

Description

Technical Field

This invention relates to power or voltage supply systems and, more particularly, to a power or voltage supply system which provides an output voltage of a given magnitude from a first supply source having a voltage of the given magnitude and alternatively from a second supply source having a voltage of a magnitude significantly different from that of that given magnitude.

Background Art

Reduced scaling or shrinking of the geometries of devices used in integrated semiconductor circuit technology for forming denser circuits has required voltage supply sources to provide lower voltages than the heretofore generally accepted standard supply voltage of 5 volts, particularly in order to avoid a voltage breakdown in the insulation layers. During the transition from 5 volt supplies to the lower voltage supplies of, say, 3.3 volts, a mix of circuits is being used wherein some of the circuits have been designed for use with standard 5 volt supplies while other circuits have been designed for use with the lower 3.3 volt supplies. In general, the geometries of memory circuits are reduced at a faster rate than are the geometries of logic circuits which are coupled to the memory circuits. Accordingly, a voltage mismatch results during this transition period when multiple levels of power supplies coexist in a given system.

In U. S. Patent 4,469,959, filed by K. Luke et al on March 15, 1982, there is disclosed a circuit for controlling the supply voltage to a complementary metal oxide semiconductor (CMOS) inverter circuit which uses first and second voltage sources wherein a voltage magnitude variation in the first supply source causes the second supply source to be connected to the inverter circuit.

U. S. Patent 3,076,135, filed by R. P. Farnsworth et al on September 29, 1958, discloses a transistor power supply system which turns off under an overload condition and turns on upon the removal of the overload.

U. S. Patent 4,309,627, filed by J. Tabata on March 27, 1979, discloses a detecting circuit for a power source voltage which includes a reference voltage generating circuit, a voltage dividing circuit and a voltage comparing circuit.

U. S. Patent 4,463,270, filed by J. S. Gordon on July 24, 1980, discloses a comparator circuit for detecting a difference in relative magnitudes of two voltages which is suitable for controlling a battery backup power supply.

Disclosure of the Invention

It is an object of this invention to provide a simple, low leakage power supply adapter system having an output voltage of a given magnitude regardless of whether the magnitude of the input voltage is at the given magnitude or higher than the given magnitude.

In accordance with the present invention, there is provided a power supply adapter system as defined in the appended claim 1.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of the preferred embodiments of the invention, as illustrated in the accompanying drawings.

Brief Description of the Drawings

Fig. 1 illustrates primarily in block form the power supply adapter system of the present invention, and

Fig. 2 is a circuit diagram of a preferred embodiment of the system of the present invention.

Best Mode for Carrying Out the Invention

Referring to drawings in more detail, there is illustrated primarily in block form in Fig. 1 the power supply adapter system of the present invention which includes a power supply source terminal 10 and a detector 12, which may be any standard voltage detector, connected between the power supply source terminal 10 and a point of reference potential, such as ground. The power supply adapter system also includes a voltage converter 14 having an output connected to an output terminal 16. The voltage converter 14 is designed to produce a constant output voltage VDD, when activated, having a magnitude lower than the voltage at the power supply source terminal 10. A switching circuit 18 includes a first switch 20 connected between the power supply voltage source terminal 10 and the voltage converter 14 and a second switch 22 disposed between the power supply source terminal 10 and the output terminal 16. The detector 12 is designed to produce a first control voltage indicative of a first range of voltages at the power supply source terminal 10 and a second control voltage indicative of a second range of voltages at the power supply source terminal 10. The first control voltage from the detector 12 is applied to a conductive line ENABLE R connected between a first output of the detector 12 and the first switch 20 of the switching circuit 18 and the second control voltage from the detector 12 is applied to a conductive line ENABLE P connected

between a second output of the detector 12 and the second switch 22 of the switching circuit 18.

In the operation of the system of the present invention illustrated in Fig. 1 of the drawings, when the magnitude of the voltage at the power supply source terminal 10 exceeds a given voltage, e.g., 4.2 volts, as may be provided from a nominal 5 volt power supply source, the detector 12 produces the first control voltage on ENABLE R line which closes the first switch 20 of the switching circuit 18. With the first switch 20 closed, the voltage converter 14 is activated to produce at the output terminal 16 the voltage VDD having a desired magnitude of, e.g., 3.3 volts. If the voltage at the power supply source terminal 10 is lower than the given voltage, the detector 12 produces the second control voltage on ENABLE P line which closes the second switch 22 of the switching circuit 18, with the first control voltage opening the first switch 20. With the second switch 22 closed, the low voltage, i.e. the 3.3 volts, at the power supply source terminal 10 is directly applied to the output terminal 16, while the voltage converter 14 is rendered inoperative by the opening of the first switch 20. Thus, a relatively low and constant output voltage VDD of, say, 3.3 volts, is made available at the output terminal 16 regardless of whether a +5 volt power supply VH or a +3.3 volt power supply VH is connected to the power supply source terminal 10. Accordingly, the adapter circuit of the present invention permits a 3.3 volt supply technology to be powered by either a 5 volt or a 3.3 volt supply.

