

SPINX1A MANUAL

PWM TO ANALOG SPINDLE INTERFACE

V1.1

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GENERAL

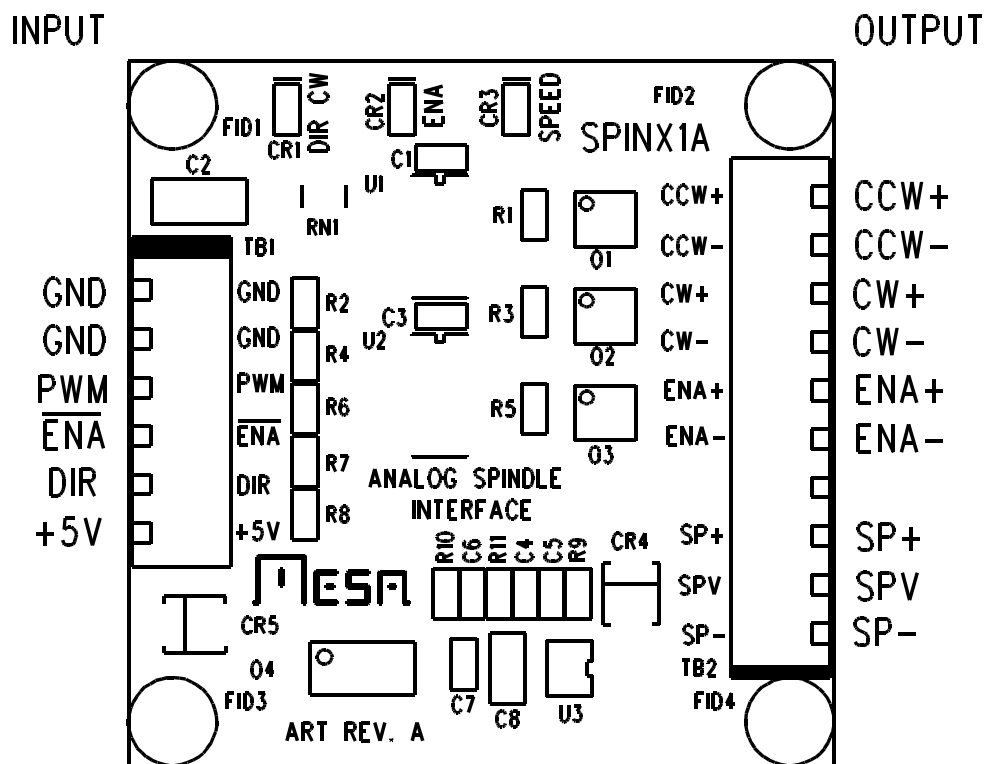
DESCRIPTION

The SPINx1A is a one channel isolated digital potentiometer intended for spindle control. The SPINx1A takes three TTL level signals, PWM, DIR and ENA and has four isolated outputs: CW, CCW, ENA and VOUT. VOUT is a buffered analog voltage proportional to the PWM input and the externally supplied analog reference voltage (5 to 21 VDC).

The SPINX1A is an upgrade to the SPINX1 with higher analog output voltage capability (21V vs 15V) and constant analog current draw (~3 mA) vs PWM duty cycle.

CONNECTORS

CONNECTOR AND SIGNAL LOCATIONS



CONNECTORS

INPUT CONNECTOR

6 pin 3.5 MM terminal block TB1 is used to the SPINX1As TTL level input connections.

PIN	FUNCTION	LEVEL
1	GND	
2	GND	
3	PWM	ACTIVE HIGH
4	ENABLE	ACTIVE LOW
5	DIR	HIGH = CW
6	+5V	

OUTPUT CONNECTOR

10 pin 3.5 MM terminal block TB2 is used to the SPINX1s isolated output connections. TB2 is normally split to a 3 pin connector for the analog out and a 6 pin connector for the isolated digital outputs.

