

SLA7075MR, MPR, MPRT/7076MR, MPR, MPRT/7077MR, MPR, MPRT/7078MR, MPR, MPRT 2-Phase to 4W 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
- 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
- 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	V _{ref} =0.4V, 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<1μs
Power Dissipation	PD	4.7	W	When T _a = 25°C
		17		When T _c = 25°C
Junction Temperature	T _J	+150	°C	
Operating Ambient Temperature	T _a	−20 to +85	°C	
Storage Temperature	T _{stg}	−30 to +150	°C	

*1: Output current value may be limited for the SLA7075MR, MPR, MPRT (1.0 A), SLA7076MR, MPR, MPRT (1.5 A), SLA7077MR, MPR, MPRT (2.0 A), and SA7078MR, MPR, MPRT (3.0 A), depending on the duty ratio, ambient temperature, and heating conditions.
Do not exceed junction temperature of T_J under any circumstances.

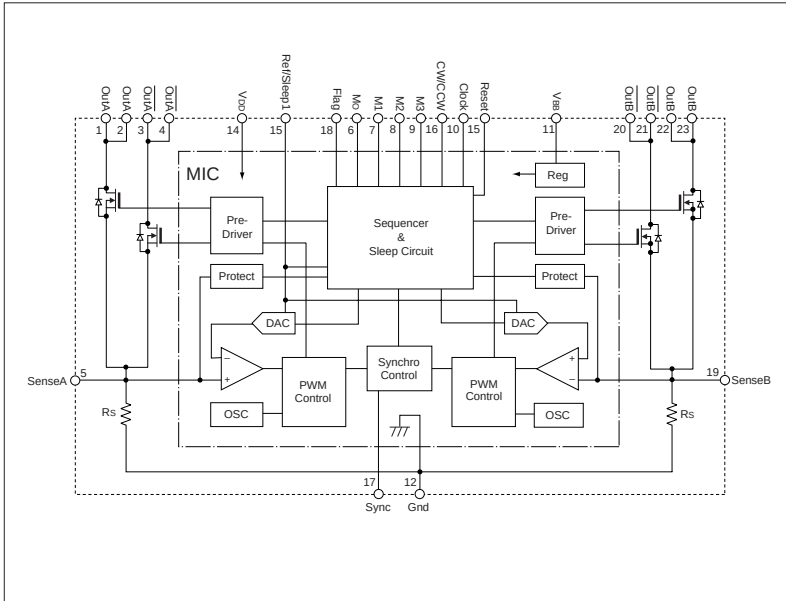
Recommended Operating Conditions

Parameter	Symbol	Rating		Unit	Remarks
		min.	max.		
Motor Supply Voltage	V _M		44	V	
Driver Supply Voltage	V _S	10	44	V	
Logic Supply Voltage	V _{DD}	3.0	5.5	V	The V _{CC} surge voltage should be 0.5 V or lower
Case Temperature	T _C		90	°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	μA	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 _O =1mA
Output MOSFET ON Resistance	R _{DS(ON)}		0.7	0.85	Ω	SLA7075M, I _O =1.0A
			0.45	0.6		SLA7076M, I _O =1.5A
			0.25	0.4		SLA7077M, I _O =2.0A
			0.18	0.24		SLA7078M, I _O =3.0A
Output MOSFET Diode Forward Voltage	V _F		0.85	1.1	V	SLA7075M, I _O =1.0A
			1.0	1.25		SLA7076M, I _O =1.5A
			0.95	1.2		SLA7077M, I _O =2.0A
			0.95	2.1		SLA7078M, I _O =3.0A
Maximum Clock Frequency	F _{clock}	250			kHz	When Clock Duty = 50%
Logic Input Voltage	V _{IL}			0.25V _{DD}	V	
	V _{IH}	0.75V _{DD}				
Logic Input Current	I _{IL}		±1		μA	
	I _{IH}		±1			
REF Input Voltage	V _{REF}	0.04		0.3	V	SLA7075M, within the specified current limit
		0.04		0.45		SLA7076M, within the specified current limit
		0.04		0.4		SLA7077M, within the specified current limit
