EGS005 User Manual

EG8025 Demo Board

Revision History

Version	Date	Description
V1.0	2019-11-02	Creation

Contents

EGS005 Driver Board User Manual

1. Description

EGS005 is an SPWM driver board using EG8025 IC specific for single phase sinusiod inverter. EG8025 is a digital pure sine wave inverter ASIC (Application Specific Integrated Circuit) that uses current-mode SPWM controlling, center-aligned PWM modulation and built-in two 600V half bridge gate drivers, which is dedicated to power inverter products.

EGS005 has high output voltage accuracy, output harmonic distortion is less than 1.5% at light load, and output harmonic distortion is less than 3% at heavy load, which can meet the waveform requirement of the inverter products.

EGS005 driver board provides various protection functions, such as over voltage and under voltage for DC bus, over load, over current, over temperature, short circuit, and etc.

EGS005 provides the UART serial port. User can set parameters or reset AC output through the UART serial ports, and can also read the running status and related data of inverter through the UART serial ports.

2. Schematics

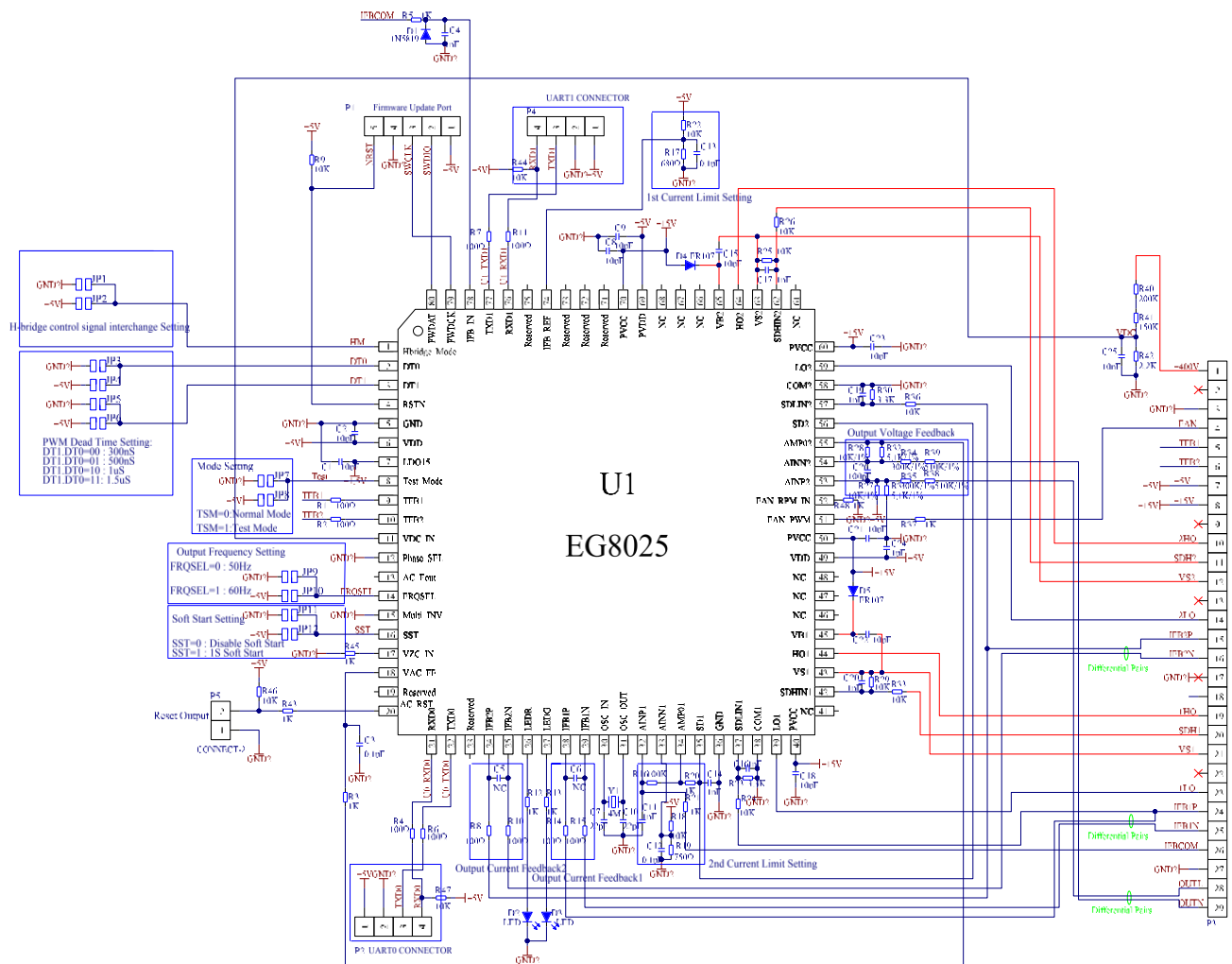## 2.1 EGS005 Driver Board Schematic

Figure 2-1. EGS005 Driver Boar Schematic

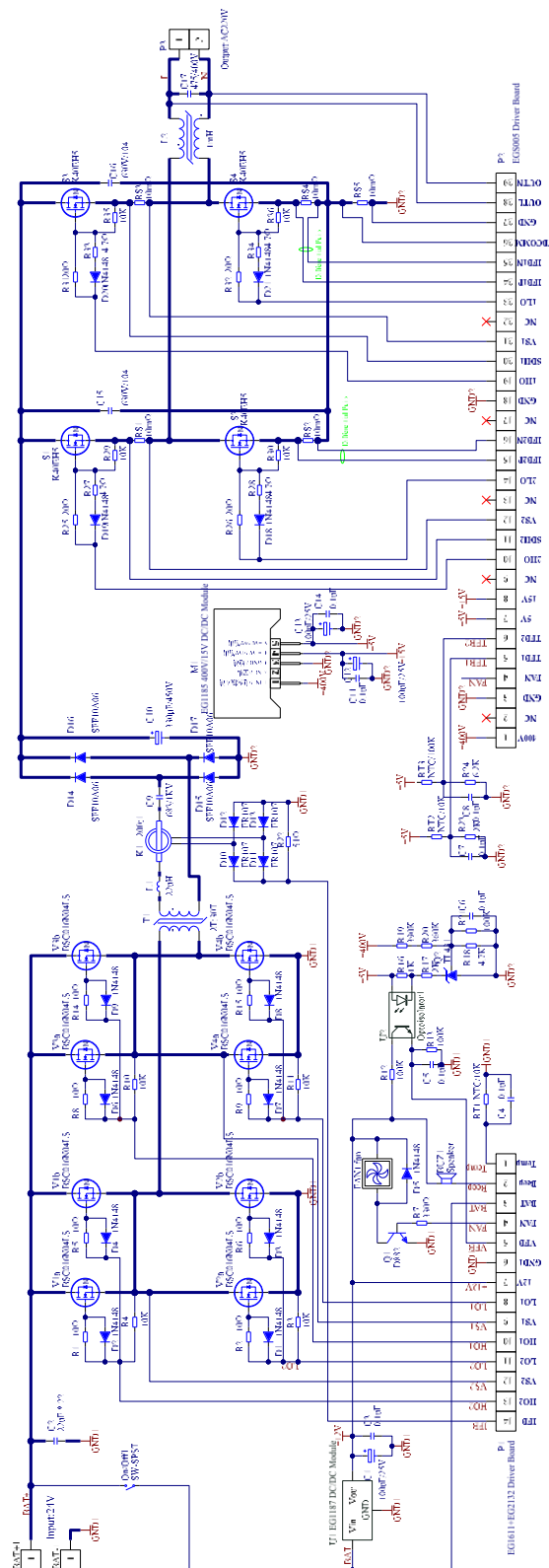## 2.2 1KW Main Board Schematic of Power Inverter for 24VDC/220VAC

