

Remedial EEE Parts ~~101~~
Part Number Decipher
(AKA Know what you're getting)

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Available



- Started work at for Lockheed at JSC, 1989
- Joined new Engineering EEE Parts branch, 2000
- Joined NASA in 2004,
 - JSC EEE Parts Technical Discipline Lead
 - ISS EEE System Manager
 - Commercial Crew Program Engineering EEE lead
 - HALO EEE Parts POC
 - Formerly MPCV/Orion EEE Parts System Manager

What this presentation is

- General
 - We'll talk about a topic that relate to EEE Parts generally, and also as they relate to types of EEE Parts (microcircuits, resistors, not so much connectors)
- Interactive
 - PLEASE ask questions at the time you have the question. Don't wait for the end.
 - We've been allotted 90 minutes, but we don't have that much material.
- Collaborative
 - We seek your experiences. You have relevant experience to share. Please speak up and share. The group gets smarter through learning from the individuals.

What's a part?

- A part is a thing (duh)
- Somebody made this thing



- Do these things matter?
 - Depends on your requirements
 - Happy Meals “Maybe”, everything else “Yes”
- To get what you want, you and the seller need to agree on what you're buying.
- Usually that's done with a Part Identifying Number - PIN.

Part Number to the rescue?

- Most manufacturers use PIN (part numbers) to identify unique combinations of design/materials/production/test
- A user can be confident that a *****COMPLETE***** PIN accounts for all important variations that might distinguish one part from another
 - Except when the same PIN is used by different manufacturers
- A part bought in 2020 and a part bought to the same PIN in 2023 should be expected to be “the same”
 - Radiation folks, see earlier disclaimer
 - Except for changes that are hopefully captured by PCNs
 - If it’s very important to you, that’s one purpose of DPA

All LM124s are the same, right?

- One manufacturer has dozens of variants of LM124 Op-Amp
 - QML-V
 - QML-Q
 - with and without RHA
 - Commercial, industrial temp ranges
 - Automotive
 - SOIC, CDIP, PDIP, LCCC, dual flat-pack, QFN,
 - Enhanced Plastic
 - Non-QML Space ceramic
 - Non-QML Space plastic
- A designer might say, “We’re using an LM124”
- NOT A PARTS ENGINEER!!!!
 - These are (or may be) different parts
 - All one one datasheet, these parts might have different parameters, different FAB sites, different material sets, different die design, different metallization, different bondwire material, different assembly/test sites, different in-process quality, different wafer probe criteria

Example of PIN confusion for QML parts

Standard microcircuit drawing PIN <u>1</u> /	Vendor CAGE number	Vendor similar PIN <u>2</u> /
5962-1721401VXC	01295	LMH5401-SP
5962R721401VXC	01295	LMH5401-RHA

- What is P/N 5962-1721401VXC?
 - CERTIFIED to MIL-PRF-38535
 - Backed by DLA
- What about LMH5401-SP?
 - **COTS!! Completely unknown!!**
 - Until you do some extra work.
 - Don't forget that the table above includes not 2/
 - "Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing."
 - In TI's case, they CHOOSE to make the parts the same. Ordering LMH5401-SP gets you 5962-1721401VXC, and the parts are dual-marked.
 - But not every manufacturer does this, so be careful.

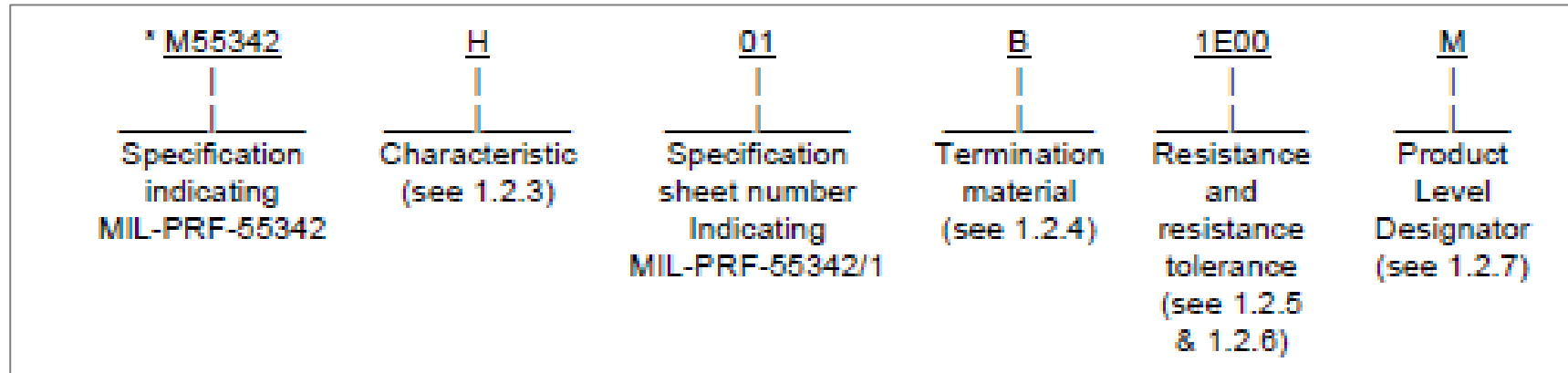
Same part? Different part?

- A part is fabricated one way, but tested in two different ways
 - i.e. – with and without PIND
 - Same part? Different part?
 - DEPENDS – Do your requirements specify screening?
- A part is made in two locations
 - Fab A, Fab B
 - Maybe assembly and test A, and assembly and test B
 - Same part? Different part?
 - DEPENDS – Do your requirements.....

Example

- An Orion contractor needed to perform radiation testing
- QML-V part had long lead time
- Had some QML-Q parts on hand
- Performed testing on QML-Q parts
 - With expectation to test V parts when available
- Later QML-V parts performed significantly differently
- Mfg had moved FAB
 - Q parts made from the new fab
 - V parts sold from bank of characterized wafers from old fab
- **DON'T ASSUME**

Problem with MIL-55342 resistors



- Resistive element technology, thin/thick film, is not specified
- Does this matter?
 - Depends.....

Closing

- Know what you want
- Use complete PINs
- Know where important differences exist in PIN
- Know what potential variations do and don't matter to you
- Don't assume anything

Your examples

- Thank you