

Facts and Legends about Standby Mode of Home Electronic Devices

György Györök, Gábor Szente, Tamás Orosz, Margit Makó

Alba Regia University Center

Óbuda University

Budai Str. 45, H-8000 Székesfehérvár

{gyorok.gyorgy, szente.gabor, orosz.tamas, mako.margit}@arek.uni-obuda.hu

Abstract—In some news coverage and even tabloid articles often read, we hear that electronic and electrical equipment can consume exorbitant electric Energy for Comfort service, for standby, or simply when we forget our phone charger in the socket. In this article we examine engineering and economic approach and the measured, calculated results will be published.

I. INTRODUCTION

Many articles and news mentioned that the electronically devices do not have high consumption in the standby mode. Huge number of regulations suggest that you can save a lot on an annual basis, if you disconnect the adapter, devices, while not in use.

In this article by measurements we try to demonstrate what is real and that is really worth it powered continuously for different electronic items.

If any electrical equipment cuts off at night, or while you are not at home, it is conceivable that saves a certain amount but not sure it is worth the surprise entry because it turns on and starts the time period for all devices. Nowadays, more and more devices will have the operating system, which is not good for the sudden and frequent on or off switching [5].

For the demonstration we use basically two type of electronic power consumption art of devices; standby mode-, and battery charger units.



Fig. 1. Measuring of electronic consumption-meter in real environment.



Fig. 2. Electric consumption analyzing of home wireless router in standby mode.

II. MEASURING OF SELECTED STANDBY DEVICES

This cheap measuring instrument can be connected in series art between the power supply voltage and the equipment (Fig. 1.).

The compunction measuring instrument is designed to the household 230-250V electricity network, for commercial application. In this device we found a hour, minutes, second counters which show exactly how long the measuring instrument in operation. It is able to show the actual consumption in Watts (W) dimension, the actual amount of current in Ampere (A).

Inside of consumption measuring device we can found two battery therefore we cause a short power cut, the device will work and store the measured results in some minutes. Port, connector not be found ont he device, It's accuracy less than 2%, but this failure is constant, so the measured relative values are correct (Fig. 3.).

So the selected household devices are seen in Table I.

III. MEASURING OF SELECTED ACCUMULATOR CHARGER DEVICES

Basically we selected chargers on three different electrical principles (Table II.).

So we chose a device that charges via a current generator art by reluctance of transformer. There is a device which, through

Device	In operation	Standby	Comments
8586 Mediabox	30,16W	21,16W	
WBR-G2 router	12,68W	12,68W	Wifi
EPC 3212 modem	14,44W	14,44W	
LG 32LS570S TV	47,65W	11,13W	LCD
TS 2510 TV	140,5W	15,63W	CRT TV

TABLE I
THE SELECTED HOUSEHOLD DEVICES WITH STAND BY ABILITY, FOR MEASUREMENT.

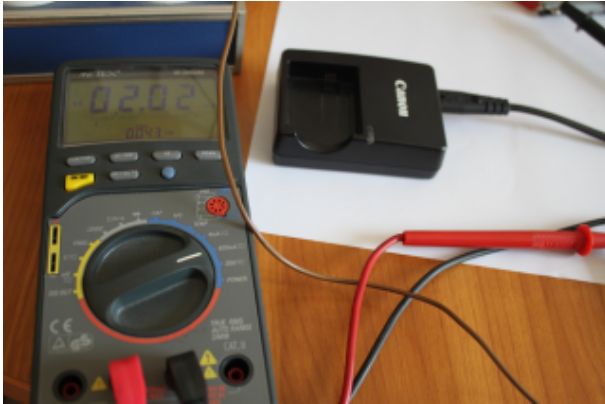


Fig. 3. Power measuring of an accumulator charger with an universal digital multi-meter.

dissipative analog electronic parts by realizing the charge. The third one which is most modern electronic equipment is operating by pulse with modulation (PWM) switching mode [3].

The test loading units as small current, small electronic power consumption, consumptions, can not measured by the chapter II d escribed device. Therefore, this measurement precision current measurer device was used (Fig. 3.).

Charger of Device	In operation	Standby	With Device
A12E	8,23W	2,57W	-
PDA N560	6,30W	0,17W	0,5W
E72 phone	9,57W	0,07W	0,13W
HP 6110	40,16W	5,22W	18,86
EOS500D	6,99W	0,46W	0,69

TABLE II
THE SELECTED ACCUMULATOR CHARGER DEVICES FOR MEASUREMENT.

IV. TECHNICAL BACKGROUND

On the Figures 6-4 you can follow the main evolution or different between the the two generation of power supply unit.

Figure 4 shows such the solution where is used a popular switching mode power supply controller. Inner structure of new generation switching mode power supply controller seen on Figure 5.

Of course for the normal operate of the television more power necessities than the stand by operate. This power we generate by a simple rectifier [4].