Figure 2-2. 1KW 24VDC/220VAC Power Inverter Application Schematic
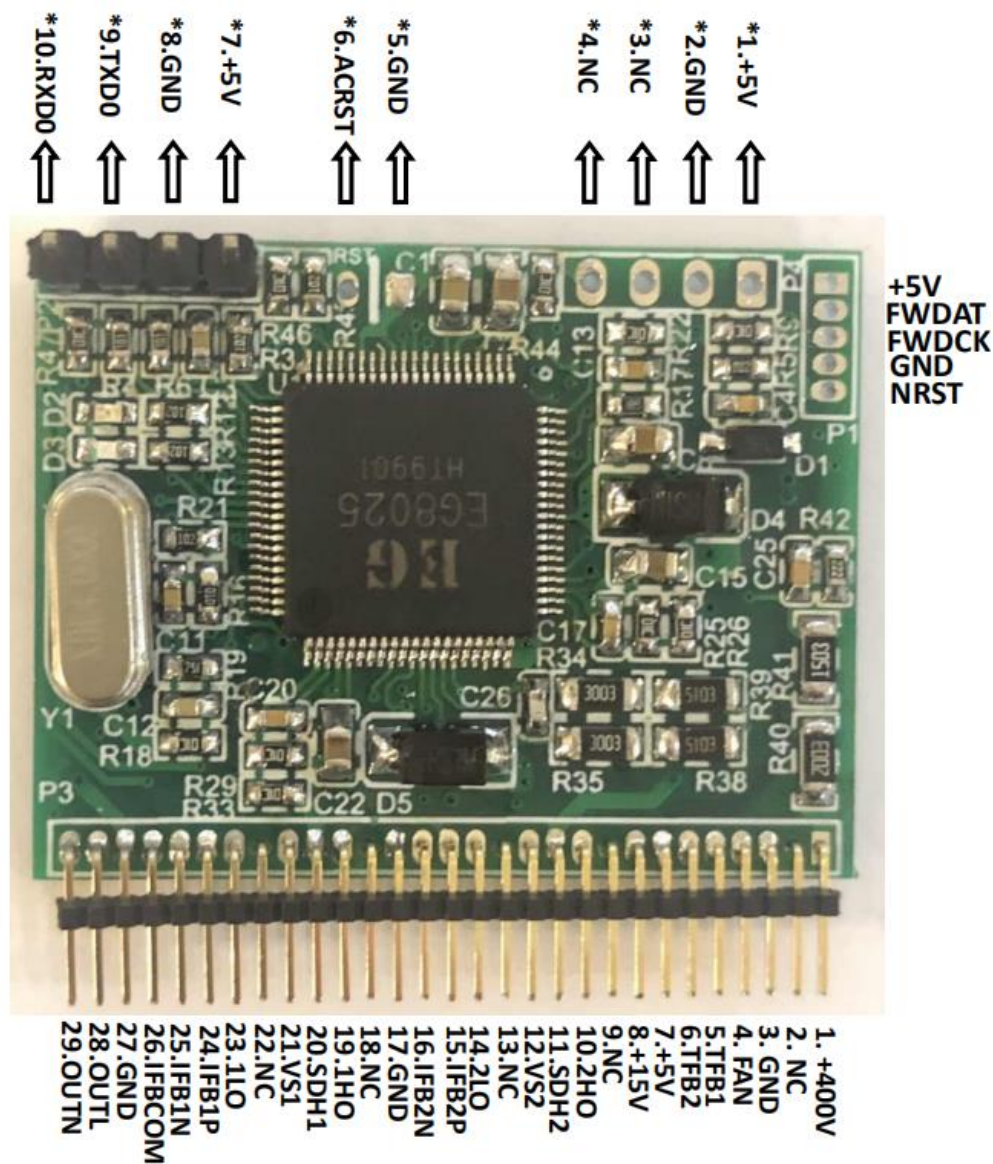
3. Pins and Jumpers

