IC fabrication and packaging

Resources and methods for learning about these subjects (list a few here, in preparation for your research):

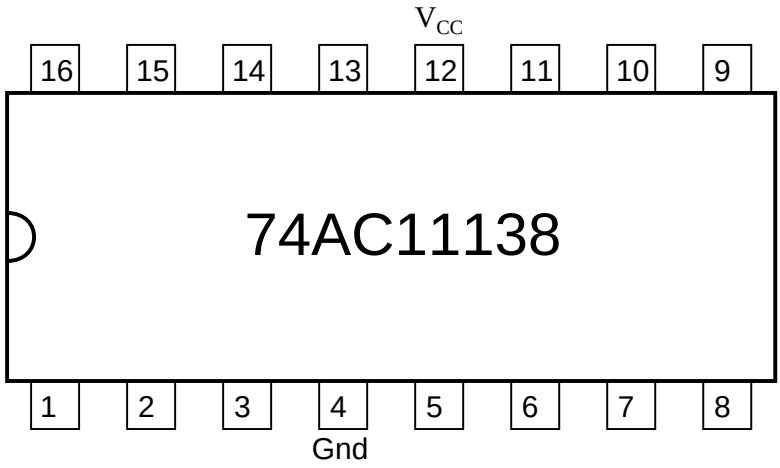
Questions

Question 1

What does it mean if an integrated circuit comes in *DIP* form? What does the acronym "DIP" mean?
file 01424

Question 2

Where are the power supply pins most commonly located for integrated circuits in the standard "DIP" form? Some manufacturers of high-speed digital ICs are now relocating power supply pins to the middle of the package, like this:



Explain the rationale for this non-traditional pin assignment.
file 01425

Question 3

Find one or two real integrated circuits and bring them with you to class discussion. Identify as much information as you can about your ICs prior to discussion:

- Manufacturer
- Part number
- Function
- Datasheet
- Date of manufacture

file 01423

Answers

Answer 1

"DIP" means "Dual Inline Package," which is a type of packaging used for some integrated circuits.

Challenge question: what is the standard spacing between pins on a DIP IC?

Answer 2

Power supply pins on DIP chips are usually located in the upper left and lower-right corners (pins 14 and 7 on a 14-pin DIP, pins 16 and 8 on a 16-pin DIP), *but this is not always the case!*.

Centered power supply pins on modern high-speed DIPs exhibit less parasitic inductance than corner-located pins.

Follow-up question: what is the best way to determine pin assignments on any given integrated circuit?

Answer 3

You will find a wealth of information on manufacturers' websites, on the internet!

Notes

Notes 1

Explain to your students that DIP packaging is not used for integrated circuits with more than 48 or so pins, and then ask them why that might be.

Notes 2

Let your students know that even some of the older integrated circuits had "weird" power supply pin locations, so they cannot assume corner-pins for every older DIP they see! An example of this is the 2102L static RAM, or the 4049 CMOS hex inverting buffer.

Even stranger is DIP chips with *multiple* +V and GND pins. Good examples of this include the 74AC11004 and the 74AUC16373.

Notes 3

The purpose of this question is to get students to kinesthetically interact with the subject matter. It may seem silly to have students engage in a "show and tell" exercise, but I have found that activities such as this greatly help some students. For those learners who are kinesthetic in nature, it is a great help to actually *touch* real components while they're learning about their function. Of course, this question also provides an excellent opportunity for them to practice interpreting component markings, use a multimeter, access datasheets, etc.