PMPedia™: A Crowd-Sourced Alternate-Grade* Electronics Space Radiation Knowledge Repository

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Electronics Technology Workshop
June 2021

*Alternate-Grade = automotive, COTS, industrial, medical, military terrestrial

Agenda

- PMPedia™ (**P**arts, **M**aterials, **P**rocesses) Encyclop**edia** Motivation
- Functional Overview
- Access
- Conclusion and Invitation to Collaborate

PMPedia™ (Parts, Materials, Processes) Encyclopedia

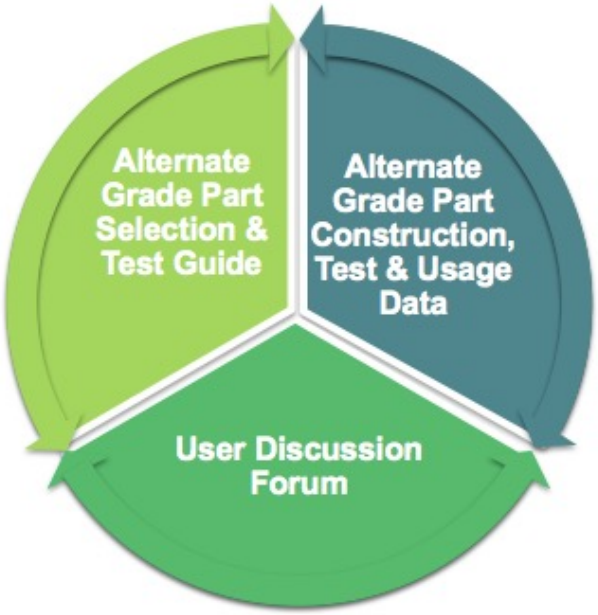
- Need a readily-accessible alternate-grade electronics data repository for the space community
  - *Reduce duplicative and/or non-value added testing and analyses*
  - *Save space system development and production costs*
  - *Deliver reliable, resilient systems more quickly*
- *www.PMPedia.space (Beta)* deployed August 2019
  - *Seeded with Aerospace Corporation and LASP data. We need more data!*
  - *Emphasis on radiation test data*
  - *Destructive and non-destructive physical analyses and more*

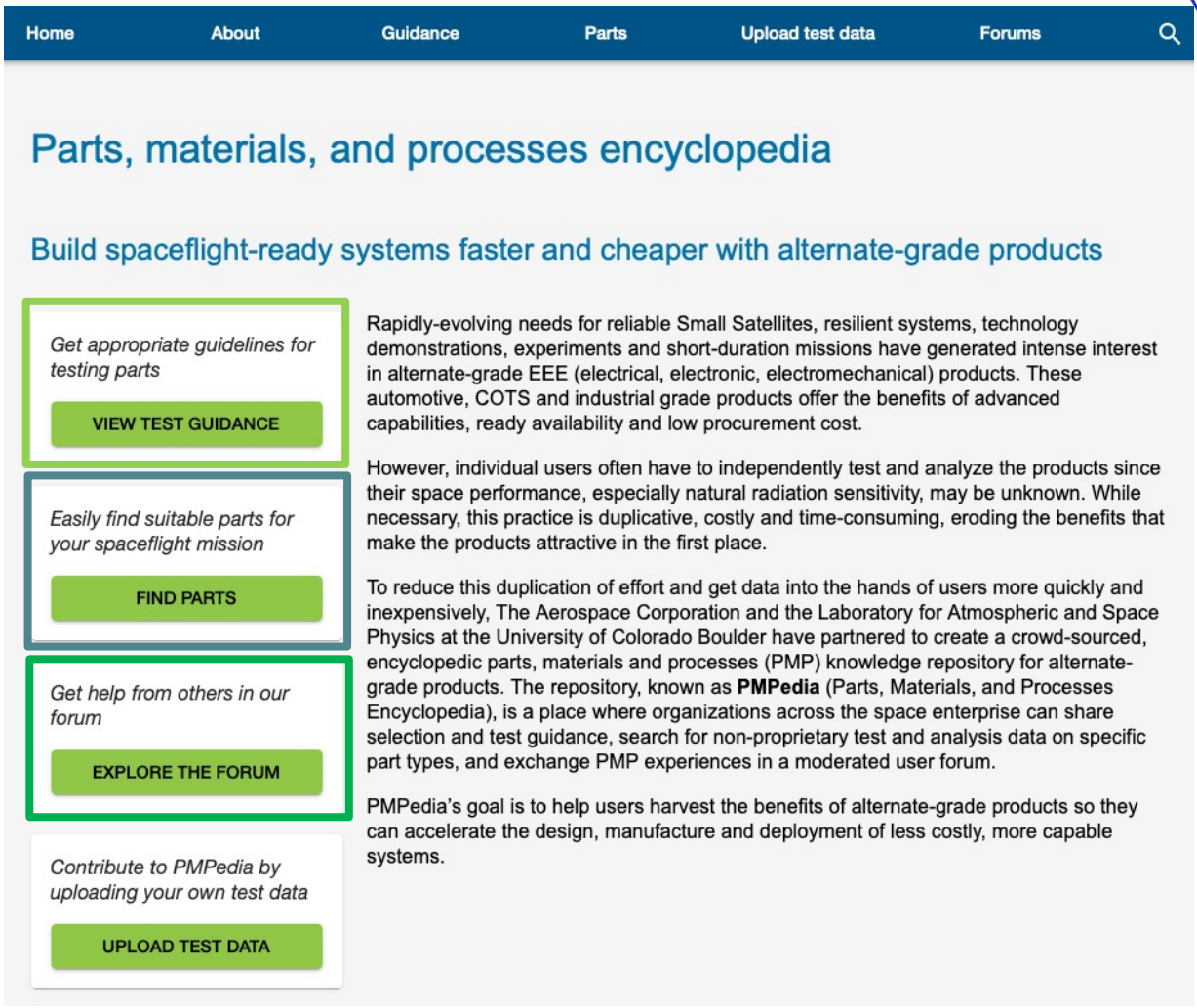
Awaiting YOUR participation and data contributions!

