

TC-10 ADC Meeting Minutes, September 24,25, 1999

Attendance: Suresh Babu

Eric Blom

Phil Green

David Hansen

Fred Irons

Dan Kien

Tom Linnenbrink

Sol Max

Tom Meyer

Mike Souders

Steve Tilden (via teleconference)

Thursday, Sept. 24:

- We had Steve Tilden on a teleconference line.
- Tom Linnenbrink gave report on his meeting with IMEKO TC-4 and EUPAS (European Project for ADC-based devices Standardization) in Naples. He said that 1241 was reasonably well received with the suggestion that it be slanted more toward the new inexperienced engineer. They felt it was a rather high level document. They were sufficiently interested in our participation to invite Tom L. and pay a portion of his expenses. They will be attending IMTC 99 and doing their own workshop. Tom feels that we should press on to get 1241 out as a draft.
- Steve Tilden mentioned that we need to update the membership list to include the European attendees from the Minneapolis meeting. We are not sure who has the membership forms but Phil Green needs to include Pasquale DaPonte, Giovanni Chiorboli, Dominique Dallet, and Izzet Kale. Tom will look for their forms.
- Web site for 1241 is <http://grouper.ieee.org/groups/1241>. User name is ADC and password is sig2noise. There is also a link to the EUPAS, 1057, pulse standard, and a few other things like meeting notices. Jerry Blair is maintaining the web page. Jerry has said he would email the appropriate committees to let them know about access to the web page.
- We should note that the draft is not to be made readily accessible to the general community at this point. We are near the end and should have a draft very soon.
- We reviewed the minutes from the May 21-22 meeting. One correction was made to the password recorded. It is "sig2noise."
- We had a discussion about figure editing. We noted the large number of problems with scaling and editing. Tom Meyer graciously agreed to become the figure editor. Steve Broadstone has indicated that he can no longer be the figure editor.
- The group began section editing. We started with Mike Souders section 4.5.2.5-6. We completed this section.
- Steve Tilden joined us again by teleconference and we discussed workshop activities at the IMTC 99 to be held in Venice, May 23-25, 1999. Separate technical papers are scheduled to be submitted by Sol Max and Fred Irons. Tom Linnenbrink encouraged people to indicate their relationship to TC-10 and the ADC standard even though these papers will not be in the workshop. Mike suggested having the EUPAS people participate in 15 – 30 minutes of the workshop. One suggestion would be a critique of 1241 by a panel. They can lead up to what needs to be done in the future.
- Workshop suggestions for papers: a) Tom Linnenbrink and Steve Tilden will do an overview, b) Tom Meyer, Dan Kien, and Fred Irons will do something in the frequency domain, c) Jerry Blair doing a sinefit in LabView, d) Sol Max doing code transition feedback method, e) Mike Souders and Jerry Blair will do something on equivalent time sampling.

- Demonstrations: Steve Tilden has some hardware which can demonstrate some testing and comparing of some ADCs.
- Eric Blom asked about our intentions to participate in ITC 99 (Atlantic City, September 28-30, 1999). Their format is to have panels using overheads. Each panelists gives a brief talk and then they have discussion. Eric agreed to look into how we get into ITC and what their format might be.
- Next EUPAS meeting is in September, 1999 in Bordeaux.
- We are invited to submit papers to Computer Standards and Interfaces. This is a new "for-profit" magazine which intends to be "The International Journal on the Development and Application of Standards for Computers, Software Quality, Data Communications, Interfaces, Measurement and Metrology." They are looking for someone to serve on the editorial board. There is some concern on our part about maintaining support for our standard IEEE journals. Is it appropriate for someone on an IEEE Standards committee to serve on the editorial board of a foreign journal? All the people on EUPAS are on this board and the European community uses and references this journal regularly.
- Location of the next meeting: If we can coordinate with IEC, some of our European colleagues can get their expenses paid to participate. Right now we will probably meet in Boulder in late January.

Friday, Sept. 25:

- We began at 8:00 AM since people would be leaving throughout the day. We started with section editing. We worked on section 4.1.6.1 from Sol Max. There are only a few loose ends to wind up on this substantial section.
- Phil Green had to leave and Fred Irons took over as secretary and text editor. He forwarded notes to Phil Green which are included below.

Notes from Fred Irons:

Notes from Meeting, Friday, Sep 25th after Phil Green's departure.

These notes do not contain transactions accomplished before Phil's departure.

(Action items are denoted by a left justified underline_____)

Both action items and corrections to the Standard are interspersed in these notes.

_____ Sol will FAX mods to clause 4.1.6.1.1 directly to Phil Green at 505-844-2057. It is still unresolved as to whether a separate figure should be added for section 4.5.3.3 and then modify Fig.4.1.6.1 to let $N1=N2=N0$.

