STA7130MPR/7131MPR/7132MPR 2-Phase to 2W 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
- Maximum output currents: 1 A, 1.5 A, and 2 A
- Supporting the clock-input-method micro-step drive (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 18-pin molded package (STA package)

■Absolute Maximum Ratings

(T_a=25°C)

Parameter	Symbol	Ratings	Unit	Remarks
Motor Supply Voltage	V_M	46	V	
Driver Supply Voltage	V_{BB}	46	V	
Output Current	Io	*1	A	Mode F
Logic Input Voltage	V_{IN}	–0.3 to +6	V	
REF Input Voltage	V_{REF}	–0.3 to +6	V	
Sense Voltage	V_{RS}	±0.5	V	Excluding tw<1μs
Power Dissipation	PD	3.5	W	When T_a = 25°C
		12.5		When T_c = 25°C
Junction Temperature	T_j	+150	°C	
Operating Ambient Temperature	T_a	–20 to +80	°C	
Storage Temperature	T_{stg}	–30 to +150	°C	

*1: Output current value may be limited for the STA7130MPR (1.0 A), 7131MPR (1.5 A), and 7132MPR (2.0 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 min.	Rating max.	Unit	Remarks
Motor Supply Voltage	V_M		44	V	
Driver Supply Voltage	V_{BB}	10	44	V	
Case Temperature	T_C		85	°C	Temperature at Pin-10 Lead (without Fin)

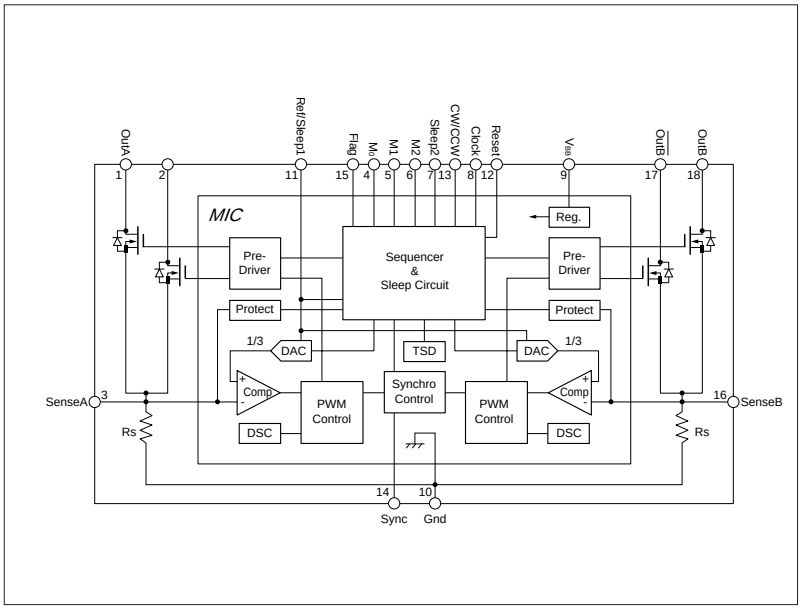
■Electrical Characteristics

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

Parameter	Symbol	Ratings min.	Ratings typ.	Ratings max.	Unit	Conditions
Main Supply Current	I_{BB}			10	mA	In operation
	I_{BBS}			3	mA	Sleep 1 and Sleep 2 modes
Output MOSFET Breakdown Voltage	$V_{(BR)DSS}$	100			V	
Output MOSFET ON Resistance	$R_{DS(ON)}$		0.7	0.85	Ω	STA7130MPR
			0.25	0.4		STA7131MPR
			0.18	0.24		STA7132MPR
Output MOSFET Diode Forward Voltage	V_F		0.85	1.1	V	STA7130MPR
			0.95	1.2		STA7131MPR
			0.95	2.1		STA7132MPR
Maximum Clock Frequency	Fclock	250			kHz	When Clock Duty = 50%
Logic Input Voltage	V_{IL}			0.7	V	
	V_{IH}	2.3				
Logic Input Current	I_{IL}		±10		μA	
	I_{IH}		±10			
REF Input Voltage	V_{REF}	0		0.9	V	
	V_{REFS}	2.0		5.5		Output OFF (Sleep 1)
REF Input Current	I_{REF}		±10		μA	
Sense Voltage	V_{SENSE}	V_{REF}/3-0.03	V_{REF}/3	V_{REF}/3+0.03	V	When step reference current ratio is 100%
Sleep-Enable Recovery Time	T_{SE}	100			μS	Sleep1&Sleep2
Switching Time	t_{con}		1.4		μS	Clock → Out ON
	t_{coff}		0.7		μS	Clock → Out OFF
Sense Resistance	R_S		0.305		Ω	STA7130MPR
			0.205			STA7131MPR
			0.155			STA7132MPR
Overcurrent Sense Voltage	V_{ocp}	0.65	0.7	0.75	V	When motor coil shorts out
Overcurrent Sense Current Vocp÷Rs	Iocp		2.3		A	STA7130MPR
			3.5			STA7131MPR
			4.5			STA7132MPR
Thermal Protection Temperature	Ttsd		125		°C	Rear of case (at the saturation temperature)
Logic Output Voltage	V_{LOL}			0.8	V	I_{LOL} =5mA
Logic Output Current	I_{LOL}			5	mA	V_{LOL} =0.8V
Step Reference Current Ratio	ModeF		100		%	VREF=0.1V to 0.9V
	ModeE		98.1		%	
	ModeC		92.4		%	
	ModeA		83.1		%	
	Mode8		70.7		%	
	Mode6		55.5		%	
	Mode4		38.2		%	
	Mode2		19.5		%	
PWM Minimum ON Time	ton(min)		1.5		μS	
PWM OFF Time	toff1		11.5		μS	Mode 8 to F
	toff2		8.5		μS	Mode 4 to 6
	toff3		7		μS	Mode 2

