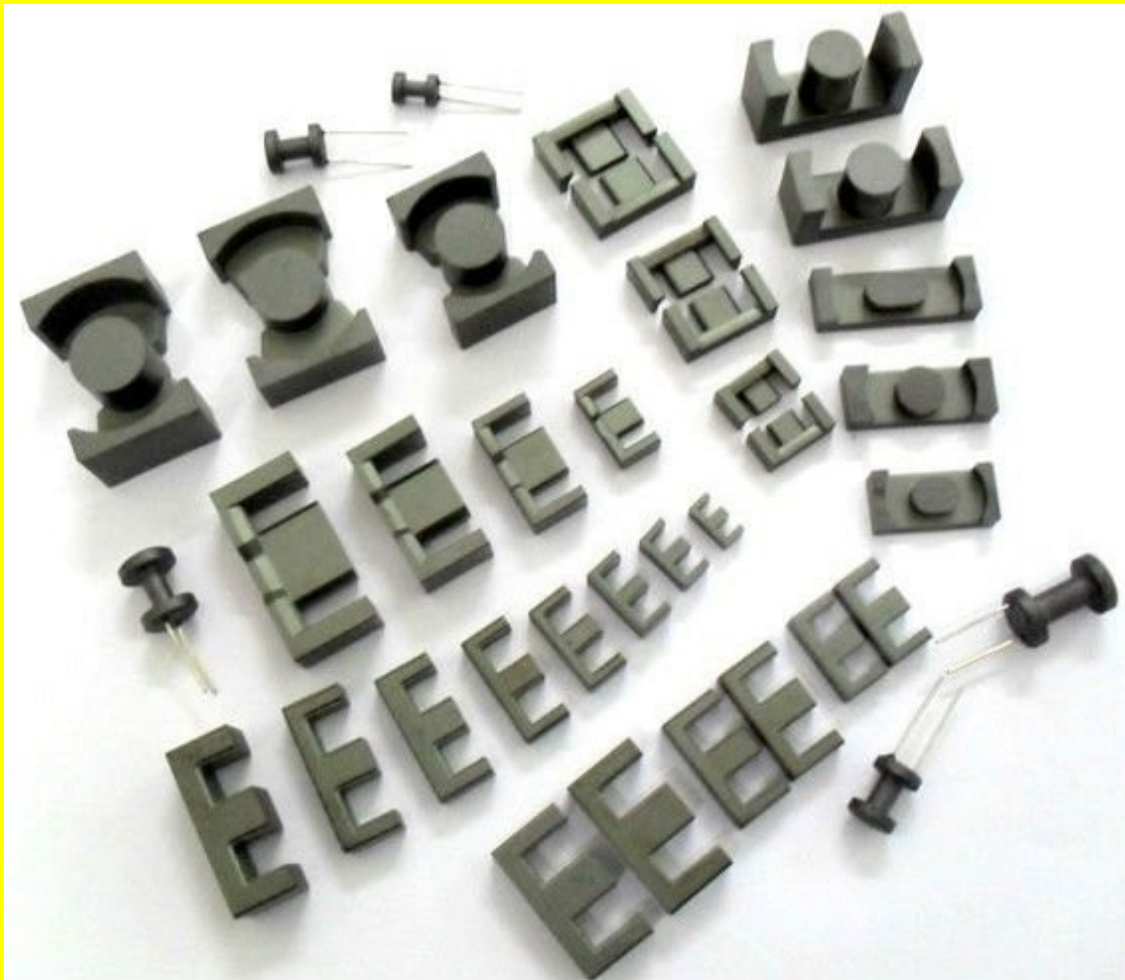


# UPS-Inverter-SMPS

## Transformer Designer

*For Beginners*



2<sup>nd</sup>. Edition June 2016

**Tekemon.com**

(Without Transformer Designer Software)

# **UPS-Inverter-SMPS Transformer Designer**

(Transformer Designer-v2.xls Excel Spreadsheet not included)

By

**Tekemon.com**

**GoTekemon@gmail.com**

**2nd Edition**

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**June, 2016**

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The design process involves entering a total number of 16 data items in the Data Input column of the accompanying “Transformer Designer” Excel worksheet (as shown on page-6). The Results Output immediately displays the design results for use in constructing a real working prototype transformer.....14

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## **A note on Safety**

**As with all instruction aids, its entirely upto the user to ensure best safe practices while constructing the real hardware. Use good insulating materials for primary-secondary isolation such as Dupont Nomex paper, if higher temperature ratings are desired. Implement good winding techniques, since it is assumed that the user is familiar with layered windings, soldering, and other everyday construction techniques for making transformers.**

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Please remember this tool is the Designer. You are the Constructor, and it is your responsibility to make sure your prototypes are robustly constructed and safe to test and use.

**Tekemon.com is in no way liable for any damages or injury sustained by the user based on information contained here in and/or in Transformer Designer-v2.xls spreadsheet.**

Disclaimer:

Tekemon.com reserves the right to alter or modify information contained herein for improvements as and when necessary.

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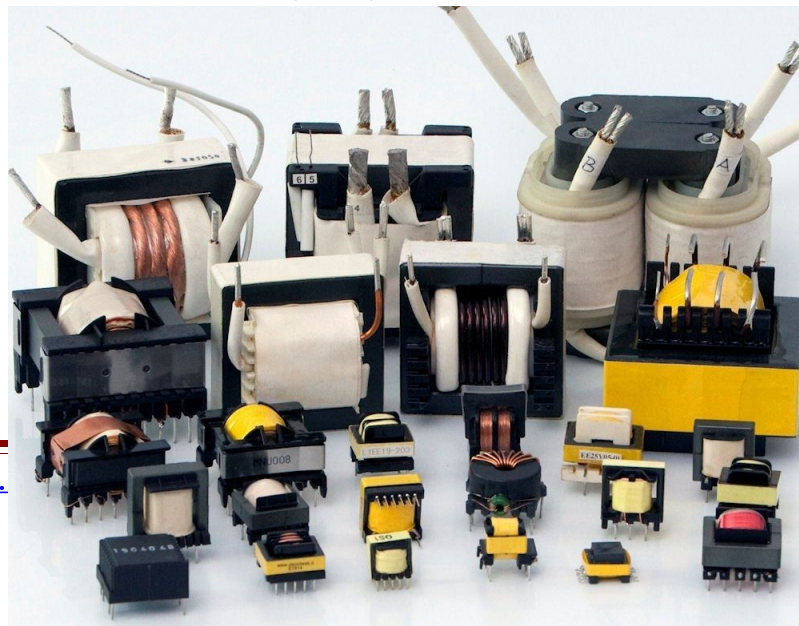
## Introduction

Thank You !

For your choice of our “**UPS-Inverter-Converter Transformer Designer 2<sup>nd</sup> Ed.**”, and “**Transformer Designer-v.2.xls**”. We hope this book and the design-aid (Transformer Designer v.2 Excel Spread-sheet) will enable you to quickly conceive practical transformer designs, for your work, hobby, or just plain learning fun.