In Fig. 2 of the drawings, there is shown a circuit diagram of a preferred embodiment of the system of the present invention. The circuit of Fig. 2 is made in the CMOS technology with P-channel field effect transistors being indicated by a rectangle with a diagonal line formed therein and a gate electrode and with N-channel field effect transistors being indicated by a rectangle without a diagonal line and a gate electrode. Furthermore, elements in the circuit of Fig. 2 which are similar to the elements of the system of Fig. 1 are identified by the same characters. The circuit of the present invention illustrated in Fig. 2 includes the detector 12 having a first comparator circuit or differential amplifier 24, a first bias network 26 for providing a substantially constant reference voltage and a control voltage circuit 28 for providing a voltage which linearly varies with the voltage at the power supply source terminal 10. The first bias network 26 includes N-channel field effect transistors 30, 32 and 34 serially arranged with a first resistor R1, preferably having a resistance of more than one megaohm and formed in an N-well in CMOS technology, connected between the power supply source terminal 10 and a point of reference potential, such as ground. Each of the transistors 30, 32

and 34 are arranged as diodes. The first comparative circuit 24 is disposed between the power supply source terminal 10 and a point of reference potential and includes bleeder devices 36 and 38, preferably made N-channel field effect transistors, and control devices 40 and 42 and a load device 44, preferably made as P-channel field effect transistors. The control voltage circuit 28 includes an output terminal or node C having a plurality of N-channel field effect transistors, such as transistors 46 and 48 connected between node C and a point of reference potential and a plurality of P-channel field effect transistors, such as transistors 50 and 52 connected between the node C and the power supply source terminal 10. The control gates of each of the transistors 46, 48, 50 and 52 are connected to node C. It should be understood that many more serially arranged N-channel and P-channel transistors can be used in the control voltage circuit 28, if desired. A first low-pass filter capacitor C1 is connected between the output or node A of the bias network 26 and a point of reference potential and a second low-pass filter capacitor C2 is connected between node C of the control voltage circuit 28 and a point of reference potential. The detector 12 further includes a buffer or inverter circuit 54 which includes N-channel field effect transistor 56 and P-channel field effect transistor 58. The input to the buffer circuit 54 is connected to the output terminal or node B of the first comparative circuit 24. Node D, of the buffer circuit 54 is connected to an Enable P line which is also connected to the control gate of the second switch 22, preferably a P-channel field effect transistor, connected between the power supply source terminal 10 and the output terminal 16. An interface circuit 60 designed to match the characteristics of the second switch 20, which is preferably an N-channel field effect transistor, includes serially arranged transistors 62, 64 and 66, with transistors 62 and 66 being of the N-channel type and transistor 64 being of the P-channel type. Transistors 62 and 64 form an inverter and transistor 66 is arranged as a diode. An output terminal or node E provided between transistor 62 and 64 is connected to the Enable R line which is also connected to the gate electrode of the first switch 20, preferably an N-channel field effect transistor.

The voltage converter 14 includes a second comparator circuit 68 having N-channel field effect transistors 70, 72 and 74 and P-channel field effect transistors 76 and 78. The output terminal or node F of the second comparator circuit 68 is connected to a control gate of a pass device 80, preferably an N-channel field effect transistor, connected between the power supply source terminal 10 and the output terminal 16. Transistor 70 acts as a current source, transistors 72 and 74 act as control devices

and transistors 76 and 78 act as current limiters for the second comparative circuit 68. The voltage converter 14 further includes a second bias network for providing a constant reference voltage having an output terminal or node G. The bias network 82 includes serially arranged P-channel field effect transistors 84, 86 and 88 disposed between node G and a point of reference potential and a second resistor R2, preferably having a resistance of more than one megaohm and formed in an N-well in CMOS technology, disposed between node G and the power supply source terminal 10. Node G is connected to the control gate of the transistor 70 and to the control gate of the transistor 72. The output terminal 16 is connected to the control gate of transistor 74. A third low-pass filter capacitor C3 is connected between node G of the second bias network 82 and a point of reference potential.

