CODIAC®

【Xhorse Multi Prog】™

Mastering Programming

Easy to handle automotive electronic programming techniques

Catalog

Preface

In the work of automotive key matching, automotive module maintenance and automotive instrument cluster repair, reading and writing memory chip data is a core skill that must be mastered.

When matching car keys, many models need to read the memory chip data first to calculate the IMMO password, CS code, ISN code, etc, in order to match the keys smoothly and make the keys work normally. Many models can not match the key through OBD, or this car supports OBD matching, but because the vehicle has a fault, OBD matching fails, it needs to write dump file, the preparation of writing dump file is to read and write memory chip data.

What is writing dump file? It is necessary to remove the module with IMMO data (due to different models, the IMMO data is loaded in different places, some IMMO data is in the IMMO box, such as some old Opel, Mitsubishi, etc; some IMMO data is in the instrument cluster, such as old Jaguar, Volkswagen, etc; Some IMMO data are in the Body Control module(BCM), such as Fiat, Ferrari, etc, then read out the IMMO data, load it into the device with write-dump function, and then put in a corresponding key chip according to the device prompt, the device will automatically convert and match the data with the key chip according to the operation, and then the machine will show new data. (Some do not show new data, after installation, the vehicle can start directly), this data contains the information of the key chip, and then write the data into the memory chip, after installation, the key chip can start the car directly, without the step of matching the key on the car.

In the maintenance of the vehicle module, for example, if the hardware of the BCM module or the ECU module on the vehicle is damaged, the data can be cloned: the data of the BCM module or the ECU module of the original vehicle is read out and stored, and then written into the replaced BCM module or the ECU module, and the replaced module can also be a second-hand module. As long as the hardware is good, it can be used directly after the data is written and installed. Avoid the problem that some modules can not be matched because they are second-hand parts, save the high cost of online programming and replacement of new modules, shorten the maintenance time and reduce the maintenance cost.

As car manufacturing becomes more intelligent, many failures are caused by data loss or confusion. It can be solved by reading, writing and repairing the memory chip data through the programmer. For example, the damage of the FRM module data of BMW will cause the failure of window lifting and lighting. For example, the loss of the steering angle module data of Toyota will cause the failure of the instrument cluster. For example, the loss of the tailgate module data of Bentley will cause the failure of opening the trunk. For example, the loss of SAM module data of Mercedes-Benz 204 or 207 will cause the wiper not to work and so on. Most of these faults can be solved by writing a good data through the programmer.

This book focuses on Multi-PROG, explaining in details of the reading and writing practice of various memory chips, the soldering techniques of memory chips, and sharing with you the cases of writing dump file and data calculation. Combined with the problems and common tips needing attention I have encountered in many years of actual combat, it helps our friends in the industry to understand the techniques of memory chip data reading and writing more deeply and comprehensively.

Chapter I Introduction to Memory Chip and Data

1.1 Memory Chip

Before we formally introduce memory chip, let's help you understand its role in an easy-understanding way:

Memory chip is like a human brain. Knowledge, memory and thinking in the brain, just like the data in the memory chip, can give instructions to the brain to control the body to complete walking, running, writing and other actions. Similarly, the memory chip is the "brain" of the electronic device, the stored data is like the knowledge in the brain, and the data allocation memory control module performs various functions.

a. Memory Chip Definition:

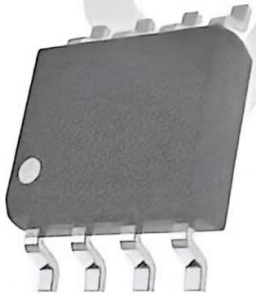
Memory chip is the core component used to store programs, data and information in electronic devices, usually made of semiconductor materials, which can realize temporary or long-term storage of data, and bear the important function of storing instructions, original data and processing results.

There are many memory chip brands and packages on the market (package refers to the appearance of the memory chip). Common brands include Freescale, Infineon, Motorola, Renesas, Microchip, STMicroelectronics, etc These memory chips are widely used in the field of automotive electronics. The following are various memory chips:

b. Package of the Memory Chip (* Package Is the Appearance):

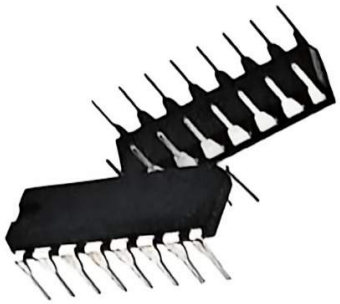
QFP package: QFP quad flat package with pin, small pin spacing, high integration.

