EGS002 SINE WAVE INVERTER CIRCUIT

9/25/2017 Opanin17 27 Comments

This is a simple sine wave inverter circuit without programming. Pure sine wave inverter circuit with no center tap design has become simple by using EGS002 Sinusoidal Inverter Driver Card. This post will give explain how to make a pure sine inverter at home without any programming. Let me start this tutorial by first introducing you to EGS002 DRIVER BOARD.

EGS002 DRIVER BOARD/CARD

Build your own MPPT read here (https://manycircuits.blogspot.com/2019/06/mppt-circuit-dspic30f2010.html)
EGS002 is an already made 17pins plug and play driver board specific for single phase sinusoidal inverter. It uses ASIC EG8010 as control chip and IR2110S as driver chip. The driver board integrates functions of voltage, current and temperature protection, LED warning indication and fan control. Jumper configures 50/60Hz AC output, soft start mode and dead time.

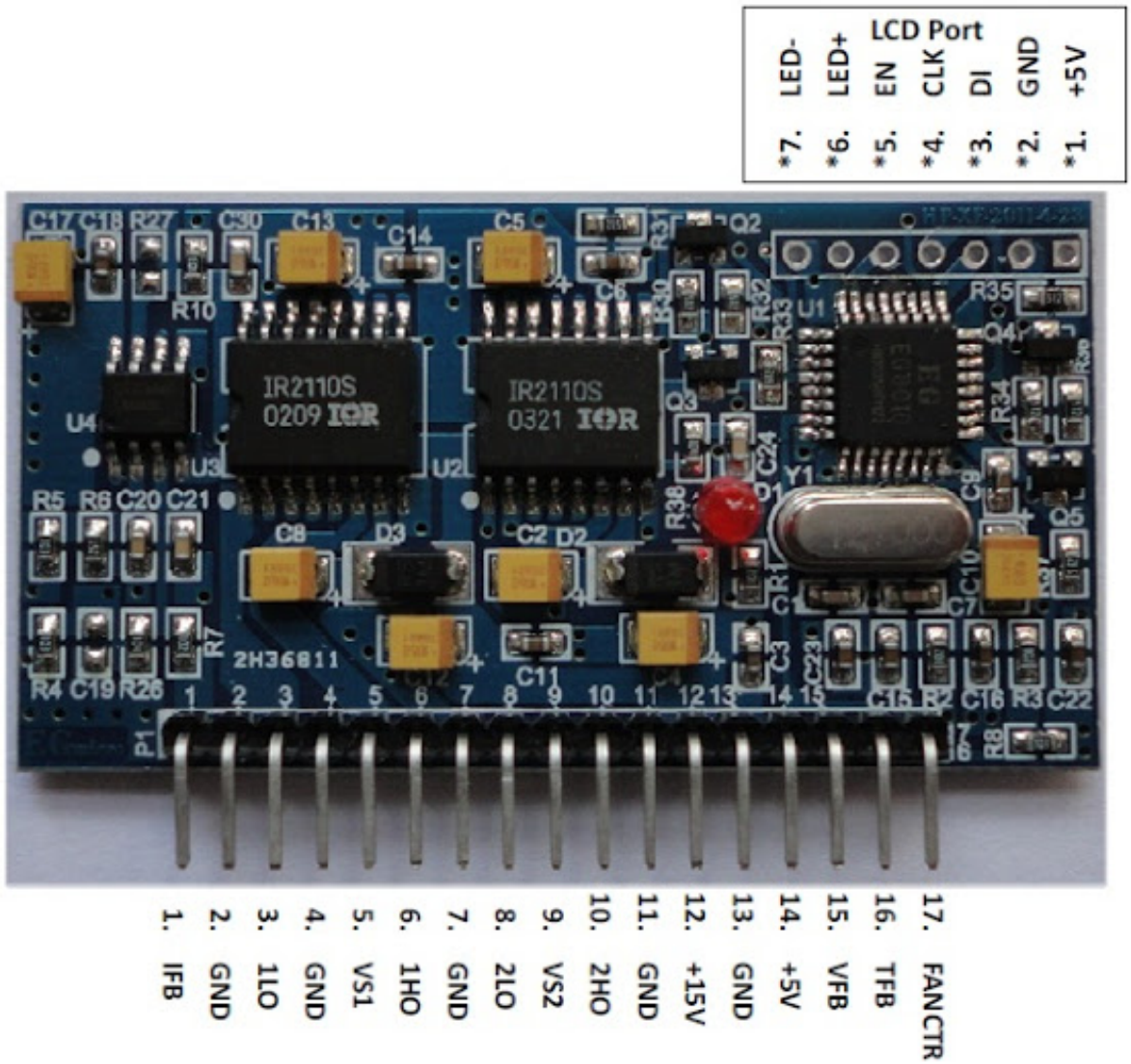
The driver board has an LCD monitor port. A connected LCD monitor will display Output voltage, current, system temperature and Output frequency. The board will still work even when no