Crowd Sourced repository provided by The Aerospace Corporation and the University of Colorado-Boulder's Laboratory for Atmospheric and Space Physics (LASP)

PMPedia™ Functions and User Interface

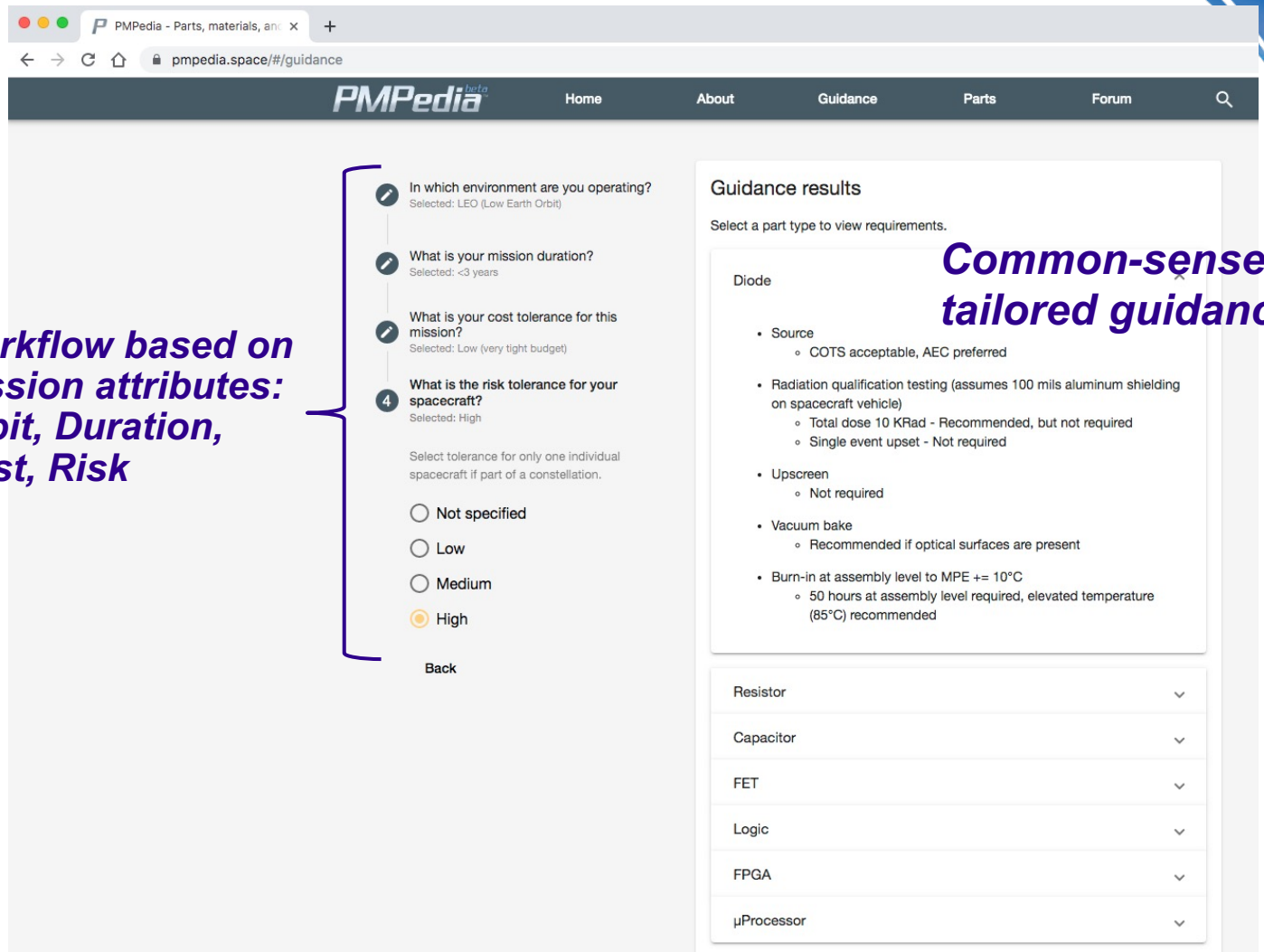
www.PMPedia.space





Alternate Grade EEE Parts Selection & Test Guidance

Alternate Grade Part Selection & Test Guide



Workflow based on Mission attributes: Orbit, Duration, Cost, Risk

Common-sense, tailored guidance

Content will evolve as user community experts offer updates and refinements

- ***Facilitates meeting program and customer requirement flow-downs***
- ***Reduces duplicative and/or non-value added testing and analyses***
- ***Accelerates alternate grade parts decision-making***

Alternate Grade EEE Parts Test Data Repository

(no image)

Analog Devices AD7983BRMZ

Analog-to-Digital Converter, 16-Bit, 1.33 MSPS PulSAR in MSOP/QFN

Suggested orbits:

Radiation test results

Beam testing	SEE Testing, Xe ions
Objective	SEL
Flux (max)	2e4 protons/cm^2/sec
Proton dose	50000 Rad(Si)
Test condition	4 units, decapped, monitor current draw on 3.3V and 5V ADC power lines

sample 1: run-away current (latch-up), samples 2 and 3: transient current increases