This e-book and accompanying Excel file (both available as downloadable products) form a powerful tool, to help hobbyists, students and R&D engineers, to quickly design various types of “**Airgap-less**” ferrite core power transformers for Push-Pull / Forward topologies as used in modern switch-mode power supplies or SMPS. It takes the boredom out of repetitive calculations with variations in design parameters, vital for drilling down to a final design. For the learners it will uncover the mystery surrounding magnetic component design.

The Spread-Sheet calculator (**Transformer Designer**) allows user to easily input data or design parameters and watch the results “on the fly”. The users can easily understand effects of changing a certain parameter and observe its impact on the overall design. The compact presentation of Input data and Results side by side, is intended to make modifications easy, and arrive at the desired final working design in minimum time.





# Transformer Designer

Based on the Formula  $E = KFANB \times 10^{-8}$  (Volts)

Data Input		Results Output	
<b>Turns Pri /Sec (Ref Fig-1)</b>			
1	E-in (Input DC /AC RMS volts)	12 V	1 Core Area ( <b>Ac</b> )
2	E-out (AC output voltage)	325 V	2 Np (Full bridge) Fig-5
3	F (oper. frequency)	50000 Hz	3 Np (Push-Pull, CT) Fig-6
4	Core Length ( <b>L</b> )	10.0 mm	4 Ns (Fullwave Rect) Fig-7
5	Core Width ( <b>W</b> )	10.0 mm	5 Ns (Fullwave Rect, CT) Fig-8
6	Bmax (max flux density, G)	1650 Gauss	6 n (trans ratio Ns/Np)
7	Waveform factor (K)	4	7 Volts / turn
8	Core Stacking Factor (S)	1	8 Turns / volt
			1.00 cm <sup>2</sup>
			3.6 turns
			7.3 turns
			98.5 turns
			197.0 turns
			27.08
			3.3000 V/t
			0.3030 t/V
<b>Bobbin (Ref Figs-2 &amp; 3)</b>			
9	Core Window Height ( <b>H</b> )	30.0 mm	9 Window Area ( <b>Wa</b> )
10	Core Window Width ( <b>N</b> )	9.0 mm	10 Avail. Window ( <b>Awa</b> )
11	Bobin-H (mm)	27.0 mm	11 Effective Area ( <b>Aeff</b> )
12	Bobin-W (mm)	7.0 mm	12 Area Product ( <b>AcWa</b> )
13	Winding Factor ( <b>Wf</b> )	0.8	13 Pri Area ( <b>Apri</b> )
	<i>Wf is lower for large wire dia. and thicker paper/tape insulation. To start Use Wf=0.8. Thinner wires give higher or better Wf.</i>		14 Sec Area ( <b>Asec</b> )
			15 Bobin H (in.)
			16 Bobin W (in.)
			17 Bobin Area (sq. mils)
			18 Bobin Area (circ. mils)
			0.95 cm <sup>2</sup>
			0.95 cm <sup>2</sup>
			1.0630 in.
			0.2756 in.
			292951 s.m.
			372995 c.m.
<b>Power &amp; Wire Sizing (Ref Fig-4)</b>			
14	I-Density (D) (circ.mils/amp)	400 c.m./A	19 I-in (input current)
15	Efficiency ( 0 to 1 )	0.95	20 I-out (output current)
16	P-out (watt)	100.0 W	21 P-in (input power)
			22 Max. Power from Core
			23 Max. Power with Bobbin
			24 Actual Power Output (without Temp rating)
			25 Pri. Wire Area (Full Bridge) Fig-5
			26 Pri. Wire Area (Push-Pull, CT) Fig-6
			27 Sec. Wire Area (Full-Wave Rect) Fig-7
			28 Sec. Wire Area (Full-Wave Rect, CT Center Tapped) Fig-8
			8.772 Amp
			0.308 Amp
			105.3 W
			818.6 W
			573.0 W
			458.4 W
			3509 c.m.
			1754 c.m.
			123 c.m.
			62 c.m.
	<p><b>Note:</b> After all results are computed, proceed to "Wire-Table" in next sheet below, to select the appropriate wire-gauge having required area in circular mils (c.m.). For <b>high-current / high-frequency windings</b>, use multiple strands of thinner wire to achieve the required wire area. This is important when frequencies are upwards of 30KHz, to prevent heating of a single thick wire due to skin-effect. Also, several thin wires are easier to wind and fit into a bobbin compared to a single thick wire of same area. This technique greatly increases core winding space utilization by increasing the winding factor (<b>Wf</b>) and results in a more compact and efficient design.</p>		



---

The **Push-Pull / Forward** ferrite core transformers are the most widely used high power transformers in the power electronic industry. They are found inevitably in all high power SMPS and popular power conversion equipment such as solar charge controllers, dc-dc converters, solar hybrid inverters, etc. Therefore a special treatment is justified for this type alone.

### **Why have a tool like this when so much else is there to help (confuse..!) ?**

Well …., why Not? For the most part, a real working design is extremely hard to predict using CAD alone, and achieving the desired performance and its verification, can come only after making and testing a few prototypes.

Let me in you on a secret… No matter how sophisticated a software package be, the only way to arrive at a successful working design is by actual physical construction and subsequent testing. There is just no work-around to this design cycle. And the sooner you get down to it, the earlier you'll have your design.

And that's precisely what this neat little tool does …. Start your design quickly and fairly accurately. All other refinements can come later after a few iterations of **design-build-test** routine.

Secondly, it allows users to quickly vary the most critical design parameters, and immediately observe what changes occur in the calculated values of other parameters. e.g. number or turns in primary/secondary, turns per volt, power handling capacity, core area, flux density, etc, etc.

## **Presentation Style**

The Transformer Designer (Excel file) brings the experience of “live-design” to the user, and is mainly divided into 3 functional areas namely **Turns, Bobbin, Power & Wire Sizing**. The following pages contain detailed info on all three sections, along with reference figures in the Excel workbook.

---

The spread-sheet tabulates the design data and results, side by side. The design data is entered sequentially, so that the design proceeds in a step by step easy to understand, logical fashion.

Figures (1-4) show the physical parameters of design. Figures (5-9) relate to the transformer topology as chosen by the user.

The Wire-Table (Fig-11) is always handy for wire selection as copied on sheet-2 of Spread-sheet.

We don't want to take anymore of your time, so start playing with the Designer and see how useful it can be. For those looking for more in-depth study of the design process, the next pages will provide the insight required.

Your feedback is important to us, so do let us know what is missing, or needs improvements.

