dimensions (ZIP21 with Fin [SLA21Pin])

(Unit : mm)



Product Mass : Approx.6g