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(54) **CIRCUIT AND METHOD FOR DETECTING SHORT CIRCUIT OF COMMON ELECTRODE WIRING**

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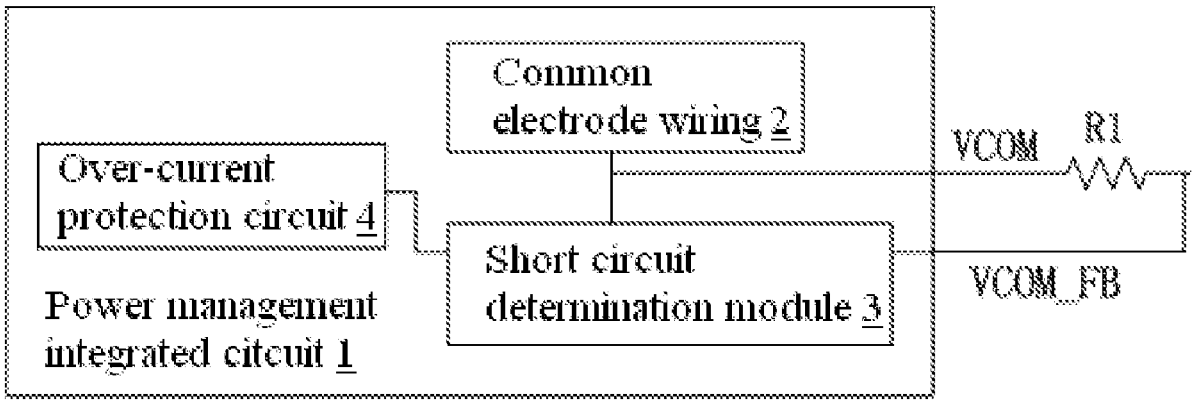
(57) **ABSTRACT**

A circuit for detecting a short circuit of a common electrode wiring is applied in an LCD panel and includes a common electrode wiring, a short circuit determination module and a resistor. An output terminal of the common electrode wiring is connected with a first terminal of the resistor and an input terminal of the short circuit determination module, and a second terminal of the resistor is connected with an input terminal of the short circuit determination module. The short circuit determination module obtains a voltage drop signal according to a first signal outputted by the common electrode wiring and a second signal from the resistor in a blanking period of the LCD panel, and determines that the common electrode wiring has a short circuit if the voltage value of the voltage drop signal is greater than the voltage value of a reference signal throughout a predetermined period.