# Sec-1. Reference Figures

(K=4 for squarewaves & 4.44 for sinewaves)  
 (S=1 for Ferrite, 0.95 or less for Laminations)

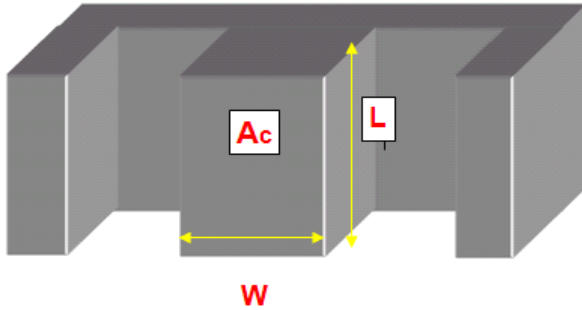


Fig-1

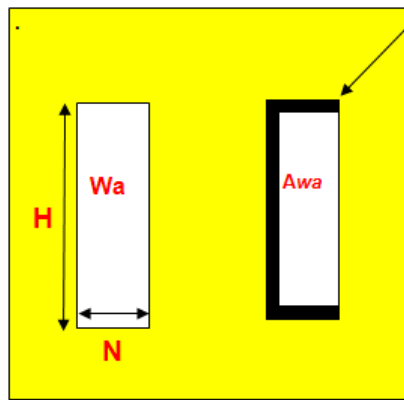


Fig-2

Bobbin (shown half only)

Area (c.m.) =  $d^2$  (dia. In mils squared)  
 1 c.m. = 0.7854 sq. mils  
 1 sq. mil = 1.273 c.m.  
 1 inch = 1000 mils

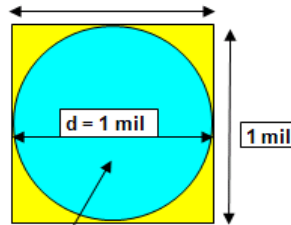


Fig-4

1 c.m.

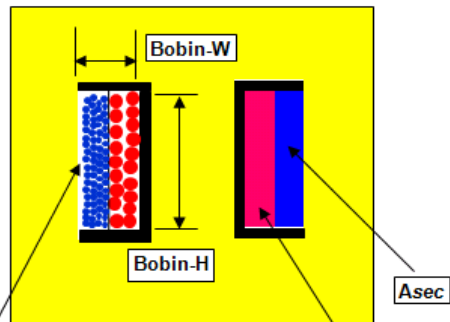


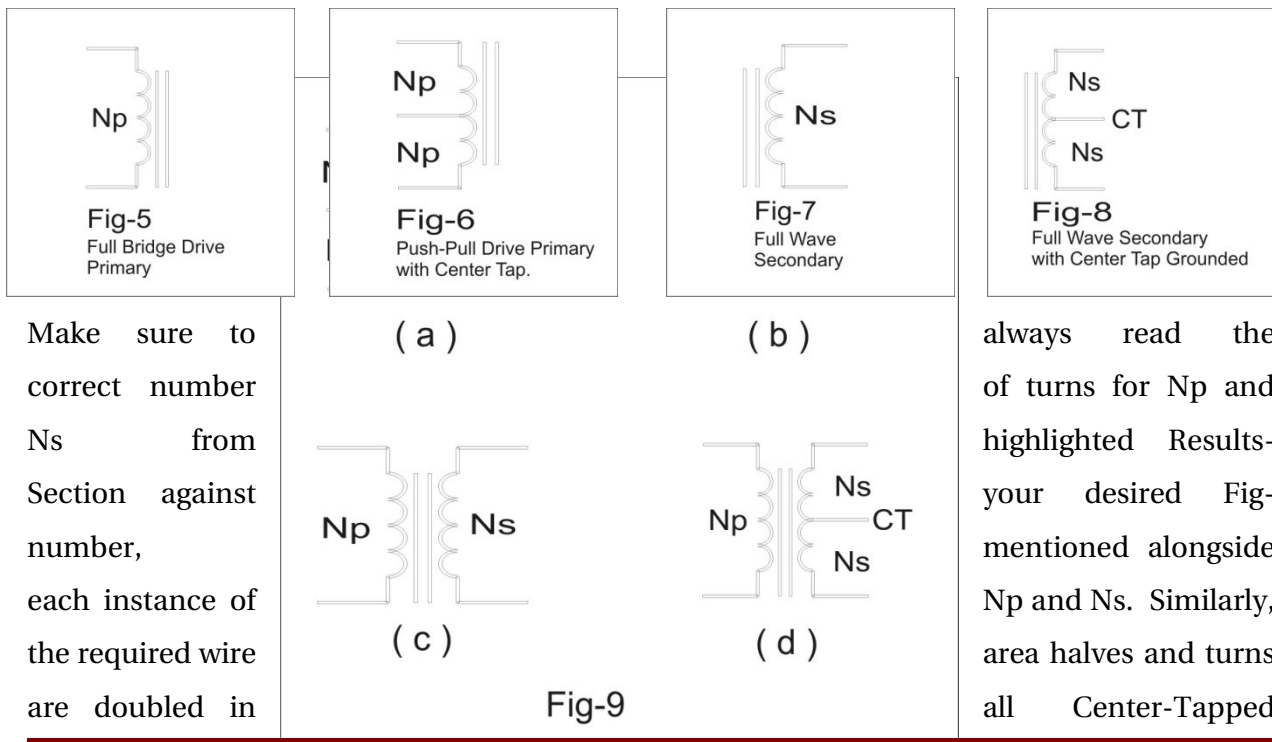
Fig-3

$A_{eff} = A_{pri} + A_{sec}$

## Sec-2. Inverter / Converter Transformer Topologies

Your desired transformer will be a mix of Primary and Secondary configurations of Figures 5 to 8 shown below and will take the final form of one of the variants shown below in Fig 9a-d. Only use “gap-less” type ferrite or other power cores, otherwise damage can occur.

Select your desired transformer topology from choices in Fig-9 below, and refer to the appropriate Primary / Secondary number for Figures 5, 6, 7, 8. For example you may have a Primary winding corresponding to Fig-6 and a Secondary like Fig-7. This will realize a design as shown in Fig-9a below.



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windings because only each half of CT winding is conducting on 50% of the duty cycle. This is also highlighted in wire area selection at the end of the Designer table.

## Sec-3. Important Physical Design Factors ( $K$ , $S$ , $W_f$ )

In order to get the correct design data from the designer worksheet in **Results Output** column, there are 3 very important factors ( $K$ ,  $S$ ,  $W_f$ ) which must be well understood, as their data input values will greatly alter the transformer's performance. These are defined as under:

### 1. Waveform Factor $K$

This is a measure of the peak to average values of a given waveform and should be chosen according to the desired waveform used.

$K=4$  for square waves or rectangular pulses in SMPS.

$K=4.44$  for sine waves as in mains power transformers, etc.

### 2. Core Stacking Factor $S$

Stacking factor represents the compactness of the core laminations within the bobbin. The effect of tight stacking is to increase the core effective area. Its mainly crucial for laminated cores where saturation can occur if not enough iron core is present. Ferrite cores are not compressible and always present the same area as measured, so for ferrites  $S=1$  always. The saturation of ferrites is more serious and is covered by choosing safe values of maximum flux densities, as mentioned above.