Test analysis

Technical documents

Size: 5.41 MB
Filetype: application/pdf

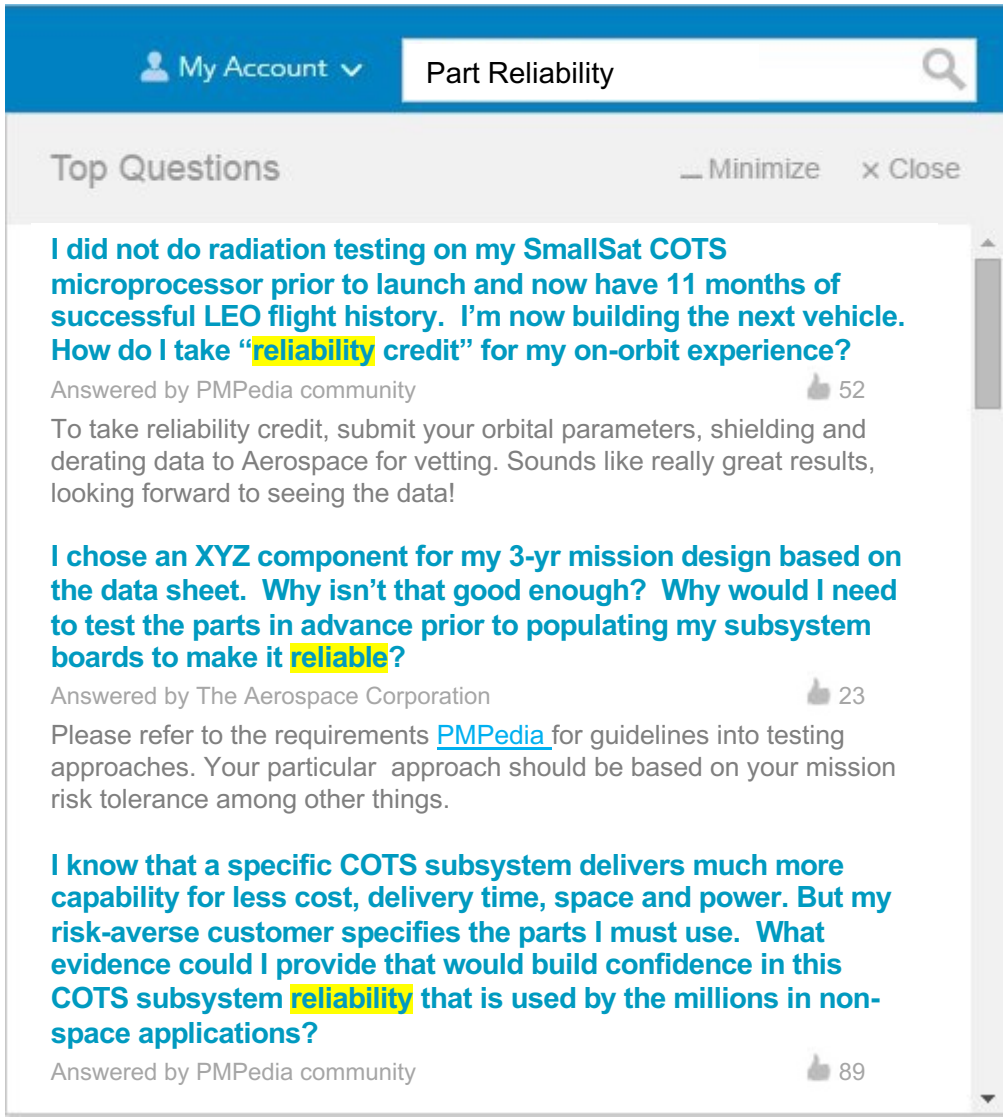
Download

Alternate Grade Part Construction, Test & Usage Data

Example part data

- ***Growing list of part types. (We need more, please!)***
- ***Data types: various radiation test data (TID, SEE, SEU), physical analyses, images***
- ***Suggestions for devices and circuit cards for upcoming radiation tests are welcome***