A conductive feedback line 90 is connected from the output terminal 16 to the control gate of a P-channel bleeder transistor 92 and to the control gate of a P-channel bleeder transistor 94. Transistor 92 is serially connected with an N-channel bleeder transistor 96 between node I of the interface circuit 60 and ground and transistor 94 is connected between node C of the control voltage circuit 28 and ground. The control gate of the transistor 96 is connected to node E of the interface circuit 60.

In the operation of the power supply adapter system of the present invention illustrated in Fig. 2 of the drawings, node A of the first bias network 26 of the detector 12 provides a substantially constant reference voltage, between 1.3 and 2.0 volts, with voltages at the power supply source terminal 10 as low as about 2 volts. This constant reference voltage is applied to the control gate of the control device 40 of the first comparator circuit or differential amplifier 24. The voltage at node C of the control voltage circuit 28 varies linearly with the voltage at the power supply source terminal 10. The detector 12 is designed so that when the voltage at terminal 10 is at 4.2 volts or higher, the voltage at B of the first comparator is low, which produces a high voltage at node D of the buffer circuit 54. This high voltage is sufficient to maintain the switch or the P-channel pass transistor 22 off. Thus, the voltage at the power supply source terminal 10 is not applied directly to the output terminal 16.

With node B at a low voltage, the P-channel transistor 64 of the interface circuit 60 is turned on while the N-channel transistor 62 is off. Thus, node E is at a high voltage, which is sufficient to turn on the first switch or N-channel transistor 20 to activate the voltage converter 14. The voltage converter 14, which operates under normal feedback

principles, is designed so that a voltage at node F of the second comparator circuit 68 applied to the control gate of the N-channel transistor 80 maintains the output voltage VDD at the output terminal 16 at 3.3 volts as long as the voltage at the power supply source terminal 10 is above 4.2 volts. As the voltage VDD on the output terminal 16 varies so does the current through transistors 74 and 78. The voltage at node H, which is proportional to the current flowing through transistors 70 and 72 assists in controlling the voltage magnitude at the output terminal 16. The current path through transistors 74 and 78, the current path through transistors 72 and 76 and the voltage at node H together regulate the voltage at node F in direct response to the voltage on output terminal 16. The voltage at node F biases the control gate of the pass transistor 80 which supplies current to the output terminal 16.

When the voltage at the power supply source terminal 10 is below, say, 3.8 volts, such as when a 3.3 voltage source is connected to the power supply source terminal, the voltage at node B of the first comparator circuit or differential amplifier 24 of the detector 12 goes high turning on N-channel transistor 56 of the buffer circuit 54 to discharge the output node D of the buffer circuit 54. The voltage at node D is decreased to a point where the second switch or P-channel transistor 22 turns on hard so as to directly connect the power supply source terminal 10 to the output terminal 16. Meanwhile, since node B of the first comparator circuit 24 of the detector 12 is at a high voltage, N-channel transistor 62 of the interface circuit 60 turns on to discharge node E thereof. Discharging node E lowers the voltage at the control gate of the first switch or N-channel transistor 20 to turn off transistor 20 and, thus, render the voltage converter inoperative. The power supply adapter system of the present invention as illustrated in Fig. 2 of the drawings can provide substantially constant output voltages at output terminal 16 to magnitudes as low as 2.0 volts.

It should be noted that the detector 10 has two main functions, (1) to monitor the power supply voltage VH at terminal 10 and (2) to turn off and on the voltage converter 14. Furthermore, it can be seen that the circuit of Fig. 2 has a hysteresis of 400 millivolt, between $V_H = 4.2$ volts and $V_H = 3.8$ volts, built in to provide essential and desirable noise immunity characteristics.

Accordingly, it can be seen that a simple power supply adapter circuit has been provided which supplies an output voltage of, say, 3.3 volts regardless of whether a 5.0 volt source or a 3.3 volt source is connected to the power supply source terminal 10.

It should also be noted that by using CMOS

technology to make the system of Fig. 2 of the drawings, the current leakage between the power supply source terminal 10 and ground is very low, even though some of the current paths between the terminal 10 and ground, such as the first bias network 26, do not use complementary devices. The paths which do not use complementary devices have minimal current leakage since they use very small devices and high resistivity resistors. Accordingly, the circuit of Fig. 2 of the drawings can be readily used in battery backup applications with a data retention mode in, e.g., six device static random access memory at voltages on terminal 10 down to 2 volts.