QFP package



S0P 8 Package: Small outline package with leads on both sides for surface mount.

S0P package

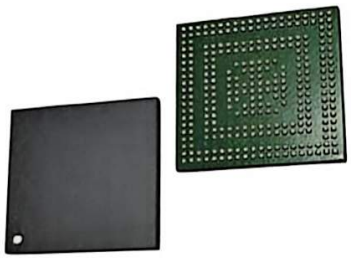


DIP package: Pins out on both sides for PCB through hole mounting.

DIP package

MSOP package: Small outline package with leads out on both sides for smaller, more pin-dense surface mount.

MSOP package



BGA package: ball solder joint at the bottom, high pin density and good heat dissipation.

BGA package

You've seen memory chips in a variety of packages, and one of the things that these memory chips have in common is that they all have a first pin and a pin order. Learning to recognize the 1st pin and pin order of each memory chip is critical in two ways:

1. All memory chips have a fixed 1st pin and its pin order, and each pin is defined differently. Multi-PROG reads all kinds of memory chip data, all of which need to be connected to fixed pins. Some modules will give the physical wiring diagram in Multi-PROG, and we can solder the wiring according to the physical diagram. Some modules will give the memory chip pin diagram without the physical wiring diagram, so we need to use a multimeter to measure the wiring according to the pin diagram. Therefore, if the first pin and its order cannot be distinguished, and the correct pin cannot be found for wiring without a physical wiring diagram, the data reading operation cannot be completed.

2. In practical work, sometimes it is necessary to replace the MCU. For example, with the BMW CAS3 model, it is often impossible to start the car. Read the fault code with the diagnostic devices, and the device will display the internal fault of CAS. At this time, you can read the MCU data in CAS, replace it with a new MCU, and then write the data into the new MCU to solve the fault.

For example, in Jaguar Land Rover after 2018, the key matching needs to replace the RFA module,

which costs a lot. We replace the MCU and write in new data, which is equivalent to replacing the RFA module, and then match the key. The MCU has a definite fixed installation direction on the circuit board. If the position of the first pin cannot be accurately identified, the memory chip still cannot work normally due to the wrong direction after replacement, and even the memory chip may be burned, which increases the rework cost and maintenance difficulty.

Therefore, mastering the first pin and pin's order is the basis before using the programmer to read data, so it is necessary to pay attention to and master it.

c. Judgment Method of Memory Chip Pin 1 (* Roughly Divided Into 2 Methods):

(1) Judge by Dot:

The first pin of most memory chips will have a small printed dot, or a small round pit, or other special identification. If there are multiple dots on the memory chip, the dot corresponding to the first pin is either larger or smaller than other dots, and there is a clear difference. After the first pin is found, the other pins are sorted in a counterclockwise direction. Let's show a few memory chip examples to distinguish between pin 1 and its pin order.

Example of Judging the First Pin by judging the dot:

Example 1:

In a DIP package, the memory chip is an eight-pin memory chip of model 25AA256 **(Figure 1)**. The first pin position can be distinguished by the dot. In the figure, there is an obvious round pit on the surface of the memory chip. The pin on the most lef side, in the row below the round pit, is the first pin. The red pin marked is the first pin of the memory chip. It can be seen from the pin diagram of 25AA256 **(Figure 2)** that pin 1 increases counterclockwise in turn, which is pin 2, pin 3, pin 4, pin 5, pin 6, pin 7 and pin 8.

