EG8010 SPWM chip data sheet

Single-phase pure sine wave inverter dedicated chip

Version change log

<table>
<tr><td>Version number date description</td><td colspan="2"></td></tr>
<tr><td>V1.0</td><td colspan="2">September 12, 2010 First draft of the EG8010 data sheet.</td></tr>
<tr><td>V2.0</td><td colspan="2">October 18, 2010 1. Updated EG8010 pin definitions and functions.
<table>
<tr><td>V1.0</td><td colspan="2">V2.0</td></tr>
<tr><td>Pin-Defined Function</td><td></td><td>defined function</td></tr>
<tr><td>Pin6 LCDDI</td><td colspan="2">Pin6 SPWMEN</td></tr>
<tr><td>Pin7 LCDCLK</td><td colspan="2">Pin7 FANCTR</td></tr>
<tr><td>Pin8 LCDEN</td><td colspan="2">Pin8 LEDOUT</td></tr>
<tr><td>Pin9 IDSPSEL</td><td colspan="2">Pin9 PWMTYP</td></tr>
<tr><td>Pin16 FRQADJ</td><td colspan="2">Pin16 FRQADJ/VFB2</td></tr>
<tr><td>Pin23 SPWMEN</td><td colspan="2">Pin23 NC</td></tr>
<tr><td>Pin24 FANCTR</td><td colspan="2">Pin24 LCDCLK</td></tr>
<tr><td>Pin25 LEDOUT</td><td colspan="2">Pin25 LCDDI</td></tr>
<tr><td>Pin31 FRQOUT</td><td colspan="2">Pin31 LCDEN</td></tr>
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Remark: SPWMEN function V1.0 is defined as "0" to enable SPWM output, "1" to disable SPWM output;
SPWMEN in V2.0 is defined as "1" to enable SPWM output, and "0" to disable SPWM output.
2. Update the SST soft start time to 3S.
3. Update the over temperature protection value to 4.3V and the over temperature release value to 4.0V.
4. Updated the typical application circuit diagram.
5. Updated the description in the Output Voltage Feedback section.
6. Add PWM output type description.
7. Update RS232 serial communication commands and functions.</td></tr>
<tr><td>V2.1</td><td>November 15, 2010 1. Updated the typical application circuit diagram (short circuit protection LM393 part), and the application diagram IR2103 driver to IR2106 driver.
2. Add the application circuit diagram of the power frequency transformer sine wave inverter.</td></tr>
<tr><td>V2.2</td><td>August 20, 2011 1. Added typical application diagram of EG8010+IR2110+ blocking function and updated typical application Circuit diagram parameters.
2. Modify the 9 of the MAX232 chip in the RS232 optocoupler isolation communication circuit in Figure 8.9a pin and pin 10 are connected.
3. Added optional NTC 25ÿ resistance value in section 8.3 of temperature detection feedback section 10KB, constant value is 3380</td></tr>
</table>

content

EG8010 chip data sheet **V2.2**

1. Features

ÿ 5V single power supply tune

ÿ Unipolar and bipolar modulation mode
- ÿ 300nS dead time
- ÿ 500nS dead time
- ÿ 1.0uS dead time
- ÿ 1.5uS dead time

ÿ External 12MHz crystal oscillator ÿ PWM carrier frequency 23.4KHz ÿ Real-time processing of voltage, current and temperature feedback Parameters such as voltage and frequency ÿ External serial port 12832 liquid crystal display module displays information such as voltage, frequency, temperature and current of the inverter

2. Description

EG8010 is a digital and fully functional pure sine wave inverter generator chip with dead zone control, which is used in DC-DC-AC two-stage power conversion architecture or DC-AC single-stage power frequency transformer boost conversion The structure, with an external 12MHz crystal oscillator, can realize a pure sine wave 50Hz or 60Hz inverter dedicated chip with high precision, low distortion and harmonics. The chip adopts CMOS technology and integrates functions such as SPWM sine generator, dead time control circuit, amplitude factor multiplier, soft start circuit, protection circuit, RS232 serial communication interface and 12832 serial LCD driver module.

3. Application areas

ÿ Single-phase pure sine wave inverter ÿ Photovoltaic inverter ÿ Wind power inverter ÿ Uninterruptible power supply UPS system ÿ Digital generator system

ÿ Single-phase motor speed controller ÿ Single-phase inverter ÿ Sine wave dimmer ÿ Sine wave voltage regulator ÿ Sine wave generator ÿ Inverter welding machine

4. Pins

4.1. Pin Definition

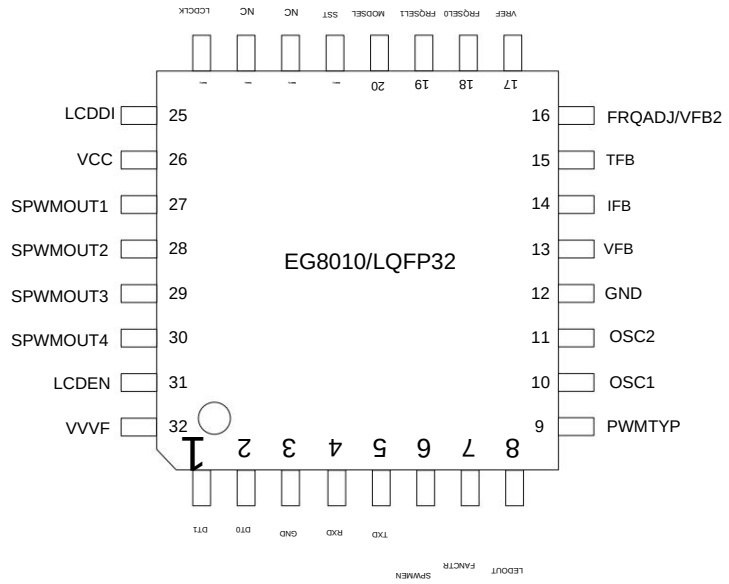


Figure 4-1. EG8010 Pin Definition

4.2. Pin description

Pin No.	Pin Name	I/O	describe
26	VCC		+5V working power supply terminal of VCC chip
3,12	GND		GND The ground terminal of the chip
1	DT1	I	DT1, DT0 is to set the dead time of PWM output upper and lower MOS tubes: "00" is 300nS dead time; "01" is 500nS dead time; "10" is 1.0uS dead time; "11" is 1.5uS dead time
2	DT0	I	
4	RXD	I	Serial port communication data receiver
5	TXD	O	Serial communication data sender
6	SPWMEN	I	SPWM output enable terminal, "1" is to enable SPWM output, "0" is to disable SPWM output
7	FANCTR	O	External fan control, when the TFB pin detects that the temperature is higher than 45°C, it will output a high level "1" to make the fan run. OK, when the temperature is lower than 40ÿ after running, output low level "0" to make the fan stop working
8	LEDOUT	O	External LED alarm output, when a fault occurs, output low level "0" to light up the LED Normal: long on Overcurrent: flashes for 2 times, off for 2 seconds, keeps circulating Overvoltage: flashes 3 times, turns off for 2 seconds, keeps cycling Undervoltage: flashes 4 times, turns off for 2 seconds, and keeps looping