Alternate Grade EEE Parts User Discussion Forum

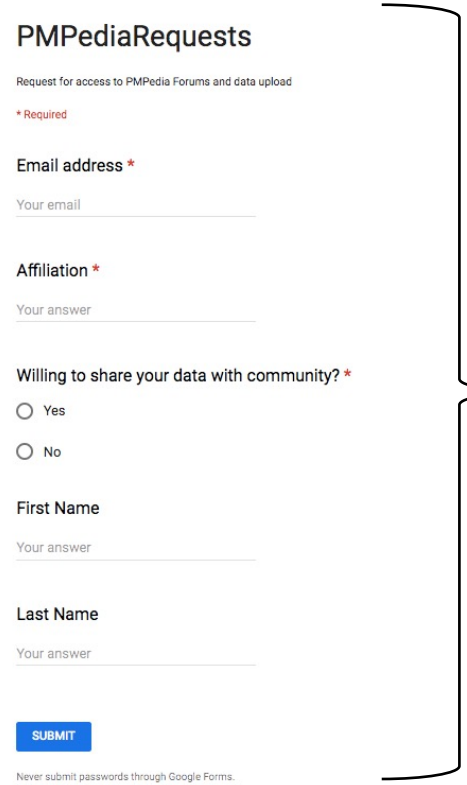


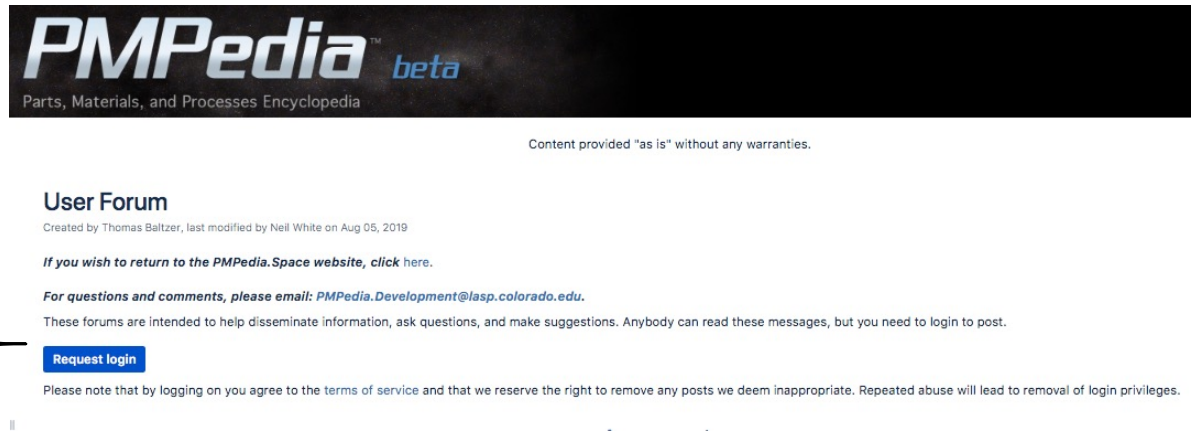
- Moderated forum
  - *Q & A*
  - *Parts application advice*
  - *Common practices*
  - *Experience sharing*
- User feedback on improvements to PMPedia™ content and usability

How to Access PMPedia™

- PMPedia™ is crowd-sourced and relies upon (welcomes!) user inputs
- To access Test and Selection Guidance, and the Parts Repository, visit *www.PMPedia.space*
- To request a login and participate in the User Forum, visit https://cms.pmpedia.space/wp-login.php?action=register

User Login Account Request





Conclusion

- PMPedia's goal is to enable data sharing and expedite advanced, reliable alternate grade parts in space systems
  - *Crowd-sourced non-proprietary data, and selection and test guidance*
