WHAT IS CLAIMED IS:

1. A storage device comprising:

a nonvolatile memory device configured to receive write data based on a data strobe signal and a data signal, and output read data based on the data strobe signal and the data signal; and

a controller configured to perform a training operation for training the nonvolatile memory device to align the data signal and the data strobe signal, the controller further configured to detect a left edge of a window of the data signal for the training operation, the controller further configured to determine a center of the window by using the left edge and unit interval length information of the data signal or determine a start point of a detection operation for detecting a right edge of the window by using the detected left edge and the unit interval length information.

2. The storage device of claim 1, wherein

the controller includes a delay locked loop circuit configured to control a delay of the data signal, and

the controller is further configured to read the unit interval length information from the delay locked loop circuit.

3. The storage device of claim 1 or claim 2, wherein the controller is further configured to execute read a training pattern from the nonvolatile memory device and compare the read training pattern with a reference pattern to detect the left edge.

4. The storage device of claim 3, wherein the controller is configured to determine that the left edge in response to the read training pattern and the reference pattern coinciding with each other in the detection operation.

5. The storage device of claim 3 or claim 4, wherein the controller is configured to skip the detection operation for detecting the right edge from the left edge to the start point in response to the left edge being detected in the detection operation.

6. The storage device of any of claims 3 to 5, wherein the controller is configured to calculate the center of the window by adding one half of a unit interval length, which is included in the unit interval length information, to the left edge.

7. The storage device of any of claims 1 to 6, wherein the left edge and the right edge are aligned to rising edges of the data strobe signal, respectively.

8. A data training method for a storage device including a controller and a nonvolatile memory device, the method comprising:

performing, by the controller, at least one first edge detection operation to detect a left edge of a window of a data signal;

determining, by the controller, a skip interval based on a length of a unit interval of the data signal provided from a delay locked loop circuit of the storage controller;

performing, by the controller, at least one second edge detection operation to detect a right edge of the window, at a point shifted from the left edge by a length of the skip interval; and

determining, by the controller, a center of the window by using temporal information of the detected left and right edges to align the data signal.

9. The method of claim 8, wherein each of the first edge detection operation and the second edge detection operation includes:

reading a training pattern from the nonvolatile memory device; and

comparing the read training pattern with a reference pattern.

10. The method of claim 9, wherein the comparing includes determining detection of the left edge or the right edge in response to the read training pattern and the reference pattern coinciding with each other.

11. The method of any of claims 8 to 10, wherein the length of the skip interval is equal to or shorter than the length of the unit interval.

12. The method of any of claims 8 to 11, wherein the length of the unit interval corresponds to a length of a delay chain applied to the data signal.

13. The method of any of claims 8 to 12, wherein the length of the unit interval, the length of the skip interval, the left edge, and the right edge are temporal information.

14. The method of any of claims 8 to 13, further comprising:

determining a start point for the performing at least one first edge detection operation.

15. The method of any of claims 8 to 14, further comprising:

aligning a sampling time or a transmission time of the data signal to the determined center of the window.

16. A data training method for a storage device including a controller and a nonvolatile memory device, the method comprising:

performing, by the controller, a detection operation at least once to detect a left edge of a window of a data signal;

reading, by the controller, a unit interval length of the data signal from a delay locked loop circuit of the controller; and

combining, by the controller, a location of the detected left edge and the unit interval length to determine a center of the window of the data signal and align the data signal thereto.

17. The method of claim 16, wherein the detection operation includes:

reading a training pattern from the nonvolatile memory device; and

comparing the read training pattern with a reference pattern.

18. The method of claim 17, wherein the comparing includes determining that the data signal is aligned to the left edge in response to the read training pattern and the reference pattern coinciding with each other.

19. The method of any of claims 16 to 18, wherein the combining includes determining the center of the window of the data signal by adding one half of the unit interval length to a location of the left edge.

20. The method of any of claims 16 to 19, further comprising:

setting a sampling time or a transmission time of the data signal to the center of the window of the data signal.