			Over temperature: flashes for 5 times, turns off for 2 seconds, and keeps repeating
9	PWMTYP	I	PWM output type selection "0" is a positive polarity PWM type output, which is used to drive devices such as IR2110 with active high level, namely Pin SPWMOUT is high level to turn on the power MOS tube "1" is a negative polarity PWM type output, which is used to drive the cathode of the internal diode of the TLP250 with an active low level Such as optocoupler devices, that is, when the pin SPWMOUT is low, the power MOS tube is turned on. When designing the application, you can refer to the typical application circuit diagram, and configure the pin state reasonably according to the driving device, otherwise Inconsistency will lead to the phenomenon that the upper and lower power MOS transistors are turned on at the same time
10	OSC1	I	12M crystal oscillator pin 1
11	OSC2	I	12M crystal oscillator pin 2
13	VFB	I	Sine wave output voltage feedback input
14	IFB	I	Load current feedback input
15	TFB	I	Temperature feedback input
16	FRQADJ/ VFB2	I	Function multiplexing pin, in FM mode (unipolar modulation) as FM voltage 0-5V input, bipolar modulation When used as the right bridge arm output voltage feedback input
17	VREF	I	chip internal reference power input
18	FRQSEL0	I	FRQSEL1 (pin 19), FRQSEL0 (pin 18) are set frequency mode, "00" is the output frequency of 50Hz; "01" is the output frequency of 60Hz; "10" is the output frequency range 0-100Hz adjusted by the FRQADJ pin; "11" is the output frequency range 0-400Hz adjusted by FRQADJ pin
19	FRQSEL1	I	
20	MODSEL	I	Unipolar and bipolar modulation options: "0" is the unipolar modulation mode; "1" is bipolar modulation
twenty one	SST	I	Soft-start function enable input: "0" means that the soft start function is not supported; "1" is to support the soft start function, the soft start time is 3S
22, 23	NC	-	empty feet
twenty four	LCDCLK	O	Serial port 12832 LCD module clock output
25	LCDDI	O	Serial port 12832 LCD module command and data output terminal
27	SPWMOUT1	O	The SPWM output of the upper tube of the right bridge arm is used as the fundamental wave output of the upper tube of the right bridge arm during unipolar modulation. Output as SPWM modulation when modulating
28	SPWMOUT2	O	SPWM output of the lower tube of the right bridge arm, when unipolar modulation, this pin is used as the fundamental wave output of the lower tube of the right bridge arm, bipolar Output as SPWM modulation when modulating
29	SPWMOUT3	O	SPWM output on the left bridge arm, this pin is used as the left bridge arm SPWM modulation output during unipolar and bipolar modulation. out
30	SPWMOUT4	O	Left bridge arm lower tube SPWM output, this pin is used as left bridge arm SPWM modulation output during unipolar and bipolar modulation. out
31	LCDEN	O	Serial port 12832 LCD module enable output
32	VVVF	I	Frequency conversion and voltage conversion function enable pins: "0" is the frequency conversion and no voltage mode; "1" is the frequency conversion and voltage conversion mode, which is used in inverter and motor control

5. Structure block diagram

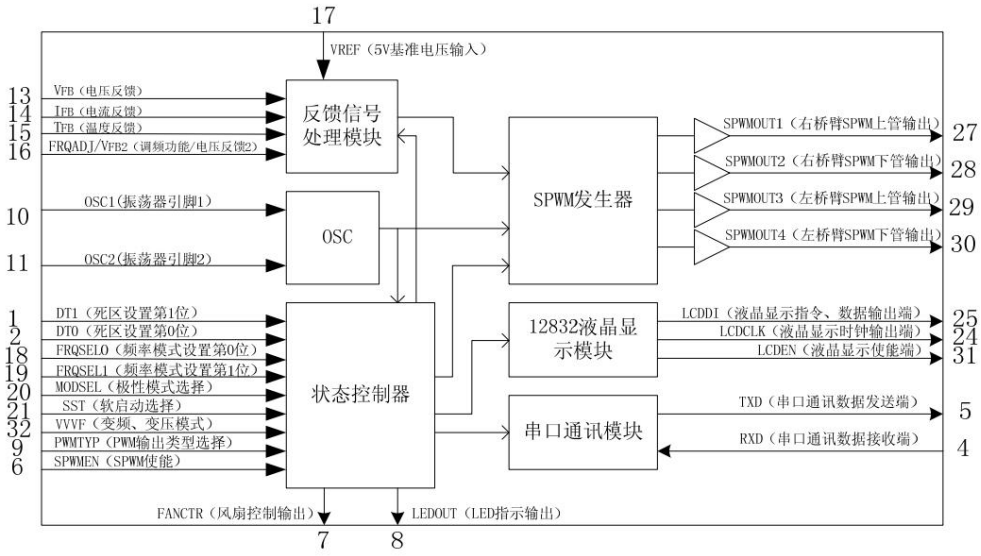


Figure 5-1. EG8010 block diagram

6. Typical application circuit

6.1 Typical application circuit diagram of EG8010+IR2110S pure sine wave inverter (unipolar modulation mode)

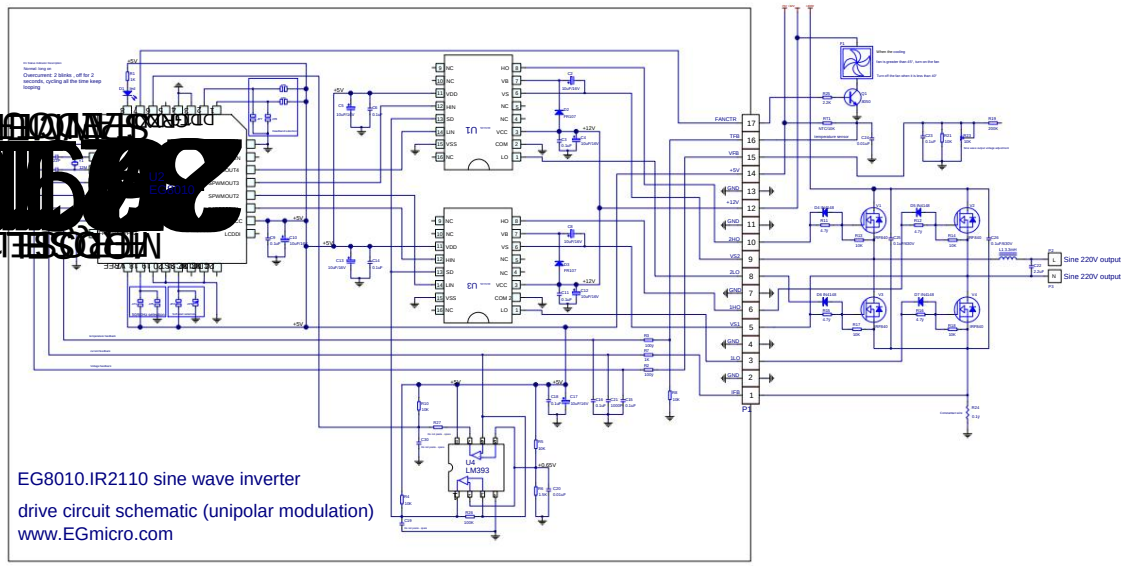


Figure 6-1. Typical application circuit diagram of EG8010+IR2110S pure sine wave inverter (unipolar modulation method)

Note:

1. In fixed frequency mode, 50Hz (FRQSEL1, FRQSEL0=00) or 60Hz (FRQSEL1, FRQSEL0=01), FRQADJ/VFB2 and VVVF pins are invalid, the sine wave output voltage is adjusted or regulated by the feedback resistor R23, which can be applied In dimming and voltage regulation occasions.

2. In fixed voltage conversion mode (VVVF pin is "0" low level) 0y100Hz (FRQSEL1, FRQSEL0=10) or 0Hzÿ400Hz (FRQSEL1, FRQSEL0=11), FRQADJ pin needs to be connected with an external potentiometer, output The frequency is adjusted by the FRQADJ pin, and the output voltage is set by R23.

3. In variable frequency and variable voltage mode (VVVF pin is "1" high level) 0y100Hz (FRQSEL1, FRQSEL0=10) or 0Hzÿ400Hz (FRQSEL1, FRQSEL0=11), FRQADJ pin needs an external potentiometer, which is controlled by FRQADJ pin to adjust the output frequency and output voltage, the internal circuit keeps V/F=constant, R23 sets the effective value of the output voltage to 220V when the output frequency is 50Hz.

6.2 Typical application circuit diagram of EG8010+IR2110S+ latching pure sine wave inverter (unipolar modulation mode)

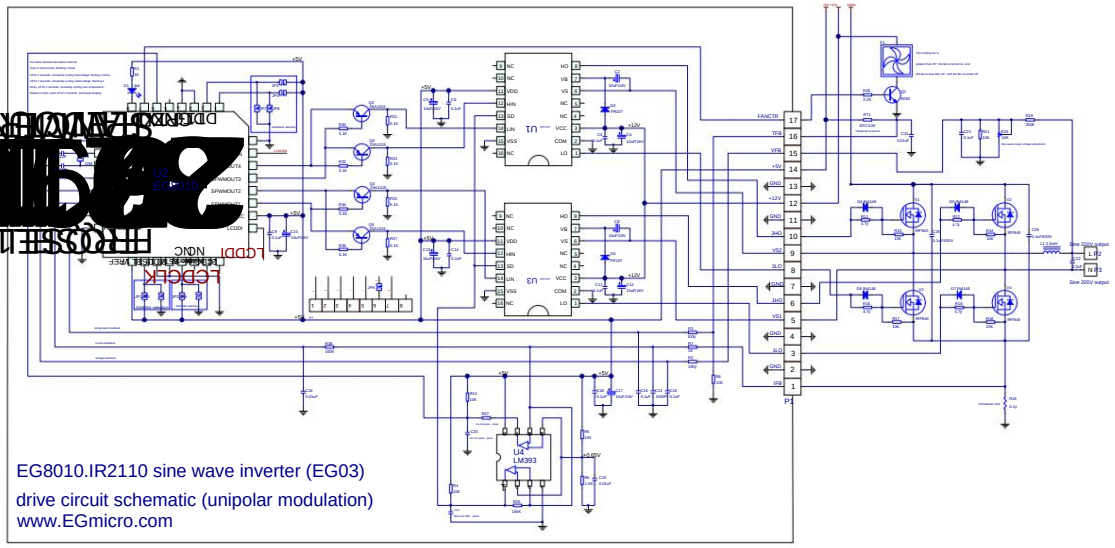


Figure 6-2. Typical application circuit diagram of EG8010+IR2110S+ latching pure sine wave inverter (unipolar modulation method)