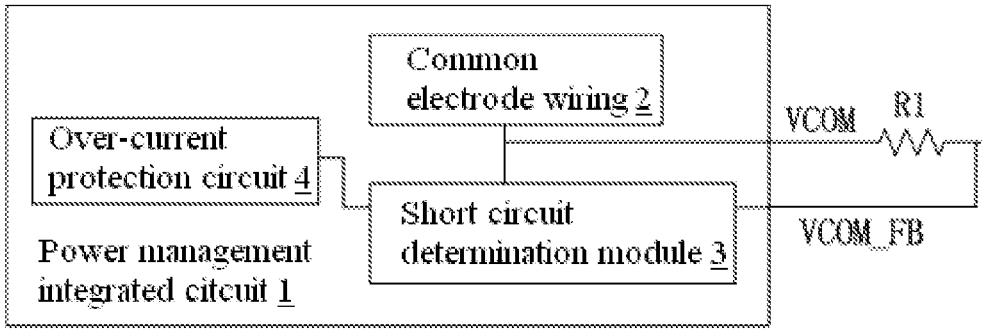


FIG. 1

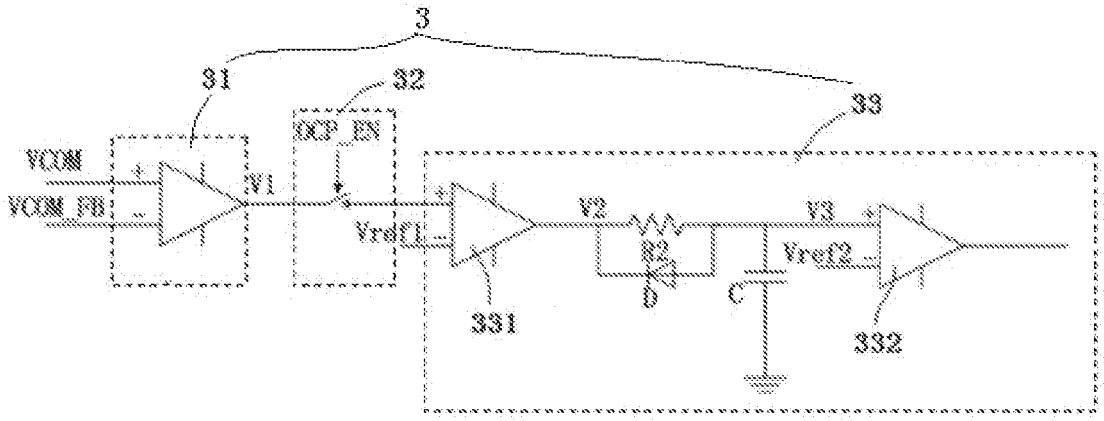


FIG. 2

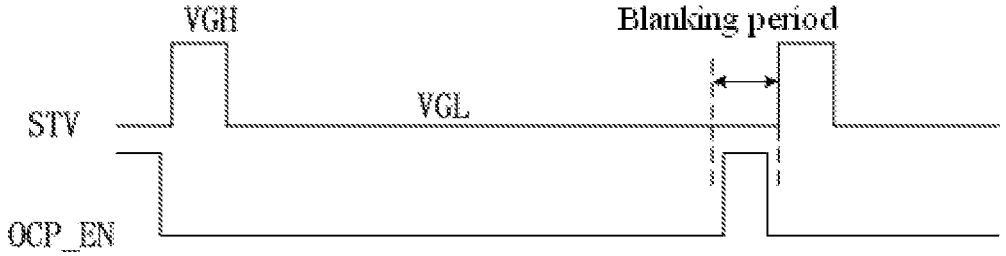


FIG. 3

CIRCUIT AND METHOD FOR DETECTING SHORT CIRCUIT OF COMMON ELECTRODE WIRING

RELATED APPLICATIONS

[0001] The present application is a National Phase of International Application Number PCT/CN2018/070041, filed Jan. 2, 2018, and claims the priority of China Application No. 201711266026.0, filed Dec. 5, 2017.

FIELD OF THE DISCLOSURE

[0002] The present invention relates to a display technology field, and more particularly, to a circuit and a method for detecting a short circuit of a common electrode wiring.

BACKGROUND

[0003] One problem of the current process of manufacturing a thin film transistor-liquid crystal display (TFT-LCD) penal (hereinafter LCD panel) that often occurs is that the internal circuit has a short circuit, and thus the circuit internal of the LCD panel to needs to be detected to determine whether a short circuit exists. Currently, a short circuit protection process of VCOM wirings (i.e. common electrode wirings in the LCD panel) is that currents of the VCOM wirings in the LCD panel are detected in each period. However, in the scanning period of each frame, the VCOM wirings would receive interferences from the data lines and the gate lines internal of the LCD panel and would be affected by the drain currents of the TFTs in the LCD panel, which results in a large variation of the short circuit current on the VCOM wirings. Therefore, the above method of detecting whether the circuit internal of the LCD panel has a short circuit has low detecting accuracy. In this method, a short circuit can be detected to trigger over current protection (OCP) only when the current of the short circuit is considerably large.

SUMMARY

[0004] To solve the aforementioned technical problem, the present invention provides a circuit and a method for detecting a short circuit of a common electrode wiring, which can increase the accuracy of detecting a short circuit to the circuits internal of the LCD panel. Even if the current of a short circuit internal of the LCD panel is relatively small, such short circuit internal of the LCD panel can also be detected.

[0005] A circuit for detecting a short circuit of a common electrode wiring provided by the present invention is applied in an LCD panel and includes a power management integrated circuit and a first resistor; the power management integrated circuit includes a common electrode wiring and a short circuit determination module.

[0006] An output terminal of the common electrode wiring is connected with a first terminal of the first resistor and an input terminal of the short circuit determination module, and a second terminal of the first resistor is connected with an input terminal of the short circuit determination module.

[0007] The short circuit determination module is configured to perform a difference processing on a first voltage signal outputted by the common electrode wiring and a second voltage signal from the first resistor to obtain a voltage drop signal in a blanking period of the LCD panel and to compare the voltage drop signal with a first reference voltage signal; if a voltage value of the voltage drop signal is greater than a voltage value of the first reference voltage signal throughout a predetermined period, the short circuit determination module determines that the common electrode wiring has a short circuit.

[0008] The second voltage signal is outputted by the first voltage signal via the first resistor.

[0009] In one embodiment, the short circuit determination module includes a subtraction unit, a comparison unit and a switching unit.

[0010] The subtraction unit is connected with the comparison unit via the switching unit, the subtraction unit is configured to receive the first voltage signal and the second voltage signal, and is configured to perform a difference processing on the first voltage signal and the second voltage signal, so as to obtain the voltage drop signal, and output the voltage drop signal to the comparison unit.

[0011] The switching unit is configured to connect the subtraction unit with the comparison unit according to an enable signal in the blanking period of the LCD panel and to disconnect the subtraction unit from the comparison unit in a scanning period of the LCD panel.

[0012] The comparison unit is configured to compare the voltage drop signal with the first reference voltage signal; if the voltage value of the voltage drop signal is less than or equal to the voltage value of the first reference voltage signal, the comparison unit determines that the common electrode wiring has no short circuit; if the voltage value of the voltage drop signal is greater than the voltage value of the first reference voltage signal throughout the predetermined period, the comparison unit determines that the common electrode wiring has a short circuit.

