

Seagate F3 Series - Common Short Circuit

This document comes from MRT Lab. <http://www.mrtlab.com/>

Please keep it confidential.

1. Outline of Seagate F3 Series Short Circuit Method

In the process of repairing Seagate HDDs, it may need to have short circuit. What is short circuit, it means to have short circuit of two contact points of the hard drive in circuit boards. It will make HDD get into certain state or skip some errors and make our repair work continue. When the HDD starts, firmware on circuit boards will starts first and then disk starts. Firmware on hard drive will be loaded into memory. If firmware on circuit board is good and the firmware on disk has problem, after the starting of disk, error of HDD will occur. Short circuit is applicable to the situation that firmware on the disc has problem. The principle of short circuit is that by short-circuiting the head amplifier or motor servo mechanism so that the HDD can not load wrong firmware into memory. Then then firmware may skip this step, making the problem of firmware no longer works. So hard drive can not go wrong and can normally stabilize in terminal T level, then the next repair operations can be carried out.

For instance, the HDD starts and soon reports LED error. When the HDD reports LED error, it means the HDD has crashed and can not receive any command. This is because the wrong firmware is loaded from the disk. And if we short out the head amplifier, reading disk can not be done, and then the HDD will not read the wrong firmware and will skip this step. Therefore, it will not report LED error. Afterwards, HDD will be stabilized at terminal T level. You can carry out the follow-up repair operations.

2. Electric Motor Short Circuit Method

As shown in the picture, An insulator (such as business cards) was inserted into electric motor control contact points that between circuit board and the disk body.



Insulation first, and then power on. Then the HDD can be stabilized at terminal T level. It is applicable for the F.11 - generation HDD.

Principle: After the insulation, disk electric motor will not spin up. Then the firmware in the disk can not be read. So only the firmware on circuit board is in the work. As long as the circuit board is good, HDD can be stabilized at T level. After entering the T level, you can carry out follow-up repair operations.

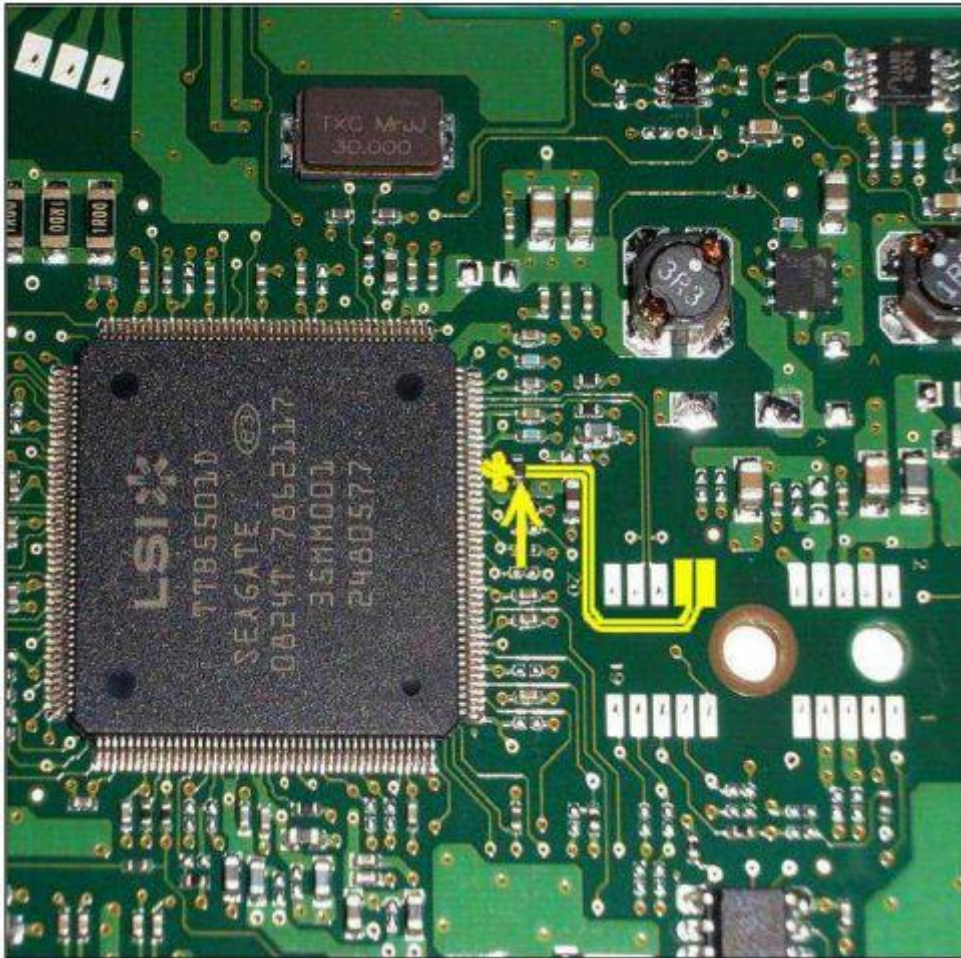
3. Head Amplifier Short Circuit Method

The picture below is the structure of contact points that connects head amplifier on the disk.



There is a corresponding position on the circuit board connects to here. HDD reads data through the head amplifier. Shorting out the head amplifier, it makes the HDD that can not read data on the disk. Then the wrong firmware data on the disk can not be read. At this point, fundamental purposes of the shorting out electric motor and shorting out the head amplifier are the same. Let the circuit board can not read the disk data. Firmware will detect this situation and skip some of the steps of loading firmware. So the HDD will not report error and can be stabilized at T level, or it may be ready directly. You need to identify the location of the pin when you short out head amplifier. In fact, eventually they all come from main control chip pins. If you are familiar with the main control chip pins, so no matter what the layout of the circuit board is, the short circuit point of head amplifier can be easily found.

Let's see the picture below:



Picture clearly shows how two pins of main control chip wire to contact points. These two pins are the head amplifier data pins of main control chip. The position of pins in the main control chip is fixed. As long as you are familiar with the pin definition of main control chip, no matter what the layout of the circuit board is, you can easily find the position of short circuit point. Please note that the different types of master chip pin positions are different, we should pay attention to distinguish.

Now we turn over the PCB and find the corresponding contact positions, using metal tool to have short circuit.

Recommend to use the tool like tweezers, then you can short out the contacts. Short circuit technique as shown in the picture:



Problems that required attention:

We should note the timing of shorting out the head amplifier. This is related to the HDD model and position of damaged disk body firmware. Generally speaking, there are three kinds of short circuit timing:

1. Short circuit first, then power on. This method is relatively simple. Short circuit first, then power on, at this time, the hard drive can not read the disc data. It will skip some of the loaded firmware and then directly be ready. Or it shows as long busy, but when you press Ctrl + Z, it can go to the terminal T level.
2. Power on first, then short circuit. It is a little bit difficult. It needs power on first. And you need to observe terminal. When terminal displays the information that indicates the firmware starting to a certain stage, you can have short circuit. At this time, the HDD can be ready or not, but when you press Ctrl + Z, it can go to the terminal T level.

```
Rst 0x20M
(P) SATA Reset
  PASSPackage Verified
Drive AMPS Configuration has been modified from compiled defaults.
Drive must be re-initialized to controller firmware defaults by re-downloading controller firmware
DO NOT SHIP WITHOUT FIRST RE-DOWNLOADING CONTROLLER FIRMWARE OR RESETTING TO DEFAULTS!

Send Status: COMRESET seen
InitiateMarkPendingReallocateRequest
```

The original failure of HDD is to report a lot of mistakes after powering on. It reports LED and crashed. It can't go to the terminal T level.

Now, we power on it. When HDD displays "(P) SATA Reset" and we immediately short out it. It can't be too early, because some important module must be loaded from disk. Shorting out too early, it can be loaded from disk, and the HDD will report error. It can't be too late too. It will load wrong module into the HDD if it is too late. Then then LED will crash, and this short circuit will be failed. You can have short circuit when "(P) SATA Reset" just appeared. This time the firmware has not crashed, and the important module has been loaded successfully.

As we can see, when we have power on and short circuit, we need to observe the information that terminal displays and grasp the timing to do it. When the short circuit is successful, and HDD is ready or go to the T level, we can release the short circuit and continue the repair operations.

3. Power on first, and short circuit at one moment, then release the short circuit at another moment. This is the most complicated method. It applies to the situation that when reading the disc firmware, there is damage to the module that needs to be skipped, but the module must be read later.

Now we assume that module B is damaged. Module B is not important, but it is damaged. Once if module B is loaded, firmware will cause a crash. While module A and C must be loaded. So, when you load the module A, you need to ensure it doesn't have short circuit. when it is about to load module B and have it short circuit, module B will fail to read and be skipped. Then release the short circuit, and load module C, the HDD can start successfully.

The timing of short circuit is to have short circuit when it is about to load module B, then release short circuit when it is about to load module C. If you don't release short circuit in time, module C will be loaded in failure and the HDD can't start.

4. Summary of Seagate F3 Series Short Circuit

Short circuit is an important skill to repair Seagate F3 series HDD. As a part of the repair procedures, short circuit is designed to allow HDD to stabilize at terminal T level. That is to say, Only when the HDD can not be ready, and can not enter the terminal T level, we will consider short circuit. Because if the HDD can not enter T level, it can not continue repair work, so it needs to have short circuit. In general, Seagate's HDD, if PCB is not damaged, or head hardware is not damage, it is certainly able to enter the T level. The key is to master the correct way to have short circuit. As long as the disk hardware is good, ROM is good, then we can enter the terminal T level by having short circuit. Sometimes, a long busy status HDD, after having short circuit successfully, it will be in ready status directly. Then you can copy the data. If it is not ready, after the success of short circuit, it also can enter T level and provide a platform for repair later. Therefore, to master Seagate short circuit skills are very important. For different types of HDDs, you need to have short circuit at the right time, the right point. It requires a lot of practice and experience.