6.3 Typical application circuit diagram of EG8010+IR2106S pure sine wave inverter (unipolar modulation mode)

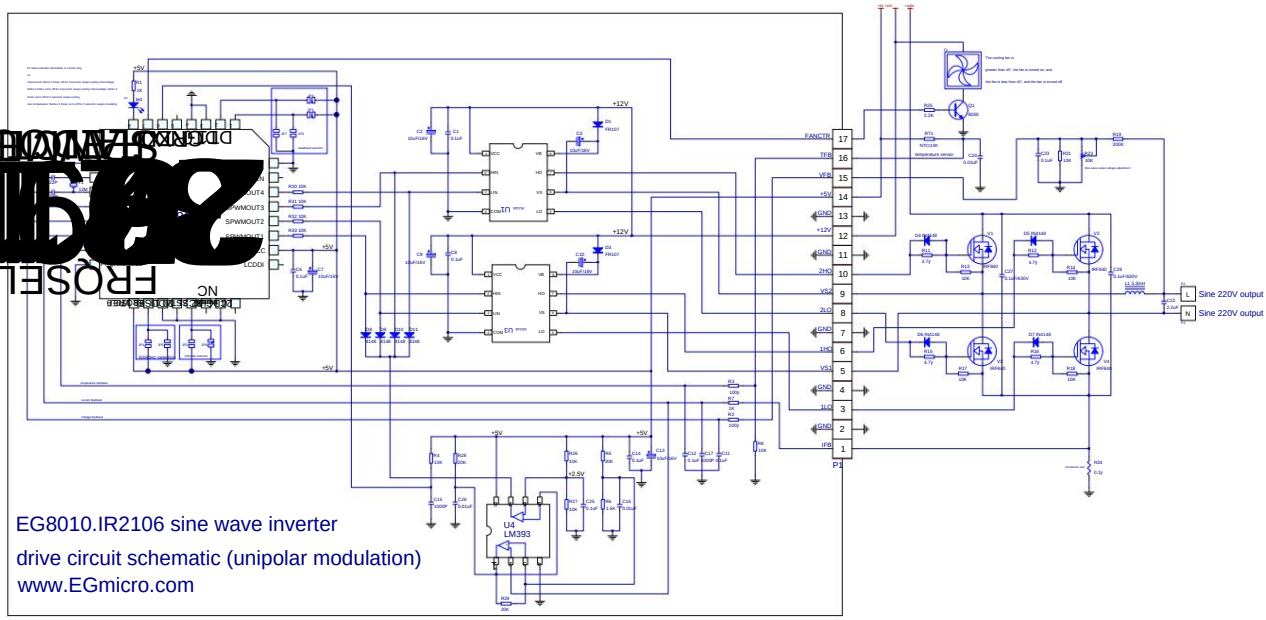


Figure 6-3. Typical application circuit diagram of EG8010+IR2106S pure sine wave inverter (unipolar modulation method)

Note:

1. In fixed frequency mode, 50Hz (FRQSEL1, FRQSEL0=00) or 60Hz (FRQSEL1, FRQSEL0=01), FRQADJ/VFB2 and VVVF pins are invalid, the sine wave output voltage is adjusted or regulated by the feedback resistor R23, which can be applied In dimming and voltage regulation occasions.

2. In fixed voltage conversion mode (VVVF pin is "0" low level) 0ý100Hz (FRQSEL1, FRQSEL0=10) or 0Hzý400Hz (FRQSEL1, FRQSEL0=11), FRQADJ pin needs to be connected with an external potentiometer, output The frequency is adjusted by the FRQADJ pin, and the output voltage is set by R23.

3. In variable frequency and variable voltage mode (VVVF pin is "1" high level) 0ý100Hz (FRQSEL1, FRQSEL0=10) or 0Hzý400Hz (FRQSEL1, FRQSEL0=11), FRQADJ pin needs an external potentiometer, which is controlled by FRQADJ pin to adjust the output frequency and output voltage, the internal circuit keeps V/F=constant, R23 sets the effective value of the output voltage to 220V when the output frequency is 50Hz.

6.4 Typical application circuit diagram of EG8010+TLP250 pure sine wave inverter (unipolar modulation mode)

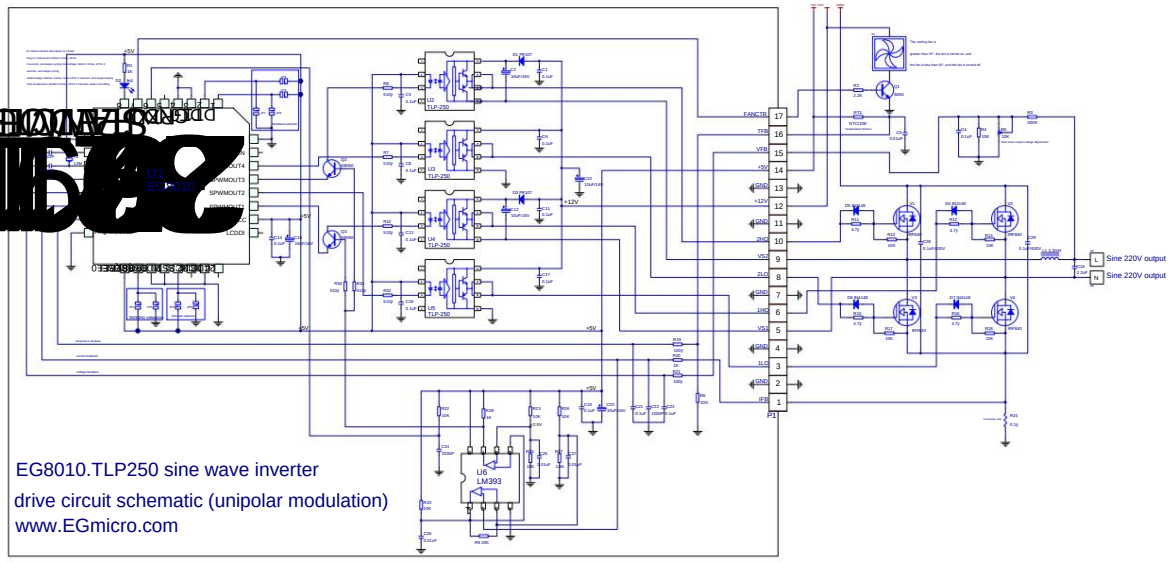


Figure 6-4. Typical application circuit diagram of EG8010+TLP250 pure sine wave inverter (unipolar modulation method)

Note:

1. In fixed frequency mode, 50Hz (FRQSEL1, FRQSEL0=00) or 60Hz (FRQSEL1, FRQSEL0=01), the sine wave output voltage is adjusted or regulated by the feedback resistor R23, which can be used in dimming and voltage regulation applications.

2. In fixed voltage conversion mode (VVVF pin is "0" low level) 0j/100Hz (FRQSEL1, FRQSEL0=10) or 0Hzj/400Hz (FRQSEL1, FRQSEL0=11), FRQADJ pin needs to be connected with an external potentiometer, output The frequency is adjusted by the FRQADJ pin, and the output voltage is set by R23.

3. In variable frequency and variable voltage mode (VVVF pin is "1" high level) 0j/100Hz (FRQSEL1, FRQSEL0=10) or 0Hzj/400Hz (FRQSEL1, FRQSEL0=11), FRQADJ pin needs an external potentiometer, which is controlled by FRQADJ pin to adjust the output frequency and output voltage, the internal circuit keeps V/F=constant, R23 sets the effective value of the output voltage to 220V when the output frequency is 50Hz.

