

SLA7075MR, MPR/7076MR, MPR/7077MR, MPR/7078MR, MPR

2-Phase/4 W1-2 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	$V_{ref}=0.4V$, 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 $t_w<1\mu s$
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_{sig}	-30 to $+150$	$^{\circ}C$	

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

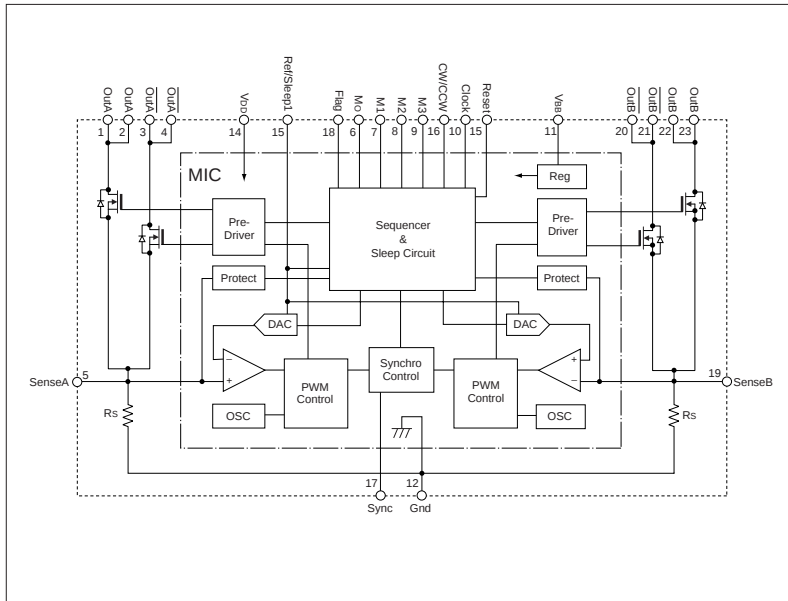
Recommended Operating Conditions

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
REF Input Voltage	V_{REF}	0.0	0.4	V	When operating current control
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	μA	Sleep 1 and Sleep 2 modes
Logic Supply Current	I_{CC}			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	Ω	SLA7075M, $I_D=1.0A$
			0.45	0.6		SLA7076M, $I_D=1.5A$
			0.25	0.4		SLA7077M, $I_D=2.0A$
			0.18	0.24		SLA7078M, $I_D=3.0A$
			0.85	1.1		SLA7075M, $I_D=1.0A$
Output MOSFET Diode Forward Voltage	V_F		1.0	1.25	V	SLA7076M, $I_D=1.5A$
			0.95	1.2		SLA7077M, $I_D=2.0A$
			0.95	2.1		SLA7078M, $I_D=3.0A$
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	SLA7075MR/7075MPR, within the specified current limit
		0.04		0.45		SLA7077MR/7076MPR, within the specified current limit
		0.04		0.4		SLA7077MR/7077MPR, within the specified current limit
		0.04		0.45		SLA7078MR/7078MPR, 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 $\rightarrow$ Out ON
	t_{coff}		1.5		μs	Clock $\rightarrow$ Out OFF
Sense Resistance	R_S	0.296	0.305	0.314	Ω	SLA7075MR/7075MPR, tolerance of $\pm 3\%$
		0.296	0.305	0.314		SLA7076MR/7076MPR, tolerance of $\pm 3\%$
		0.199	0.205	0.211		SLA7077MR/7077MPR, tolerance of $\pm 3\%$
		0.150	0.155	0.160		SLA7078MR/7078MPR, tolerance of $\pm 3\%$
Overcurrent Sense Voltage	V_{ocp}	0.65	0.7	0.75	V	SLA7075MPR/7076MPR/7077MPR/7078MPR, when motor coil shorts out
Overcurrent Sense Current	I_{ocp}		2.3		A	SLA7075MPR/7076MPR
			3.5			SLA7077MPR
			4.6			SLA7078MPR
Flag Output Voltage	V_{FlagL}			1.25	V	SLA70750MPR/7076MPR/7077MPR/7078MPR, $I_{FlagL}=1.25mA$
	V_{FlagH}	$V_{DD}-1.25$				SLA7075MPR/7076MPR/7077MPR/7078MPR, $I_{FlagH}=-1.25mA$
Flag Output Current	I_{FlagL}			1.25	mA	SLA7075MPR/7076MPR/7077MPR/7078MPR
	I_{FlagH}	-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		%	
	Mode1		9.8		%	
Mo (Load) Output Voltage	V_{MOL}			1.25	V	$I_{MOL}=1.25mA$
	V_{MOH}	$V_{DD}-1.25$				$I_{MOH}=-1.25mA$
Mo (Load) Output Current	I_{MOL}			1.25	mA	
	I_{MOH}	-1.25				
PWM Minimum ON Time	$t_{on(min)}$		1.7		μs	
	t_{off1}		12		μs	Mode 8 to F
PWM OFF Time	t_{off2}		9		μs	Mode 4 to 7
	t_{off3}		7		μs	Mode 1 to 3

Internal Block Diagram



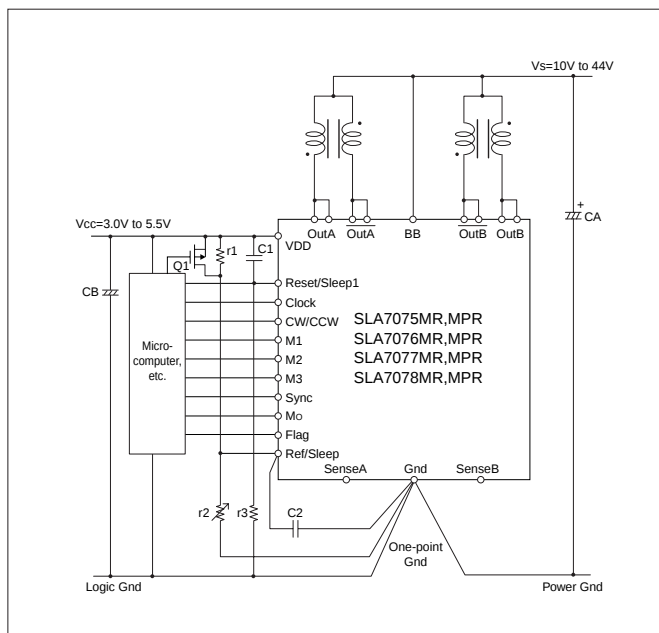
The protect circuit is deleted and the flag pin is N.C. for SLA7075MR, 7076MR, 7077MR, and 7078MR.

Pin Assignment

Pin No.	Symbol	Function
1	OutA	Phase A output
2		
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	V _{BB}	Driver supply (motor supply)
12	Gnd	Device GND
13	Ref/Sleep1	Control current mode/Sleep 1 setting input
14	V _{DD}	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	OutB/	Phase B current output
21		
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])