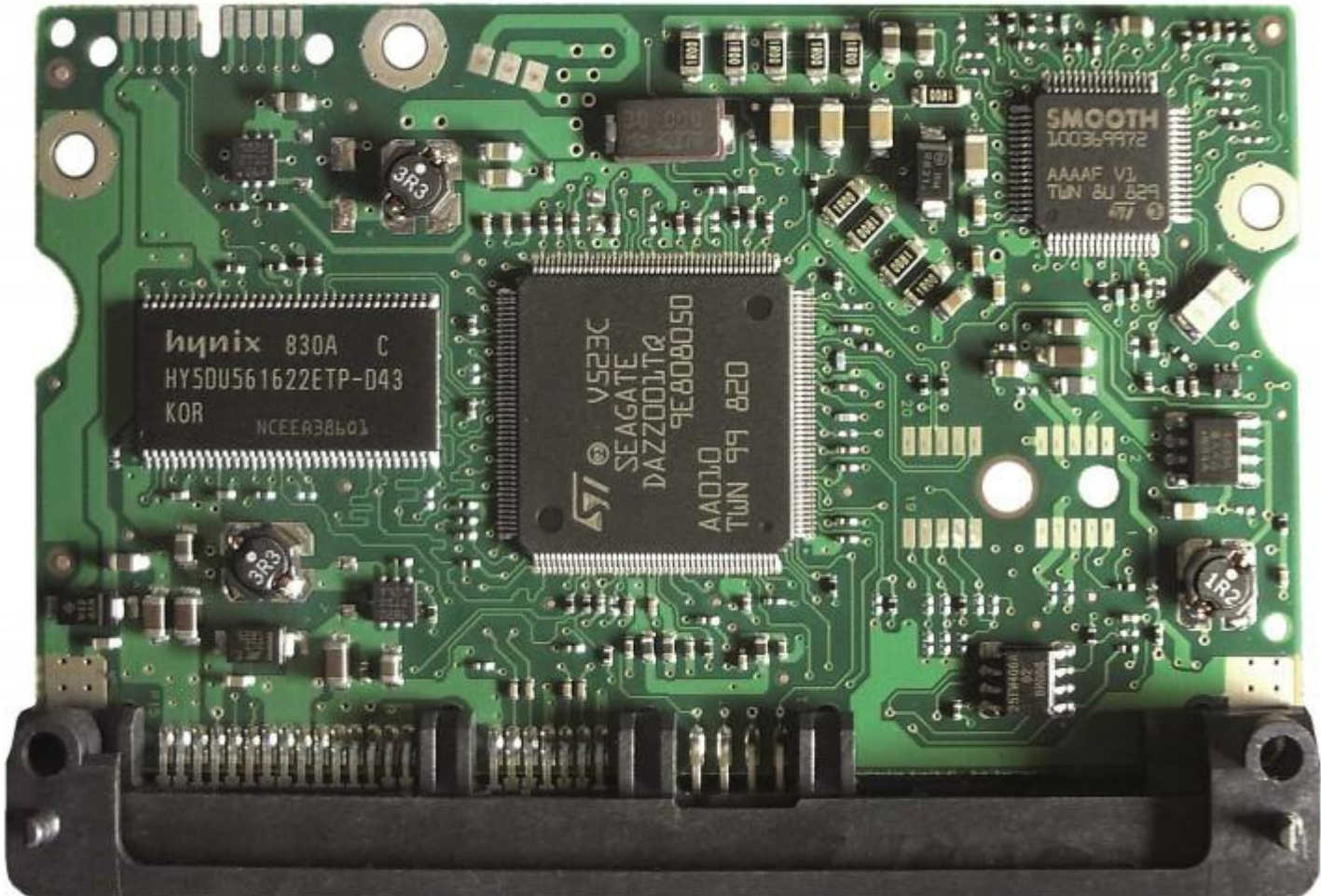
Finally, give you some common PCB short circuit contacts.



Above, the model of PCB is 10496208 REV A. That is the version number is A.
Below, common PCB short circuit contact position. In the back of the PCB. Circle in the picture. Please pay attention to distinguish.

PCB Model: 100466725 REV A (DLAJ-4)

Front:

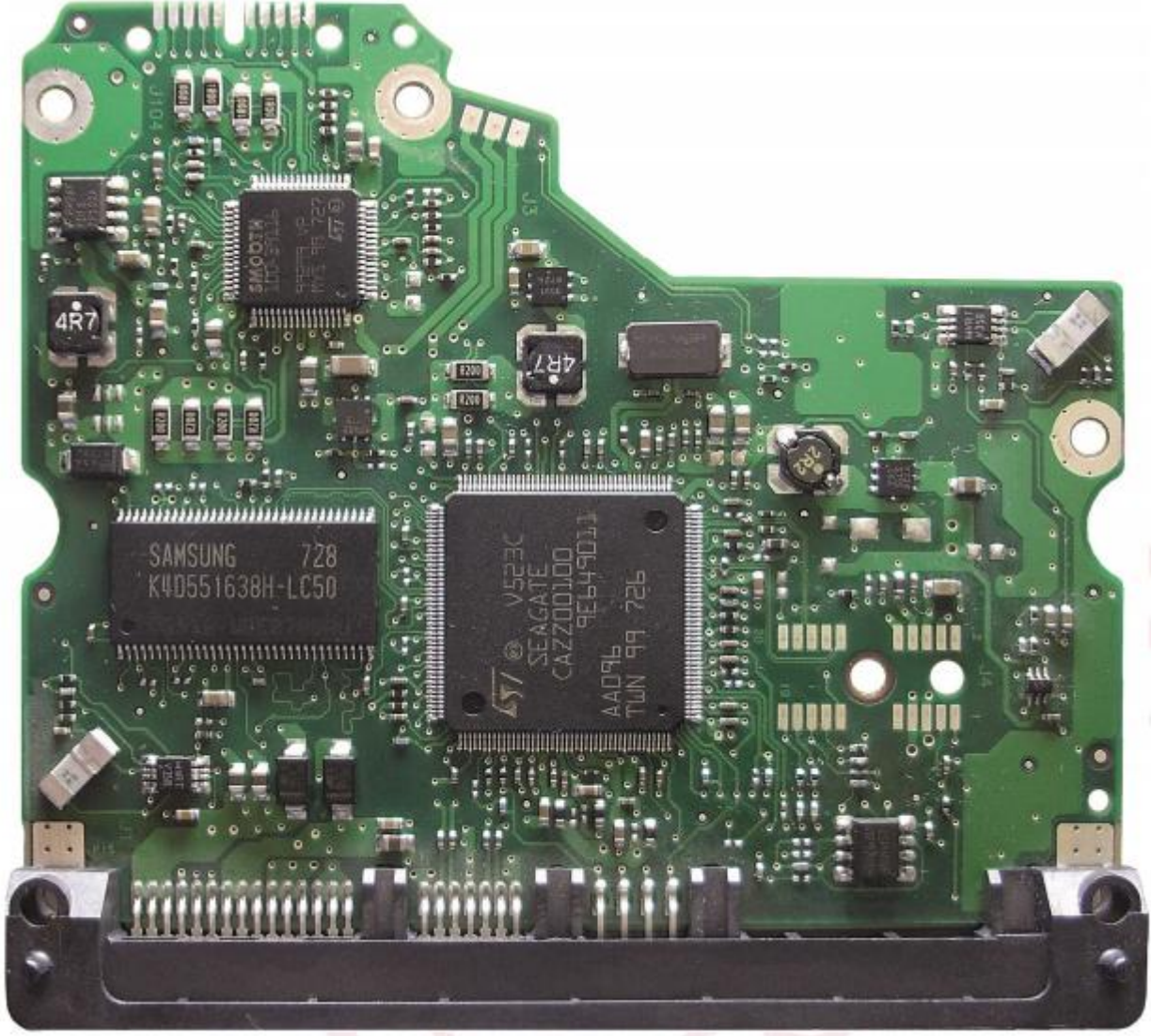


Bcak:
The short circuit contact is in the circle.

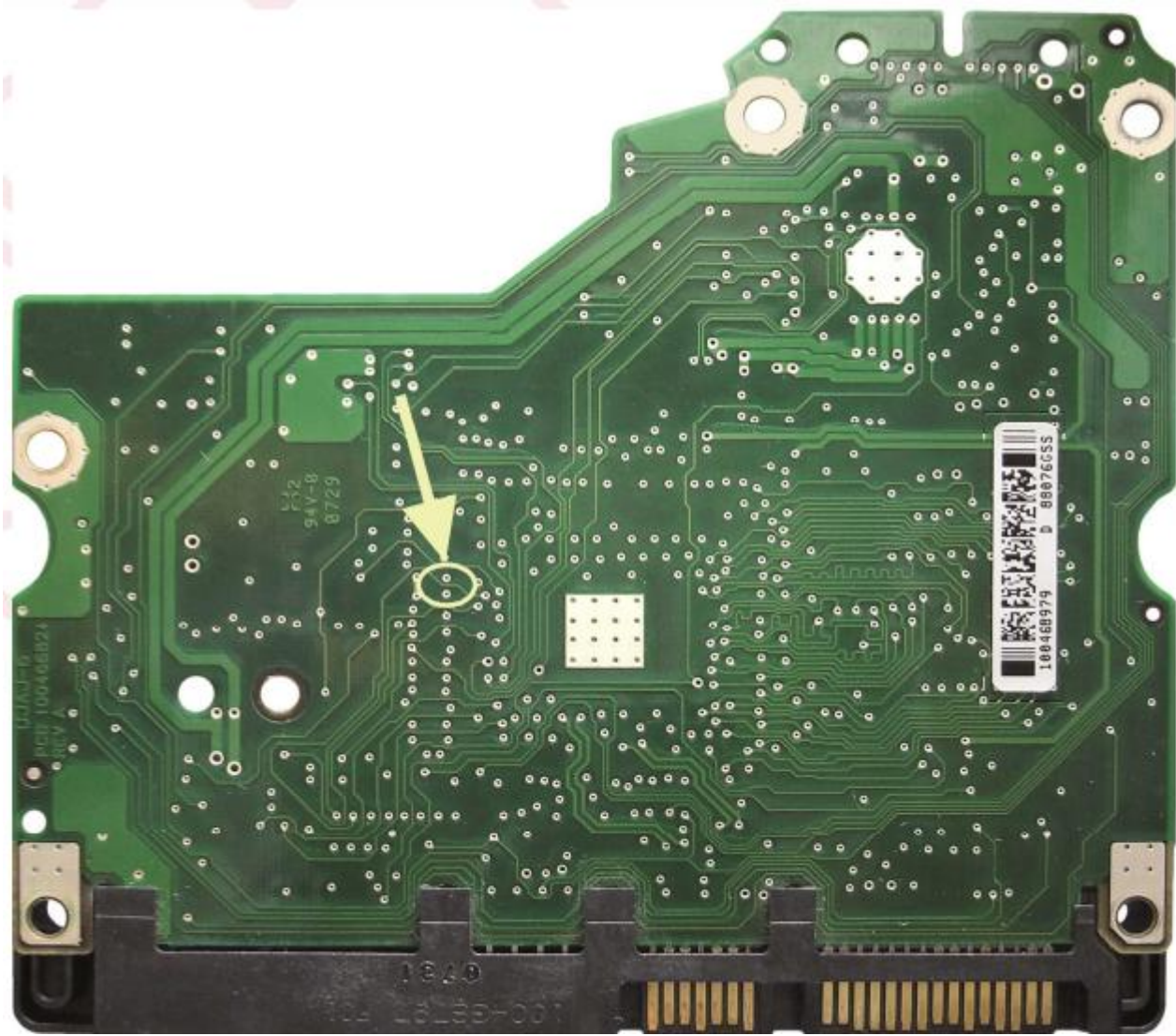


PCB Model: 100466824 REV A (UJAJ-6)