3.1 EGS005 Front View

Figure 3-1. EGS005 Driver Board Pin Definition
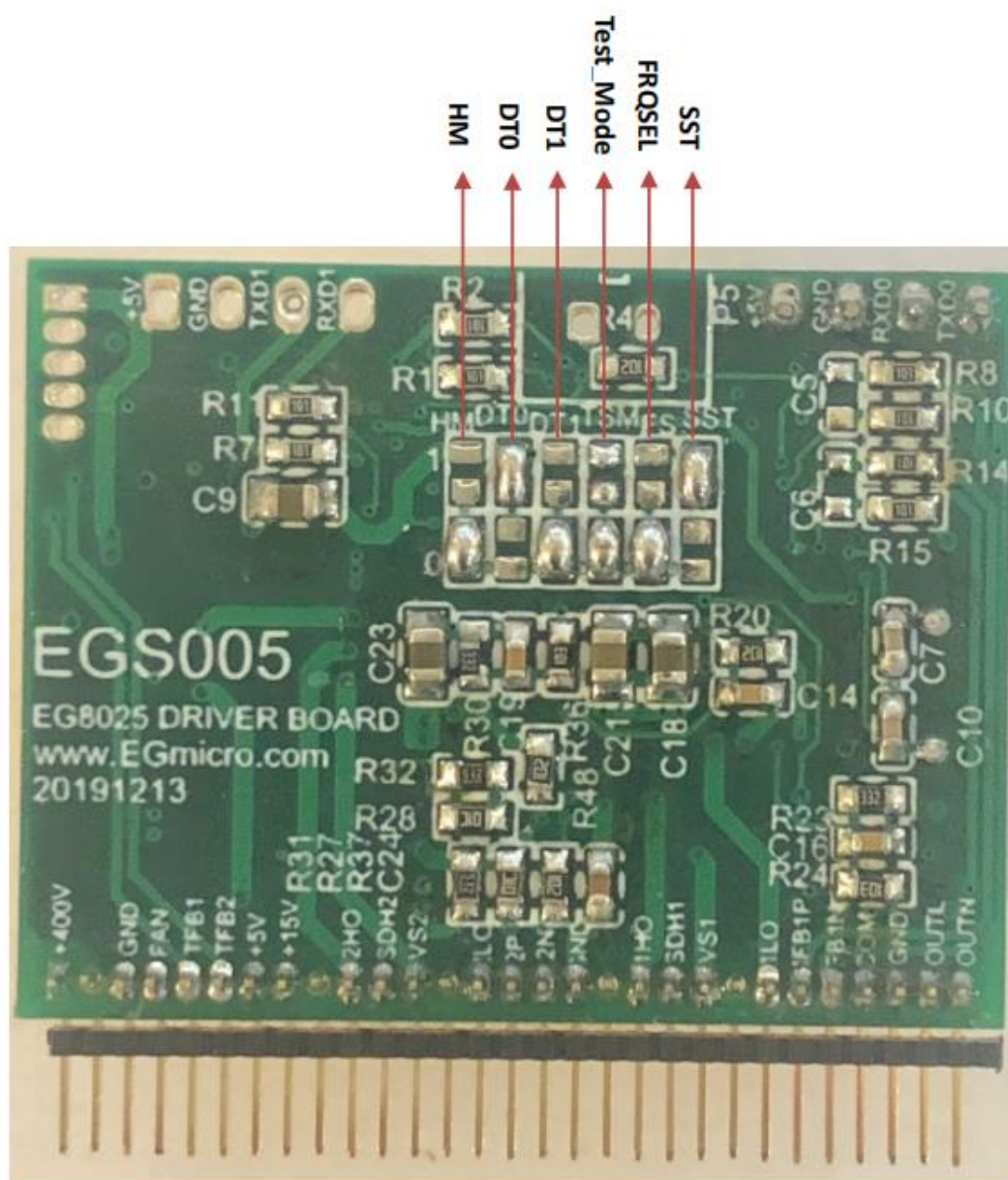
3.2 EGS005 Rear View

Figure 3-2. EGS005 Driver Board Jumper Settings

3.3 Pin Description

Note:The following pin numbers are described based on the pin-out in Fig 3-1.

Designator	Name	I/O	Description
1	+400V	I	DC Bus voltage input
2	NC	-	Not connect for pins isolation
3	GND	GND	EGS005 Driver board ground
4	FAN	O	Control FAN signal output,external transistor or NMOS is required to drive the FAN.
5	TFB1	I	Temperature feedback input 1.When TFB1 input is higher than 3V,it will cause over temperature protection
6	TFB2	I	Temperature feedback input 2.When TFB2 input is higher than 3V,it will cause over temperature protection
7	+5V	Power	+5V Power supply input
8	+15V	Power	+15V Power supply voltage input for gate drivers, the voltage range is from 10V to 20V
9	NC	-	Not connect for pins isolation
10	2HO	O	Output of gate driver 2 for high side MOSFET
11	SDH2	I	Peak current limitation input to gate driver 2 for high side MOSFET, with internal reference voltage 200mV
12	VS2	O	High side bootstrap return of gate driver 2
13	NC	-	Not connect for pins isolation
14	2LO	O	Output of gate driver 2 for low side MOSFET
15	IFB2P	I	Non-inverting input to the internal operation amplifier 2 for AC current sense 2
16	IFB2N	I	Inverting input to the internal operation amplifier 2 for AC current sense 2
17	GND	GND	EGS005 driver board ground
18	NC	-	Not connect for pins isolation
19	1HO	O	Output of gate driver 1 for high side MOSFET
20	SDH1	I	Peak current limitation input to gate driver 1 for high side MOSFET, with internal reference voltage 200mV
21	VS1	O	High side bootstrap return of gate driver 1
22	NC	-	Not connect for pins isolation
23	1LO	O	Output of gate driver 1 for low side MOSFET
24	IFB1P	I	Non-inverting input to the internal operation amplifier 1 for AC current sense 1
25	IFB1N	I	Inverting input to the internal operation amplifier 1 for AC current sense 1
26	IFBCOM	I	Over current signal input
27	GND	GND	EGS005 driver board ground
28	OUTL	I	AC output voltage feedback input

