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03/03/2006

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Title : AC/DC Adapter 110/230 volts, with multiple DC outputs.



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Background :

Generally most AC/DC adapters 110/230 volts have a variable DC output of 1.5v/4.5v/9v/12v combinations. Some even have an additional separate battery charger for 12 v or similar fixed DC voltage, for dual function as a battery charger and as an AC/DC adapter. These AC/DC adapters have 30, 45, 60 even 110 watts power and are used for various electronic devices using the different DC voltages of 1.5v/4.5v/9v/12v. There is none with dual DC output of 5 volts and 12 volts and or more than two DC outputs. AC/DC adapters with higher power of 200 watts, 300 watts or more usually have outputs of DC 24 or 48 volts, rather than DC 12 volts.

All desktop computers including workstations and servers have a heavy and bulky internal power supply (with dimensions approximately 7 inches length x 6 inches width x 3.5 inches height and weight > 1000 gms) incorporated in the casing of the computer and with DC output of 12v and 5 v from a AC 110v/230v outlet. They do not have a portable AC-DC adapter or an external/internal battery power supply. In the event of an electrical failure the desktop computer shuts down with total loss of unsaved data except when the desktop computer is backed up by the Uninterruptible Power Supply (UPS) system. The laptop computers have AC/DC adapters at DC output of 16v for power supply for simultaneous use by the computer laptop as well as charging the battery The laptop computers are powered by internal/external battery or charged simultaneously from a AC 110v/230v adapter. Each laptop use different battery voltages from 10.4 v to 14.8 volts or more, very specific to the particular model and manufacturer. The AC/DC adapters and the respective battery for the laptop computers are not interchangeable. Use of one from one manufacturer on another manufacturer's equipment may lead to damage of the sensitive internal electronic components of the said laptop computer.

Discussion on prior art.

The 1982 US4323962 patent relates to high efficiency rectifiers using transistors as controlling elements to provide for independently controlled multiple output voltages from a single power source.

The 1993 US 5220271 patent relates to an apparatus for regulating the voltage at the output terminals of a multiple output power supply by directing current from one output terminal to another.

In 1993, the US 5225767 patent relates to synchronous switching power supply (SPS) for high efficiency multiple output power supply with boost and/or flyback converters, using low number of components.

In 1994, the EP 0608091 patent relates to power converters for supplying distributed pulsed loads using energy-storage capacitors for coupling to an input dc power source and for storing substantial energy at high voltage for supplying pulsed voltage at low voltage.

The US 5386359 patent in 1995, relates to multi-output converter with plural circuit by changing the switching frequency of a switching device, a conduction duty cycle and a resonance frequency of one of the output circuit.

The 1995 US 5400239 patent uses a pulse width modulator (PWM) power converter for providing a plurality of regulated outputs.

August 1995, Cuk et al used a Cuk switching mode converter with two separate non-isolated feedback loops to regulate against input voltage changes and the other against load current change. The Cuk et al configurations have become the industry standard.

April 1997. The US 5619404 relates to a single stage ac-dc converter having unity power factor.

May 1999. The EP 0918393 patent relates to plurality of dc-dc converter circuits and the feature of separation in time switching of the respective power switches of dc-dc converter circuits.

In spite of these advances, the development of the power supply for computers have not matched the progress of the central processing units (CPU) and other peripheral computer components. For example, the desktop computers still have the bulky AT or ATX power supply (with dimensions approximately 7" L x 6" W x 3.5" H and weight > 1000 gms) with multiple dc outputs of 5v/12v and 3.3v/5v/12v respectively. Instead, the computer industry directed their efforts to reducing the power requirements for the CPU, LCD screen and the size of other components specially for the laptop and notebook computers.

The problem remained in three areas, namely in achieving high wattage power for ac-dc adapters with multiple low dc voltage of 3.3v/5v/12v; secondly, high current/amperes dc output for low voltage dc-dc converters; and thirdly to reduce the size of the components and total dc-dc converters apparatus. With ac-dc adapters, wattage was directly related to the voltage of dc output. Up to 100 watts in 1999 was possible for 12vdc output. Higher wattage was for higher dc output of 24vdc or even 48vdc. Similarly, low voltage dc-dc converters have low current capabilities only, maximum of usually about 1200 milliamps . High current in low voltage dc-dc converters seemed impossible. Even more, standard low voltage dc-dc converters were bulky, exceeding 1 inch in height..

The object of this invention is to provide for a high wattage ac-dc adapter > 100 watts in a compact size 4" L x 2" W x 1" H or smaller and with regulated single/multiple high current low voltage 12vdc/5vdc/3.3vdc or other low dc-dc

output and secondly, to provide for a low profile high current low voltage dc-dc converter with single/multiple dc outputs. With the smaller dimensions and lower weight, high current low voltage external adapters can be easily carried around and connect to the desktop computers, laptops or similar electronic equipment which require high current low DC voltage output. The small size low profile DC-DC converters permit a marked reduction in size of the desktop computers which can be combined with a battery backup for uninterruptible power supply will enable the desktop computer to match the mobility of laptop computers. Similarly larger heavy electronic equipment can become portable and mobile when equipped with small compact low profile high current low DC voltage output DC-DC converters and with the smaller compact AC/DC adapters.

