

## NEWS FLASH DECEMBER 2002

## FEATURES

**Focus: Field Programmable Gate Arrays (FPGAs)**

*Office of Logic Design/K-Labs* In February 2002, an Office was established to concentrate on digital engineering for space flight as a discipline. The charter for the group is “a scientific study of the problems of digital engineering for space flight systems, with a view to their practical solution.” This is quite similar to the National Advisory Committee on Aeronautics (NACA) charter, and the Office operates in a similar fashion.

*The Programmable Technologies Web Site* has a new host on the World Wide Web. All of the original content has been preserved, and a lot of new content has been added. The new URL is <http://klabs.org>. The theme is still dedicated to the research, development, and use of programmable logic and elements for space flight applications.

*Office of Logic Design (OLD) News* is a new mechanism where hot topics, issues that can easily be overlooked by designers and reviewers, are e-mailed directly to a diverse mailing list. An archive is also available at [http://klabs.org/richcontent/old\\_news](http://klabs.org/richcontent/old_news)

*2003 Military and Aerospace Programmable Logic Device (MAPLD) International Conference First Call for Papers* Send your abstracts on programmable devices and technologies and related aspects of digital engineering... <http://klabs.org/mapld03>

*C-C Cell Flip-Flops in SX, SX-A, and SX-S* Designers and reviewers should carefully check the implementation of their flip-flops as not all C-C macros are implemented with C-Cells ...

*RT54SX  $t_R/t_F$  Experiment* Summarizes findings of fall time experiments to determine potential reliability issues...

**Other Relevant Links:**

**Archive** of *Programmable Logic Application Notes Columns* in EEE Links:

[http://www.klabs.org/richcontent/eeelinks/EEE\\_Links.htm](http://www.klabs.org/richcontent/eeelinks/EEE_Links.htm) (This column will be reinstated in EEE Links, beginning with the next issue.)

**What's New:** [http://klabs.org/whats\\_new.htm](http://klabs.org/whats_new.htm)

**Office of Logic Design News:**

[http://klabs.org/richcontent/old\\_news](http://klabs.org/richcontent/old_news)

## SPECIAL EVENTS

2003 Military and Aerospace Programmable Logic Device (MAPLD) International Conference...

*For other upcoming special events...*

## **Focus: Field Programmable Gate Arrays (FPGAs)**

### **Office of Logic Design/K-Labs Summary**

“A scientific study of the problems of digital engineering for space flight systems, with a view to their practical solution.”

K-Labs, now formally established as the NASA Office of Logic Design, is a small, experienced, highly skilled group of electrical engineers specializing in digital systems for space flight applications. They employ a cooperative team philosophy emphasizing work done in-house, an approach that keeps costs low, schedules short, and quality high. These engineers work on new, interesting, and challenging projects for space flight electronics. Their extensive activities include flight hardware design, analysis, independent reviews, and failure investigations. For applied research, design and analysis techniques are developed and evaluations and suggestions are made to device manufacturers, in the NACA fashion. A variety of design and analysis seminars has been produced, specializing in spacecraft and high-reliability applications. Flight experiments are conducted on new technology and techniques, and an assortment of research projects, such as reconfigurable computing, are also conducted.

The FPGA abstracts you see in this issue of *E-Flash Spotlight* are just a small sample of the useful information this group has generated to benefit NASA's scientific community.

For more information, go to the Programmable Technologies Web site at <http://klabs.org>, or contact Richard Katz at [richard.b.katz@nasa.gov](mailto:richard.b.katz@nasa.gov)

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### **First Call for Papers 2003 MAPLD International Conference**

Richard Katz, NASA GSFC  
[mapld2003@klabs.org](mailto:mapld2003@klabs.org)

Abstracts are being accepted from now through April 25, 2003, for the 6th annual Military and Aerospace Programmable Logic Devices (MAPLD) International Conference. This year the event will be held at the Ronald Reagan Building and International Trade Center (Wow!), Washington, DC, from September 9-11, 2003. Programmable devices and technologies and related aspects of digital engineering will compose the major emphasis of this conference, hosted by the Office of Logic Design and the AIAA.

This year, there will be a special emphasis on papers with the following themes:

- Reliability of Hardware and Designs; Fault Tolerance
- Reconfigurable/Adaptive Computing Systems
- Long-term Space Missions: > 15 Years
- Hardware and Software: The Line is Blurring
- Radiation Hardening by Design
- Digital Signal Processing with Programmable Devices
- Design Security
- “War Stories” and Lessons Learned

The Technical Program will consist of oral and poster technical presentations. We are planning an exciting program including several special invited speakers in the annual Invited History Talk. Select papers will be published in the *AIAA Journal of Spacecraft and Rockets*. This unclassified conference is open to both foreign participation and U.S. citizens. For conference information, please visit the following URLs:

Conference Home Page:  
<http://klabs.org/mapld03>

Call for Papers :  
[http://klabs.org/richcontent/MAPLDCon03/admin/mapldcon03\\_cfp.html](http://klabs.org/richcontent/MAPLDCon03/admin/mapldcon03_cfp.html)  
(.htm)

<http://klabs.org/richcontent/MAPLDCon03/admin/cfp.doc> (.doc)

### **2002 MAPLD International Conference**

The following were highlights of the 2002 MAPLD Conference held September 10-12, 2002, at The Johns Hopkins University Applied Physics Laboratory Kossiakoff Conference Center:

- AIAA Chapter Meeting: "Do You Know What Your Software is Doing Right Now? Accidents and Mishaps Involving Software," will appear as an *AIAA Journal of Spacecraft and Rockets* paper and as a featured article in *Aerospace America* based on this Invited Talk.
- Technical Session topics: Applications: Military and Aerospace; Design 1: Logic

Design and Programmable Devices; Reliability: Devices and The Effects of the Radiation Environment; Design 2: Systems and Platforms; and Design 3: Evolvable Hardware and Other Systems and Architectures

- Panel Session: Why Is Mars So Hard? A Discussion of the Technical, Programmatic, and Political Factors That Have Led To Failures at Mars over the Last 40 Years

Proceedings from the 2002 MAPLD conference are now available online. For more information, go to <http://klabs.org/richcontent/MAPLDCon02/MAPLDCon02.html>

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### **Actel SX, SX-A, and SX-S FPGAs Application Notes**

#### **C-C Cell Flip-Flops in SX, SX-A, and SX-S**

Richard Katz, NASA GSFC

"C-C flip-flops" should increase the LET resistance of the memory element, when compared to an R-Cell in SX and SX-A technology. For SX-S, this technique can be used to increase the number of flip-flops available. However, for some C-C flip-flop macros, an R-Cell was used, not the pair of C-Cells, which would give the user an implementation that did not have the expected SEU tolerance or the extra flip-flops.

To view the full report, go to [http://klabs.org/richcontent/old\\_news/old\\_news\\_6.htm](http://klabs.org/richcontent/old_news/old_news_6.htm)

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## RT54SX $t_R/t_F$ Experiment

Actel Corporation

It is sometimes difficult to meet the 50 ns  $t_R$  and  $t_F$  specification of the RT54SX devices (see Note 1, Electrical Specifications). This is particularly the case for tri-state bus applications, where the maximum rise or fall time could exceed the data sheet limits. In this type of application, there is a concern when the design has implemented an input or bi-directional I/O macro. The tri-state buffer macro (output drive only) in an RT54SX device disables the input buffer and will not be a concern. There may be concerns for functionality issues during the tri-state conditions, as well as long-term reliability concerns. This report summarizes the findings of fall time experiments completed to determine any potential reliability issues with slow fall times.

To view the full report, go to [http://klabs.org/richcontent/fpga\\_content/DesignNotes/input\\_transition\\_time/rtsx\\_trtf\\_report.pdf](http://klabs.org/richcontent/fpga_content/DesignNotes/input_transition_time/rtsx_trtf_report.pdf)

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## Upcoming Events

*2002 IEEE Microelectronics Reliability and Qualification Workshop*  
December 3-4, 2002, Marriott  
Manhattan Beach, Manhattan Beach, CA  
For details, contact Ron Lacoë,  
[ronald.c.lacoe@aero.org](mailto:ronald.c.lacoe@aero.org), 310.336.0118,  
or  
<http://www.aero.org/conferences/mrqw/index.html>

*Military and Aerospace Electronics MMRC Meeting (Winter Conference on Military and Aerospace Electronics)*  
December 8-10, 2002, U.S. Grant Hotel,  
San Diego, CA

For details, contact IMAPS,  
[IMAPS@imaps.org](mailto:IMAPS@imaps.org), 202.548.4001, or  
[www.imaps.org](http://www.imaps.org)

*International Symposium on Micromachining and Microfabrication, Reliability, Testing, and Characterization of MEMS/MOEMS II*  
January 25-31, 2003, San Jose Convention Ctr., San Jose, CA  
For details, contact Rajeshuni Ramesham or Danelle Tanner,  
[abstracts@spie.org](mailto:abstracts@spie.org), 360.647.1445, or  
[www.spie.org/info/pw/](http://www.spie.org/info/pw/)

*SPIE Photonics West 2003 Reliability, Testing, and Characterization of MEMS/MOEMS II*  
January 27-29, 2003, San Jose Convention Center, San Jose, CA  
For details, contact Rajeshuni Ramesham, 818.354.7190,  
[Rajeshuni.Ramesham@jpl.nasa.gov](mailto:Rajeshuni.Ramesham@jpl.nasa.gov),  
<http://spie.org/Conferences/Programs/03/pw/mf/index.cfm?fuseaction=4980>

*SPIE Photonics West 2003 Free Exhibition (Optics, Lasers, Optoelectronic Components, and Imaging Technologies)*  
January 28-30, 2003, San Jose Convention Center and Parkside Hall, San Jose, CA  
For details, contact SPIE at  
<http://spie.org>, 1.360.676.3290, or  
[spie.org/app/exhibition/index.cfm?fuseaction=Welcome&meeting\\_id=37](http://spie.org/app/exhibition/index.cfm?fuseaction=Welcome&meeting_id=37)

*Commercialization of Military and Space Electronics, 7th International CMSE Conference*  
February 10-13, 2003, Sheraton Gateway Hotel, Los Angeles, CA  
For details, contact Dale Stamps or Leon Hamiter, [dale@cti-us.com](mailto:dale@cti-us.com) or  
[lhamiter@cti-us.com](mailto:lhamiter@cti-us.com), 256.536.1304, or  
[www.cti-us.com](http://www.cti-us.com)