display is connected.

The board can be used for two stage AC converter (DC-DC-AC) or DC-AC single stage low power frequency transformer systems. In this tutorial, we are going to limit ourselves to Low frequency transformer systems. That is no center tap transformer inverter.

Lets now take a look at our EGS002 card and its pins. You can download the pdf. datasheet of the card by clicking here

EGS002 Front View



(https://2.bp.blogspot.com/-pIo13mFHex0/VxjFwZ9V16I/AAAAAAAAAX0/od-AeQIZDgsIbA4bnxoDBxueO_Q5Zh7dQCLcB/s1600/pin%2Bview.jpg)

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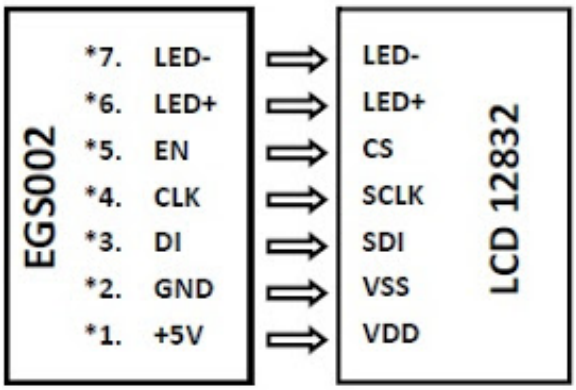
EGS002 DISPLAY CONNECTION

12832 LCD Connection Diagram:



(https://1.bp.blogspot.com/-iOJSJRU98EU/Vxjp4nKQRfI/AAAAAAAAAYo/MfOP3JeGq4wytaAVH87x2CAEb7rvRlzcwCLcB/s1600/LCD%2Bconnection.jpg)

The board has several functions which the user can activate or select by using
jumper or soldering the points together. The image below provides the jumper setting if the default is not wanted.

Jumper settings

Designator	Name	Mark	Setting Description
1	FS0	JP1	When JP1 is short, it selects AC output frequency at 60Hz
		JP5	When JP5 is short, it selects AC output frequency at 50Hz
2	SST	JP2	When JP2 is short, it enables 3 seconds soft start mode
		JP6	When JP6 is short, it disables soft start mode
3	DT0	JP3	When JP7 and JP8 are short, dead time is 300ns.
		JP7	When JP3 and JP8 are short, dead time is 500ns.
4	DT1	JP4	When JP4 and JP7 are short, dead time is 1.0us.
		JP8	When JP3 and JP4 are short, dead time is 1.5us.
*5	LED+	JP9	When JP9 is short, LCD backlight is on When JP9 is open, LCD backlight is off

The driver board's jumperJP5, JP2, JP7 and JP8 are shorted as default setting, corresponding to 50Hz output, soft start mode on, 300nS dead time. Users can change these based on their needs.
Warning: Jumper of the same function CANNOT be short circuited at the same time. (For example: JP1 And JP5 cannot be short at the same time.)

(https://2.bp.blogspot.com/-dCnZ-

/

R7fvxg/VxjjoYuf0TI/AAAAAAAAAYQ/beKxILumNvIr-FTpv1uquqtYu6-A6aWiwCLcB/s1600/jumper%2Bsetting.jpg)

SINE WAVE INVERTER MOSFET BRIDGE BOARD (https://manycircuits.blogspot.com/2017/05/h-bridge.html)

Now that you have fair idea of the sine inverter card, plug the card into the circuit below. the below circuit will work without any modification when using 12V or 24V battery system. To use 48V or higher Dc voltage designs, you have to step down the higher DC voltage to 12V using a buck converter or an appropriate Step down IC and later use 7805 to get your 5V.

