

# Homework

## Designing a low power transformer

**A.** A low power transformer will be designed which will have 3 secondary windings that feeds 3 different resistive networks:

- First Secondary Winding, with .... Volts Voltage, supplies a network with the following configuration (each student will be given a resistive network with fixed linear resistors – a minimum of 5 components); the resistors operate at the ambient temperature  $T_a = \dots$  greater than the nominal temperature;
- Second Secondary Winding, with .... Volts Voltage, supplies a resistive network consisting of a resistor and a non-linear resistive element (bulb, thermistor) at an ambient temperature of 20 degrees C;
- Third Secondary Winding, with a voltage of 50 ... 60 V will supply a resistive type consumer ( $R_{max}$  560 ohms) at a current of 5 ... 10 mA, with voltage reduction by means of another passive element;
- Input voltage in the primary circuit: 220V or 110V / 50Hz or 60Hz.

### **B. Format (in a folder)**

Cover (see example at the end of the document)

*Page 1:* Same as the cover (content).

Obs.: For folders with transparent covers the cover and first page are a single sheet

*Page 2:* **Initial data**

*Page 3:* Project summary one single page (**no more, no less**) in Romanian

*Page 4:* Project summary one single page **in a foreign language**.

*Page 5:* Contents (chapters and sub-chapters paging).

*Page 6:* **Chapter 1.** Introduction (General notions);

*Page i:* **Chapter 2.** Computing and dimensioning the assembly:

- 2.1. Computation of current and dissipated power for each resistor;
- 2.2. Resistor selection based on nominal value and dissipated power with derating; justification;
- 2.3. Bill of materials. Two types of components will be chosen: THD and SMD. The table will be presented as an annex to the project. More details can be found in the third page of this document.
- 2.4. Transformer power computation and dimensioning.

*Page x-1:* **Chapter 3** Instructions, drawings and manufacturing technological details;

*Page x-1:* **Chapter 4** References.

*Last page:* x **Conclusions– strictly one page** (personal conclusions of the student regarding the project)

### **Project evaluation:**

1. Project Format (abiding content requirements) .....	1 pts
2. Resistor and secondary windings current computation .....	2 pts
3. Correct dimensioning of the passive element in the secondary 3 .....	3 pts
3. Correct selection of types of resistors, capacitors, inductors.....	2 pts
4. Editing the BOM with the chosen components, THT and SMD .....	3 pts
5. Dimensioning of the transformer .....	2.5 pts
6. Checking the filling factor .....	0.5 pts
7. Technological instructions .....	0.5 pts
8. Pages 3, 4 and x, as required .....	0.5 pts
<b>Project Total</b>	<b>15 points</b>

UNIVERSITY „POLITEHNICA” of BUCHAREST  
Faculty of Electronics, Telecommunications and Information Technology

- on the top row at 2...2.5 cm  
- with smaller characters on one line

Project  
Passive Components and Circuits

- 10 cm from the top edge

Resistive circuit powered by a low-power transformer

- 15 cm from the top edge

Constantinescu Adina

Grupa 414A

- 20 cm from the top edge

Bucharest 2017

- 2 cm from the bottom edge

**Page format:** A4 with margins of 2.5 cm left; 2.5 cm right; 2 cm top; 2 cm bottom.

No lines will be drawn on the page and the sheet will not be bent

**Note:** The project is written by hand (except pages 1 and 2, some illustration and the BOM)

Note: Drawing is done by handwriting (except pages 1 and 2, some illustrations and BOM)

## Bill of Materials - BOM

This table must contain component information to enable the practical implementation of the circuit containing these components. A BOM has to provide comprehensive information about the components, but also about the purchase method and their price. The model below shows an example in Excel, but Word or similar can also be used.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Nr. Crt.	Reference Designator, RefDes (referință componentă în schemă, nume PCB)	Nume/cod/număr/valoare componentă în schemă (part name/code/number/value)	Clasă	Descriere	Catalog, pagină sau link Internet	Distribuitor (in Romania)	Cod componentă (din catalog sau din pagina distribuitorului din RO)	Nume componentă (la producător)	Producător	Cantitate	Cantitate minima	Pret unitar (Lei fara TVA)	Pret articol (Lei fara TVA)	
1	R2	10	rezistor	Resistor SMD, chip, 0805, 10, ±5%	<a href="http://www.tme.eu/ro/ds/">http://www.tme.eu/ro/ds/</a>	TME România <a href="http://www.tme.eu/ro/">http://www.tme.eu/ro/</a>	SMD0805-KIT	0805WAJE024KIT	ROYAL OHM	1	100	0.027	2.7	
2														
3														
4														

A short description of each field can be seen below.

Col.	Designation	Outline
A	Item #	Number in the table.
B	Reference Designator, RefDes	In an electronic schematic, all components must have a reference name. For example. R1, C4, L3, D7, TR1, etc.
C	Part name/code/number/value	In this case, the value of the component is the relevant parameter, e.g. 10 Ω. Generally, for passive components, fill in the field with their nominal value and for active components, their type, e.g. for a 1N4007 type diode, write exactly that name.
D	Type	Class, category may be resistor, potentiometer, capacitor, integrated circuit, etc.
E	Description	This text should provide helpful component information. For example, SMD chip or MELF resistor. nominal value, tolerance, rated power if relevant, etc.
F	Link/Page no. Supplier	When purchasing a component, we need to have its datasheet. The information in the data sheet allows us to carry out the proper electrical design and to correctly realize the printed circuit -PCB. Data sheets are available from the component manufacturer, but also from the component vendor.
G	Vendor (in Romania)	Component manufacturers typically only sell large quantities of components, making it impossible for a small user to buy directly from the manufacturer. The distribution company, vendor is preparing components to be delivered in smaller quantities. Also, some companies only sell to distributors. Electronic component sellers usually have well-designed Web sites and catalogues where they have a lot of information regarding buying and using that component. Example of vendors in Romania: TME, Farnell, ECAS, Digikey, RS Components.
H	Part number (supplier)	The components have a code or serial number given by the seller. When purchasing a component from a seller this is one of the main parameters to be checked to choose the desired component.
I	Part number (supplier)	The name, manufacturer's component code may differ from the one from the vendor. The manufacturer code is useful for identifying accurately a particular component and having access to primary information, unfiltered by the vendor.
J	Manufacturer	Company producing the component. For example: Vishay, AVX, TDK, KOA, Kemet, Panasonic, Murata, EPCOS, WIMA, etc.
K	Quantity	Required number of components of this type in the project.
L	Minimum quantity	The vendor sets the minimum delivery unit. Especially for small and / or low-priced components, the minimum delivery unit may be quite large.
M	Price per component (Lei without VAT)	The price on a single component. If there is a minimum required delivery unit, this price is calculated by dividing the total price by the number of minimum items that can be delivered.
N	Total price (Lei without VAT)	Producer price on the minimum delivery unit. Information must be read carefully; some manufacturers may display the unit price here