

Chapter 1 2812 Evaluation Board Overview

2812 High Voltage Evaluation Board is based on TI DSP TMS320F2812 evaluation board. This evaluation is to help users learn DSP's basic features of C28X series, hence apply to motor control. This evaluation board can connect with external DC brush or brushless motor, asynchronous AC motor, permanent magnet synchronous motor and stepper motor to constitute an all digital servo motion control system.

1.1 Main Features

- On board 256K (Program 64K, data 64K) non-delay SRAM, clock frequency at 150MHz;
- 16-Channel 12 bit A/D internal converter;
- 128K Flash ROM is reprogrammable;
- In-chip event organizer directly controls 12-channel PWM pulse outputs. 6 hardware acquisition units can connect to Hall signal and photoelectric encoder signal.
- In-chip SPI slot exchanges data with serial EEPROM for bootload function
- 250Kbps RS232C interface to communicate with host
- On-board IEEE1149.1 JTAG slot supports system emulation and Flash ROM program
- On-board optical encoder input slot and Hall input slot
- AC220V input, supplying power to control system
- Completely separate digital ground and analogue ground, supporting testing point output interface.

Chapter 2 2812 High Voltage Driver Board Instruction

2.1 Board Connection

MCK2812 high voltage driver board connects with MCK2812HV and MCBUS1 of EVM2812 board to group up an electric motor driving system, and connects with MCBUS2 of IO2812 and EVM2812 to display revolution figure.

2.2 2812 High Voltage Driver Board Operation

The whole driving system needs +310V, +15V, +5V and +3.3V (DC power supply). +310V is for electric motor. +15V supplies IPM module. +5V and +3.3V supplies DSP chips and other control circuits.

Please directly provide 220V power supply to J4 slot, and pay attention to polarity. If D13, D14 and D15 LEDs are on, it means power supply is successfully connected to the whole driver board. If EVM2812 is connected, D16 would be ON too.

Please note that J4 of MCK2812LV and JP11 of EVM2812 CANNOT be powered simultaneously.

U, V, W of J4 correspond to PWM(1,2), PWM(3,4) and PWM(5,6) bridge output; J1 and J3 correspond to acquisition units of file manager EVA/EVB or GPIO can directly input Hall signal and photoelectric encoder separately, or simultaneously.

If only Hall signal is inputted, CAP of file manager would capture the input, and jump to Pin 2 and Pin 3, and JP7, JP8 and JP9 are off. If only photoencoder signal is connected, CAP of file manager would capture the input, and jump to pin 1 and pin 2, and JP7-8 jump off. If both Hall and photoelectric signal are connected, JP4, JP5 and JP6 can jump to pin1 and pin2, and connect photoelectric to CAP, and jump on JP7, JP8 and JP9, then connect Hall signal to corresponding GPIO port. By doing this, it is possible to use only one EVM2812 board to drive both MCK2812LC boards simultaneously.

J2 is the MCBUS port of MCK2812, which connects with EVM2812's JP1 or JP2 to form a complete control system. Please note that when hooking up the circuit, pay attention to pin order.

2.3 Power Supply Connection

A 220V power supply can be directly provided to J4. Please pay attention to connection order: emulator is connected to EVM2812 board by JTAG, after EVM2812 and MCK2812 are connected, power up J4. It is essential to power off the evaluation board before JTAG is pulled out.

If the board is powered by J4, the +5V power can not be connected to other +5V power source to prevent current from flowing back.

2.4 Digital/Analog IO Signal Input/Output

320F2812 provides 16-channel 10 bit A/D inputs, 14 of which are led by corresponding ports (AD0-AD7 are led by J5 and AD8-AD13 are led by J6). Moreover, there is analog/digital pulse input interface J11, which can be utilized by both analog and digital signals, varying in choice between JP7 and JP8. When JP7 and JP8 are both short circuited between 1-2, please choose digital impulse as input type. Pin 2 of J11 respects to pulse ground. In the other hand, when both JP7 and JP8 are short-circuited between 2-3, external analog input should not be greater than 5 volts, which can be reduced by on board 10K POT.

Internal AD arrangement:

AD0 is low bridge arm current sample signal. Resistance is 5 ohms with gain of 10.