$S=1$  for ferrite cores

$S=0.95$  or less for laminated cores

### 3. Winding Factor $W_f$

---

This is the most critical design parameter to choose due to its direct impact on the transformer's power output, temperature rise, and winding technique (choice of wire diameters of pri /sec).

Directly, it's the ratio of the copper cross-section of the winding to the core winding window area. The winding factor represents how effectively a core's winding window area will be filled up by the wire. It is impossible to fill a core's window 100% with copper, as some space is always lost to the bobbin, insulating tape/paper, wire insulation and round wire geometry.

Since turns of round wire wound side by side will always leave small triangular inter-turn space inside a rectangular window (Fig-3), its impossible to achieve the theoretical maximum of  $W_f=1$  (or 100%). Moreover as the windings are layered and some insulation is always used between layers of same winding and also between the primary and secondary, the additional winding space taken by the insulating materials further lowers  $W_f$ . So its important to choose  $W_f$  with a fair bit of accuracy in order to get meaningful results from the Transformer Designer worksheet.  $W_f$  is close to 1 for large transformers, and less for smaller ones.

As a good starting point take  $W_f = 0.8$  for small to medium power designs, and perform few iterations of winding with smaller wires in parallel until you reach your desired wire area in C.M. (circular mils) and power output / temperature rise, etc.

## Sec-4. The Design Process

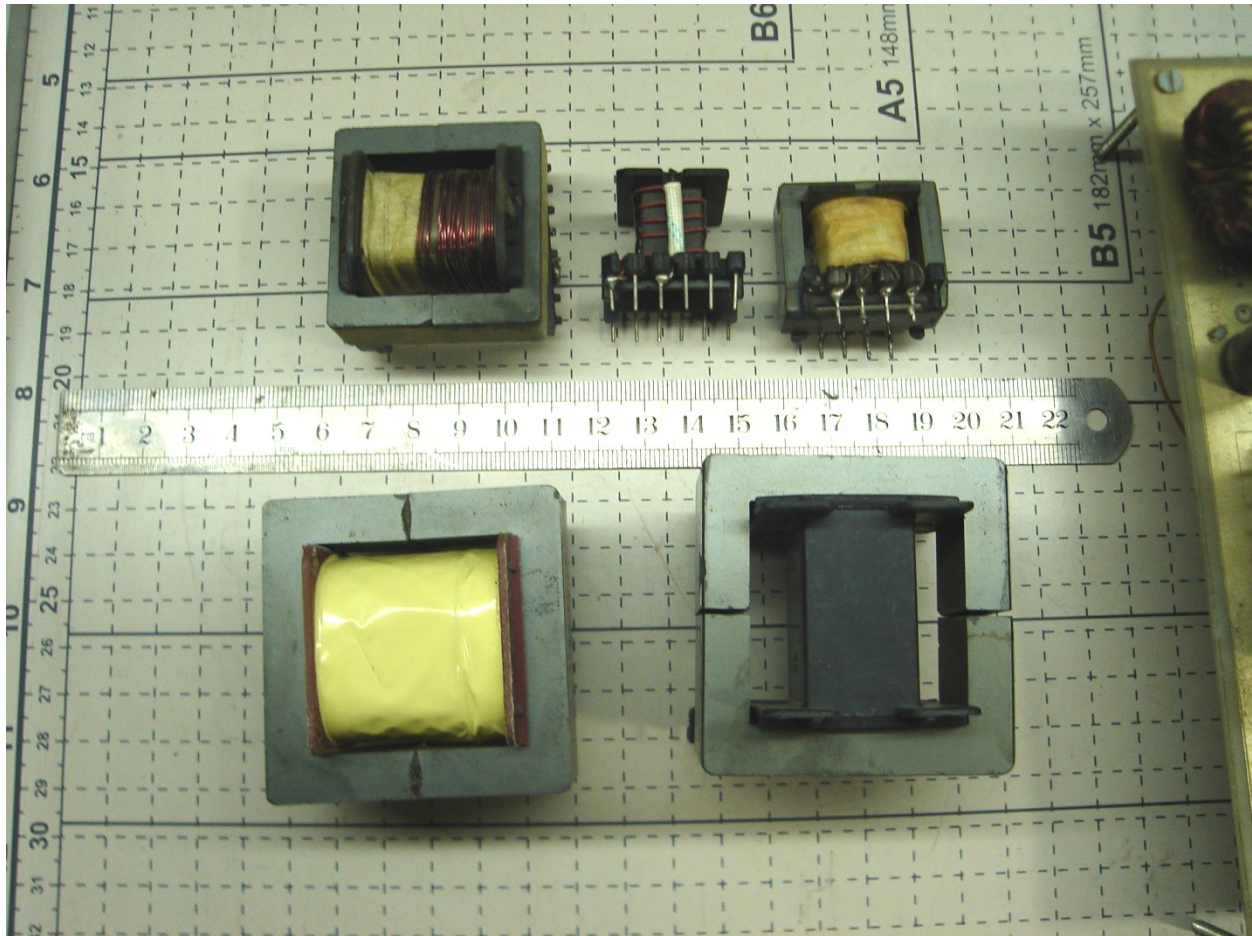
The design process involves entering a total number of 16 data items in the Data Input column of the accompanying "**Transformer Designer**" Excel worksheet (as shown on page-6). The Results Output immediately displays the design results for use in constructing a real working prototype transformer.

The worksheet is divided into 3 sections to facilitate clarity of workflow throughout the design process. These sections are labeled as:

- **Turns Pri / Sec** (Data inputs 1-8, and Results outputs 1-8. Topology is also discussed)
- **Bobbin** (Data inputs 9-13, and Results outputs 9-18)

- **Power & Wire Sizing** (Data inputs 14-16, and Results outputs 19-28)

A detailed description of method and interpretation of results is given on the following pages. Each section above is explained in more detail with reference to the drawings and figures relevant at each step of the design.

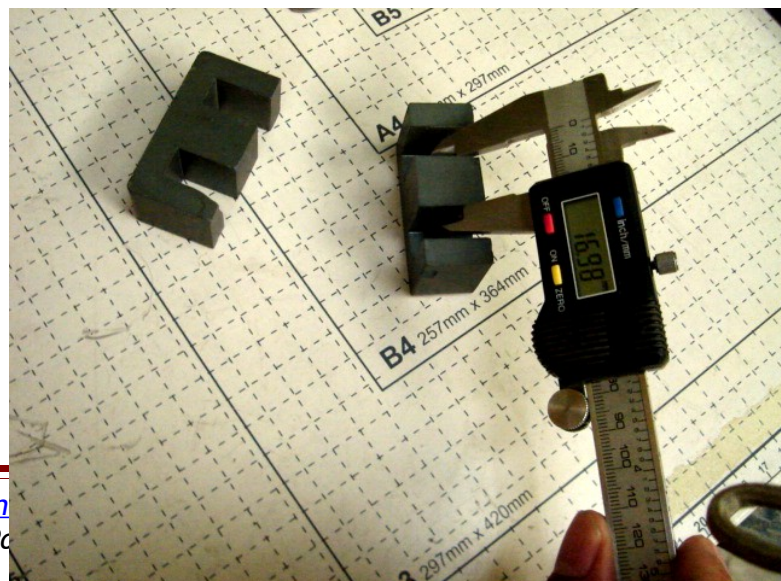


## 4.1 Turns Pri / Sec

### Turns Calculation & Transformer Topology Selection

First and foremost the number of turns in the primary and secondary windings must be calculated based upon parameters such as core area, operating flux density, and your

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design transformer topology. Although the focus here is on high frequency SMPS ferrite power transformers shown above, the designer spread-sheet can just as easily be use for 50/60 Hz laminated iron-core power transformers.

