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Geoscientific Instrumentation Methods and Data Systems Discussions

Interactive comment on "One-chip analogue circuits for a new type of plasma wave receiver onboard space missions" *by* Takahiro Zushi et al.

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The manuscript presents a new one chip analogue circuit for plasma wave (spectrum) receivers. Wave measurements are fundamental ones is space physics, thus the topic is important. The presented spectrum receiver with analogue ASIC looks promising. However, there are a few major and minor points that need to be clarified before I suggest the publication:

Major points:

1. From the manuscript I understand that the 3 frequency bands are exclusive, i.e. at a time only one band can be active. Thus, if this is the case, compared to e.g a waveform receiver with 200kHz sampling rate only a fraction of information can be collected by the proposed spectrum receiver. An alternative could be to add another 2 ASICs having them running parallel. But this case, many advantages over a waveform receiver are

lost.

2. Similarly, my understanding form the MS is that the proposed receiver would store the absolute value of the spectrum only (Line 23 on page 1: "Spectrum receivers provide the intensities of frequency spectra..."), dropping the complex spectrum. This is a general statement, the authors do not specify what is their plan - this is a major point in comparison of the advantages with other (e.g. waveform) receivers.

3. a detailed comparison with existing/implemented waveform/spectrum receiver on performance, power consumption, EMC compatibility is missing

Minor points:

1. page 1, line 18: "Space is filled with collisionless plasmas." This is not true. There are regions where it is true (e.g. Earth's magnetosphere, solar wind), but not true for e.g. ionosphere, solar corona, etc.

2. page 3, lines 22-29 and Fig 1, the description of ASIC block diagram. The concept uses an analogue anti-aliasing filter. Such a filter has several disadvantages. If the roll-off of the filter above the upper cut-off frequency is slow, either the sampling rate needs to be increased resulting in dummy/empty data above a certain frequency (this is the case e.g with EMFISIS on VAPs [Kletzing et al., 2013]) or there will be aliasing in the data. A steep roll-off makes strong phase distortion around the cut-off frequency. Using delta-sigma ADC can be a solution to this problems. Why is it not mentioned/compared with analogue-anti-aliasing? If the analogue filtering is superior, it would need to be demonstrated.

3. Fig. 2./table 3/page 5, line 28: "The cutoff frequency can be set to 4, 40, or 400 kHz." what are these values? no any other mention about them.

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