		0.04		0.45		SLA7078M, within the specified current limit
	V _{REFS}	2		V _{DD}		Output (OFF) Sleep 1
REF Input Current	I _{REF}		±10		μA	
SENSE Sense Voltage	V _{SENSE}		V _{REF}		V	When step reference current ratio is 100%
Sleep-Enable Recovery Time	T _{SE}	100			μs	Sleep1&Sleep2
Switching Time	t _{con}		2.0		μs	Clock → Out ON
	t _{coff}		1.5		μs	Clock → Out OFF
Sense Resistance	R _S	0.296	0.305	0.314	Ω	SLA7075M, tolerance of ±3%
		0.296	0.305	0.314		SLA7076M, tolerance of ±3%
		0.199	0.205	0.211		SLA7077M, tolerance of ±3%
		0.150	0.155	0.160		SLA7078M, tolerance of ±3%
Overcurrent Sense Voltage	V _{ocp}	0.65	0.7	0.75	V	SLA707xMPR, MPRT, when motor coil shorts out
Overcurrent Sense Current	I _{ocp}		2.3		A	SLA7075MPR, MPRT/7076MPR, MPRT
			3.5			SLA7077MPR, MPRT
			4.6			SLA7078MPR, MPRT
Thermal Protection Temperature	T _{std}		140		°C	SLA707xMPRT, Rear of case (at the saturation temperature)
Logic Output Voltage	V _{LOL}			1.25	V	SLA707xMPR, MPRT, I _{FlagL} =1.25mA
	V _{LOH}	V _{DD} −1.25				SLA707xMPR, MPRT, I _{FlagH} =−1.25mA
Logic Output Current	I _{LOL}			1.25	mA	SLA707xMPR, MPRT
	I _{LOH}	−1.25				
Step Reference Current Ratio	ModeF		100		%	
	ModeE		98.1		%	
	ModeD		95.7		%	
	ModeC		92.4		%	
	ModeB		88.2		%	
	ModeA		83.1		%	
	Mode9		77.3		%	
	Mode8		70.7		%	
	Mode7		63.4		%	
	Mode6		55.5		%	
	Mode5		47.1		%	
	Mode4		38.2		%	
	Mode3		29.0		%	
	Mode2		19.5		%	
PWM Minimum ON Time	ton(min)		1.7		μs	
	toff1		12		μs	Mode 8 to F
PWM OFF Time	toff2		9		μs	Mode 4 to 7
	toff3		7		μs	Mode 1 to 3

Internal Block Diagram



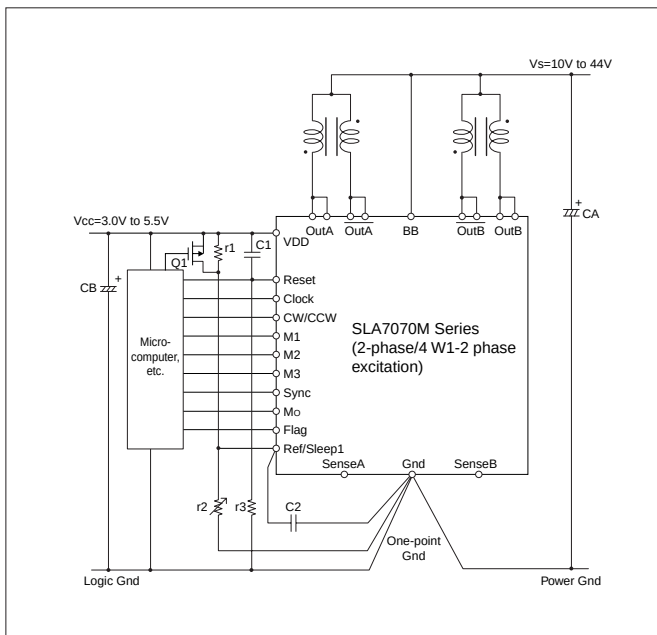
The protect circuit is deleted and the flag pin is N.C. for SLA7075MR, 7076MR, 7077MR, and 7078MR.

Pin Assignment

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

*1: N.C. pin for SLA7075MR, 7076MR, 7077MR, and 7078MR.

Typical Connection Diagram



* There is no Flag pin (pin 18) for SLA7075MR, 7076MR, 7077MR, and 7078MR.

External Dimensions (ZIP23 with Fin [SLA23Pin])