The main change for iron core is in the frequency and the maximum operating flux density  $B_{max}$ , which for iron-cores is **9000 G (Gauss)** instead of **1650 G** for ferrites. Some designers have used **2000 G** for ferrites without any problems, with good cooling schemes of course.

In the Data Input column Section of Turns Pri/Sec enter the following:

1. Operating DC voltage (or RMS AC volts).
2. Required output AC volts.
3. Operating Frequency in Hertz (Hz).
4. Measure and enter core center leg length L.
5. Measure and enter core center leg width W.
6. Enter maximum flux density in Gauss (G). 1650 G for ferrites, and 9000 G for iron core.
7. Waveform factor K.
8. Core stacking factor S.

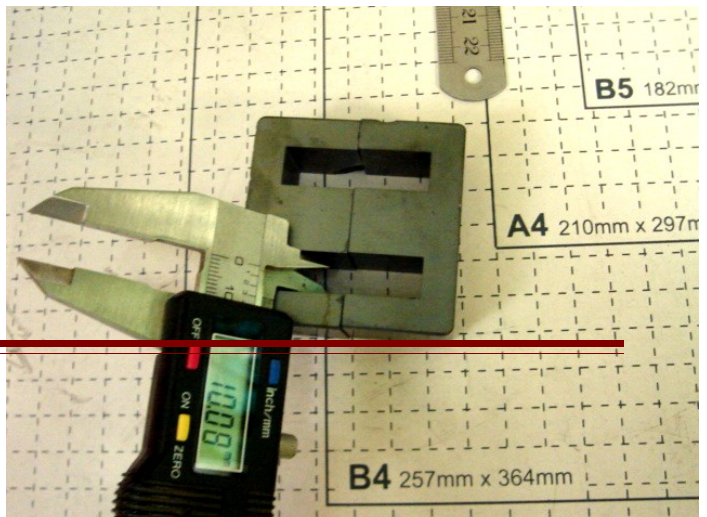
Choose your transformer topology (**Fig-9: a, b, c, d**) and select the appropriate primary  $N_p$  and secondary  $N_s$  turns from the **Results Output** column with ref to **Fig-5 to 8**.

Data Input			Results Output		
<b>Turns Pri /Sec (Ref Fig-1)</b>					
1	E-in (Input DC /AC RMS volts)	12 V	1	Core Area ( $A_c$ )	1.00 cm <sup>2</sup>
2	E-out (AC output voltage)	325 V	2	$N_p$ (Full bridge) Fig-5	3.6 turns
3	F (oper. frequency)	50000 Hz	3	$N_p$ (Push-Pull, CT) Fig-6	7.3 turns
4	Core Length ( $L$ )	10.0 mm	4	$N_s$ (Fullwave Rect) Fig-7	98.5 turns
5	Core Width ( $W$ )	10.0 mm	5	$N_s$ (Fullwave Rect, CT) Fig-8	197.0 turns
6	$B_{max}$ (max flux density, G)	1650 Gauss	6	n (trans ratio $N_s/N_p$ )	27.08
7	Waveform factor (K)	4	7	Volts / turn	3.3000 V/t
8	Core Stacking Factor (S)	1	8	Turns / volt	0.3030 t/V

## 4.2 Bobbin

### Estimation of Available Winding Space in Core Window

Now we proceed to next section where core's winding area availability will be ascertained





and effects of the winding factor  $W_f$  on overall design will be investigated. The physical measurements made for the core and bobbin are entered into the **Data Input** column.

Perform the following steps and enter the Data in the Designer as shown below:

9. Measure and input core window height H.
10. Measure and input core window width N.
11. Measure and input Bobbin height H.
12. Measure and input Bobbin width W.
13. Choose a suitable value for the Winding Factor  $W_f$  (0.8 e.g.) and check results.

Result No.10 shows the window area available for both Primary and Secondary. For first build, allocate 50-50% to both Pri and Sec, and proceed with winding. Adjust  $W_f$  and note resulting effect on various Results in this section.

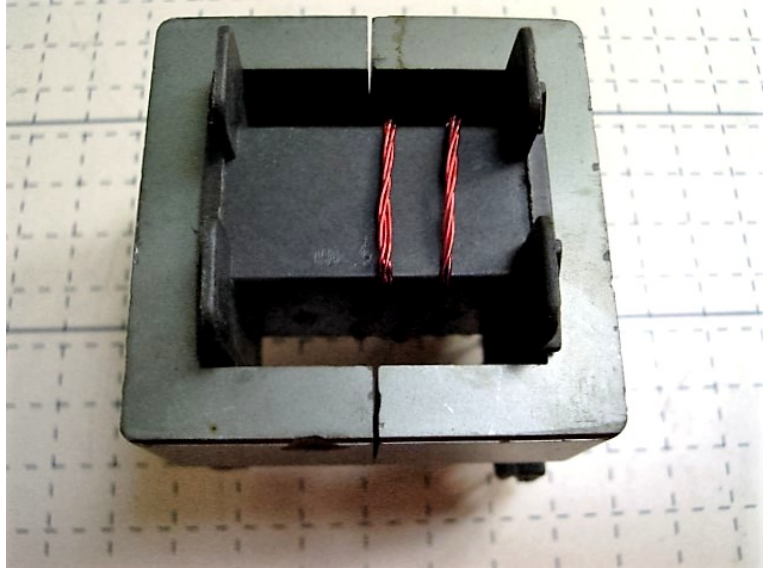
Bobbin (Ref Figs-2 & 3)				
9	Core Window Height (H)	30.0 mm	9 Window Area (Wa)	2.70 cm <sup>2</sup>
10	Core Window Width (N)	9.0 mm	10 Avail. Window (Awa)	1.89 cm <sup>2</sup>
11	Bobin-H (mm)	27.0 mm	11 Effective Area (Aeff)	1.51 cm <sup>2</sup>
12	Bobin-W (mm)	7.0 mm	12 Area Product (AcWa)	2.916 cm <sup>4</sup>
13	Winding Factor (Wf)	0.8	13 Pri Area (Apri)	0.95 cm <sup>2</sup>
	<i>Wf is lower for large wire dia. and thicker paper/tape insulation. To start Use Wf=0.8. Thinner wires give higher or better Wf.</i>		14 Sec Area (Asec)	0.95 cm <sup>2</sup>
			15 Bobin H (in.)	1.0630 in.
			16 Bobin W (in.)	0.2756 in.
			17 Bobin Area (sq. mils)	292951 s.m.
			18 Bobin Area (circ. mils)	372995 c.m.