Claims

1. Power supply adapter system comprising

a voltage supply terminal (10),

an output terminal (16),

voltage conversion means (14) disposed between said voltage supply terminal (10) and a point of reference potential, said voltage conversion means (14) having an output coupled to said output terminal (16),

switching means (18) including first and second switches, said first switch (20) being connected between said voltage supply terminal (10) and said voltage conversion means (14) and said second switch (22) being connected between said voltage supply terminal (10) and said output terminal (16) and,

means (12) connected between said voltage supply terminal (10) and said point of reference potential for detecting first and second ranges of voltages at said voltage supply terminal (10) and for producing first and second control signals respectively indicative of said first and second ranges of voltages, said first control signal being applied to said first switch (20) and said second signal being applied to said second switch (22).

2. Power supply adapter system as set forth in claim 1 wherein said voltage conversion means (14) is converting a first voltage within said first range of voltages to a magnitude substantially equal to a second voltage within said second range of voltages and wherein

said means (12) for detecting has first and second inputs for detecting said first and second voltages and for producing said first and

second control voltages on said first and second outputs, said first output being connected to the control element of said first switch (20) and said second output being connected to the control element of said second switch (22).

3. Power supply adapter system as set forth in claim 2 wherein said first and second voltages have magnitudes such that only one of said switches (22, 20) is closed during any given period of time.

4. Power supply adapter system as set forth in anyone of the claims 1 to 3 wherein said voltage conversion means (14) includes a first comparator circuit (68) having first and second inputs and first means (82) connected between said voltage supply terminal (10) and a point of reference potential for providing a substantially constant reference voltage at an output (G) thereof, the output of said substantially constant reference voltage means (82) being coupled to the first input of said comparator circuit (68) and said output terminal (16) being coupled to the second input of said comparator circuit (68).

5. A power supply adapter system as set forth in claim 4 wherein said voltage conversion means (14) further includes a transistor (80) connected between said voltage supply terminal (10) and said output terminal (16), an output (F) of said comparator circuit (68) being connected to a control gate of said transistor (80).

6. A power supply adapter system as set forth in claim 4 or 5 wherein said first means (82) includes a series circuit having a first plurality of transistors (84, 86, 88) each being connected as a diode, and a resistor (R2).

7. A power supply adapter system as set forth in anyone of the claims 1 to 6 wherein said detecting means (12) includes a second comparator circuit (24) having first and second inputs, second means (26) connected between said voltage supply terminal (10) and a point of reference potential for providing a substantially constant reference voltage at an output (A) thereof, the output of said second means (26) being coupled to the first input of said second comparator circuit (26),

and a control voltage circuit (28) having an output coupled to the second input of said second comparator circuit (24).

8. A power supply adapter system as set forth in



technology to make the system of Fig. 2 of the drawings. the current leakage between the power supply source terminal 10 and ground is very low, even though some of the current paths between the terminal 10 and ground, such as the first bias network 26, do not use complementary devices. The paths which do not use complementary devices have minimal current leakage since they use very small devices and high resistivity resistors. Accordingly, the circuit of Fig. 2 of the drawings can be readily used in battery backup applications with a data retention mode in, e.g., six device static random access memory at voltages on terminal 10 down to 2 volts.

Claims

1. Power supply adapter system comprising

a voltage supply terminal (10),

an output terminal (16),

voltage conversion means (14) disposed between said voltage supply terminal (10) and a point of reference potential, said voltage conversion means (14) having an output coupled to said output terminal (16),

switching means (18) including first and second switches, said first switch (20) being connected between said voltage supply terminal (10) and said voltage conversion means (14) and said second switch (22) being connected between said voltage supply terminal (10) and said output terminal (16) and,

means (12) connected between said voltage supply terminal (10) and said point of reference potential for detecting first and second ranges of voltages at said voltage supply terminal (10) and for producing first and second control signals respectively indicative of said first and second ranges of voltages, said first control signal being applied to said first switch (20) and said second signal being applied to said second switch (22).

2. Power supply adapter system as set forth in claim 1 wherein said voltage conversion means (14) is converting a first voltage within said first range of voltages to a magnitude substantially equal to a second voltage within said second range of voltages and wherein

said means (12) for detecting has first and second inputs for detecting said first and second voltages and for producing said first and

second control voltages on said first and second outputs, said first output being connected to the control element of said first switch (20) and said second output being connected to the control element of said second switch (22).