AD1 is same as AD0 as a low bridge arm, with gain of 18.

AD2 is DC voltage 15-40 monitoring input, divided by voltage divider into 19:1

AD3 is external analog input

AD4 is U phase mid-voltage monitor input. Voltage divided at 50:3

AD5 is V phase mid-voltage monitor input. Voltage divided at 50:3

AD6 is W phase mid-voltage monitor input. Voltage divided at 50:3

AD7 is EVA port (J5 lead) for external input

AD8-AD13 is EVA port (J6 lead) for external input.

2.5 Hall Signal and Orthogonal Encoding Signal Input

Hall signal and orthogonal encoding signal are both 5VTTL or CMOS inputs. On-board voltage divider would divide 5V into 3.3V and then input. There is a pull-up resistor on MCK2812 board, which connects between OC output or direct output Hall signal and photoelectric encoding signal.

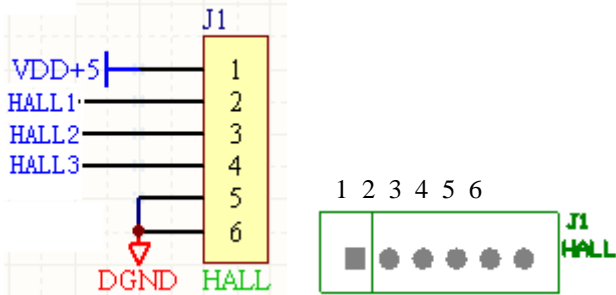
J1 is Hall signal input (6 pins input), and J3 is orthogonal encoding photoelectric input port (8pins).

Chapter 3 Input/Output Sketch Instructions

3.1 J1 Pin Assignment

J1 is Hall sensor input pin

J1's wiring instruction is shown as below:

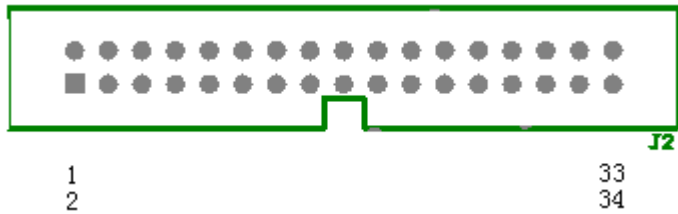


J1-1	+5V output
J1-2	HALL A
J1-3	HALL B
J1-4	HALL C
J1-5	HALL D

3.2 J2 Pin Assignment

J2 is a MCBUS port.