6.5 Typical application circuit diagram of EG8010+IR2110S pure sine wave inverter (bipolar modulation mode)

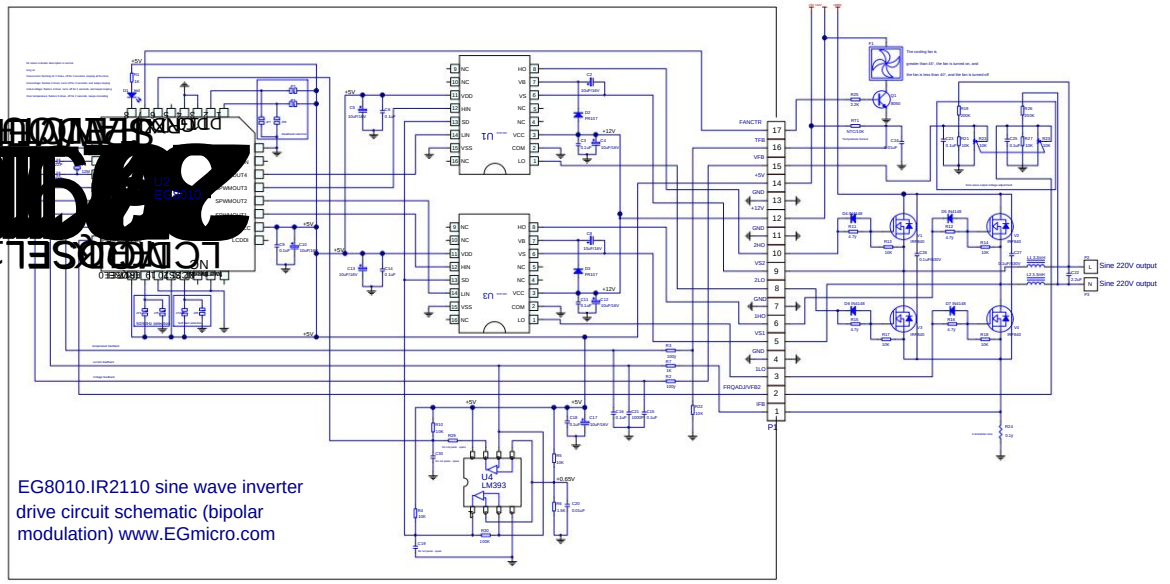


Figure 6-5. Typical application circuit diagram of EG8010+IR2110S pure sine wave inverter (bipolar modulation method)

Note:

1. In fixed frequency mode 50Hz (FRQSEL1, FRQSEL0=00) or 60Hz (FRQSEL1, FRQSEL0=01), pin 20 (MODSEL) needs to be connected to high level during bipolar modulation, and the sine wave output voltage is determined by double Resistor R23 for adjustment or voltage regulation.

2. The FM function is not supported when using bipolar modulation.

6.6 Typical application circuit diagram of EG8010+IR2110S pure sine wave inverter (power frequency transformer)

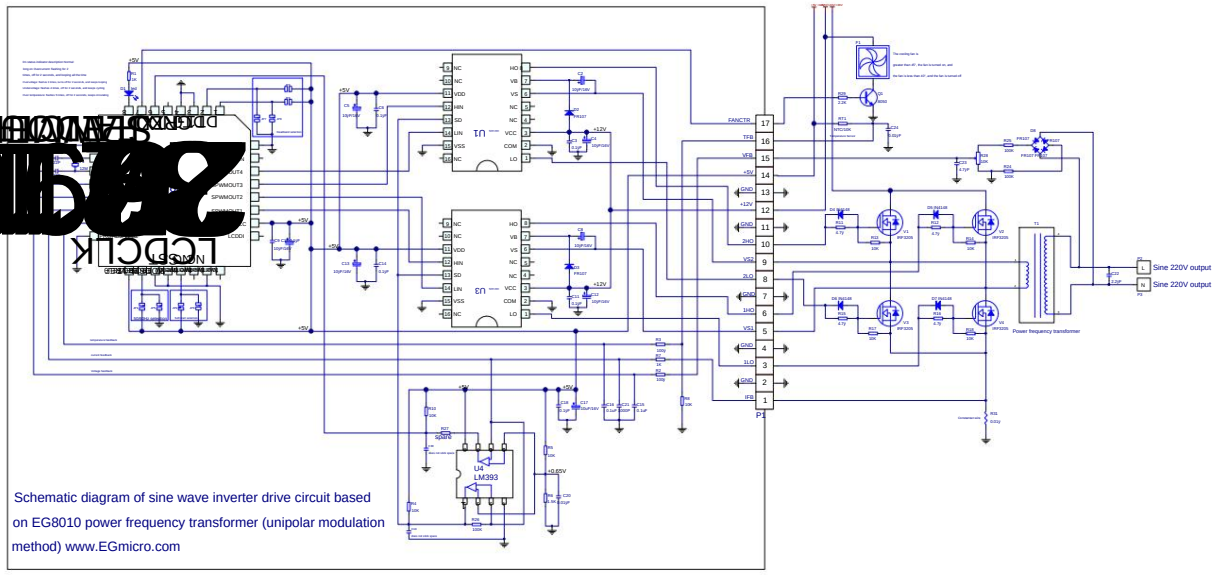


Figure 6-6. Typical application circuit diagram of EG8010+IR2110S power frequency transformer sine wave inverter

Note:

1. T1 needs to use a power frequency transformer, and the secondary side of the power frequency transformer needs to be connected to a high-voltage filter capacitor to filter out the PWM high-frequency modulation signal, and output a power frequency 50Hz/60Hz sine wave after the capacitor filter.

2. For the full-bridge power MOS tube of the primary stage of the power frequency transformer, the tube type should be selected according to the input voltage, and the tube with low on-resistance should be selected as much as possible.

7. Electrical Characteristics

7.1 Limit parameters

Unless otherwise stated, under the condition of TA=25ÿ

symbol	parameter name	Test Conditions	Min	Max	Unit
VCC	power supply	Vcc pin relative to GND Voltage	-0.3	6.5	V
I/O	All input and output ports	All I/O pins to GND voltage	-0.3	5.5	V
Isink	Maximum output sink for output pins current	-	-	25	mA
isource	The maximum output pull of the output pin current	-	-	-5	mA
TA	ambient temperature	-	-45	85	°C
Tstr	Storage temperature	-	-65	125	°C

Note: Exceeding the listed limit parameters may cause permanent damage to the chip, and long-term operation under the limit conditions will affect the reliability of the chip.

7.2 Typical parameters

Unless otherwise stated, at TA=25ÿ, Vcc=5V, OSC=12MHz

symbol	Parameter Name	Test Condition	Min	Typical	Max	Unit
Vcc	power supply	-	2.7	5	5.5	V
VREF	Reference power input	-	-	5	-	V
I/O	All I/O All I/O pins to GND voltage 0			-	5	V
Icc	Quiescent Current	Vcc=5V,OSC=12MHz	-	10	15	mA
VFB	Peak feedback reference voltage	Vcc=5V	-	3.0	-	V
IFB	Current protection reference voltage	Vcc=5V	-	0.5	-	V
TFB	Temperature protection reference voltage	Vcc=5V	-	4.3	-	V
Vin(H)	Input logic signal high potential	Vcc=5V	2.0	5.0	5.5	V
Vin(L)	Input logic signal low level	Vcc=5V	-0.3	0	1.0	V
Vout(H)	Output logic signal high level	Vcc=5V, IOH=-3mA	3.0	5.0	-	V
Vout(L)	Output logic signal low level	Vcc=5V, IOL=10mA	-	-	0.45	V
Isink	Maximum output sink for output pins current	-	-	-	20	mA
isource	The maximum output pull of the output pin current	-	-	-	-3	mA