Please note that LM7805 and LM7812 will burn when the input is more than 30V DC.

SINE WAVE INVERTER CIRCUIT (http://manycircuits.blogspot.com/2018/04/dspic30f2010-inverter-with-charger.html)

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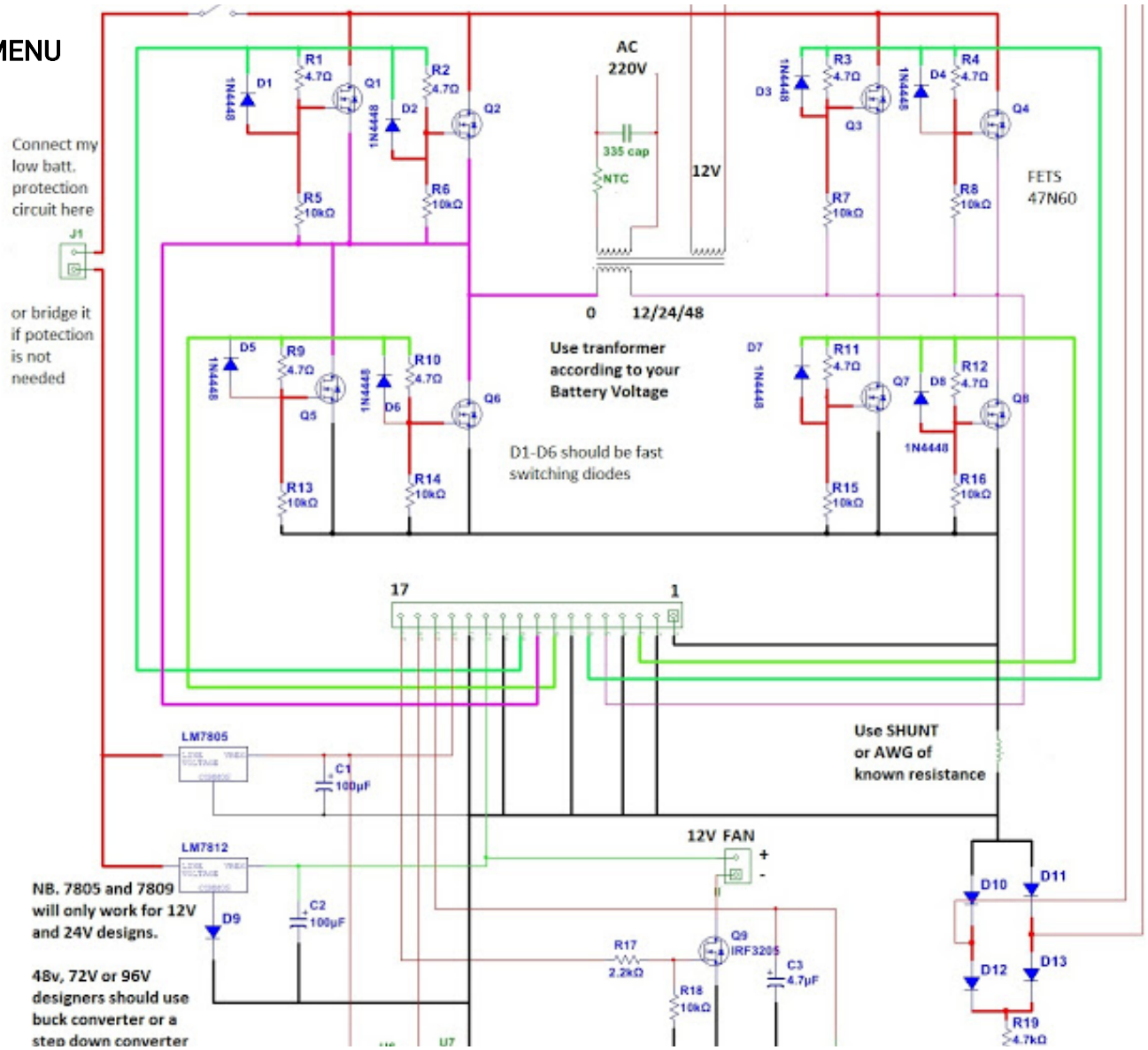

(https://4.bp.blogspot.com/-ZYzFSAutO98/VxjJ6m7QSJI/AAAAAAAAAYA/Y65OSsiwcJolUo3k4XAi0Qn5cx0w4QEigCLcB/s1600/SINE%2BPLUG.jpg)
to make your own transformer for this circuit click below

Read more on make inverter transformer (https://manycircuits.blogspot.com/2019/03/make-inverter-transformer.html)

With this circuit, you only fix your card pins to the corresponding circuit pins. Output regulation is achieved by adjusting the 10K variable resistor. U6 is 10K NTC for temperature sensing and fan regulation. The 220V ac output of this power inverter is protected from power surge using Power NTC 10ohms.