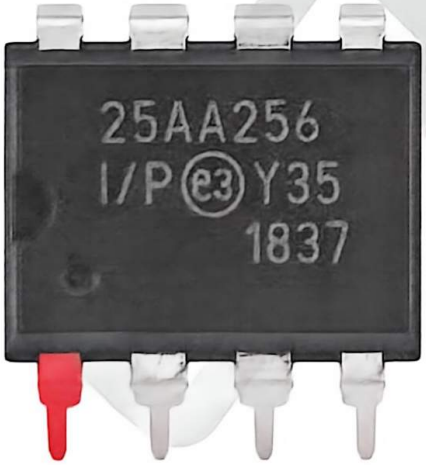


Figure 1 25AA256 Memory chip Physical Diagram

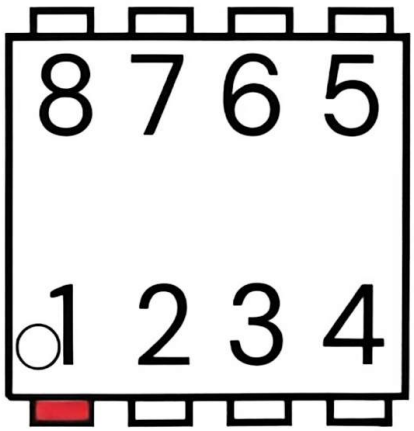


Figure 2 25AA256 Memory chip Pin Diagram

Example 2:

DIP package. The memory chip is an eight-pin memory chip of model 24C08 produced by ATMEL manufacturer **(Figure 3)**. The first pin position can be distinguished by the dot judgment method. In the figure, there is an obvious round pit on the surface of the memory chip. The first pin on the leftmost side of the row below the round pit, and the red pin marked is the first pin of the memory chip. It can be seen from the pin diagram of 24C08 **(Figure 4)** that pin 1 increases counterclockwise in turn, which is pin 2, pin 3, pin 4, pin 5, pin 6, pin 7 and pin 8.

Figure 1 Physical diagram of 24C08 memory chip

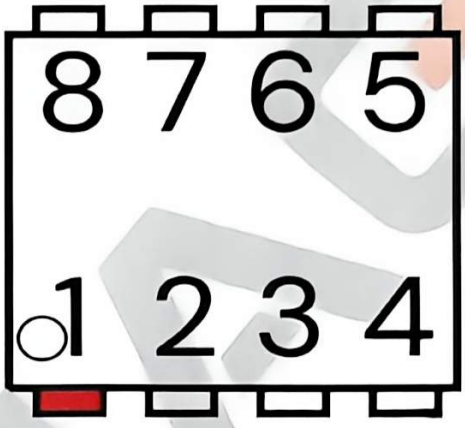


Figure 2 Pin diagram of 24C08 memory chip

Example 3:

SOP package. The memory chip is a Macronix model 25L12873 eight-pin memory chip **(Figure 5)**. The first pin position can be distinguished by the dot judgment method. In the figure, there is an obvious round pit on the surface of the memory chip. The first pin on the leftmost side of the row below the round pit, and the red pin pointed by the red arrow is the first pin of the memory chip. It can be seen from the pin diagram of 25L12873 **(Figure 6)** that pin 1 increases counterclockwise in turn, and there are pins 2, 3, 4, 5, 6, 7 and 8 in turn.

Figure 5 MX25L12873 Memory Chip Physical Diagram

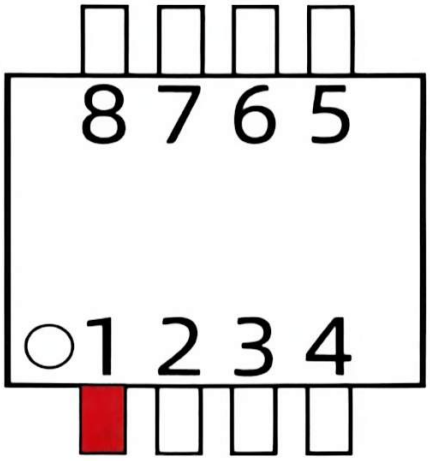


Figure 6 MX25L12873 Memory Chip Pin Diagram

Example 4:

SOP package. The memory chip is an eight-pin memory chip, Model 93C46, produced by ATMEL **(Figure 7)**. The first pin position can be distinguished by the dot judgment method. In the figure, there is an obvious round pit on the surface of the memory chip. The first pin on the leftmost side of the row below the round pit, and the red pin pointed by the red arrow is the first pin of the memory chip. It can be seen from the pin diagram of 93C46 **(Figure 8)** that pin 1 increases counterclockwise in turn, which is pin 2, pin 3, pin 4, pin 5, pin 6, pin 7 and pin 8.