29	OUTN	I	AC output voltage feedback input
*UART Serial Ports & AC Reset Port			
*1	+5V	Power	EGS005 driver board +5V supply output for UART
*2	GND	GND	EGS005 driver board ground
*3	NC	NC	Not connect
*4	NC	NC	Not connect
*5	GND	GND	EGS005 driver board ground
*6	AC_RST	I	Enable/Disable AC output voltage,"0":Disable,"1":Enable
*7	+5V	Power	EGS005 driver board +5V supply output
*8	GND	GND	EGS005 driver board ground
*9	TXD0	O	UART0 data transmitter
*10	RXD0	I	UART0 data receiver

3.4 EGS005 Jumper Settings

Note:The following jumpers are described based on the name definition in Fig 3-2.

Designator	Name	Mark	Description
1	HM	JP1	When JP1 is short, it selects that left bridge is controlled by gate driver 2
		JP2	When JP2 is short, it selects that left bridge is controlled by gate driver 1
2	DT0	JP3	When JP3 and JP5 are short, dead time is 300ns.
		JP4	When JP4 and JP5 are short, dead time is 500ns.
3	DT1	JP5	When JP3 and JP6 are short, dead time is 1.0us.
		JP6	When JP4 and JP6 are short, dead time is 1.5us.
4	TSM	JP7	When JP7 is short, it selects the normal mode
		JP8	When JP8 is short, it selects the test mode
5	FS	JP9	When JP9 is short, it selects AC output frequency at 50Hz
		JP10	When JP10 is short, it selects AC output frequency at 60Hz
6	SST	JP11	When JP11 is short, it disables soft start mode
		JP12	When JP12 is short, it enables 1 seconds soft start mode

EGS005 driver board's jumper JP1, JP3, JP6, JP7, JP9 and JP12 are shorted as default setting, corresponding to 50Hz output, 1S soft start mode on, 500nS dead time, normal mode. Users can change it as needed.

Warning: Jumper of the same function CANNOT be short circuited at the same time. (For example: JP1 And JP2 cannot be short at the same time.)

3.5 LED Indication

EGS005 driver board provides the green LED and red LED for running and fault indication.User can determine problem according to the followings:

- Normal：Green LED always on and Red LED always off.
- OverLoad/OverCurrent：Green LED always on and Red LED blinks quickly, which indicates there is an over load or over current condition, but it has not entered the protection state.
- OFF：Green LED always off and Red LED always on,which indicates that it has entered the protection state.

4. Testing

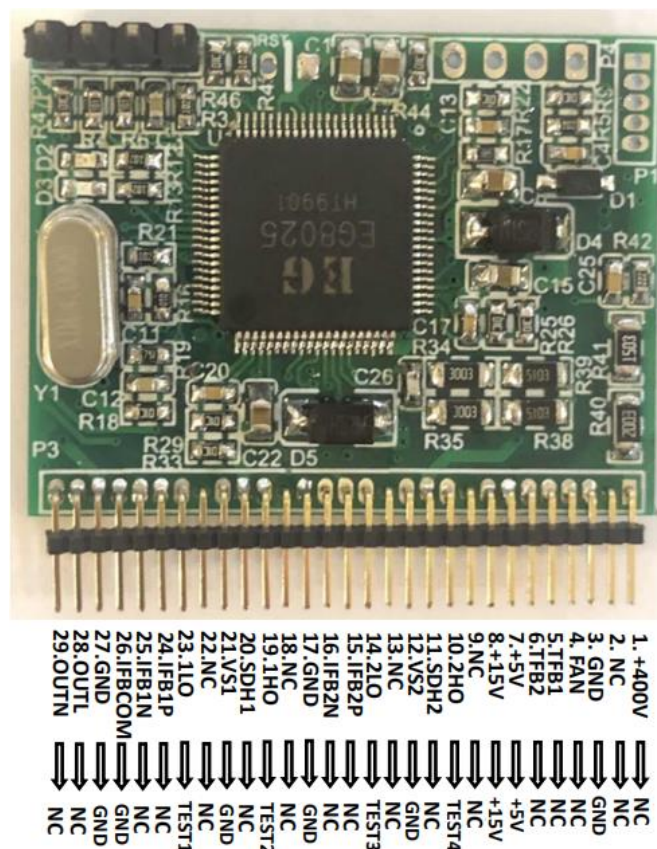### 4.1 EGS005 Driver Board Pins Connection for Testing