---

## 4.3 Power & Wire Sizing

### Current Density, Power, Efficiency, Wire Sizing, and Litz-Wire Windings

The power handling capability of a transformer depends greatly on the current density ( $I_d$ ) used in the design. For some reason  $I_d$  is expressed as Area/Amp and the engineering practice is to use the unit circular mils / ampere or C.M./Amp for  $I_d$ . The picture on right shows an example of 5 parallel wires twisted together to make what is called a “Litz Wire” to handle high power high frequency currents.



Enter the following data in Power & Wire Sizing Section, as shown in table on next page:

14. Use  $I_d=400$  CM/Amp (not less if high currents are expected).
15. Choose a realistic Efficiency figure of 0.9 or less for first build.
16. Enter the required output power figure (P-out).

The Results column will display all relevant design parameters of Input/Output Power, Currents, and applicable wire area (in C.M. of course) required to perform at these levels. The wire areas are displayed separately for each type of topology used for the transformer, as shown in figs 5 to 8, or Fig-9 a to b. Choose the wire area from whichever is your required topology.

Now you have your design ready to go for a first prototype. Proceed to the wire selection table and match the required wire area for each primary and secondary winding.

Donot use a single thick wire for high current windings as it will be hard to wind, waste too much winding space (lower Wf), or even make the design impossible to fit into the winding window. Add several wires in parallel to make up the required wire size in step 4 above. This will ensure ease of winding and better window utilization, thus higher power, from same core size.

Finally, observe all safety measures, and adequately isolate the low and high voltage windings using good quality winding paper or heat resistant materials (Dupont Nomex) etc.

...continued from power & wire sizing section 6.3:

Power & Wire Sizing (Ref Fig-4)					
14	I-Density (D) (circ.mils/amp)	400 c.m./A	19 I-in (input current)	8.772 Amp	
15	Efficiency ( 0 to 1 )	0.95	20	I-out (output current)	0.333 Amp
16	P-out (watt)	100.0 W	21	P-in (input power)	105.3 W
<p><b>Note:</b> After all results are computed, proceed to "Wire-Table" in next sheet below, to select the appropriate wire-gauge having required area in circular mils (c.m.). For <b>high-current / high-frequency windings</b>, use multiple strands of thinner wire to achieve the required wire area. This is important when frequencies are upwards of 30KHz, to prevent heating of a single thick wire due to skin-effect. Also, several thin wires are easier to wind and fit into a bobbin compared to a single thick wire of same area . This technique greatly increases core winding space utilization by increasing the winding factor ( Wf) and results in a more compact and efficient design.</p>			22	Max. Power from Core	1414.6 W
			23	Max. Power with Bobbin	990.2 W
			24	Actual Power Output (without Temp rating)	792.1 W
			25	Pri. Wire Area (Full Bridge) Fig-5	3509 c.m.
			26	Pri. Wire Area (Push-Pull, CT) Fig-6	1754 c.m.
			27	Sec. Wire Area (Full-Wave Rect) Fig-7	133 c.m.
			28	Sec. Wire Area (Full-Wave Rect, CT Center Tapped) Fig-8	67 c.m.

---

#### **4.4 The Wire-Selection Table (Fig-11)**

Use Polyester insulated copper magnet wire for ordinary designs. For high temperature applications Poly-imide/amide coated wire is recommended. Polyester wire is easy to solder, without any need for scrapping, whereas Poly-imide/amide requires abrasive cleaning prior to soldering. Similarly for hot-running transformers use Dupont Nomex insulation paper instead of normal winding paper.

**HEAVY FILM-INSULATED MAGNET WIRE SPECIFICATIONS**

<i>AWG</i>	<i>Diameter over insulation (inches)</i>		<i>Nominal circular mil area</i>	<i>Resistance per 1000 ft.</i>	<i>Current capacity in millamperes based on</i>	<i>AWG</i>
	<i>Min.</i>	<i>Max.</i>				
8	0.13	0.133	16510	0.6281	16510	8
9	0.116	0.119	13090	0.7925	13090	9
10	0.104	0.106	10380	0.9985	10380	10
11	0.0928	0.0948	8230	1.261	8226	11
12	0.0829	0.0847	6530	1.588	6529	12
13	0.0741	0.0757	5180	2.001	5184	13
14	0.0667	0.0682	4110	2.524	4109	14
15	0.0595	0.0609	3260	3.181	3260	15
16	0.0532	0.0545	2580	4.02	2581	16
17	0.0476	0.0488	2050	5.054	2052	17
18	0.0425	0.0437	1620	6.386	1624	18
19	0.038	0.0391	1290	8.046	1289	19
20	0.034	0.0351	1020	10.13	1024	20
21	0.0302	0.0314	812	12.77	812.3	21
22	0.0271	0.0281	640	16.2	640.1	22
23	0.0244	0.0253	511	20.3	510.8	23
24	0.0218	0.0227	404	25.67	404	24
25	0.0195	0.0203	320	32.37	320.4	25
26	0.0174	0.0182	253	41.02	252.8	26
27	0.0157	0.0164	202	51.44	201.6	27
28	0.0141	0.0147	159	65.31	158.8	28
29	0.0127	0.0133	128	81.21	127.7	29
30	0.0113	0.0119	100	103.7	100	30
31	0.0101	0.0108	79.2	130.9	79.21	31
32	0.0091	0.0098	64	162	64	32
33	0.0081	0.0088	50.4	205.7	50.41	33
34	0.0072	0.0078	39.7	261.3	39.69	34
35	0.0064	0.007	31.4	330.7	31.36	35

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## Sec-5. Some Prototype Designs

As claimed, we will always present as much practical knowledge as possible, deriving from our own designed, built, and tested prototypes.

Three designs are presented next which have the types of transformers designed and constructed with the Transformer Designer. These prototypes include:

- A300-Watt Micro-Inverter using a 33mm core.
- 1000-Watt Solar Inverter (single-board up-converter/inverter) with 55mm core.
- 500-1000 Watt DC-DC Converter / Solar Charge Controller using 42mm or 55mm cores, resp.

