

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**

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

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 ($t_w > 1\mu\text{s}$)			V
Power Dissipation	P_d	3.5 (Without Heatsink)			W
Junction Temperature	T_j	+150			$^\circ\text{C}$
Operating Ambient Temperature	T_a	-20 to +85			$^\circ\text{C}$
Storage Temperature	T_{stg}	-30 to +150			$^\circ\text{C}$

■ **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	$^\circ\text{C}$	Temperature at Pin-11 Lead (Without heatsink)

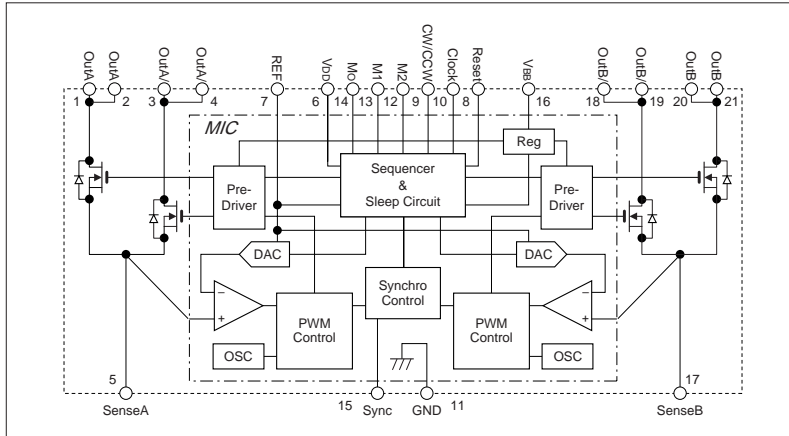
■ **Electrical Characteristics**

($V_{DD}=5V, V_{BB}=24V, T_a=25^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Ratings								Unit	
		SLA7060M			SLA7061M			SLA7062M			
		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			
	Conditions	Sleep mode			Sleep mode			Sleep mode			
Logic Supply Current	I_{DD}			4			4			4	mA
	Conditions	Sleep mode			Sleep mode			Sleep mode			
Output MOSFET Breakdown Voltage	$V_{(BR)DS}$	100			100			100			V
Output MOSFET ON Resistance	$R_{DS(ON)}$			0.7			0.25			0.18	Ω
	Conditions	$V_{BB}=44V, I_D=1mA$			$V_{BB}=44V, I_D=1mA$			$V_{BB}=44V, I_D=1mA$			
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
Logic Input Voltage	V_{IL}			$V_{DD}\cdot 0.25$			$V_{DD}\cdot 0.25$			$V_{DD}\cdot 0.25$	V
	Conditions	When Clock Duty = 50%			When Clock Duty = 50%			When Clock Duty = 50%			
Logic Input Current	I_{IH}	$V_{DD}\cdot 0.75$			$V_{DD}\cdot 0.75$			$V_{DD}\cdot 0.75$			μA
	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			
	Conditions	Output OFF (sleep)			Output OFF (sleep)			Output OFF (sleep)			
REF Input Current	I_{REF}			± 10			± 10			± 10	μA
	Conditions	Output OFF (sleep)			Output OFF (sleep)			Output OFF (sleep)			
Mo Output Voltage	V_{MoL}			1.25			1.25			1.25	V
	Conditions	$I_{MoL}=1.5mA$			$I_{MoL}=1.5mA$			$I_{MoL}=1.5mA$			
Mo Output Current	I_{MoH}	$V_{DD}-1.25$			$V_{DD}-1.25$			$V_{DD}-1.25$			mA
	Conditions	$I_{MoH}=-1.5mA$			$I_{MoH}=-1.5mA$			$I_{MoH}=-1.5mA$			
Sense Terminal Inflow Current	I_{SENSE}			± 10			± 10			± 10	μA
	Conditions	When $V_{REF} = 1V$ in Mode F			When $V_{REF} = 1V$ in Mode F			When $V_{REF} = 1V$ in Mode F			
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			
Switching Time	T_{ONC}		2.0			2.0			2.0		μs
	Conditions	Clock→OutON			Clock→OutON			Clock→OutON			
	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		
	Conditions	Mode 4 to 7			Mode 4 to 7			Mode 4 to 7			
Chopping OFF Time	T_{OFF3}		7			7			7		μs
	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.

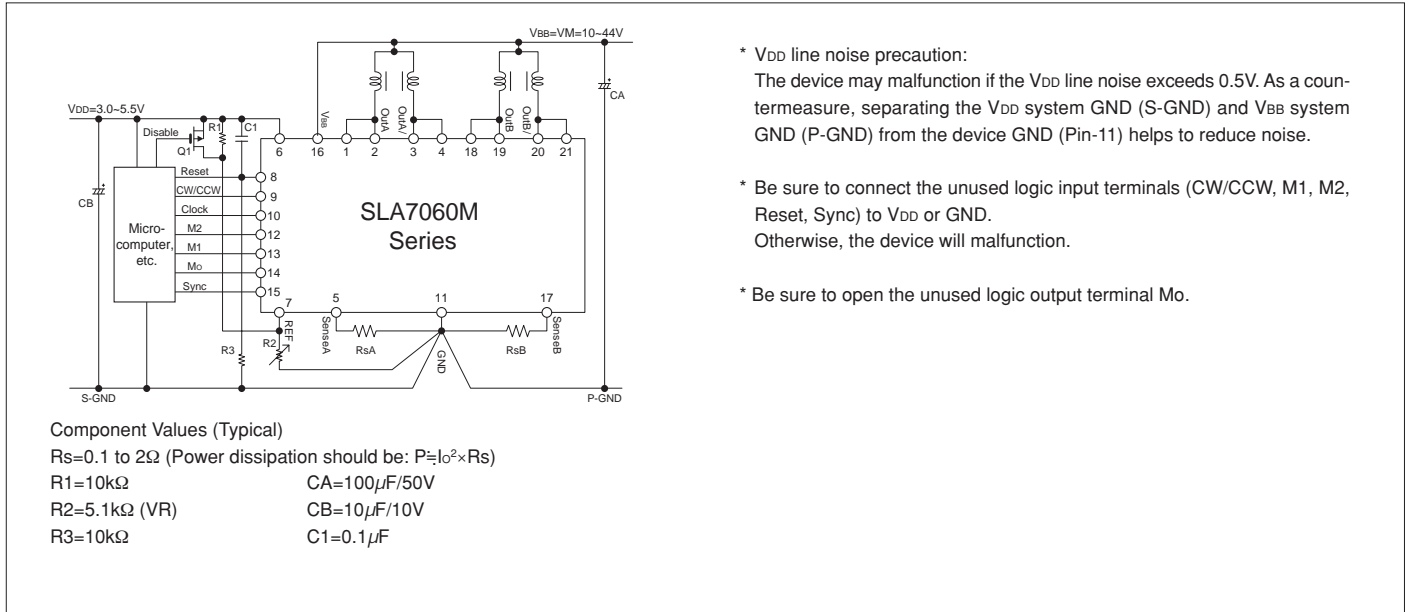
Internal Block Diagram



Pin Assignment

Pin No.	Symbol	Function
1	OutA	Phase A output
2		Phase A output
3	OutA/	Phase A-bar output
4		Phase A-bar output
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	Mo	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 B-bar output
19		Phase B-bar output
20	OutB	Phase B output
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Typical Connection Diagram



External Dimensions (ZIP21 with Fin [SLA21Pin])

(Unit : mm)