3. Power supply adapter system as set forth in claim 2 wherein said first and second voltages have magnitudes such that only one of said switches (22, 20) is closed during any given period of time.

4. Power supply adapter system as set forth in anyone of the claims 1 to 3 wherein said voltage conversion means (14) includes a first comparator circuit (68) having first and second inputs and first means (82) connected between said voltage supply terminal (10) and a point of reference potential for providing a substantially constant reference voltage at an output (G) thereof, the output of said substantially constant reference voltage means (82) being coupled to the first input of said comparator circuit (68) and said output terminal (16) being coupled to the second input of said comparator circuit (68).

5. A power supply adapter system as set forth in claim 4 wherein said voltage conversion means (14) further includes a transistor (80) connected between said voltage supply terminal (10) and said output terminal (16), an output (F) of said comparator circuit (68) being connected to a control gate of said transistor (80).

6. A power supply adapter system as set forth in claim 4 or 5 wherein said first means (82) includes a series circuit having a first plurality of transistors (84, 86, 88) each being connected as a diode, and a resistor (R2).

7. A power supply adapter system as set forth in anyone of the claims 1 to 6 wherein said detecting means (12) includes a second comparator circuit (24) having first and second inputs, second means (26) connected between said voltage supply terminal (10) and a point of reference potential for providing a substantially constant reference voltage at an output (A) thereof, the output of said second means (26) being coupled to the first input of said second comparator circuit (24),

and a control voltage circuit (28) having an output coupled to the second input of said second comparator circuit (24).

8. A power supply adapter system as set forth in



claim 7 wherein said second comparator circuit (24) further includes first and second output terminals, said first and second control signals being produced on said first and second output terminals, respectively.

9. A power supply adapter system as set forth in claim 7 or 8 wherein said second means (26) includes a series circuit having a second plurality of transistors (30, 32, 34) each being connected as a diode, and a resistor (R1) and said control voltage circuit (28) includes a series circuit having an output node (C) connected between said voltage supply terminal (10) and a point of reference potential, said series circuit including a P-channel field effect transistor (50) disposed between said output node (C) and said voltage supply terminal (10) and an N-channel field effect transistor (48) disposed between said output node (C) and a point of reference potential.

10. Power supply adapter system as set forth in anyone of the claims 1 to 9 wherein said means (12) for detecting detects a voltage within the first range of voltages at said power supply source terminal (10) during a first interval of time and activates said voltage conversion means (14) and deactivates said switching means (18) and detects a voltage within the second range of voltages at said power supply source terminal (10) during a second interval of time and activates said switching means (18) and deactivates said voltage conversion means (14).

11. Power supply adapter system as set forth in claim 5 and in anyone of the claims 6 to 10 wherein said transistor (80) is an N-channel field effect transistor and said second switch (22) is a P-channel field effect transistor.

12. Power supply adapter system as set forth in claim 6 and in anyone of the claims 7 to 11 wherein each of said first plurality of transistors (84, 86, 88) is a P-channel field effect transistor.

13. Power supply adapter system as set forth in claim 9 and in anyone of the claims 10 to 12 wherein each transistor of said second plurality of transistors (30, 32, 34) is an N-channel field effect transistor.

14. Power supply adapter system as set forth in anyone of the claims 1 to 13 wherein each of said first and second switches is a transistor.

15. Power supply adapter system as set forth in anyone of the claims 1 to 14 wherein said second switch (22) is a P-channel field effect transistor and said first switch (20) is a N-channel field effect transistor.

Revendications

1. Système adaptateur pour source d'énergie comprenant :

une borne d'alimentation en tension (10),
une borne de sortie (16),

un moyen de conversion de tension (14) disposé entre ladite borne d'alimentation en tension (10) et un point de potentiel de référence, ledit moyen de conversion de tension (14) ayant une sortie couplée à ladite borne de sortie (16),

un moyen de commutation (18) comportant des premier et second interrupteurs, ledit premier interrupteur (20) étant connecté entre ladite borne d'alimentation en tension (10) et ledit moyen de conversion de tension (14) et ledit second interrupteur (22) étant connecté entre ladite borne d'alimentation en tension (10) et ladite borne de sortie (16), et

un moyen (12) connecté entre ladite borne d'alimentation en tension (10) et ledit point de potentiel de référence pour détecter les première et seconde plages des tensions au niveau de ladite borne d'alimentation en tension (10) et pour produire des premier et second signaux de commande respectivement indicatifs desdites première et seconde plages des tensions, ledit premier signal de commande étant appliqué audit premier interrupteur (20) et ledit second signal étant appliqué audit second interrupteur (22).