There was an unresolved question about when and what version will be placed on the website. ? Can each page have a date ?

_____ Tom L. will send forms and invite Pat Bohan at TI to join the committee.

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Finished reviewing 4.1.6.1.1

_____ Sol agreed to write comments for 4.1.6.2.1 - statistics of process;
... .2 - slow to static; and3 - sorting by sign

It was noted that Belcher patents on NPRBS methods have expired some years ago and so we could proceed with adding a section to NPR to include this method. Fred handed out some results obtained by simulation that show similarity to the harder to implement NPR test.

_____ Fred will send copies of this simulation to Dave Hanson & Tom L. Babu requested a copy of the finished article when finished for IMTC99.

In connection with his rewrite, Eric B. opened a discussion on bandwidth measures aimed at two definitions for a two part spec for small signal and power (large) signal. Thinks it should be based on a "flaky frequency" where ADC starts to misbehave. After long discussion:

_____ Eric will now complete a rewrite of Section 4.7.1.1 and related clauses along with working out a 4.7.1.3 Comment pointing out when the procedure does not work.

Accepted, after discussion, Tom M's rewrite of 4.15. (see end of these notes)

_____ Babu agreed to review Dan Kien's comments which he brought to the meeting.

Following are editorial changes agreed upon;

pg3. delete ##### Meyer: Gain=1.0, Offset= 0.0???

pg6. define SINAD= signal-to-noise and distortion ratio

pg5. in Table 1.4.4 Change all SNR to SINAD

pg10. in definition for max operating common-mode signal
change to read: ...ADC will meet its specifications when...
by deleting eff. bits and changing in to when. Del. EDB query

pg9. def. for diff. input imp. delete to ground. Then def reads as follows:
differential input impedance: For a differential-input ADC, the
impedance between the positive input and the negative input.

_____ Eric B. will look for reference on method to measure differential input impedance.

pg38. in Title for 4.2.1.3 delete Other
delete extraneous listings in title for 4.2.1.2

pg39. at end of 1st paragraph, replace contents of bracket [The Impedance

Measurement] with [B 7.1]

pg9., in list of definitions, appropriate place, insert:
effective number of bits: A measure of SINAD used to compare actual ADC performance to an ideal ADC

____ Dave H. will check out other definitions and bring back to next meeting

pg10. correct definition for passband to read as follows:
The band of input signal frequencies that the ADC is intended to digitize with nominally constant gain.

____ Phil. It was suggested that the document be searched for the string "under test". It is used for "ADC under test". The committee felt that the phrase could either be replaced with DUT (standard lingo) or delete altogether the use of under test where appropriate.

pg8. appropriate place insert new definition: common-mode-range:
(lift from IEEE Std, Ref 3)

pg40. in 4.3.1.1 line 3, change tits to its. Delete editorial comment at end of paragraph.

pg17. last line change [Gray93?] to [B 5.2]

pg26. in sentence preceding Equation 4.1.4.5.1, delete sampled

____ Sol wil resubmit Fig.4.1.3.1 pg19 with dashes

Tom M. has agreed to help with the figure editing since Steve Brodastone requested to be relieved of this responsibility. There was discussion and we agreed to a procedure for graphs and figures that each person will be responsible for their figures to get to 1/4 or 1/2 page portrait mode and will be responsible for future editing until the document is turned over to IEEE. .ps and .eps files are fine for distribution in the meantime. This is because IEEE will probably redraw all graphs anyway. It was generally felt that it was too difficult for one person to try and coordinate all the different file types that are used by the committee.

____ Steve T. is still on to edit 4.11 with review by Tom M.

____ Fred I. will check out meaning of as frequency gets higher on pg 26.

Following is the Tom M. rewrite which for section 4.15

* * *

4.15 Comment on reference signals

Many ADCs provide for one or more reference signals which can be either inputs to control or outputs to monitor operating characteristics. A common example is voltage references to set V_{min} and V_{max} , the minimum and maximum limits of the input signal.

When such reference signals are control inputs, it is necessary to understand the electrical properties, such as input impedance and capacitance. If there are dynamic aspects, such as a dependence of the impedance on the signal level or frequency, care must be taken to understand them.

If the reference signal is an output for monitoring, the drive characteristics must be well understood. Also the accuracy and stability need to be determined, particularly under changes in environmental conditions, such as temperature.

Methods to determine the properties of reference signals are beyond the scope of this standard, in part because they may not be the same for all ADC architectures. It is important for manufacturers to specify them when appropriate and for users to understand their needs.

* * *

This is everything I managed to get down on paper.

FHI (Fred H. Irons)