Figure 7 Physical diagram of 93C46 memory chip

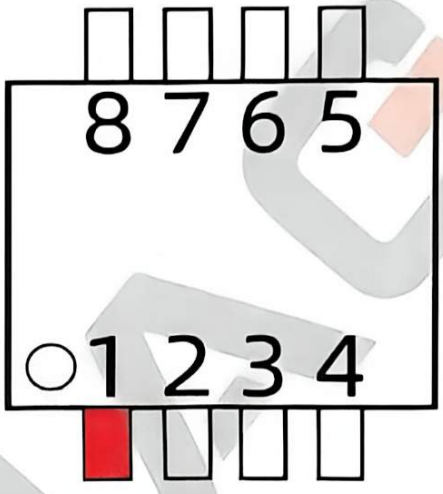


Figure 8 Pin diagram of 93C46 memory chip

Example 5:

The memory chip is the MCU memory chip of the ST SPC560B60L3 **(Figure 9)**. The first pin position can be distinguished by the dot judgment method. In the figure, there is an obvious round pit on the surface of the memory chip. The first pin on the leftmost side of the row below the round pit, and the red pin pointed by the red arrow is the first pin of the memory chip. It can be seen from the pin diagram of SPC560B60L3 **(Figure 10)** that the number of pins 1 increases counterclockwise from 2, 3, 4, 5, 6 to 100.

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Figure 9 Physical drawing of ST SPC560B60L3MCU

Figure 10 Pin diagram of ST SPC560B60L3MCU

Example 6:

This memory chip is the MCU memory chip of model MC9S12XS128 **(Figure 11)**. The first pin position can be distinguished by the dot judgment method. In the figure, there is an obvious round pit on the surface of the memory chip. The first pin on the leftmost side of the row below the round pit, and the red pin pointed by the red arrow is the first pin of the memory chip. It can be seen from the pinout diagram of MC9S12XS128 **(Figure 12)** that pin 1 increases counterclockwise in turn from pin 2, pin 3, pin 4, pin 5, pin 6 to pin 80.