The egs002 card can be used for all voltage systems.
But 24 and 48V systems will need a voltage conveter.
YOU CAN READ ON HOW TO MAKE SMPS VOLTAGE CONVERTER BY CLICKING THIS TEXT
(https://manycircuits.blogspot.com/2018/07/how-to-make-ferrite-transformer-chopper.html)

The feedback can also be achieved by using a separate 12V transformer instead of one transformer with a separate winding.

WATTAGE

(https://manycircuits.blogspot.com/2017/05/overload-protection-circuit-and-low.html)

The wattage of the inverter depends on the number of mosfets you will connect in parallel. Add more mosfets in parallel for high output power. Every 4 Mosfets will switch 250W in 12V system, 500W in 24V system and 1000w in 48V system. I hope you can make your calculation from it as to how many Fets to connect in parallel to get a certain wattage.

WHERE TO BUY THE SINE WAVE INVERTER DRIVER CARD

You can buy it on ebay or Ali express at 6 to 18 dollars with delivery time up to 40 working days.

You can also buy the BRIDGE BOARD from me by stating the wattage

Contact me on +233273315313 or opanin17@gmail.com

BATTERY PROTECTION AND LOW BATTERY ALARM

The inverter battery is very expensive and must be protected to prolong its life. when the battery is drained too low, the battery expected life will be shortened. connect the positive lines of my battery protection circuit to J1 and negative to the ground. Battery protection circuit can be seen by clicking this link

OVERLOAD PROTECTION FOR THE SINE WAVE INVERTER CARD

Overload protection protects the inverter from failing when the output is shorted or load exceeds maximum load. The sine wave driver board has an inbuilt current sense which shuts down the inverter when max current is exceeded. Pin 1 of the card is dedicated to this function. The current sense uses a shunt resistor. Shunt value is selected such that at maximum current, The voltage drop will be 0.5V. This prompts the system that there is an overload so that the system turns off until overload cause is removed.

The formulae for calculating the shunt resistance are:

1. R= 0.6 (V/ I max) where V=0.5, I=Max DC switching current. and R = Shunt value.

read how to calculate max drive stage current from

http://manycircuits.blogspot.com/2017/05/inverter-circuit-with-charger.html (http://manycircuits.blogspot.com/2017/05/inverter-circuit-with-charger.html)

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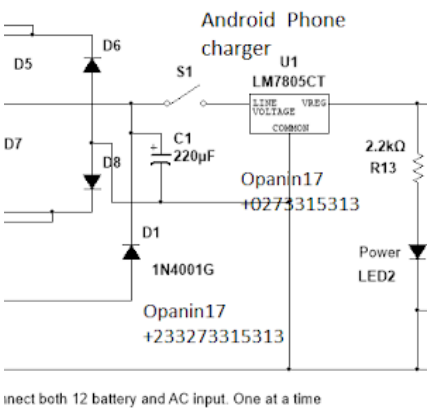

(https://manycircuits.blogspot.com/2017/05/how-to-charge-phone-using-12v-battery.html)

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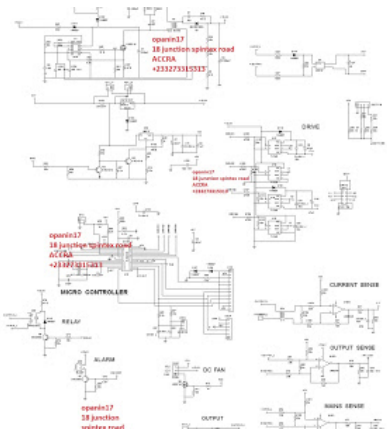

(https://manycircuits.blogspot.com/2018/04/dspic30f2010-inverter-with-charger.html)

DSPIC30f2010 PURE SINE INVERTER CIR... (https://manycircuits.blogspot.com/2018/04/dspic30f2010-inverter-with-charger.html)

27 comments:

Anonymous September 21, 2017 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1505979150316#c3314145467181984872)

Hi, you haven't specified the mosfet number. IRFZ44N or IRF3205N? Is the board configured as unipolar or bipolar?