[0013] In one embodiment, the comparison unit includes a first comparator, a second comparator, a second resistor and a capacitor.

[0014] An output terminal of the first comparator is connected with a first terminal of the capacitor and the second comparator via the second resistor, a second terminal of the capacitor is grounded, and an input terminal of the first comparator is connected with the subtraction unit via the switching unit.

[0015] The first comparator is configured to compare the voltage drop signal with the first reference voltage signal; if the voltage value of the voltage drop signal is less than or equal to the voltage value of the first reference voltage signal, the first comparator outputs a low level signal; if the voltage value of the voltage drop signal is greater than the voltage value of the first reference voltage signal, the first comparator outputs a third voltage signal of high level to charge the capacitor.

[0016] The second comparator is configured to compare a fourth voltage signal outputted by the capacitor with a second reference voltage signal; after the capacitor is charged in the predetermined period, if a voltage value of the fourth voltage signal is greater than a voltage value of the second reference voltage signal, the second comparator determines that the voltage value of the voltage drop signal is greater than the voltage value of the first reference voltage signal throughout the predetermined period and that the common electrode wiring has a short circuit.

[0017] In one embodiment, the short circuit determination module further includes a diode that is connected in parallel with the second resistor, and an anode of the diode is connected with the first terminal of the capacitor.

[0018] The subtraction unit is a subtractor.

[0019] In one embodiment, the switching unit is an N-channel TFT, and the enable signal is at high level in the blanking period of the LCD panel and is at low level in the scanning period of the LCD panel.

[0020] In one embodiment, the enable signal is outputted by an over-current protection circuit that is connected with the common electrode wiring.

[0021] In one embodiment, the predetermined period is at a range of 150 ps to 300 μs.

[0022] The present invention further provides a circuit for detecting a short circuit of a common electrode wiring. The circuit is applied in an LCD panel and includes a power management integrated circuit and a first resistor. The power management integrated circuit includes a common electrode wiring and a short circuit determination module.

[0023] An output terminal of the common electrode wiring is connected with a first terminal of the first resistor and an input terminal of the short circuit determination module, in which a second terminal of the first resistor is connected with an input terminal of the short circuit determination module.

[0024] The short circuit determination module is configured to perform a difference processing on a first voltage signal outputted by the common electrode wiring with a second voltage signal from the first resistor to obtain a voltage drop signal in a blanking period of the LCD panel and to compare the voltage drop signal with a first reference voltage signal; if a voltage value of the voltage drop signal is greater than a voltage value of the first reference voltage signal throughout a predetermined period, the short circuit determination module determines that the common electrode wiring has a short circuit.

[0025] The second voltage signal is outputted by the first voltage signal via the first resistor, and the predetermined period is at a range of 150 μs to 300 μs.

[0026] In one embodiment, the short circuit determination module includes a subtraction unit, a comparison unit and a switching unit.

[0027] The subtraction unit is connected with the comparison unit via the switching unit, the subtraction unit is configured to receive the first voltage signal and the second voltage signal, and is configured to perform a difference processing on the first voltage signal and the second voltage signal, so as to obtain the voltage drop signal, and output the voltage drop signal to the comparison unit.

[0028] The switching unit is configured to connect the subtraction unit with the comparison unit according to an enable signal in the blanking period of the LCD panel and to disconnect the subtraction unit from the comparison unit in a scanning period of the LCD panel.

[0029] The comparison unit is configured to compare the voltage drop signal with the first reference voltage signal; if a voltage value of the voltage drop signal is less than or equal to a voltage value of the first reference voltage signal, the comparison unit determines that the common electrode wiring has no short circuit; if the voltage value of the voltage drop signal is greater than the voltage value of the first reference voltage signal throughout the predetermined period, the comparison unit determines that the common electrode wiring has a short circuit.

[0030] In one embodiment, the comparison unit includes a first comparator, a second comparator, a second resistor and a capacitor.

[0031] An output terminal of the first comparator is connected with a first terminal of the capacitor and the second comparator via the second resistor, a second terminal of the capacitor is grounded, and an input terminal of the first comparator is connected with the subtraction unit via the switching unit.

[0032] The first comparator is configured to compare the voltage drop signal with the first reference voltage signal; if the voltage value of the voltage drop signal is less than or equal to the voltage value of the first reference voltage signal, the first comparator outputs a low level signal; if the voltage value of the voltage drop signal is greater than the voltage value of the first reference voltage signal, the first comparator outputs a third voltage signal of high level to charge the capacitor.

[0033] The second comparator is configured to compare a fourth voltage signal outputted by the capacitor with a second reference voltage signal; after the capacitor is charged in the predetermined period, if a voltage value of the fourth voltage signal is greater than a voltage value of the second reference voltage signal, the second comparator determines that the voltage value of the voltage drop signal is greater than the voltage value of the first reference voltage signal throughout the predetermined period and that the common electrode wiring has a short circuit.

[0034] In one embodiment, the short circuit determination module further includes a diode that is connected in parallel with the second resistor, and an anode of the diode is connected to the first terminal of the capacitor.