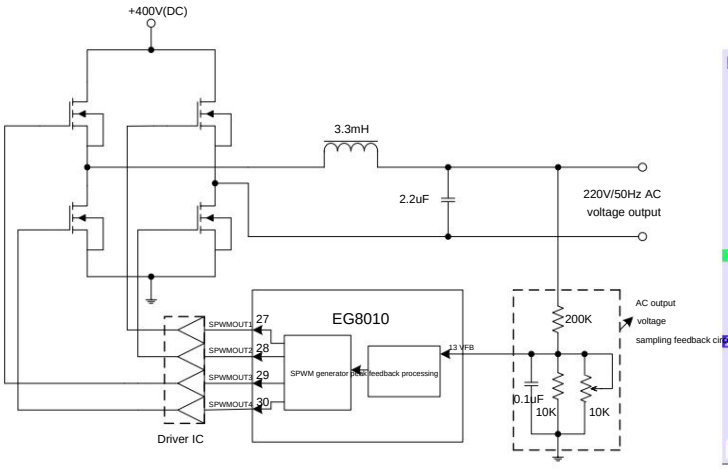
8. Application Design

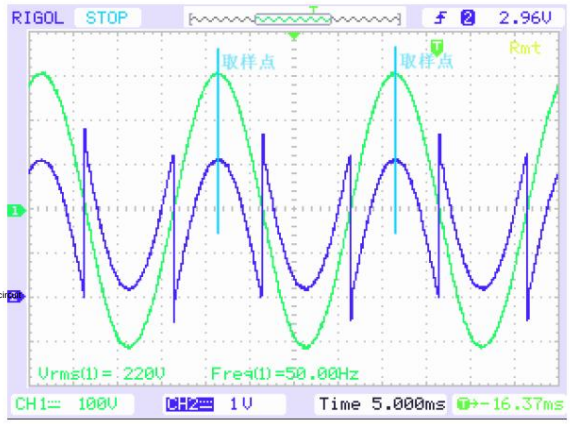
8.1 Output Voltage Feedback

The working mode of EG8010 chip is divided into unipolar modulation mode and bipolar modulation mode. In unipolar modulation, only one bridge arm (EG8010 pin SPWMOUT3, SPWMOUT4) as SPWM modulation output, the other bridge arm (EG8010 pin SPWMOUT1, SPWMOUT2) as base Wave output, the filter inductor needs to be connected to the output end of the SPWM modulation bridge arm, and the voltage sampling feedback circuit also needs to be connected to the SPWM modulation bridge The output of the arm inductance, as shown in Figure 8.1a. In the case of bipolar modulation, the dual bridge arms (EG8010 pins SPWM3, SPWM4, SPWM1, SPWM2) are the same as When used as SPWM modulation output, it will be better to use two-way inductance filtering characteristics in application, and the voltage sampling feedback circuit needs two-way voltage divider network to make a difference Sub-feedback processing, as shown in Figure 8.1c.

In unipolar modulation mode, the voltage feedback processing of the EG8010 chip is to measure the AC voltage output by the inverter through pin (13) VFB.

(16) FRQADJ/VFB2 is only the FRQADJ function in FM mode. At this time , the feedback of VFB2 is invalid. The circuit structure is shown in Figure 8.1a. Voltage sampling feedback part Measure the feedback peak voltage and the internal reference sine wave peak voltage 3V to calculate the error, and adjust the output voltage value accordingly. When the output voltage increases, the voltage of this pin also increases. After calculating the error value of the internal circuit, the coefficient of the amplitude factor multiplier is adjusted to reduce the output voltage. The output voltage reaches the regulation process, on the contrary, when the voltage of this pin decreases, the chip will increase the output voltage.





CH1: 220V/50Hz sine wave output waveform CH1: VFB feedback signal input waveform

Figure 8.1a EG8010 unipolar modulation output voltage feedback circuit Figure 8.1b Measured SPWM unipolar modulation pure sine wave output waveform and VFB feedback waveform

Figure 8.1b is the actual test waveform of the unipolar modulation mode. EG8010 adopts the peak point sampling output voltage, which has the advantages of high voltage regulation accuracy, electrical The voltage adjustment speed is fast. When the output voltage deviates for some reason, such as load changes or input voltage fluctuations, EG8010 can Adjust to the desired output voltage within the AC cycle.

In bipolar modulation mode, the voltage feedback processing of the EG8010 chip is to measure the output voltage of the left bridge arm and pin (16) through pin (13) VFB. FRQADJ/VFB2 is only for VFB2 function to measure the output voltage of the right bridge arm. At this time, the FRQADJ frequency modulation function is invalid, and the circuit structure is shown in Figure 8.1c. The feedback part is used to measure the peak differential voltage and the internal reference sine wave peak voltage of 3V through two differential feedbacks, and perform error calculation on the output voltage. Make corresponding adjustments to the value, and adjust the amplitude factor multiplier coefficient after calculating the error value of the internal circuit to realize the voltage regulation process, and the bipolar modulation can also Adjust to desired output voltage within 1-3 AC cycles.

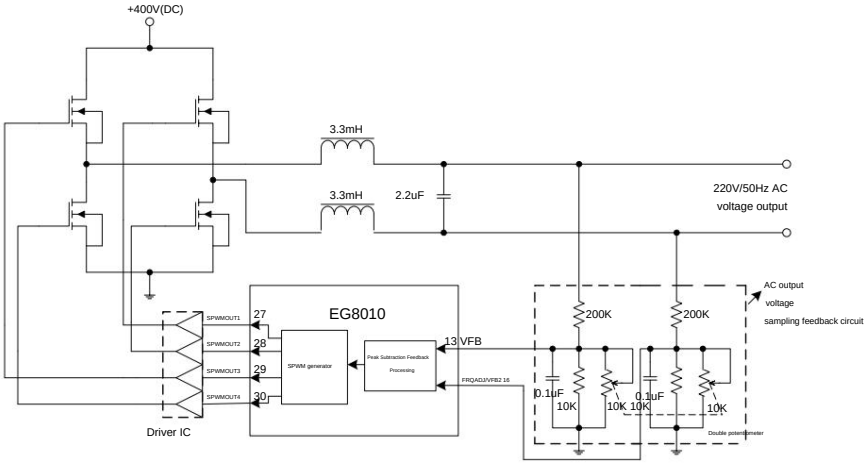


Figure 8.1c EG8010 bipolar modulation output voltage feedback circuit

In order to prevent too low or too high output voltage from being supplied to the load, EG8010 has set overvoltage and undervoltage protection functions inside, and the overvoltage protection setting value The delay time of 3.15V is 300mS, and the set value of undervoltage protection is 2.75V, and the delay time is 3S. When overvoltage or undervoltage protection occurs, EG8010 will The setting state of pin (9) PWMTYP will output SPWMOUT1~SPWMOUT4 to "0" or "1" level, turning off all power MOSFETs Make the output voltage to a low level, once it enters the overvoltage and undervoltage protection, the EG8010 will release the power MOSFET after 8S and then judge In the case of output voltage, the duration of releasing and turning on the power MOSFET is 100mS, and the overvoltage or undervoltage event will be judged within the 100mS release time. If there is still an overvoltage or undervoltage event, EG8010 will turn off all power MOSFETs to make the output voltage low, and wait for the release of 8S again. If the normal operation reaches more than 1 minute after the release, the EG8010 will clear the number of overvoltage or undervoltage events; If the EG8010 is not running normally, the output of the SPWM module will be completely shut down, and it needs to be released after the system is powered on again.

8.2 Output Current Feedback

The pin IFB of the EG8010 chip is used to measure the output load current of the inverter, which is mainly used for overcurrent protection detection. The circuit structure is shown in Figure 8.1a. In the sampling feedback part, the reference peak voltage inside this pin is set to 0.5V, and the overcurrent detection delay time is 600mS. If the current is too high and exceeds the load current of the inverter, EG8010 will output SPWMOUT1~SPWMOUT4 according to the setting state of pin (9) PWMTYP To "0" or "1" level, turn off all power MOSFETs to make the output voltage to a low level, this function is mainly to protect the power MOSFET and the load, Once it enters the overcurrent protection, EG8010 will release and reopen the power MOSFET after 16S, and then judge the load overcurrent condition and release the open power. The duration of the rate MOS tube is 100mS, and the overcurrent event will be judged within the released 100mS time. If there is still an overcurrent event, the EG8010 will Turn off all power MOSFETs to make the output voltage to a low level, and wait for the release of 16S again, if the normal operation reaches more than 1 minute after the release EG8010 will clear the number of overcurrent events, otherwise there is still no normal operation after 5 consecutive releases. EG8010 will completely shut down the SPWM The output of the module needs to be released after the system is powered on again. If the starting current is relatively large and the time is long in some occasions, it is not suitable to use this function Yes, the IFB pin can be grounded.

8.3 Temperature detection feedback

The pin TFB of the EG8010 chip is to measure the operating temperature of the inverter, which is mainly used for over-temperature protection detection and operating temperature output display to 12832 On the LCD module, the circuit structure is shown in Figure 8.3a, the temperature detection circuit. As shown in the figure, the NTC thermistor RT1 and the measuring resistor RF1 form a simple The voltage divider circuit, the voltage divider value changes with the temperature value, the size of this voltage will reflect the size of the NTC resistance to obtain the corresponding temperature value. The NTC selects a thermistor with a corresponding resistance value of 10K at 25°C (the B constant value is 3380). The over-temperature voltage of the TFB pin is set at 4.3V. When over temperature protection occurs, EG8010 will output SPWMOUT1~SPWMOUT4 to "0" according to the setting state of pin (9) PWMTYP

or "1" level, turn off all power MOSFETs to make the output voltage to a low level, once it enters the over-temperature protection, EG8010 will re-judge the work temperature, if the voltage of the TFB pin is lower than 4.0V, the EG8010 will exit the over-temperature protection and the inverter will work normally. If the over temperature protection function is not used Yes, this pin needs to be grounded.