Reply

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Replies

Opanin17 (https://www.blogger.com/profile/15128224101373900489) September 21, 2017 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1505986825512#c1779972489705401974)

Hi, Any N-Chanel mosfet will work.
But always make sure that the maximum voltage of your mosfet is at least twice your system voltage.
eg. You can use 3205 or Irfz44 for 12V systems and 24V systems.....But cannot be used for 48V systems since their max voltage is 55V

Anonymous September 21, 2017 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1505982029591#c5623558739552300336)

I have started liking this Board especially when one considers the simplicity and the low cost of acquisition. I have decided to convert all my single stage modified UPS/inverters to pure sine-wave ones using your circuit schema. How does it fare in terms efficiency?

Reply

Replies

Opanin17 (https://www.blogger.com/profile/15128224101373900489) September 21, 2017 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1505987082967#c5440189427686554943)

Very efficient with clean output

nitin November 16, 2017 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1510861242949#c6660899312614243318)

suggest egs002 and boost PFC circuit using same h bridge for 48v system. is it possible to switch off egs002 when mains on and shift same h bridge to boost PFC SG3524.

Reply

Opanin17 (https://www.blogger.com/profile/15128224101373900489) November 17, 2017 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1510924731122#c3261493366794216758)

Yes its possible. I have done that before using 8pins relay

Reply

naveed (https://www.blogger.com/profile/07158032062765868232) November 18, 2017 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1511007502639#c5649228248998471176)

Pretty good post. I just stumbled upon your blog and wanted to say that I have really enjoyed reading your blog posts. Any way I'll be subscribing to your feed and I hope you post again soon. Big thanks for the useful info.
Robinets de Lavabo (https://www.robinetsboutique.fr/38-robinets-de-lavabo)

Reply

Unknown (https://www.blogger.com/profile/01373068825461884308) December 20, 2017 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?

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showComment=1513767005205#c5107238741243840608)

Pls, my questions go this way.
1) is the value of the 10k BTC critical?

2)now, if you want to use a single transformer for both the inverting and charging from the mains, what modifications are needed in your circuit?

Reply

Replies

Opanin17 (https://www.blogger.com/profile/15128224101373900489) December 20, 2017 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1513771240034#c6254605045289262788)

1. The 10k is not critical depending on how hot you want your sysyem to be before fan starts.

2. You need high skills in this very circuit because the card doesnt have charging code. You can however acheive that using a relay to disconnect the gate drive and switching the the low side mosfets at 20kz-27kz.with an external driver when the transformer is connected to mains

Rogério Leite (http://www.apolo11.com) January 13, 2018 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1515875853946#c8744103520025510176)

Hi!
Can you tell me about power transformer used in this circuit? For 12 volts battery, how must be the transformer (Primary and secondary)?

Thanks so much!

Reply

Replies

Opanin17 (https://www.blogger.com/profile/15128224101373900489) January 15, 2018 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1516008387775#c4172391066786722478)

The secondary must 6V (0-6v) whiles the primary must be a ratio of your secondary turns which can give 220v or 110v depending on where you are.

Unknown (https://www.blogger.com/profile/09877099692542954185) January 16, 2018 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1516106083027#c3398257830995803770)

Sir but in the above diagram u have mentioned, to use transformer accoring to the battery , but now u r saying to use (6-0) v why?

Reply

Replies

Opanin17 (https://www.blogger.com/profile/15128224101373900489) January 16, 2018 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1516117407537#c6089490691249620272)

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That was a mistake...In pure sinewave systems, you have to use transformers which are half of your battery voltage.
Example: 48v (24V to 26V transformer)
24V (use 12V to 14V transformer)
12v (use 6V to 7v transformer)

Unknown (https://www.blogger.com/profile/04860040006493307043) March 12, 2018 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1520826695704#c5965878476062754019)

Sir what is u7 is this non polarised capacitors

Opanin17 (https://www.blogger.com/profile/15128224101373900489) March 12, 2018 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1520839443854#c8129776474419593732)

Yes U7 has no polarity

Anonymous March 25, 2018 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1522002384669#c4189890156525266779)

Good day! Would you mind if I share your blog with my facebook
group? There's a lot of folks that I think would really enjoy your content.