Front:

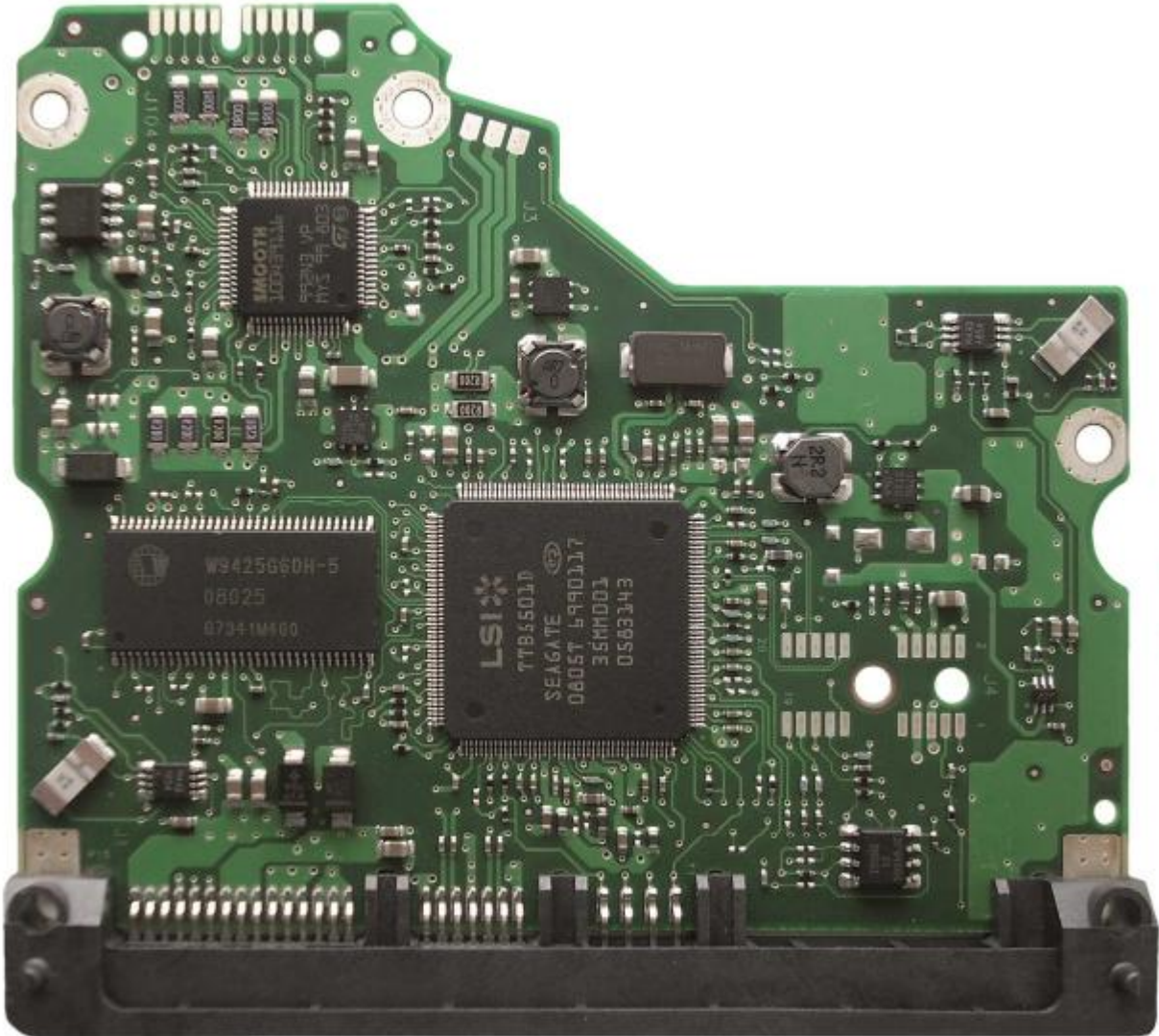


Back:

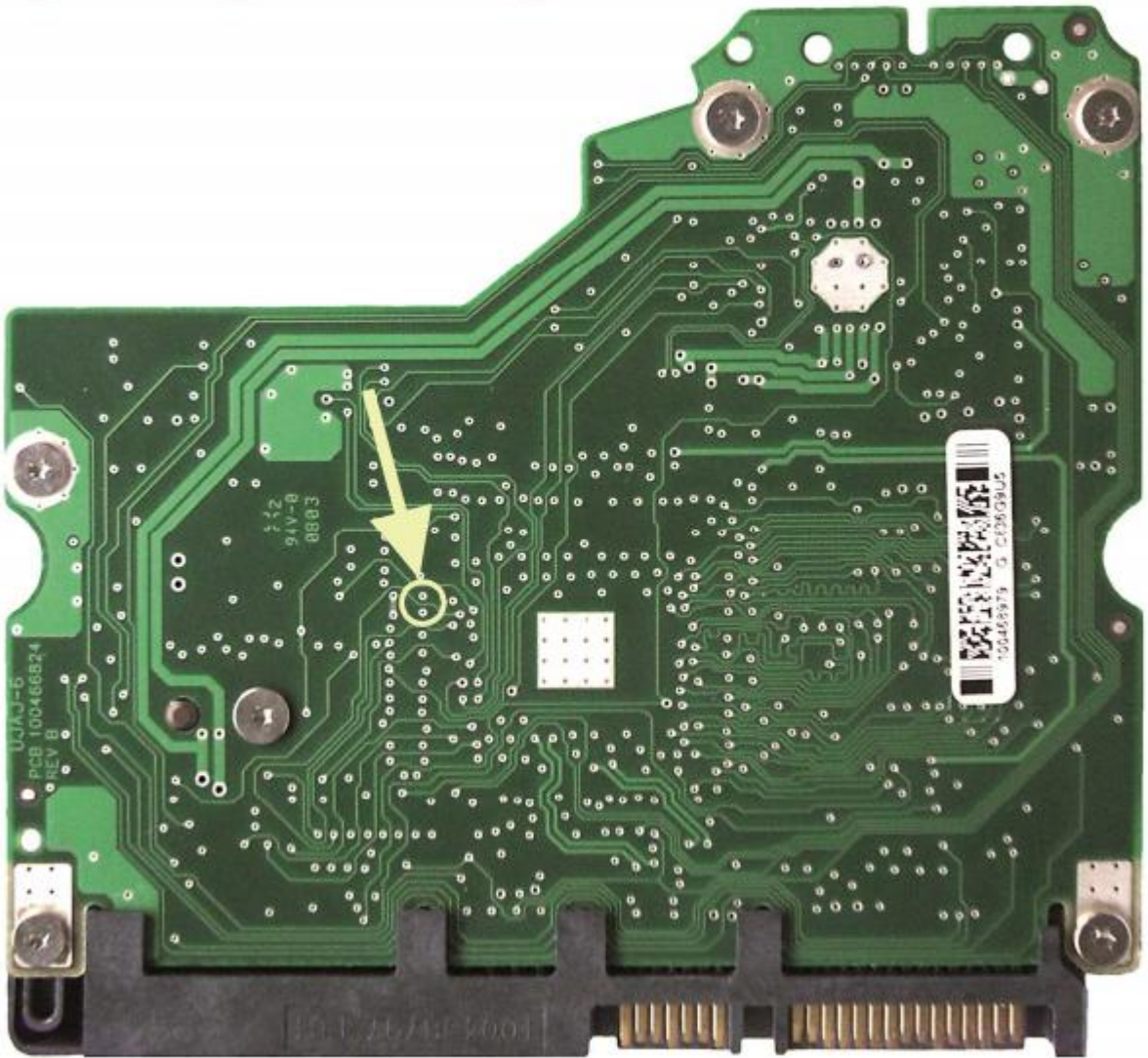


PCB Model: 10466824 REV B (UJAJ-6)

Front:

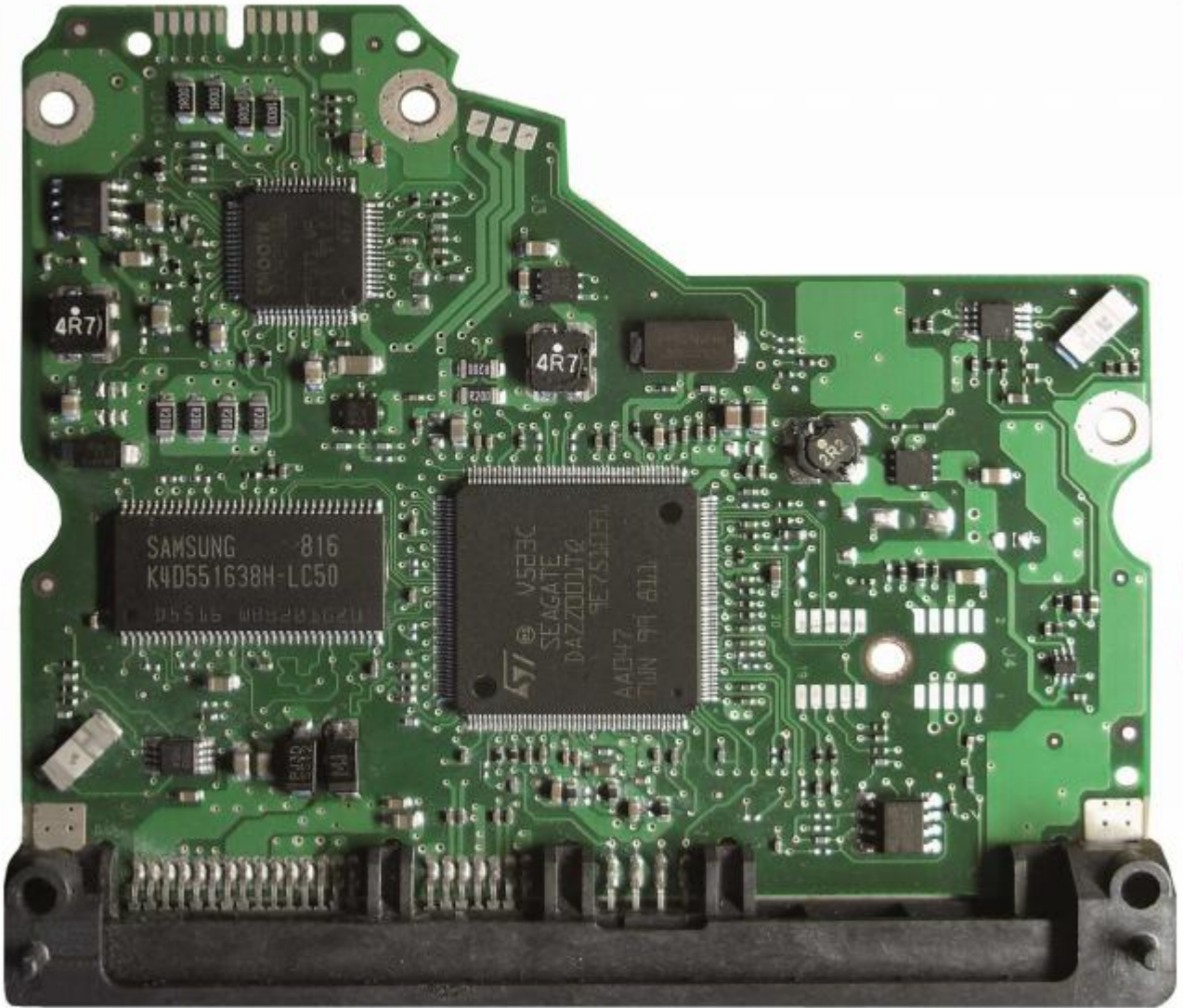


Back:

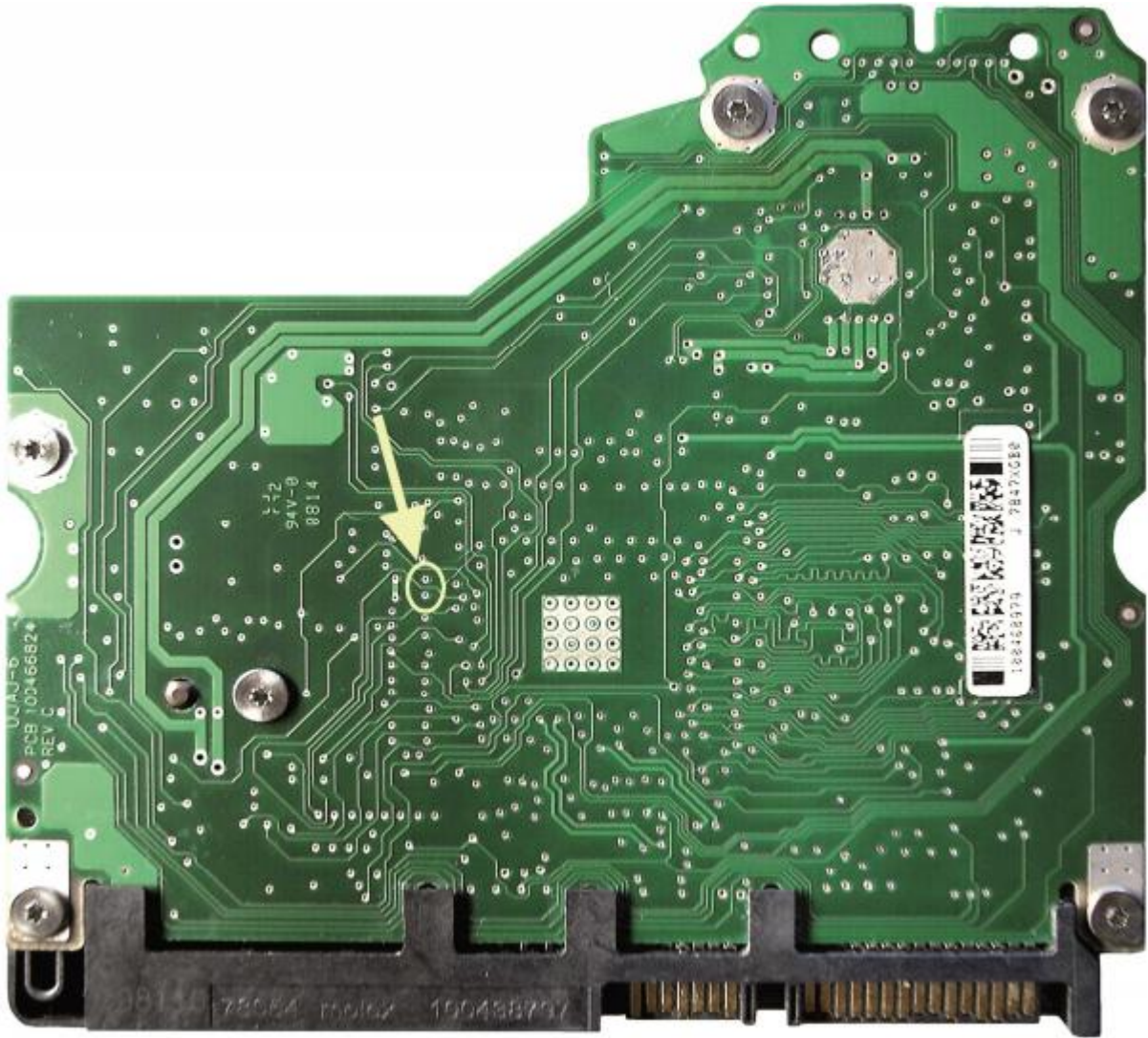


PCB Model: 100466824 REV C (UJAJ-6)

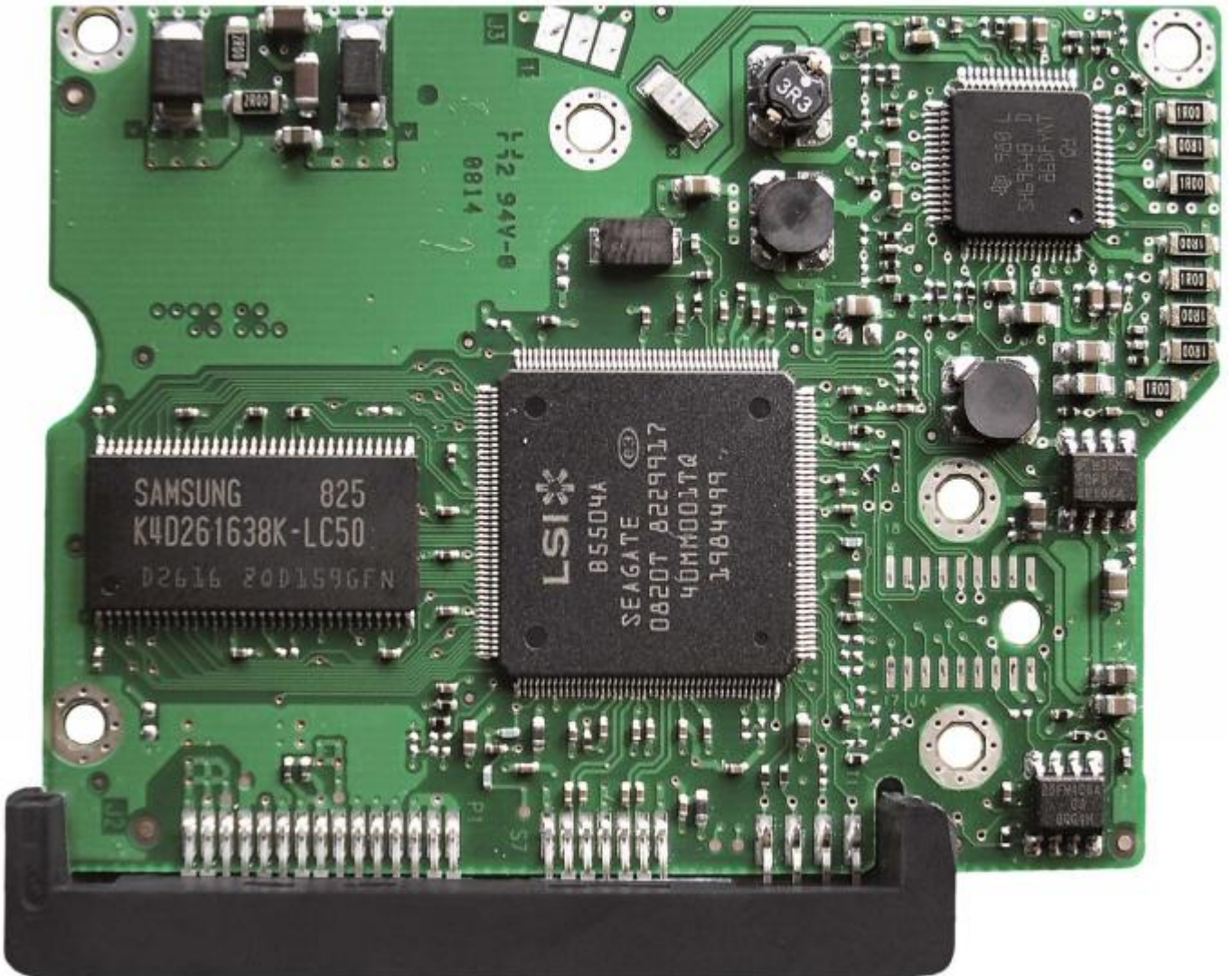
Front:



Back:



PCB Model: 100496208 REV A
Front:

