THE CASE OF THE COUNTERFEIT 2N5543 N- JFETS.

These fets were ordered from an American semiconductor supplier who claimed to be able to supply them. They are not a common part.

The part is an obsolete Teledyne/Crystalonics product. This company specialised in this type of J-Fet. This particular part is manufactured by few other companies that I am aware of. I have seen one with a TI logo but I'm not sure if it was a genuine part. These were certainly not a Motorola part.

After ordering the part, weeks went by and they had not turned up so I contacted the supplier. They told me that they were still in their "production department" which had a sinister ring to it that something wasn't right.

When they arrived I noticed they were super bright and shiny, as though the cases had just been re-plated and the labelling looked crisp and freshly printed. Also there were unusual defects in the lead wires.

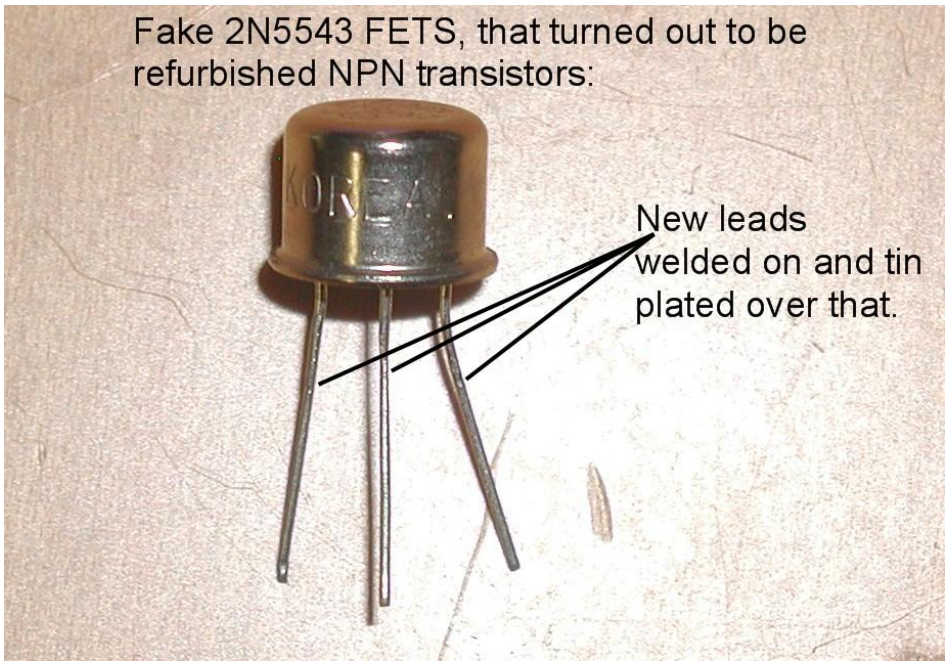
Close examination showed that the lead wires had been joined to lengthen them and tin plated over that. That aspect was quite an accomplishment and the fact that someone had gone to these lengths astonished me. The welds on some were poor and they fractured with a little bending though.