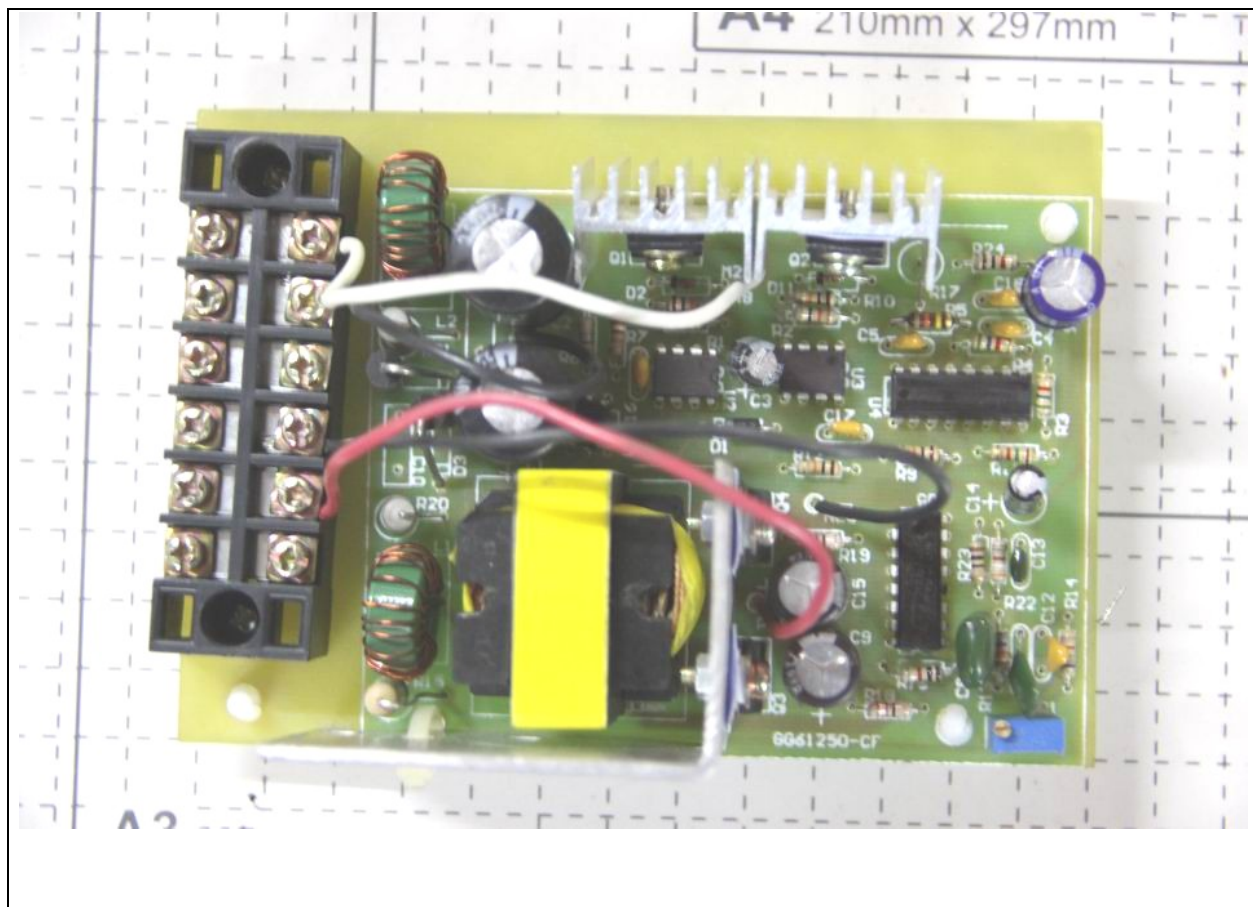
More info on these prototypes will be made available on our website:

<http://www.Tekemon.com>

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## 5.1 Prototype 300-Watt Micro-Inverter

This micro-inverter uses a high voltage split power supply of +/-300 VDC obtained from a single EE-33 core. The wide input DC voltage makes it ideal to connect it directly to a suitable Solar PV panel, thus minimizing further losses of solar energy.



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**Specifications:**

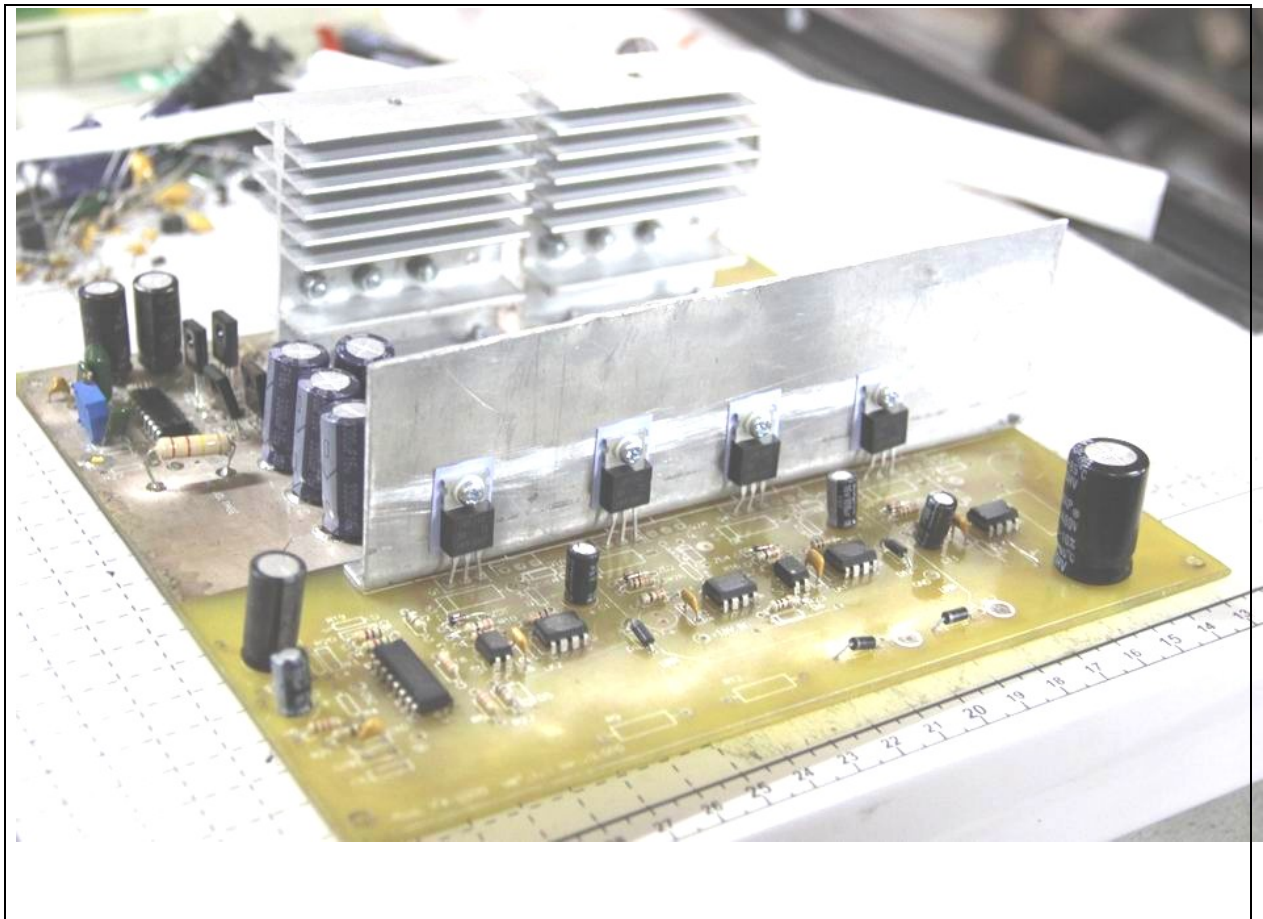
Input Voltage: 12-20 V DC

Output Voltage: 110/ 220VAC

AC Frequency: 50/ 60HZ, +/-1%

**5.2 Prototype 1000-Watt Inverter**

This is a Single Board DC-DC upconverter and DC-AC inverter. It uses EE-42 or EE-55 core transformer as per power requirements. The board has pad holes for both varieties.