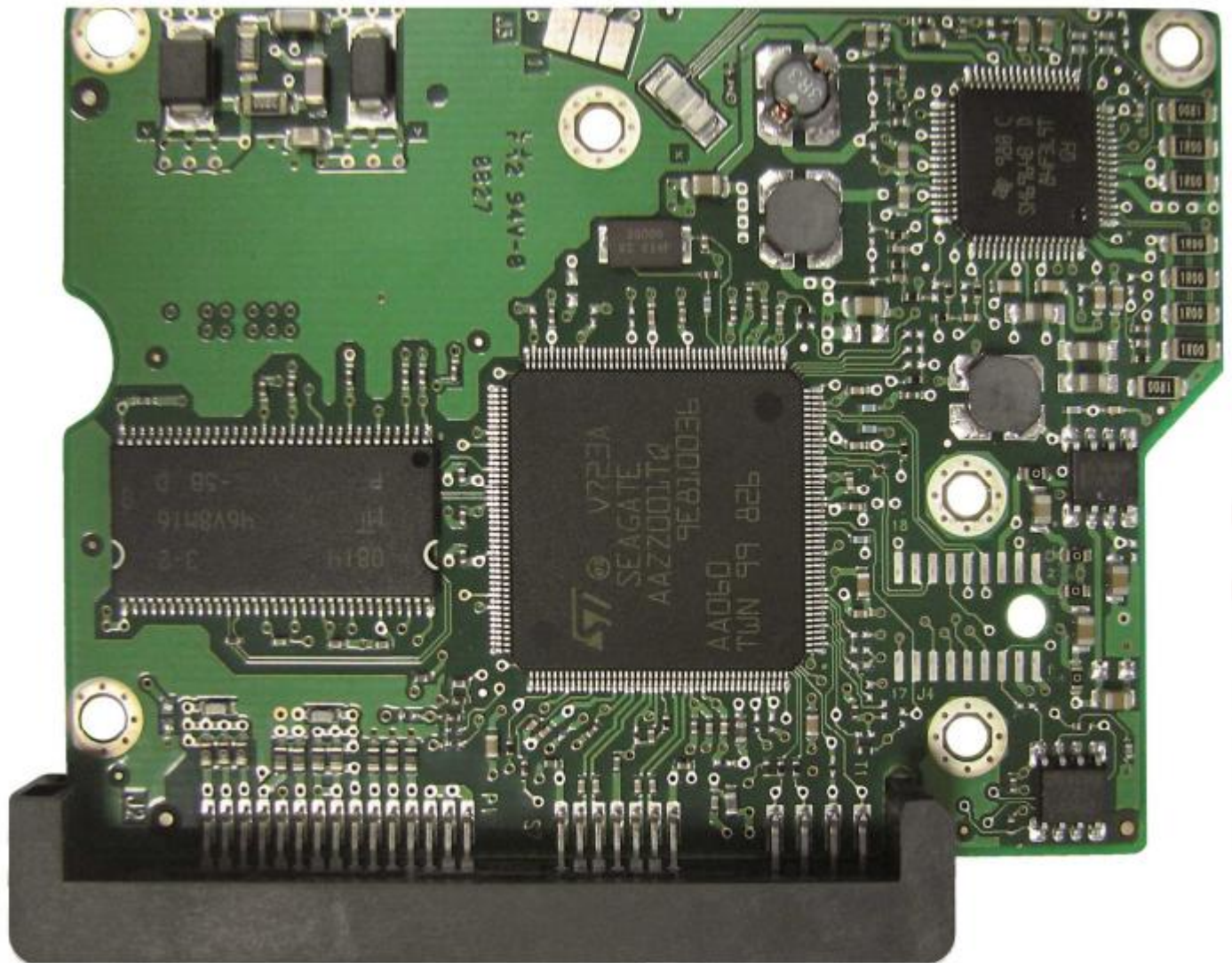


Back:



PCB Model: 100504364 REV B

Front:

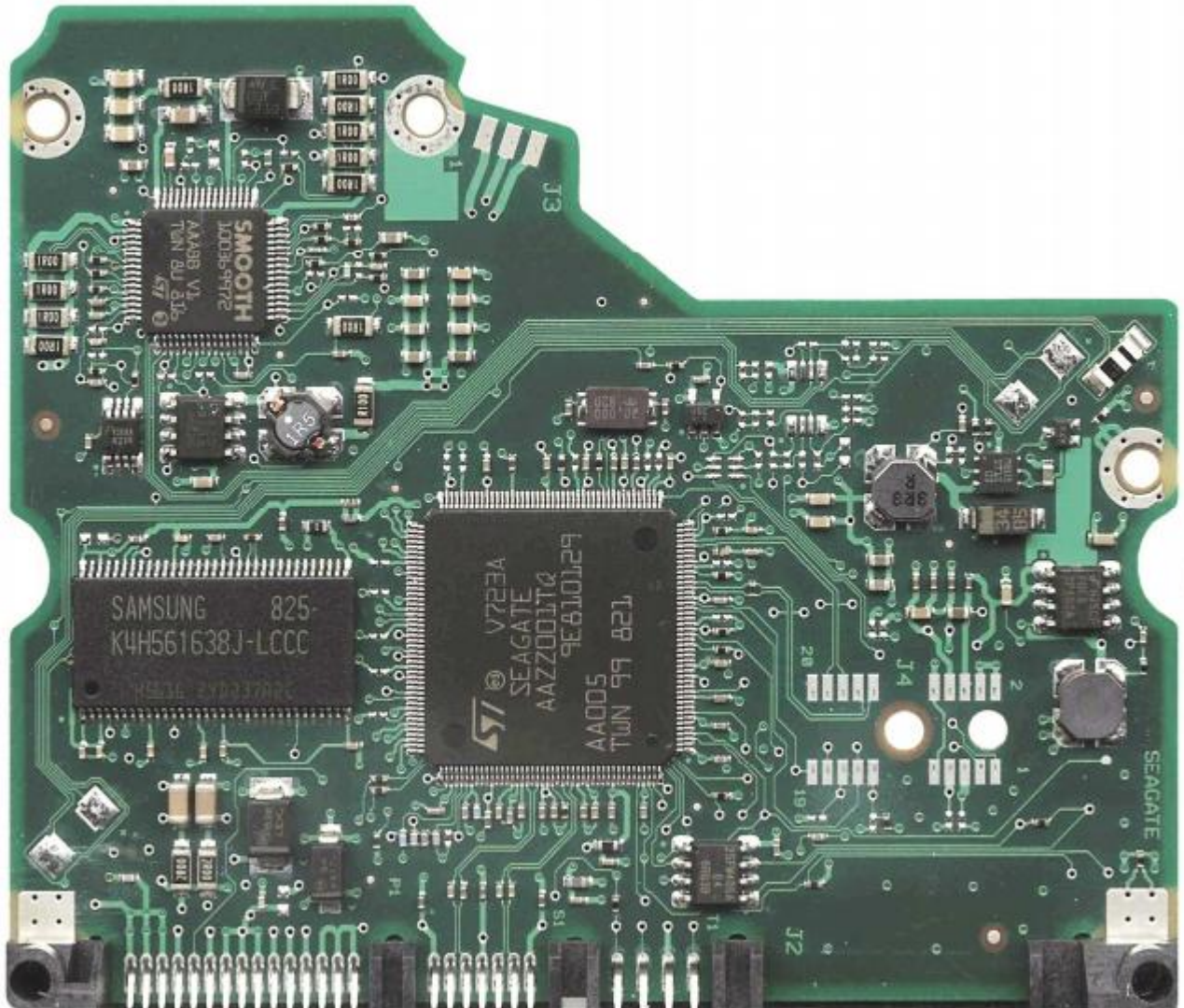


Back:

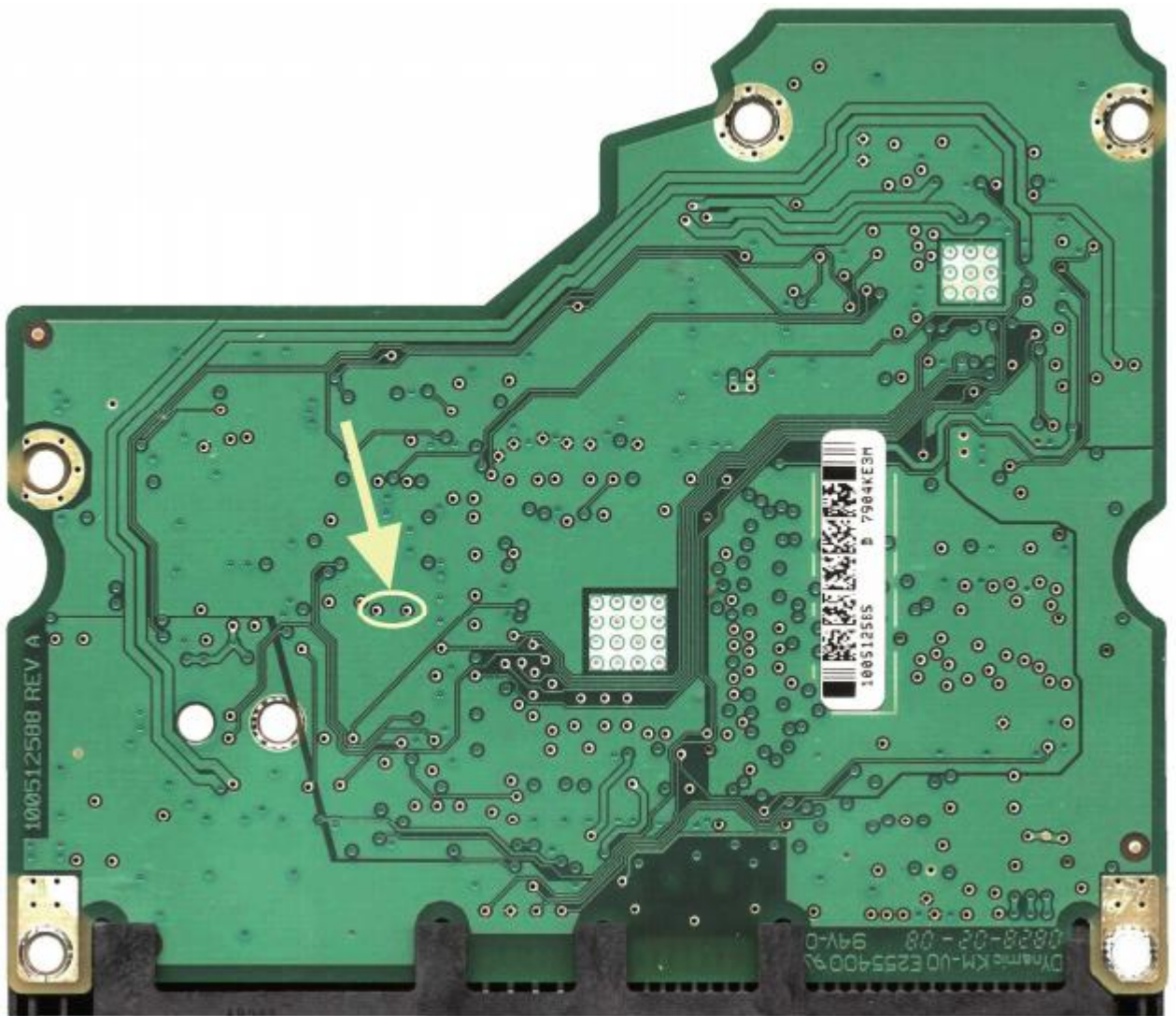


PCB Model: 100512588 REV A

Front:

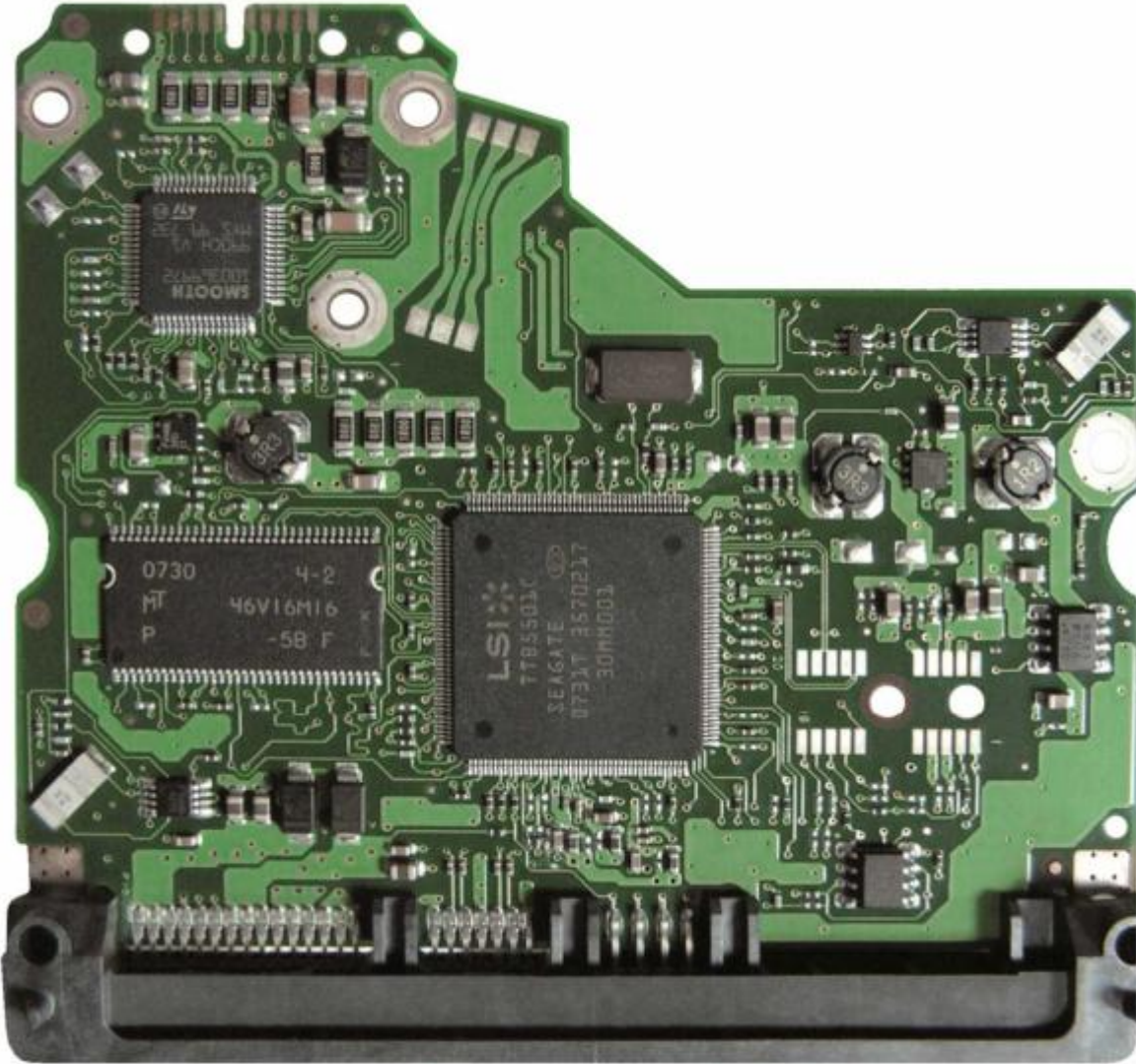


Back:

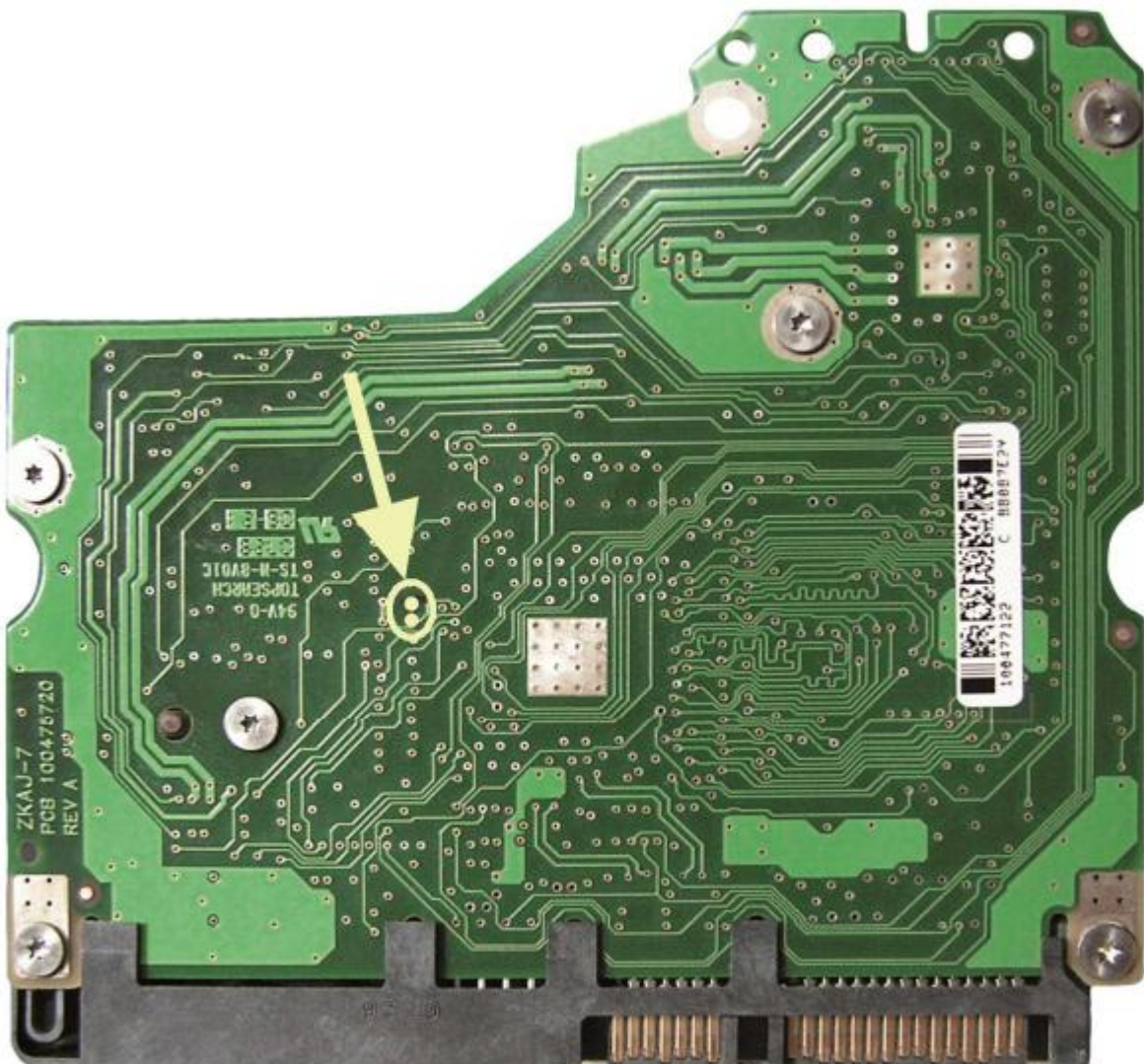


PCB Model: 100475720 REV A (ZKAJ - 7)

Front:



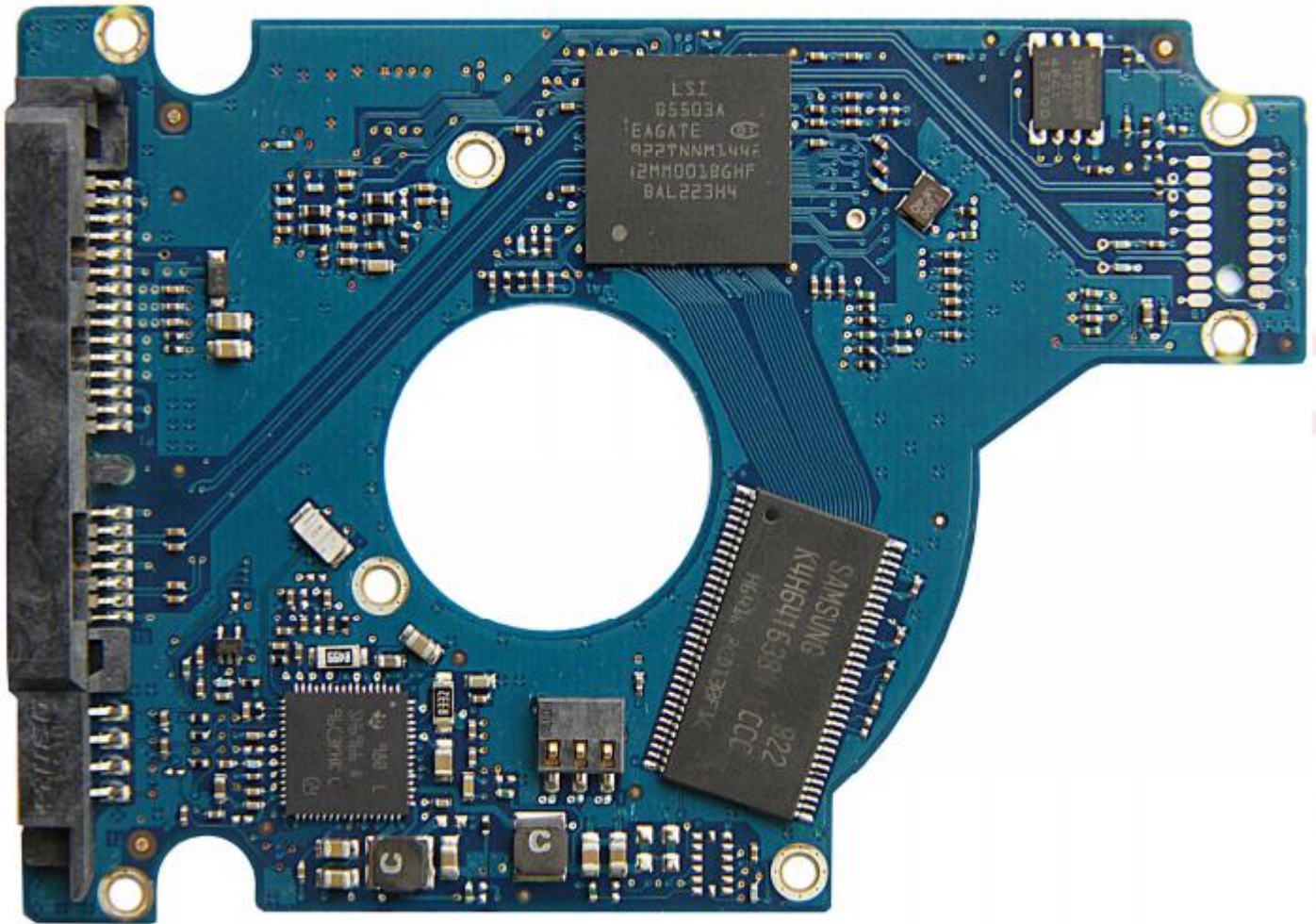
Back:



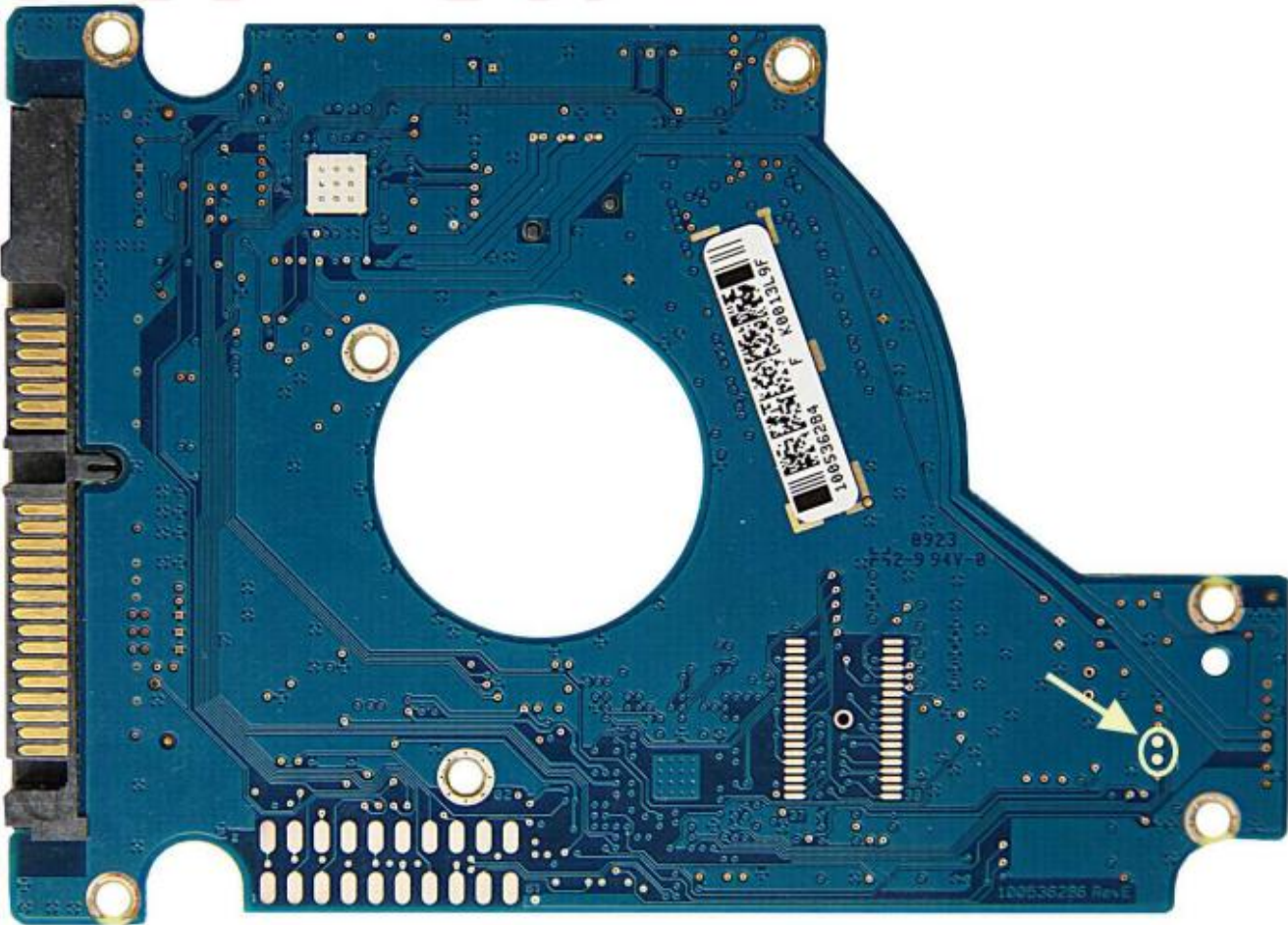
Below, those are some Seagate laptop HDDs short circuit contacts:

PCB Model: 100536286 REV E

Front:

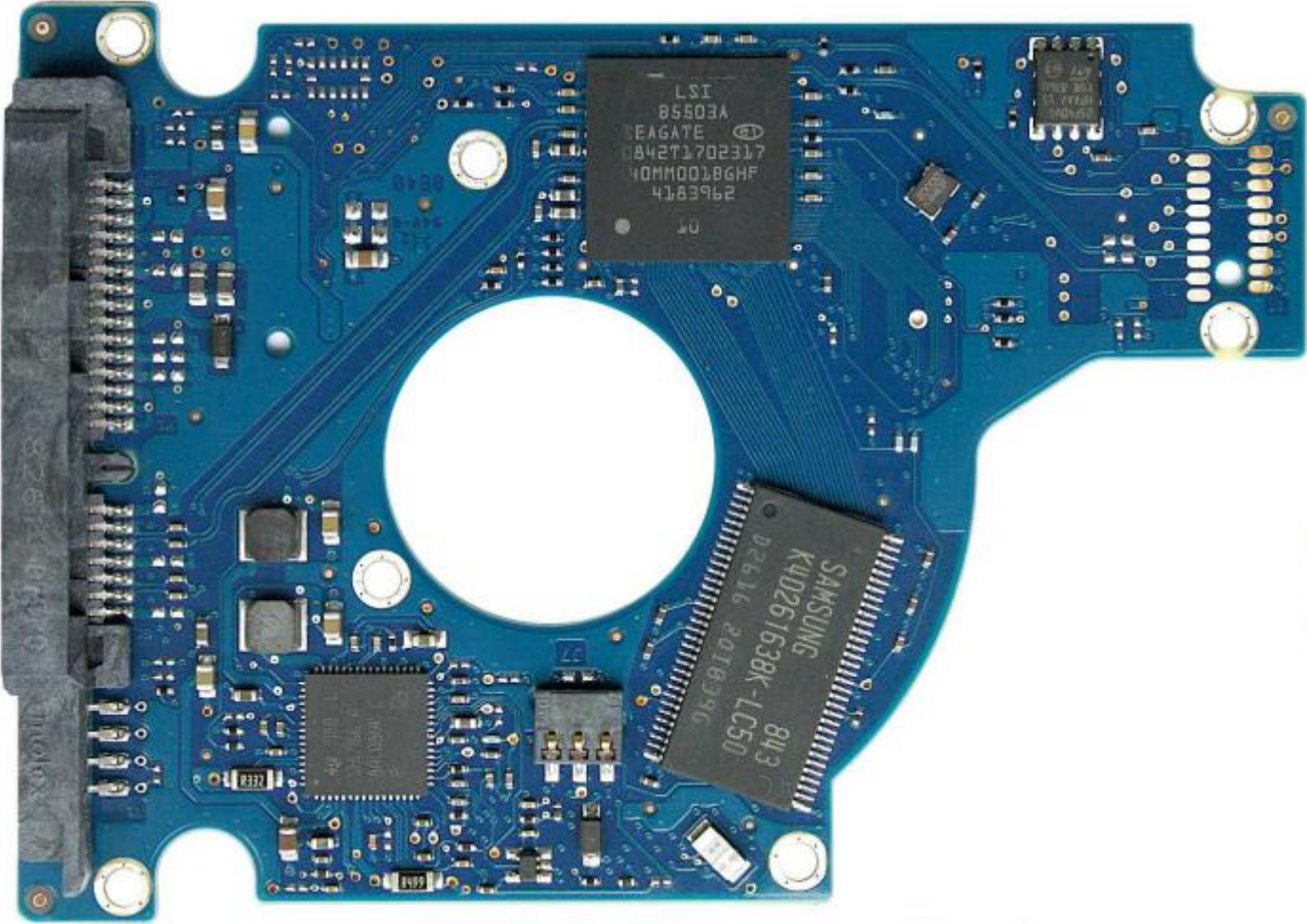


Back:

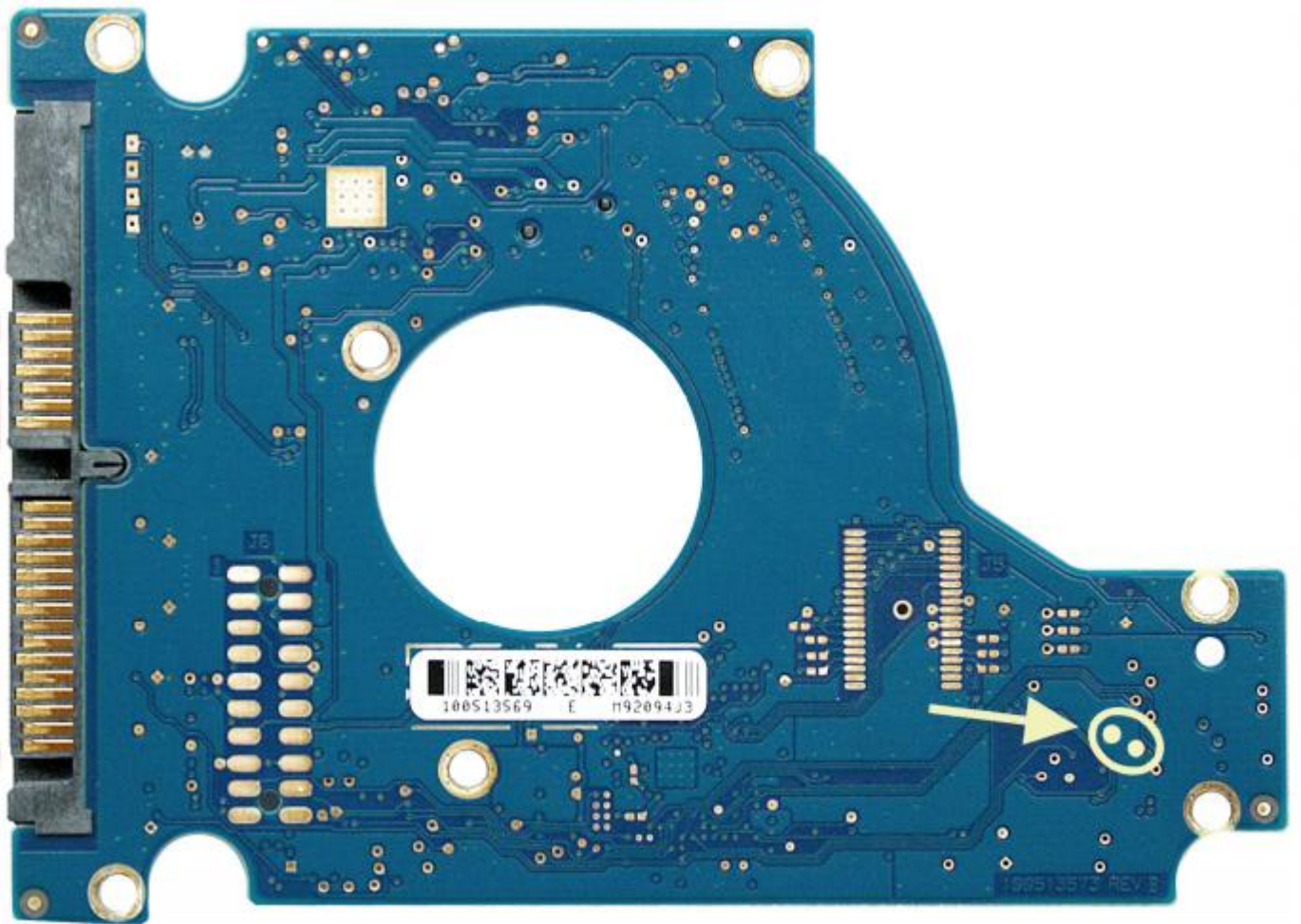


PCB Model: 100513573 REV B

Front:

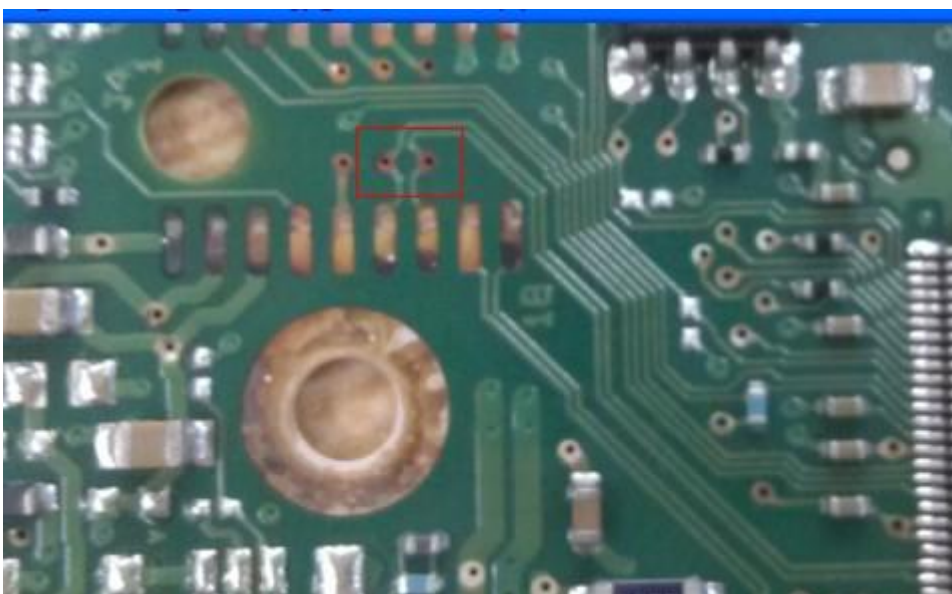


Back:

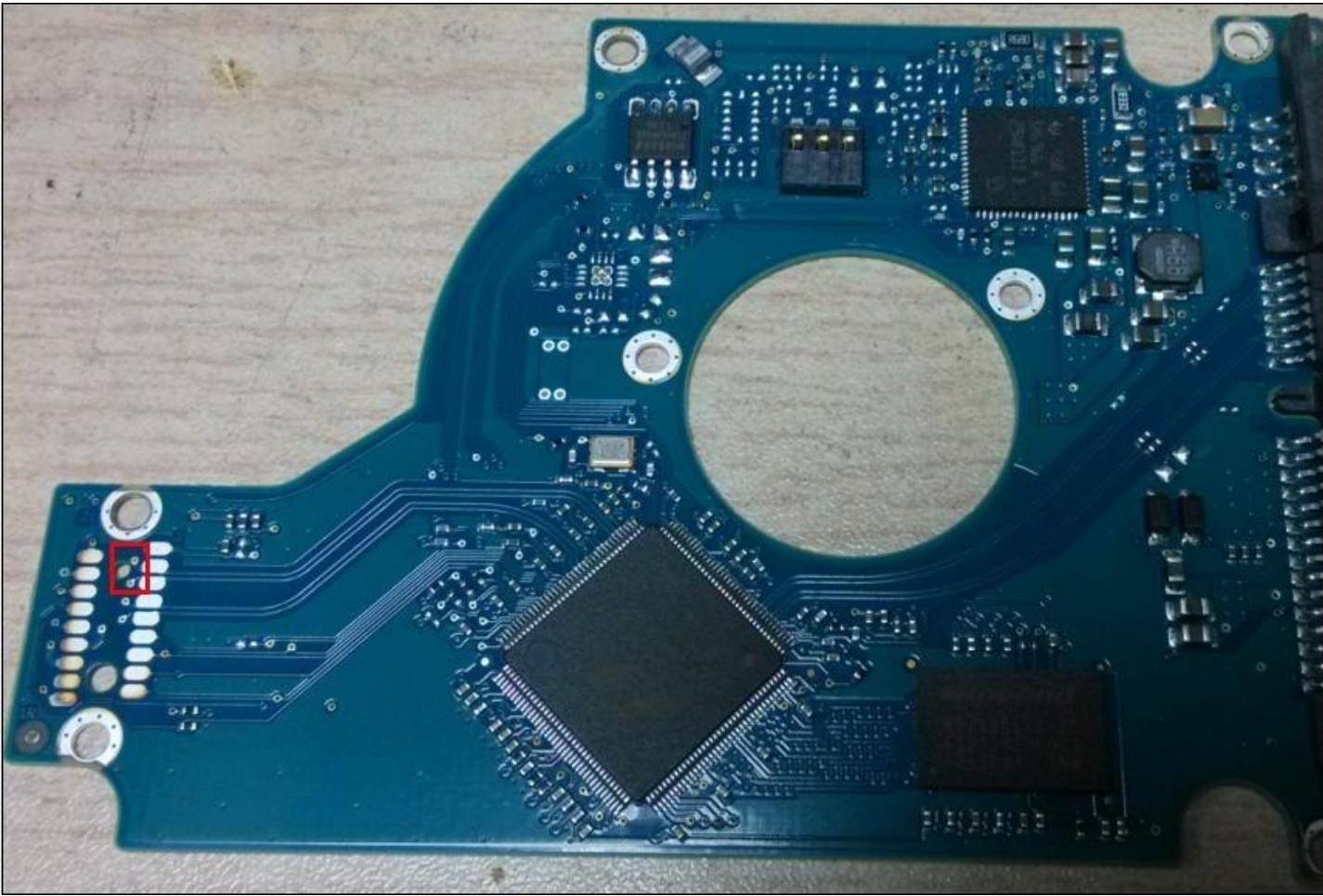


Other model PCB:

Short circuit contacts are in the red square.



Laptop HDD:

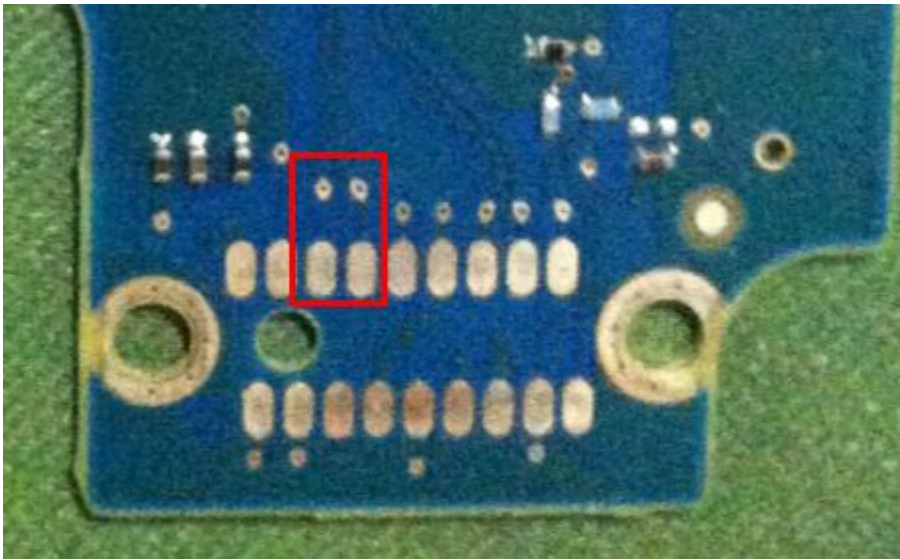




Other laptop HDD short circuit contacts:
Appearance of PCB is below:



short circuit contacts are shown in the picture.



MRT Laboratory
<http://www.mrtlab.com>