Figure 11 Physical drawing of MC9S12XS128MCU

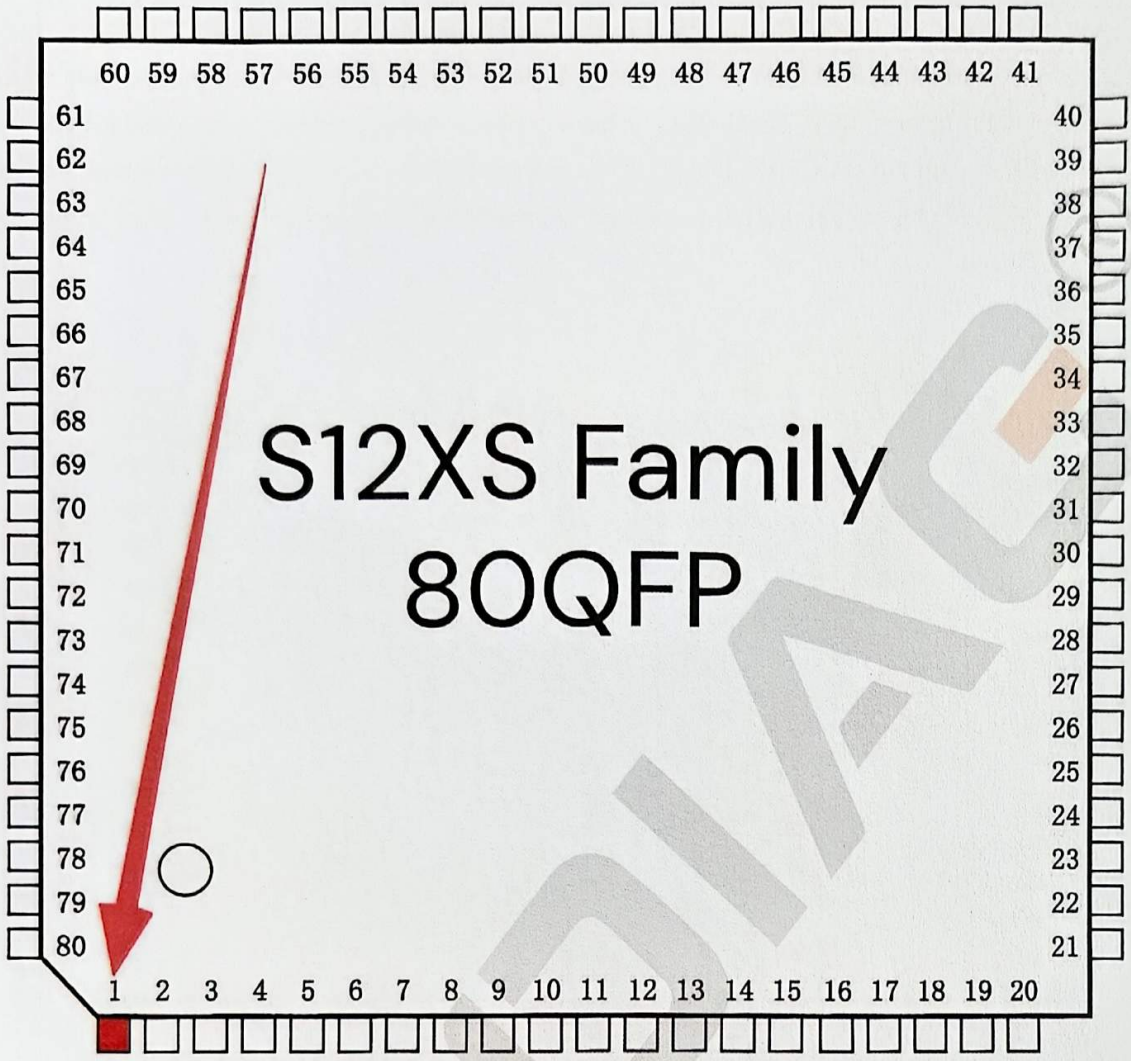

Figure 12 MC9S12XS128MCU Pinout

Example 7:

The memory chip is PIC18F6620 MCU memory chip from MICROCHIP **(Figure 13)**. The first pin position can be distinguished by the dot judgment method. In the figure, there is an obvious round pit on the surface of the memory chip. The first pin on the leftmost side of the row below the round pit, and the red pin pointed by the red arrow is the first pin of the memory chip. It can be seen from the pin diagram of PIC18F6620 **(Figure 14)** that pin 1 increases counterclockwise in turn from pin 2, pin 3, pin 4, pin 5, pin 6 to pin 64.

