POWER AND DATA TRANSMISSION SYSTEM AND METHOD

The disclosure relates to a system and method for allowing for the transmission of power and data over the single pair of wires or electrical contacts. In particular, the disclosure relates to the transmission of power and data from a charging device to a rechargeable device over a single pair of electrical contacts.

The use of a single pair of wires or lines to transmit both power and data is known in the art, using frequency multiplexing. Data is transmitted using high frequency transmission over the wire pair. A low-pass or high-pass filter is employed at the receiving end, allowing data transfer simultaneously with power transmission. However, this solution is not always desirable. In particular, when the receiving device needs to be small and inexpensive the requirement for low-pass or high-pass filters is undesirable. These components add additional expense to the device electronics and also take up space within the device.

It would be desirable to provide a system, device and method for receiving power and data over a single pair of electrical contacts that is inexpensive, compact and reliable.

According to a first aspect, there is provided a handheld, battery powered, electrically operated aerosol-generating device configured to receive power and data from a host device over a single pair of electrical contacts comprising:

an input connectable to the host device;

a power receiving circuit;

a data receiving circuit; and

a switch element configured to connect the input to the power receiving circuit or the data receiving circuit dependent on a voltage of a signal received from the input.

According to a second aspect, there is provided a system for transmitting power and data from a host device to an electrically operated aerosol-generating device over an electrical connection through a single pair of electrical contacts comprising:

a host device configured to transmit power and data through an output, the host device configured to transmit the power through the output at different times to the data; and an electrically operated aerosol-generating device according to the first aspect.

According to a third aspect, there is provided a method for receiving power and data from a host device at an electrically operated aerosol-generating device having a power receiving circuit and a data receiving circuit over an electrical connection through a single pair of electrical contacts, comprising:

receiving at a input an electrical signal from the host device; and performing a comparison of a voltage of the input signal received at the input with a threshold voltage; and connecting or disconnecting the input and the power receiving circuit or the data receiving circuit dependent on a result of the comparison.

Herein disclosed is a system for transmitting power and data from a host device to a receiver device over an electrical connection comprising:

a host device configured to transmit power and data through an output, the host device configured to transmit the power through the output at different times to the data; and

a receiver device having an input connectable to the output of the host device, the receiver device comprising a power receiving circuit and a data receiving circuit and a switch element configured to connect the input to the power receiving circuit or the data receiving circuit dependent on a voltage of a signal received from the input.

The system employs "time-multiplexing", which is a cheaper and easier solution than frequency multiplexing and requires no additional filters. Furthermore, the system does not rely on dedicated time slots for power and data and so does not require synchronization between the host device and the receiver device. The receiver device determines when data is being received instead of power on the basis of one or more voltage determinations.

Herein disclosed is a receiver device for receiving power and data from a host device comprising:

an input connectable to the host device;

a power receiving circuit;

a data receiving circuit; and

a switch element configured to connect the input to the power receiving circuit or the data receiving circuit dependent on a voltage of a signal received from the input.

The switch element may be configured to switch from a first state to a second state when the voltage at the input is above a first voltage threshold. The switch element may be configured to switch from the second state to the first state when the voltage at the input is

power to the receiver device as pulses of current. The current provided by the host device may be between 0 and 5 Amps.

Herein disclosed is a method for receiving power and data from a host device at a receiver device having a power receiving circuit and a data receiving circuit over an electrical connection comprising:

receiving at a input an electrical signal from the host device; and

performing a comparison of a voltage of the input signal received at the input with a threshold voltage; and

connecting or disconnecting the input and the power receiving circuit or the data receiving circuit dependent on a result of the comparison.

The step of performing a comparison is advantageously performed continuously while the electrical signal is being received at the input. The electrical signal is advantageously a time multiplexed signal comprising both power and data.

The step of connecting or disconnecting may comprise switching the input from connection to one of the power receiving circuit and the data receiving circuit to the other of the power receiving circuit and the data receiving circuit. Alternatively, the step of connecting or disconnecting may comprise connecting or disconnecting the input and only one of the power receiving circuit and the data receiving circuit, while the other of the power receiving circuit and the data receiving circuit remains permanently connected to the input.

Embodiments of the invention will now be described in detail, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a schematic illustration of an electrically operated smoking system;

Figure 2 is a schematic illustration of one configuration of the receiver device electronics in the system of Figure 1;

Figure 3 is a flow diagram illustrating the operation of the switching element of Figure 2; and

Figure 4 is a schematic illustration of an alternative configuration of the receiver device electronics in the system of Figure 1.

Figure 1 shows a system comprising a host device 100 and a receiver device 102 in accordance with one embodiment of the invention. The host device 100 in this example is a charging unit for an electrically heated smoking system. The receiver device 102 in this example is an electrically heated aerosol-generating device adapted to receive a smoking article 104 comprising an aerosol-forming substrate. The receiver device includes a heater to heat the aerosol forming substrate in operation. The user inhales on a mouthpiece portion of the smoking article 104 to draw aerosol into the user's mouth. The receiver device 102 is configured to be received within a cavity 112 in the host device 100 in order to recharge the power supply in the receiver device.

Claims

1. A handheld, battery powered, electrically operated aerosol-generating device configured to receive power and data from a host device over a single pair of electrical contacts comprising:
an input connectable to the host device;
a power receiving circuit;
a data receiving circuit; and
a switch element configured to connect the input to the power receiving circuit or the data receiving circuit dependent on a voltage of a signal received from the input.

2. A system for transmitting power and data from a host device to an electrically operated aerosol-generating device over an electrical connection through a single pair of electrical contacts comprising:
a host device configured to transmit power and data through an output, the host device configured to transmit the power through the output at different times to the data; and
an electrically operated aerosol-generating device according to claim 1.

3. A system or electrically operated aerosol-generating device according to claim 1 or claim 2, wherein the switch element is configured to switch from a first state to a second state when the voltage at the input is above a first voltage threshold.

4. A system or electrically operated aerosol-generating device according to claim 3, wherein the switch element is configured to switch from the second state to the first state when the voltage at the input is below a second voltage threshold.

5. A system or electrically operated aerosol-generating device according to claim 4, wherein the second voltage threshold is lower than the first voltage threshold.

6. A system or electrically operated aerosol-generating device according to any one of claims 3 to 5, wherein the first state is connection to the data receiving circuit.

7. A system or electrically operated aerosol-generating device according to any one of claims 3 to 5, wherein the first state is disconnection from the power receiving circuit.

8. A system or electrically operated aerosol-generating device according to claim 4 or 5, wherein the second state is connection to the power receiving circuit.

9. A system or electrically operated aerosol-generating device according to any one of claims 3 to 8, wherein the first voltage threshold is between 1 and 30 Volts and advantageously between 2 and 8 Volts.

10. A system or electrically operated aerosol-generating device according to any one of the preceding claims, wherein the data receiving circuit is configured to determine logic levels in the data by comparing an input voltage with a third threshold voltage.

11. A system according to any one of the preceding claims, wherein the host device is a battery charging device.

12. A method for receiving power and data from a host device at an electrically operated aerosol-generating device having a power receiving circuit and a data receiving circuit over an electrical connection through a single pair of electrical contacts, comprising:
receiving at a input an electrical signal from the host device; and
performing a comparison of a voltage of the input signal received at the input with a threshold voltage; and
connecting or disconnecting the input and the power receiving circuit or the data receiving circuit dependent on a result of the comparison.

13. A method according to claim 14, wherein the step of performing a comparison is performed continuously while the electrical signal is being received at the input.