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**SLA7070MR, MPR, MPRT/7071MR, MPR, MPRT/7072MR, MPR, MPRT/7073MR, MPR, MPRT** 2-Phase/1-2 Phase Excitation Support, Built-in Sequencer

■ **Features**

- Lineup of built-in current sense resistor and built-in protection circuit-type
- Power supply voltages,  $V_{BB}$ : 46 V (max), 10 to 44 V normal operating range
- Logic supply voltages,  $V_{DD}$ : 3.0 to 5.5 V
- Maximum output currents: 1 A, 1.5 A, 2 A, and 3 A
- 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
- ZIP type 23-pin molded package (SLA package)

■ **Absolute Maximum Ratings**

Parameter	Symbol	Ratings	Unit	Remarks
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	A	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	$V_{RS}$	$\pm 2$	V	Excluding $t_w < 1 \mu s$
Power Dissipation	PD	4.7	W	When $T_a = 25^\circ C$
		17		When $T_c = 25^\circ C$
Junction Temperature	$T_j$	+150	$^\circ C$	
Operating Ambient Temperature	$T_a$	-20 to +85	$^\circ C$	
Storage Temperature	$T_{stg}$	-30 to +150	$^\circ C$	

\*1: Output current value may be limited for the SLA7070MR, MPR, MPRT (1.0 A), SLA7071MR, MPR, MPRT (1.5 A), SLA7072MR, MPR, MPRT (2.0 A), and SA7073MR, MPR, MPRT (3.0 A), depending on the duty ratio, ambient temperature, and heating conditions.

Be sure that junction temperature of  $T_j$  is not exceeded under any circumstances.

■ **Recommended Operating Conditions**

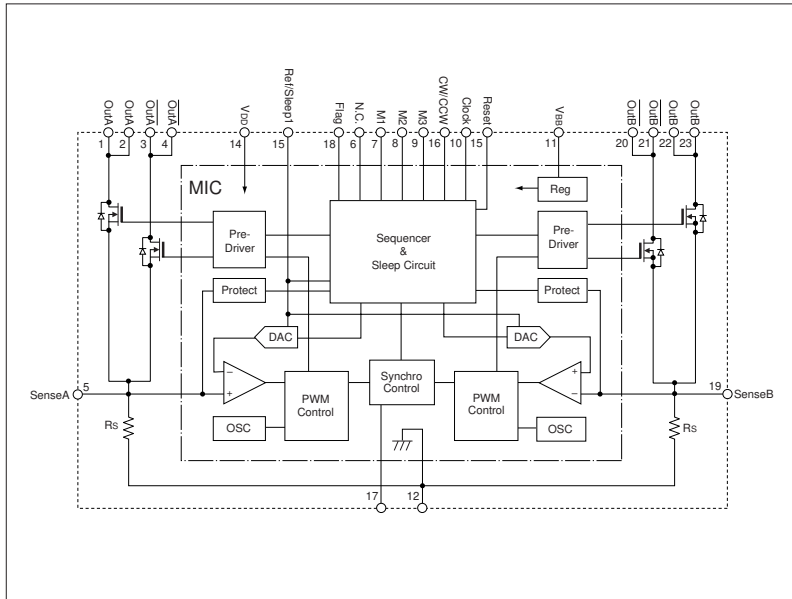
Parameter	Symbol	Rating		Unit	Remarks
		min.	max.		
Motor Supply Voltage	$V_M$		44	V	
Driver Supply Voltage	$V_{BB}$	10	44	V	
Logic Supply Voltage	$V_{DD}$	3.0	5.5	V	The $V_{DD}$ surge voltage should be 0.5 V or lower
Case Temperature	$T_C$		90	$^\circ C$	Temperature at Pin-12 Lead (without heatsink)