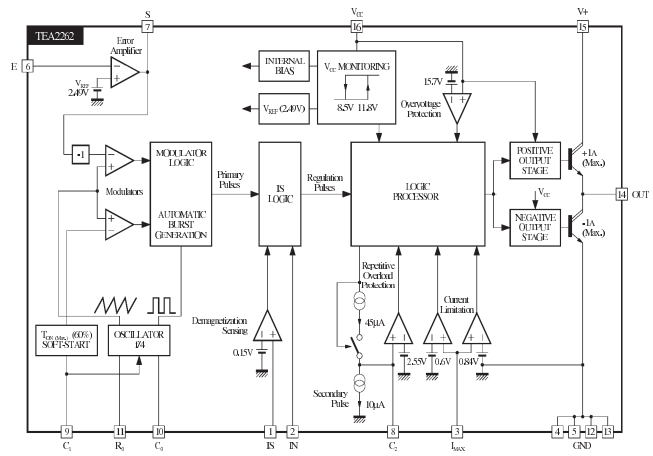


Fig. 5. A popular switching mode integrated circuit TEA2262 [2].

Their got the voltage from the power network (rarely after a switch). This huge DC voltage we can reduced by resistor (R). So the dissipation of this part is (1);

$$P_R = I_{TEA2262}^2 R, \tag{1}$$

The current of integrated circuit ($I_{TEA2262}$) is limited. Therefore we can choose enough great resistor for R position.

This is the main reason of the relative big stand by current consumption of this art of devices [1] [2].

On the Figure 6 can follow how is developed the self power providing method. In this integrated circuit has own inner stand by power supply device, so the the power consumption in OFF mode of device is more less.

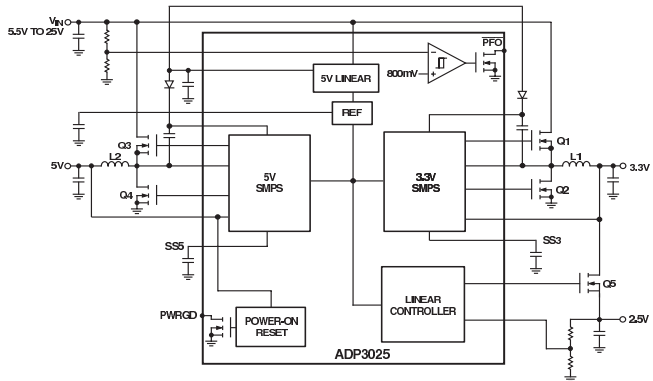


Fig. 6. Inner structure of multi-voltage switching mode power supply controller [1].

V. RESULT OF MEASURING

We compiled of the average household. We create such an average household which contains televisions, media-box, mobile phone chargers to the counting (Table III). Furthermore, the Internet connection requires a modem, a router and a laptop. Two cell phone charger were taken into the counting because at least two people have got a mobile phone. In the garage is at least one Do it yourself equipment for example

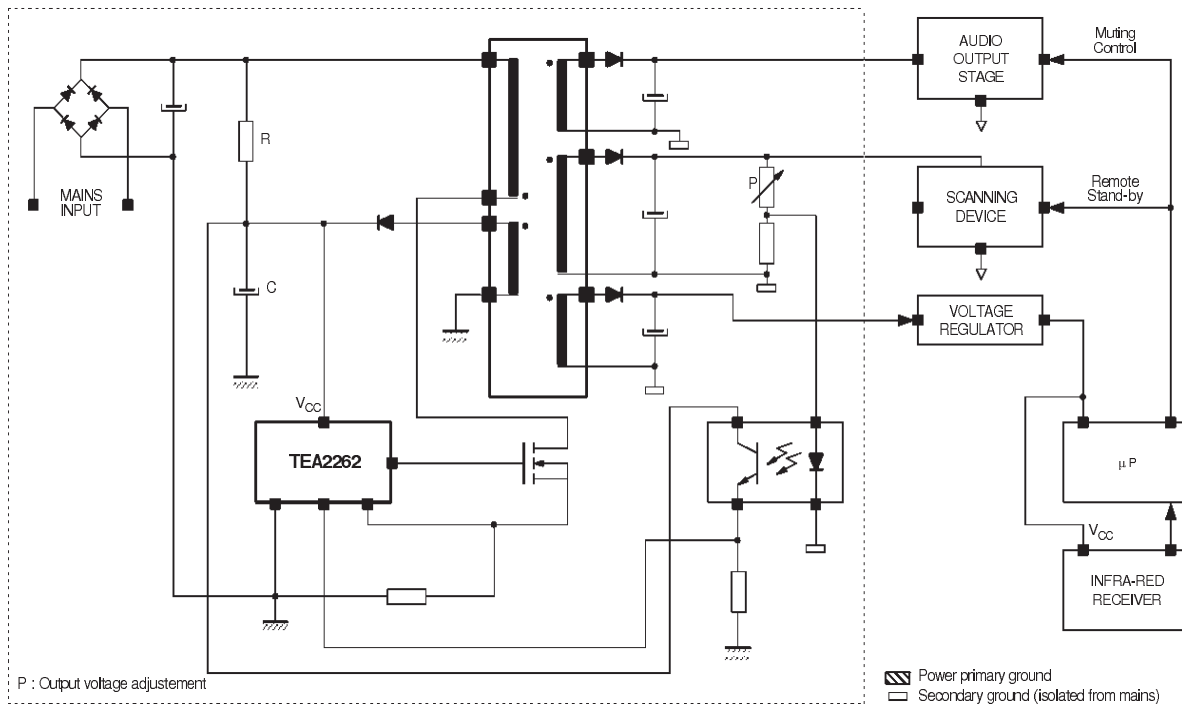


Fig. 4. Circuit environment of a switching mode power supply and it's controller [2].