Specifications:

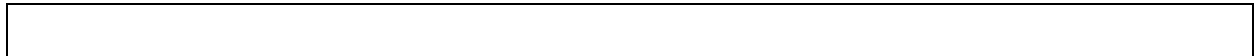


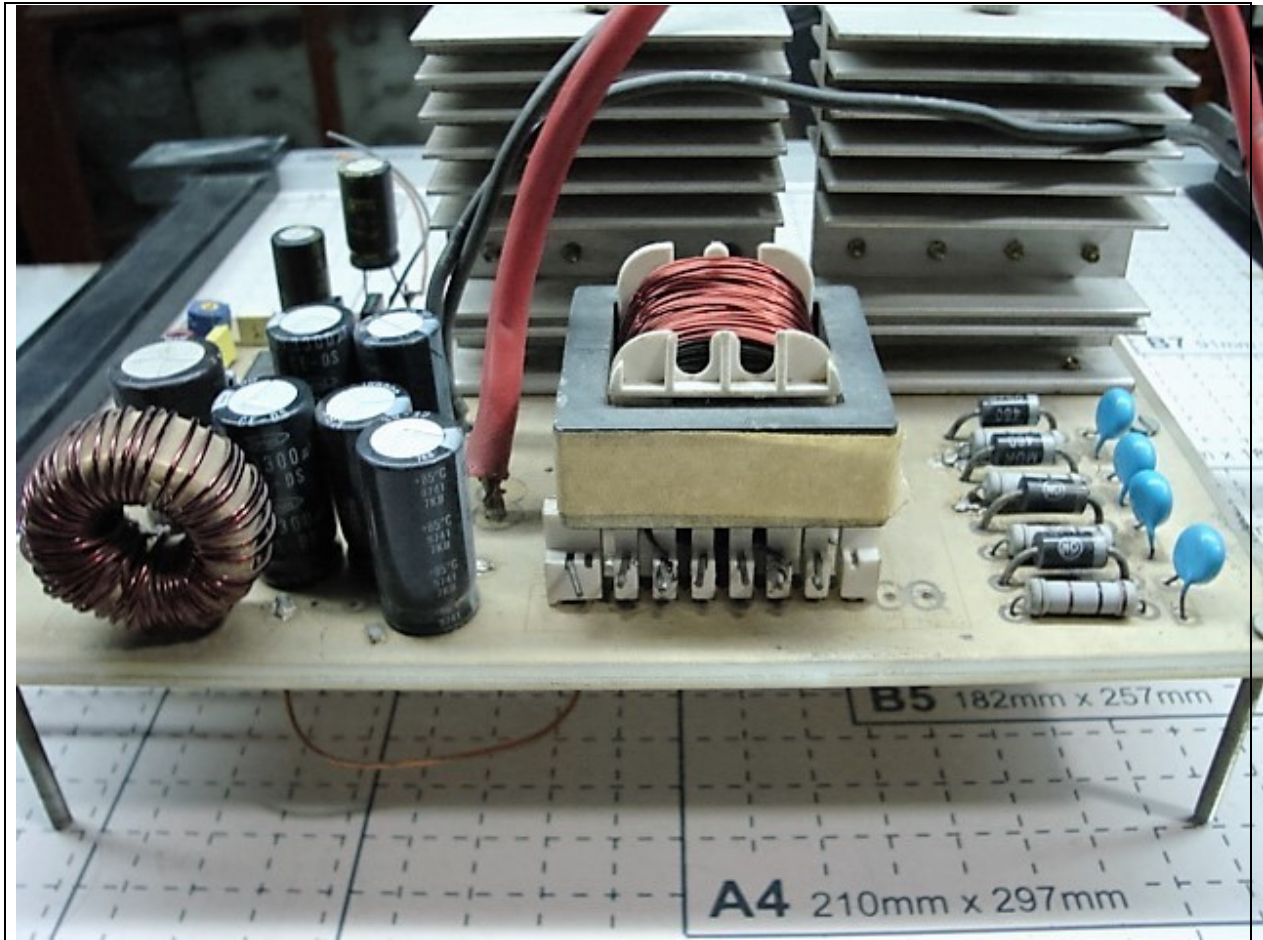
---

Input Voltage:	12-20 V DC
Output Voltage:	110 / 220VAC
AC Frequency:	50 / 60HZ, +/-1%

### **5.3 1000-Watt DC-DC Converter / Charge Controller**

This DC-DC Converter design can be used for a variety of applications such as charge controllers, power supply, etc. The output DC voltage is regulated to within +/- 1%, and greater accuracy is achieved by using external reference. Also temperature variation adjustments can be implemented for battery charger applications, if demanded. The board can accommodate both EE-42 and EE-55 cores.





Specifications:

Input Voltage: 10 – 20 VDC

Output Voltage: Upto 500 VDC (as per rectifier specs)

Power: 1000-Watts (with forced air cooling)

## Things to Come...

There's plenty of fully functional, down-right workable stuff on the way. Look for things like:

- 1KW Inverter 12-24 VDC to 110-220VAC

- Inverters 3Kw, 5Kw, 10Kw
- Micro Inverters
- Solar Charge Controllers
- Variable Speed Drives
- Kits and Parts for all Plans above (PCBs, components, photo-tools, the works !)
- More ……!

All plans will come with full schematics and Gerber manufacturing files, for those who want to make their own PCBs.

## **About [www.tekemon.com](http://www.tekemon.com)**

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[www.Tekemon.com](http://www.Tekemon.com) [GoTekemon@gmail.com](mailto:GoTekemon@gmail.com)

**Tekemon.com is a place for amateurs and professionals, students, scientists, engineers, hobbyists, DIY-ers and all kind of technology enthusiasts.**

**We are dedicated to the spread and use of technology; initially focusing on electronic engineering but at the same time not loosing sight of key technological advancements as they become available in the market.**

**We will try to make your experience rewarding in terms of your progression from the “drawing board” to the “diving board” or real life practicality.**

**So stay with us as we grow, for exciting knowledge, products, and inspiration !**

## **Stay Tuned !**

**Please keep visiting our website ([www.tekemon.com](http://www.tekemon.com)) for updates and feel free to contact us anytime for any kind of queries you have. We'll make sure you get the most accurate and practical advice to all your related questions.**

**And Thanks once Again For your choice of this E-book and Transformer Designer Excel software. We hope it will be helpful in understanding the complexities of magnetic component design and construction.**

**Sincerely,**

**Tekemon.com Team**

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