[0035] The subtraction unit is a subtractor.

[0036] In one embodiment, the switching unit is an N-channel TFT, and the enable signal is at high level in the blanking period of the LCD panel and is at low level in the scanning period of the LCD panel.

[0037] In one embodiment, the enable signal is outputted by an over-current protection circuit that is connected with the common electrode wiring.

[0038] The present invention further provides a method for detecting a short circuit of a common electrode wiring. The method includes the following steps.

[0039] A short circuit determination module receives a first voltage signal outputted by the common electrode wiring and a second voltage signal from the first resistor, and performs a difference processing on the first voltage signal and the second voltage signal to obtain a voltage drop signal, in which the second voltage signal is outputted by the first voltage signal via the first resistor.

[0040] In a blanking period of an LCD panel, the short circuit determination module comparing the voltage drop signal with a first reference voltage signal and determining that the common electrode wiring has a short circuit if a voltage value of the voltage drop signal is greater than a voltage value of the first reference voltage signal throughout a predetermined period includes the following steps.

[0041] In one embodiment, comparing the voltage drop signal with the first reference voltage signal in the blanking period of the LCD panel includes the following steps.

[0042] An enable signal is outputted to a switching unit that is connected between a subtraction unit and the first comparator, and the subtraction unit is connected with the first comparator by controlling the switching unit in the blanking period of the LCD panel.

[0043] The first comparator receives the voltage drop signal from the subtraction unit and compares the voltage

drop signal with the first reference voltage signal; the first comparator outputs a low level signal if a voltage value of the voltage drop signal is smaller or equal to a voltage value of the first reference voltage signal; the first comparator outputs a third voltage signal of high level to charge a capacitor if the voltage value of the voltage drop signal is greater than the voltage value of the first reference voltage signal.

[0044] The second comparator compares a fourth voltage signal outputted by the capacitor with the second reference voltage signal; after the capacitor is charged in the predetermined period, the second comparator determines that the voltage value of the voltage drop signal is greater than the voltage value of the first reference voltage signal throughout the predetermined period and that the common electrode wiring has a short circuit if a voltage value of the fourth voltage signal is greater than a voltage value of the second reference voltage signal.

[0045] In one embodiment, the predetermined period is at a range of 150 μs to 300 μs.

[0046] The embodiments of the present invention have the following beneficial effects. In the embodiments of the present invention, the voltage drop value of the first voltage signal that is outputted from the output terminal of the common electrode wiring and through the first resistor is detected in the blanking period of the LCD panel, and then the voltage drop value is compared with the voltage value of the first reference voltage signal to determine if the voltage drop value is greater than the voltage value of the first reference voltage signal throughout the predetermined period; if yes, the common electrode wiring is determined to have a short circuit. In the embodiments of the present invention, the common electrode wiring is detected in the blanking period, such that interference on data lines and gate lines in the scanning period of the LCD panel and effects of drain currents of the TFTs in the LCD panel can be avoided. Therefore, when the common electrode wiring has a short circuit, a triggered over-current protection on the common electrode wiring can be accurately detected.

BRIEF DESCRIPTION OF THE DRAWINGS

[0047] Accompanying drawings are for providing further understanding of embodiments of the disclosure. The drawings form a part of the disclosure and are for illustrating the principle of the embodiments of the disclosure along with the literal description. Apparently, the drawings in the description below are merely some embodiments of the disclosure, a person skilled in the art can obtain other drawings according to these drawings without creative efforts. In the figures:

[0048] FIG. **1** is a block diagram of a circuit for detecting a short circuit of a common electrode wiring according to one embodiment of the present invention.

[0049] FIG. **2** is a circuit diagram of a short circuit determination module according to one embodiment of the present invention.

[0050] FIG. **3** is a sequential diagram of a scan activation signal and an enable signal of an LCD panel according to one embodiment of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0051] The present invention provides a circuit for detecting a short circuit of a common electrode wiring which is applied in an LCD panel. As shown in FIG. **1**, the circuit includes a power management integrated circuit **1** and a first resistor R**1**. The power management integrated circuit **1** includes a common electrode wiring **2** and a short circuit determination module **3**.

[0052] An output terminal of the common electrode wiring **2** is connected with a first terminal of the first resistor R**1** and an input terminal of the short circuit determination module **3**, and a second terminal of the first resistor R**1** is connected with an input terminal of the short circuit determination module **3**.

[0053] The short circuit determination module **3** is configured to perform a difference processing on a first voltage signal VCOM outputted by the common electrode wiring **2** and a second voltage signal VCOM_FB from the first resistor R**1** to obtain a voltage drop signal V**1** in a blanking period of the LCD panel and to compare the voltage drop signal V**1** with a first reference voltage signal Vref**1**. If the voltage value of the voltage drop signal V**1** is greater than the voltage value of the first reference voltage signal Vref**1** throughout a predetermined period, the short circuit determination module **3** determines that the common electrode wiring **2** has a short circuit. The second voltage signal VCOM_FB is outputted by the first voltage signal VCOM via the first resistor R**1**. A voltage drop value of the voltage drop signal V**1** is that of the first voltage signal VCOM after passing through the first resistor R**1**.