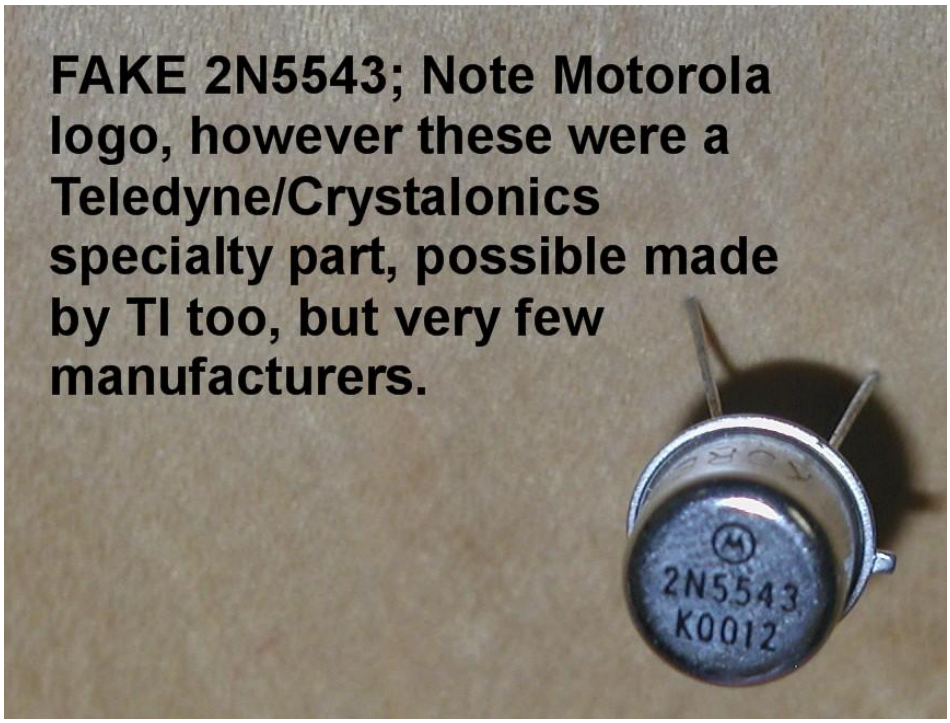
I tested the devices and found that they are nothing more than common garden NPN transistors, not J-Fets. So in summary they were short leaded NPN transistors, probably used pulls from pcb's, with lengthened leads, fresh electroplating and fresh labels.

So how did the supplier expect to get away with this?

I had seen in the past in a transistor reference book the 2N5543 mis-labelled as being an NPN transistor, so perhaps the counterfeiters saw that and simply thought that is what these parts were.

Photos shown below:





So it looks like the American supplier sourced the part from Korea, by the stamping on the transistor case.

People in the counterfeit semiconductor area are not experts in semiconductor physics. From their perspective if they see two parts that look the same on a transistor equivalents list, they assume its reasonable to substitute one part in for the other and they convince themselves (so they can sleep at night) they are not doing their customers a great disservice.

However what the counterfeiters seem blissfully unaware of is that transistor equivalence books are not rules, they are guidelines. The customer may have selected the component they require for special parameters such as low noise, transition frequency, inter-electrode capacity, hfe etc, all parameters which vary wildly between supposed equivalents.

So in essence the counterfeiters are making risky assumptions about a customer's needs and therefore increasing the failure rates and hazards associated with their customer's products.

For example I heard of a case recently where a mosfet which was selected for a high current pass application by the designer (for low ON resistance) was supplied as a fake part with a higher on resistance. As a result there was significant heating. These sorts of things can lead to fires.

The frightening thing is that fake semiconductors with reduced maximum rating specifications are finding their way into supply chains worldwide. There was a case recently of fake parts in Airbag Controllers and fake parts in military supply chains. No doubt they have got into

avionics systems too. Does that make you feel comfortable flying when now much of the plane's controls systems are dependent on the electronics in that the pilot flies the computer and the computer flies the plane?

If you have an unexpected electronic failure in your car or home appliance when it is still relatively new, don't be surprised.

While the problem is not new it appears to be getting worse. The first component I saw subject to counterfeit activity or cloning was the venerable 2N3055 transistor. The cloned/fake parts have a transistor die about half the size of RCA's original design. The fake parts work, unless you push them near RCA's max ratings, then they fail. So a lot of the time the fakers "get away with it"

Many plastic cased semiconductors are re-labelled with a technique that appears to be fine bead blasting of the surface to get rid of the original numbers/markings, so they have a matt look to them rather than shiny.

Be on the lookout for fake parts, and where possible buy new old stock with original date codes. Pre 1990 genuine components are very seldom fakes. To avoid fakes for my projects I always buy the most vintage date codes possible but this is not an option for modern commercially made products.

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