CLAIMS

1. A liquid crystal display device formed on an insulating substrate and performing pause drive in an alternating-voltage drive mode, the device comprising:

a plurality of scanning signal lines;

a plurality of data signal lines crossing each of the scanning signal lines;

pixel forming portions provided at intersections of the scanning signal lines and the data signal lines;

a correction circuit that outputs either a corrected image signal generated by adding a correction value to an input image signal or an uncorrected image signal generated by not adding anything to the input image signal;

a scanning signal line driver circuit that sequentially selects and scans the scanning signal lines;

a data signal line driver circuit that writes to the data signal lines correction voltages in accordance with the corrected image signal outputted by the correction circuit or uncorrected signal voltages in accordance with the uncorrected image signal; and

a timing control circuit that controls the scanning signal line driver circuit and the data signal line driver circuit, wherein,

the pause drive alternatingly repeats a drive period consisting of a plurality of drive frames and a pause period following the drive period and lasting until the start of the next drive period,

the correction circuit outputs one of the corrected image signal and the uncorrected image signal to the data signal line driver circuit at least during the first drive frame of the drive period and also outputs the uncorrected image signal to the data signal line driver circuit during the last drive frame, and

the correction voltages in accordance with the corrected image signal has the same polarity as the uncorrected signal voltages and an absolute value greater than or equal to an absolute value of the uncorrected signal voltages.

2. The liquid crystal display device according to claim 1, wherein,

the correction circuit includes:

frame memory that stores the input image signal every frame;

a comparator circuit that obtains grayscale values for a current frame for the input image signal and grayscale values for a previous frame stored in the frame memory;

a table having stored correction values correlated with combinations of grayscale values for the current and previous frames for the input image signals; and

an adder circuit that outputs either the corrected image signal or the uncorrected image signal to the data signal line driver circuit in accordance with the input image signal,

the table provides the adder circuit with the correction values correlated with the grayscale values for the current and previous frames

every time the comparator circuit provides the grayscale values for the current and previous frames for the input image signal, and

the adder circuit outputs the corrected image signal by correcting the grayscale values for the input image signal with the correction values provided by the table and also outputs the uncorrected image signal without correcting the grayscale values for the input image signal.

3. The liquid crystal display device according to claim 2, wherein the adder circuit outputs the corrected image signal in each of two or more consecutive drive frames including the first drive frame, and outputs the uncorrected image signal during the last drive frame.

4. The liquid crystal display device according to claim 1, wherein,

the correction circuit includes:

frame memory that stores the input image signal every frame;

a comparator circuit that obtains grayscale values for a current frame for the input image signal and grayscale values for a previous frame stored in the frame memory;

a table having stored correction values correlated with combinations of grayscale values for the current and previous frames for the input image signals when the grayscale values for the current and previous frames are equal; and

an adder circuit that outputs either the corrected image signal or the uncorrected image signal in accordance with the input image signal,

the comparator circuit provides the table with grayscale values for the current and previous frames for the input image signal only when the grayscale values for the current and previous frames for the input image signal are equal or substantially equal,

the table provides the adder circuit with the correction values correlated with the grayscale values for the current and previous frames provided by the comparator circuit,

when the grayscale values for the current and previous frames for the input image signal are essentially equal, the adder circuit outputs the corrected image signal by correcting the grayscale values for the input image signal with the correction values provided by the table and also outputs the uncorrected image signal without correcting the grayscale values for the input image signal, and

when the grayscale values for the current and previous frames for the input image signal are essentially not equal, the adder circuit outputs the corrected image signal at least once without correcting the grayscale values for the input image signal.

5. The liquid crystal display device according to claim 4, wherein, when the grayscale values for the current and previous frames for the input image signal are not equal, the adder circuit outputs the corrected image signals successively without correcting the grayscale values for the input image signal.

6. The liquid crystal display device according to claim 4, wherein,

the comparator circuit further obtains an inverting direction in which the input image signal is inverted in polarity for each of the drive periods, and

the table includes first and second tables having stored different correction values in accordance with directions of the polarity, such that every time grayscale values for the current and previous frames for the input image signal and a direction of the polarity are provided by the comparator circuit, the adder circuit is provided with the correction values correlated with the grayscale values for the current and previous frames from one of the first and second tables corresponding to the direction of the polarity.