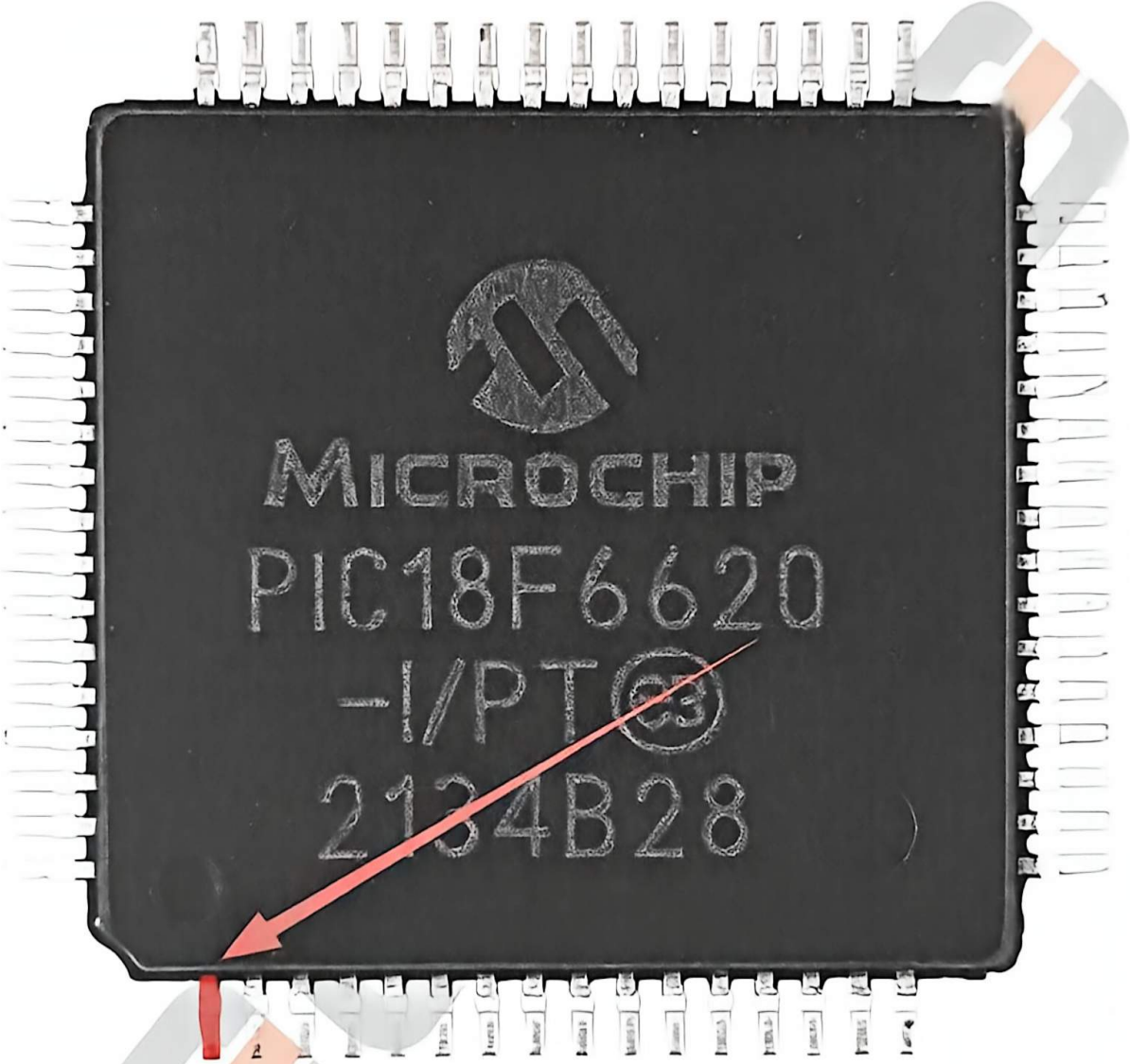

Figure 13 Picture of MICROCHIP PIC18F6620

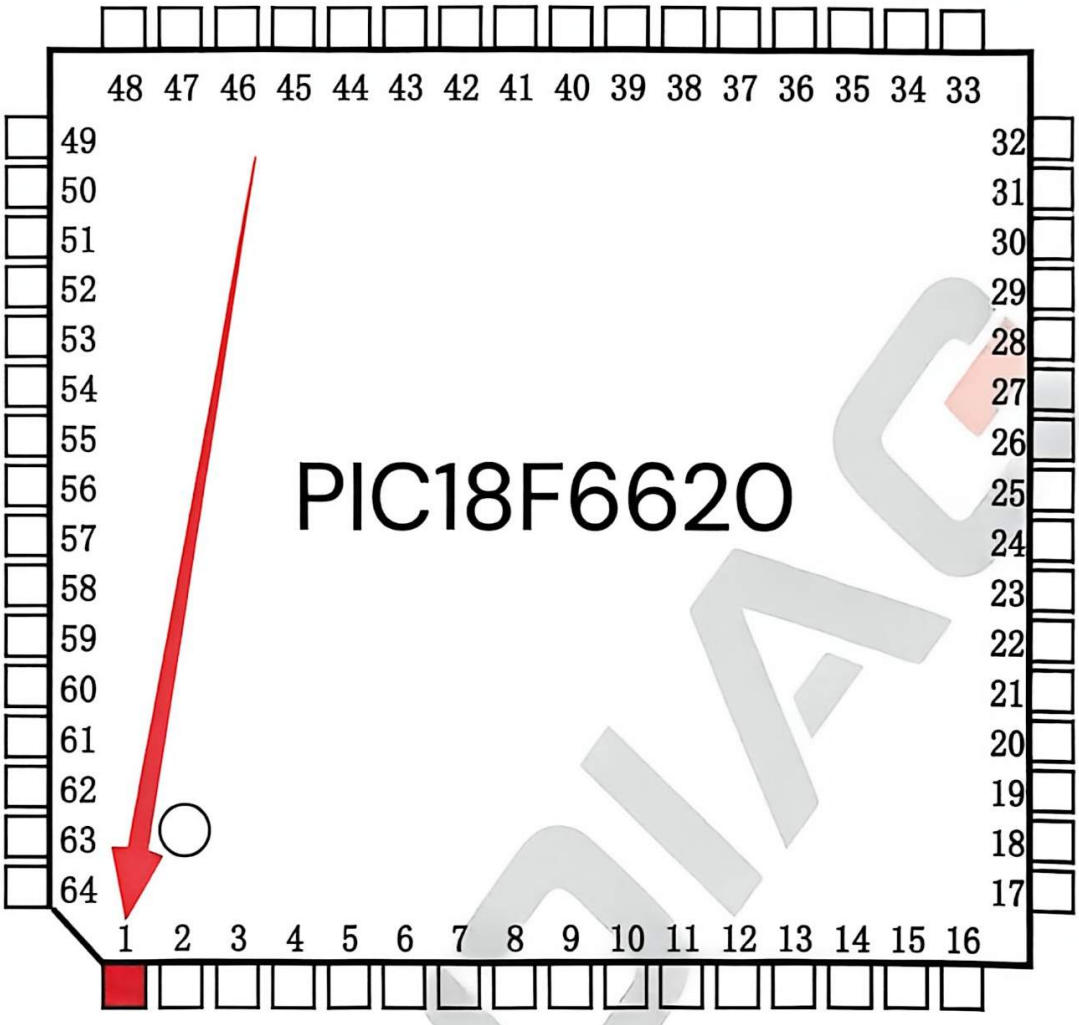

Figure 14 MICROCHIP PIC18F6620 Pinout

(2) Conventional judgment method:

Some memory chips do not have dots or obvious special marks, so it is necessary to use the conventional resolution method:

That is, the memory chip is in the positive direction, and the positive direction is to see the font in the normal direction on the memory chip, as shown in Figure 1. In the positive direction, the leftmost side of the lower row is the first pin.

Example 1 of Judging the First Pin by the Conventional Judgment Method:

The SOP packaged memory chip placed in the positive direction is the eight-pin memory chip of the 95080 **(Figure 1)**. The memory chip is not marked with obvious dots or pits. In the positive direction, the leftmost pin