PIN	FUNCTION	DESCRIPTION
1	SP-	SPINDLE ANALOG OUT LOW
2	SPV	SPINDLE ANALOG OUT
3	SP+	SPINDLE ANALOG OUT HIGH
4	NC	NOT USED
5	ENA-	SPINDLE ENABLE -
6	ENA+	SPINDLE ENABLE +
7	CW-	SPINDLE CW-
8	CW+	SPINDLE CW+
9	CCW-	SPINDLE CCW-
10	CCW+	SPINDLE CCW+

OPERATION

INPUTS

Three TTL level digital inputs are required for SPINX1A operation, ENABLE, PWM and direction. The ENABLE input is active low, that is it must be pulled low to enable analog and digital outputs. The PWM signal is active high. The PWM signal is terminated with 220/330 ohm termination resistors for signal fidelity. The DIR input is high for CW and low for CCW

5V POWER

The SPINX1A requires ~50 mA of 5V power for operation. This is applied to TB1 input pins 1 and 6.

MONITOR LEDS

Monitor LEDs are provided on the SPEED (PWM), ENABLE, and DIR CW lines. The enable LED illuminates when ENABLE is asserted, the DIR CW LED illuminates when the direction is CW, and the SPEED LED illuminates with a brightness proportional to the PWM duty cycle. **Note that on SPINX1A cards previous to revision A, the DIR CW and SPEED LED labels are swapped.**

ANALOG OUT

The SPINX1A provides an analog output for spindle control. The analog output is a isolated potentiometer replacement type device. It functions like a potentiometer with SP+ being the positive end of the potentiometer, SPV being the wiper and SP- being the negative end. The voltage on SPV pin out can be set to any voltage between SP- and SP+. Polarity and voltage range must always be observed for proper operation. The voltage supplied between SP+ and SP- must be between 5VDC and 21VDC with SP+ always being more positive than SP-. The analog output voltage is set by PWM from the controller. The optimum PWM frequency is approximately 20KHz, Higher frequencies will have lower ripple but more non-linearity, lower frequencies will have better linearity but more ripple.

A 50% duty cycle PWM signal will result in a 50% voltage output. The voltage output is gated by the ENABLE interface signal, and forced to = SP- when enable is not asserted (enable is active low at the FPGA interface level).

Because the analog output is isolated, bipolar output is possible, for example with SP+ connected to 10V and SP- connected to -10V, a +/-10V analog output range is created. In this case the PWM output must be offset so that 50% PWM is generated when a 0V output is required. Note that if bipolar output is used, the output will be forced to SP- at startup or when ENABLE is false.

OPERATION

ISOLATED OUTPUTS

The SPINX1A provides 3 isolated outputs for use for spindle direction control, spindle enable or other applications. These outputs are OPTO coupler Darlington transistors. They are all isolated from one another so can be used for pull up or pull-down individually. They will switch a maximum of 50 mA at 0 to 100 VDC. The ENABLE output is special as it uses the same signal that enables the analog output. When the analog output is enabled, the ENABLE OPTO output is on. The CW and CCW outputs can only be enabled then the ENABLE input is asserted.

ENABLE IN	DIR IN	ENABLE OUT	CW OUT	CCW OUT
0	0	ON	OFF	ON
0	1	ON	ON	OFF
1	X	OFF	OFF	OFF

Note that the isolated outputs are all individual switches so must always have both the + and - pins connected with switch polarity observed.

SPECIFICATIONS

	MIN	MAX	UNITS
5V POWER SUPPLY	4.75	5.25	VDC
5V POWER CONSUMPTION	---	50	mA
ANALOG REFERENCE VOLTAGE (from SP- to SP+)	5	21	Volts
ANALOG SUPPLY CURRENT	—	3	mA
ANALOG ISOLATION VOLTAGE (from input side)	—	2000	Volts DC
ANALOG OUTPUT NON-LINEARITY	—	1	% at 20KHz
ANALOG OUTPUT BANDWIDTH	60	—	Hz
ISOLATED OUTPUT CURRENT	—	10	mA
ISOLATED OUTPUT SWITCH VOLTAGE	—	100	Volts DC
ISOLATION VOLTAGE (From input side)	—	2000	Volts DC
OPERATING TEMP.	0	+70	°C
OPERATING TEMP. (-I version)	-40	+85	°C
OPERATION HUMIDITY	0	95%	NON-COND

REFERENCE INFORMATION

CARD DIMENSIONS

