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Fact Sheet

FUN FACTS: EXACTLY HOW SMALL (AND COOL) IS 22 NANOMETERS?

- The original transistor built by Bell Labs in 1947 was large enough that it was pieced together by hand. By contrast, more than 100 million 22nm tri-gate transistors could fit onto the head of a pin.[1]

- More than 6 million 22nm tri-gate transistors could fit in the period at the end of this sentence.[2]

- A 22nm tri-gate transistor's gates that are so small, you could fit more than 4000 of them across the width of a human hair.[3]

- If a typical house shrunk as transistors have, you would not be able to see a house without a microscope. To see a 22nm feature with the naked eye, you would have to enlarge a chip to be larger than a house.[4]

- Compared to Intel's first microprocessor, the 4004, introduced in 1971, a 22nm CPU runs over 4000 times as fast and each transistor uses about 5000 times less energy. The price per transistor has dropped by a factor of about 50,000.

- A 22nm transistor can switch on and off well over 100 billion times in one second. It would take you around 2000 years to flick a light switch on and off that many times[5].

- It's one thing to design a tri-gate transistor but quite another to get it into high volume manufacturing. Intel's factories produce over 5 billion transistors every second. That's 150,000,000,000,000,000 transistors per year, the equivalent of over 20 million transistors for every man, woman and child on earth.

[1] A pin head is about 1.5 mm in diameter.
[2] A period is estimated to be 1/10 square millimeter in area.
[3] A human hair is about 90 microns in diameter.
[4] The smallest feature visible to the naked eye is 40 microns.
[5] Assumes a person can flick a light switch on and off 150 times per minute.