a screwdriver which has a battery therefore there is also a charger. I wrote one media-box and two TV's because in my opinion popular behavior put a second TV into the bedroom, kitchen, children's room. This TV can be operated by only antenna, so it is not usually to use media-box.

VI. COST ANALYSIS

We looked at the devices how many hours a week is operating or in stand by mode. During one week these devices in stand-by mode produce 7,067kWh consumption, which means 349,71HUF in money. This consumption in a whole year means 18 185,33HUF. During operation, these devices over a period of one week generate 16,136kWh consumption which means 798,45HUF. It means 41 519,662HUF int he whole year.

Type of Device	In operation	Standby	Weekly O/S
8586 Mediabox	30,16W	21,16W	42/126Wh
WBR-G2 router	12,68W	12,68W	168/0Wh
EPC 3212 modem	14,44W	14,44W	168/0Wh
LG 32LS570S TV	47,65W	11,13W	42/126Wh
TS 2510 TV	140,5W	15,63W	42/126Wh
A12E	8,23W	2,57W	3,5/164,5Wh
PDA N560	6,30W	0,17W	7/161Wh
E72 phone	9,57W	0,07W	7/161Wh
HP 6110	40,16W	5,22W	56/112Wh

TABLE III

POWER CONSUMPTION OF SELECTED DEVICE IN OPERATING (O) AND STANDBY (S) MODE.

We put together an average household without freezers to the counting (Table IV.). The Internet requires a modem, a router and a laptop. Two cell phone charger were taken into the counting. In he garage is at least one screwdriver charger. I wrote one media-box and two TV's because in my opinion popular put a second TV into the bedroom, kitchen, children's room. This TV can be operated by only antenna, so it is not usually to use media-box.

Type of Device	Weekly Consumption
8586 Mediabox	3933Wh
WBR-G2 router	2130Wh
EPC 3212 modem	2425Wh
LG 32LS570S TV	3403Wh
TS 2510 TV	7870Wh
A12E	3,452Wh
PDA N560	78Wh
E72 phone	78Wh
HP 6110	52834Wh

TABLE IV

WEEKLY ELECTRICITY CONSUMPTION AT ESTIMATED USAGE.

We looked at the devices how many hours a week is operating or in stand by mode. During one week these devices in stand-by mode produce 7,067kWh consumption, which means 349,71HUF in money. This consumption in a whole year means 18 185,33HUF.

During operation, these devices over a period of one week generate 16.136kWh consumption which means 800HUF. It means 42 000HUF int he whole year.

VII. CONCLUSION

We hope that this short article we can show any aspect of the legends and facts about in the connector forgotten plug. Let our brain work, and not forget the any times ten Forint, is one side, and other side is the continues searching of device, breaks down of charger. Other hand, let not forget that, the comfort is an extra servicing which has got own cost.

We believe at this topic main principium is the reasonable.

REFERENCES

- [1] Analog Devices, Inc. High Efficiency Dual Output Power Supply Controller. http://www.analog.com/static/imported-files/data_sheets/ADP3025.pdf.
- [2] ST Microelectronics. Switch Mode Power Supply Controller Integrated Circuit. http://www.st.com/internet/com/TECHNICAL_RESOURCES/TECHNICAL_LITERATURE/DATASHEET/CD00021898.pdf.
G. Hudoba, S. Berczi. The HUNVEYOR-project - a novel way of teaching Science and Physics HSCI2011, Proceedings of the 8th International Conference os Hands-on Science, Ljubljana, Sovenia, 2011. pp. 3-6., ISBN 978-989-95095-7-3,
- [3] Gy. Györök. Self Configuration Analog Circuit by FPAA. *4th Slovakien–Hungarien Joint Symposium on Applied Machine Intelligence, 2006 January 20-21, Herlany, Slovakia, ISBN 963 7154 44 4* p. 34–37.
- [4] Gy. Györök. The function-controlled input for the IN CIRCUIT equipment. *IEEE-INES2004 Intelligent, Engineering Systems Conference, Cluj-Napoca, Romania, 2004 September 19-21, INES 2004, ISBN 973-662-120-0*, p. 443–446.
- [5] Gy. Györök, M. Makó. Self configuration Analog Circuits. *XVIIth Kand conference 2006 „In memoriam Klmn Kand” Budapest Tech Kand Klmn Faculty of Electrical Engineering, 12-14 January 2006, ISBN 963 7154 426*.