Please let me know. Cheers

Reply

Replies

Opanin17 (https://www.blogger.com/profile/15128224101373900489) March 25, 2018 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1522012053424#c7034293999025345227)

Feel free to share on any site that you want to.
Thanks very much.

Anonymous March 29, 2018 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1522327456186#c6758334807873543318)

You are so interesting! I don't think I've read something like this before.
So nice to discover somebody with some original thoughts
on this subject matter. Really.. many thanks for starting this up.
This website is something that's needed on the web, someone
with a little originality!

Reply

Anonymous March 29, 2018 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1522327846274#c9143045106746811046)

Hey There. I discovered your weblog the use of msn. This is an extremely
well written article. I will make sure to bookmark it and
return to read more of your helpful info.

Thanks for the post. I will certainly comeback.

Reply

Anonymous May 05, 2018 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1525533248028#c1925197968623415827)

I ggot this web site fromm my friend who informed me aƄout this wweb site and
at the moment this time I am browsing this wweb page
and reading very informative articpes orr reviews at this tim e .

Reply

Anonymous May 29, 2018 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1527628936119#c8784168135928823949)

Good day very cool web site!! Man .. Excellent
.. Wonderful .. I'll bookmark your website annd take the feeds also?
I am satisfied to search outt a lot of useful information right here in the submit,
we'd like work out more techniques in this regard, thank you for sharing.

. . . . .

Reply

Unknown (https://www.blogger.com/profile/10083259633542996195) January 01, 2019 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1546367091734#c4024570621593398978)

Nice brother please more on egs002 projects thanks

Reply

Unknown (https://www.blogger.com/profile/10652967073850240898) February 16, 2019 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1550301564940#c2679919806335545545)

Hi
does anyone knows a version of this board with a variable frequency (as the ED8010 allows)?

Reply

Unknown (https://www.blogger.com/profile/05071341807534810140) July 29, 2019 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1564439202717#c1601721586392315390)

Can I use 370 VDC as long as I take care of EGS002 5 volt supply, Fan 12 volt supply and FET voltage/current?

Reply

Replies

Opanin17 (https://www.blogger.com/profile/15128224101373900489) July 30, 2019 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1564468089162#c6456744469803388070)

Yes you can. But in that case you have to use high frequency inverter topology and use an LC filter to block the high frequency harmonics to get only 50Hz at the output.

MENU

chemartin (https://www.blogger.com/profile/05512409979858881702) January 23, 2020 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1579821933940#c7848096970006459291)

hi! your project is amazing! can I ask you something? if I use an 12v battery, the transformer that I have to use is 6v/220V??

Reply

Replies

Opanin17 (https://www.blogger.com/profile/15128224101373900489) January 24, 2020 (https://manycircuits.blogspot.com/2017/05/simple-pure-sine-inverter-circuit.html?showComment=1579847636031#c1764129533408607299)

Yes. The transformer should be 6V maximum 6.5V

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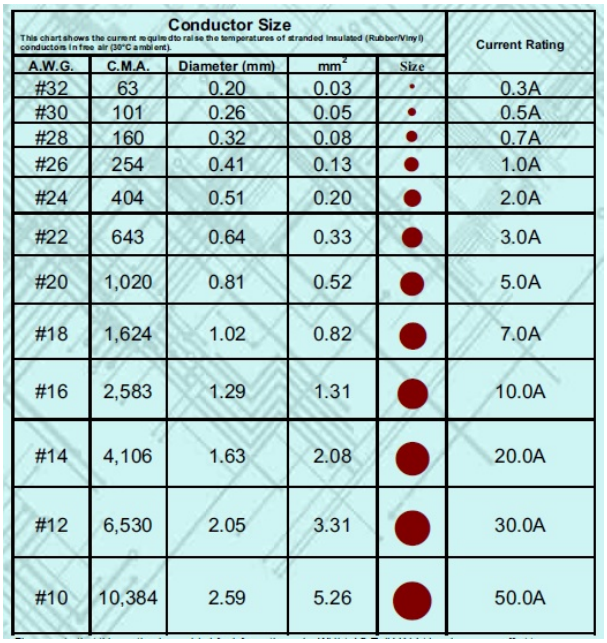
MAKE INVERTER TRANSFORMER (https://manycircuits.blogspot.com/2019/03/make-inverter-transformer.html)

Inverter transformers are just like any other power transformers except that inverter transformers works in the reversed form of the standa...