of the lower row is the first pin, and the red pin is the first pin. As you can see from the pin diagram of the 95080 **(Figure 2)**. Pin 1 increases counterclockwise, followed by Pin 2, Pin 3, Pin 4, Pin 5, Pin 6, Pin7 and Pin 8.

Figure 1 Physical drawing of 95080 (SOP package)

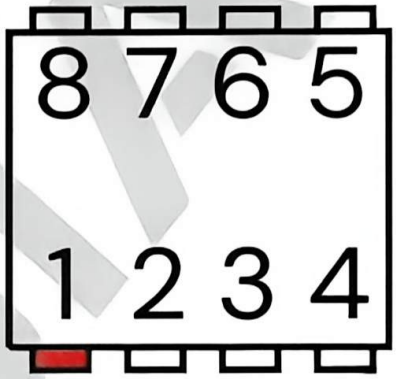

Figure 2 95080 pin diagram

Pin 1 Identification Example 2:

SOP package, the memory chip is a model 24 C02 positive-direction eight-pin memory chip **(Figure 3)**. In the positive direction, the leftmost pin below is pin 1, and the red pin is pin 1. It can be seen from the pinout diagram of 24C02 **(Figure 4)** that pin 1 increases counterclockwise in turn, which is pin 2, pin 3, pin 4, pin 5, pin 6, pin 7 and pin 8.

Figure 3 Physical view of 24C02 (SOP package)

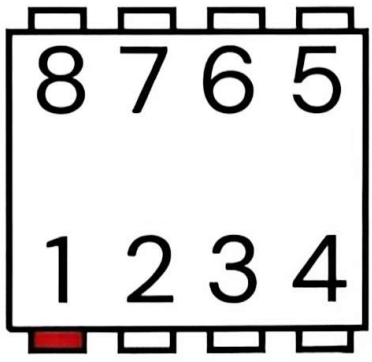

Figure 4 Pin diagram of 24C02