

# 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

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

Parameter	Symbol	Ratings	Unit	Remarks
Motor Supply Voltage	$V_M$	46	V	
Driver Supply Voltage	$V_{BB}$	46	V	
Output Current	$I_o$	*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	$V_{RS}$	$\pm 0.5$	V	Excluding $t_w < 1\mu\text{s}$
Power Dissipation	PD	3.5	W	When $T_a = 25^\circ\text{C}$
		12.5		When $T_c = 25^\circ\text{C}$
Junction Temperature	$T_j$	+150	$^\circ\text{C}$	
Operating Ambient Temperature	$T_a$	-20 to +80	$^\circ\text{C}$	
Storage Temperature	$T_{stg}$	-30 to +150	$^\circ\text{C}$	

\*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		Unit	Remarks
		min.	max.		
Motor Supply Voltage	$V_M$		44	V	
Driver Supply Voltage	$V_{BB}$	10	44	V	
Case Temperature	$T_c$		85	$^\circ\text{C}$	Temperature at Pin-10 Lead (without Fin)

## Electrical Characteristics

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

Parameter	Symbol	Ratings			Unit	Conditions
		min.	typ.	max.		
Main Supply Current	$I_{bb}$			10	mA	In operation
	$I_{bbs}$			3		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	$\Omega$	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	$F_{clock}$	250			kHz	When Clock Duty = 50%
Logic Input Voltage	$V_{IL}$			0.7	V	
	$V_{IH}$	2.3				
Logic Input Current	$I_{IL}$		$\pm 10$		$\mu\text{A}$	
	$I_{IH}$		$\pm 10$			
REF Input Voltage	$V_{REF}$	0		0.9	V	
	$V_{REFS}$	2.0		5.5		Output OFF (Sleep 1)
REF Input Current	$I_{REF}$		$\pm 10$		$\mu\text{A}$	
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			$\mu\text{s}$	Sleep1&Sleep2
Switching Time	$t_{con}$		1.4		$\mu\text{s}$	Clock $\rightarrow$ Out ON
	$t_{coff}$		0.7			Clock $\rightarrow$ Out OFF
Sense Resistance	$R_s$		0.305		$\Omega$	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 $V_{ocp}+R_s$	$I_{ocp}$		2.3		A	STA7130MPR
			3.5			STA7131MPR
			4.5			STA7132MPR
Thermal Protection Temperature	$T_{tsd}$		125		$^\circ\text{C}$	Rear of case (at the saturation temperature)
Logic Output Voltage	$V_{LLOL}$			0.8	V	$I_{LLOL} = 5\text{mA}$
Logic Output Current	$I_{LLOL}$			5	mA	$V_{LLOL} = 0.8V$
Step Reference Current Ratio	ModeF		100		%	$V_{REF}=0.1V$ to $0.9V$
	ModeE		98.1			
	ModeC		92.4			
	ModeA		83.1			
	Mode8		70.7			
	Mode6		55.5			
	Mode4		38.2			
PWM Minimum ON Time	$t_{on(min)}$		1.5		$\mu\text{s}$	
	$t_{off1}$		11.5			Mode 8 to F
PWM OFF Time	$t_{off2}$		8.5		$\mu\text{s}$	Mode 4 to 6
	$t_{off3}$		7			Mode 2

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