■ **Electrical Characteristics**

Parameter	Symbol	Ratings			Unit	Conditions
		min.	typ.	max.		
Main Supply Current	$I_{BB}$		15		mA	In operation
	$I_{BBS}$			100	$\mu A$	Sleep 1 and Sleep 2 modes
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	$R_{DS(ON)}$		0.7	0.85	$\Omega$	SLA7070M, $I_D=1.0A$
			0.45	0.6		SLA7071M, $I_D=1.5A$
			0.25	0.4		SLA7072M, $I_D=2.0A$
			0.18	0.24		SLA7073M, $I_D=3.0A$
Output MOSFET Diode Forward Voltage	$V_F$		0.85	1.1	V	SLA7070M, $I_D=1.0A$
			1.0	1.25		SLA7071M, $I_D=1.5A$
			0.95	1.2		SLA7072M, $I_D=2.0A$
			0.95	2.1		SLA7073M, $I_D=3.0A$
						When Clock Duty = 50%
Maximum Clock Frequency	$F_{clock}$	250			kHz	
Logic Input Voltage	$V_{IL}$			0.25VDD	V	
	$V_{IH}$	0.75VDD				
Logic Input Current	$I_{IL}$		$\pm 1$		$\mu A$	
	$I_{IH}$		$\pm 1$			
REF Input Voltage	$V_{REF}$		0.04	0.3	V	SLA7070M, within the current setting range
			0.04	0.45		SLA7071M, within the current setting range
			0.04	0.4		SLA7072M, within the current setting range
			0.04	0.45		SLA7073M, within the current setting range
	$V_{REFS}$	2		VDD		Output OFF (Sleep 1)
REF Input Current	$I_{REF}$		$\pm 10$		$\mu A$	
Sense Voltage	$V_{SENSE}$		$V_{REF}$		V	When step reference current ratio is 100%
Sleep-Enable Recovery Time	$T_{SE}$	100			$\mu s$	Sleep1&Sleep2
Switching Time	$t_{con}$		2.0		$\mu s$	Clock $\rightarrow$ Out ON
	$t_{off}$		1.5		$\mu s$	Clock $\rightarrow$ Out OFF
Sense Resistance	$R_s$		0.296	0.305	$\Omega$	SLA7070M, tolerance of $\pm 3\%$
			0.296	0.305		SLA7071M, tolerance of $\pm 3\%$
			0.199	0.205		SLA7072M, tolerance of $\pm 3\%$
			0.150	0.155		SLA7073M, tolerance of $\pm 3\%$
Overcurrent Sense Voltage	$V_{ocp}$		0.65	0.7	V	SLA7070xMPR, MPRT, when motor coil shorts out
				2.3		SLA7070MPR, MPRT/7071MPR, MPRT
Overcurrent Sense Current	$I_{ocp}$			3.5	A	SLA7072MPR, MPRT
				4.6		SLA7073MPR, MPRT
						SLA707xMPRT, Rear of case (at the saturation temperature)
Flag Output Voltage	$V_{FlagL}$			1.25	V	SLA707xMPR, MPRT, $I_{FlagL}=1.25mA$
	$V_{FlagH}$	1.25-VDD				SLA707xMPR, MPRT, $I_{FlagH}=-1.25mA$
Flag Output Current	$I_{FlagL}$			1.25	mA	SLA707xMPR, MPRT
	$I_{FlagH}$	-1.25				
Step Reference Current Ratio	ModeF		100		%	
	Mode8		70.7		%	
PWM Minimum ON Time	$t_{on(min)}$		3.2		$\mu s$	
PWM OFF Time	$t_{off}$		12		$\mu s$	

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

Internal Block Diagram



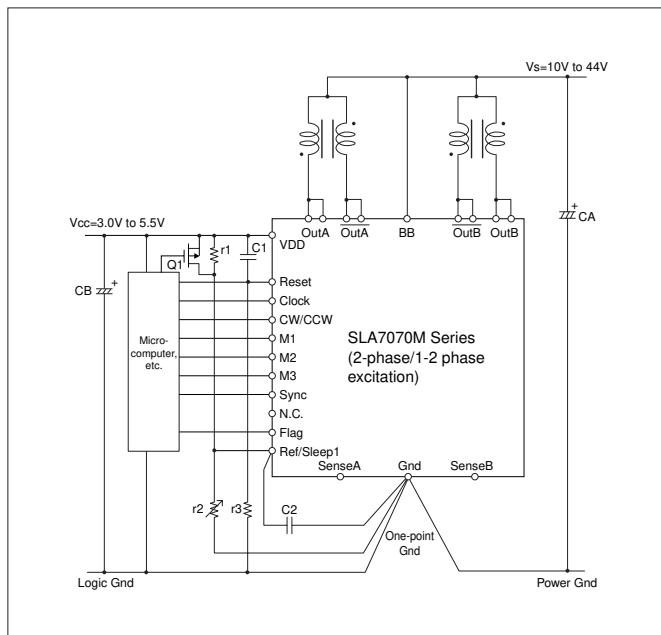
The protect circuit is deleted and the flag pin is N.C. for SLA7070MR, 7071MR, 7072MR, and 7073MR.

Pin Assignment

Pin No.	Symbol	Function
1	OutA	Phase A output
2		
3		
4	OutA/	Phase A̅ output
5	SenseA	Phase A current sense
6	N.C.	N.C.
7	M1	Excitation mode/Sleep 2 setting input
8	M2	
9	M3	
10	Clock	Step Clock input
11	V <sub>SS</sub>	Driver supply (motor supply)
12	Gnd	Device GND
13	Ref/Sleep1	Control current mode/Sleep 1 setting input
14	V <sub>DD</sub>	Logic supply
15	Reset	Internal logic reset input
16	CW/CCW	Normal/reverse control input
17	Sync	PWM control signal input
18	Flag <sup>1</sup>	Protection circuit monitor output <sup>1</sup>
19	SenseB	Phase B current sense
20	OutB/	Phase B̅ current output
21		
22		
23	OutB	Phase B current output

<sup>1</sup>: N.C. pin for SLA7070MR, 7071MR, 7072MR, and 7073MR.

Typical Connection Diagram



\* There is no Flag pin (Pin-18) for SLA7070MR, 7071MR, 7072MR, and 7073MR.

External Dimensions (ZIP23 with Fin[SLA23Pin])