  - *Open forum for knowledge exchange*
- Accelerate efficient, cost-effective development and fielding of reliable, resilient systems
- The PMPedia™ team welcomes your participation
  - *PMPedia.Development@lasp.colorado.edu*
- If you have a site to which we can link, please let us know

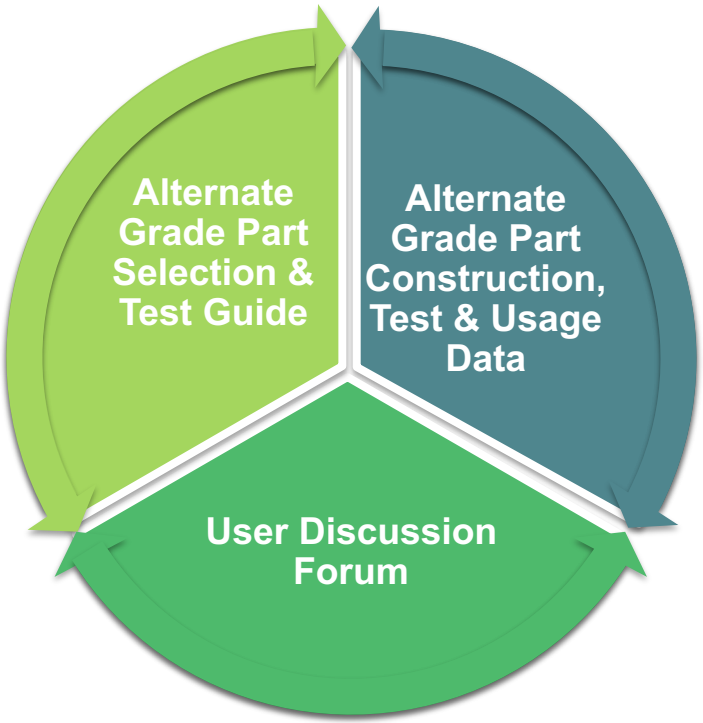
The authors acknowledge the collaboration and support of:

- The Aerospace Technical Investment Program
- CU-Boulder/Laboratory for Atmospheric and Space Physics
- NASA - Goddard Space Flight Center, Ames Research Center

Backup

Crowd Sourced Knowledge Repository – PMPedia™

- "Dynamic" standard refreshed continuously
- Workflow driven, common sense parts guide
- Usage requirements tailored to mission orbit, duration, cost, risk
- Facilitates meeting program and customer requirement flow-downs