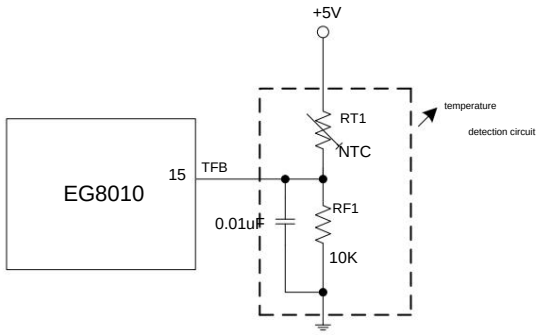


Figure 8.3a EG8010 temperature detection circuit

8.4 PWM output types

The pin PWMTYP of the EG8010 chip is to set the PWM output type, PWMTYP is "0" is the positive polarity PWM type output is applied to When the dead zone level is low at the same time (such as driving IR2110 or IR2106 and other driver chips), Figure 8.4a is the SPWMOUT of EG8010 pin Output waveform, active high-level drive power MOS tube, Figure 8.4b is the application of positive polarity PWM type driving IR2110 when PWMTYP="0" circuit.

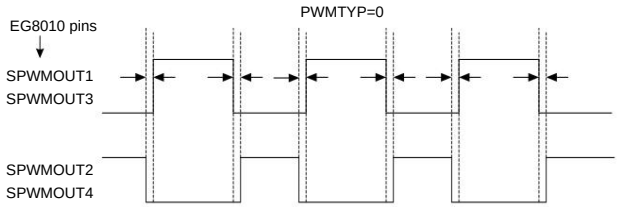


Figure 8.4a EG8010 positive polarity PWM type output

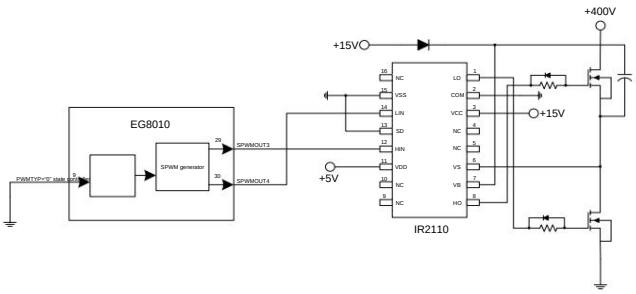


Figure 8.4b EG8010 positive polarity PWM driving IR2110

When PWMTYP is "1", it is a negative polarity PWM type output. It is used in cases where the dead zone level is high at the same time (such as driving optocoupler devices such as TLP250). The cathode of EG8010), the output waveform of EG8010 pin SPWMOUT is shown in Figure 8.4c, the low level is active to drive the optocoupler, and the optocoupler outputs the high-level drive power MOS tube, Figure 8.4d is the application circuit of negative polarity PWM type driving TL250 optocoupler device when PWMTYP="1".

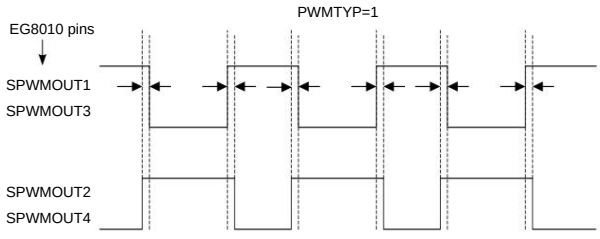


Figure 8.4c EG8010 Negative Polarity PWM Type Output

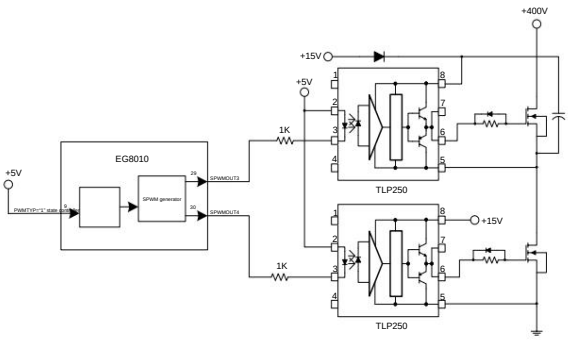


Figure 8.4d EG8010 negative polarity PWM driving TLP250 optocoupler device

8.5 Dead time setting

The pins DT1 and DT0 of the EG8010 chip are used to control the dead time. Dead time control is one of the important parameters of the power MOS tube.

If the dead zone time is too small, the upper and lower power MOS tubes will be turned on at the same time and the MOS tubes will be burned. If the dead zone is too large, it will cause waveform distortion and power tube failure.

Serious thermal phenomenon, Figure 8.5a is the internal dead time control sequence of EG8010, as shown in the figure, pins DT1, DT0 are used to set 4 kinds of dead time, "00" is

300nS dead time, "01" is 500nS dead time, "10" is 1uS dead time, "11" is 1.5us dead time.

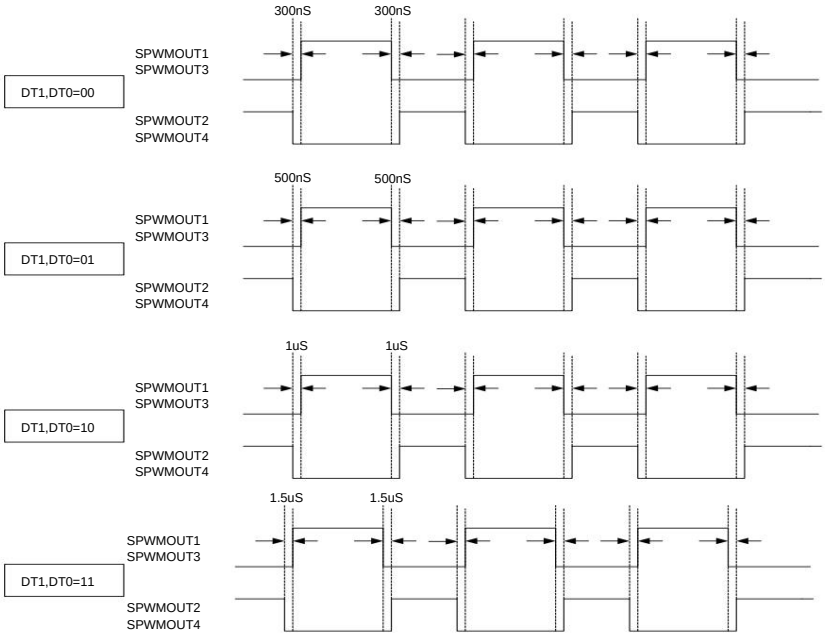


Figure 8.5a EG8010 dead zone control settings

8.6 Frequency setting

EG8010 frequency mode is divided into fixed frequency mode and adjustable frequency mode. In adjustable frequency mode, EG8010 only adopts unipolar modulation method.

In the adjustable frequency mode, the pin (20) MODSEL needs to be connected to a low level. The frequency mode is set by pins FRQSEL1, FRQSEL0, fixed

When the frequency mode is "00", the output frequency is 50Hz, and "01" is the output frequency of 60Hz. In the fixed frequency mode, the FRQADJ function is invalid.

In the bipolar modulation mode, pin (16) will be used as the VFB2 voltage feedback circuit; in the adjustable frequency mode, "10" is the output frequency range of 0~100Hz

Adjustable, "11" means the output frequency range is adjustable from 0 to 400Hz. The adjustable frequency is adjusted by the FRQADJ pin. The circuit is shown in Figure 8.6a.

When the input voltage changes from 0 to 5V, the corresponding fundamental wave output frequency changes from 0 to 100Hz or 0 to 400Hz. This function can be used in combination with the VVVF pin.

Used in single-phase inverter systems.

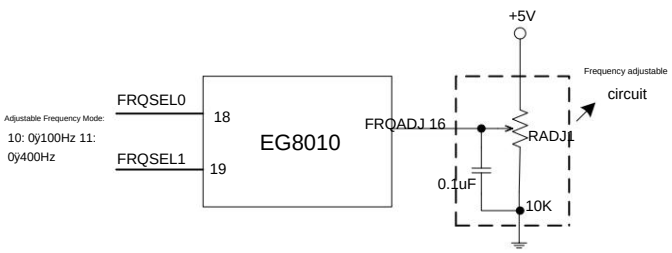


Figure 8.6a EG8010 frequency adjustment circuit

8.7 VVVF Variable Frequency Variable Voltage Mode

In order to ensure that the electromagnetic torque of the motor is constant during frequency conversion, EG8010 ensures that the value of V/F is constant when VVVF is "1"

That is, the output voltage is adjusted while the output frequency is being adjusted; in the mode where VVVF is "0", the output voltage is not adjusted when the output frequency is adjusted.