J2. MOTOR CONTROL BUS

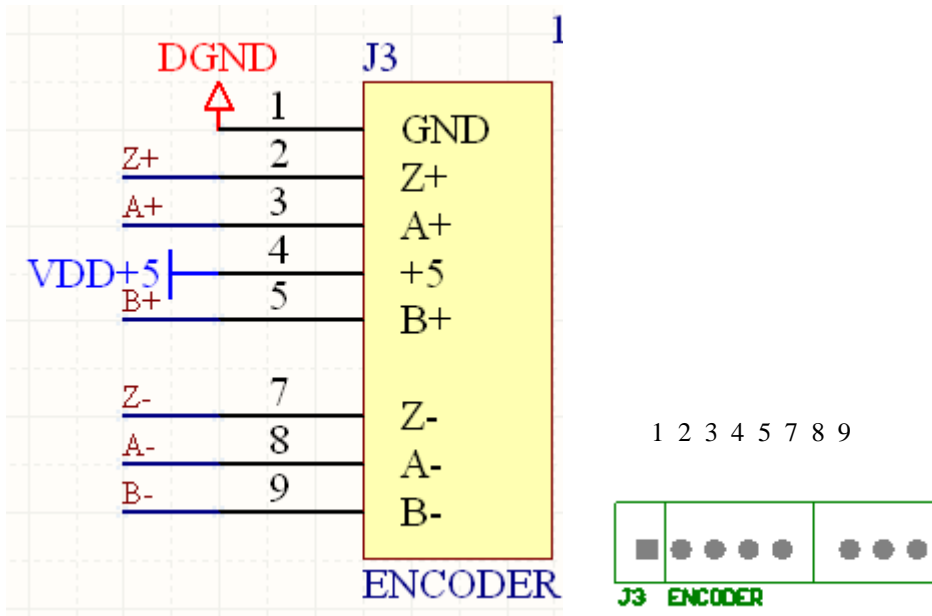


Pin #	Signal	Pin #	Signal
1	PWM1	2	PWM2
3	PWM3	4	PWM4
5	PWM5	6	PWM6
7	T1PWM	8	T2PWM
9	CAP1	10	CAP2
11	CAP3	12	TDIRA
13	TCKINA	14	/T1CTRIP
15	XINT2	16	/T2CTRIP
17	(empty)	18	(empty)
19	(empty)	20	(empty)
21	GND	22	GND
23	+5V	24	+5V
25	(empty)	26	ADCLO
27	ADINA6	28	ADINA7
29	ADINA4	30	ADINA5
31	ADINA2	32	ADINA3

33	ADINA0	34	ADINA1
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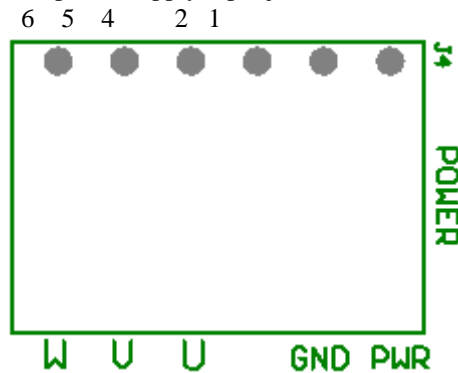
3.3 J3 Pin Assignment

J3 is orthogonal photoelectric encoder input port.



3.4 J4 Pin Assignment

J4 is a three-phase electric motor and power supply input jack.



- J4-1 Power +18-80V DC power supply input
- J4-2 GND power supply ground
- J4-4 Electric motor U phase
- J4-5 Electric motor V phase
- J4-6 W Electric motor W phase

Chapter 4 MCK2812 Jumpers Instruction

Jumper #	Dimensions	Function
JP1	1×2	HALL Pull-up
JP2	1×2	HALL Pull-up
JP3	1×2	HALL Pull-up
JP4	1×3	CAP Pin input /HALL/ENC Signal choice
JP5	1×3	CAP Pin input /HALL/ENC Signal choice
JP6	1×3	CAP Pin input /HALL/ENC Signal choice
JP7	1×2	HALL Signal Input IO Port
JP8	1×2	HALL Signal Input IO Port
JP9	1×2	HALL Signal Input IO Port
JP10	1×3	Hardware/Software output PWM

JP1. HALL Pull-up

1-2	Hall signal pull up
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JP2. HALL Pull-up

1-2	Hall signal pull up
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JP3. HALL Pull-up

1-2	Hall signal pull up
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JP4. CAP Pin input /HALL/ENC Signal choice

1-2	CAP input photoelectric signal
2-3	CAP input HALL Signal

JP5. CAP Pin input /HALL/ENC Signal choice

1-2	CAP input photoelectric signal
2-3	CAP input HALL Signal

JP6. CAP Pin input /HALL/ENC Signal choice

1-2	CAP input photoelectric signal
2-3	CAP input HALL Signal

JP7. HALL Signal Input IO Port

1-2	HALL Signal Input IO Port
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JP8. HALL Signal Input IO Port

1-2	HALL Signal Input IO Port
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JP9. HALL Signal Input IO Port

1-2	HALL Signal Input IO Port
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JP10. Hardware/Software output PWM

1-2	Software 6-channel PWM output
2-3	Hardware 6-channel PWM output

Chaper5 Specifications

- Power Supply: 150V to 320V
- V_{CCP} : - 0.3 V to 5.5 V
- Theoretical input voltage range V_{IN} : - 0.3 V to 4.6 V
- Theoretical output voltage range V_O : - 0.3 V to 4.6 V
- DSP Input Clamp Current $I_{IK}(V_{IN} < 0$ or $V_{IN} > VCC)$: $\pm 20mA$
- DSP Output Clamp Current $I_{OK}(V_O < 0$ or $VO > VCC)$: $\pm 20mA$
- Operation Temperature: -40°C to 85°C .