2. Système adaptateur pour source d'énergie selon la revendication 1, dans lequel ledit moyen de conversion de tension (14) convertit une première tension à l'intérieur de ladite première plage de tensions à une amplitude pratiquement égale à une seconde tension à l'intérieur de ladite seconde plage de tensions et dans lequel

ledit moyen (12) pour détecter comporte des première et seconde entrées pour détecter les première et seconde tensions et pour produire lesdites première et seconde tensions de commande sur lesdites première et seconde sorties, ladite première sortie étant connectée à l'élément de commande dudit premier interrupteur (20) et ladite seconde sortie étant connectée à l'élément de commande dudit second interrupteur (22).



3. Système adaptateur pour source d'énergie selon la revendication 2, dans lequel lesdites première et seconde tensions ont des amplitudes telles que seulement un desdits interrupteurs (22, 20) est fermé pendant tout intervalle de temps donné. 5
4. Système adaptateur pour source d'énergie selon l'une quelconque des revendications 1 à 3, dans lequel ledit moyen de conversion de tension (14) comporte un premier circuit de comparateur (68) ayant des première et seconde entrées et un premier moyen (82) connecté entre ladite borne d'alimentation en tension (10) et un point de potentiel de référence pour délivrer une tension de référence pratiquement constante à sa sortie (G), la sortie dudit moyen de tension de référence pratiquement constante (82) étant couplée à la première entrée dudit circuit de comparateur (68) et ladite borne de sortie (16) étant couplée à la seconde entrée dudit circuit de comparateur (68). 10 15 20
5. Système adaptateur pour source d'énergie selon la revendication 4, dans lequel ledit moyen de conversion de tension (14) comporte de plus un transistor (80) connecté entre ladite borne d'alimentation en tension (10) et ladite borne de sortie (16), une sortie (F) dudit circuit de comparateur (68) étant connectée à une grille de commande dudit transistor (80). 25 30
6. Système adaptateur pour source d'énergie selon la revendication 4 ou 5, dans lequel ledit premier moyen (82) comporte un circuit série ayant une première pluralité de transistors (84, 86, 88) chacun étant connecté comme une diode, et une résistance (R2). 35
7. Système adaptateur pour source d'énergie selon l'une quelconque des revendications 1 à 6, dans lequel ledit moyen de détection (12) comporte un second circuit de comparateur (24) comportant des première et seconde entrées, un second moyen (26) connecté entre ladite borne d'alimentation en tension (10) et un point de potentiel de référence pour délivrer une tension de référence pratiquement constante à sa sortie (A), la sortie dudit second moyen (26) étant couplée à la première entrée dudit second circuit de comparateur (26), et un circuit de tension de commande (28) ayant une sortie couplée à la seconde entrée dudit second circuit de comparateur (24). 40 45 50
8. Système adaptateur pour source d'énergie selon la revendication 7, dans lequel ledit second circuit de comparateur (24) comporte de plus des première et seconde bornes de sortie, lesdits premier et second signaux de commande étant produits sur lesdites première et seconde bornes de sortie, respectivement. 55
9. Système adaptateur pour source d'énergie selon la revendication 7 ou 8, dans lequel ledit second moyen (26) comporte un circuit série ayant une seconde pluralité de transistors (30, 32, 34) chacun étant connecté comme une diode, et une résistance (R1), et ledit circuit de tension de commande (28) comporte un circuit série ayant un noeud de sortie (C) connecté entre ladite borne d'alimentation en tension (10) et un point de potentiel de référence, ledit circuit série comportant un transistor à effet de champ à canal P (50) disposé entre ledit noeud de sortie (C) et ladite borne d'alimentation en tension (10) et un transistor à effet de champ à canal N (48) disposé entre ledit noeud de sortie (C) et un point de potentiel de référence.
10. Système adaptateur pour source d'énergie selon l'une quelconque des revendications 1 à 9, dans lequel ledit moyen (12) pour détecter détecte une tension à l'intérieur de la première plage des tensions à ladite borne de la source d'énergie (10) pendant un premier intervalle de temps et active ledit moyen de conversion de tension (14) et désactive ledit moyen de commutation (18) et détecte une tension à l'intérieur de la seconde plage de tensions à ladite borne de la source d'énergie (10) pendant un second intervalle de temps et active ledit moyen de commutation (18) et désactive ledit moyen de conversion de tension (14).
11. Système adaptateur pour source d'énergie selon la revendication 5 et selon l'une quelconque des revendications 6 à 10, dans lequel ledit transistor (80) est un transistor à effet de champ à canal N et ledit second interrupteur (22) est un transistor à effet de champ à canal P.
12. Système adaptateur pour source d'énergie selon la revendication 6 et selon l'une quelconque des revendications 7 à 11, dans lequel chacun de ladite première pluralité de transistors (84, 86, 88) est un transistor à effet de champ à canal P.
13. Système adaptateur pour source d'énergie selon la revendication 9 et selon l'une quelconque des revendications 10 à 12, dans lequel chaque transistor de ladite seconde pluralité de transistors (30, 32, 34) est un transistor à