8.8 Three-wire serial interface 12832 LCD control

EG8010 supports three-wire serial interface 12832 liquid crystal display module, this function realizes the display of inverter voltage, frequency, temperature and

The current and other information are for the user to observe, and the connection method is shown in Figure 8.8a.

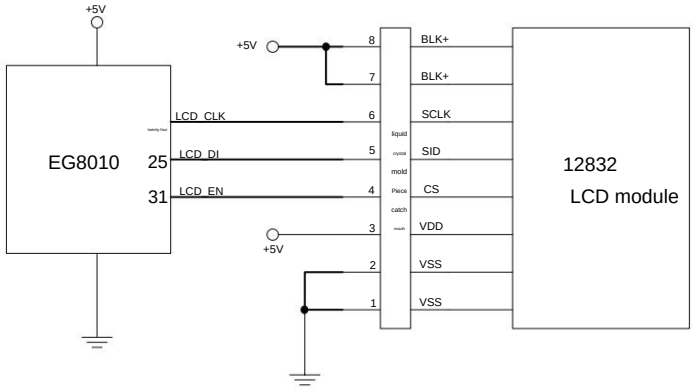


Figure 8.8a EG8010 three-wire serial interface 12832 LCD module

The LCD communication control protocol of the EG8010 chip is mainly for ST7920 type LCD modules such as 12832 LCD, the control timing diagram if 8.8b

shown.

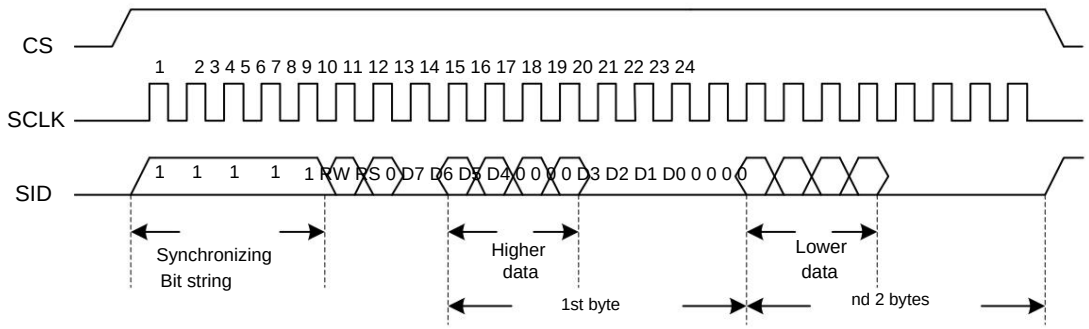


Figure 8.8b EG8010 serial LCD communication control sequence diagram

Figure 8.8c is the information displayed on the LCD screen when the EG8010 is connected to the 12832, and Figure 8.8d is the size chart of the 12832 LCD screen.

Figure 8.8c LCD screen displays information when EG8010 is connected to 12832

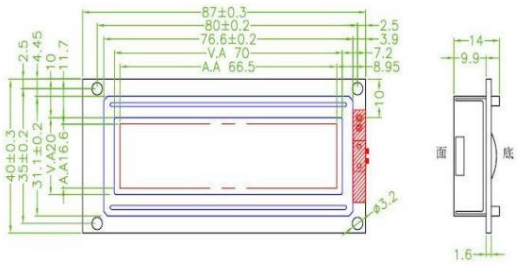


Figure 8.8d 12832 LCD screen size

8.9 RS232 serial communication interface

EG8010 is used in RS232 serial port communication interface to set inverter voltage, frequency, dead zone and other parameters. Optocoupler isolation communication is required for application.

Figure 8.9a.

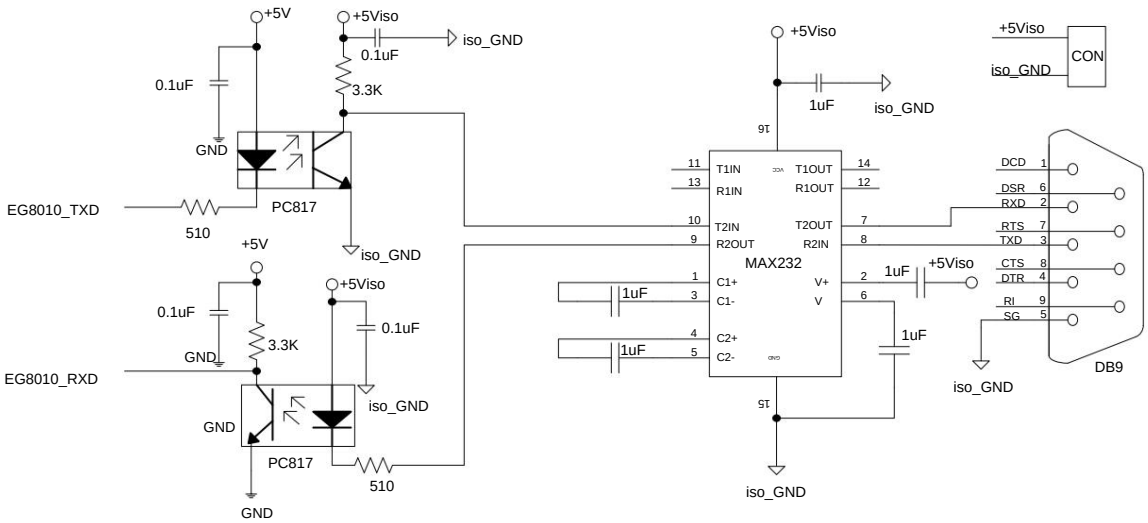


Figure 8.9a RS232 optocoupler isolation communication circuit

Serial port parameters:

Baud rate: 2400

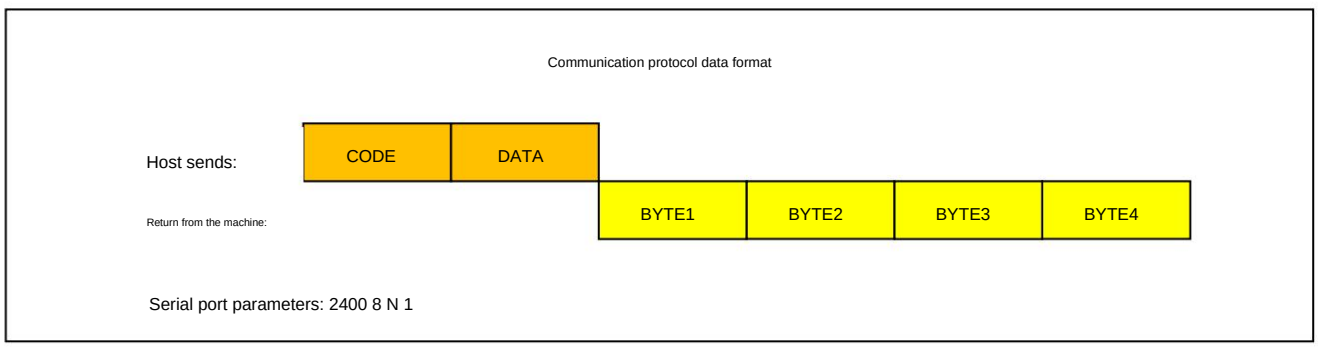
Data bits: 8

Check Digit: None

stop bit: 1

Protocol description:

In communication, EG8010 is used as slave, and users can use MCU or PC as master. Once the slave receives the command sent by the master, it immediately Generate a response, reply data to the host.



The data format is shown in the figure. In one operation, the host sends two bytes of data, the first byte is the command byte, and the second byte is the data byte. After the slave receives two bytes from the master, it returns four bytes of data immediately.