7. The liquid crystal display device according to claim 1, wherein,

the correction circuit includes:

frame memory that stores the input image signal every frame;

a table having stored correction values correlated with grayscale values for a current frame for the input image signal; and

an adder circuit that outputs either the corrected image signal or the uncorrected image signal in accordance with the input image signal,

the table provides the adder circuit with correction values corresponding to the grayscale values for the current frame every time the input image signal is provided, and

the adder circuit outputs the corrected image signal by correcting the grayscale values for the input image signal with the correction values provided by the table and also outputs the uncorrected image signal without correcting the grayscale values for the input image signal.

8. The liquid crystal display device according to claim 1, wherein,

the correction circuit includes:

frame memory that stores the input image signal every frame; and

an adder circuit that outputs either the corrected image signal or the uncorrected image signal in accordance with the input image signal, and

the adder circuit stores one correction value and outputs the corrected image signal by correcting the grayscale values for the input image signal with the correction value, while outputting the uncorrected image signal without correcting the grayscale values for the input image signal.

9. The liquid crystal display device according to claim 2, further comprising a temperature sensor that measures an ambient temperature around the liquid crystal display device, wherein,

the table includes a plurality of sub-tables having stored different correction values for predetermined temperature ranges, and

one of the sub-tables is selected in accordance with temperature information provided by the temperature sensor.

10. The liquid crystal display device according to claim 2, further comprising a temperature sensor that measures an ambient temperature around the liquid crystal display device, wherein,

the correction circuit further includes nonvolatile memory that stores a plurality of data items for different correction values for predetermined temperature ranges, and

one of the data items is selected and provided to the table in accordance with temperature information provided by the temperature sensor.

11. The liquid crystal display device according to claim 9, wherein,

the temperature sensor is provided on the insulating substrate, and

the temperature sensor provides the temperature information to the timing control circuit via serial communication.

12. The liquid crystal display device according to claim 9, wherein the temperature sensor is provided in the timing control circuit.

13. The liquid crystal display device according to claim 1, wherein the pixel forming portion includes a thin-film transistor including a control terminal connected to the scanning signal line, a first conductive

terminal connected to the data signal line, a second conductive terminal connected to a pixel electrode to which the correction voltages or the uncorrected signal voltages is to be applied, and a channel layer formed of an oxide semiconductor.

14. The liquid crystal display device according to claim 1, wherein the pixel forming portion includes a thin-film transistor including a control terminal connected to the scanning signal line, a first conductive terminal connected to the data signal line, a second conductive terminal connected to a pixel electrode to which the correction voltages or the uncorrected signal voltages is to be applied, and a channel layer formed of either an amorphous semiconductor or a polycrystalline semiconductor.

15. The liquid crystal display device according to claim 1, wherein the liquid crystal display device is driven by dot-by-dot inversion drive, line-by-line inversion drive, column-by-column inversion drive, or frame-by-frame inversion drive in the alternating-voltage drive mode.

16. A method for driving a liquid crystal display device performing pause drive in an alternating-voltage drive mode and including a plurality of scanning signal lines, a plurality of data signal lines crossing each of the scanning signal lines, pixel forming portions formed at intersections of the scanning signal lines and the data signal lines, a correction circuit

that outputs either a corrected image signal generated by adding a correction value to an input image signal or an uncorrected image signal generated by not adding anything to the input image signal, a scanning signal line driver circuit that sequentially selects and scans the scanning signal lines, and a data signal line driver circuit that writes to the data signal lines correction voltages in accordance with the corrected image signal or uncorrected signal voltages in accordance with the uncorrected image signal, the method comprising the steps of:

outputting one of the corrected image signal and the uncorrected image signal at least during the first of a plurality of drive frames provided in a drive period;

outputting the uncorrected image signal during the last drive frame, wherein the uncorrected signal voltages have the same polarity as the correction voltages and an absolute value less than or equal to an absolute value of the correction voltages; and

setting a pause period following the drive period and lasting until the start of the next drive period.