effet de champ à canal N.

14. Système adaptateur pour source d'énergie selon l'une quelconque des revendications 1 à 13, dans lequel chacun desdits premier et second interrupteurs est un transistor. 5

15. Système adaptateur pour source d'énergie selon l'une quelconque des revendications 1 à 14, dans lequel ledit second interrupteur (22) est un transistor à effet de champ à canal P et ledit premier interrupteur (20) est un transistor à effet de champ à canal N. 10

Patentansprüche

1. Stromversorgungs-Adapter-System enthaltend

einen Spannungsquellenanschluß (10),

einen Ausgangsanschluß (16),

Spannungsumwandlungsmittel (14), die zwischen dem Spannungsquellenanschluß (10) und einem Bezugspotentialpunkt angeordnet sind, wobei ein Ausgang der Spannungsumwandlungsmittel (14) mit dem Ausgangsanschluß (16) verbunden ist, 25

Schaltmittel (18), die erste und zweite Schalter enthalten, wobei der erste Schalter (20) zwischen den Spannungsquellenanschluß (10) und die Spannungsumwandlungsmittel (14) und der zweite Schalter (22) zwischen den Spannungsquellenanschluß (10) und den Ausgangsanschluß (16) eingeschaltet ist, und 30

Mittel (12), die zwischen dem Spannungsquellenanschluß (10) und den Bezugspotentialpunkt eingeschaltet sind, um erste und zweite Spannungsbereiche an dem Spannungsquellenanschluß (10) festzustellen und erste und zweite Steuersignale zu erzeugen, die den ersten oder zweiten Spannungsbereich anzeigen, welches erste Steuersignal dem ersten Schalter (20) und welches zweite Steuersignal dem zweiten Schalter (22) zugeführt wird. 40 45

2. Stromversorgungs-Adapter-System nach Anspruch 1, in welchem die Spannungsumwandlungsmittel (14) eine erste Spannung in dem ersten Spannungsbereich in eine Größe umwandeln, die im wesentlichen gleich einer zweiten Spannung innerhalb des zweiten Spannungsbereiches ist und 50 55

die Mittel (12) zur Feststellung erste und zweite Eingänge zur Feststellung besagter erster

und zweiter Spannungen und zur Erzeugung besagter erster und zweiter Steuerspannungen auf besagten ersten und zweiten Ausgängen haben, wobei der erste Ausgang mit dem Steuerelement des ersten Schalters (20) und besagter zweiter Ausgang mit dem Steuerelement des zweiten Schalters (22) verbunden ist.

3. Stromversorgungs-Adapter-System nach Anspruch 2, in welchem besagte erste und zweite Spannungen solche Größen aufweisen, daß während einer gegebenen Zeit nur einer dieser Schalter (22, 20) geschlossen ist.

4. Stromversorgungs-Adapter-System nach einem der Ansprüche 1 bis 3, in welchem die Spannungsumwandlungsmittel (14) ein erste Vergleichsschaltung (68) mit ersten und zweiten Eingängen und erste Mittel (82) einschließen, die zwischen besagten Spannungsquellenanschluß (10) und einen Bezugspotentialpunkt, der eine im wesentlichen konstante Bezugsspannung an einen seiner Ausgänge (G) liefert, eingeschaltet ist, wobei der Ausgang dieser im wesentlichen konstanten Bezugsspannungsmittel (82) mit dem ersten Eingang der Vergleichsschaltung (68) und besagter Ausgangsanschluß (16) mit dem zweiten Eingang der Vergleichsschaltung (68) verbunden ist. 15 20 25

5. Stromversorgungs-Adapter-System nach Anspruch 4, in welchen besagte Spannungsumwandlungsmittel (14) ferner einen Transistor (80) einschließen, der zwischen den Spannungsquellenanschluß (10) und dem Ausgangsanschluß (16) eingeschaltet ist und wobei der Ausgangsanschluß (16), ein Ausgang (F) der besagten Vergleichsschaltung (68) mit dem Steuergate des Transistors (80) verbunden ist.