Conductor Size This chart shows the current required to raise the temperatures of stranded insulated (Rubber/Vinyl) conductors in free air (30°C ambient).					Current Rating
A.W.G.	C.M.A.	Diameter (mm)	mm^2	Size	
#32	63	0.20	0.03		0.3A
#30	101	0.26	0.05		0.5A
#28	160	0.32	0.08		0.7A
#26	254	0.41	0.13		1.0A
#24	404	0.51	0.20		2.0A
#22	643	0.64	0.33		3.0A
#20	1,020	0.81	0.52		5.0A
#18	1,624	1.02	0.82		7.0A
#16	2,583	1.29	1.31		10.0A
#14	4,106	1.63	2.08		20.0A
#12	6,530	2.05	3.31		30.0A
#10	10,384	2.59	5.26		50.0A

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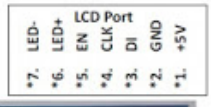
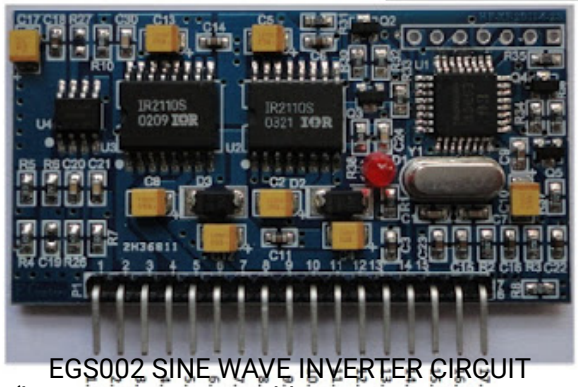
GS002 Front View





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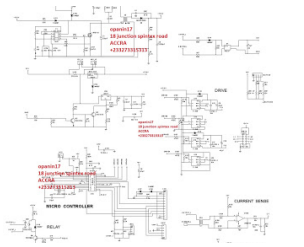

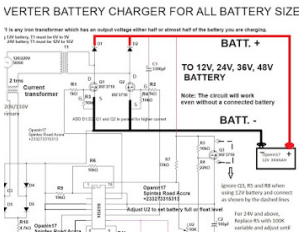

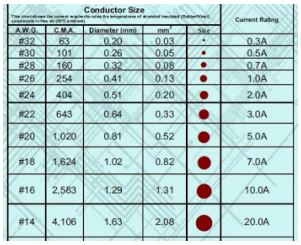

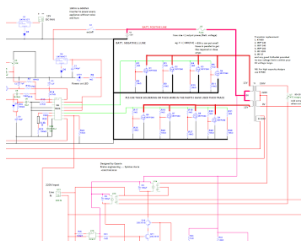

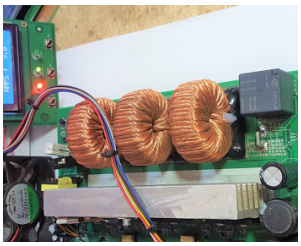

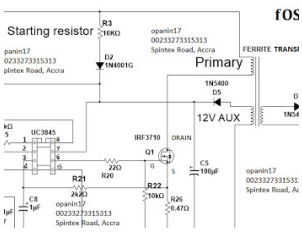

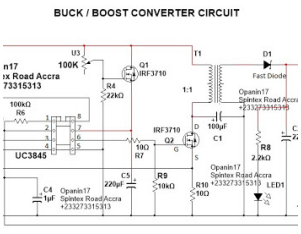

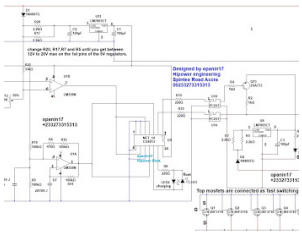

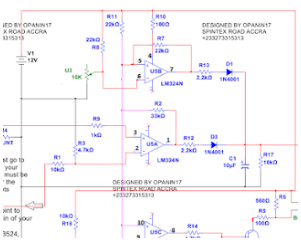

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