Command format:

Read mode:

1. Read voltage, current, temperature, frequency data

Function			Read voltage, current, temperature, frequency AD value, the chip returns BYTE1 (voltage AD value), BYTE2 (electrical flow AD value), BYTE3 (temperature AD value), BYTE4 (frequency AD value)							
			BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Host sends	CODE 41H (read command)		0	1	0	0	0	0	0	1
	DATA	00H	0	0	0	0	0	0	0	0
Slave return	BYTE1	Voltage	V7	V6	V5	V4	V3	V2	V1	V0
	BYTE2	current	I7	I6	I5	I4	I3	I2	I1	I0
	BYTE3	temperature	T7	T6	T5	T4	T3	T2	T1	T0
	BYTE4	frequency	F7	F6	F5	F4	F3	F2	F1	F0

V7ÿV0 is the VFB pin feedback voltage AD value

I7ÿI0 are IFB pin feedback current AD value

T7ÿT0 is the feedback temperature AD value of TFB pin

F7ÿF0 is to set the sine wave output frequency

2. Enable/disable SPWM output

Function			Enable/disable SPWM output After the chip receives the command, the returned BYTE1 is the command byte (81H), indicating that the writing is successful							
			BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Host sends	CODE	81H	1	0	0	0	0	0	0	1
	CTL control word -			-	-	-	-	-	-	-
Slave return	BYTE1	81H	1	0	0	0	0	0	0	1
	BYTE2 reserves 0			0	0	0	0	0	0	0
	BYTE3 reserves 0			0	0	0	0	0	0	0
	BYTE4 reserves 0			0	0	0	0	0	0	0

The second byte sent by the host is the control word CTL

CTL is 55H, start SPWM output

CTL is 0AAH, disable SPWM output

3. Write control data

Function			Write control data, set the chip working mode configuration through the serial port After the chip receives the command, the returned BYTE1 is the command byte (82H), indicating that the writing is successful							
			BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Host sends	CODE	82H	1	0	0	0	0	0	1	0
	CTL control word MOD DT1				DT0 VVVF SST			MS	FS1	FS0
Slave return	BYTE1	82H	1	0	0	0	0	0	1	0
	BYTE2 reserves 0			0	0	0	0	0	0	0
	BYTE3 reserves 0			0	0	0	0	0	0	0
	BYTE4 reserves 0			0	0	0	0	0	0	0

MOD is the setting control mode, "0" is the external port setting control, "1" is the internal register setting control

DT1, DT0 are dead zone control time setting, "00" is 300nS, "01" is 500nS, "10" is 1uS, "11" is 1.5uS

VVVF is the selection of variable frequency and variable voltage mode, "0" is the variable frequency and constant voltage mode, "1" is the variable frequency and variable voltage mode

SST is the soft-start mode selection, "0" is to disable the soft-start mode, "1" is to enable the soft-start mode

MS is modulation mode selection, "0" is unipolar modulation mode, "1" is bipolar modulation mode

FS1, FS0 are fundamental frequency selection, "00" is 50Hz, "01" is 60Hz, "10" is 0~100Hz, "11" is 0~400Hz

4. Write the output voltage

Function			Write the output voltage. After the chip receives the command, the returned BYTE1 is the command byte (83H), indicating that the writing is successful.							
			BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Host sends	CODE	83H	1	0	0	0	0	0	1	1
	Vol Byte	V7		V6	V5	V4	V3	V2	V1	V0
Slave return	BYTE1	83H	1	0	0	0	0	0	1	1
	BYTE2	reserves 0		0	0	0	0	0	0	0
	BYTE3	reserves 0		0	0	0	0	0	0	0
	BYTE4	reserves 0		0	0	0	0	0	0	0

Voltage adjustment is linear adjustment, 1LSB is 19.6mV

The data range of Vol7 ~ Vol0 is 0x00 ~ 0xFF, and the corresponding VFB pin voltage is 0V ~ 5V

5. Write the output frequency

Function			Write output frequency After the chip receives the command, the returned BYTE1 is the command byte (84H), indicating that the writing is successful.							
			BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Host sends	CODE	84H	1	0	0	0	0	1	0	0
	FRQ byte	F7		F6	F5	F4	F3	F2	F1	F0
Slave return	BYTE1	84H	1	0	0	0	0	1	0	0
	BYTE2	reserves 0		0	0	0	0	0	0	0
	BYTE3	reserves 0		0	0	0	0	0	0	0
	BYTE4	reserves 0		0	0	0	0	0	0	0

When FRQSEL1, FRQSEL0 = "10"

When the data of Frq7~Frq0 is 0x00, the output frequency is 0Hz

When the data of Frq7~Frq0 is 0xFF, the output frequency is 100Hz

When the data of Frq7~Frq0 is 0x7F, the output frequency is 50Hz

When FRQSEL1, FRQSEL0 = "11"

When the data of Frq7~Frq0 is 0x00, the output frequency is 0Hz

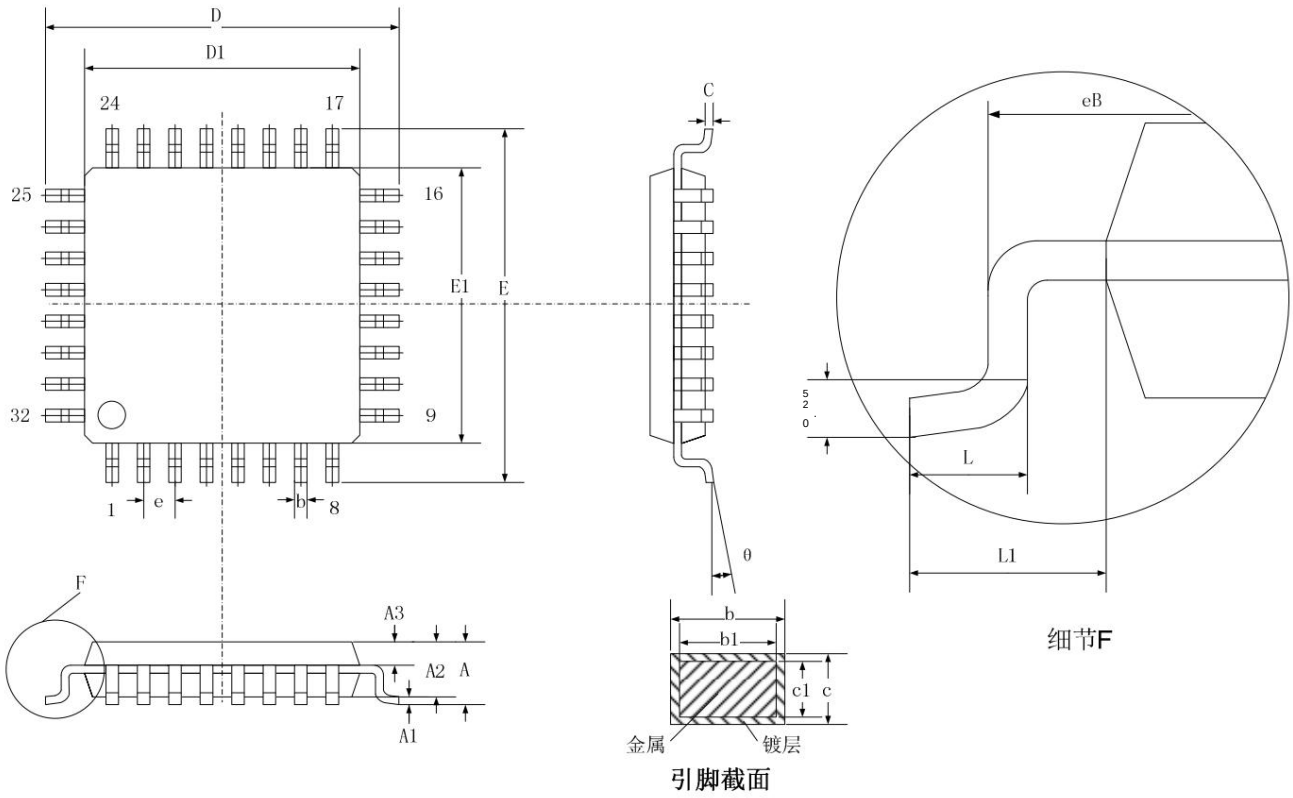
When the data of Frq7~Frq0 is 0xFF, the output frequency is 400Hz

When the data of Frq7~Frq0 is 0x7F, the output frequency is 200Hz

The above frequency adjustment is a linear adjustment method

9. Package size

9. LQFP32 package size:



Symbol	A	A1	A2	A3	b	b1	c				c1	D	D1	E			E1	e	eB	L			L1	theta
MIN	-	0.05	1.35	0.59	0.32	0.31	0.13	0.12	8.80	6.90	8.80	6.90								8.10	0.40			0
NOM	-		-		1.40	0.64	-	0.35	-	0.13	9.00	7.00	9.00	7.00				0.80 BSc		-	-		1.00 BSc	-
MAX	1.60	0.20	1.45	0.69	0.43	0.39	0.18	0.14	9.20	7.10	9.20	7.10								8.25	0.65			7
Unit	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm										o