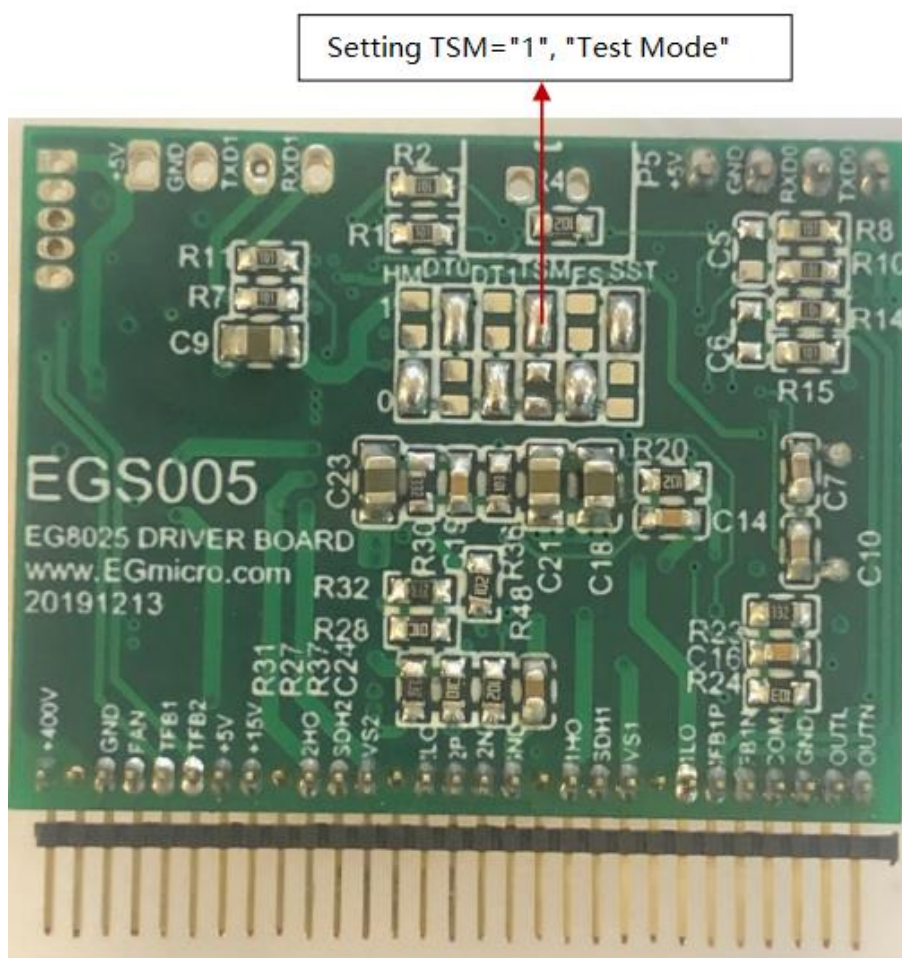Figure 4-1a. EGS005 Driver Boar Pins Connection for Testing

Figure 4-1b. Set EGS005 Driver Boar to Test Mode

4.2 EGS005 Driver Board Testing Description

Step1: Set the jumper TSM= "1" as Figure 4-1b,that is, JP8 is short circuited,EG8025 enters test mode. In test mode,EG8025 outputs an open-loop SPWM signals, which means that there are no protection functions, and the voltage feedback and current feedback are invalid.

Step2: Connect GND(pin3),VS2(pin12),GND(pin17),VS1(pin21),IFBCOM(pin26) and GND(pin27) to the ground during testing.

Step3: Connect +5V(pin7) to external power supply 5V, and +15V(pin8) to external power supply 15V.