[0054] In general, the output terminal of the common electrode wiring **2** is connected with an RC filtering circuit, and the first resistor R**1** may be the resistor of the RC filtering circuit. Here, the voltage value of the first reference voltage signal Vref**1** may be determined according to the first resistor R**1**. For example, if a current value of a short circuit current of the common electrode wiring **2** to be detected is I, the voltage value of the first reference voltage signal Vref**1** is U**1** and the resistance of the first resistor R**1** is R**1**, then U**1**=R**1***I.

[0055] Furthermore, as shown in FIG. **2**, a short circuit determination module **3** includes a subtraction unit **31**, a comparison unit **33** and a switching unit **32**.

[0056] The subtraction unit **31** is connected with the comparison unit **33** via the switching unit **32**, the subtraction unit **31** is configured to receive the first voltage signal VCOM and the second voltage signal VCOM_FB, and is configured to perform a difference processing on the first voltage signal VCOM and the second voltage signal VCOM_FB, to obtain the voltage drop signal, and output the voltage drop signal V**1** to the comparison unit **33**. The subtraction unit **31** may be a subtractor, in which a positive input terminal receives the first voltage signal VCOM and a negative input terminal receives the second voltage signal VCOM_FB.

[0057] The switching unit **32** is configured to connect the subtraction unit **31** with the comparison unit **33** according to an enable signal OCP_EN in the blanking period of the LCD panel and to disconnect the subtraction unit **31** from the comparison unit **33** in a scanning period of the LCD panel.

[0058] The comparison unit **33** is configured to compare the voltage drop signal V**1** with the first reference voltage signal Vref**1**. If the voltage value of the voltage drop signal V**1** is less than or equal to the voltage value of the first reference voltage signal Vref**1**, the comparison unit **33** determines that the common electrode wiring **2** has no short circuit; if the voltage value of the voltage drop signal V**1** is

greater than the voltage value of the first reference voltage signal Vref**1** throughout the predetermined period, the comparison unit determines that the common electrode wiring **2** has a short circuit.

[0059] Furthermore, as shown in FIG. **2**, the comparison unit **33** includes a first comparator **331**, a second comparator **332**, a second resistor R**2** and a capacitor C.

[0060] An output terminal of the first comparator **331** is connected with a first terminal of the capacitor C and the second comparator **332** via the second resistor R**2**, a second terminal of the capacitor C is grounded, and an input terminal of the first comparator **331** is connected with the subtraction unit **31** via the switching unit **32**.

[0061] A positive input terminal of the first comparator **331** receives the voltage drop signal V**1**, while a negative input terminal of the first comparator **331** receives the first reference voltage signal Vref**1**. The first comparator **331** is configured to compare the voltage drop signal V**1** with the first reference voltage signal Vref**1**. If the voltage value of the voltage drop signal V**1** is less than or equal to the voltage value of the first reference voltage signal Vref**1**, then the first comparator **331** outputs a low level signal, the common electrode wiring **2** has no short circuit, and no over-current protection is triggered; if the voltage value of the voltage drop signal V**1** is greater than the voltage value of the first reference voltage signal Vref**1**, the first comparator **331** outputs a third voltage signal V**2** of high level to charge the capacitor C. The first comparator **331** charges the capacitor C via the second resistor R**2**, which may reduce the current outputted to the capacitor C, such that the charge rate of the third voltage signal V**2** to the capacitor C is reduced to prevent from an instantaneous fully charging the capacitor C instantaneously, thereby avoiding the second comparator **332** from not being to determine whether an over-current protection for the common electrode wiring **2** is triggered by a short circuit or based on a spike that may cause false triggering.

[0062] A voltage value of a second reference voltage signal Vref**2** may be determined according to the predetermined period, the capacitor C, the second resistor R**2** and the third voltage signal V**2**. For example, if the predetermined period is t and the voltage value of the third voltage signal V**2** is U**0**, then the voltage value U of the second reference voltage signal Vref**2** is U**0***(1−exp(−t/RC)), where R is the resistance of the second resistor R**2** and C is a capacitance of the capacitor C.

[0063] The second comparator **332** is configured to compare a fourth voltage signal V**3** outputted by the capacitor C with a second reference voltage signal Vref**2**. After the capacitor C is charged in the predetermined period, if a voltage value of the fourth voltage signal V**3** is greater than a voltage value of the second reference voltage signal Vref**2**, the second comparator **332** determines that the voltage value of the voltage drop signal V**1** is greater than the voltage value of the first reference voltage signal Vref**1** throughout the predetermined period and that the common electrode wiring **2** has a short circuit.