6. Stromversorgungs-Adapter-System nach den Ansprüchen 4 oder 5, in welchem besagte erste Mittel (82) eine Serienschaltung mit mehreren ersten, jeweils als Diode geschalteten, Transistoren (84,86,88) und einen Widerstand (R2) einschließen.

7. Stromversorgungs-Adapter-System nach einem der Ansprüche 1 bis 6, in welchem besagte Feststellmittel (12) eine zweite Vergleichsschaltung (24) mit ersten und zweiten Eingängen und zweite Mittel (26) einschließt, die zwischen besagten Spannungsquellenanschluß (10) und einen Bezugspotentialpunkt eingeschaltet sind, der eine im wesentlichen konstante Bezugsspannung an einem seiner 50 55



Ausgänge (A) liefert wobei der Ausgang der besagten zweiten Mittel (26) mit dem ersten Eingang der zweiten Vergleichsschaltung (26) verbunden ist,

und ein Ausgang einer Steuerspannungsschaltung (28) mit dem zweiten Eingang der zweiten Vergleichsschaltung (24) verbunden ist.

8. Stromversorgungs-Adapter-System nach Anspruch 7, in welchem besagte zweite Vergleichsschaltung (24) ferner erste und zweite Ausgangsanschlüsse einschließt, an denen jeweils besagte erste und zweite Steuerspannungen erzeugt werden.
9. Stromversorgungs-Adapter-System nach Anspruch 7 oder 8, in welchem besagte zweite Mittel (26) eine Serienschaltung, mit mehreren, jeweils als Diode geschalteten, zweiten Transistoren (30,32,34) und einen Widerstand (R1) einschließen und besagte Steuerspannungsschaltung (28) eine Serienschaltung mit einem Ausgangsknoten (C) umfaßt, die zwischen dem Spannungsquellenanschluß (10) und einem Bezugspotentialpunkt eingeschaltet ist, besagte Serienschaltung einen P-Kanal-Feldeffekttransistor (50) einschließt, der zwischen besagtem Ausgangsknoten (C) und besagtem Spannungsquellenanschluß (10) vorgesehen ist und ein N-Kanal-Feldeffekttransistor (48) zwischen dem Ausgangsknoten (C) und einem Bezugspotentialpunkt vorgesehen ist.
10. Stromversorgungs-Adapter-System nach einem der Ansprüche 1 bis 9, in welchem besagte Feststellungsmittel (12) eine Spannung im ersten Spannungsbereich an besagtem Spannungsquellenanschluß (10) während eines ersten Zeitintervalles feststellen und besagte Spannungsumwandlungsmittel (14) aktivieren und besagte Spannungsumwandlungsmittel (18) deaktivieren und eine Spannung im zweiten Spannungsbereich an besagtem Spannungsquellenanschluß (10) während eines zweiten Zeitintervalles feststellen und besagte Spannungsumwandlungsmittel (18) aktivieren und besagte Spannungsumwandlungsmittel (14) deaktivieren.
11. Stromversorgungs-Adapter-System nach Anspruch 5 und einem der Ansprüche 6 bis 10, in welchem besagter Transistor (80) ein N-Kanal-Feldeffekttransistor und besagter zweiter Schalter (22) ein P-Kanal-Feldeffekttransistor ist.
12. Stromversorgungs-Adapter-System nach An-

spruch 6 und einem der Ansprüche 7 bis 11, in welchem jeder der ersten Transistoren (84,86,88) ein P-Kanal-Feldeffekttransistor ist.

- 5 13. Stromversorgungs-Adapter-System nach Anspruch 9 und einem der Ansprüche 10 bis 12 in welchem jeder der zweiten Transistoren (30,32,34) ein N-Kanal-Feldeffekttransistor ist.
- 10 14. Stromversorgungs-Adapter-System nach einem der Ansprüche 1 bis 13, in welchem jeder der ersten und zweiten Schalter ein Transistor ist.
- 15 15. Stromversorgungs-Adapter-System nach einem der Ansprüche 1 bis 14, in welchem besagter zweiter Schalter (22) ein P-Kanal-Feldeffekttransistor und besagter erster Schalter (20) ein N-Kanal-Feldeffekttransistor ist.

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