Description :

1. Variation 1 : A compact portable AC/DC adapter measuring approximately 4"Lx 2"W x 1.5 "H with 110v/230v 50/60 MHz, 120 watts (using one or more transformers in the circuit/s) with the appropriate high power single regulated 12vdc output or dual regulated DC output of 5v 10amps and 12 volts 6amps. (Figure 1a and 2a)
2. Variation 2: As above and with a AC/DC 110v/230v battery charger with regulated DC output of 16 volts for simultaneous charging of the battery and internal/external DC power supply to the desktop computers. (Figures 1a, 1b, 2a and 2b)
3. Variation 3 : Variations 1 and 2 but with different wattage from 30 watts to 230 watts or more and with higher amps current output of 5vdc 10 to 20 amps or higher, and or 12 vdc 6 to 9 amps or higher
4. Variation 4 : A compact portable low profile internal/external DC-DC adapter/converter measuring 4"L x 2"W x 1 "H or smaller dimensions for a variable or fixed DC input of 8v-16v or wider range or higher DC voltage from various DC battery voltages, and/or vehicle/s and/or airplane/s, with various high DC current supply in dual regulated DC output of 12v (6-9amps) and 5v (10-20amps) and a separate battery charger, for simultaneous charging of the battery and power supply to the portable desktop computer. (Figures 1c, 2c and Figure 1d)
5. Variation 5 : As in variation 4 above (low profile internal/external) DC-DC adapter/converter but with single/double/triple regulated DC output of 12v, 5v and 3.3v as separate/combined components
6. Variation 6 : As in any of the above but with variable DC output for 1.5v/3.3v/4.5v/5v/9v/12v/16v or more and or any other DC voltage requirement (Figure 2d) for any combination of any three or more DC outputs with or without a switch control for each separate DC output.

Materials : Hard plastic polymer casing, PCB with components and wiring, DC output jacks.

Drawings : See Attached Annex A. Figures 1a,b,c,d and 2a,b,c,d,e.

Summary :

The proposed portable AC/DC adapter 110/230v, with models of various wattage, is a new type of AC/DC adapter using 1 or more transformers complete with the circuits for two or more regulated DC outputs, a dual DC output of 5v and 12 v for the power requirements for the desktop computer components and a battery charger which function also as a battery holder and supply continuous regulated DC supply from the battery of various voltages for variable period/s in the event of a mains power supply failure. A key component is the low profile internal/external high current DC-DC adapter/converter with variable or fixed DC input of 8v to 16v or higher and a dual regulated variable DC output of 12v, 5v and/or a triple regulated DC output of 12v, 5v and 3.3v or other regulated variable DC output. The AC/DC adapter is specifically designed for desktop computers with requirement for dual DC output of 5v and 12v. The same concept and/or different variations is/are also applicable to power multiple electronic equipment/appliances simultaneously, each according to their DC voltage requirement and individual switch control. - all these from a single AC mains supply, instead of three or more AC power sockets, or from other power supply as found in vehicles and airplanes

Title : AC/DC Adapter 110/230 volts, with multiple DC outputs.**Claims :****Patent is to provide protection for the following :**

1. Patent rights for a high wattage compact portable AC/DC 110v/230v 120 watts or higher wattage adapter with a single high current from 6 amps to 20 amps or higher regulated 12vdc output.
2. Patent rights to a new class of compact portable AC/DC 110v/230v from 30 to 230 watts or larger wattage adapters with two or more regulated DC outputs with high current from 6 amps to 20 amps or higher output
3. Patent rights to compact AC/DC 110v/230v 30-230 watts or larger wattage adapter with a regulated high current dual DC outputs specifically for 5 volts (10 amps to 20 amps or higher) and 12 volts (from 6 amps to 9 amps or higher) specially to power desktop computers but also applicable to power laptop computers or other electronic equipment or to power multiple electronic equipment simultaneously.
4. Patent rights to compact AC/DC 110v/230v from 30 to 230 watts or larger wattage adapter with a regulated multiple high current DC outputs specifically for 3.3volts (10 amps or more or less), 5volts (10 amps to 20 amps or higher) and 12volts (from 6 amps to 9 amps or higher) and/or any other DC output voltage specially to power desktop computers or mobile desktop computers/notebook computers but also applicable to power multiple electronic equipment simultaneously.
5. Patents rights to an internal and or an external low profile approximately measuring 4"L x 2"W x 1" H or smaller dimensions, high current low voltage DC-DC adapter/converter with variable DC input of 8v-16v (or wider range or higher DC voltage) or fixed 12vdc input and regulated DC output of 5vdc (from 10 amps to 20 amps or higher) and 12vdc (from 6amps to 9 amps or higher) and/or other variable low voltage DC output. DC-DC adapter/converter to be as single, double or triple separate components or combined as one component with dual DC output or triple DC output to power desktop computers or mobile desktop computers or notebook computers or hand held computers or other electronic equipment.
6. Patents rights to an internal and or an external low profile approximately measuring 4"L x 2"W x 1" H or smaller dimensions, high current low voltage DC-DC adapter/converter with variable low voltage DC input of 8v-16v (or wider range or higher DC voltage) or fixed 12vdc input and regulated DC output of 3.3v (10 amps or more or less), 5v (10 amps to 20 amps or more) and 12v (6 amps to 9 amps or more) and/or other multiple variable DC output voltage combinations to power desktop computers or mobile desktop computers or notebook computers or hand-held computers or other electronic equipment.
7. Patents rights to an internal and or an external low profile approximately measuring 4"L x 1.5"W x 0.5" H or smaller dimensions, high current low voltage DC-DC adapter/converter with variable low voltage DC input of 8v-16v (or wider range or higher DC voltage) or fixed 12vdc input and regulated DC output of 3.3v (10 amps or more or less), 5v (10 amps to 20 amps or more) and 12v (6 amps to 9 amps or more) and/or other multiple variable DC output voltage combinations to power desktop computers or mobile desktop computers or notebook computers or hand-held computers or other electronic equipment