[0064] Furthermore, the short circuit determination module **3** further includes a diode D that is connected in parallel with the second resistor R**2**, in which an anode of the diode D is connected with the first terminal of the capacitor C. When the switching unit **32** disconnects the subtraction unit **31** from the first comparator **331**, the capacitor C begins discharging, and the diode D is used to accelerate the discharge rate of the capacitor C.

[0065] Furthermore, as shown in FIG. **3**, the switching unit **32** is an N-channel TFT, and the enable signal OCP_EN is at high level VGH in the blanking period of the LCD panel and is at low level VGL in the scanning period of the LCD panel. The blanking period of the LCD panel means a period before the LCD panel starts scanning. As can be seen in FIG. **3**, the blanking period is a period before the scan activation signal STV rises to the high level VGH.

[0066] In general, the LCD panel starts scanning when the scan activation signal STV rises to the high level VGH. After each scanning period of the LCD panel ends, a non-scanning period is between the scanning period and a next scanning period, and such non-scanning period is the blanking period.

[0067] Furthermore, the enable signal OCP_EN is outputted by an over-current protection circuit **4** that is connected with the common electrode wiring **2**.

[0068] Furthermore, the predetermined period is at a range of 150 μs to 300 μs.

[0069] The present invention further provides a method for detecting a short circuit of a common electrode wiring **2**. The method is applied in the above-mentioned circuit for detecting a short circuit of a common electrode wiring and includes the following steps.

[0070] The short circuit determination module **3** receives and performs a difference processing on the first voltage signal VCOM outputted by the common electrode wiring **2** and the second voltage signal VCOM_FB from the first resistor R**1** to generate the voltage drop signal V**1**, in which the second voltage signal VCOM_FB is outputted by the first voltage signal VCOM via the first resistor R**1**.

[0071] The short circuit determination module **3** compares the voltage drop signal V**1** with the first reference voltage signal Vref**1** in a blanking period of an LCD panel; the short circuit determination module **3** determines that the common electrode wiring **2** has a short circuit if a voltage value of the voltage drop signal V**1** is greater than a voltage value of the first reference voltage signal Vref**1** throughout a predetermined period.

[0072] Furthermore, the short circuit determination module comparing the voltage drop signal with a first reference voltage signal and determining that the common electrode wiring has a short circuit if a voltage value of the voltage drop signal is greater than a voltage value of the first reference voltage signal throughout a predetermined period includes the following steps.

[0073] The enable signal OCP_EN is outputted to the switching unit **32** that is connected between the subtraction unit **31** and the first comparator **331**, and the subtraction unit **31** is connected with the first comparator **331** by controlling the switching unit **32** in the blanking period of the LCD panel.

[0074] The first comparator **331** receives the voltage drop signal V**1** from the subtraction unit **31** and compares the voltage drop signal V**1** with the first reference voltage signal Vref**1**; the first comparator **331** outputs a low level signal if the voltage value of the voltage drop signal V**1** is smaller or equal to the voltage value of the first reference voltage signal Vref**1**; the first comparator **331** outputs the third voltage signal V**2** of high level to charge the capacitor C if the voltage value of the voltage drop signal V**1** is greater than the voltage value of the first reference voltage signal Vref**1**.

[0075] The second comparator **332** compares the fourth voltage signal V**3** outputted by the capacitor C with the second reference voltage signal Vref**2**; the second comparator **332** determines that the voltage value of the voltage drop signal V**1** is greater than the voltage value of the first reference voltage signal Vref**1** throughout the predetermined period and that the common electrode wiring **2** has a short circuit if a voltage value of the fourth voltage signal V**3** is greater than a voltage value of the second reference voltage signal Vref**2** after the capacitor C is charged in the predetermined period.

[0076] Furthermore, the predetermined period is at a range of 150 μs to 300 μs. In general, the blanking period of the LCD panel is 300 **82** s.

[0077] In summary, in the embodiments of the present invention, the voltage drop value of the first voltage signal VCOM that is outputted from the output terminal of the common electrode wiring **2** and through the first resistor R**1** is detected in the blanking period of the LCD panel, and the voltage drop value is compared with the voltage value of the first reference voltage signal Vref**1** to determine if the voltage drop value is greater than the voltage value of the first reference voltage signal Vref**1** throughout the predetermined period; if yes, the common electrode wiring **2** is determined to have a short circuit. In the embodiments of the present invention, the common electrode wiring **2** is detected in the blanking period, such that interference on data lines and gate lines in the scanning period of the LCD panel and effects of drain currents of the TFTs in the LCD panel can be avoided. Therefore, when the common electrode wiring **2** has a short circuit, a triggered over-current protection on the common electrode wiring **2** can be accurately detected.

[0078] Furthermore, a de-noising technique is applied in the embodiments of the present invention. That is, after the capacitor C is charged in the predetermined period, the second comparator **332** compares the voltage value of the fourth voltage signal V**3** with the voltage value of the second reference voltage signal Vref**2**, and thus a short circuit of the common electrode wiring **2** can be efficiently detected without being interfered by an over-current protection based on a spike that may cause false triggering. A short circuit with a current small than 10 mA can also be detected, which improves the conventional method for detecting a short circuit with a 100 mA degree circuit by 10 times.