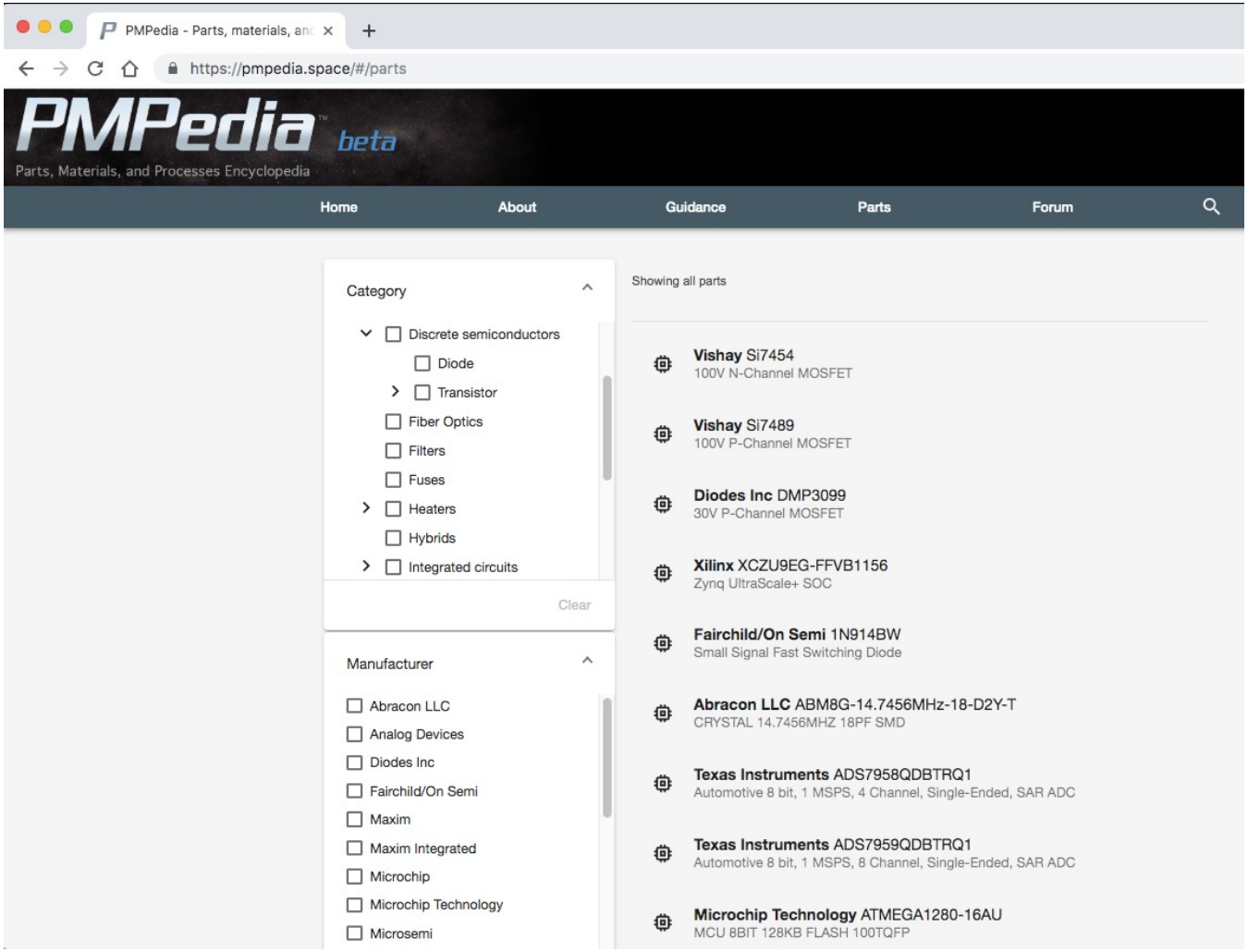


- Shared knowledge repository for entire Space community
- Big Data analytics applied to parts construction artifacts and test results
- Radiation testing and various analyses

- Discuss what has worked in space, what didn't
- Space community knowledge exchange moderated by subject matter experts

Knowledge Repository for Reliable Alternate Grade EEE Parts Usage in Space

Alternate Grade EEE Parts Test Data Repository



Alternate Grade Part Construction, Test & Usage Data

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