Step4: Four RC filter of 10K and 0.1uF are connected to the outputs of TEST1,TEST2,TEST3 and TEST4 respectively. The filter circuit is shown in Figure 4-2a. Connect an 4-channels oscilloscope to the output of four RC filters to observe waveform. When TEST1,TEST2,TEST3 and TEST4 are connected to RC filter, it will output waveform shown as Figure 4-2b,CH1 to TEST1 RC filter, CH2 to TEST2 RC filter, CH3 to TEST3 RC filter, CH4 to TEST4 RC filter.
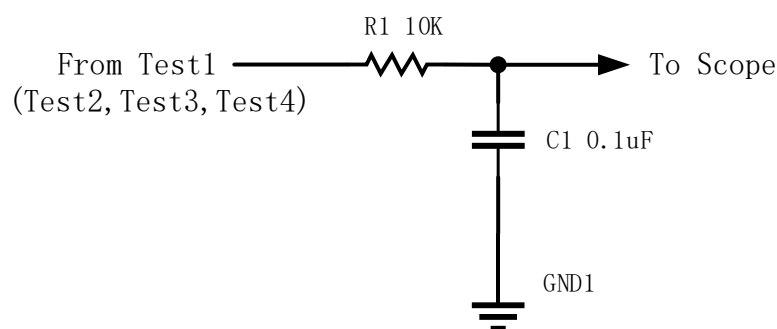

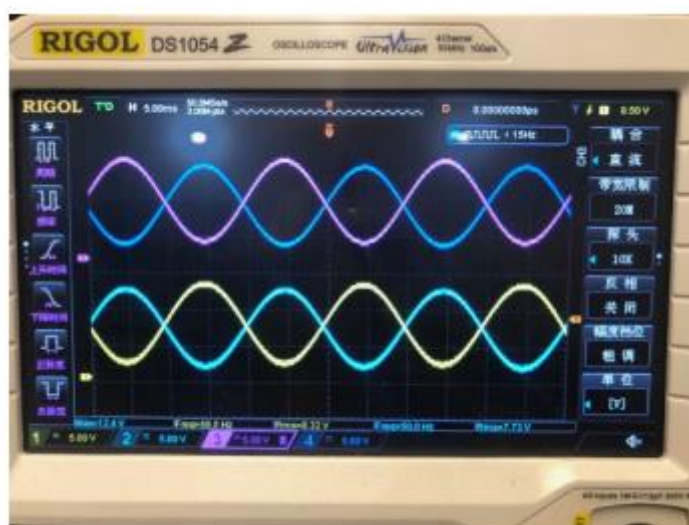Figure 4-2a. Four RC filter for Test1,Test2,Test3 and Test4

Figure 4-2b. Output waveform of Test1,Test2,Test3 and Test4
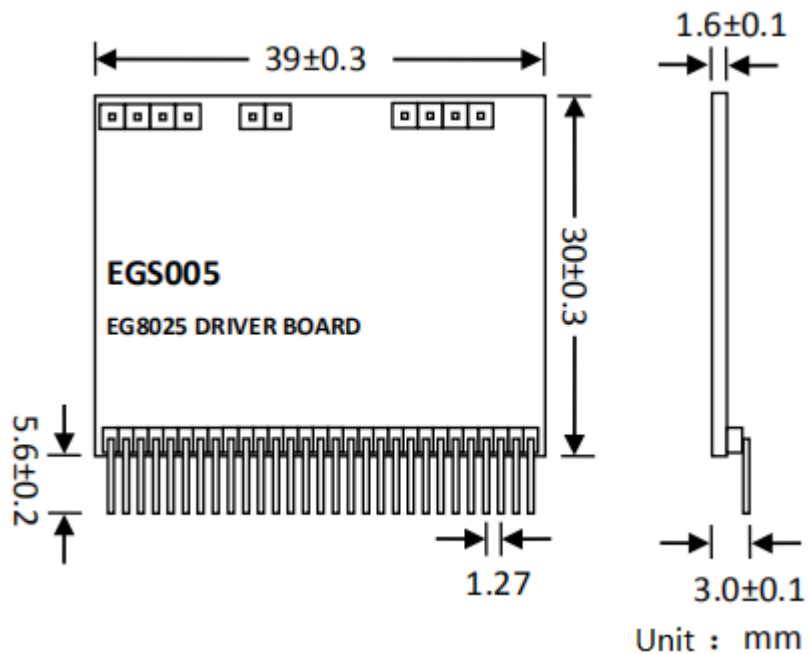
5. Dimensions Diagram

5.1 EGS005 Dimension Diagram

Figure 5-1. EGS005 Driver Board Dimension Diagram