[0079] The foregoing contents are detailed description of the disclosure in conjunction with specific preferred embodiments and concrete embodiments of the disclosure are not limited to these description. For the person skilled in the art of the disclosure, without departing from the concept of the disclosure, simple deductions or substitutions can be made and should be included in the protection scope of the application.

What is claimed is:

1. A circuit for detecting a short circuit of a common electrode wiring, the circuit applied in a liquid crystal display (LCD) panel and comprising a power management integrated circuit and a first resistor, wherein the power management integrated circuit comprises a common electrode wiring and a short circuit determination module;

an output terminal of the common electrode wiring is connected with a first terminal of the first resistor and an input terminal of the short circuit determination module, and a second terminal of the first resistor is connected with an input terminal of the short circuit determination module;

the short circuit determination module is configured to perform a difference processing on a first voltage signal outputted by the common electrode wiring and a second voltage signal from the first resistor to obtain a voltage drop signal in a blanking period of the LCD panel, and to compare the voltage drop signal with a first reference voltage signal; if a voltage value of the voltage drop signal is greater than a voltage value of the first reference voltage signal throughout a predetermined period, the short circuit determination module determines that the common electrode wiring has a short circuit;

wherein the second voltage signal is outputted by the first voltage signal via the first resistor.

2. The circuit according to claim **1**, wherein the short circuit determination module comprises a subtraction unit, a comparison unit and a switching unit;

the subtraction unit is connected with the comparison unit via the switching unit, the subtraction unit is configured to receive the first voltage signal and the second voltage signal, and is configured to perform a difference processing on the first voltage signal and the second voltage signal, so as to obtain the voltage drop signal, and output the voltage drop signal to the comparison unit;

the switching unit is configured to connect the subtraction unit with the comparison unit according to an enable signal in the blanking period of the LCD panel and to disconnect the subtraction unit from the comparison unit in a scanning period of the LCD panel;

the comparison unit is configured to compare the voltage drop signal with the first reference voltage signal; if the voltage value of the voltage drop signal is less than or equal to the voltage value of the first reference voltage signal, the comparison unit determines that the common electrode wiring has no short circuit; if the voltage value of the voltage drop signal is greater than the voltage value of the first reference voltage signal throughout the predetermined period, the comparison unit determines that the common electrode wiring has a short circuit.

3. The circuit according to claim **2**, wherein the comparison unit comprises a first comparator, a second comparator, a second resistor and a capacitor;

an output terminal of the first comparator is connected with a first terminal of the capacitor and the second comparator via the second resistor, a second terminal of the capacitor is grounded, and an input terminal of the first comparator is connected with the subtraction unit via the switching unit;

the first comparator is configured to compare the voltage drop signal with the first reference voltage signal; if the voltage value of the voltage drop signal is less than or equal to the voltage value of the first reference voltage signal, the first comparator outputs a low level signal; if the voltage value of the voltage drop signal is greater than the voltage value of the first reference voltage signal, the first comparator outputs a third voltage signal of high level to charge the capacitor;

the second comparator is configured to compare a fourth voltage signal outputted by the capacitor with a second

reference voltage signal; after the capacitor is charged in the predetermined period, if a voltage value of the fourth voltage signal is greater than a voltage value of the second reference voltage signal, the second comparator determines that the voltage value of the voltage drop signal is greater than the voltage value of the first reference voltage signal throughout the predetermined period and that the common electrode wiring has a short circuit.

4. The circuit according to claim **3**, wherein the short circuit determination module further comprises a diode that is connected in parallel with the second resistor, an anode of the diode is connected with the first terminal of the capacitor;

wherein the subtraction unit is a subtractor.

5. The circuit according to claim **2**, wherein the switching unit is an N-channel thin film transistor (TFT), and the enable signal is at high level in the blanking period of the LCD panel and is at low level in the scanning period of the LCD panel.

6. The circuit according to claim **2**, wherein the enable signal is outputted by an over-current protection circuit that is connected with the common electrode wiring.

7. The circuit according to claim **1**, wherein the predetermined period is at a range of 150 μs to 300 μs.

8. A circuit for detecting a short circuit of a common electrode wiring, the circuit applied in an LCD panel and comprising a power management integrated circuit and a first resistor, wherein the power management integrated circuit comprises a common electrode wiring and a short circuit determination module;

wherein an output terminal of the common electrode wiring is connected with a first terminal of the first resistor and an input terminal of the short circuit determination module, and wherein a second terminal of the first resistor is connected with an input terminal of the short circuit determination module;

the short circuit determination module is configured to perform a difference processing on a first voltage signal outputted by the common electrode wiring with a second voltage signal from the first resistor to obtain a voltage drop signal in a blanking period of the LCD panel, and to compare the voltage drop signal with a first reference voltage signal; if a voltage value of the voltage drop signal is greater than a voltage value of the first reference voltage signal throughout a predetermined period, the short circuit determination module determines that the common electrode wiring has a short circuit;

wherein the second voltage signal is outputted by the first voltage signal via the first resistor, and the predetermined period is at a range of 150 μs to 300 μs.