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

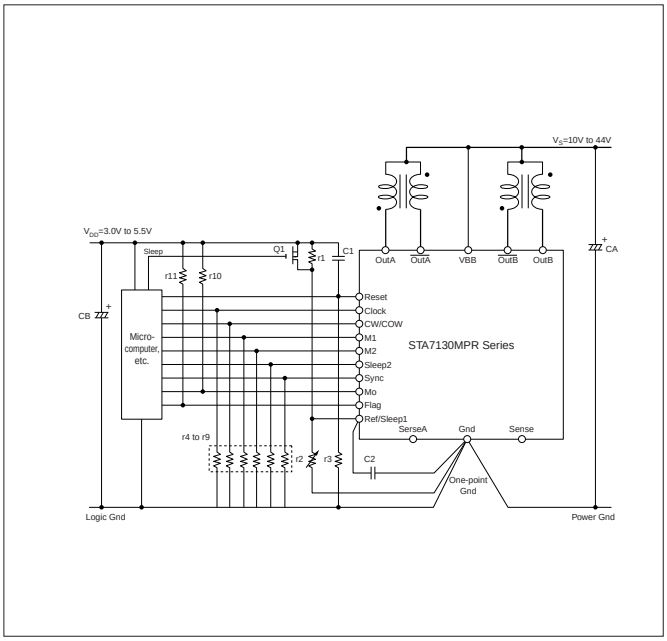
■Internal Block Diagram



■Pin Assignment

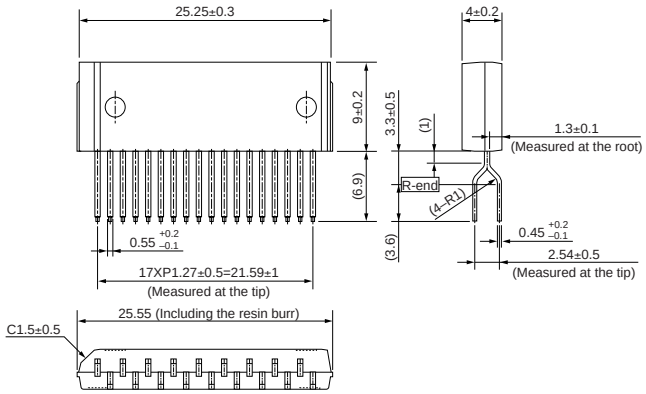
Pin No.	Symbol	Function
1	OutA	Phase A output
2	OutA/	Phase $\overline{A}$ output
3	SenseA	Phase A current sense
4	M_O	2 phase excitation state output monitor output
5	M1	Excitation mode setting input
6	M2	
7	Sleep2	Sleep 2 setting input
8	Clock	Step Clock input
9	V_{BB}	Driver supply (motor supply)
10	Gnd	Device GND
11	Ref/Sleep1	Control current mode/Sleep 1 setting input
12	Reset	Internal logic reset input
13	CW/CCW	Normal/reverse control input
14	Sync	PWM control signal input
15	Flag	Coil open/shorted detection output
16	SenseB	Phase B current sense
17	OutB/	Phase $\overline{B}$ output
18	OutB	Phase B output

■Typical Connection Diagram



■External Dimensions (ZIP18 with Fin [STA18Pin])

(Unit : mm)



Forming No. No.434

Product Mass : Approx.6g