9. The circuit according to claim **8**, wherein the short circuit determination module comprises a subtraction unit, a comparison unit and a switching unit;

the subtraction unit is connected with the comparison unit via the switching unit, the subtraction unit is configured to receive the first voltage signal and the second voltage signal, and is configured to perform a difference processing on the first voltage signal and the second voltage signal, so as to obtain the voltage drop signal, and output the voltage drop signal to the comparison unit;

the switching unit is configured to connect the subtraction unit with the comparison unit according to an enable signal in the blanking period of the LCD panel and to disconnect the subtraction unit from the comparison unit in a scanning period of the LCD panel;

the comparison unit is configured to compare the voltage drop signal with the first reference voltage signal; if a voltage value of the voltage drop signal is less than or equal to a voltage value of the first reference voltage signal, the comparison unit determines that the common electrode wiring has no short circuit; if the voltage value of the voltage drop signal is greater than the voltage value of the first reference voltage signal throughout the predetermined period, the comparison unit determines that the common electrode wiring has a short circuit.

10. The circuit according to claim **9**, wherein the comparison unit comprises a first comparator, a second comparator, a second resistor and a capacitor;

an output terminal of the first comparator is connected with a first terminal of the capacitor and the second comparator via the second resistor, a second terminal of the capacitor is grounded, and an input terminal of the first comparator is connected with the subtraction unit via the switching unit;

the first comparator is configured to compare the voltage drop signal with the first reference voltage signal; if the voltage value of the voltage drop signal is less than or equal to the voltage value of the first reference voltage signal, the first comparator outputs a low level signal; if the voltage value of the voltage drop signal is greater than the voltage value of the first reference voltage signal, the first comparator outputs a third voltage signal of high level to charge the capacitor;

the second comparator is configured to compare a fourth voltage signal outputted by the capacitor with a second reference voltage signal; after the capacitor is charged in the predetermined period, if a voltage value of the fourth voltage signal is greater than a voltage value of the second reference voltage signal, the second comparator determines that the voltage value of the voltage drop signal is greater than the voltage value of the first reference voltage signal throughout the predetermined period and that the common electrode wiring has a short circuit.

11. The circuit according to claim **10**, wherein the short circuit determination module further comprises a diode that is connected in parallel with the second resistor, an anode of the diode is connected to the first terminal of the capacitor;

wherein the subtraction unit is a subtractor.

12. The circuit according to claim **9**, wherein the switching unit is an N-channel TFT, the enable signal is at high level in the blanking period of the LCD panel and is at low level in the scanning period of the LCD panel.

13. The circuit according to claim **9**, wherein the enable signal is outputted by an over-current protection circuit that is connected with the common electrode wiring.

14. A method for detecting a short circuit of a common electrode wiring, the method comprising the following steps:

a short circuit determination module receiving a first voltage signal outputted by the common electrode wiring and a second voltage signal from the first resistor, and performing a difference processing on the

first voltage signal and the second voltage signal to obtain a voltage drop signal, wherein the second voltage signal is outputted by the first voltage signal via the first resistor;

the short circuit determination module comparing the voltage drop signal with a first reference voltage signal in a blanking period of an LCD panel and determining that the common electrode wiring has a short circuit if a voltage value of the voltage drop signal is greater than a voltage value of the first reference voltage signal throughout a predetermined period.

15. The method according to claim **14**, wherein the short circuit determination module comparing the voltage drop signal with a first reference voltage signal and determining that the common electrode wiring has a short circuit if a voltage value of the voltage drop signal is greater than a voltage value of the first reference voltage signal throughout a predetermined period includes the following steps:

outputting an enable signal to a switching unit that is connected between a subtraction unit and a first comparator, and connecting the subtraction unit with the first comparator in the blanking period of the LCD panel by controlling the switching unit;

the first comparator receiving the voltage drop signal from the subtraction unit and comparing the voltage drop signal with the first reference voltage signal; the first comparator outputting a low level signal if the voltage value of the voltage drop signal is smaller or equal to the voltage value of the first reference voltage signal; the first comparator outputting a third voltage signal of high level to charge a capacitor if the voltage value of the voltage drop signal is greater than the voltage value of the first reference voltage signal; and

the second comparator comparing a fourth voltage signal outputted by the capacitor with the second reference voltage signal; after the capacitor is charged in the predetermined period, the second comparator determining that the voltage value of the voltage drop signal is greater than the voltage value of the first reference voltage signal throughout the predetermined period and that the common electrode wiring has a short circuit if a voltage value of the fourth voltage signal is greater than a voltage value of the second reference voltage signal.

16. The method according to claim **15**, wherein the predetermined period is at a range of 150 μs to 300 μs.

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